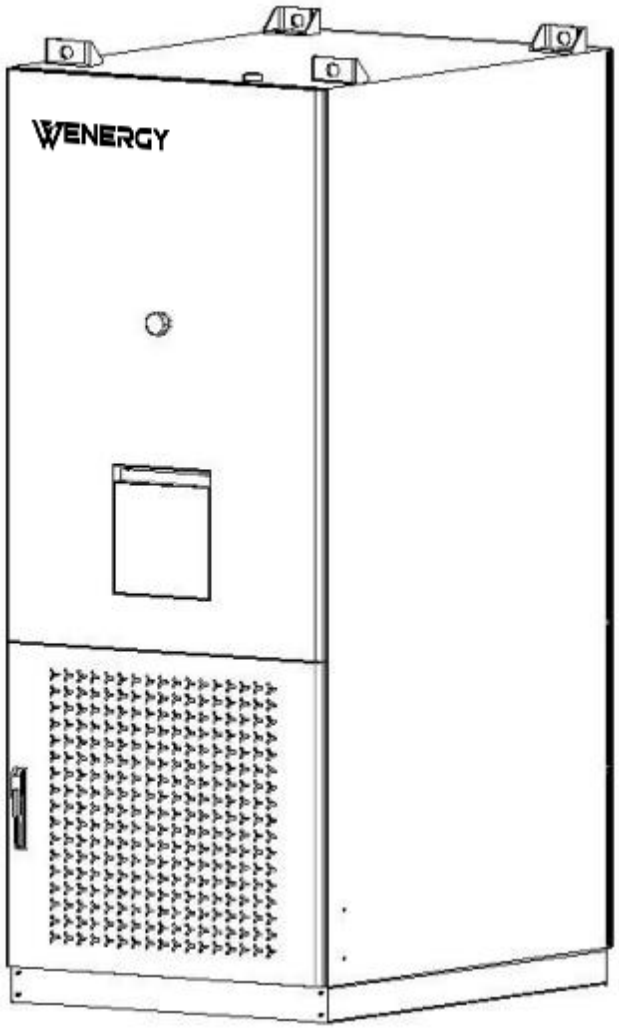
Wenergy ESS Technical Specification
100kW/215kWh



Product Model：Star 215

Version：V1.4

Documentation Revision History

Version	Revision content	Initial versions	Reviser	Revision Date
V1.0	Initial Release		Zhang Taotao	2023.06.06
V1.1	Update		Zhang Taotao	2023.10.18
V1.2	Update	Page 3/5/9	Zhang Taotao	2023.11.01
V1.3	Add PCS Model	Page 7/13	Zhang Taotao	2023.11.24
V1.4	Add max current on the DC side and the voltage on the AC side line	Page 4	Zhang Taotao	2023.12.5

Compiled: Zhang Taotao Reviewed: Zhu Wanyong Approved: Yang Dewan

Contents

1 Application of the product

The product technical specification specifies the technical parameters of Wenergy Technologies Pte. Ltd. Wenergy structure introduction Electrical connection and interface definition transportation storage and installation of the technical requirements.

2 Product overview

2.1 Product name

Star Series - Star 215

2.2 Product model

Star 215

2.3 Product definition

This product Star 215 is used for power storage of power storage system, which is easy to carry, install and maintain.

Star 215 consists of cabinet, battery module, PCS, battery controller, connector and other electrical and mechanical accessories.

The cell type is aluminum shell lithium iron phosphate battery, nominal voltage / capacity of single cell: 3.2V / 280Ah.

2.4 Reference specification

GB/T 36276-2018	Lithium-ion batteries for electric energy storage
UN 38.3	United Nations Manual of Tests and Standards for the Transport of Dangerous Goods Part 3, paragraph 38.3 - Requirements for lithium batteries
IEC 62619-2017	Safety requirements and test methods for industrial(including stationary)lithium batteries and lithium battery packs
ANSI/CAN/UL 1973：2022	Battery safety requirements for stationary vehicle auxiliary power and light rail (LER) applications
UL9540A-2019	Safety standard for test methods for evaluating thermal runaway fire propagation in battery energy storage systems
UL60730-1:2016 Annex H	EMC Part 6-4 General standards. Radiation standards for industrial environments
IEC 61000-6-1-2019	EMC Part 6-1: Common standards. Residential, commercial and light industrial environments
IEC 61000-6-2-2019	EMC Part 6-2: Common standards. Immunity standards for industrial environments

IEC 61000-6-3-2019	EMC Part 6-3: General standards. Radiation standards for residential, commercial and light industrial environments
IEC 61000-6-4-2019	EMC Part 6-4 General standards. Radiation standards for industrial environments
EN 62477-1:2012+A1:2017	Safety functional requirements for electrical equipment and systems
EN50549-1:2019+AC.2019-04	European grid connection standards
CEI 0-21	Italian low voltage grid connection standard
CEI 0-16	Italian medium and high voltage grid connection standard
NRS 097-21-1: :2017	South African grid connection standards
EN50549+Deviations of Netherlands	Dutch grid connection standard
C10/11: 2019	Belgian grid connection standard
GB/T 34120	Technical specification for energy storage converters for electrochemical energy storage Systems
GB/T 34133	Harmonics detection standard for energy storage converters

2.5 Operating environment

Star 215 operating environment

No.	Item	Requirement	Remark
1	Storage environment temperature	-30°C~60°C	
2	Operating environment temperature	-30°C ~55°C	＞45°C, derating
3	Operating environment humidity	RH≤95%	
4	Operating altitude requirement	≤2000m	＞2000, derating

3 Product performance parameters and system composition

3.1 Product introduction

Star 215 contains five battery packs and one battery controller, modular power conversion system, BMS system, liquid Cooling Type system and Fire protection system. The battery cell is the smallest basic unit. BMS mainly contains BCU, BMU, EMS, responsible for collecting cell, electric box and electric cabinet information, and communicate with other devices. And provide local energy management services. The liquid Cooling Type system is responsible for the Cooling Type and heating of the entire electrical cabinet system. The fire control system is responsible for the fire status detection and fire prevention of the entire electrical cabinet system.

