SYL

USER MANUAL
MANUEL DE L'UTILISATEUR

GOLDEN SIGMA
SU340U&E170KM

REVISION HISTORY

REV.	DESCRIPTION	DATE	BY	REVIEW
V01	Issued for review.	04/14/2023	Xiaolin Niu, Xin Gao, Yantao Zhu	Lei Zhang,
V02	Update the details	05/15/2023	Yantao Zhu	Lei Zhang,

Other contributors to this 'User Manual' also include Songliang Chai.

IMPORTANT NOTICE

CAUTION

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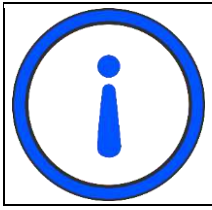
IF YOU HAVE ANY UNCERTAINTY REGARDING THE CONTENT OF THIS MANUAL, PLEASE CONTACT SYL FOR ADVICE OR CLARIFICATION.



IMPORTANT

KEEP THIS MANUAL IN A SECURE PLACE FOR FUTURE REFERENCES!

CAUTION

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SYL

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1 ACRONYMS AND DEFINITIONS

1	AC	Alternating Current
2	Ah	Amp-hour
3	BCP	Battery Connection Panel
4	BESS	Battery Energy Storage System
5	BMS	Battery Management System
6	BOL	Beginning of Life
7	BOP	Balance of Plant
8	BOS	Balance of System
9	BSPU	Battery Safety and Protection Unit
10	EMS	Energy Management System
11	EOL	End of Life
12	ESS	Energy Storage System
13	DC	Direct Current
14	FSS	Fire Suppression System
15	HMI	Human Machine Interface
16	HV	High Voltage
17	HVAC	Heating & Ventilation and HVAC
18	IP	Ingress Protection
19	kV	Kilovolt
20	kW	Kilowatt
21	MV	Medium Voltage
22	MW	Megawatt
23	MWh	Megawatt-hour
24	MVA	Mega Volt-Amps
25	MVAr	Mega Volt Amps (reactive)
26	NMC	NiMnCo
27	OSD	Overcharge Safety Device
28	O&M	Operation and Maintenance
29	PCS	Power Conversion System
30	PPA	Power Purchase Agreement

31	PPE	Personal Protective Equipment
32	RMU	Ring Main Unit
33	RTU	Remote Terminal Unit
34	SCADA	Supervisory Control and Data Acquisition
35	SOC	State of Charge
36	SOH	State of Health
37	SPDs	Surge Protection Devices
38	SYL	SYL (Ningbo) Battery Co., Ltd
39	TCP	Transmission Control Protocol
40	UPS	Uninterruptable Power Supply

2 ABOUT THIS MANUAL

2.1 APPLICABLE PRODUCT

This installation manual applies to the SYL Golden Sigma energy storage system under the model number SU340U&E170KM.

All references to "Golden Sigma" in this manual, unless specifically indicated herein, refer to the product series mentioned above.

Figure 2-1: Rendering of SU340U&E170KM

2.2 TARGET GROUP

The tasks described in this document must only be performed by qualified personal. Qualified personal must have the following skills:

- Training in how to deal with the dangers and risks associated with the installation of the product.
- Training in the installation of electrical devices.
- Knowledge of all applicable laws, regulations, standards, and directives.
- Knowledge of and compliance with this document and all safety information.

CAUTION

SYL'S BATTERIES AND BESS ARE INTENDED AND WARRANTED FOR INSTALLATION AS DETAILED IN THIS DOCUMENT. VIOLATION OF THE INSTALLATION PROCEDURES FOR PURPOSES OTHER THAN THOSE APPROVED BY SYL MIGHT CAUSE DAMAGE TO THE PRODUCTS AND WILL VOID THE EQUIPMENT WARRANTIES.

2.3 MAIN FEATURE

- The Golden Sigma battery system can detect the battery operating statussuch as voltage, current, temperature, SOC/SOH/SOP estimation, etc.. According to the current state of the battery and the actual performance of the electrical components, it will adjust the battery charge and discharge and energy storage conditions automatically for storing and exporting.
- The Golden Sigam battery system contains a set of safety functions such as, but not limited to, insulation detection, high-voltage sampling, and safety devices (such as fuses) status checking. When a safety failure is detected, the system will report and limit the charge or discharge current or power, open or delay the closing of the contactors, to ensure the safety of the power system.
- The Golden Sigma battery system controls the refrigeration, heating, and ventilation through temperature settings in the HVAC unit.
- The cabinet body of the Golden Sigma meets the IP55 protection grade requirement to protect the system against contamination from dust and water spray. It is suitable for outdoor use.
- Golden Sigma is equipped with a fire detection and aerosol fire extinguishing system. It can detect the smoke in the cabinet in real-time to prevent fire harzadous from happening such as an accidental battery fire.

2.4 LEVELS OF SAFETY INSTRUCTIONS

To ensure personal and property safety in using the system or to use the system efficiently, this manual provides relevant instructions that are highlighted by corresponding symbols. Read the following symbols carefully, as they indicate levels of safety warnings and are used everywhere in this manual.

To ensure the safety of personnel and property, please carefully read all safety instructions in this document before the installation.

DANGER

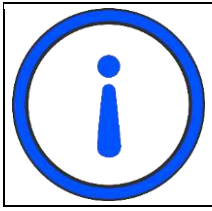
FAIL TO FOLLOW THE INSTRUCTION WITH THIS SYMBOL MAY RESULT IN A FATAL ACCIDENT, SEVERE INJURY, EVEN DEATH!

WARNING

INDICATES A HAZARDOUS SITUATION THAT, IF NOT AVOIDED, COULD RESULT IN INJURY OR DEATH.

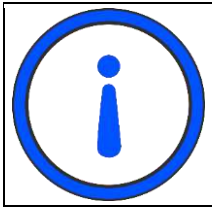
CAUTION

INDICATES A HAZARDOUS SITUATION THAT, IF NOT AVOIDED, COULD RESULT IN MINOR INJURY OR DAMAGE TO THE EQUIPMENT.



IMPORTANT

INFORMATION WHICH CONSIDERED IMPORTANT BUT NOT HAZARD-RELATED. FAIL TO FOLLOW THE INSTRUCTION WITH THIS SYMBOL MAY RESULT IN EQUIPMENT DAMAGE!



IMPORTANT

INDICATES AN IMPORTANT STEP OR TIP THAT LEADS TO BEST RESULTS, BUT IS NOT SAFETY OR DAMAGE RELATED.

2.5 SYMBOLS ON THE PRODUCT

HAZARDOUS VOLTAGE, RISK OF ELECTRIC SHOCK OR BURN. AUTHORIZED PERSONNEL ONLY.

OPEN THE DOOR.

CLOSE THE DOOR.

GROUNDING.

DANGER, BE CAREFUL WHEN HANDLING THE BATTERIES.

RECHARGEABLE BATTERIES, CANNOT DISPOSE OF IN THE HOUSEHOLD WASTE.

DO NOT DAMAGE THE BATTERIES IN SUCH A WAY AS DROP, DEFORM, IMPACT, CUT, OR SPEARING OBJECT.

NO SMOKING, NO OPEN FLAME, EMBERS, OR SPARKS NEARBY THE BATTERY, TO AVOID RISK OF FIRE OR EXPLOSION.

KEEP OUT OF REACH OF YOUNG CHILDREN PETS, OR ANIMALS.

HEAVYWEIGHT, SINGLE-PERSON LIFT COULD CAUSE INJURY. USE ASSISTANCE WHEN MOVING OR LIFTING.

ELECTROLYTE IS HIGHLY CORROSIVE.

METAL PARTS OF THE BATTERY CELL ARE ALWAYS LIVE. NEVER PLACE FOREIGN OBJECTS OR TOOLS ON THE BATTERY.

OBSERVE INSTALLATION AND OPERATION INSTRUCTIONS IN THE MANUALS BEFORE WORKING ON THE BATTERIES.

WEAR EYE PROTECTION AND PROTECTIVE CLOTHING WHEN WORKING WITH BATTERIES. OBSERVER ACCIDENT-PREVENTION REGULATIONS.

WEAR PROTECTIVE GLOVES AND CLOTHING WHEN WORKING WITH BATTERIES.

PREPARE FIRST-AID BEFORE WORKING WITH BATTERIES.

WHEN ELECTROLYTES LEAK OUT, AVOID CONTACTING WITH EYES, SKIN, OR CLOTHES. IN EVENTS OF ACCIDENTS, FLUSH WITH WATER AND GET MEDICAL HELP IMMEDIATELY.

RECYCLABLE.

3 SAFETY GUIDELINES

WARNING

SAFETY FIRST! ALWAYS OBSERVE AND FOLLOW SAFETY INSTRUCTIONS!

3.1 LOCK OUT TAG OUT

DANGER

FOLLOW ALL THE APPLICABLE LOCK-OUT TAG-OUT (LOTO) PROCEDURES AT ALL TIMES. IF PROPER LOTO PROCEDURES ARE NOT FOLLOWED, IT MAY RESULT IN SERIOUS INJURY OR DEATH.

WITH POWER APPLIED TO THE BATTERIES, HAZARDOUS VOLTAGES ARE PRESENT ON SOME COMPONENTS.

TO PREVENT ACCIDENTAL DEATH OR INJURY, DO NOT TOUCH ANY COMPONENTS WITHIN THE ENCLOSURE UNLESS YOU ARE SPECIFICALLY DIRECTED TO DO SO. TO REDUCE THE RISK OF ELECTRICAL SHOCK, MAKE SURE THAT ALL EQUIPMENT IS PROPERLY GROUNDED.

WARNING

ENCLOSURES/CASES SHALL REMAIN CLOSED EXCEPT WHEN ACCESS TO THE INTERIOR IS REQUIRED. IF POSSIBLE, PERSONNEL SHOULD KEEP A SAFE DISTANCE FROM ENCLOSURES/ CASES WHENEVER THE EQUIPMENT IS ENERGIZED. ALWAYS COMPLY WITH LOCAL, STATE, AND NATIONAL LOCK OUT/TAG OUT (LOTO) GUIDELINES WHEN WORKING WITH OR NEAR THE BATTERIES. THE LOTO PROCEDURES SHOULD MEET OR EXCEED THE REQUIREMENTS OF ALL GUIDELINES PRESENTED IN SYL SAFETY DOCUMENTATION.

COMPLETE THE SITE/LOCAL SAFETY TRAINING BEFORE ENTERING POTENTIALLY HAZARDOUS AREAS OR BEGINNING WORK ON THE BATTERIES.

3.1.1 CABINET DOOR BUTTON OPERATION OF BCP

1. Please press the “E-STOP” button in case of an emergency.
2. "POWER", “RUN,” and “FAULT” indicators show the status of the system.
3. Horn and Strobe on the top will be activated whenever there is a fire risk or incident.

Figure 3-1: Cabinet door button operation of BCP

3.2 PRECAUTIONS FOR CABINET DOOR OPENING

DANGER

WHEN OPENING THE DOOR LOCK,BE SURE TO USE THE CORRECT WAY TO OPEN IT. IF YOU OPEN THE DOOR IN THE WRONG WAY,YOUR FINGERS WILL BE CRUSHED.

WEAR GLOVES TO PROTECT YOUR FINGERS BEFORE OPENING THE CABINET DOOR.

Figure 3-2: The way to open the door

3.3 GENERAL PRECAUTIONS

When installing, operating, and maintaining the equipment, read this manual and follow the labels on the equipment and all safety precautions in this manual.

The "Danger", "Warning", "Caution" and "Important" in this manual do not represent all the safety precautions to be followed, but only serve as a supplement to the safety precautions. SYL is not responsible for any breach of safe operation requirements or safety standards for design, manufacture and use of the equipment.

The product should be used in an environment that meets the design requirements. Otherwise, the equipment may fail, and the resulting equipment function abnormalities, component damage, personal safety accidents, and property losses are not covered by the quality guarantee.

Comply with local laws and regulations when installing, operating, and maintaining the equipment. The safety precautions in this manual only serve as a supplement to local laws regulations.

SYL is not responsible for any of the following circumstances:

- Do not operate under the operating conditions described in this manual.
- The installation and operating environment dose not conform to the international, national or regional standards.
- Disassemble or modify the product or modify the software code without authorization.
- Do not follow the operation instructions and safety warnings written on the product and in the manual.
- Equipment damage caused by abnormal natural environment (earthquake, fire, storm, flood, debris flow, etc.)
- Damage caused by storage conditions that do not meet product documentation requirements.
- Hardware or data damage caused by negligence, improper operation or intentional destroy of customers.

DANGER

DO NOT INSTALL, USE, OR OPERATE OUTDOOR DEVICES AND CABLES (INCLUDING BUT NOT LIMITED TO HANDLING DEVICES, OPERATING DEVICES AND CABLES, PLUGGING AND UNPLUGGING SIGNAL PORTS CONNECTED TO THE OUTDOORS, WORKING AT HEIGHTS, AND OUTDOOR INSTALLATION) IN SEVERE WEATHER SUCH AS LIGHTNING, RAIN, SNOW, STRONG BREEZE OR WIND OF HIGHER FORCE ON BEAUFORT WIND SCALE.

DANGER

OBSERVE THE REQUIREMENTS OF THIS MANUAL, USE THE CORRECT TOOLS, AND MASTER THE CORRECT METHODS OF USING THE TOOLS.

DANGER

MEASURE THE VOLTAGE AT THE CONTACT POINT BEFORE TOUCHING ANY CONDUCTOR SURFACE OR TERMINAL TO ENSURE THAT THERE IS NO DANGER OF ELECTRIC SHOCK.

DANGER

PAINT SCRATCH IN THE PROCESS OF EQUIPMENT TRANSPORTATION AND INSTALLATION MUST BE REPAIRED IN TIME, AND IT IS STRICTLY FORBIDDEN TO EXPOSE THE SCRATCHED PART TO THE OUTDOOR ENVIRONMENT FOR A LONG TIME.

DANGER

DO NOT CHANGE THE STRUCTURE, INSTALLATION ORDER, ETC. OF THE EQUIPMENT WITHOUT AUTHORIZATION AND PERMISSION UNDER ANY CIRCUMSTANCES

DANGER

IN CASE OF FIRE, EVACUATE THE BUILDING OR EQUIPMENT AREA AND PRESS THE FIRE BELL OR CALL THE FIRE ALARM. UNDER NO CIRCUMSTANCES SHOULD YOU RE-ENTER THE BURNING BUILDING.

DANGER

PLEASE BE AWARE THAT THE BATTERIES PRESENT A RISK OF ELECTRICAL SHOCK INCLUDING A HUGE SHORT-CIRCUIT CURRENT.

DANGER

ARC FLASH HAZARD IS ASSOCIATED WITH BATTERIES. THERE IS A SERIOUS RISK OF ARC FLASH RELATING TO ANY EQUIPMENT MODIFICATION. SERIOUS INJURIES CAN OCCUR IN ARC FLASH INCIDENTS.

WARNING

FIRE MAY OCCUR UNDER CERTAIN FAULT CONDITIONS.

WARNING

REMOVE WATCHES, RINGS, OR OTHER METAL OBJECTS.

WEAR PROPER PPE IN ACCORDANCE WITH LOCAL CODES AND REGULATIONS.

WARNING

USE TOOLS WITH INSULATED HANDLES TO AVOID ACCIDENTAL SHORT-CIRCUIT.

DO NOT PUT TOOLS OR ANY METAL PARTS ON THE TOP OF THE BATTERIES.

WARNING

DO NOT OPEN OR VANDALIZE THE BATTERIES.

WARNING

BATTERIES SHALL BE DISPOSED OF ACCORDING TO THE SYL RECYCLING POLICY, DISPOSE OF THE BATTERIES IN A FIRE COULD CAUSE AN EXPLOSION.

WARNING

SHARP POINTS AND PINCH POINTS ARE PRESENT ON MOST SYSTEM COMPONENTS. BE AWARE OF THE SERIOUS RISK OF INJURY WHILE WORKING AROUND EQUIPMENT BATTERIES.

CAUTION

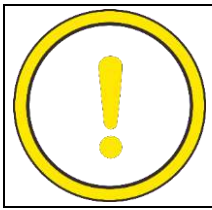
COMPONENTS IN THE BATTERY SYSTEM CAN BE DAMAGED BY ELECTROSTATIC DISCHARGE. BE SURE TO WEAR A GROUNDED ANTI-STATIC WRIST STRAP AND TO DISCHARGE STATIC ELECTRICITY BY TOUCHING A GROUNDED SURFACE NEAR THE EQUIPMENT BEFORE YOU TOUCH ANY SYSTEM COMPONENTS.

CAUTION

DAMAGE, MISHANDLING, OR EXPOSURE TO CONDITIONS BEYOND THOSE RECOMMENDED BY SYL COULD RESULT IN LEAKAGE OF FLAMMABLE GAS, WITH CONSEQUENT HAZARDOUS SITUATIONS ARISING.

CAUTION

WHEN CARRYING OUT TRANSPORTATION, TURNOVER, INSTALLATION, WIRING AND MAINTENANCE AND OTHER OPERATIONS, IT MUST MEET THE LAWS AND REGULATIONS AND RELEVANT STANDARDS OF THE COUNTRY OR REGION WHERE IT IS LOCATED.



CAUTION

IT IS NECESSARY TO OBTAIN THE PERMISSION OF THE POWER DEPARTMENT OF THE COUNTRY OR REGION WHERE IT IS LOCATED TO WORK ON THE GRID.

CAUTION

BE FAMILIAR WITH THE COMPOSITION OF THE ENTIRE ENERGY STORAGE SYSTEM, WORKING PRINCIPLE, AND THE RELEVANT STANDARDS OF THE COUNTRY/REGION WHERE THE PROJECT IS LOCATED.

IMPORTANT

REVERSE ENGINEERING, DECOMPILING, DISASSEMBLING, ADAPTING, IMPLANTING OR OTHER DERIVATIVE OPERATIONS ON THE DEVICE SOFTWARE ARE PROHIBITED. RESEARCH ON THE INTERNAL IMPLEMENTATION OF THE DEVICE, OBTAINING THE SOURCE CODE OF THE DEVICE SOFTWARE, STEALING INTELLECTUAL PROPERTY, ETC., AND DISCLOSURE OF THE PERFORMANCE TEST RESULTS OF ANY DEVICE SOFTWARE ARE PROHIBITED.

3.4 PERSONNEL REQUIREMENTS

- Personnel responsible for the installation and maintenance of SYL equipment must be trained to understand safety precautions and correct operation methods.
- Only qualified professionals or trained personnel are allowed to install, operate, and maintain the equipment.
- Only qualified professionals are allowed to remove safety facilities and repair equipment.
- Personnel who operate the equipment, including operators, trained personnel, and professionals, must have local and state-required special operation qualifications, such as high voltage operation, height climbing, and special equipment operation qualifications.
- Replace equipment or components (including software) only by professionals or authorized personnel.

CAUTION

PROFESSIONAL PERSONNEL: PERSONNEL WITH TRAINING OR EXPERIENCE IN OPERATING DEVICES AND KNOW THE POTENTIAL SOURCES AND LEVELS OF HAZARDS DURING DEVICE INSTALLATION, OPERATION, AND MAINTENANCE.

TRAINED PERSONNEL: PERSONNEL WITH APPROPRIATE TECHNICAL TRAINING AND NECESSARY EXPERIENCE. BEING AWARE OF THE DANGER THAT MAY BE POSED TO HIM WHILE PERFORMING AN OPERATION AND MINIMIZE THE RISK TO HIMSELF OR OTHER PERSONNEL.

OPERATING PERSONNEL: OTHER THAN TRAINED PERSONNEL AND PROFESSIONAL PERSONNEL WHO MAY COME INTO CONTACT WITH THE EQUIPMENT.

3.5 ELECTRICAL SAFETY

3.5.1 GROUNDING REQUIREMENTS

- When installing a device that needs to be grounded, install the protective grounding cable first. When removing a device, remove the protective grounding cable at the end
- Do not damage the grounding conductor.
- Do not operate the device without a grounding conductor installed.
- The device should be permanently connected to a protective ground. Before operating the device, check the electrical connections of the device to ensure that the device is reliably grounded.

3.5.2 GENERAL REQUIREMENTS

WARNING

BEFORE ELECTRICAL CONNECTION, ENSURE THAT THE DEVICE IS NOT DAMAGED; OTHERWISE, ELECTRIC SHOCK OR FIRE MAY OCCUR.

- All electrical connections must meet national/regional electrical standards.
- You must obtain permission from the electricity authority of the country/region to connect to the grid.
- Cables prepared by customers must meet local laws and regulations.

- When performing high voltage operations, use special insulation tools.

3.5.3 DC OPERATION

WARNING

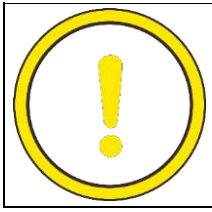
DO NOT INSTALL OR REMOVE POWER CABLES WHEN POWER IS ON. TRANSIENT CONTACT BETWEEN THE CORE OF A POWER CABLE AND THE CONDUCTOR GENERATES ELECTRIC ARCS OR SPARKS, WHICH MAY CAUSE FIRE OR PERSONAL INJURY.

- Before electrical connection of the device, if live parts may be encountered, disconnect the corresponding disconnecting device at the front stage of the device.
- Before connecting a power cable, ensure that the label on the power cable is correct.
- If the device has multiple inputs, disconnect all inputs and perform operations on the device only after the device is completely powered off.

3.5.4 WIRING REQUIREMENTS

- The insulation layer may be aged or damaged if cables are used in a high temperature environment. Keep at least 50mm away from the heating device or heat source area.
- Cables of the same type must be bound together. Cables of different types must be routed at least 30mm apart. Do not intertwine or cross cables.
- Cables must be securely connected, properly insulated, and of appropriate specifications.
- Protect the pipe or cable holes from sharp edges and burrs.

3.5.5 ANTI-STATIC REQUIREMENTS



CAUTION

THE STATIC ELECTRICITY GENERATED BY HUMAN BODIES MAY DAMAGE THE ELECTROSTATIC SENSITIVE COMPONENTS ON BOARDS, SUCH AS THE LARGE-SCALE INTEGRATED CIRCUIT (LSI).

- Wear ESD gloves when touching the PCB board. Do not wear clothes prone to static electricity.

3.6 FIRST-AID MEASURES

3.6.1 DANGER AND TOXICITY INSTRUCTIONS

DANGER

DANGER: IF BATTERY TERMINALS CONTACT OTHER METALS, HEAT OR ELECTROLYTE LEAKAGE MAY OCCUR. THE ELECTROLYTE IS COMBUSTIBLE AND THE BATTERY SHOULD BE REMOVED FROM THE FIRE IMMEDIATELY IF THE ELECTROLYTE LEAKS.

DANGER

TOXICITY: STEAM FROM BURNING BATTERIES MAY IRRITATE EYES, SKIN AND THROAT.

3.6.2 FIRST-AID MEASURES FOR BATTERY ABNORMALITIES

DANGER

WHEN THERE IS ELECTROLYTE LEAKAGE OR ABNORMAL SMELL, AVOID CONTACT WITH THE LEAKING LIQUID OR GAS. NON- PROFESSIONALS SHOULD KEEP AWAY AND CONTACT PROFESSIONALS IMMEDIATELY. PROFESSIONALS SHOULD WEAR SAFETY GOGGLES, RUBBER GLOVES, GAS MASKS, AND PROTECTIVE CLOTHING TO PROTECT THEMSELVES FROM ELECTROLYTE OVERFLOW.

DANGER

ELECTROLYTE IS CORROSIVE AND CONTACT MAY CAUSE SKIN IRRITATION AND CHEMICAL BURNS. IF YOU COME IN CONTACT WITH BATTERY ELECTROLYTE, TAKE THE FOLLOWING MEASURES:

1.INHALATION: IMMEDIATELY EVACUATE THE CONTAMINATED AREA AND SEEK MEDICAL ATTENTION.

2.EYE CONTACT: IMMEDIATELY RINSE EYES WITH WATER FOR 15 MINUTES AND SEEK MEDICAL ATTENTION.

3.CONTACT WITH SKIN: WASH THE CONTACTED AREA: THOROUGHLY WITH SOAP AND WATER AND SEEK MEDICAL ATTENTION.

4.INGESTION: INDUCE VOMITING AND SEEK MEDICAL ATTENTION.

3.6.3 FIRST-AID MEASURES FOR FIRE

DANGER

IF A FIRE OCCURS DURING THE CHARGING OF THE BATTERIES, ISOLATE THE CHARGER FROM ITS POWER SUPPLY BY TURNING OFF THE POWER SWITCH AT THE INVERTER/PCS OR PUSHING THE E-STOP BUTTON ON THE SYSTEM ENCLOSURE.

PUSH THE MANUAL RELEASING BUTTON ON THE SYSTEM ENCLOSURE IF THE AUTOMATIC FIRE SUPPRESSION SYSTEM IS NOT ACTIVATED BY ITSELF.

DANGER

USE CARBON DIOXIDE, FM-200 OR ABC DRY POWDER FIRE EXTINGUISHERS TO EXTINGUISH THE FIRE.

DANGER

FIREFIGHTERS NEED TO AVOID CONTACT WITH HIGH-VOLTAGE COMPONENTS DURING EXTINGUISHING, OR IT MAY RESULT IN THE RISK OF ELECTRIC SHOCK.

DANGER

WHEN THE BATTERY TEMPERATURE IS TOO HIGH, IT MAY CAUSE BATTERY DEFORMATION, DAMAGE, ELECTROLYTE OVERFLOW, AND TOXIC GAS LEAKAGE. WEAR PROTECTIVE RESPIRATORY EQUIPMENT AND KEEP AWAY FROM THE BATTERY TO AVOID SKIN IRRITATION AND CHEMICAL BURNS.

3.6.4 FIRST-AID MEASURES FOR BATTERY DROP

DANGER

WHEN INSTALLING THE BATTERY, IF THE BATTERY DROPS OR SUFFERS A STRONG IMPACT, IT MAY CAUSE INTERNAL DAMAGE TO THE DEVICE. DO NOT CONTINUE TO USE THE BATTERY, OTHERWISE THERE MAY BE SAFETY RISKS (CELL LEAKAGE, ELECTRIC SHOCK, ETC.).

DANGER

AFTER THE BATTERY DROPS, IF THERE IS OBVIOUS ODOR, DAMAGE, SMOKE, FIRE, ETC., EVACUATE PERSONNEL IMMEDIATELY, CALL THE POLICE IN TIME, AND CONTACT PROFESSIONALS WHO WILL USE FIRE-FIGHTING EQUIPMENT TO EXTINGUISH THE FIRE WHILE ENSURING SAFETY.

DANGER

AFTER THE BATTERY DROPS, IF THERE IS NO OBVIOUS ODOR, DAMAGE, SMOKE OR FIRE CONTACT PROFESSIONALS TO TRANSFER THE BATTERY TO AN OPEN AND SAFE PLACE OR CONTACT A RECYCLING COMPANY.

3.7 HANDLING GUIDELINES

CAUTION

THIS PRODUCT HAS PASSED THE CERTIFICATION OF UN38.3 (UN38.3 : SECTION 38.3 OF THE SIXTH REVISED EDITION OF THE RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS: MANUAL OF TESTS AND CRITERIA) AND SN/T 0370.2-2009 "RULES FOR INSPECTION OF PACKAGING FOR EXPORT DANGEROUS GOODS-PART 2: PERFORMANCE TEST" AND BELONGS TO CLASS 9-MISCELLANEOUS DANGEROUS GOODS.

HANDLING REQUIREMENTS:

- The energy storage system must be handled according to local laws, regulations, and industry standards. Rough handling may cause short circuit or damage to batteries in the container, which may result in battery leakage, rupture, explosion, or fire.

IMPORTANT

DO NOT EXPOSE BATTERY MODULES TO TEMPERATURES ABOVE 50℃. THE OPTIMAL TEMPERATURE RANGE IS 23±5 ° C. EXPOSURE TO AN ENVIRONMENT BEYOND THIS RANGE CAN ACCELERATE BATTERY CAPACITY DEGRADATION.

WARNING

BE AWARE OF THE HEAVYWEIGHT OF BATTERY MODULES AND THE RISK OF A DROP.

THE BATTERY MODULE NEEDS TO BE REPLACED IF SUFFERED A DROP. POTENTIAL INTERNAL DAMAGE MAY CAUSE AN SERIOUS FIRE INCIDENT EVEN THERE IS NO SERIOUS VISUAL EXTERNAL DAMAGE ON THE BATTERY MODULE.

- Battery modules must be handled carefully and any exposure to shock or excessive mechanical load could cause significant damage. In the event of a module being

dropped during handling, storage, or installation, the battery module shall be returned to the SYL service center for inspection.

WARNING

DO NOT USE THE BATTERY MODULE IF ANY PART OF ITS HOUSING OR CONNECTORS EXHIBITS PHYSICAL DAMAGE.

- Do not place battery modules on flammable construction materials, in areas where highly inflammable materials are stored, in potentially explosive environments, or high humid environments.
- Do not stack any objects on the battery module.
- Any mishandling of the battery module including dropping, deforming, impacting, cutting, or penetrating is likely to damage the unit and might cause a fire.
- Always ensure the battery is maintained with its top surface facing upwards. Do not place the module upside-down.

SHIPMENT CONDITIONS:

- Before shipment, check that the battery should be intact and not appear obvious odor, smoke, fire and other phenomena, otherwise the shipment is prohibited.

IMPORTANT

PRODUCTS WHICH MEET THE REQUIREMENTS OF VEHICLE, SHIP AND OTHER TRANSPORTATION CAN BE DELIVERED DIRECTLY TO THE SITE, TRANSPORTATION PACKING BOXES MUST BE FIRM. HANDLE WITH CARE AND TAKE MOISTURE-PROOF MEASURES. SUBJECT TO EXTERNAL ENVIRONMENT (SUCH AS TEMPERATURE, TRANSPORTATION, STORAGE, ETC.), THE PRODUCT SPECIFICATIONS ARE SUBJECT TO THE MANUFACTURE DATE.

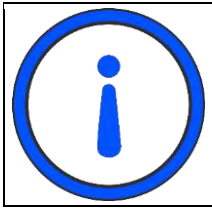
TRANSPORTATION PROCESS REQUIREMENTS:

- Maritime transport in accordance with IMDG CODE.
- Land transport in accordance with ADR or JT T617.
- Meet the regulatory requirements of the transport regulatory authorities in the countries of origin, route and destination.

- Comply with international regulations for the transport of dangerous goods and the regulatory requirements of the corresponding national transport regulatory authorities.

THINGS SHOULD BE PROHIBITED DURING HANDLING OR TRANSPORTATION:

- Direct rain, snow or falling into water.
- Fall or mechanical impact.
- Invert or tilt.



IMPORTANT

IF ANY OF THE PRECEDING EXCEPTIONS OCCURS, HANDLE THEM ACCORDING TO FIRST-AID MEASURES.

3.8 PERSONAL PROTECTIVE EQUIPMENT

Please be aware that a battery can pose a risk of electrical shock including a high short-circuit current. Follow all safety precautions while operating the batteries. During the installation or maintenance of the battery system, a worker shall wear proper PPE such as eye protection, high visibility clothing, protective gloves, and protective footwear. Insulation gloves with over 1500VDC ratings are needed when connecting the busbars and jumpers between modules and racks.

Figure 3-3: Safe gear for installation

- Wear appropriate personal protective equipment when operating the device. If a fault is found that may cause personal injury or device damage, terminate the operation immediately, report the fault to the person in charge, and take effective protective measures.
- Before using the tools, master the proper use of the tools to avoid injury and damage to the device.
- Do not touch the device when it is operating because the case is at a high temperature, which may cause burns.
- To ensure personal safety and normal use, ensure reliable grounding before use.

- Avoid contact with a faulty battery when the temperature may exceed the burn threshold for touchable surfaces.
- Do not open or damage the battery. The electrolyte released is harmful to skin and eyes. Avoid contact with it.
- Do not place irrelevant items on the top of the device or insert them into anywhere of the device.
- Do not place combustible materials around the device.
- Do not place the battery in the fire to avoid explosion which may bring danger in personal safety.
- Do not place the battery module in water or other liquids.
- Do not short-circuit battery terminals. Short-circuited batteries may cause combustion.
- The battery may cause shock and a large short-circuit current hazard. When using batteries, pay attention to the following precautions:

  a）Use tools with insulated handles.

  b）Put on rubber gloves and boots.

  c）Do not place tools or metal parts on the top of the battery.

  d）Disconnect the charging power supply before connecting or disconnecting the battery terminals.

  e）Check whether the battery is accidentally grounded. If so, remove the power supply from the ground.
- Do not use water or detergent to clean electrical components inside or outside the cabinet.
- Do not stand, lean or sit on the device.
- Do not damage any module of the device.

4 system overview

4.1 SYSTEM DESIGN

To slow the degradation and easy deployment of batteries, SYL designed an outdoor battery cabinet. This is a modular design that enables a "plug and play" concept of Battery Energy Storage System (BESS). In SYL's product spectrum, this product is called "Golden Sigma".

4.1.1 GOLDEN SIGMA DESCRIPTION

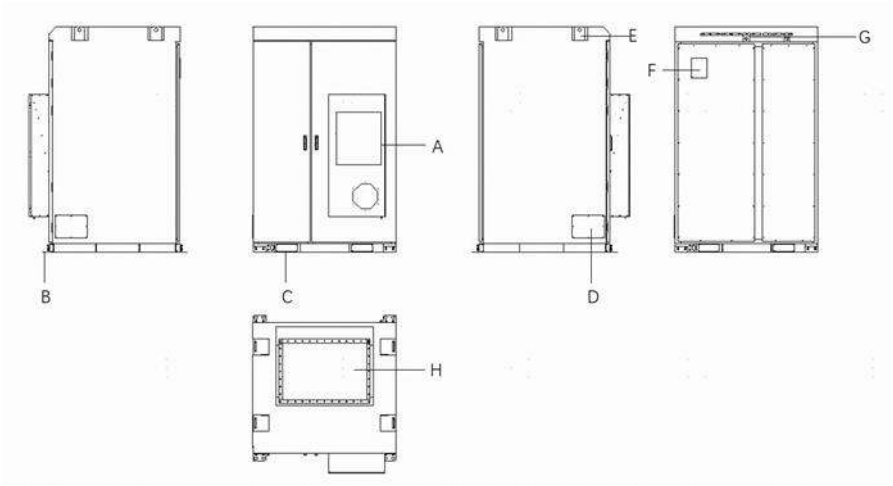


Figure 4-1: Appearance

Table 4-1Introduction

NO.	ITEM	QTY	DESCRIPTION
A	HVAC	1	Battery cabinets thermal management
B	L- bracket	4	Battery cabinets fixation
C	Forklift hole sealing plate	4	Forklift hole sealing
D	Tunnel covering plate	2	Windows for cabinets combination
E	Lifting lug	4	Lifting point
F	Nameplate	1	Battery cabinets parameters
G	Water fire suppression hose coupling	1	1/2 BSP, access the customer station water fire suppression network
H	Deflagration vent	1	Pressure release after the battery cabinet thermal runaway deflagration

4.1.2 SPECIFICATION

Table 4-2: Specification

BATTERY PARAMETERS	
Cell type	280Ah
Configuration	380S1P
Nominal capacity	340.48kWh
Voltage range	1064V – 1368V
SYSTEM PARAMETERS	
Dimensions	1585*2500*1450(without HVAC)mm 1585*2500*1675(with HVAC)mm
Weight	3.9±0.2 T
Operating temperature	-30~50 °C (de-rating > 45°C)
Charge-discharge rate	0.25~0.5C
Operating humidity	0~95% (non-condensing)
Anti-corrosion grade	C4-M
Protection grade	IP55
Thermal method	Intelligent air cooling
Fire suppression design	Aerosol and water
Allowable working altitude	≤3000m
Noise	≤70dB@1m
Wind load	49.9m/s
Snow load	40psf
Seismic zone	Zone 4&9

4.1.3 EASY DEPLOYMENT

The installation and deployment of battery energy storage systems are very costly and time-consuming. To solve this, SYL’s Golden Sigma battery system will be designed with a series of key features that enable easy deployment of BESS.

- Easy handling: Golden Sigma has forklift grooves that can be easily moved by a forklift.
- No conduits for Golden Sigma: each Golden Sigma will have a group of busbars on the bottom of the cabinets that are capable of carrying the current of the whole battery block. Once Golden Sigma has been put next to each other, a group of flexible busbars will connect the busbars similar to a “daisy chain” connection.
- No onsite battery module installation: all the battery modules will be installed in the factory and shipped with the Golden Sigma and no need to populate battery modules onsite.
- Flexible augmentation: for future augmentation, it is quite easy to add a few

Golden Sigma without any retrofitting on old batteries. Besides, a rack-level DC to DC converter will enable the mix-use of new batteries with old batteries on the same DC bus.

5 MAIN SYSTEM EQUIPMENT

5.1 BATTERY SYSTEM

5.1.1 BATTERY CELL

SYL Battery storage systems rely on advanced LFP chemistry to provide a combination of high performance, low cost, and industry-leading safety. Configurable to serve the application at hand, 3.2V 280Ah prismatic cells became SYL’s best pick for a battery storage solution. Cell specifications are as follows.

Table 5-1: Specification of the Battery cell

ITEM	UNIT	SPECIFICATION	RENDERING
Battery Chemistry	-	LFP	
Shape	-	Prismatic	
Dimension(W×D×H)	mm	173.9×71.7×207.2	
Weight	kg	5.34±0.3	
Nominal Capacity	Ah	280	
Nominal Energy	Wh	896	
Nominal Voltage	Vdc	3.2	
Operating Voltage	Vdc	2.8~3.6	
Operating Temperature Range	°C	Charge: 0~60; Discharge: -20~60	

5.1.2 BATTERY MODULE

SYL deploys modular design which allows for customized configurations, ease of maintenance, and future expansion capability. Modules are formed by configuring 10 LFP cells in a series connection. Modules are connected with a battery management system (BMU) to form a rack-mountable module assembly. Multiple module assemblies are then combined into a rack. Each rack contains rack-level BMS.

Table 5-2: Specification of Module

ITEM	UNIT	SPECIFICATION	RENDERING
Make	-	SYL	
Configuration	-	1P 10S	
Key Component	-	10 cells, module BMU	
Dimension(W×H×D)	mm	220×230×990	
Weight	kg	70	
Nominal Capacity	Ah	280	
Nominal Energy	kWh	8.96	
Nominal Voltage	Vdc	32.0	
Operating Voltage	Vdc	28.0~36.0	
Maximum Power	kW	4.48 (0.5C)	

Storage Temperature	°C	-30~60
Storage Humidity	%	≤85

5.1.3 BATTERY RACK

The Golden Sigma battery rack/cabinet is consisting of multiple battery modules and 1 BSPU (Battery Switch & Protective Unit). Racks/cabinets are connected in parallel and paired with a system BMS to meet the power and energy requirements of the application at hand. All wire connections are placed on the front side of the rack to allow for easy installation and maintenance.

Table 5-3: Specification of Battery Rack

ITEM	UNIT	SPECIFICATION	RENDERING
Configuration	-	1P 380S	
Number of Modules	EA	38	
Key Component	-	38 Modules, 1 BSPU (DC Switchgear)	
Switchgear Position	-	Bottom left	
Dimension(W×H×D)	mm	1, 585×2,500×1,450 (without HVAC) 1,585×2,500×1,675 (with HVAC)	
Weight	kg	3.9±0.2T	
Nominal Capacity	Ah	280	
Nominal Energy	kWh	340.48	
Operating Voltage	V	1064V – 1368V	
Operating Temperature Range	°C	-30~50 °C (de-rating > 45°C)	
Storage Temperature	°C	-30~60	
Operating Humidity	%	0~95% (non-condensing)	
Degree of Protection		IP55	

(for reference only)

The battery safety and protection unit (BSPU) are physically located in the bottom left corner of the cabinet. The BSPU consists of some key components, e.g., a bidirectional contactor, a disconnecting load switch, a group of fuses, an RBMS, and a communication interface of SBMS.

5.1.4 BATTERY MANAGEMENT SYSTEM

The BESS employs a sophisticated, multilevel battery management system (BMS) for system monitoring and control. Each multilevel battery management system includes:

- Module Battery management unit (BMU)
- Rack Battery Management Controlling System (RBMS)

• System-level BMS (SBMS)

Figure 5-1: SBMS interface to Ethernet Switch

The Module BMS (BMU) is designed to detect voltage and temperature and execute cell balance functions for cells. The rack BMS (RBMS) can manage all module BMS units and detects total voltage, current, and executes protection functions by switching the DC-contactor. Finally, a system-level BMS (SBMS) manages rack BMS units and communicates with PCS or EMS. The table below outlines the BMS units of the system.

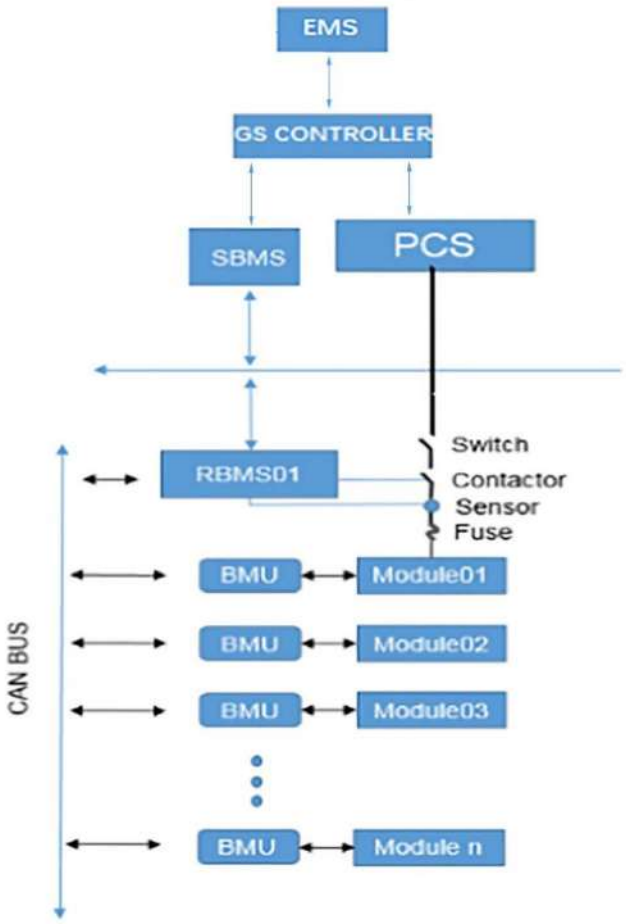


Figure 5-2: Architecture of the BMS

The functionalities of each level of BMS are shown in the following table.

Table 5-4: BMS Functionality

FUNCTIONALITY		BMU	RBMS	SBMS
Measurement	Cell Voltage	√		
	Cell Temperature	√		
	Rack Voltage		√	
	Rack Current		√	
Calculation	SOC		√	√
	SOH		√	√
	Power Prediction		√	
Control	Contactor Control		√	
	Cell Balancing	√	√	
Communication	CAN2.0	√	√	
	RS485			√
	Ethernet			√

5.2 BATTERY CONNECTION PANEL (BCP)

5.2.1 BCP DESCRIPTION

The appearance of BCP is shown below.

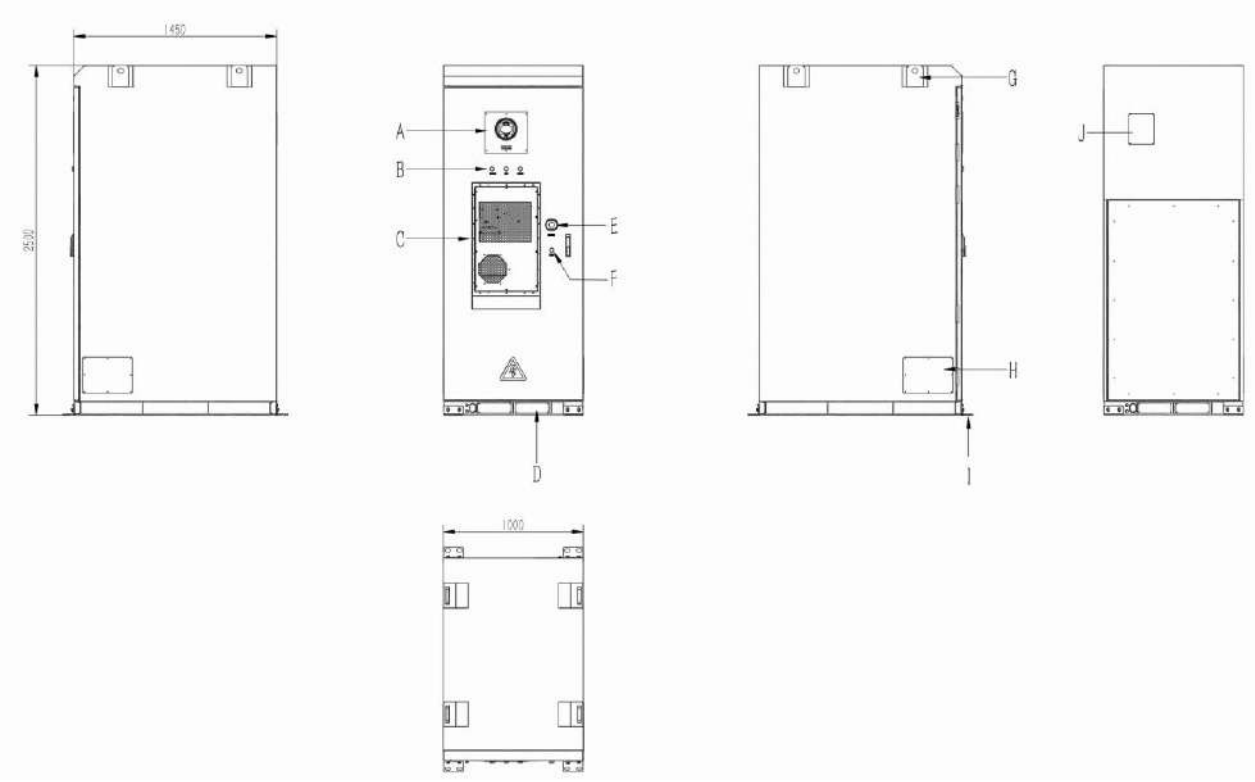


Figure 5-3: Appearance of BCP

Table 5-5: Introduction of BCP

No.	NAME	QTY	DESCRIPTION
A	Audible and visual alarm	1	Fire alarm
B	Indicator	3	System live indicator, DC grid-connected indicator, fault warning
C	HVAC	1	BCP cabinet heat dissipation
D	Forklift hole sealing plate	4	Forklift hole sealing plate
E	Emergency stop button	1	System emergency stop
F	Network interface	1	WEB debugging interface
G	Lifting lug	4	Lifting points
H	Rubber tunnel sealing plate	2	Cabinets combination
I	L- bracket	4	BCP fixation
J	Nameplate	1	BCP parameters

5.2.2 SPECIFICATION

Table 5-6: Specification

SYSTEM PARAMETERS	SPECIFICATION
Dimensions (W x D x H)	1,000 mm x 1,450 mm x 2,500 mm
Weight	1.1±0.2 T
Operating Temperature	-30~50 °C
Charge-discharge rate	0.25~0.5C
Operating humidity range	0~95% (non-condensing)
Anti-corrosion grade	C4-M
Protection grade	IP55
Thermal method	Intelligent air cooling
Fire suppression design	/
Allowable working altitude	≤2000m
Noise	≤70dB@1m
Wind load	49.9m/s
Snow load	40psf
Seismic zone	Zone 4&9

5.2.3 MODEL LIST

Table 5-7: Model list

NO.	MODEL	SCOPE OF APPLICATION	NOTE
1	SA1700KU(ALO)	UL	BCP is connected on the right side of the Golden Sigma. Without isolation switch. Can be equipped with 10 0.5C Golden Sigma.

2	SA1700KU(ARO)	IEC	BCP is connected on the left side of the Golden Sigma. Without isolation switch. Can be equipped with 10 0.5C Golden Sigma.
3	SA1700KE(ALO)		BCP is connected on the right side of the Golden Sigma. Without isolation switch. Can be equipped with 10 0.5C Golden Sigma.
4	SA1700KE(ARO)		BCP is connected on the left side of the Golden Sigma. Without isolation switch. Can be equipped with 10 0.5C Golden Sigma.

5.2.4 MECHANICAL DATA

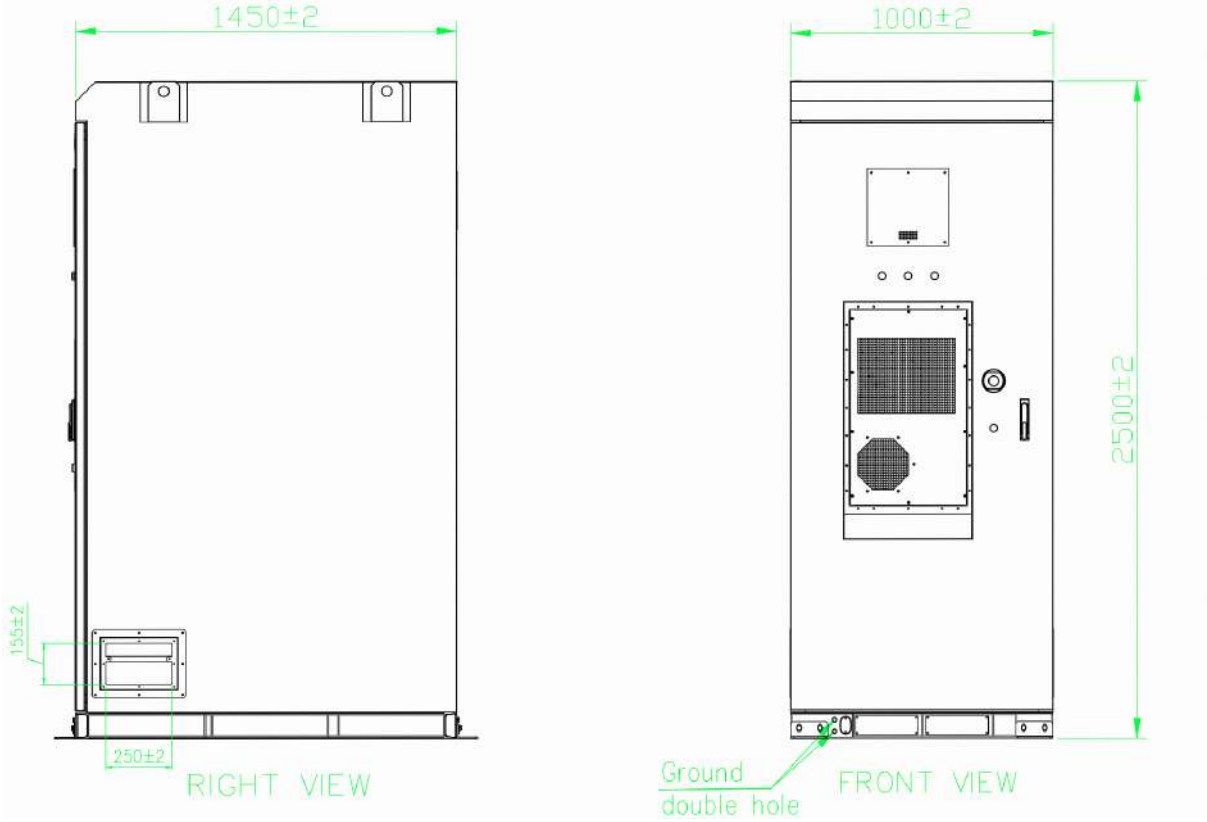


Figure 5-4: Mechanical data

5.2.5 VENTILATION DESIGN

Cooling air enters the BCP from the bottom air inlet, and hot air enters the BCP from the top air outlet.

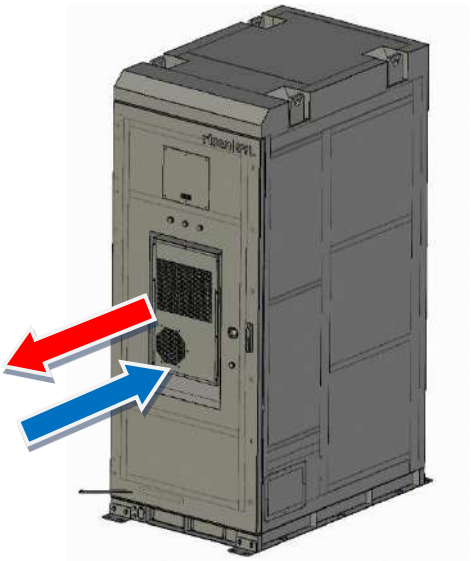


Figure 5-5: Ventilation design

5.2.5.1 INLET DESIGN

All cables enter the BCP through the cable entry. The cable inlet is shown in the figure below.

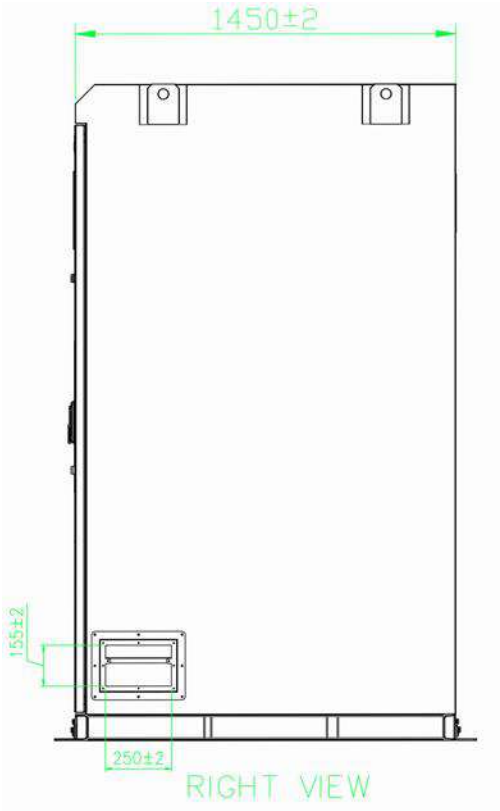


Figure 5-6: Inlet design

The inlet hole in the figure above is where the copper bar is connected, refer to Figure 8-7 for details. The copper bus connection is installed by on-site personnel after arriving at

the project site.

5.2.5.2 CABLE OUTLET DESIGN

The electrical connection between the BCP and the energy storage converter is through an air outlet at the bottom of the BCP.
The location and size of the outlet are shown below.

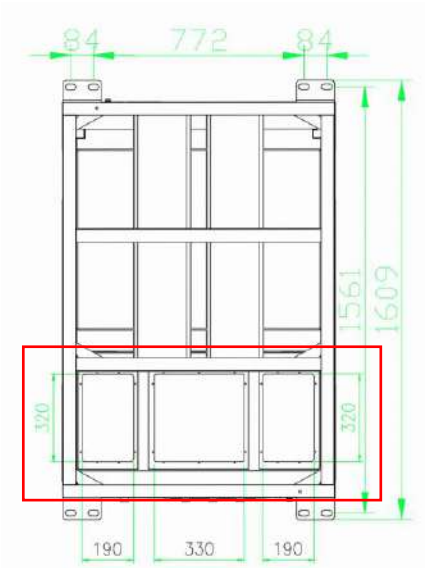


Figure 5-7: The location and size of the outlet

The circled part in the figure is the position of all cable inlets and outlets. Due to different installation conditions, customers need to purchase cables and install them by themselves.

5.2.6 MAIN FUNCTION

- The BCP serves as the connection between the Golden Sigma and the PCS.
- The BCP provides secondary power to the Golden Sigma (BMS power supply, battery module power supply).
- The BCP can control the start and stop of the entire primary and secondary circuits.
- The BCP can read the battery operating status (voltage, current, temperature, SOC, SOH, etc.) of each Golden Sigma connected to it.
- The BCP has the function of checking the status of safety devices such as DC fuses, DC load isolating switches, and lightning protection devices. When a failure occurs, the BCP failure indicator light is on.
- The BCP can adjust the temperature in the cabinet according to demand.

- The BCP meets the IP55 protection level and supports outdoor use.
- The BCP is equipped with an aerosol fire extinguishing system, which can detect the temperature and smoke status of the Golden Sigma connected to it in real-time to prevent fire safety accidents such as accidental battery fire. The fire alarm panel is inside the front door of BCP.

5.3 GOLDEN SHIELD CONTROLLER

To offer one universal communication interface for battery systems with SCADA or EMS and release EMS from basic system protection, SYL deploys a system controller as part of the BESS integration.

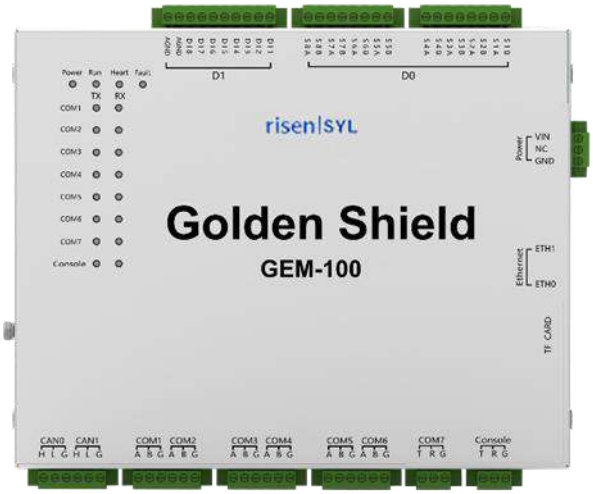


Figure 5-8: Rendering of Golden Shield

5.3.1 FEATURES AND FUNCTIONS

- Control integration of the battery system (include battery BMS, cooling units, BCP, etc.).
- Offering one universal communication interface for battery systems with SCADA or EMS.
- Acting as a communication adaptor that converts various types of communication protocols (RS-485, CAN, dry contact, etc.) from BMS, PCS, HVAC, FSS, and other BOS equipment to one communication protocol for EMS to easy integration.
- Performing system basic protection to prevent the batteries, PCS, and other equipment from damage during operation.

- Data logging (short period) for troubleshooting.
- Remote firmware updating (pending).

5.3.2 COMMUNICATION TOPOLOGY

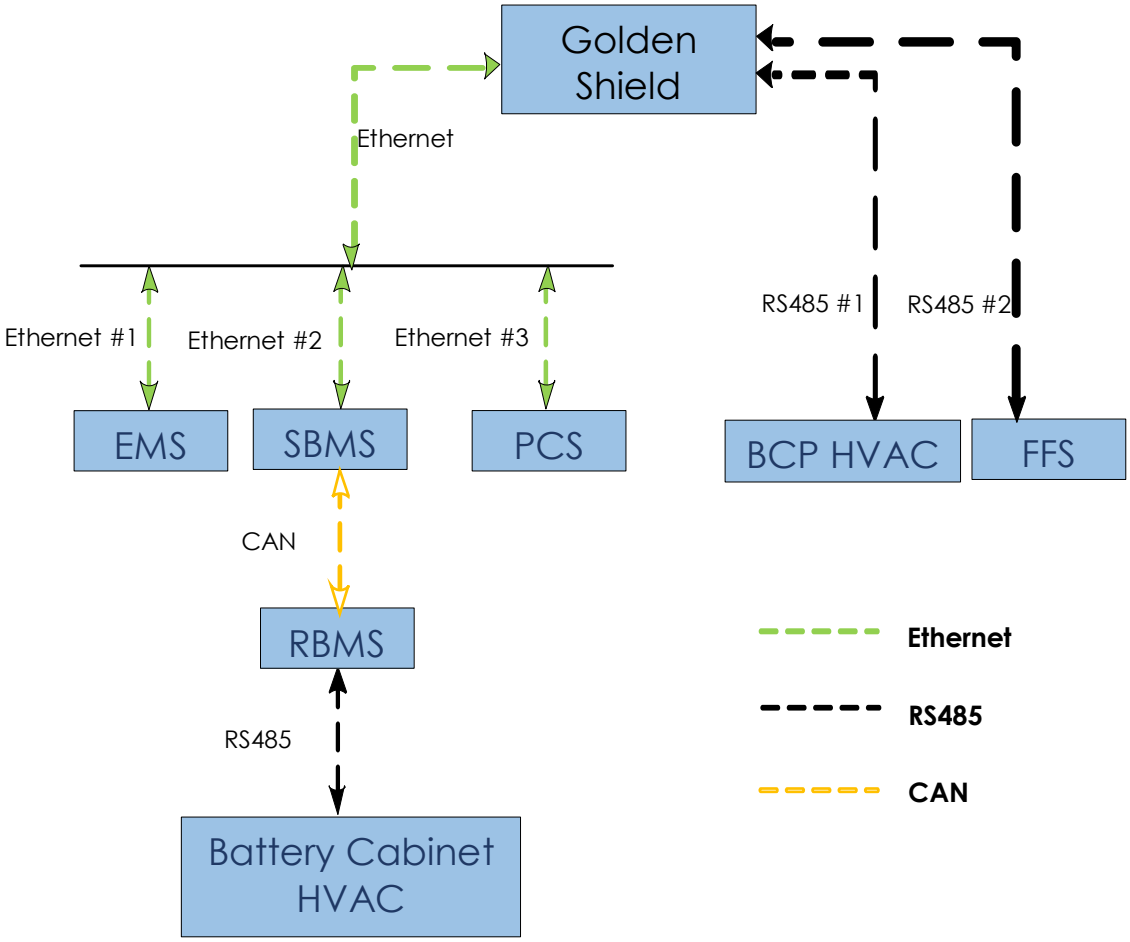


Figure 5-9: Communication topology with Golden Shield

5.4 THERMAL MANAGEMENT SYSTEM

5.4.1 COOLING CONCEPT

The battery energy storage container is equipped with an industrial-rated Heating, Ventilation, and Air Conditioning system (HVAC). At all times, especially, during the battery charging and discharging process, the HVAC will transfer the heat generated to the outside of the battery cabinet, maintaining an ideal temperature range for the batteries. When the internal temperature is below the minimum temperature required for battery operation, the HVAC will heat the internal environment.