3.2 Product parameter

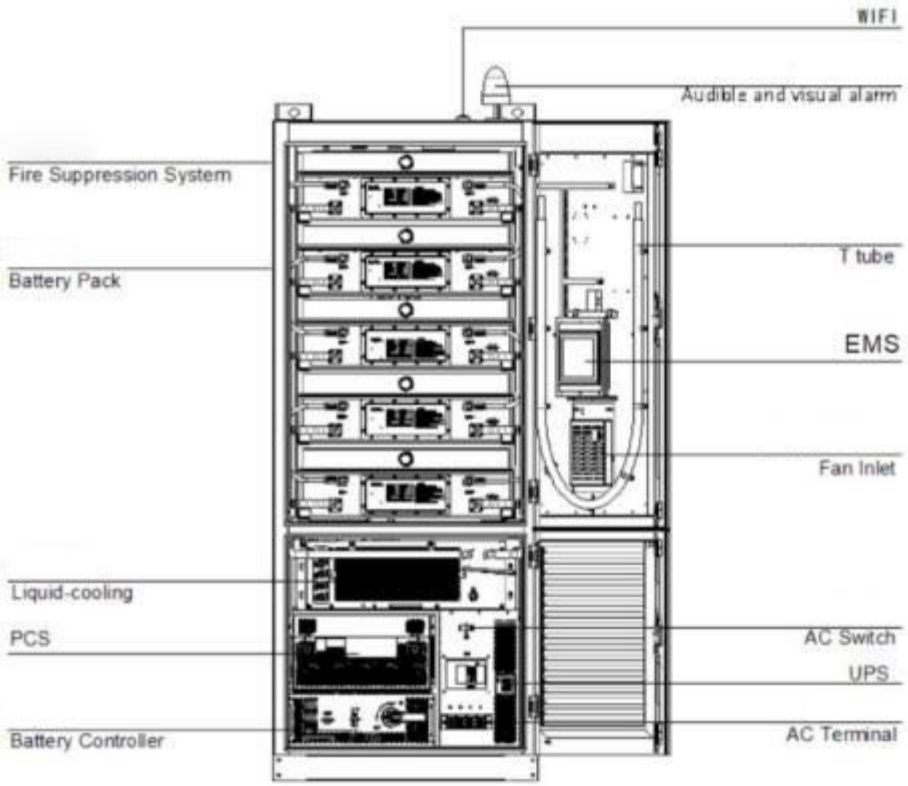
Star 215 parameters

DC	Battery Type	LFP
	Cell Configurations	1P240S
	Rated Capacity (Ah)	280
	Rated Energy (KWh)	215
	Rated Voltage (V)	768
	Rated Power (KW)	100
	Rated Charge/Discharge Rate	0.5C
	Voltage Range (V)	672～864
	Standard Charge/Discharge Current (A)	140/140
	Max Current	170A
	Cooling Type	Liquid Cooling
	Coolant	Ethylene glycol: aqueous solution (50%v:50%v)
	Life Cycles	6000
	Fire Suppression	NOVEC1230/FM200, optional
	Detector	Smoke, heat & flammable gas detectors
AC	Rated AC power	100kW
	AC overload Capacity(KVA)	1.1 times long-term, 1.2 times 1min
	Connection Mode	Three-Phase Four-Wire System
	On-grid AC Voltage	380V/400V（-15%～＋15%）
	On- grid Frequency	50Hz/60Hz±2.5Hz
	Total Harmonic Distortion	≤3% (the full load)
	Power Factor	-0.99~+0.99

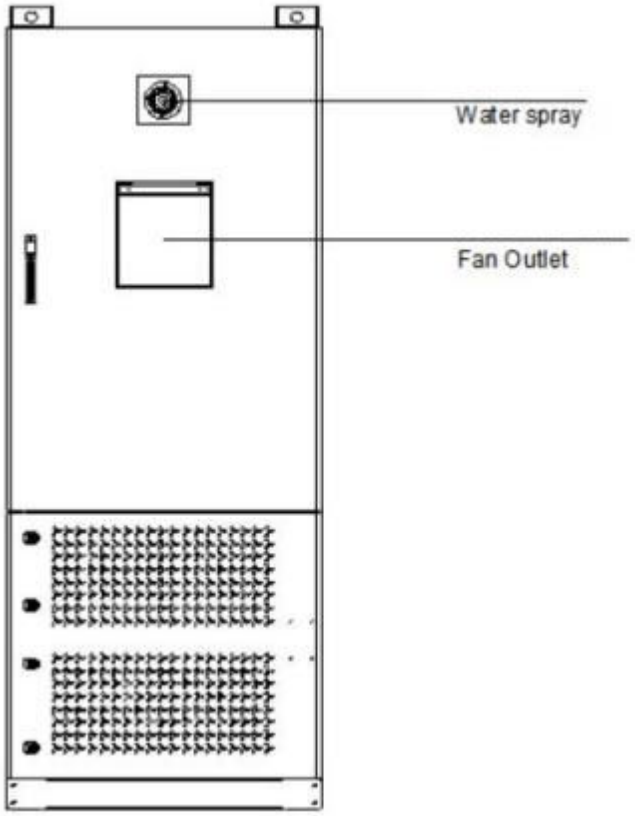
	DC component of current		≤0.5%
	Charge discharge conversion time		＜100ms
	Max. Conversion Efficiency		≥98%
	Cooling Type		Forced air Cooling
System	Charging Operating Temperatures Range (°C)		-30°C~55°C(>45°C, derating)
	Discharging Operating Temperatures Range(°C)		-30°C~55°C(>45°C, derating)
	Storage Temperature Range	Short term (<1month)(°C)	-30°C～60°C
		Long term (<1year)(°C)	0°C～35°C
	Noise		≤75dB
	Dimensions(W*D*H)(mm)		935*1250*2340mm
	Weight(T)		2.7±0.1
	Anti-corrosion		C4/C5 (optional)
	IP Rating		Battery compartment: IP65 Electrical compartment: IP54
	Relative Humidity		0-95% (no condensing)
	Standard Altitude(m)		≤2000(derating, > 2000)
	Efficiency		≥86%
	Communication Interface		CAN, Ethernet
	Communication Protocol		Modbus TCP/RTU
	Operation Mode	Peak load shifting	Yes
		Demand control	Yes
		Economic operation mode	Yes
		Reactive power regulation	Yes
		Power grid dispatch connection	Yes
		Remote dispatch connection	Yes
		Local data storage	Yes
		Anti-reflux	Optional
	Certification standards	BMS	UL60730, GB/T34131-2017
		Battery	GB/T36276-2018, IEC62619, UL1973, UL9540A
		PCS	CE; EN50549-1:2019+AC.2019-04; CE10-21; CE10-16; NRS 097-21-1: :2017; EN50549+Deviations of Netherlands; C10/11: 2019; GB/T 34120; GB/T 34133