Inside the enclosure, the battery rack(s) are designed with space at the sides of battery modules for air circulation. During the cooling process, the cold air from the HVAC will be delivered to the top of the rack(s) and be pushed into the space between battery modules. The fans at the front side of each module will then pull the cold air through each module to cool down the battery cells. The warm air exits each module is returned to the HVAC. The airflow of the battery rack is shown below.

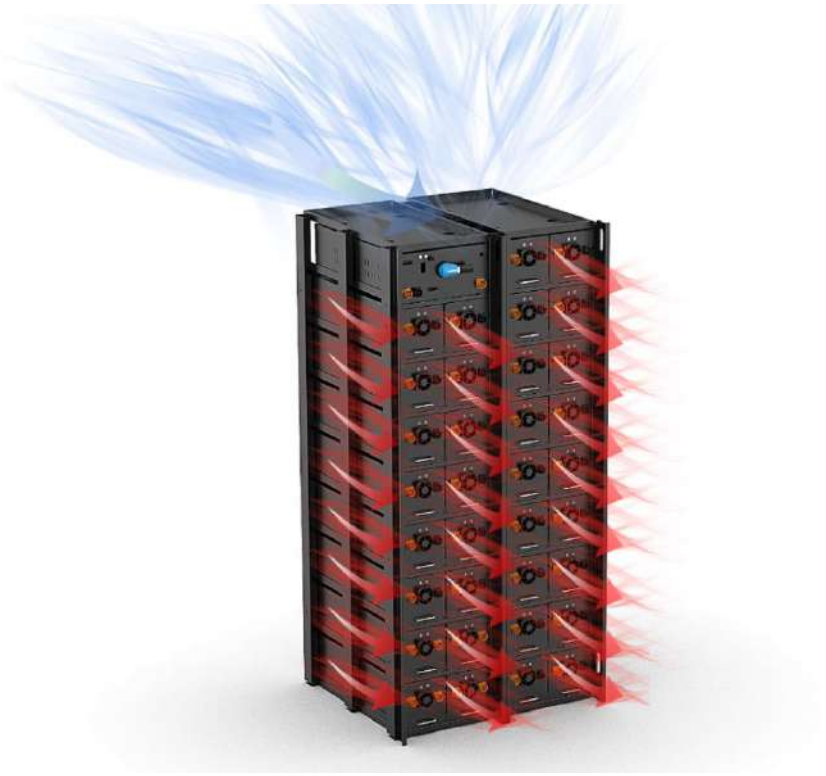


Figure 5-10: Airflow in Battery Racks

5.4.2 HVAC INTRODUCTION

As shown in Figure 5-12, the air conditioner takes in the hot air from the upper portion of the battery enclosure through a heat exchanger, then discharges the cold air to the lower portion of the enclosure, facilitating internal air circulation. The external ambient cold air enters the air conditioner from the lower air inlet through the heat exchanger and then exits from the upper air outlet to the ambient. Thus, the internal and external airflows are in opposite directions through the heat exchanger giving rise to efficient heat exchange.

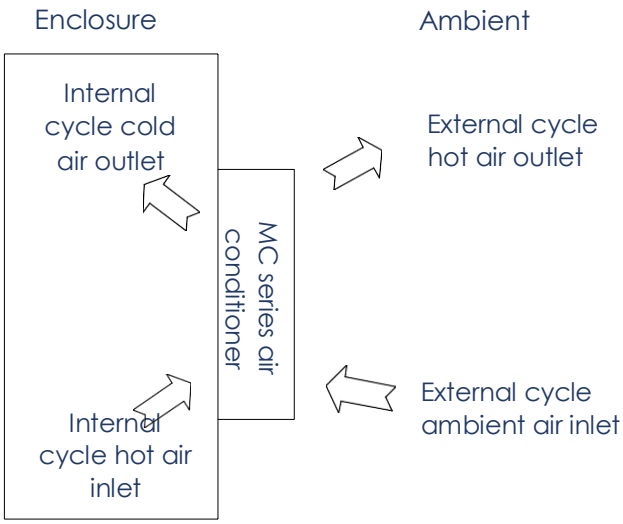


Figure 5-11: Airflow of the HVAC

The air conditioner is controlled and operated automatically according to the cabinet's internal temperature. The controller controls the compressor or the fan's operation by comparing the cabinet return air temperature, detected by the internal temperature sensor, against the temperature set point.

Table 5-8: Specification of HVAC

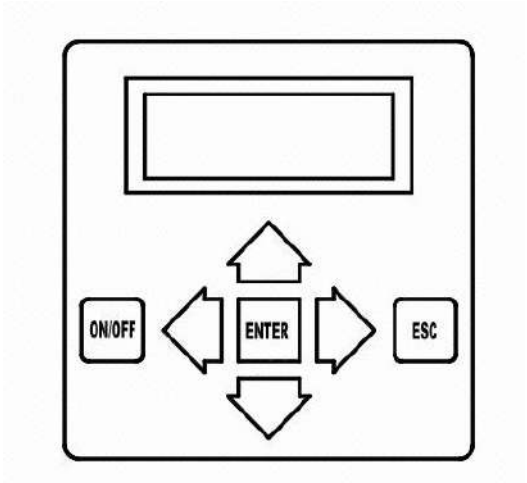
ITEM	UNIT	SPECIFICATION	RENDERING
Make	-	ENVICOOL or equivalent	
Model	-	MC50HDNC1U or equivalent	
Dimension(W×H×D)	mm	620×1,350×300	
Weight	kg	66	
Mounting Method	-	Door-mounted	
Working Temperature Range	°C	-40 ~ +55	
Noise Level	dB(A)	65	
IP Protection	-	IP 55	
Refrigerant	-	R134a	
RoHS Compliant	V	Yes	
Cooling Capacity@L27/L35 50Hz	W	5,000	
Heating Capacity @ Tu=10℃	W	2,000	
Power Consumption@L27/L35 50Hz	W	1,850	
Internal Airflow	m^3/h	1500	
Power Supply Range	V, Hz	220±10%, 50/60	
Max. Current	A	17	

SYL selects Envicool MC50HDNC1U unit as the air conditioner for the Sigma battery

cabinets, after performing heat generation modeling and air flow pattern simulation inside the container. Envicool is a professional thermal control solutions provider for outdoor cabinets. Their MC series is a compact, highly efficient AC-powered air conditioner. It is designed and optimized for applications that require superior HVAC performance and functionalities but have limited space available. Its advanced features are listed as follows:

- Wide voltage ranges with variable frequency control technology.
- The unique Envicool (EVO) control system allows multiple units to be grouped easily.
- The EVO can be operated under a full range of climatic conditions.
- The EVO allows users to set an automatic start or a delayed start when power is turned on in case the inrush current must be managed.
- The EVO uses an RS485 interface that supports the Modbus protocol.
- EVO provides expanded storage to record multiple histories of alarms.
- The EVO is proven to be highly reliable.

5.4.3 HVAC INTERFACE



- ON/OFF: ON/OFF button, which can be used to turn on/off the unit:
- ↑:UP button, which is used to select the previous record/menu or increase the setting value (password only);
- ↓: Down button, which is used to select the next record/menu or decrease the setting value (password only);
- ←: Left button, which is used to increase the setting value or select the previous data while conducting password operation;
- →: Right button, which is used to decrease the setting value or select the next data while conducting password operation;

- ENTER: Return key, which is used to confirm the input;
- ESC: Quit button, which is used to return to the previous page menu.

if there is no keyboard operation for consecutively 60s under any interface after startup.it will automatically return to the normal display interface.

When any button is pressed after the system is powered up, the backlight will turn on. If there is no keyboard operation for consecutively 60s, the backlight will be off.

The factory default operation password of the unit is "0001". You need to press ENTER on the normal display interface to enter the password input interface, press the LEFT button or RIGHT button to select the bits for change, and press the UP/DOWN button to change the relevant digits, and finally press Ok button to confirm the change. If the password is incorrect, the interface will display the error message, and the unit setting cannot be changed. If the password is correct, you can enter the main menu and edit the unit setting, the menu structure diagram of the unit follows the 3.5 diagram.

Note: the parameters of the menu don't represent the factory default parameters.

Abbreviation description

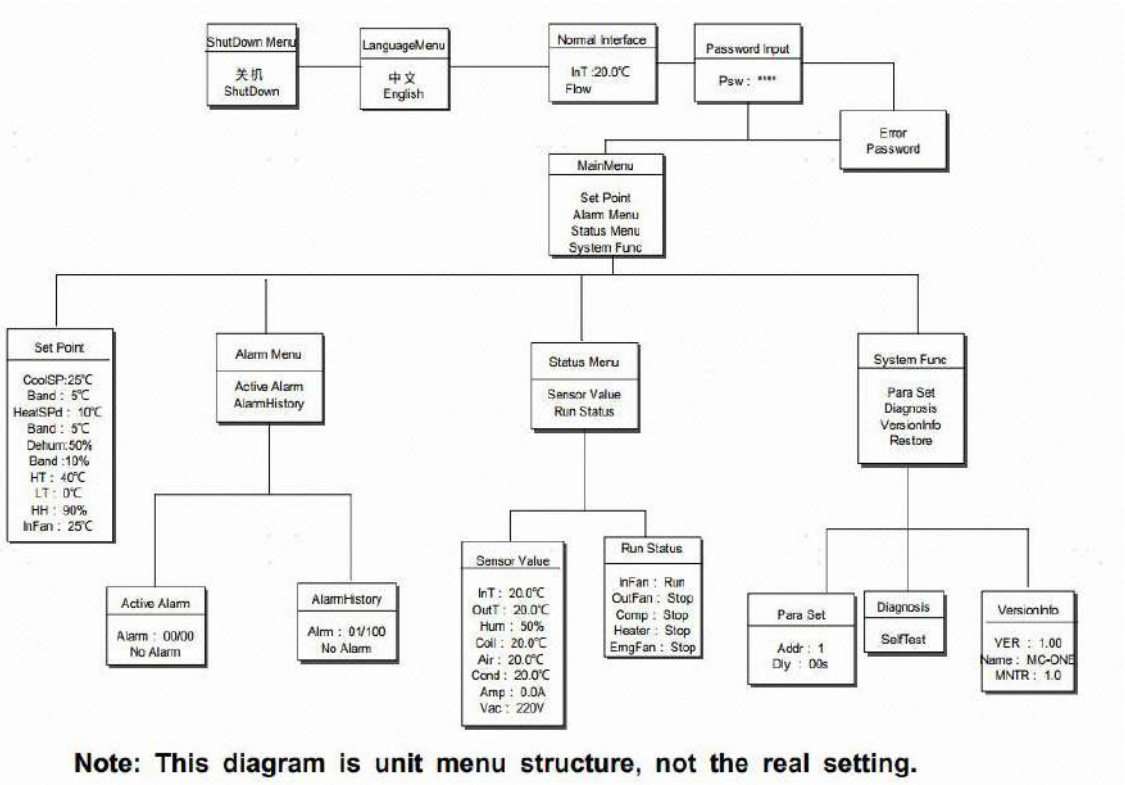


Figure 5-12: Diagram

5.5 FIRE SUPPRESSION SYSTEM

5.5.1 TYPE OF FIRE PROTECTION

The outdoor cabinet has a separate and relatively sealed space. According to the working principle of the energy storage system and other related technical characteristics, aerosol fire extinguishers and smoke detectors are installed. The fire extinguisher will automatically release aerosols and send a signal to the control panel when the internal temperature reaches 74 °C (162 °F). After releasing, the pressure sensor will send a signal to the Fire Control Panel to report the release event. In a separate loop, the smoke detector sends a signal to the control panel after sensing smoke. Smoke detection is normally reported before aerosol release. Upon receipt of either signal, the fire control panel sends an alarm to the fire mainframe and triggers a light and sound alarm.

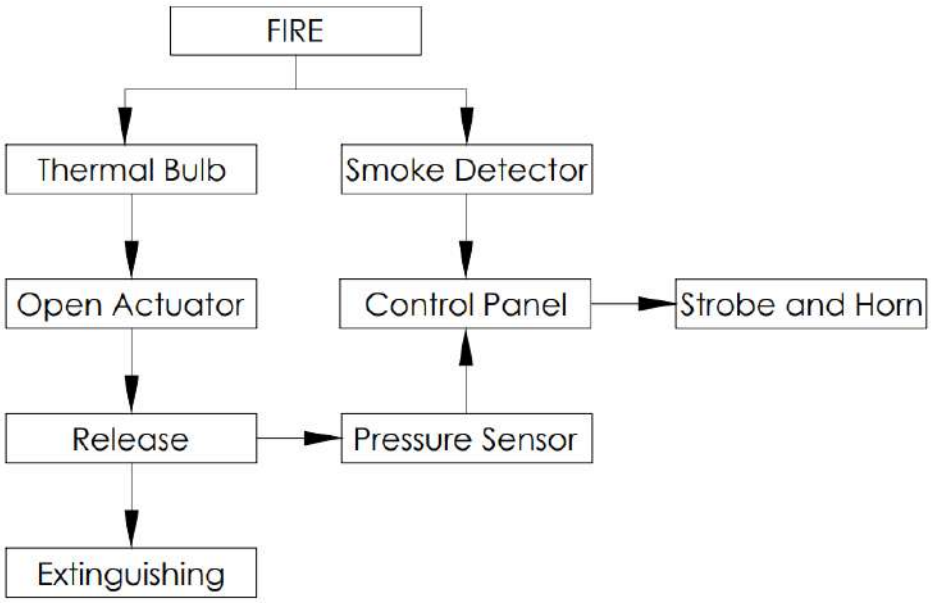


Figure 5-13: Fire suppression system

5.5.2 AEROSOL AUTOMATIC FIRE EXTINGUISHERS

When the temperature rises high enough, the extinguisher will automatically and efficiently generate and release an ultra-fine potassium-based aerosol with the assistance of a series of auxiliary components. With the collaboration of the patented design, the aerosol composition, and the ultra-fine particle size, the reaction between oxygen and combustible materials is greatly interrupted, thus ending the spread of flame.

Compared to gas fire extinguishing systems, aerosol offers higher performance than gas while using the same weight of the agent. Aerosol extinguishers require no pressurized vessels, pipes or other expensive components, are almost maintenance-free, have a service life of over ten years, and have a minimal size and weight. All these advantages make aerosol fire extinguishers a highly cost-effective solution for fire prevention.

5.6 DEFLAGRATION VENT

The deflagration vent will be designed and installed for SYL outdoor battery cabinet. The indoor pressure may increase quickly, when the battery system under thermal runaway. And when the indoor pressure reaches to the set bursting pressure, the deflagration vent will open and release the indoor pressure.

6 HANDLING

To ensure the system will be handled properly and to avoid any damages from mishandling the system, SYL has prepared these guidelines for customers, handlers, installers, and operations personnel.

SYL reminds customers that loading and off-loading the system cabinets to and from an ISO standard shipping container is very critical and often difficult to perform. Therefore, these guidelines will focus on these two steps.

6.1 SAFETY PRECAUTIONS

Safety first! Always follow safety protocol!

a. The tasks described in this document must only be performed by qualified persons who have received training in how to deal with the dangers and risks associated with loading and off-loading large object with a forklift.
b. Follow all applicable laws and regulations.
c. Wear proper PPE when handling the equipment.
d. Disconnect the cables shown in the following figure before handling.

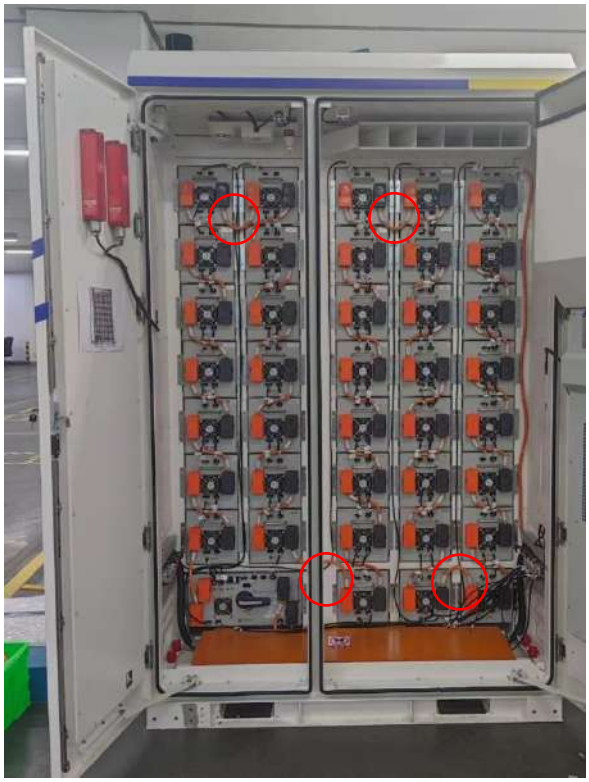


Figure 6-1: Cables need to be disconnected(for reference only)

Failure to follow the above safety protocols may result in accident, injury, or damage to the equipment. SYL will not be responsible for injuries or damages due to the violation of

safety protocols.

6.1.1 EQUIPMENT INFORMATION

The BCP, each battery enclosure, and PCS will be packed and transported separately. The weight of a single battery cabinet with the package is about 4,000kg (8,818lbs).

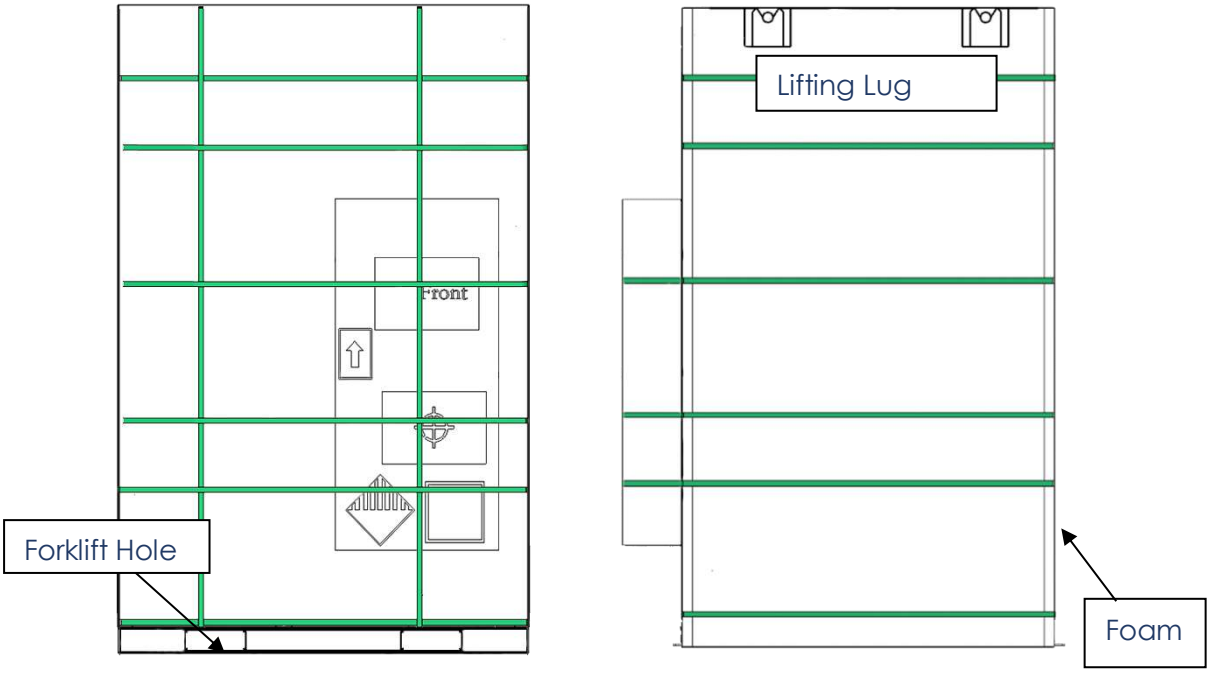


Figure 6-2: Equipment Information

The distance between the center of the two forklift grooves is 940mm / 3.1'.

1）Bottom: Forklift slots for forklift handling.

2）Top fixing hole: Used for top wire rope fixation.

3）Direction: Cabinet door is on the front side of the cabinet.

6.1.2 FORKLIFT HANDLING

General loading procedures are as follows:

1) The forklifts used for handling battery cabinets shall be capable of and certified for handling a 5000kg enclosure.
2) Forks need to reach at least 4/5 of the cabinet depth in the forklift slots on the base of the cabinet.
3) Slowly lift the cabinet to a small height and check if there is an issue with the center of gravity of the cabinet before further movement.

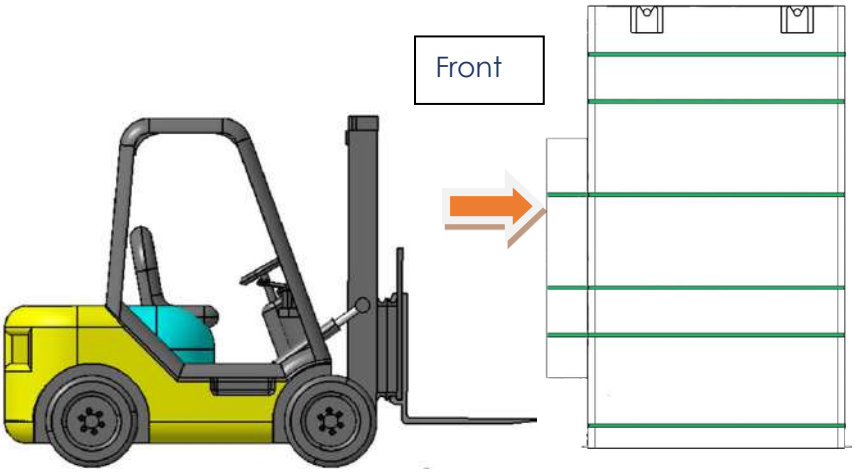


Figure 6-3: Forklift Handing

6.2 LOADING PROCEDURE

Use a forklift to load the cabinet to the ISO 40' HQ shipping container.

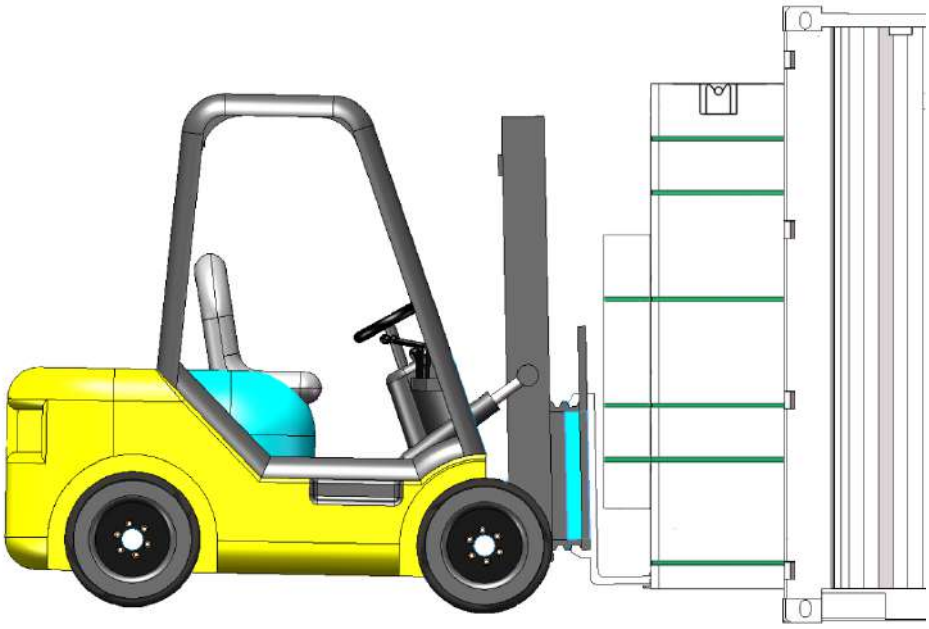


Figure 6-4: Load the cabinet with a forklift

Ensure that the cabinet is in the middle of the internal space of the container when loading

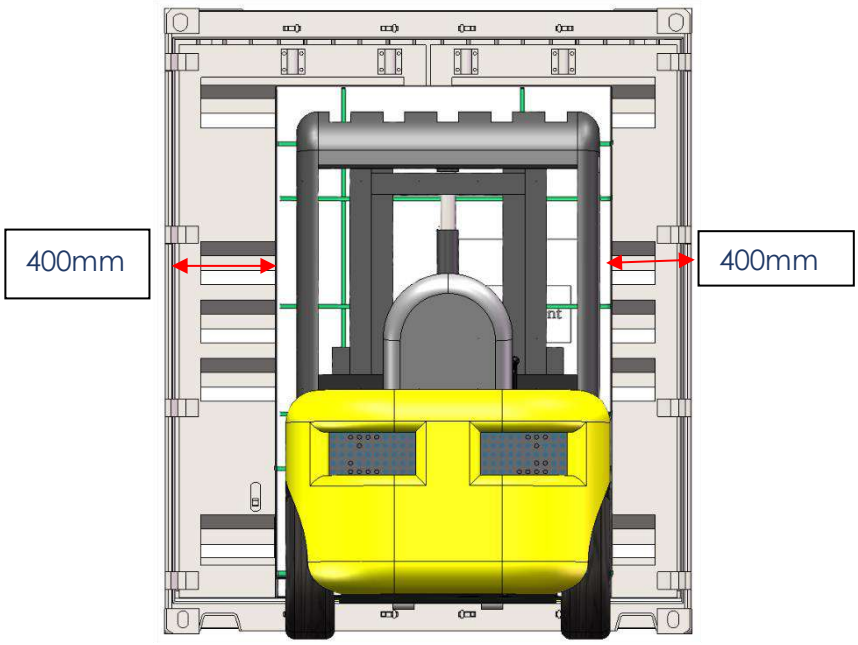


Figure 6-5: Locate the cabinet in the middle

into the container, the position and spacing of the cabinets are as follows:

1) The cabinets shall be placed against the side wall of the container, and the base of the cabinet is supported by triangular wood or stow wood to prevent the bottom displacement.
2) Put front and back supports between cabinets to prevent the cabinet from moving back and forth.
3) The cabinets are placed in a staggered manner, that is, three cabinets are placed against one side of the container and the other three are against the opposite side of the container so that the barycenter as well as the center of gravity of the container is centered and balanced. Please refer to the loading map in the figure below.
4) Use support beams to support the cabinets and container to prevent the displacement of the cabinets (as shown in the figure below).

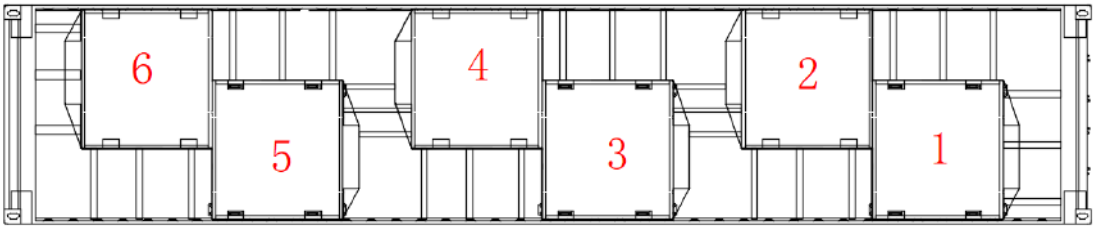


Figure 6-6: The recommended internal arrangement

6.3 FIX THE TOP OF THE CABINET

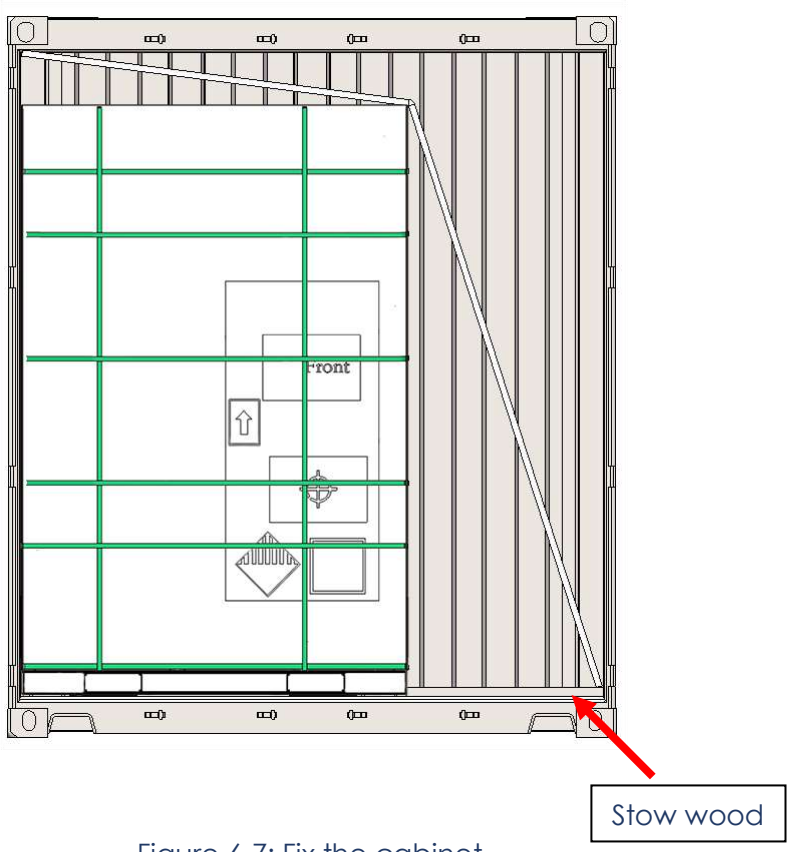


Figure 6-7: Fix the cabinet

1) Use Tie-Down straps that should meet the requirement of 2000kg pulling force.
2) The straps shall be fixed on the top and bottom of the cabinet.
3) Hook: One end of the hook is installed with the four top fixing holes on the top of the cabinet, then passes through the fixing hole on the top of the cabinet, and the other end is fixed to the bottom of the container.
4) A total of 5 Tie-Down straps are used, refer to the figure below to secure the cabinet to the container.