3.3 System composition

Star 215 contains five battery packs and one battery controller, modular power conversion system, BMS, EMS, liquid Cooling Type system and fire protection system.



Front



Back

Composition of Star 215

No.	Component part	Qty	Remark
1	Battery pack	5	1P48S
2	Battery Controller	1	Battery Controller mainly includes a detectdevice and a protection device
3	AC Controller	1	Including main output switch, UPS, surge, etc
4	Liquid Cooling Type system (chiller unit+Cooling Type pipe)	1	Including Cooling Type Type,Heating mode,Self-cycle mode, standby mode
5	PCS Model: EPCS105-AM or INPPCS-100/0.4-W-14-C1-OS	1	AC/DC conversion between the grid and the battery, three-phase active and reactive power control, solve the three-phase imbalance problem, hold multiple machines in parallel, good scalability, support active and reactive power regulation

6	FSS	1	Smoke sensor,Temperature sensor ,Combustible gas sensor
7	BMS+EMS	1	5BMU+1BCU+1EMS Battery management system and energy management system

3.4 Battery Cell

The cell type is aluminum shell lithium iron phosphate battery, the capacity of each cell is 3.2V 280Ah.

No.	Item		Specification	Remark
1	Basic parameters	Chemical materials	LFP	
2		Rated Capacity (Ah)	280Ah	
3		Rated Energy (Wh)	896Wh	
4		Rated Voltage (V)	3. 2Vdc	
5		Voltage range (V)	2.8~3.6Vdc	
6		Temperature range(°C)	Charge: 0~45°C Discharge: -20~45°C	
7	General Parameters	Dimension (W×D×H)	173*71*208mm	
8		Weight (Kg)	5.34±0.15kg	
9		Storage Temperature	-30~60°C	
10		Storage Humidity	≤95%	
11	Testing and certification	Battery Cell	UN38.3	
12			ANSI/CAN/UL9540A	
13			ANSI/CAN/UL 1973	
14			IEC 62619	
15			GB/T 36276-2018	

3.5 Battery Pack

The battery pack contains 48 cells and a BMU, a battery pack contains 28 NTC temperature samples. The BMU is responsible for collecting the voltage and temperature of the cells in the battery pack. The appearance of the battery pack is shown in the figure:

Battery Pack

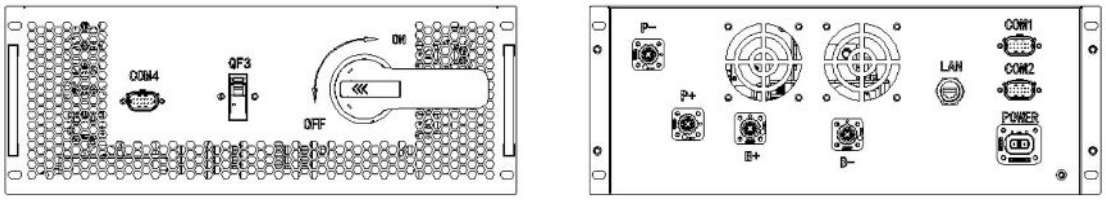
Battery Pack parameter

No.	Item		Specification	Remark
1	Basic parameters	Rated Energy (kWh)	43.008kWh	
2		Quantity of cells	48	
3		Cell self-discharge / month	≤3%	25°C, 30%SOC, 3 months after new battery produced
4		Voltage range (V)	134.4~172.8V DC	CELL: 2.8~3.6V
5		Rated voltage (V)	153.6VDC	
6		Rated charge rate	0.5P	
7		Rated discharge rate	0.5P	
8		Max continuous current	160A 1min	
9		IP level of the electrical box	IP67	
10	General Parameters	Dimension (W*D*H)	761mm*1036mm* 246mm	
11		Weight (Kg)	315±5kg	
12		Cooling Type Type	Liquid Cooling Type	
13		Communication mode	Multi stream transport ISO SPI	
14	Testing and certification	Battery Pack	UN38.3	
			UL9540A	