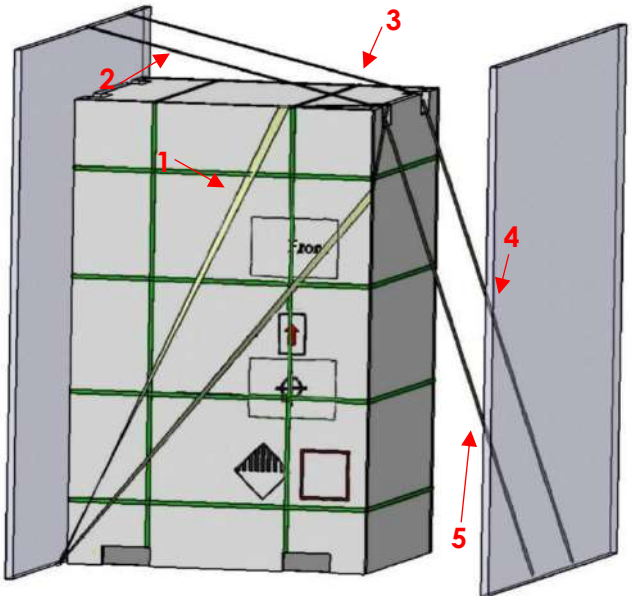


Figure 6-8: The location of 5 Tie-Down straps

5) The bottom of the battery cabinet is supported by stow wood.

6.4 OFF-LOADING PROCEDURE

Avoid collision during the offloading process. The offloading procedures are as follows:

STEP 1: Remove the Tie-Down straps on the first cabinet.

STEP 2: Remove the stow wood.

STEP 3: Use a forklift to move the first cabinet out of the container. The other cabinets can be removed in the same way with proper order.

STEP 4: The forklifts used for handling battery cabinets are required to meet the 3000Kg handling and lifting capacity.

STEP 5: Forks need to reach at least 4/5 of the cabinet depth in the forklift slots on the base of the cabinet.

STEP 6: Slowly lift the cabinet to a small height and check if there is an issue with the center of gravity of the cabinet before further movement.

After unloading from the shipping containers, the BESS shall be stored in a temperature-controlled environment. A storage guideline is given in section 10.1.

6.5 RECOMMENDED LIFTING STRATEGY

When forklifting, note the following：

- Forklift tines should be over 50mm above the equipment to prevent the

equipment from overturning.

- During forklifting, the equipment should be kept horizontal and not tilted.
- During forklifting, the equipment shall not be tilted on the forklift to avoid deformation of the external parts of the product.

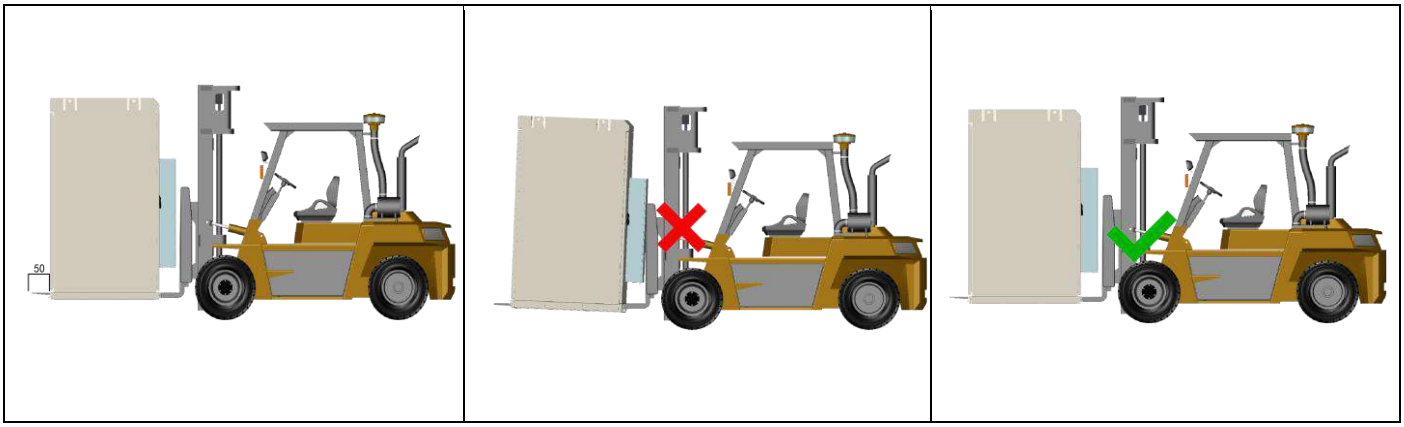


Figure 6-9: Forklifting

When crane lifting, note the following:

- Overload lifting is strictly prohibited.
- During crane operation, no personnel shall stay or pass under the boom and equipment.
- In case of strong breeze or wind of higher force on Beaufort Wind Scale, heavy rain, heavy snow, heavy fog, the lifting operation should be suspended.
- The lifting or landing should be at a constant speed.
- During the lifting operation, stop the operation immediately if abnormal noises, deformation, or welding cracking occur.

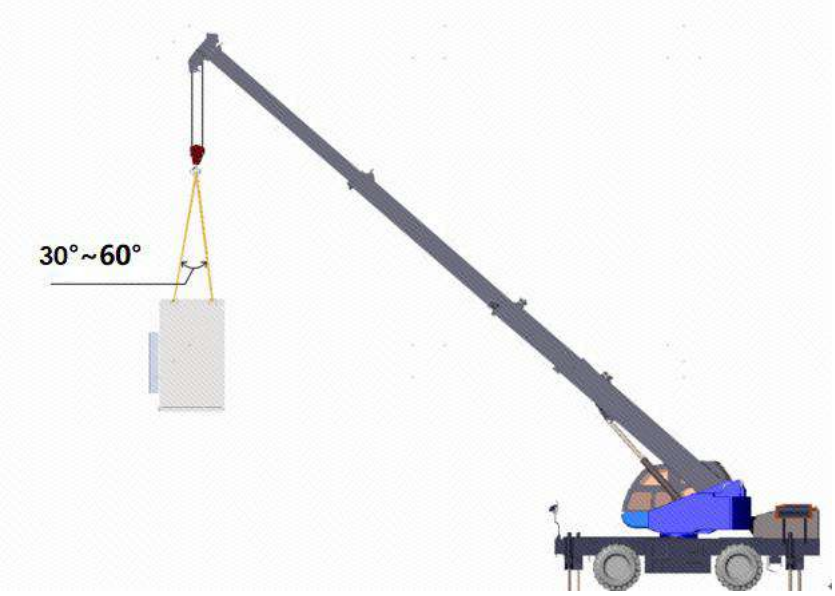


Figure 6-10: Crane lifting(for reference only)

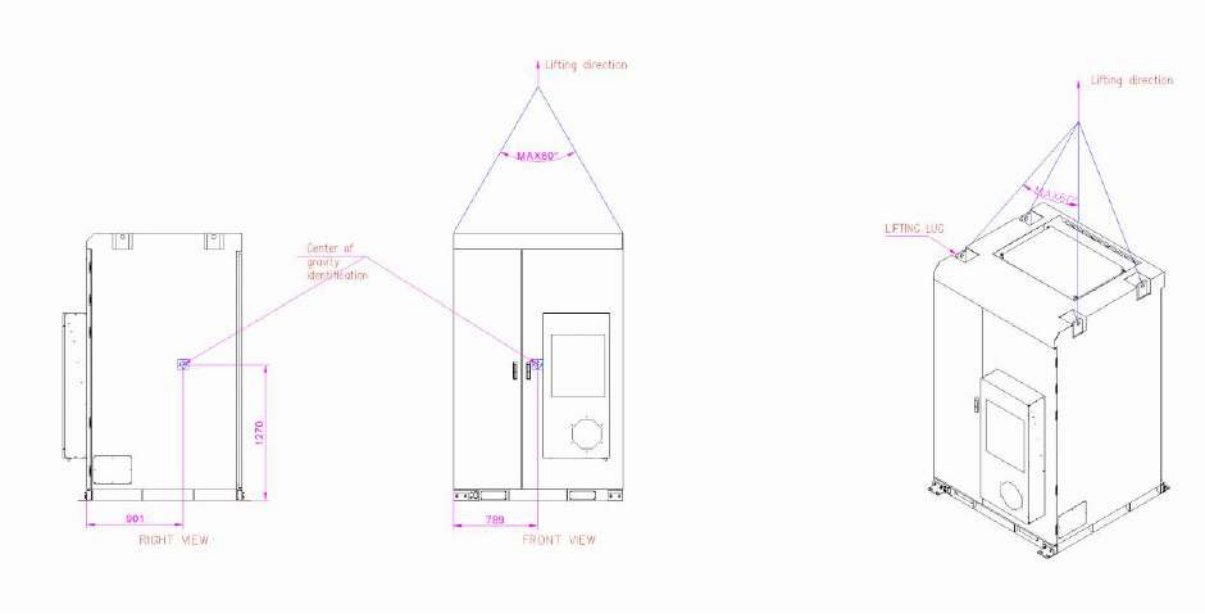


Figure 6-11: Center of gravity and maximum lifting angle(for reference only)

7 INSTALLATION

The battery system is a high-voltage energy storage device, which is regarded as dangerous goods. Non-professionals and improper operation and use may cause serious consequences such as electric shock, burning, and explosion. The battery system must be installed and maintained by professional technicians and used in strict accordance with the relevant safety provisions.

7.1 MAIN TOOLS AND COMPONENTS FOR INSTALLATION

Tools needed for the system installation are listed below.

Table 7-1: Tools for system installation

NO.	ITEM	PURPOSE	SAMPLE
1	Cutter	Unpacking	
2	Insulated Torque wrench	Use to install power connection	
3	Insulated driver	Use to install power connection	
4	Multi-meter	Voltage measurement	
5	Insulation gloves	Battery power connection	

6	Insulation shoes	Safety protection	
7	Wrench set	Busbar connection	
8	Forklift	Handling of battery Cabinet, Module, and Switch Gear (Lift Capacity 5000 kg)	
9	Drill(Φ16)	Hole the expansion bolts	
10	Expansion bolt(stainless steel is recommended M16X100)	Connect the foundation to the device L-brackets	
11	Electric hand drill, sleeve assembly and screwdriver assembly	Installation of grounding cable, power cable, rubber tunnel, forklift hole sealing plate	
12	Marking pen	Torque mark	
13	Cable tie	Cable fixation	

14	Goggles	Arc protection

The main components for installation are listed below.

Table 7-2: Main components for installation

COMPONENTS	NUMBER	UNIT	REMARK	DIAGRAM
Golden Sigma	1	Pcs	Dimension:W*D*H(mm) 1585*1675*2500 Weight: 3.9±0.2T Voltage range: Refer to nameplate	
BCP	1	Pcs	Dimension: W*D*H(mm) 1000*1450*2500 Weight: 1500kg	
The copper bar between cabinets	2	Set	One positive and negative between two cabinets	
Power/Communication harness	1	set	Building the connection between two adjoining Golden Sigmas	

Terminal resistance	2	set	First cabinet RACK COMM port and end cabinet RACK COMM	

7.2 PREPARATION FOR INSTALLATION

7.2.1 INSTALLATION REQUIREMENTS

- The foundation design shall be able to support such weight through all kinds of situations. Include but not limit to wind load, snow load, seismic.
- All equipment can be anchored both front and rear sides. Each side has 2 L-shaped brackets, and each bracket has two anchoring holes. (Note: those L-Shaped brackets are provided separately, not attached to the enclosures. Use the inner hole for anchoring.)
- The cabinets are recommended to be placed at a sufficient height above the ground level to avoid any flood. Check local history weather data for rain or flood information.
- The upper surfaces of the foundations should be at the same level (unevenness shall be less than 10mm).
- After each cabinet is placed on the top of the pad, adjust their position to stay within the guidelines provided for gaps between cabinets.
- Mark the hole location on the pad and remove the bracket for drilling.
- Drill the hole on marked locations for anchoring.
- Refer to Section 7.2.4 for the clearance recommendations.
- The following dimensions are in mm unless otherwise specified.
- Note: The unit is mm.

7.2.2 INSTALLATION ENVIRONMENT REQUIREMENTS

- The installation and use environment must comply with local laws and regulations and relevant international and regional standards for lithium electric products.
- For areas with frequent natural disasters such as floods, mudslides, earthquakes and typhoons, appropriate preventive measures shall be taken for installation.
- Keep the installation location away from fire and heat sources. Do not place combustible or explosive materials around the device.
- When the device is running, do not block the vent or thermal management system to prevent fire caused by high temperature.
- Do not place the device in an environment with combustible or explosive gas or smoke. Do not perform any operations in such an environment.

IMPORTANT

HE OPERATION AND SERVICE LIFE OF THE ENERGY STORAGE DEPENDS ON THE OPERATING TEMPERATURE. INSTALL THE STORAGE DEVICES AT A TEMPERATURE EQUAL TO OR HIGHER THAN THE AMBIENT TEMPERATURE.

THE OPERATING TEMPERATURE OF THE SU340U&E170KM SERIES BATTERY CABINET RANGES FROM -30 °C TO 50 °C. IF THE CABINET IS STORED IN A COLD ENVIRONMENT (SUCH AS 0°C) BEFORE INSTALLATION, IT WILL TAKE SOME TIME TO HEAT UP BEFORE IT CAN BE RECHARGED.

WHEN THE AMBIENT TEMPERATURE IS HIGHER THAN 45 ° C OR LOWER THAN 0 ° C, THE BATTERY CHARGING AND DISCHARGING POWER DECREASES.

7.2.3 CHECK BEFORE INSTALLATION

1) Outer packing check

Before opening the outer packing of the product, please check the outer packing for obvious damage, such as breakage, cracks or other signs of possible internal damage, and check the product model. If there is any abnormal packaging or product type discrepancy, please contact us as soon as possible.

2) Deliverable check

After unpacking the product, please check the deliverables for completeness and for any obvious external damage. If anything is missing or damaged, please contact us.

IMPORTANT

REFER TO "SPARE PARTS" LIST FOR DETAILS OF THE SPARE PARTS DELIVERED WITH THE CASE.

3) Installation foundation check

Before product installation, it is necessary to check the prefabricated foundation at the project site and ensure that the foundation is solid and reliable and meets the flatness requirements.

7.2.4 INSTALLATION SPACE

When installing devices, ensure that there are no combustible or explosive materials around, and reserve enough space to ensure heat dissipation and safety isolation.

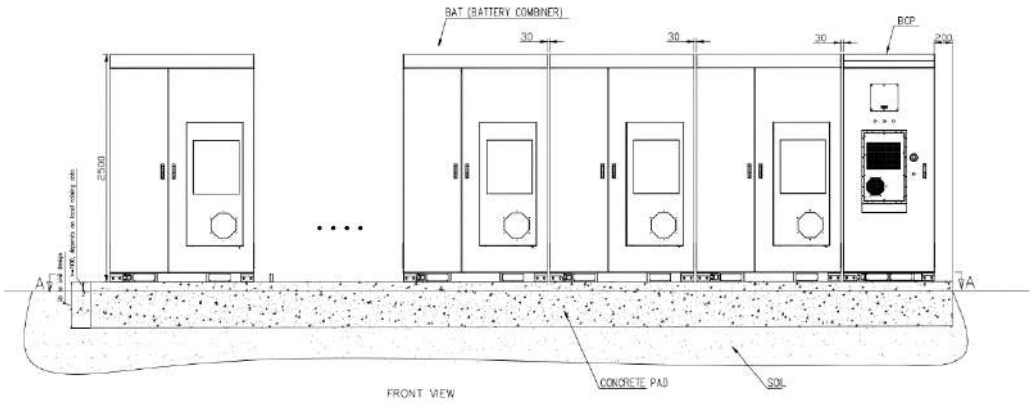


Figure 7-1: Foundation Reference Front View

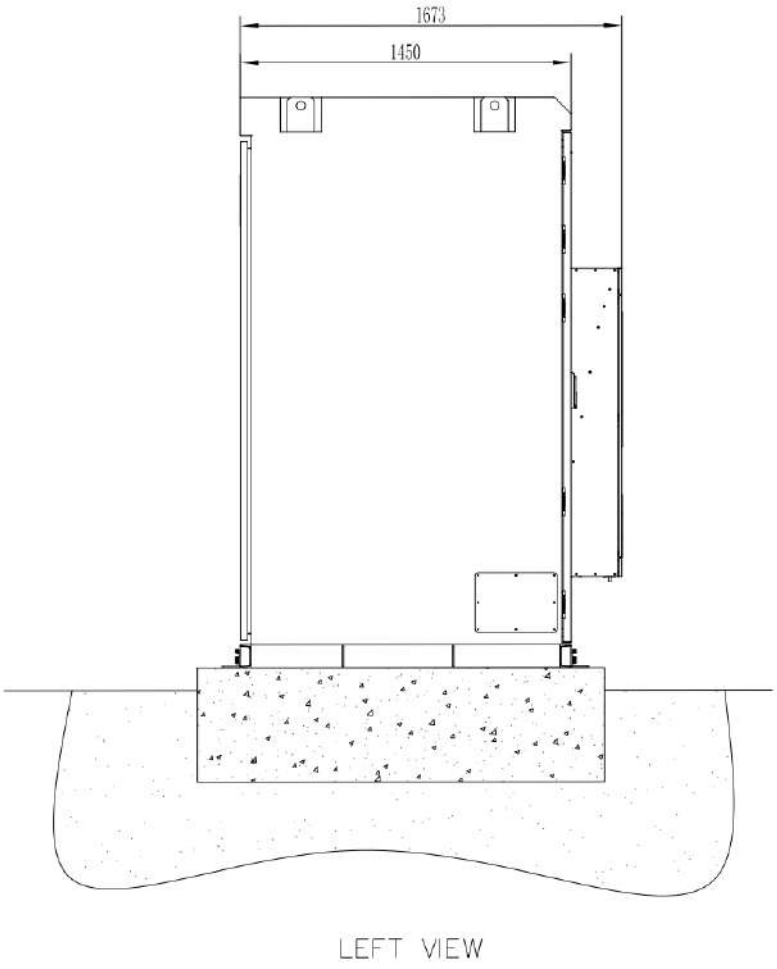


Figure 7-2: Foundation Reference Left View

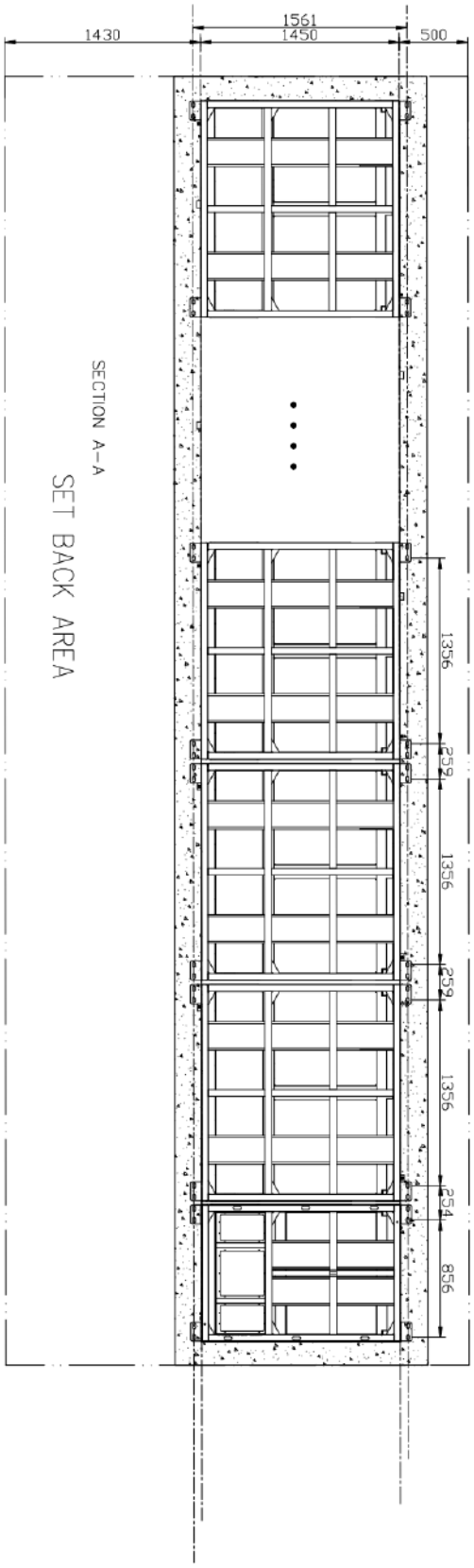


Figure 7-3: Foundation Reference Top View

7.2.5 UNPACKING

Unpacking steps are as follow:

STEP 1: Remove the packing belt and winding film on the box.

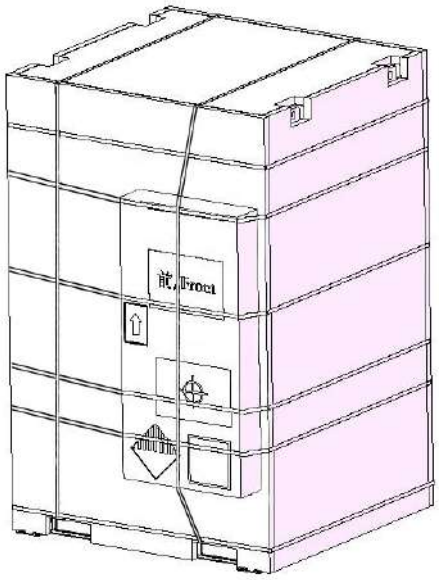


Figure 7-4: Use ropes or straps to fasten the four lifting holes

STEP 2: Remove the front and back panels from the front side and backside respectively. Remove the right side and left side panels.

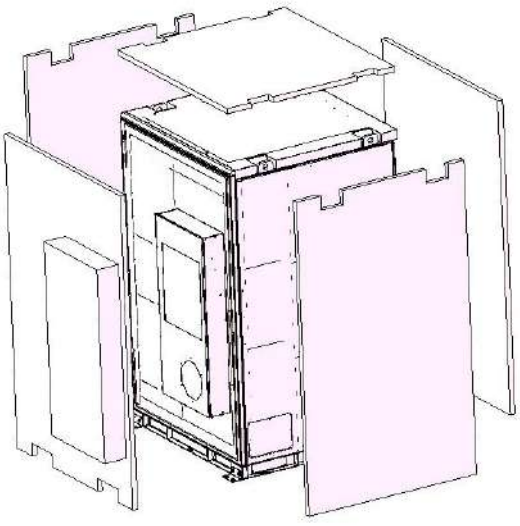


Figure 7-5: Remove the packing forms

7.2.6 DESCRIPTION OF THE INSTALLATION PROCESS

The first Golden Sigma number for the first block is the S1-01, The first Golden Sigma number for the second block is the S2-01, Number 01 of each group of the block is a master control cabinet and should be placed next to the BCP.

The installation process is mainly divided into two stages: Golden Sigma installation and wiring. The main content and steps are as follows:

Table 7-3: The main content and steps

INSTALLATION STEPS	SPECIFIC IMPLEMENTATION	REMARK
Golden Sigma installation	A. Transfer the Golden Sigma to the designated location using forklift transfer or hoisting.	The tool should meet the weight requirements, and the tilt angle should be smaller than 5°.
	B. Fix the bottom foot of the Golden Sigma.	M16 bolt required torque is 150~200N.M
	C. Grounding of the Golden Sigma.	M8 bolt required torque is 10N.M, wire size ≥50mm2 (cooper)
Wiring	A. Power harness	Including positive and negative poles, red connect to V+, black connects to V-.
	B. Auxiliary power supply harness	Including power supply for Golden Sigma and control circuit.
	C. Communication harness	One for input and one for output.

7.3 CABINETS INSTALLATION

7.3.1 INSTALLATION PRECAUTIONS

WARNING

THE TITLE ANGLE SHOULD BE SMALLER THAN 5°DURING THE HOISTING.

WARNING

DO NOT HIT THE STAFF DURING LANDING.

WARNING

SHOULD SET AN ISOLATION AREA FOR THE OPERATION OF INSTALLATION.

WARNING

MOVE AND TRANSFER THE GOLDEN SIGMA IN A MANNER WAY DURING HOISTING.

WARNING

GOLDEN SIGMA INSTALLATION MUST BE CARRIED OUT ONLY BY INSTALLERS WHO HAVE BEEN TRAINED IN DEALING WITH HIGH VOLTAGE ELECTRICITY.

WARNING

DO NOT USE OR INSTALL THE GOLDEN SIGMA IF IT IS DEFECTIVE, APPEARS BROKEN, OR OTHERWISE DAMAGED.

WARNING

DO NOT ATTEMPT TO OPEN, DISASSEMBLE, REPAIR, TAMPER WITH, OR MODIFY GOLDEN SIGMA.

WARNING

DO NOT CONDUCT THE INSTALLATION UNDER WORSE WEATHER, SUCH AS RAINSTORMS AND SANDSTORMS.

WARNING

TO PROTECT GOLDEN SIGMA AND ITS COMPONENTS FROM DAMAGE WHEN TRANSPORTING, HANDLE WITH CARE. DO NOT IMPACT, PULL, DRAG, OR STEP ON GOLDEN SIGMA. DO NOT SUBJECT GOLDEN SIGMA TO ANY STRONG FORCE. TO HELP PREVENT DAMAGE, LEAVE GOLDEN SIGMA IN ITS SHIPPING PACKAGING UNTIL IT IS READY TO BE INSTALLED.

WARNING

DO NOT INSERT FOREIGN OBJECTS INTO ANY PART OF GOLDEN SIGMA.

WARNING

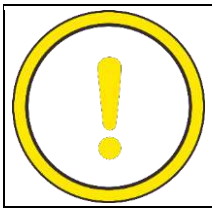
DO NOT EXPOSE GOLDEN SIGMA OR ITS COMPONENTS TO DIRECT FLAME.

WARNING

DO NOT INSTALL GOLDEN SIGMA NEAR HEATING EQUIPMENT.

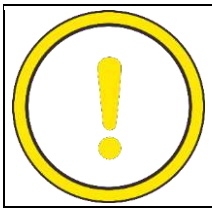
WARNING

DO NOT IMMERSE GOLDEN SIGMA OR ITS COMPONENTS IN WATER OR OTHER FLUIDS.



CAUTION

DO NOT USE CLEANING SOLVENTS TO CLEAN GOLDEN SIGMA, OR EXPOSE GOLDEN SIGMA TO FLAMMABLE OR HARSH CHEMICALS OR VAPORS.



CAUTION

THE SCHEMATIC DIAGRAM OF TRANSFER AND HOISTING AS SHOWN IN THE FIGURE IS FOR REFERENCE ONLY, THE SPECIFIC TOOLS AND EQUIPMENT USED IN ACTUAL OPERATION SHALL PREVAIL.

CAUTION

THE MINIMUM CLEARANCE BETWEEN THE GOLDEN SIGMAS SHOULD BE ≤ 10MM(SIDE BY SIDE) THE CLEARANCES ABOVE ARE FOR REFERENCE ONLY, THE ACTUAL CLEARANCE SHOULD COMPLY WITH THE LOCAL STANDARDS AND REGULATIONS.

WARNING

PLEASE PLACE THE BATTERY SYSTEM ON A LEVEL GROUND TO ENSURE THAT IT IS PLACED STABLY WITHOUT SHAKING OR TILTING;

WARNING

BATTERY SYSTEM INSTALLATION SHOULD CONSIDER THE LOAD CAPACITY OF ITS INSTALLATION GROUND AND FLOOR (ACCORDING TO THE REQUIREMENTS OF ARCHITECTURAL DRAWINGS).

7.3.2 INSTALLATION STEPS

7.3.2.1 DEVICE FIXATION

After the device is placed in the correct position of the foundation, you can secure the device. The steps are as follows:

STEP 1: Remove the Tunnel covering plates with a hand drill and sleeve.

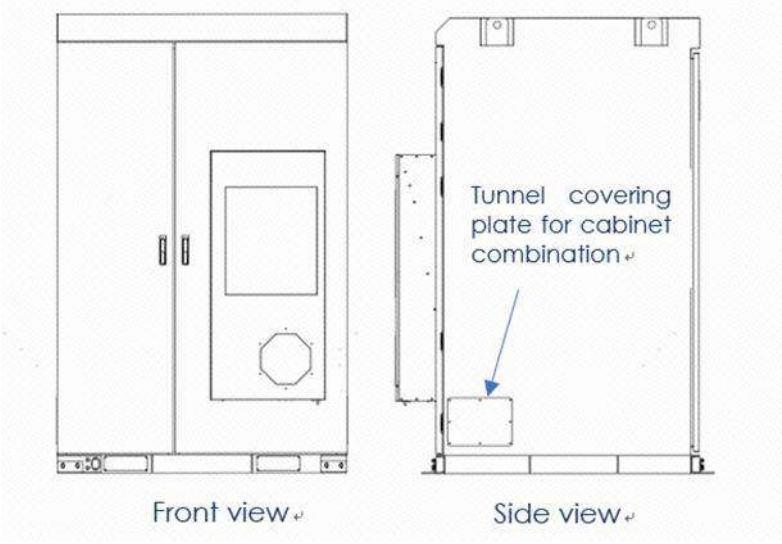


Figure 7-6: The front view and the side view of the cabinet

STEP 2: Use a forklift that meets 5 tons bearing capacity to move the cabinet. The gap between the two devices is 30mm.

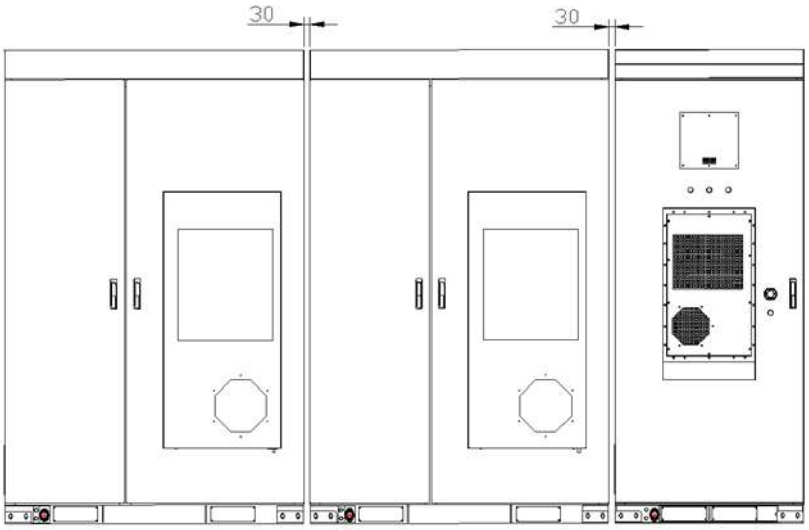


Figure 7-7: The gap between cabinets

STEP 3: Determine the positions of expansion bolt holes and drill holes to bury M16X100 expansion bolts.Position the L-brackets.Tighten the L-brackets with M10X30,A4-70 bolt assembly.