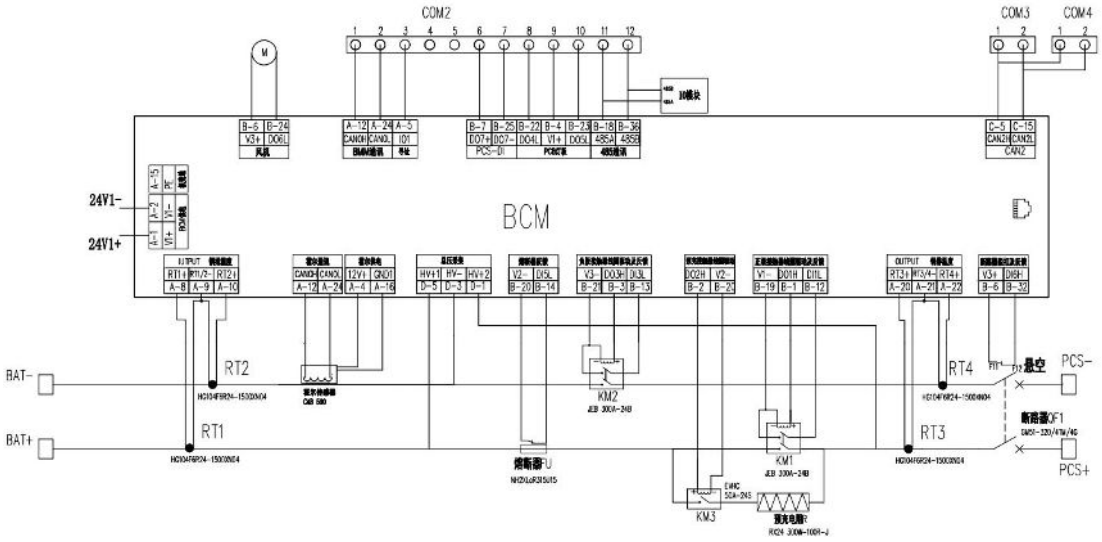
15			ANSI/CAN/UL 1973	
16			IEC 62619	
17			GB/T 36276-2018	

3.6 Battery Controller

The battery Controller mainly includes BCU, contactor, fuse and AC/DC power supply. The structure diagram is shown below:



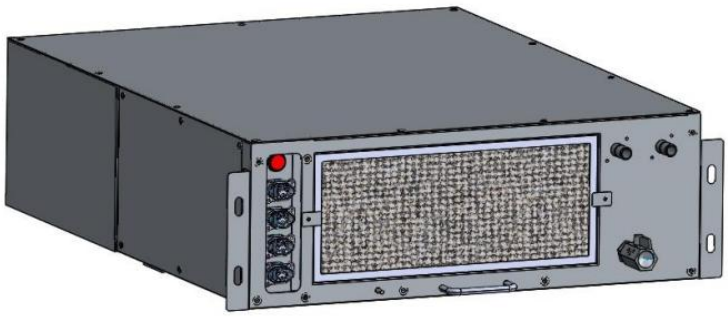
Battery Controller



Electrical schematic diagram

3.7 Liquid Cooling Type system

Star 215 with Liquid Cooling Type system, it is an equipment that can control temperature as antifreeze of energy storage battery, with frequency control ability. It includes Cooling Type function, heating function, control module, high and low voltage power supply module, support and protection structure module and other functional modules.



Liquid Cooling parameter

Operating conditions1	Cooling Capacity	kW	3
	EER	W/W	1.97
	Refrigerating power	kW	1.524
Operating conditions2	Cooling Capacity	kW	3
	EER	W/W	3.28
	Refrigerating power	kW	0.915
Heating capacity		kW	3.0(Default)/1.5(CE)
Maximum input power		kW	1.644
Power			220V single phase
Refrigerating fluid	Type		R134a
Variable throttle apparatus			EEV
Cold compressor	Type		Rotor
	Energy regulation mode		Variable frequency regulation
Fan	Type		Centrifugal fan
	Qty	Set	2
Condenser			MCHX

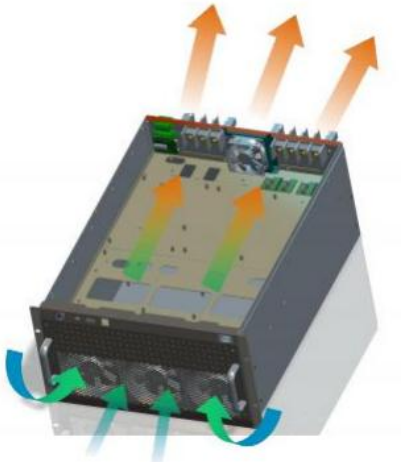
Chiller			PHE
Refrigerating medium			50%(CH2OH)2
Rated flow		L/min	26
Dimensions	Wide(repair surface)	mm	700
	Deep	mm	940
	High	mm	246
DN			CQC18(Default)/CQC20(Opention)
Net		kg	≤80
Communication mode			Modbus/CAN2.0
Operating temperature range		℃	-30℃~55℃
IP Rating		IP	Electrical connection IP67， Component IP54
Standby power		W	39
Operating conditions1：Environment temperature 45℃, water supply temperature 18℃ Operating conditions2：Environment temperature 35℃, water supply temperature 18℃			

3.8 PCS (Power Conversion System)

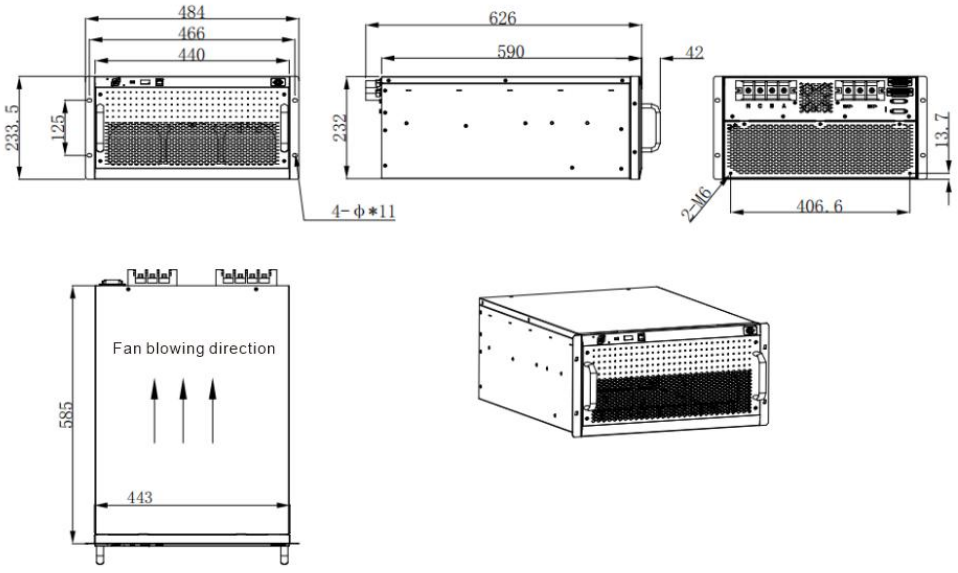
The Power Conversion System (PCS) is a bidirectional current controllable conversion device connecting the energy storage battery system and the power grid. Its main function is to realize the energy exchange between the battery and the power grid, and to control and manage the charge and discharge of the battery. In the grid-connected mode, peak cutting and valley filling, peak and frequency regulation, virtual capacity increase and off-grid backup can be realized. At the same time, PCS also supports a variety of charge and discharge modes of constant voltage, constant current and floating charge.

Model: EPCS105-AM or INPPCS-100/0.4-W-14-C1-OS

Heat dissipation diagram (Wind direction: forward and out)



Dimensional diagram

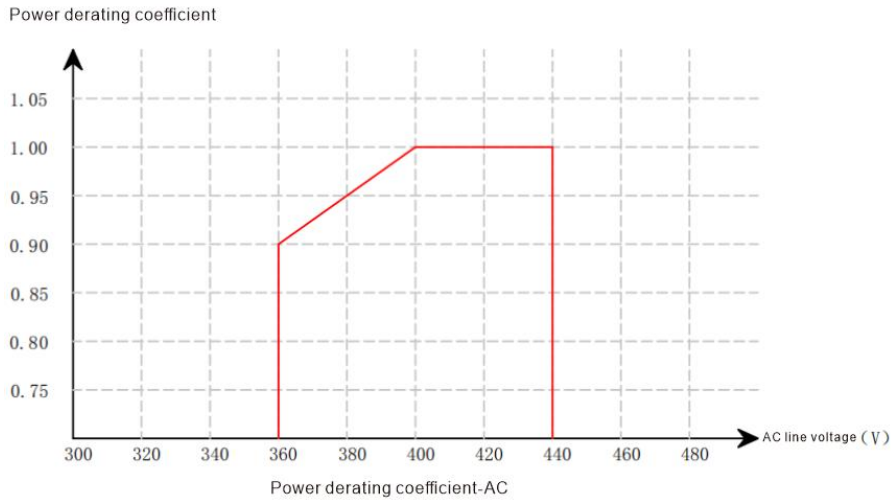


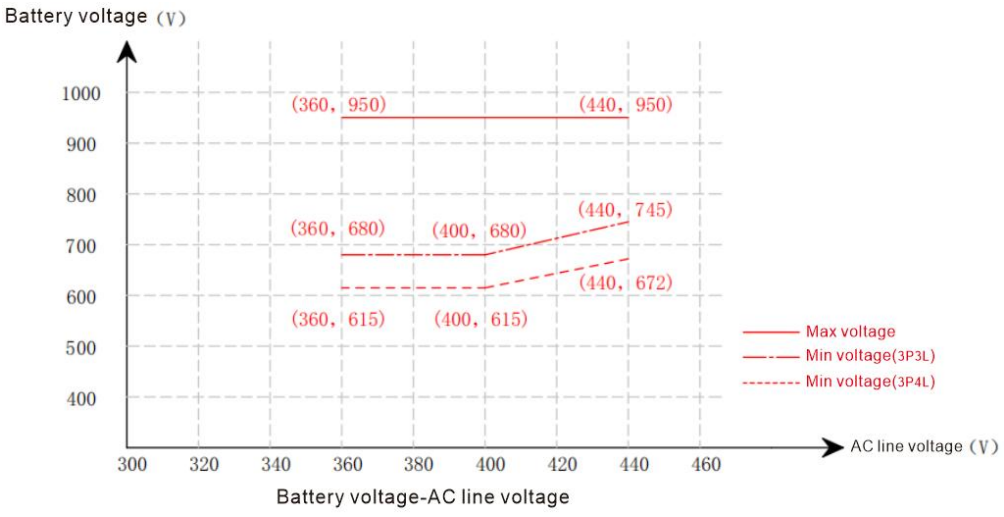
PCS technical parameters

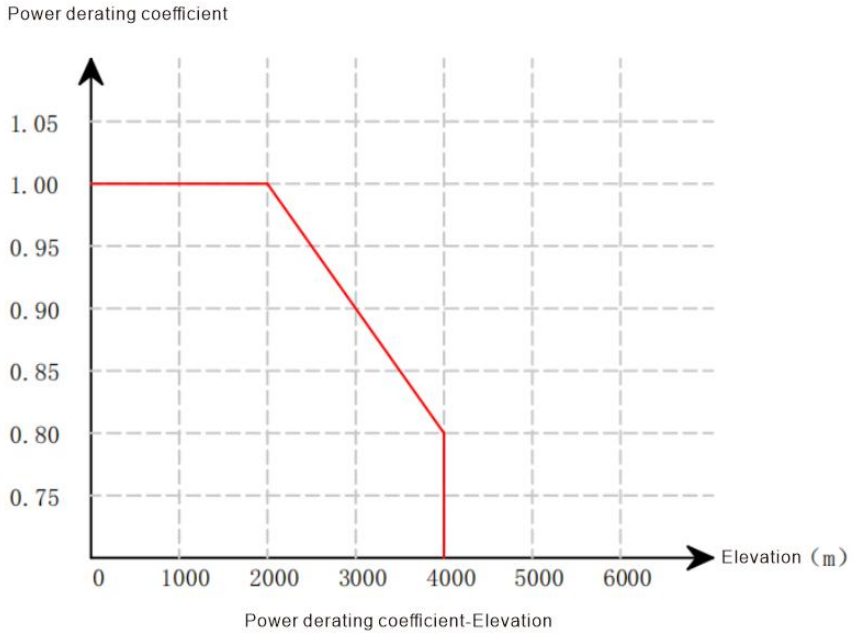
Voltage range(V)	615~950(3P3L)/680~950(3P4L)
Input path number	1
Maximum charge and discharge current(A)	171
AC(Grid-connection)	
VDC(V)	230/400
Wiring Method	(3P3L)Three-phase Three-wire/(3P4L)Three-phase four-wire
Power Output(KW)	100
Maximum apparent power(kVA)	110
Imax(A)	167
Rated network frequency(Hz)	50/60
COS	0.99
Power factor range	1(Lead)~1(Lag)
THID	＜3%(Rated power)
DC component	0.5%
Overload	110%Long-term
Maximum discharge efficiency	98.2%
AC(Off-grid)	
DCV	230/400
AC voltage harmonics	＜3%(Linear load)
Rated frequency(Hz)	50/60
Power Outpu(KW)	100
Maximum apparent power(kVA)	110
Max Output Current(A)	167
Protection	
Function	AC overcurrent protection, AC overvoltage protection, AC surge protection, AC short circuit protection, anti-island protection, DC reverse connection protection, straight surge protection
System parameter	
Dimension(mm) Rear connection	484*703*256.5
Weight(kg)	50
Altitude(m)	4000(＞2000, derating)
Operating temperature	-30℃～55℃(＞45°C, derating)