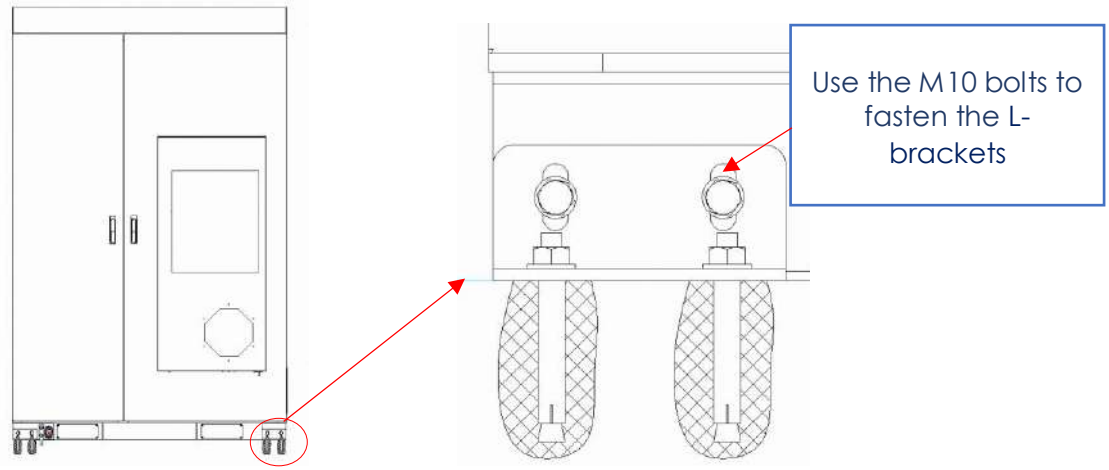


Figure 7-8: Install anchoring bolts

STEP 4: Check whether the paint film is damaged near the forklift hole. If so, repair it in time. Tighten the sealing plates with M5X10,A4-70 bolt assembly.

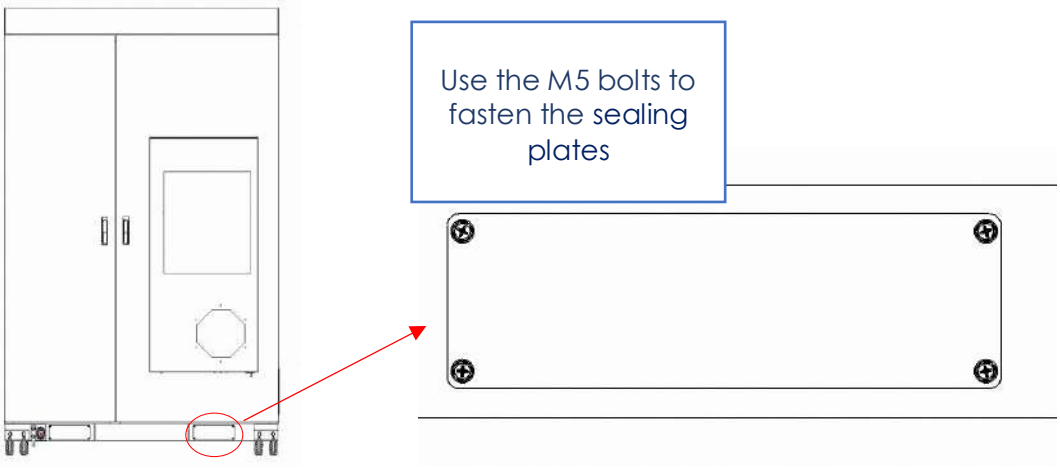


Figure 7-9: Install the forklift hole sealing plates

7.3.2.2 DEVICE GROUNDING

Both the front and rear of the device have one grounding point. Select one grounding point based on site requirements. The steps are as follows:

STEP 1: Make ground cable: Use two-hole copper nose YA25A7, crimping 25mm² yellow and green cable.Tighten the grounding cable with M10X30,A4-70 bolt assembly.

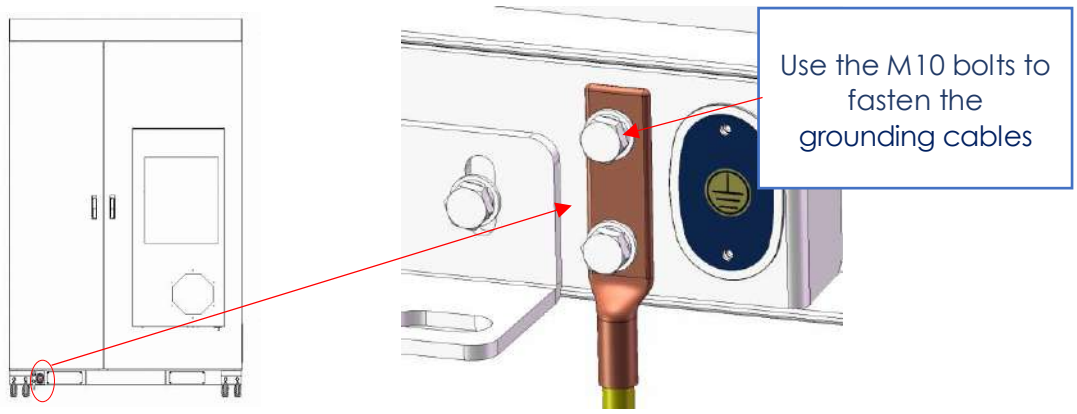


Figure 7-10: Install grounding cables

7.3.2.3 RUBBER TUNNEL INSTALLATION

One side of the rubber tunnel is secured before delivery. The other side needs to be secured onsite. The steps are as follows:

STEP 1: After combining cabinets, secure the rubber tunnel in the left cabinet with M4X10 bolt assembly.

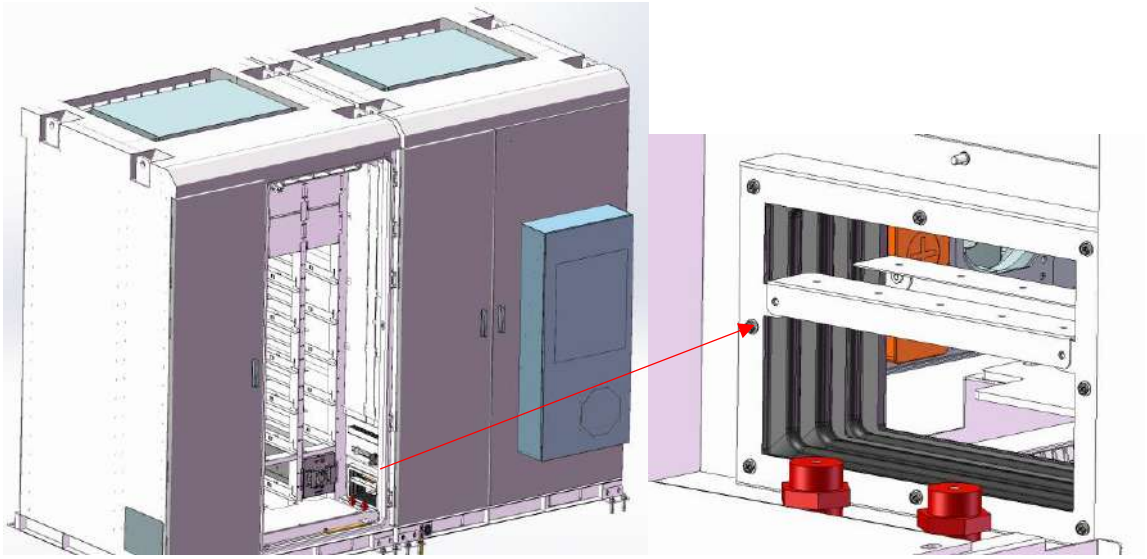


Figure 7-11: Install rubber tunnel

7.3.2.4 COPPER BUSBAR CONNECTION

After combining cabinets and installing rubber tunnel, connect and fix the copper busbars. The steps are as follows:

STEP 2: Remove the bakelite plates with a hand drill and sleeve.

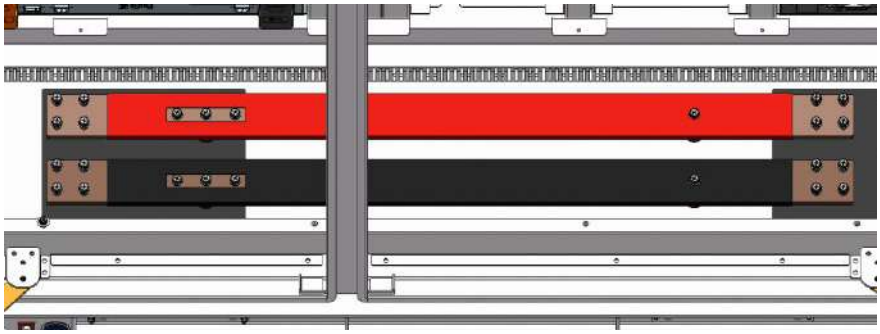


Figure 7-12: Bakelite plates removed

STEP 3: Pass the copper busbars through the rubber tunnel and secure the copper busbars with M8X40 bolt assembly.

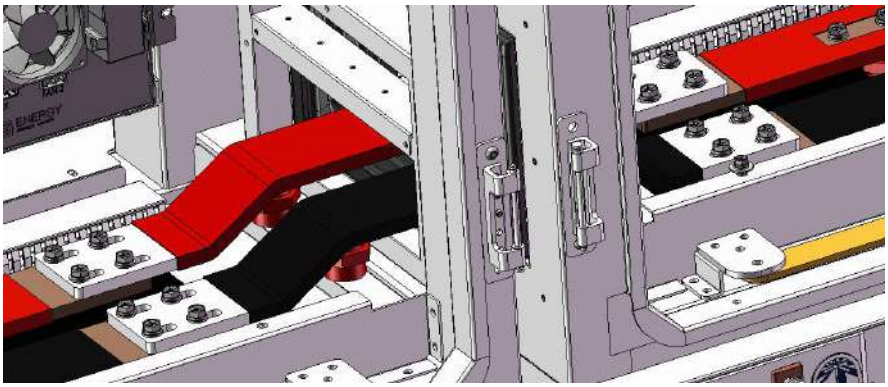


Figure 7-13: Copper busbars connected

STEP 4: Intall the bakelite plates with a hand drill and sleeve.

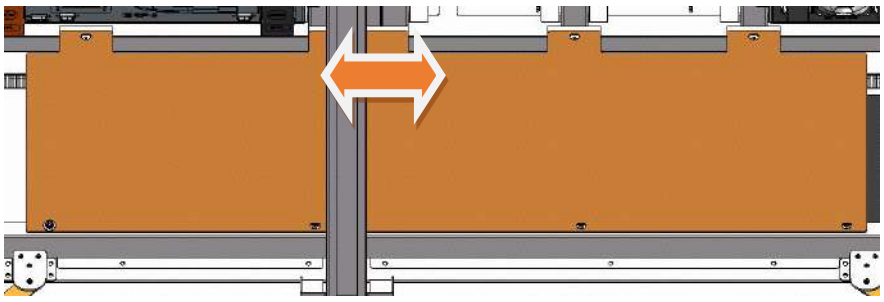


Figure 7-14: Bakelite plates installed

8 ELECTRICAL CONNECTION

8.1 PREPARATION FOR INSTALLATION

Tools for electrical connections are listed in the table below.

WARNING

THE TOOLS USED FOR BATTERY POWER CONNECTION INSTALLATION SHOULD BE INSULATED OR SHOULD HAVE A MINIMIZED EXPOSED METAL AREA. AT LEAST THE GRIP PART SHOULD BE INSULATED.

IMPORTANT

BECAUSE OF THE STRUCTURAL PARTICULARITY OF THE CABINET TERMINAL BOARD, A SLEEVE SCREWDRIVER TOOL IS USED TO CONNECT.

Table 8-1: Tools for electrical connection

NO.	ITEM	PURPOSE	SAMPLE
1	Cutter	Unpacking	
2	Insulated Torque wrench	Use to install power connection	
3	Insulated driver	Use to install power connection	
4	Multi-meter	Voltage measurement	

5	Insulation gloves	Battery power connection	
6	Wrench set	Busbar connection	

8.2 SYSTEM ELECTRICAL CONNECTION

DANGER

IN THE EVENT OF A GROUND FAULT, COMPONENTS CONSIDERED VOLTAGE-FREE IN THE ENERGY STORAGE SYSTEM MAY CARRY LETHAL HIGH VOLTAGE WHICH IS POTENTIALLY LETHAL. THE DANGER OF ACCIDENTAL TOUCH EXISTS. BEFORE DOING ANY OPERATION, MAKE SURE THAT THE GROUNDING SYSTEM IS NOT FAULTY AND TAKE ADEQUATE PRECAUTIONS.

CAUTION

ELECTRICAL CONNECTIONS ARE MADE ONLY BY PROFESSIONAL ELECTRICIANS AND QUALIFIED PERSONNEL. STRICTLY FOLLOW THE EQUIPMENT INTERNAL WIRING IDENTIFICATION FOR CABLE CONNECTION.

WARNING

ENSURE THAT ALL DC AND AC SWITCHES IN THE PCS ARE DISCONNECTED BEFORE STARTING ELECTRICAL CONNECTIONS.

CAUTION

THE VOLTAGE RATING OF THE SELECTED CABLE SHALL NOT BE LESS THAN THE PCS THREE-PHASE INSTANTANEOUS ALTERNATING VOLTAGE. THE VOLTAGE LEVEL OF THE DC CABLE SHOULD NOT BE LOWER THAN THE MAXIMUM DC VOLTAGE OF A LITHIUM BATTERY.

WARNING

WHEN CONDUCTING ELECTRICAL CONNECTIONS, CHECK THAT ALL CABLES ARE INSULATED AND INTACT. PARTIALLY EXPOSED OR OTHER DAMAGED CABLES OR INSULATED CABLES MAY POSE A SERIOUS SAFETY RISK AND SHOULD BE REPLACED IMMEDIATELY.

CAUTION

FAILURE OF EQUIPMENT OR SYSTEMS RESULTING FROM A VIOLATION OF THE INSTALLATION AND DESIGN REQUIREMENTS SPECIFIED IN THIS MANUAL WILL RENDER THE QUALITY ASSURANCE INEFFECTIVE.

8.2.1 AUXILIARY POWER CONNECTION

The AC auxiliary power input cable is connected to the lower port of the MCB0.

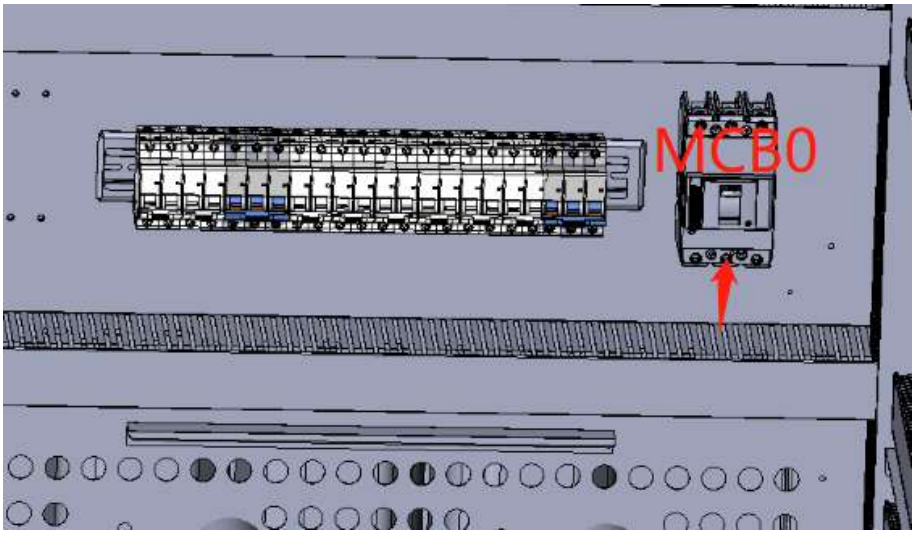


Figure 8-1: BCP auxiliary power inlet terminal (For reference only)

For convenience of wiring, we have added wiring copper bar for the customer's inlet wire. After connecting the customer's inlet terminal to the copper bar, it is necessary to bake and tighten the heat shrink tube as shown in the figure below for insulation protection. The cables are specified 1/0AWG.

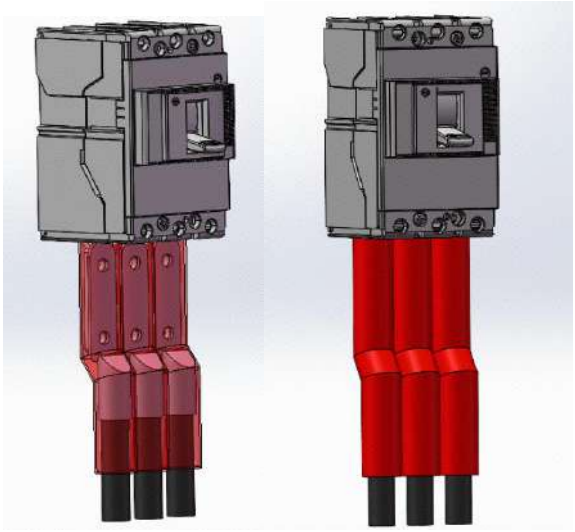


Figure 8-2: Heat shrink tube

8.3 BCP ELECTRICAL CONNECTION

WARNING

THE POSITIVE AND NEGATIVE POLES OF THE TERMINAL BLOCK CANNOT BE REVERSED.

WARNING

THE POSITIVE AND NEGATIVE POLES ON THE DC COMBINER CABINET CANNOT BE REVERSED DURING WIRING.

WARNING

STRICTLY PREVENT ANY FORM OF SHORT CIRCUIT DURING THE CONNECTION PROCESS.

WARNING

IT IS STRICTLY FORBIDDEN FOR THE OPERATOR TO OPERATE WITHOUT TRAINING.

WARNING

IT IS STRICTLY FORBIDDEN FOR THE OPERATOR TO OPERATE FREEHAND WITHOUT WEARING PROTECTIVE EQUIPMENT.

WARNING

ALL CONNECTIONS MUST BE MADE UNDER EXPLICIT GUIDANCE, AND ANY FORM OF GUESSING AND VAGUE TRIAL OPERATION METHODS ARE STRICTLY PROHIBITED.

WARNING

THE KEY POINTS OF THE CONNECTION ARE: ENSURE THE CONNECTION IS CORRECT, RELIABLE (WILL NOT BE LOOSENED), GOOD CONTACT, NO SHORT CIRCUIT.

CAUTION

AFTER THE CONNECTION IS COMPLETED, IT MUST BE MEASURED AND CONFIRMED POINT BY POINT.

WARNING

BEFORE WIRING, MAKE SURE THE GOLDEN SIGMA IS IN AN OFF STATE BY SETTING QF1, QF2, AND QS1 IN AN OFF STATE.

CAUTION

IF THERE ARE OTHER UNCERTAIN FACTORS, NEED TO BE CONFIRMED BY PROFESSIONALS BEFORE IMPLEMENTATION.

Open the front door of the BCP and remove the protective cover. The DC external output interface of BCP is shown in the figure below.

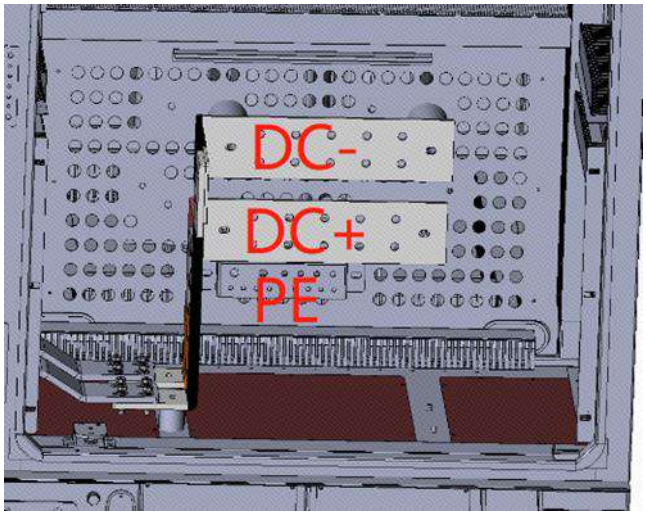


Figure 8-3: The DC+/DC- Output copper bar to PCS

8.3.1 CONNECT THE COPPER BUSBAR

Use M8 bolts to fix the provided copper bar on the reserved copper bar on the back of the BCP. The connected copper bar are shown in Figure 8-5.

8.3.2 GROUND CONNECTION

Comply with relevant national laws and regulations when grounding.

The connection between the grounding equipment and the grounding electrode must be firm.

Ensure that the ground resistance is not greater than 4Ω.

The external grounding point of the BCP is located on the left side of the front and the back of the cabinet as shown in the figure below.

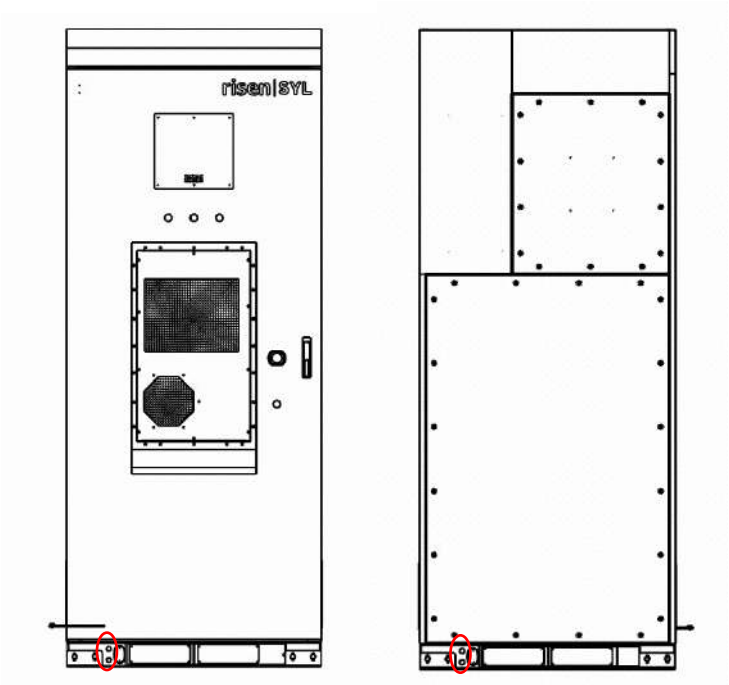


Figure 8-4: Grounding connection

8.4 BATTERY ELECTRICAL CONNECTION

8.4.1 BATTERY POWER CONNECTION

All the power cable connections between the battery modules will be done by SYL before shipment.

The connection procedures are shown as follows.

STEP 1: After all battery modules are properly seated in the slots and fixed on the rack, the power cable shall be then connected and installed.

STEP 2: Simply use a screwdriver on the upper left and lower right corners or manually pinch the protective covers on both sides to remove the connector covers and expose the battery lugs.

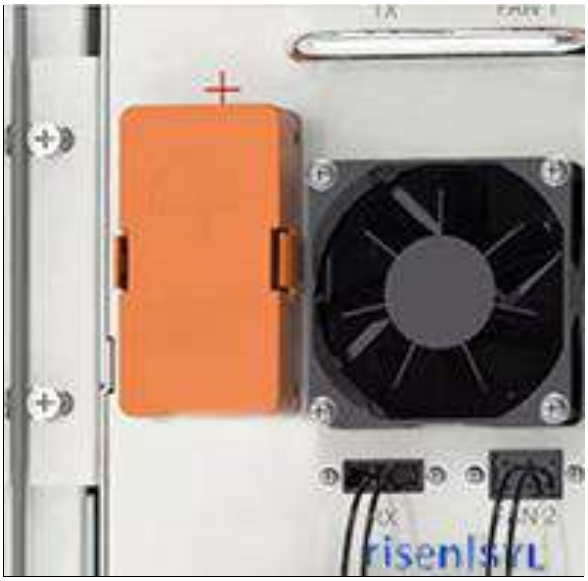


Figure 8-5: Remove the protective cover on the battery module

STEP 3: Install copper busbar or the power cable. Use the torque to fasten the bolts to 10Nm.

DANGER

HIGH VOLTAGE! DO NOT TOUCH THE EXPOSED METAL PART OF THE COPPER BUSBAR OR THE CONNECTORS.

STEP 4: The figure below shows a fully connected battery cabinet.

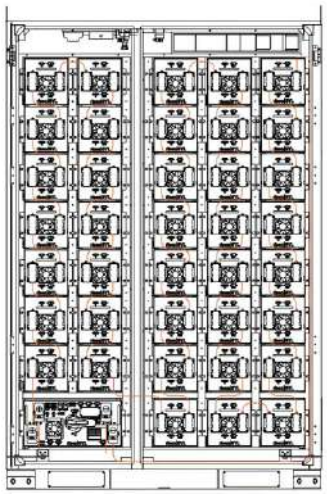


Figure 8-6: Battery DC power connection

STEP 5: Use the torque wrench to check if all the bolts for power connections are securely fastened to the torque of 10Nm.

STEP 6: Use the multimeter, on the positive and negative BSPU terminal, to check if the rack voltage is within the battery rack voltage range (784 ~ 1,080V)

before putting the covers back on.

STEP 7: Push the covers back onto the battery electrode lugs. Hearing a "click" sound to make sure covers are properly installed.

8.4.2 GROUNDING

Refer to section 7.3.2.2 for grounding details.

8.4.3 COPPER BAR CONNECTION

IMPORTANT

THE INSTALLATION SURFACE OF THE COPPER BUSBARS MUST BE FREE OF IMPURITIES, FOREIGN MATTER, OIL POLLUTION, FLATNESS, AND GOOD CONTACT BETWEEN THE TWO COPPER BUSBARS.

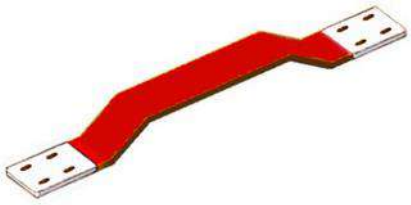


Figure 8-7: Cabinet connect to copper bar (positive)

Figure 8-8: Cabinet connect to copper bar (negative)

- The copper bars pass through the rubber sleeve between the two cabinets according to the positive and negative poles position (the positive of the copper bar is on the inside and the negative of the copper bar is on the outside).

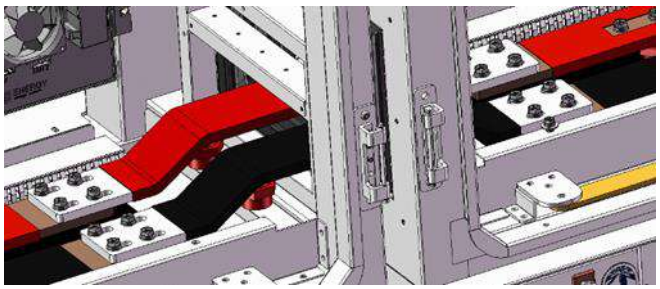


Figure 8-9: COPPER BAR CONNECTION

- The installation surface fits the copper busbar inside the cabinet, and M8 bolts (torque 20Nm) are used to lock the installation to complete the installation of the

crossover copper busbar of the cabinet.

- Isolating switch QS1 and BCP internal circuit breaker is in OFF state.
- The positive and negative copper bars are respectively connected to the adjacent two cabinets.

8.4.4 BATTERY COMM. AND AUX. CONNECTION

IMPORTANT

THE HEAD OF THE CONNECTORS FOR THE FAN POWER SUPPLY LINE AND THE COMMUNICATION LINE CONTAINS AN ANTI-INSERTION FUNCTION.

All the power cable connections between the battery modules will be done by SYL before shipment. Please refer to the following sketch for connecting the BMS communications between the DC switchgear unit and the modules, as well as the fan power cabling.

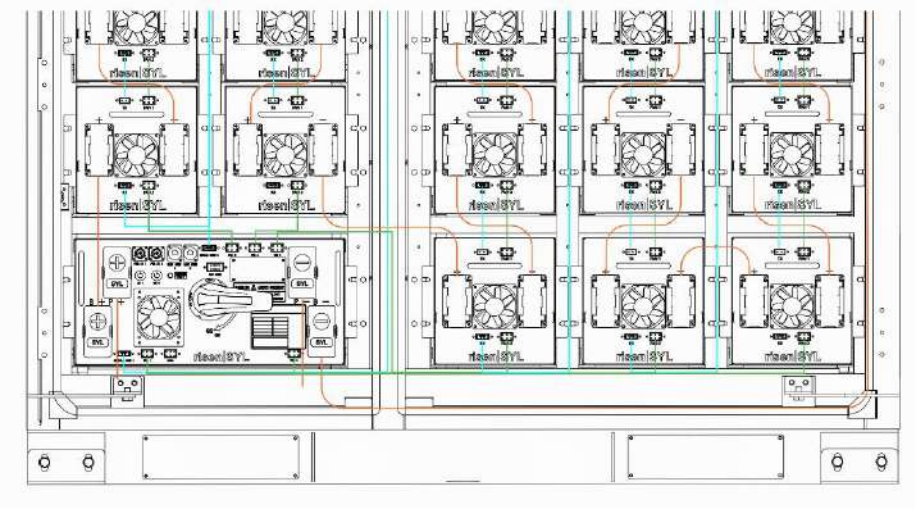


Figure 8-10: Cable and Harness

Figure 8-11: The XT1 terminal block in the battery cabinet(For reference only)

Figure 8-12: The XT2 terminal block in the battery cabinet(For reference only)

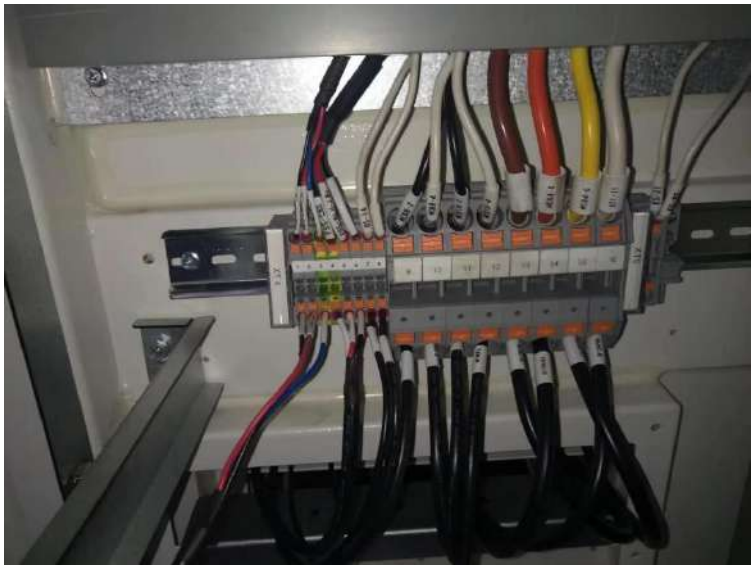


Figure 8-13: The XT4 terminal block in the BCP(For reference only)

After the cable connection is complete, check whether the cable is connected correctly according to Section 8.5.

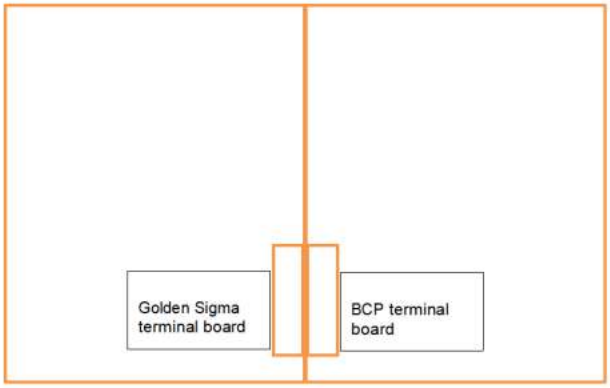


Figure 8-14: Cable connection between BCP and Golden Sigma

After connecting BCP to Golden Sigma, then connect Golden Sigma to the next Golden Sigma. Refer to Section 8.5 for connection list.

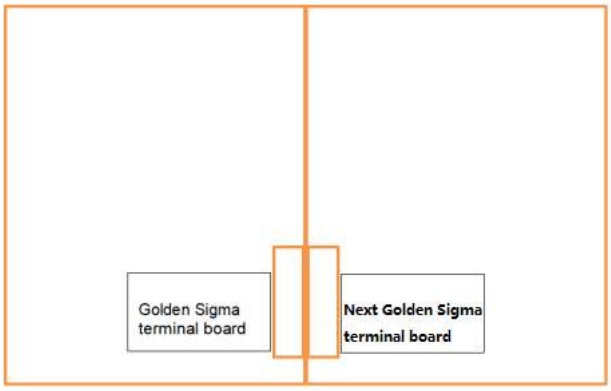


Figure 8-15: Cable connection between Golden Sigma

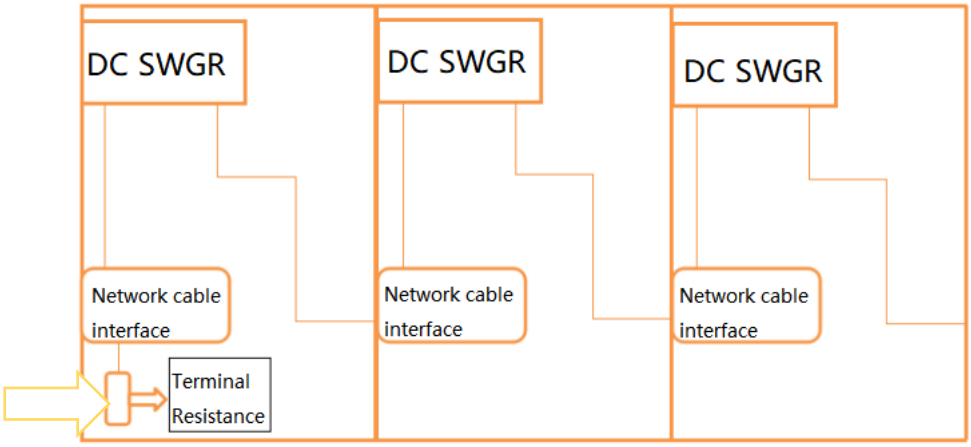


Figure 8-16: Terminal resistance

Figure 8-17: Network Transfer Interface

As for the communication cable connection between two BCPs in one block, plug the two ends of the cable into the network ports of the switches within the two BCPs.

8.4.5 THE HVAC COMMUNICATION SIGNAL ENHANCE

The solution is to adopt communication wire harness to achieve the direct communication between HVAC and BMS, then the BMS uploads the HVAC data to Golden shield. In this way, the stablibe of the communication can be enhanced.

Connect one end of the 485 communicate cable to the communication port of HVAC. Connect the BAU external communicate harness to BAU. Then connect the other end of the 485 communicate harness to the N4 terminal of the BAC external communicate harness.

Then connect one end of another 485 communicate cable to the communication port of HVAC. Connect the BCU external communicate harness to BAU. Then connect the other end of this 485 communicate harness to the N1 terminal of the BCU external communicate harness.

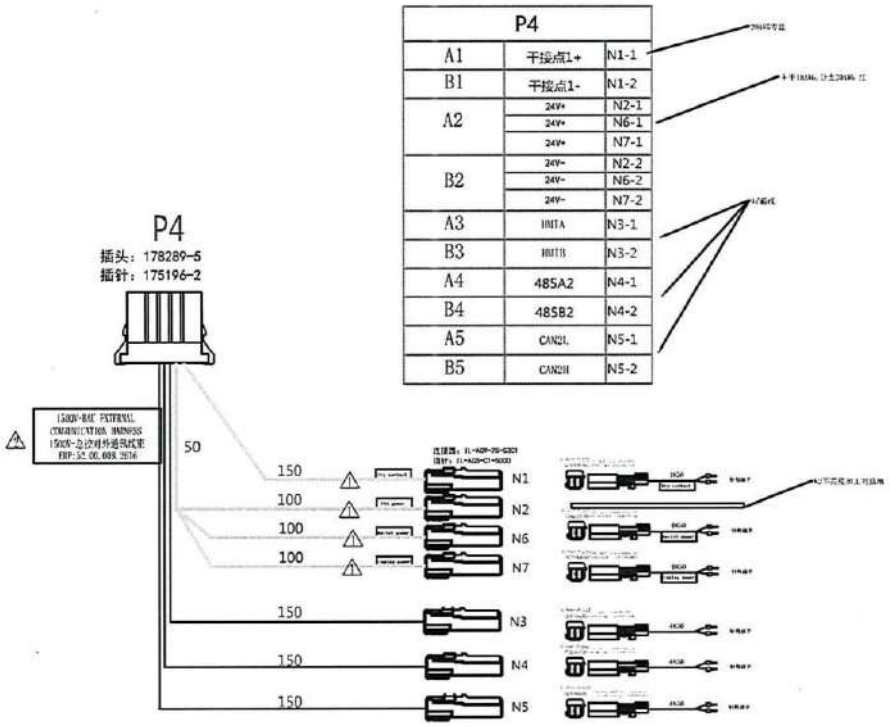


Figure 8-18: BAU external communication harness

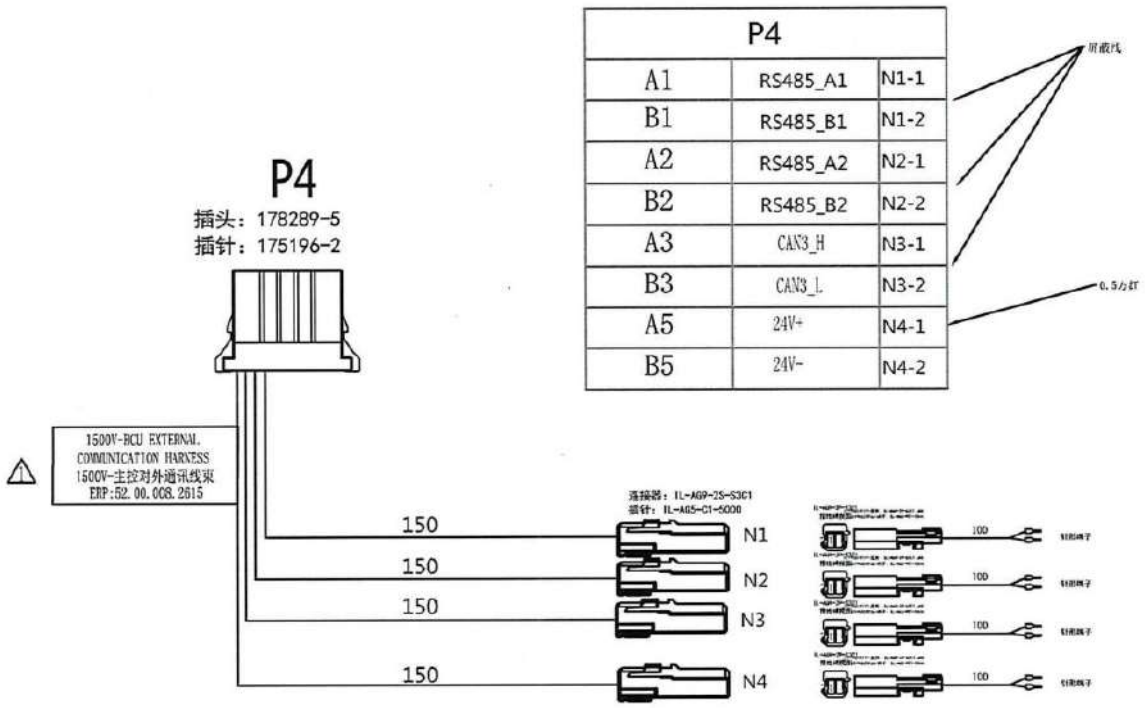


Figure 8-19: BCU external communication harness

8.4.6 BATTERY MODULE JUMPER CONNECTION

DANGER

PLEASE BE AWARE THAT THE BATTERIES PRESENT A RISK OF ELECTRICAL SHOCK INCLUDING A HUGE SHORT-CIRCUIT CURRENT. MUST WEAR THE INSULATION GLOVES WHEN CONNECTING THE BATTERY JUMPERS.

WARNING

THE TOOLS USED FOR BATTERY POWER CONNECTION INSTALLATION SHOULD BE INSULATED OR SHOULD HAVE A MINIMIZED EXPOSED METAL AREA. AT LEAST THE GRIP PART SHOULD BE INSULATED.

Four of the battery jumpers between the modules have been removed for safety during transportation. The locations of the removed jumpers as shown in the following picture.

Figure 8-20: Location of the removed jumper

Remove the connector cap and connect the jumper with insulated tools. Wear insulation gloves when connecting the jumpers. The torque of the bolt on the connector is 10Nm.

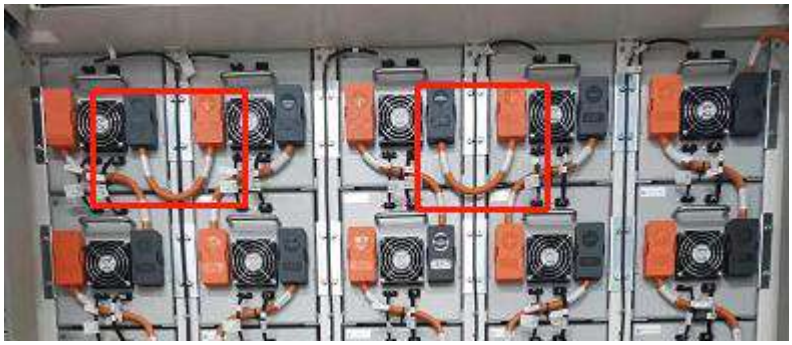


Figure 8-21: Cabinet connect to power cable

8.5 EXTERNAL INTERFACE

1) Terminal block interface

BCP is connected on the left side of the battery cabinet:

BCP-XT4

XT4	Battery cabinet contact terminal		
	1	CAN-H	BAU-CANH
	2	CAN-L	BAU-CANL
	3	PE	CAN-GND
	4	PE	FSS-GND
	5	FSS+	FSS+
	6	FSS-	FSS-
	7	SQ01	SQ-01
	8	SQ02	SQ-02
	9	BMS-L	BMS-L
	10	BMS-N	BMS-N
	11	FAN-L	FAN-L
	12	FAN-N	FAN-N
	13	A	HVAC-A
	14	B	HVAC-B
	15	C	HVAC-C
	16	N	HVAC-N
3-4(PT2.5-PE) 1-2/5-8(PT2.5) 9-16 (PT16)			

BAT1

XT1	Battery Cabinet terminal XT1		
FSS-GND	1	PE	FSS-GND
FSS-01+	2	FSS+	FSS+
FSS-01-	3	FSS-	FSS-
SQ-03-1	4	SQC1	SQ-01
SQ-04	5	SQC2	SQ-02
BMS-L-1	6	BMS-L	BMS-L
PWR IN 1	7		
BMS-N-1	8	BMS-N	BMS-N
PWR IN 1	9		
FAN-L-1	10	FAN-L	FAN-L
PWR IN 2	11		
FAN-N-1	12	FAN-N	FAN-N
PWR IN 2	13		
HVAC-A-1	14	A	HVAC-A
	15		
HVAC-B-1	16	B	HVAC-B
	17		
HVAC-C-1	18	C	HVAC-C
	19		
HVAC-N-1	20	N	HVAC-N
	21		
1(TP2.5-PE) 2-5(TP2.5) 6-21 (TP10)			

XT2	Battery Cabinet terminal XT2		
FSS-GND	1	PE	
FSS-03+	2	FSS+	FSS+
FSS-03-	3	FSS-	FSS-
SQ-03-2	4	SQ01	SQ-01
SQ-04	5	SQ02	SQ-02
BMS-L-1	6	BMS-L	BMS-L
	7		
BMS-N-1	8	BMS-N	BMS-N
	9		
FAN-L-1	10	FAN-L	FAN-L
	11		
FAN-N-1	12	FAN-N	FAN-N
	13		
HVAC-A-1	14	A	HVAC-A
	15		
HVAC-B-1	16	B	HVAC-B
	17		
HVAC-C-1	18	C	HVAC-C
	19		
HVAC-N-1	20	N	HVAC-N
HVAC-N	21		
1(TP2.5-PE) 2-6(TP2.5) 6-21 (TP10)			

TO BAT1-XT1

TO BAT1 S/G COMM1

TO BCP-XT4

TO NEXT BAT-XT1

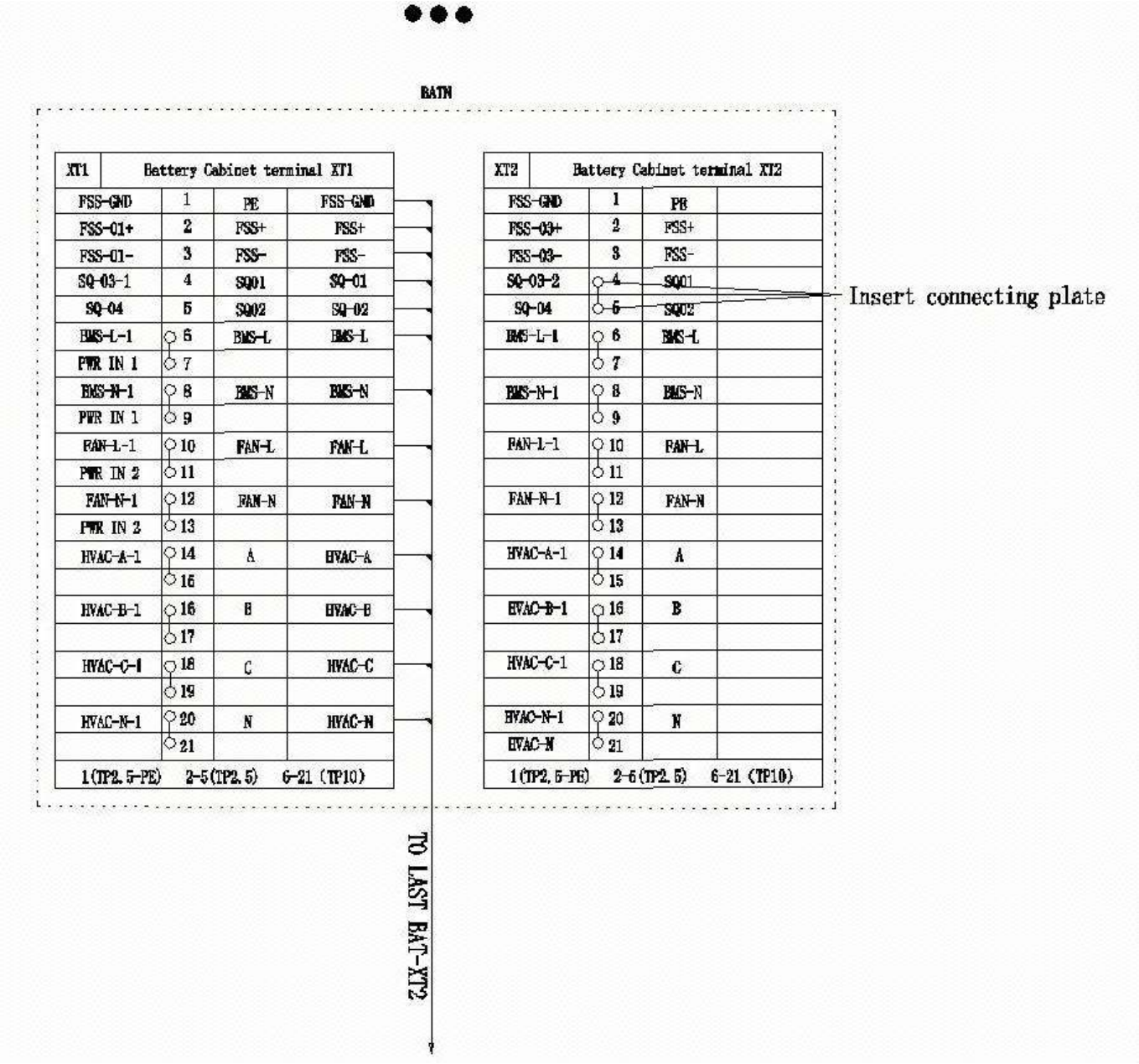
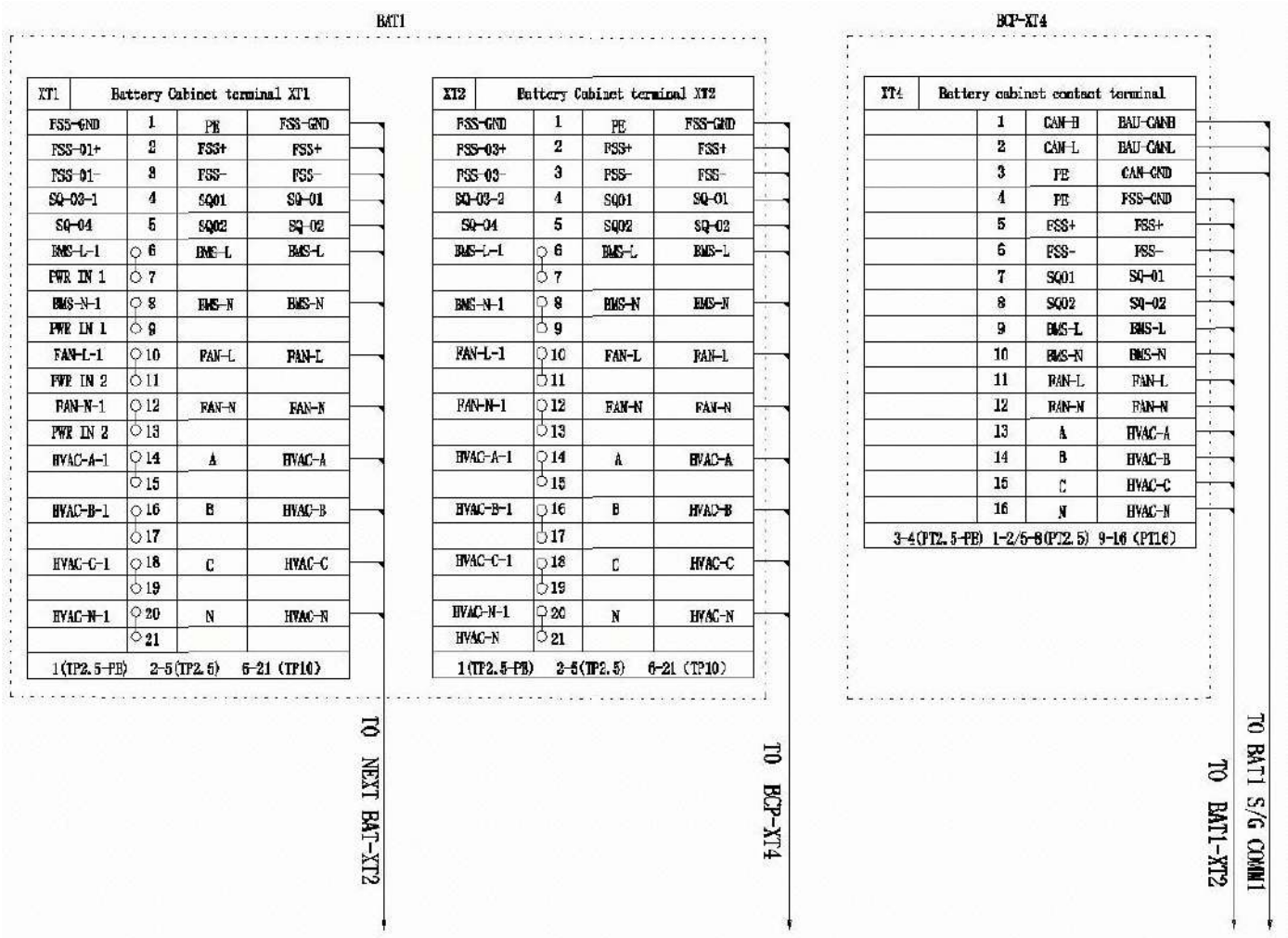


Figure 8-22: Connection list when BCP is connected on the left side of the battery cabinet

As shown in the figure, terminals 4 and 5 of terminal block XT2 in the last air cooling cabinet need to be shorted with connecting plates or cables.

BCP is connected on the right side of the battery cabinet:


BAT1
XT1 Battery Cabinet terminal XT1
FSS-GND 1 PE FSS-GND
FSS-01+ 2 FSS+ FSS+
FSS-01- 3 FSS- FSS-
SQ-03-1 4 SQ01 SQ-01
SQ-04 5 SQ02 SQ-02
BMS-L-1 6 BMS-L BMS-L
PWR IN 1 7
BMS-N-1 8 BMS-N BMS-N
PWR IN 1 9
FAN-L-1 10 FAN-L FAN-L
PWR IN 2 11
FAN-N-1 12 FAN-N FAN-N
PWR IN 2 13
HVAC-A-1 14 A HVAC-A
15
HVAC-B-1 16 B HVAC-B
17
HVAC-C-1 18 C HVAC-C
19
HVAC-N-1 20 N HVAC-N
21
1(TP2.5-PE) 2-5(TP2.5) 6-21 (TP10)
XT2 Battery Cabinet terminal XT2
FSS-GND 1 PE FSS-GND
FSS-03+ 2 FSS+ FSS+
FSS-03- 3 FSS- FSS-
SQ-03-2 4 SQ01 SQ-01
SQ-04 5 SQ02 SQ-02
BMS-L-1 6 BMS-L BMS-L
7
BMS-N-1 8 BMS-N BMS-N
9
FAN-L-1 10 FAN-L FAN-L
11
FAN-N-1 12 FAN-N FAN-N
13
HVAC-A-1 14 A HVAC-A
15
HVAC-B-1 16 B HVAC-B
17
HVAC-C-1 18 C HVAC-C
19
HVAC-N-1 20 N HVAC-N
HVAC-N 21
1(TP2.5-PE) 2-5(TP2.5) 6-21 (TP10)
TO NEXT BAT-XT2
TO BCP-XT4
BCP-XT4
XT4 Battery cabinet contact terminal
1 CAN-H BAU-CANH
2 CAN-L BAU-CANL
3 PE CAN-GND
4 PE FSS-GND
5 FSS+ FSS+
6 FSS- FSS-
7 SQ01 SQ-01
8 SQ02 SQ-02
9 BMS-L BMS-L
10 BMS-N BMS-N
11 FAN-L FAN-L
12 FAN-N FAN-N
13 A HVAC-A
14 B HVAC-B
15 C HVAC-C
16 N HVAC-N
3-4(PT2.5-PE) 1-2/5-8(PT2.5) 9-16 (PT16)
TO BAT1-XT2
TO BAT1 S/G COMM1

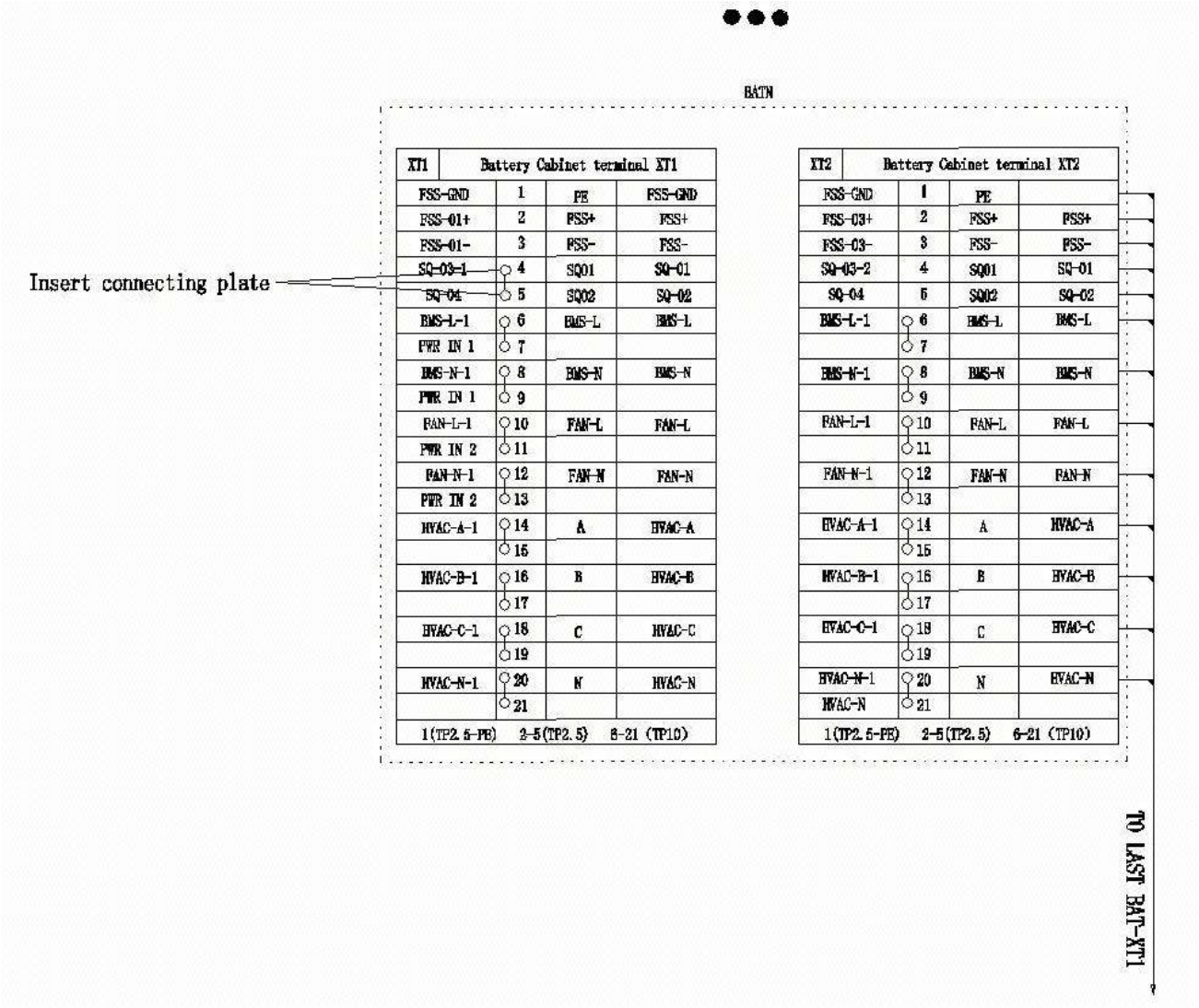


Figure 8-23: Connection list when BCP is connected on the right side of the battery cabinet

As shown in the figure, terminals 4 and 5 of terminal block XT1 in the last air cooling cabinet need to be shorted with connecting plates or cables.

8.6 AUTOMATIC UPS BYPASS MAINTENANCE FUNCTION

Figure 8-24: UPS maintenance bypass

The UPS is equipped with an external automatic bypass maintenance circuit. When the UPS has no output, KM1 automatically supplies power from the bypass while the charging and discharging process of the system not being affected. When you switch to the maintenance bypass mode, Golden Shield transmits the UPS output status to the EMS. You can determine the UPS fault based on the status and check the UPS after the charging and discharging process is complete.