Humidity	0%RH~95% RH，non-condensing
Cooling Type	Forced air Cooling
IP Rating	IP20
Communication interface	CAN/RS485
Testing and certification	CE；EN 50549-1:2019+AC.2019-04；CE1 0-21; CE10-16； NRS 097-21-1: :2017; EN50549+Deviations of Netherlands; C10/11: 2019; GB/T 34120; GB/T 34133

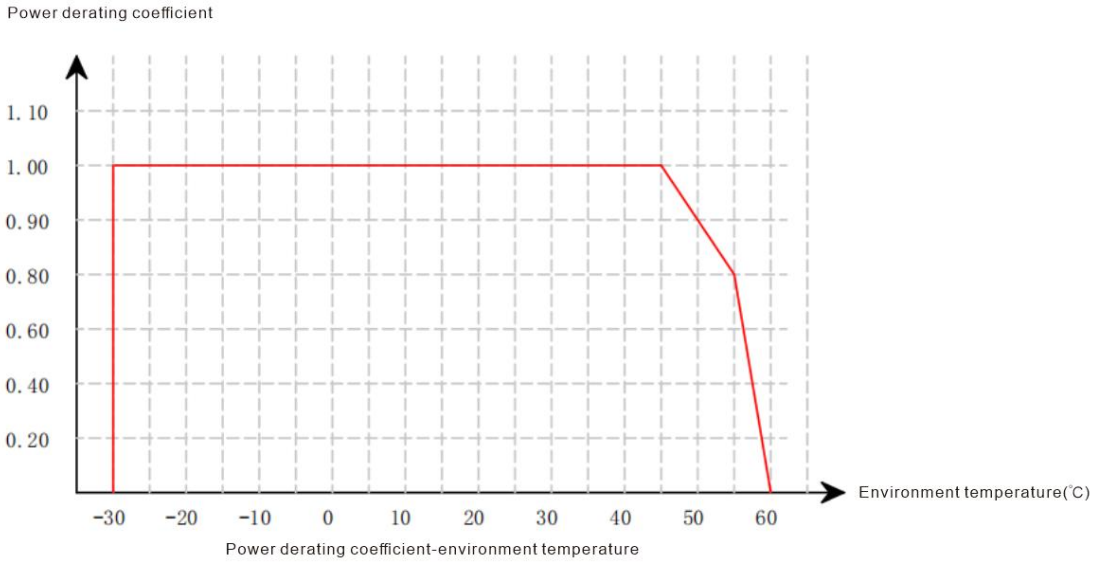
Power curve







Power derating coefficient-Elevation

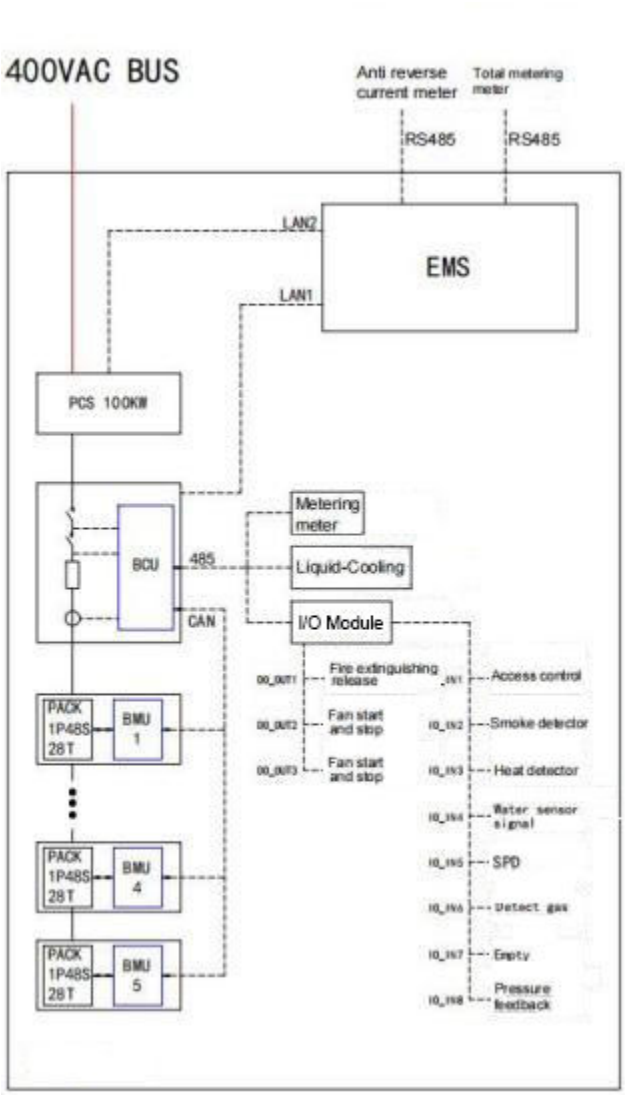


Power derating coefficient-environment temperature

3.9 BMS (Battery Management System)

BMS uses a three-level architecture. Local energy management system-EMS, battery main control unit-BCU, battery information monitoring unit-BMU. The BMU is the battery main control unit at the level 1 of the control system. The main control module BCU is level 2, receives and comprehensively judges the basic information of the battery, computing SOC, upload or issue commands, complete phase actions according to system control policies. The battery information monitoring unit (BMU) manages the cells. The BCU can manage the battery information monitoring unit at most, the local energy management system EMS is level 3, can manage the battery main control unit BCU. The following diagram shows the battery management system topology:

BMS frame diagram



BMU basic parameter

No.	Specifications	Value	Remark
Operating voltage	Range	9~32V	
Cell voltage sampling	Range	1V~5V	
	Accuracy	±5mV	0°C ~ +60°C
		±10mV	-40°C ~ 0°C or 60°C ~ 85°C
	No. of voltage sampling channels	48	Supports a maximum of 48 channels (Optional, can be configured according to project requirements)
Cell temperature sampling in module	Range	-40°C ~ +125°C	
	Accuracy	±2°C	-25°C ~ + 85°C
		±3°C	Other temperature
Balanced	Balanced Current	100mA@V cell>3.2V	Passive balance

BCU basic parameter

No.	Specifications	Value	Remark
1	Operating humidity range	0%~95%	
2	Altitude	≤4000m	
3	Supply voltage range	9V~32V	
4	Operating power consumption	≤ 1.7W	The power supply voltage ranges from 9V to 32V