8.7 DC SWITCHGEAR AND PACK DESCRIPTION

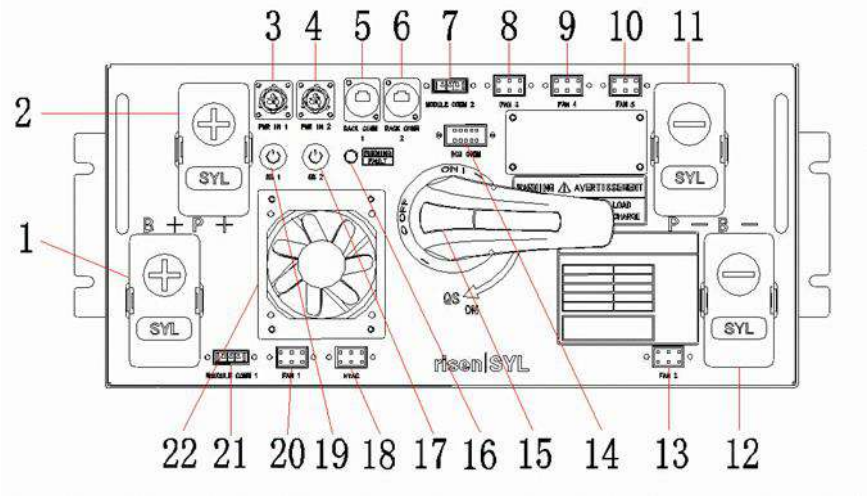


Table 8-2: Interface Connectors of DC Switchgear

No.	Item	Function	Description
1	B+	Battery Positive	Connect to the highest module +
2	P+	PCS Negative	Connect to DC bus -
3	PWR IN 1	Aux power in	BMS 220Vac Aux power in

4	PWR IN 2	Aux power in	FAN 220Vac Aux power in
5	RACK COMM 1	Rack communication	Connect to the next COMM2
6	RACK COMM 2	Rack communication	Connect to the next COMM1
7	MODULE COMM 2	Module communication	BCU & BMU communication
8	FAN 3	FAN power out 3	FAN 24VDC power out
9	FAN 4	FAN power out 4	FAN 24VDC power out
10	FAN 5	FAN power out 5	FAN 24VDC power out
11	P-	PCS Negative	Connect to DC bus +
12	B-	Battery Positive	Connect to the highest module -
13	FAN 2	FAN power out 2	FAN 24VDC power out
14	BCU COMM	BCU communication	(BCU only)
15	QS	Break Switch	To connect and cut off the main circuit in
16	RUNNING/FAULT	State indicator	Battery Rack system status
17	SB 2	Switch Button 2	Power control of PWR IN 2
18	HVAC	HVAC communication	HVAC communication
19	SB 1	Switch Button 1	Power control of PWR IN 1
20	FAN 1	FAN power out 1	FAN 24VDC power out
21	MODULE COMM 1	Module communication	BCU & BMU communication 1
22	FAN	Module cooling fan	Module cooling fan

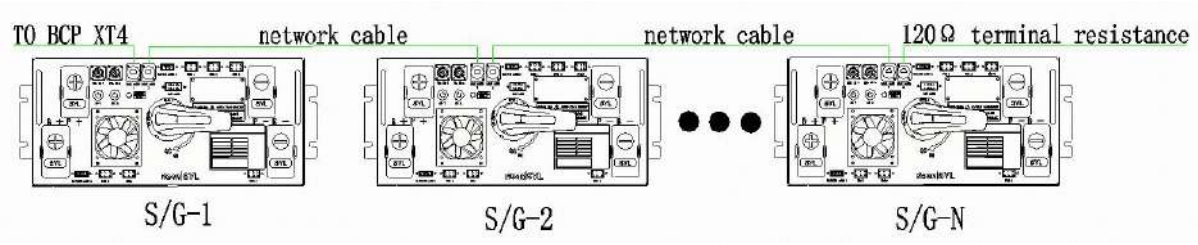


Figure 8-25: Communication connection of DC Switchgears

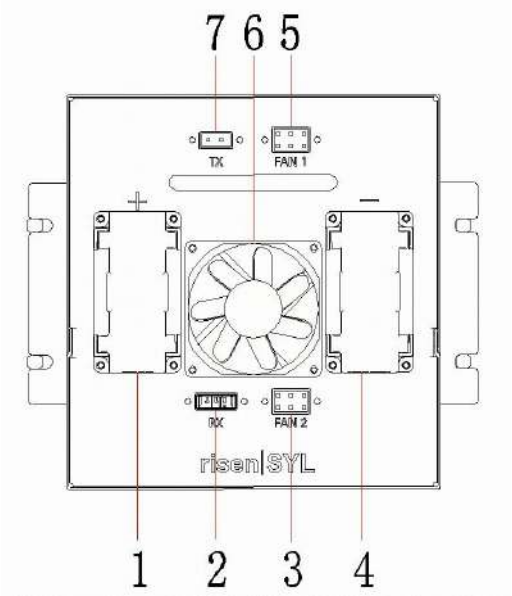


Table 8-3: Interface Connectors of PACK

No.	Item	Function	Description
1	+	Battery Positive	Battery Positive
2	RX	Module communication	Daisy chain communication sender
3	FAN2	Module fan power supply	Module fan power supply terminal 2
4	-	Battery Negative	Battery Negative
5	FAN1	Module fan power supply	Module fan power supply terminal 1
6	FAN	Fan	Module cooling fan
7	TX	Module communication	Daisy chain communication receiver

9 COMMISSIONING

After checking all wiring points, make sure the wire harness is not missing or loose. All personnel is forbidden to touch any original device and metal part before power-on operation. Keep a safe distance from the container.

When powering on the device for the first time, professionals must set the parameters correctly. Incorrect Settings may affect the normal operation of the device.

9.1 PRE-COMMISSIONING OF BCP

To ensure the long-term reliable and safe operation of your energy storage system, please read and follow the instructions carefully.
[Note] SYL is not responsible for battery damage and other losses caused by using it not per the specified requirements or using it beyond the specified range. Put into use chapter.

9.1.1 CABLE CONNECTION CONFIRMATION

- Before the formal power-on, according the connection table we provided, check the connecting cables of the entire system to ensure that the cables are connected reliably, without aging, fracture, and insulation damage.
- Check whether the positive and negative poles of the input DC busbar of the BCP are connected correctly.
- Check whether the positive and negative poles of the output DC power cables of the BCP are correctly connected.
- Check whether all communication cables and connection terminals are connected tightly and reliably.

9.1.2 DEVICE SWITCH STATUS CHECK

- Check whether all the components are significantly damaged or falling off by visual check.
- Check whether all internal circuit breakers of the BCP are in an open state. It is necessary to keep the open state before power-on, and the lines controlled by each circuit breaker are kept in the open state. The location diagram and function of all internal circuit breakers are shown below.

Figure 9-1: Internal circuit breakers of BCP (For reference only)

Table 9-1: MCB0~MCB10

MCB0	MCB1	MCB2	MCB3	MCB4	MCB5	MCB6
Main switch on	Socket	SPD1	HVAC#0	HVAC#1-#10	UPS	Automatic switchover

MCB7	MCB8	MCB9	MCB10
U1	BMS Power Supply	FSS power supply	Fans in battery cabinet

9.2 POWER-ON PROCEDURES

9.2.1 POWER ON THE SECONDARY CIRCUIT

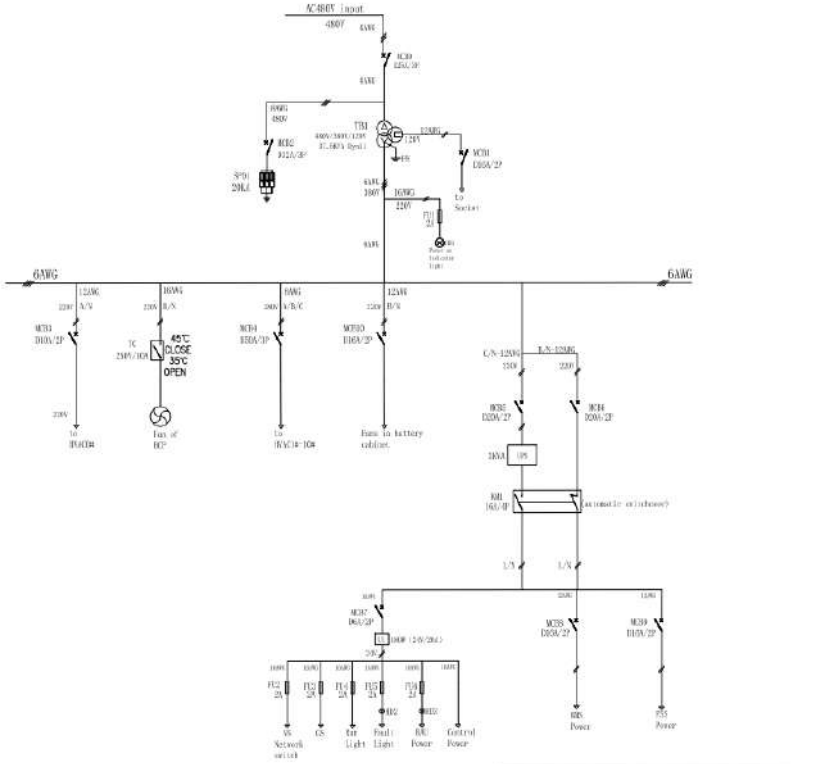
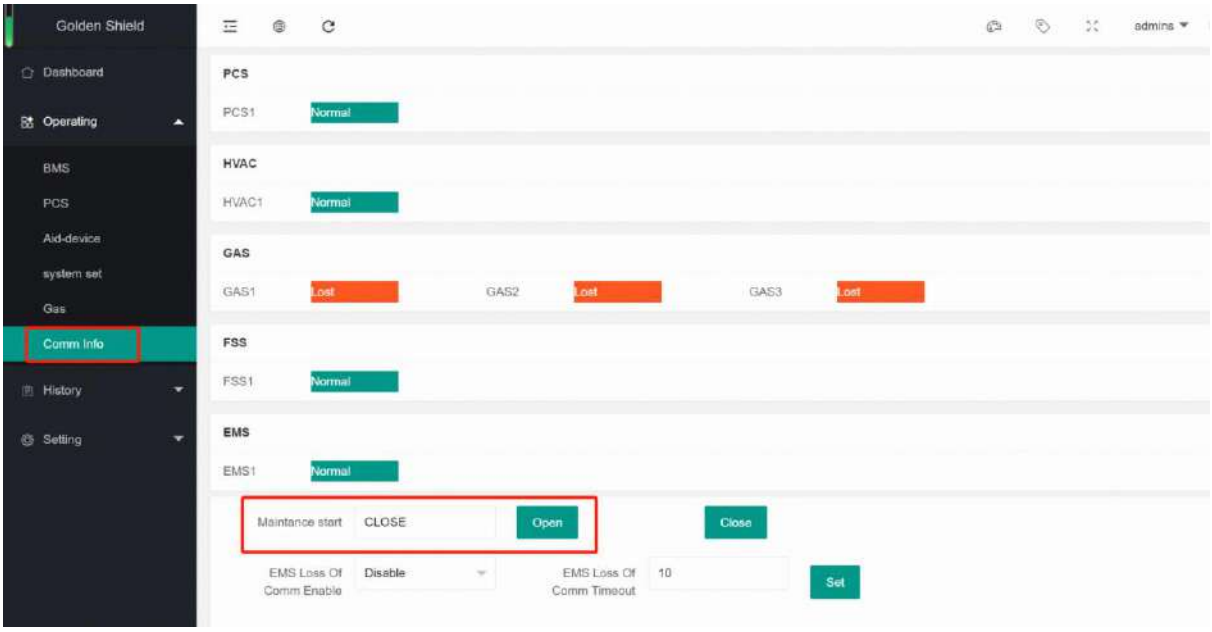


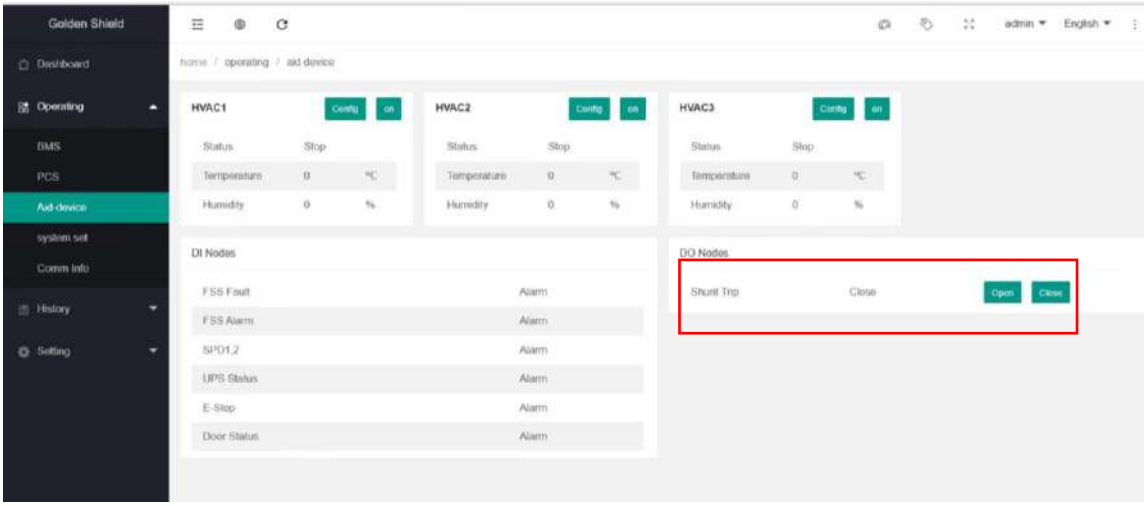
Figure 9-2: Auxiliary connection(for reference only)

STEP 1: After the UPS battery cable is plugged in, click the UPS start button and enter the UPS battery output mode according to the UPS LCD panel display.

STEP 2: Close MCB7, connect the network cable to the laptop through COMM on the cabinet door. Change the IP address of the PC to 192.168.1.150, open the browser, and enter http://192.168.1.136 to access the WEB page. Locate the Comm Info page on the WEB page, and change the Maintance Start option to OPEN. As shown in the figure below.



STEP 3: Enter the Aid-device page to ensure that the Shunt Trip option is in the OPEN state.



STEP 4: After the operation and maintenance mode is changed, close MCB0 to MCB6, MCB8 to MCB10 in sequence.

After the debugging is complete, close the cabinet door, and change the Maintance Start option to CLOSE on the WEB page.

Note:

After the mains power supply is connected, the indicator status of the BCP at this time shown below.

System status	Secondary circuit power indicator	Running lights	Fault indicator
Start	Green light on	Red light on	Yellow light off

If the combination of the on and off of each status indicator does not match the above list, it means that the system has not started normally, just repeat the steps.

If it still does not start normally, please contact the manufacturer for system troubleshooting.

9.2.2 POWERING ON THE MAIN CIRCUIT

STEP 1: After the secondary circuit is powered on, press the SB1 (BMS power button), and SB2 (Fan power button), and close the cabinet door. After the door is closed, the contactors will be closed, and the system enters in standby mode.

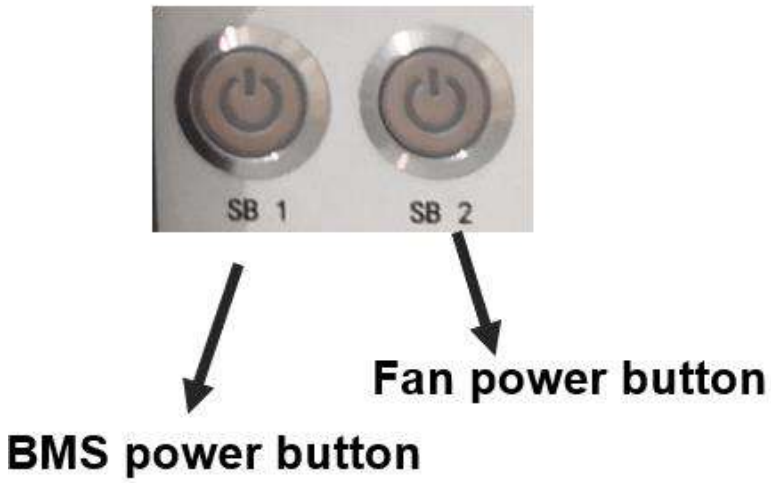


Figure 9-3: BMS and Fan Power Button

a. If the indicator shows red (Figure 9-4 red circle), which means the contactor is not closed, it is necessary to check whether there is a fault in the circuit system or whether the switch is closed.

b. If the indicator shows green, which means that all circuits and communication are normal, the contactor is in the closed state, the system is in the standby state.

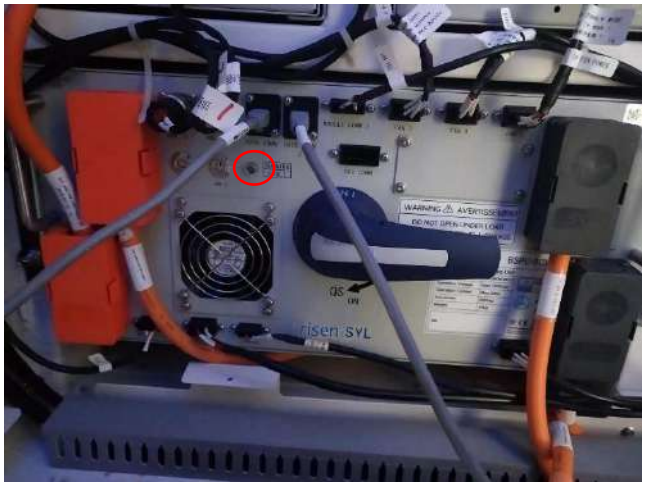


Figure 9-4: The indicator on the DC Switchgear(For reference only)

STEP 2: Switch the QS of the DC switchgear to "ON" state, as shown in the figure below.

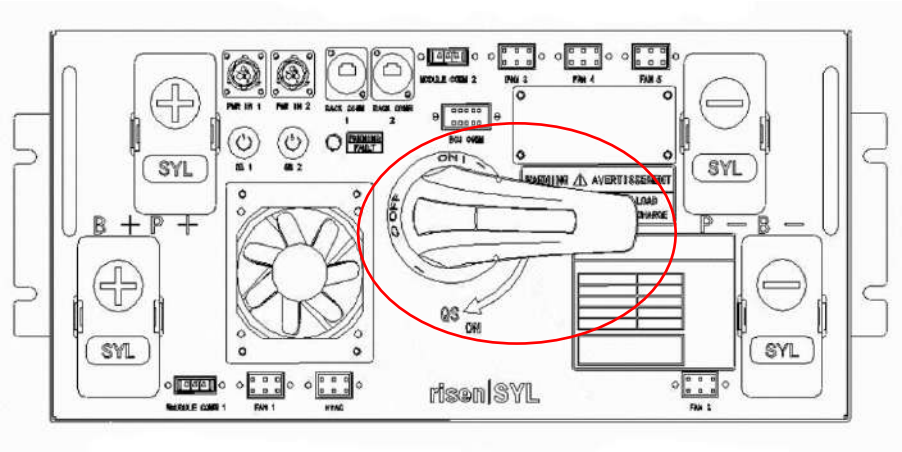


Figure 9-5: The QS of the DC Switchgear

9.3 POWER-OFF PROCEDURES

9.3.1 POWER OFF THE MAIN CIRCUIT

STEP 1: Switch the QS of the DC switchgear to "OFF" state.

STEP 2: Turn off SB1, SB2 on the DC switchgear.

9.3.2 POWER OFF THE SECONDARY CIRCUIT

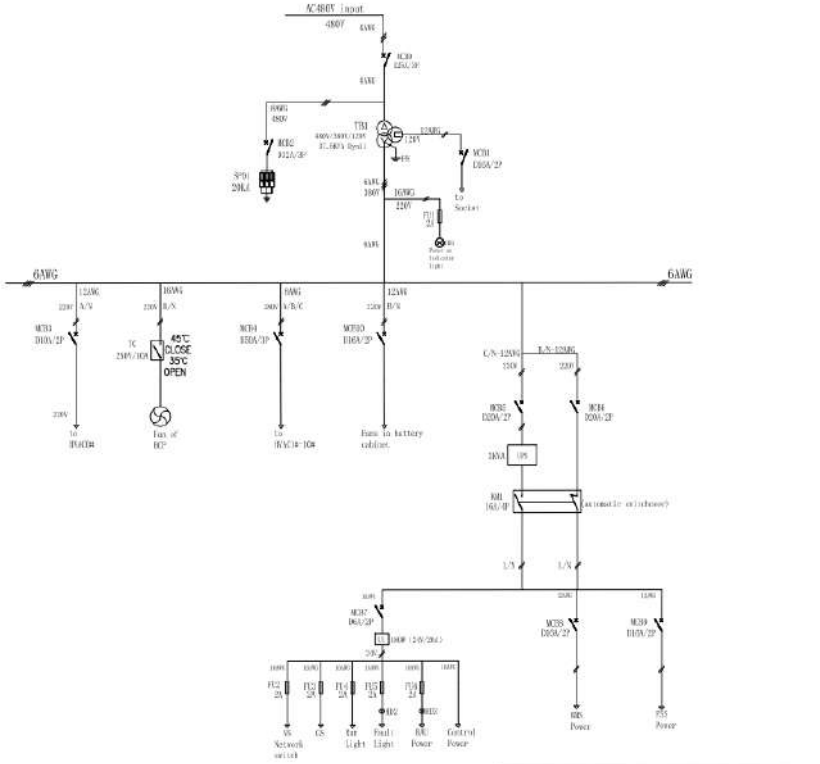


Figure 9-6: Auxiliary connection(for reference only)

STEP 1: Disconnect MCB10 to MCB8, MCB6 to MCB1, MCB7 in sequence.

system status	Secondary circuit power indicator	Running lights	Fault indicator
Shut down	Green light off	Red light off	Yellow light off

If the combination of the on and off of each status indicator does not match the above list, it means that the system has not started normally, just repeat the steps.

If it still does not shut down normally, please contact the manufacturer for system troubleshooting.

9.4 POWER-OFF PROCEDURE WHEN A FAULT OUCCRES

If there is a fault occurs, firstly disconnect the corresponding switch, and then please refer to the section 9.3 to power off the main circuit and secondary circuit.

9.5 LOCK OUT TAG OUT

After powering off the whole battery system, and make sure that the circuit breakers/contactors of DC side are all disconnected, then the customer can proceed the "LOTO" procedure.

DANGER

FOLLOW ALL THE APPLICABLE LOCK-OUT TAG-OUT (LOTO) PROCEDURES AT ALL TIMES. IF PROPER LOTO PROCEDURES ARE NOT FOLLOWED, IT MAY RESULT IN SERIOUS INJURY OR DEATH.

WITH POWER APPLIED TO THE BATTERIES, HAZARDOUS VOLTAGES ARE PRESENT ON SOME COMPONENTS.

TO PREVENT ACCIDENTAL DEATH OR INJURY, DO NOT TOUCH ANY COMPONENTS WITHIN THE ENCLOSURE UNLESS YOU ARE SPECIFICALLY DIRECTED TO DO SO. TO REDUCE THE RISK OF ELECTRICAL SHOCK, MAKE SURE THAT ALL EQUIPMENT IS PROPERLY GROUNDED.

WARNING

ENCLOSURES/CASES SHALL REMAIN CLOSED EXCEPT WHEN ACCESS TO THE INTERIOR IS REQUIRED. IF POSSIBLE, PERSONNEL SHOULD KEEP A SAFE DISTANCE FROM ENCLOSURES/ CASES WHENEVER THE EQUIPMENT IS ENERGIZED. ALWAYS COMPLY WITH LOCAL, STATE, AND NATIONAL LOCK OUT/TAG OUT (LOTO) GUIDELINES WHEN WORKING WITH OR NEAR THE BATTERIES. THE LOTO PROCEDURES SHOULD MEET OR EXCEED THE REQUIREMENTS OF ALL GUIDELINES PRESENTED IN SYL SAFETY DOCUMENTATION.

COMPLETE THE SITE/LOCAL SAFETY TRAINING BEFORE ENTERING POTENTIALLY HAZARDOUS AREAS OR BEGINNING WORK ON THE BATTERIES.

9.5.1 CABINET LOCK OUT TAG OUT PROCEDURE

DANGER

IT IS HIGHLY RECOMMENDED TO SHUT DOWN THE WHOLE BATTERY BLOCK UNDER THE SAME BCP TO PERFORM ANY MAINTAINANCE WORK INSTEAD OF SHUTTING DOWN ONE OR SEVERAL CABINETS IN THE BLOCK. AS THERE ARE CERTAIN PARTS OF THE CABINET STILL LIVE WITH FATAL VOLTAGE PRESENTS EVEN THE DISCONNECTING SWITCH ON THE BATTERY SWITCHGEAR IS OPEN.

DO NOT KEEP THE BATTERY BLOCK IN OPERATION WHILE SERVICING ONE OF THE CABINETS IN THE BLOCK.

STEP 1: Select padlocks with the diameter of the lock bar between 6 to 8 mm.

STEP 2: Follow the shutdown procedure to shut down the cabinet properly.

STEP 3: Rotate the handles on the battery switchgear inside the cabinet to the 'OFF' position to open the disconnecting switch.

STEP 4: Push the end with bumpers on the white button of the handle to get the holes on

the handle for locks. Three holes on the handle allow three locks at the same time.

Figure 9-7: Holes on the Handle

STEP 5: Put the lock onto the handle as shown in the figure below to finish the lockout procedure.

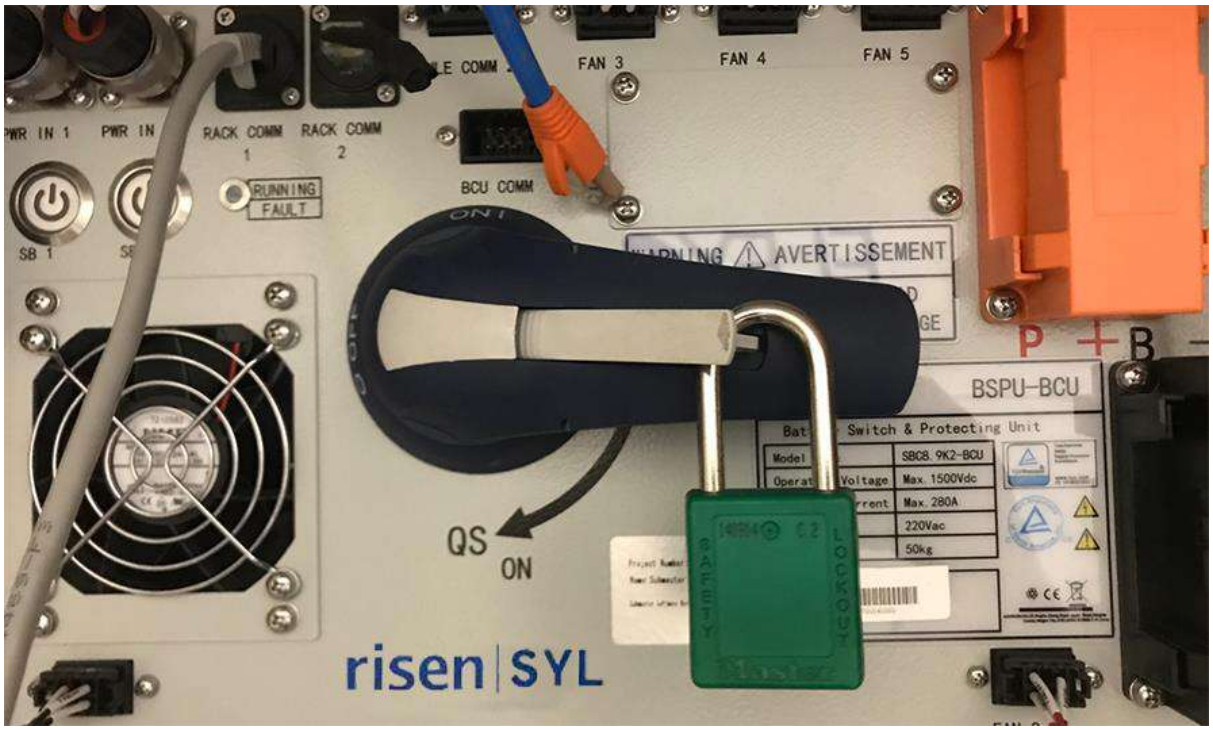


Figure 9-8: Lock the Handle

STEP 6: Put the tag on the lock as the 'tag out' procedure.

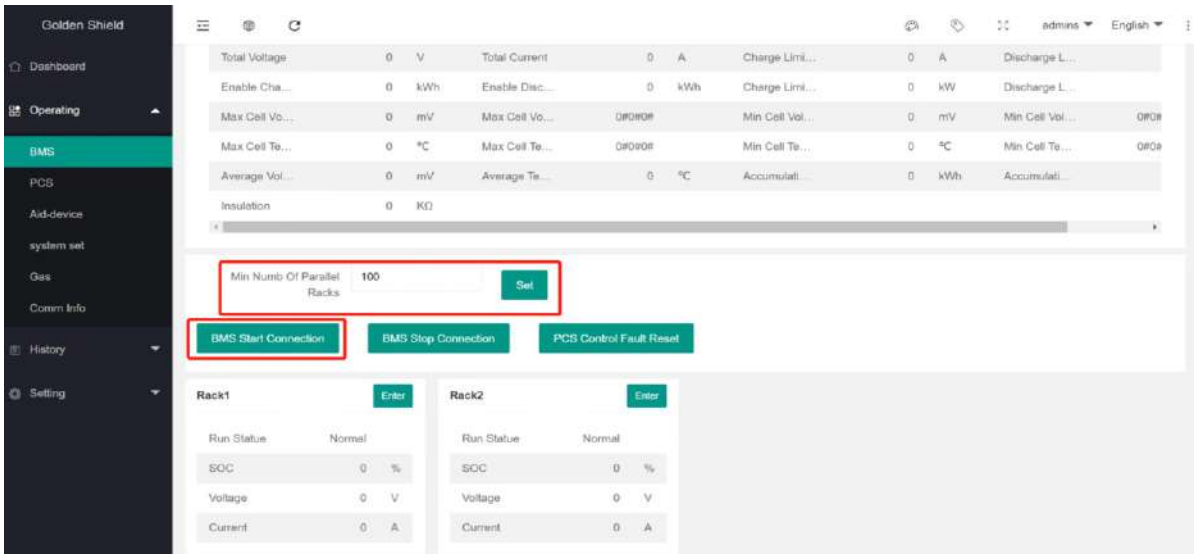
9.6 BCP STATUS LIST

system status	Secondary circuit power indicator	Running lights	Fault indicator
Shut down	Green light off	Red light off	Yellow light off
Fault	Green light on	Red light off	Yellow light on
Start	Green light on	Red light on	Yellow light off

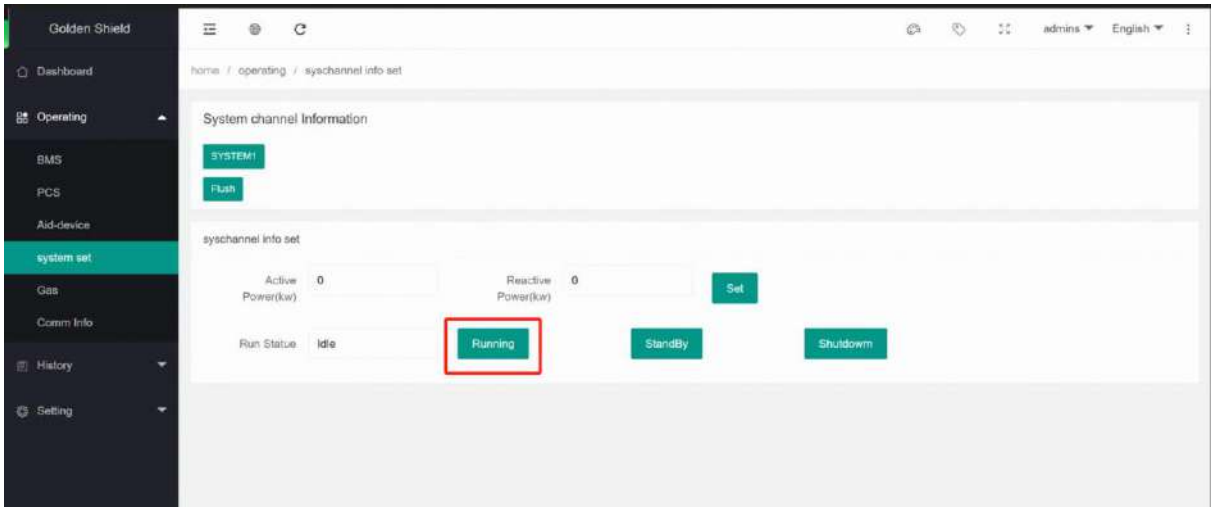
9.7 MANUAL CHARGE AND DISCHARGE PROCEDURE

STEP 1: When the system is in normal standby state, the BCP POWER indicator (green) is on, and the yellow and red indicators are off. PCS FAULT indicators are on.

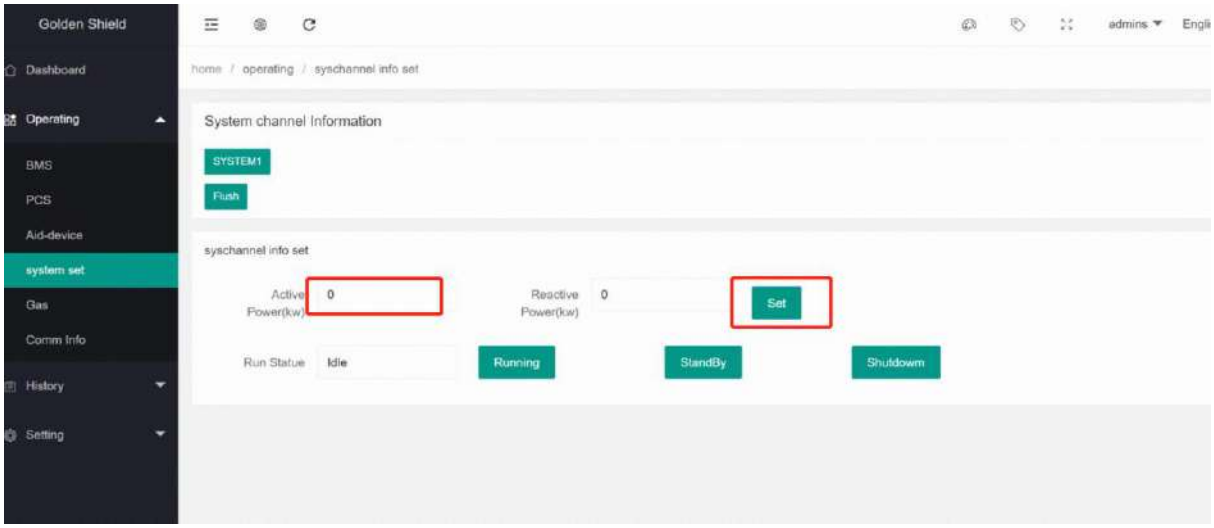
STEP 2: Enter the BMS page on the WEB page and click BMS Start Connection. After that, the contactors in the DC switchgears of the air cooling cabinets are closed one by one. The BCP copper bar is equipped with high voltage, the BCP RUN indicator (red) is on, and the PCS STANDBY indicators are on.



STEP 3: Enter the system set page on the WEB page and click Running. Then the PCS RUN indicators are lighted up one by one.



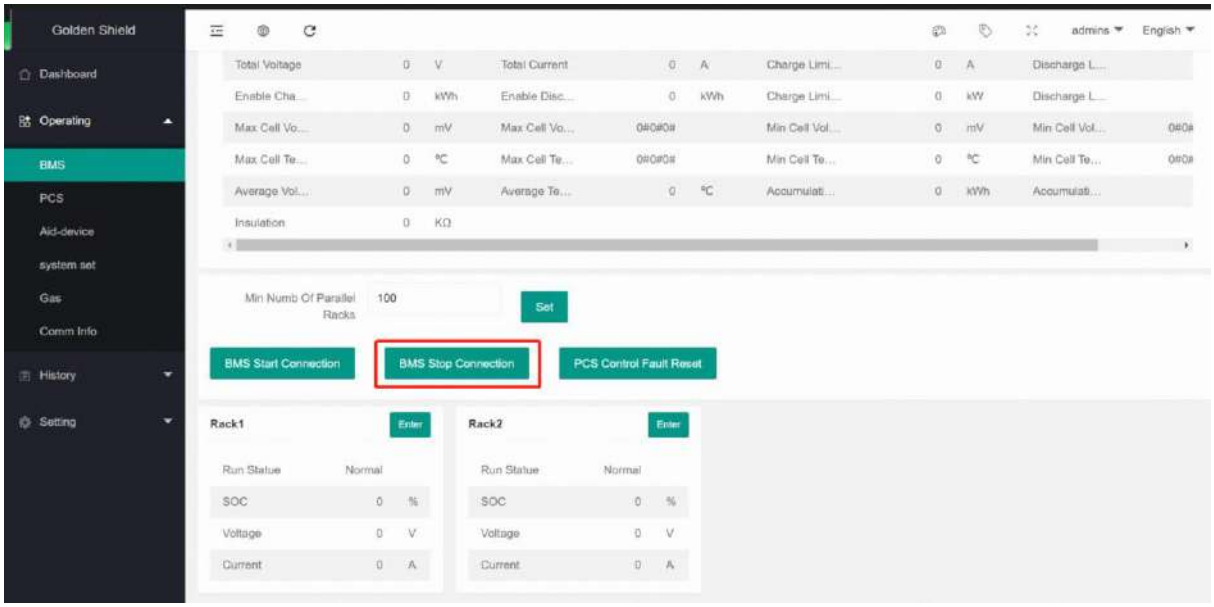
STEP 4: After typing charge (negative value) or discharge power (positive value) in Active Power, click Set and the system will enter charge/discharge mode.



STEP 5: You can view the AC and DC data during charging and discharging on the PCS BMS page.

STEP 6: Type 0 in Active Power and click Set. The system will reduce the power to 0.

STEP 7: Enter the BMS page on the WEB page and click BMS Stop Connection. Then the contactor in the DC switchgears of the air cooling cabinets is disconnected, the BCP RUN indicator (red) is off, and the PCS RUN indicators are off.


Golden Shield
Dashboard
Operating
BMS
PCS
Aid-device
system set
Gas
Comm Info
History
Setting
admins
English
Total Voltage
Total Current
Charge Limi...
Discharge L...
Enable Cha...
Enable Disc...
Max Cell Vo...
Min Cell Vol...
Max Cell Te...
Min Cell Te...
Average Vol...
Average Te...
Accumulati...
Insulation
Min Numb Of Parallel Racks
100
Set
BMS Start Connection
BMS Stop Connection
PCS Control Fault Reset
Rack1
Enter
Rack2
Run Statue
Normal
SOC
Voltage
Current

10 OPERATION

10.1 SYSTEM OPERATION

To ensure the long-term safe and reliable operation of your energy storage system, please read and follow the instructions below:

NOTE

OUR COMPANY WILL NOT BE LIABLE FOR ANY DAMAGE CAUSED BY FAILURE TO USE THE BATTERY SYSTEM IN ACCORDANCE WITH THE SPECIFIED REQUIREMENTS OR BEYOND THE SPECIFIED RANGE AND OTHER LOSSES ARISING OUT OF SUCH DAMAGE.

10.1.1 GOLDEN SIGMA TEMPERATURE CHARACTERISTICS

- Operating ambient temperature: -30℃~50℃. If stored in a cold environment (e.g. 0°C) before installation, it will take some time to heat up before it can be recharged.
- Optimum operating ambient temperature: 0℃~45℃. When the ambient temperature is higher than 45 ° C or lower than 0 ° C, the battery charging and discharging power decreases.
- Safe storage ambient temperature: -30℃~60℃.
- Recommended storage environment temperature: 20℃~30℃.

10.1.2 CABLE CONNECTION CONFIRMATION

- Before power on, check the connection cable of the whole system, and make sure that the cable connection is reliable without aging fracture and insulation damage.
- Check whether the positive and negative poles of the DC output power cable in the Golden Sigma are connected correctly.
- Check whether the power connection of the battery cupboard is correct.
- Check whether all communication wires and cables and sub connections at the connection ends are tight and reliable.

Refer to Section 8.8 for details of DC swichgaer.

10.1.3 STATUS CHECKING OF EQUIPMENT SWITCH

- Close the QS circuit breaker switch on the DC switchgear of Golden Sigma.
- Press down switch button SB1, SB2.

10.1.4 SYSTEM STATES AND INDICATORS

The system states and indicators as follows.

INDICATOR	SYSTEM STATE
The green light is ON●	Normal standby, AC auxiliary power supply
The red light is ON●	DC connected
The yellow light is ON●	Warning exists

11 DC MAINTENANCE

11.1 MAINTENANCE AND REPLACEMENT REQUIREMENTS

DANGER

WHEN THE DEVICE IS RUNNING, A HIGH VOLTAGE MAY GENERATE ELECTRIC SHOCKS, RESULTING IN DEATH, SERIOUS PERSONAL INJURY, OR PROPERTY DAMAGE. THEREFORE, BEFORE PERFORMING ANY MAINTENANCE, POWER OFF THE DEVICE AND STRICTLY FOLLOW THE SAFETY PRECAUTIONS LISTED IN THIS MANUAL AND OTHER RELATED DOCUMENTS.

- Maintain the equipment when you are familiar with this manual and have appropriate tools and test devices.
- Before maintenance, power off the device and wait for the required time according to the delay discharge label. Ensure that the device is powered off.
- During maintenance, avoid irrelevant personnel from entering the maintenance site. Temporary warning signs or fences must be erected for isolation.
- If the equipment fails, please contact our after-sales service in time.
- Power on the device only after the fault is rectified; otherwise, the fault may be extended or the device may be damaged.
- Do not open the device without authorization, otherwise there will be a risk of electric shock, and the resulting failure is not covered by the warranty.
- Operation and maintenance personnel and professional technical personnel should be fully trained in safe use and maintenance of the device, and should be equipped with adequate preventive measures and personal protective equipment when performing operations.
- Before moving or reconnecting cables, cut off the power supply. After the internal energy discharge is complete and the multimeter is used to confirm that there is no dangerous voltage between the DC bus and the parts to be repaired inside the machine, the maintenance can begin.
- Battery maintenance should be performed or supervised by personnel familiar with batteries and the precautions required.
- Replace the battery or battery pack with a new one of the same type.

- After the maintenance, check to ensure that no tools or other components are left inside the device immediately.
- If the device is not used for a long period of time, you need to store and charge the batteries according to this manual.

11.2 TERMS EXPLANATION

Table 11-1: Terms Explanation

TERM	EXPLANATION
Normal operating	Refers to the system that works every day.
Intermittent operating	Refers to a system that does not have a fixed monthly running frequency and cannot guarantee daily work.
Long-time unused	The battery system has not started working for more than 3 months (the battery system needs to be charged to 40% SOC before being suspended).

11.3 OPERATING INSTRUCTIONS

Table 11-2: Operating Instructions

TERM	INSTRUCTION
Normal operating system	➢ Perform battery maintenance on the system every twelve months to prevent battery damage. Refer to Section 11.5 for specific maintenance operating methods. ➢ Inspect ESS every twelve months (refer to Appendix 1) and make inspection record.
Intermittent operating system	➢ The operating instructions are the same as those of a normal operating system.
Long-time unused system	➢ SOC range of battery storage: 30%~50%., avoid long-term storage of batteries below 15% SOC. If the battery is not used for a long time, it is necessary to cut off the power-consuming equipment in time. ➢ Inspect ESS every three months (refer to Appendix 1) and make inspection record. ➢ Perform battery maintenance on the system every three months to prevent battery damage. Refer to Section 11.5 for specific maintenance operating methods. ➢ Before the first usage of a long-time unused system, the battery system must be fully charged at least once to activate the battery system to recover the battery performance to the best condition. Tips: If the energy storage system is not used for a long time, it will cause irreversible damage to the battery. Please perform regular maintenance.

11.4 FUNCTION OF ISOLATING SWITCH

- The isolating switch is an electrical component used to manually cut off the high voltage circuit for safety protection (the figure below).
- Before performing maintenance on the system, relevant personnel must first disconnect the DC side molded case circuit breaker in the BCP cabinet to ensure that the DC molded case circuit breaker is in the open state. Use a multimeter to check whether the DC side is energized. After confirming that the DC side is not energized, proceed to the next step.

- After completing the previous step, turn the isolating switch on the high-voltage box from on to off, and confirm that the isolating switch is disconnected. After the maintenance work is completed, ensure that the isolating switch is in the ON state.

11.5 OPERATING METHOD OF BATTERY MAINTENANCE

To ensure the long-term safe and reliable operation of your energy storage system, please read and follow the instructions below.

Table 11-3: Operating Method of Battery Maintenance

PLAN	MAINTENANCE PROCESS
Plan 1 This plan is applicable when the SOC of the battery system is low(< 50%)	1. Discharge the battery system to the cut-off condition (Average cell voltage< 3.1V or the lowest voltage<2.8V), then stop discharging, standing for 1 hour. 2. Full charging automatically to the battery system (The highest voltage>3.6V), after charging, standing for 1 hour. 3. Discharge the battery system to 40% and stop.
Plan 2 This plan is applicable when the SOC of the battery system is high(> 50%)	1. Full charging automatically to the battery system (The highest voltage>3.6V), after charging, standing for 1 hour. 2. Discharge the battery system to the cut-off condition (Average cell voltage< 3.1V or the lowest voltage<2.8V), then stop discharging, standing for 1 hour. 3. Charge the battery system to 40% and stop.

Tips: 1. Check to ensure environmental safety, system safety, no alarm, no-fault before

performing maintenance operations.

12 AUX MAINTENANCE

12.1 MAINTENANCE REQUIREMENTS

Table 12-1: Maintenance Requirements

SYSTEM	MAINTENANCE REQUIREMENTS
Golden Sigma System	➢ Maintenance and inspection of the grounding impedance. ➢ Maintenance and inspection of the air - conditioning communication. ➢ Periodic inspection of the appearance. ➢ Inspection of rubber parts connected between cabinets.
Fire Protection System	➢ The service life of the aerosol is 10 years, and replacement is required every 10 years. ➢ Check the temperature sensor and smoke sensor every 12 months. ➢ Dust regularly: to ensure the free circulation of air in the cabinet, clean the system every 6 months. Especially for dusty application scenarios, especially the air inlet and outlet of the fan, Floor drain, and use a vacuum cleaner when necessary. Power must be cut off before dust removal; do not rinse with water. ➢ The catkins need to be maintained and cleaned at least once a week during the catkin season to prevent the mesh from being blocked.

12.2 REQUIREMENTS FOR MAINTENANCE PERSONNEL

Safety precautions listed below are very crucial to perform maintenance safely on the BESS:

- Strictly follow Lock-Out Tag-Out procedures.
- Cautious about the hazardous voltages in the BESS even when not in operating. Check the voltage (using a multimeter or other device) of possible live parts and make sure they are in the safety range conditions are safe before attempting to perform the maintenance work on the BESS.
- DO NOT wear metal jewelry such as necklaces, rings, or wristwatches when working on the BESS.
- Before performing maintenance services on the BESS, read through the operations manual, and follow the SMP procedures.

12.3 MAINTENANCE

(1) Installation and storage should avoid high corrosive, high dust, high temperature, high humidity environment, especially to avoid metal substances falling into it.
(2) Before opening the door for maintenance, the water and dust in the control cabinet should be cleaned up.

- Clean the dust in the cabinet regularly
- Check whether the screws of each terminal are tightened
- Check for traces of overheating and damaged components
- Check the wiring for aging
- After the thunderstorm, check whether the surge protector is invalid and replace it with new spare parts
- Check whether the cable joint is tightened and whether there is hidden water leakage

Instruction: When the control cabinet fails to work normally, please refer to the manual to deal with it. If there is no solution, please contact the manufacturer. Please do not disassemble the parts by yourself.

WARNING

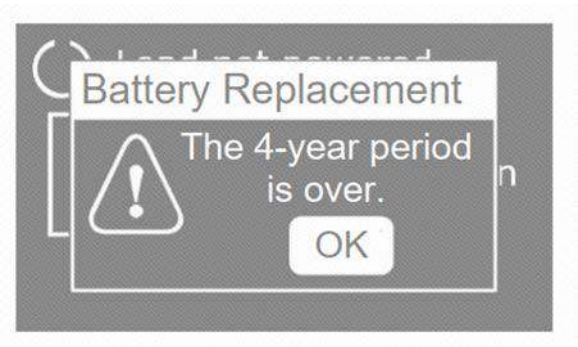
PRIOR TO ANY MAINTENANCE PROCEDURES/ACTIONS, FOLLOW THE SHUTDOWN PROCEDURES IN THE SYSTEM MANUAL AND WAIT FOR THE COMPLETION OF THE DE-ENERGIZATION OF POWER ELECTRONIC COMPONENTS/EQUIPMENT.

12.3.1 VISUAL INSPECTION

Table 12-2: Visual Inspection

NO.	MAINTENANCE WORK	INTERVAL
	Power Conversion System (PCS) / Energy Storage Inverter	
1	Check all the labels and nameplates of the PCS enclosure(s).	12 months
2	Check the exterior of the enclosure for any signs of damage, metal fatigue, or vandalism. For signs of metal fatigue or rust, remove rust and coat with a rust protector. Paint over any vandalism.	12 months
3	Inspect all louvers for any signs of damage, metal fatigue, or vandalism. For signs of metal fatigue or rust, remove rust and coat with a rust protector. Paint over any vandalism.	12 months
4	Check door insulation is not damaged and does not stick to the door when opening. Also, verify all doors are sealed	12 months

	tightly when the handle is locked.	
5	Inspect the interior of the PCS enclosure for any signs of damage, metal fatigue, and/or water damage, and/or spots and egress. For signs of metal fatigue or rust, remove rust and coat with a rust protector. Caulk any areas where water egress could or has occurred.	12 months
	Battery Enclosure	
6	Check all the labels and nameplates on the battery enclosure(s).	12 months
7	Inspect the exterior of the enclosure for any signs of damage, metal fatigue, or vandalism. For signs of metal fatigue or rust, remove rust and coat with a rust protector. Paint over any vandalism.	12 months
8	Inspect all louvers for any signs of damage, metal fatigue, or vandalism. For signs of metal fatigue or rust, remove rust and coat with a rust protector. Paint over any vandalism.	12 months
9	Verify door insulation is not damaged and does not stick to the door when opening. Also, verify all doors are sealed tightly when the handle is locked.	12 months
10	Inspect the interior of BESSs for any signs of damage, metal fatigue, and/or water damage, and/or spots and egress. For signs of metal fatigue or rust, remove rust and coat with a rust protector. Caulk any areas where water egress could or has occurred.	12 months
	Batteries(normal or intermittent operation)	
11	Inspect all battery management system(s) ("BMS") and battery switchgear.	12 months
12	Verify connections to BMS and battery switchgear are tight and solidly connected.	12 months
13	Inspect battery modules for any damage, rust, discoloration, condensation, or leakage. Repair or replace as needed.	12 months
14	Inspect battery power cables for any damage, rust, condensation, warping, or leakage. Repair or replace as needed.	12 months
15	Inspect battery communication cables for any damage, rust, discoloration, condensation, warping, or leakage. Repair or replace as needed.	12 months
	Batteries(long-time unused)	
16	Perform battery maintenance every 3 months to prevent battery damage. Storage SOC range: 30%~50%, avoiding long-term storage of battery cells below 15% SOC. Cut off power consuming devices in time for long-term storage. At least one full charge is required to activate the battery before the first use after a long-term storage to restore the performance of the battery to its optimum condition. Refer to the section 11.5 for maintenance schemes.	3 months
	Air-Conditioning Unit(s)	
17	Inspect drain hose (if applicable) for damage and proper operation. Remove and clean any blocks or restrictions on	6 months

	the drain hose.	
18	Inspect radiators and outer circulation outlet for any dust/sand blocks. Clean any blocks with water or a blower.	6 months
19	Inspect A/C fans for damage or unusual noise. Repair or replace as needed.	6 months
	Fire Suppression System(s)	
20	Inspect smoke detector. Open the cabinet door, turn on the power. if the temperature and smoke indicator flashing every few seconds, the smoke detector is working normally.	12 months
21	Inspect thermal bulb. Open the cabinet door to check whether the bulb is broken	6 months
22	Inspect aerosol status.	6 months
23	Inspect all pipe and cable connections for leakage, and repair as needed.	6 months
	Deflagration Vent	
24	Inspect the deflagration vent at the top of the cabinet to check for debris blocking the drainage channel around the deflagration vent, and whether the deflagration vent is deformed and cracked.	6 months
	UPS	
25	If you need to store the device for a period of time, connect the UPS to the power grid at least every 6 months to charge the battery. The internal battery is charged to 90% capacity in three hours. However, it is recommended that the device need be charged for 48 hours after long-term storage. When the LCD displays a message about battery replacement, it is recommended to replace battery. The recommended date for replacing battery can be checked on LCD(MEASURE>BATTERIES). 	6 months

12.3.2 MECHANICAL INSPECTION

Table 12-3: Mechanical Inspection

NO.	MAINTENANCE WORK	INTERVAL
1	Inspect all anchoring bolts of PCS and battery enclosures that are securely fastened. Use a torque wrench to check any suspicious loosen, fasten, and mark as	12 months

	needed.	
2	Verify the door and hinges of PCS and battery enclosures can move freely without restrictions and don't creak. Apply lubricant as necessary.	12 months
3	Verify locking mechanisms lock freely and properly without restrictions. Apply lubricant as necessary.	12 months
4	Torque check the bolts of AC and DC connections of PCS per SYL recommended values in the BESS installation manual.	12 months
5	Verify connections to BMS and battery switchgear are tight and solidly connected.	12 months
6	Inspect all bolts or connectors on battery modules for any sign of loosening. Torque check the bolts of all connections per SYL recommended values in the BESS installation manual.	12 months
7	Check nuts and bolts. Torque bolts, bus joints, and cable terminals per BESS installation manual.	12 months
8	Check and clean/replace air filters. Ensure the air filter is clean and there is no visible damage. Scheduled cleaning of the air filter is necessary to reduce air blockage to maintain adequate ventilation. The Interval of air filter cleaning should be decided based on on-site conditions. More frequent cleaning may be required.	12 months

12.3.3 ELECTRICAL INSPECTION

Table 12-4: Electrical Inspection

NO.	MAINTENANCE WORK	INTERVAL
1	Inspect AC/DC capacitor casing for melting or signs of corrosion.	12 months
2	Inspect the DC disconnect knob for damage and ensure knob/handle functionality.	12 months
3	Inspect relay(s). If the relay casing is transparent, that exposes internal components. Look for burn marks or signs of premature failure. Otherwise, inspect the relay casing for visible damage.	12 months
4	Perform a visual inspection of the AC/DC sensors. Compare current reading from HMI against a known measurement (for example, measured by calibrated clamp meter). The current sensor can be calibrated from HMI. However, if the current reading is significantly different from the last calibration, it may indicate a compromised sensor.	12 months
5	Perform a visual inspection of temperature sensors.	12 months
6	Perform a visual inspection of the AC/DC filter modules.	12 months
7	Check surge protectors' condition by confirming the status of surge protector on the main circuit and control circuit.	12 months
8	Check for open fuse(s). Do so by inspecting the protected circuit, and if any damage is found, remove any fault condition that caused the burning or damage of the fuse initially before replacing the fuse and re-energizing the circuit.	12 months
9	Inspect wiring harnesses, connectors, and power cables for signs of damage. Inspect field fitted and installed cables for proper sealing. Inspect factory sealed connections.	12 months

	Damaged sealing may indicate unauthorized field modification. Perform a thermal scan on power cables and look for hot spots that indicate high resistance.	
10	Inspect circuit boards, by checking ribbon cables and wire connectors are seated properly. Check for any sign of overheating.	12 months
11	Inspect fan operation, check all signs of wear and tear, and abnormal noise; ensure that fan works properly as per control signals.	12 months
12	Measure insulation resistance between battery (+) to ground and battery (-) to ground at the applied voltage for 60 seconds. Troubleshoot for resistance value less than 30k ohms.	12 months
13	Measure control voltage on circuit boards aligns with BESS manual specifications.	12 months
14	Check all fuse status, change any blown ones.	12 months

12.3.4 CONTROL INSPECTION

Table 12-5: Control Inspection

NO.	MAINTENANCE WORK	INTERVAL
1	Verify firmware version and update as required per SYL's specifications.	12 months
2	Review all alarm, event, and fault logs as recorded on the HMI of PCS.	12 months
3	Review all alarm, event, and fault logs as recorded on the HMI of the FSS controller.	12 months
4	Check all communication features function properly.	12 months

12.3.5 SAFETY INSPECTION

Table 12-6: Safety Inspection

NO.	MAINTENANCE WORK	INTERVAL
1	Check all warning signs are clear and legible.	12 months
2	Check the emergency stop button's function.	12 months
3	Check all safety ground connections.	12 months
4	Check the functionality of the Fire Suppression System(s).	12 months

12.4 AFTER MAINTENANCE

With AC power reapplied, maintenance personnel shall perform the following:

- Confirming all the BESS settings are set appropriately per the configuration list.
- Confirming all indicators are illuminated properly. i.e. indicators on BCP, switchgear, and BESS. Charging or discharging the BESS for 5 minutes at 5kW, confirming all indicators in the BESS are functional during this period.
- Restore the BESS to normal operation.

- Notify the BESS Owner/operator that the BESS is operational.
- Securely lock all BESS doors and follow proper lock-out tag-out procedures.

13 COMMON FAULTS AND TROUBLESHOOTING

The common faults and troubleshooting are as follows.

Table 13-1: Common faults and troubleshooting

NO.	Fault category	Fault description	Handing method
1	Air conditioner communication lost	The WEB interface displays a communication failure.	For air conditioners in the BCP cabinet, check whether the 485 communication cable of the air conditioner is loose, and then check whether the communication cable is properly connected. (Connect the 485 communication cable A and B to the COMM1-A/B port on the Golden Shield controller, and connect the shielded layer to the COMM1-G port.) Then check whether the IP addresses of air conditioners on the air conditioner panel are all 1. For air conditioner in the air cooling cabinet: Check whether the 485 communication cable of the air conditioner is loose, and then check whether the communication cable is correctly connected (the 485 communication port of the air conditioner is connected to the HVAC port on the panel of the HVAC cabinet). Then check whether the IP addresses of air conditioners on the air conditioner panel are all 1.
2	Access control is lost	After closing all the door,the WEB interface still shows that the cabinet door is open.	Check whether terminals 4 and 5 of terminal BLOCK XT2 or XT1 of the last battery cabinet in the block are short-circuited by referring to section 8.4.4 of this manual. If not short-circuited, use connectors or cables in spare parts to short-circuit terminals. If the fault persists, check whether the wiring harnesses between cabinets are connected hand-to-hand as shown in the figure by referring to section 8.4.4 of this manual. If the fault persists after the above checks are complete, use the following method: Tools: A short cable and a multimeter. One person shorted the terminal block of the battery cabinet XT1-4/5 with a short cable, and then switched on and off the multimeter with two hands

			pointing to the terminal block of XT2-4/5. The other person pressed the lower limit switch. After simulated closing the door, if the multimeter makes a sound, it indicates that the access control signal cable is connected correctly or the limit switch is in good condition. Continue until you find a faulty harness or a broken limit switch.
3	Fire problem	Fire controller shows:BUS_Short ALU#1	This fault is bus short circuit, and the reason is that the 24V positive and negative connection of a smoke sensor or aerosol trigger alarm is reversed. In case of this alarm, it is necessary to check whether the wiring terminals of each smoke sensor and aerosol alarm are reversed.
		Fire controller shows: NOU_CircuitTrbl NOU#1-1 Cabinet 24	The fault is that an aerosol trigger or fire controller NOU does not add terminal resistance. After this fault occurs, check whether terminal resistors are added between terminals 2B+/2B- and 1B+/1B- on the NOU module of the fire control controller. Normally, the NOU module has two terminal resistors. If there is no problem with the terminal resistance of the NOU module, check whether there is a terminal resistance between the 7/8 terminals of each INPUT module.
		Fire controller shows: Primary POWER_Loss PCU#1	This fault means that the 220V power supply of the fire controller is not connected, and the switch of the fire controller needs to be turned on.
		Fire controller shows: Battery Missing	The fault is that the fire controller is not connected to the battery, the battery needs to be installed.
		During system operation, the fire controller reports a smoke or aerosol trigger failure at a fixed address	After the fault is detected, check whether a real fire alarm occurs. If no fault occurs, troubleshoot the fire module itself. The alarm module is exchanged with the corresponding module of the adjacent cabinet, and the system runs again. If it is found that the fire controller continues to report the smoke sensor at the same address or the INPUT module is triggered, the module needs to be replaced, and the corresponding ID needs to be written

			into the corresponding ID by the fire encoder (the ID of the faulty module can be read by the fire encoder and then written into the new module).
4	BMS Communication Fault	BMS data loss	First, check whether a 120Ω terminal resistor is inserted into the DC switchgear RACK COMM2 port of the last cabinet in the BLOCK. Then, check whether the communication cable between BCP and the DC switchgear RACK COMM1 of the first air cooling cabinet, is properly connected. Then, check whether the communication cable between RACK COMM2 and RACK COMM1 of the next air cooling cabinet, is properly connected. If necessary, use a network cable tester to check whether the network cable for the air cooler is properly connected.
5	DC switchgear problem	The indicator light is not on.	Check whether the two-way aviation plugs of the DC switchgear are reversed. If it is not inserted reversely, unplug the aviation plug and measure whether the 220V power supply is normal. If the 220V power supply is normal, it indicates that there is a problem with the high-voltage box and needs to be fed back to the quality department.
		After charging and discharging are started, the HMI displays that a battery cabinet is not connected to the network successfully.	First check whether the isolation switch is closed; if the isolation switch is closed, the fault is mostly caused by the loose auxiliary contact of the isolation switch of DC switchgear, and it is necessary to unpack and check whether the auxiliary contact is connected normally.
6	Air conditioner failure	Air conditioner power supply burned out due to overvoltage.	This problem occurs when the N wire in the system is in poor contact. As a result, the phase voltage increases by 1.732 times, resulting in overvoltage. Therefore, you need to check whether the N wire is reliably connected before powering on the air conditioner. Before powering on the air conditioner, it is best to remove the air conditioner inlet terminals, and measure whether each air conditioner has a stable 220V voltage after closing

			the switch. If the voltage is determined to be stable, disconnect the switch, connect the terminals, and then power on again. Be careful when powering on the air conditioner.
		Air conditioner power supply is normal but burns out after power on.	The internal communication board of the air conditioner is burned out, which is a quality problem of the air conditioner.

14 AFTER-SALES SERVICE

SLY (Ningbo) Battery Co., Ltd. provides customers with a full range of technical support and after-sales service. Users can gain services by dialing our service number.

Please refer to the contract for the free warranty service information.

The following circumstances are not within the scope of our free warranty service:

- System damage or failure caused by not following the user manual.
- Damage or failure caused by not following the relevant electrical safety specifications for wiring and power supply, or caused by poor site environment.
- System damage or failure caused by users' private modification.
- System damage or failure is caused by irresistible natural factors, such as typhoons, earthquakes, floods, fire, or harsh environments (high temperature, low temperature, high humidity, acid rain, etc.).
- After the failure occurs, the user fails to maintain the initial failure state, fails to timely notify the manufacturer, and handles without authorization, thus causing it to be unable to make a practical fault identification of the failure.

15 CONTACT

If you have technical issues with our products, please contact us. The following data is required to provide you with the necessary assistance:

- Product model number
- Serial number
- Fault information
- A detailed description of the problem

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