5	Sleep power consumption	≤ 100mW	The power supply voltage ranges from 9V to 32V

3.10 EMS(Energy storage system)

The EMS has the function of aggregating device information of the energy storage system, supporting local monitoring, EMU management, and unified coordination and management of system devices and data. Edge computing technology supports EMS to realize second-level real-time diagnosis of battery safety status and intelligent analysis of health status and maintenance policies. It can reduce the initial investment cost and later operation and maintenance cost of the user's energy storage system, improve the diagnostic efficiency and intelligent operation level, and enhance the value of the energy storage system.

The EMS centralized control unit can be widely used in various energy storage systems such as user side and power side, with data aggregation and collaborative diagnosis capabilities, support wireless Internet of Things interface and large capacity SSD storage space, support cloud edge interaction with cloud platform or station control layer, and provide more abundant data services and user experience.

EMS basic parameter

No.	performance	parameter
1	CPU	ARM ，Quad-Core，2.0GHz
2	Memory	4GB LPDDR4
3	Operating system	Linux
4	Storage card	32GB eMMC；240G ~500G SSD；32G SD (optional)
5	The number of batteries	Max. 450 S×10 Cluster
6	LCD	10.1"LCD
7	Data recording interval	≥1S
8	Inquiry mode	Local、Remote
9	Communication interface	3 LAN、3 CAN、5 RS485、2 USB
10	DO/DI interface	12 IO 12 DO
11	Communication protocol	MQTT; Modbus TCP
12	Log database	> 100,000 event records, including exception, occurrence time, and protection action Storage of full data information with full life cycle
13	Supply voltage	DC24V

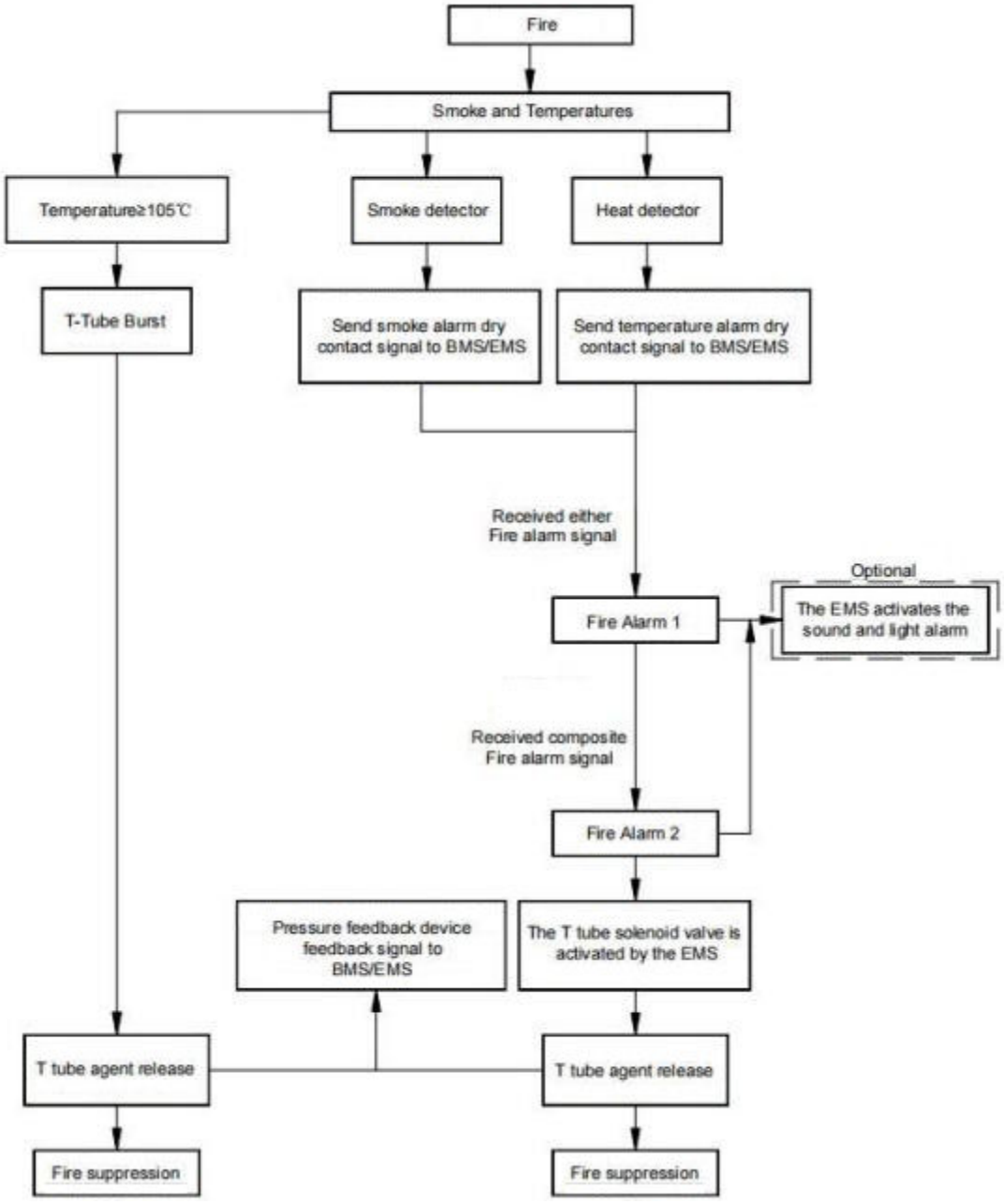
14	Power	＜10W(Screen light status)
15	Communication baud rate	9600bps @ RS485、250Kbps @ CAN、 100Mbps/1000Mbps @ LAN
16	Insulation resistance	500MΩ 1500VDC
17	Power frequency withstand voltage	2500VAC

3.11 FSS (Fire Suppression System)

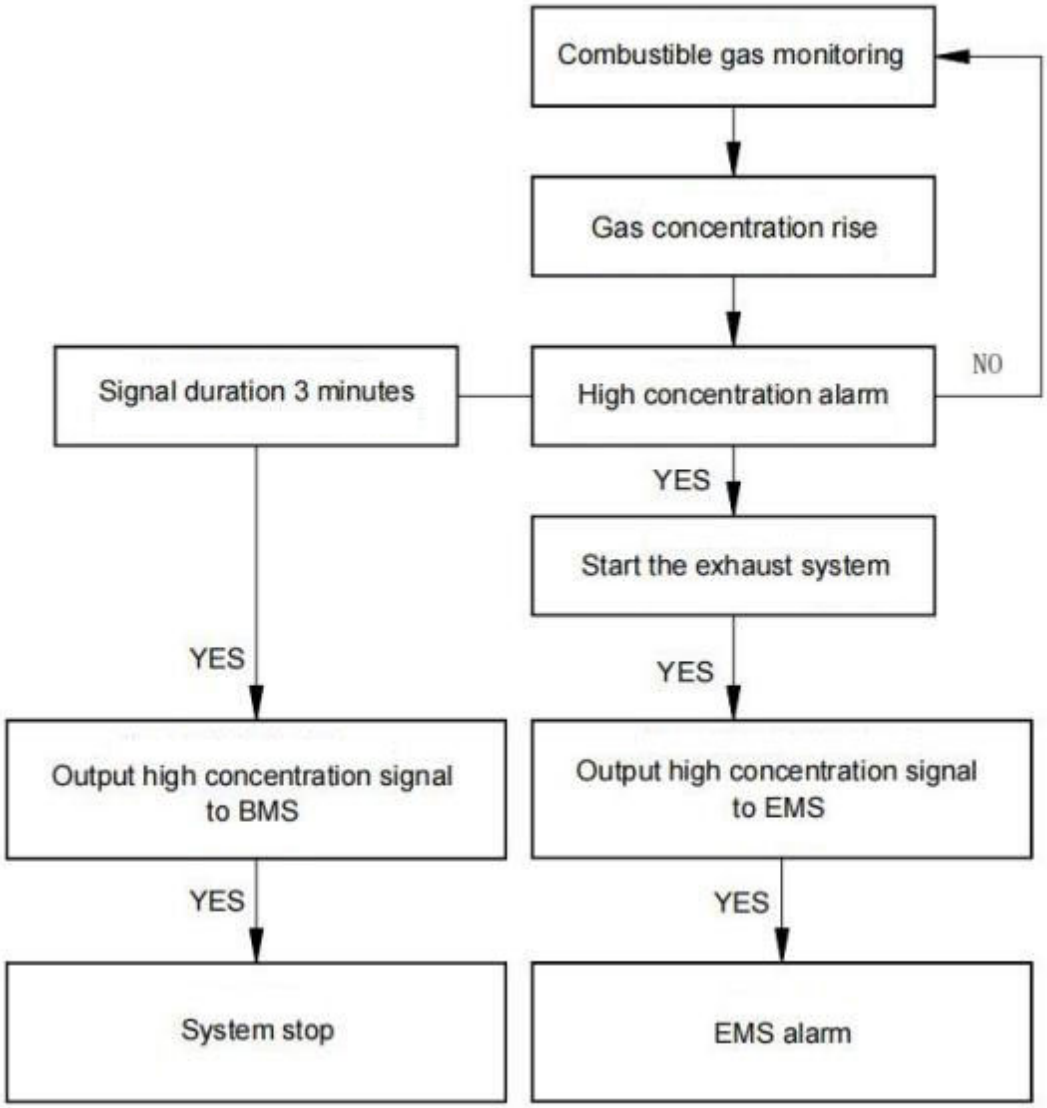
FSS Composition

No.	Components	Qty	Description
1	T tube	1	release C6F12O
2	Heat detector	1	detect temperature
3	Smoke detector	1	detect of smoke concentration
4	Combustible gas detector	1	detect the concentrations of combustible gas (H2 or CO)

FSS Control Logic

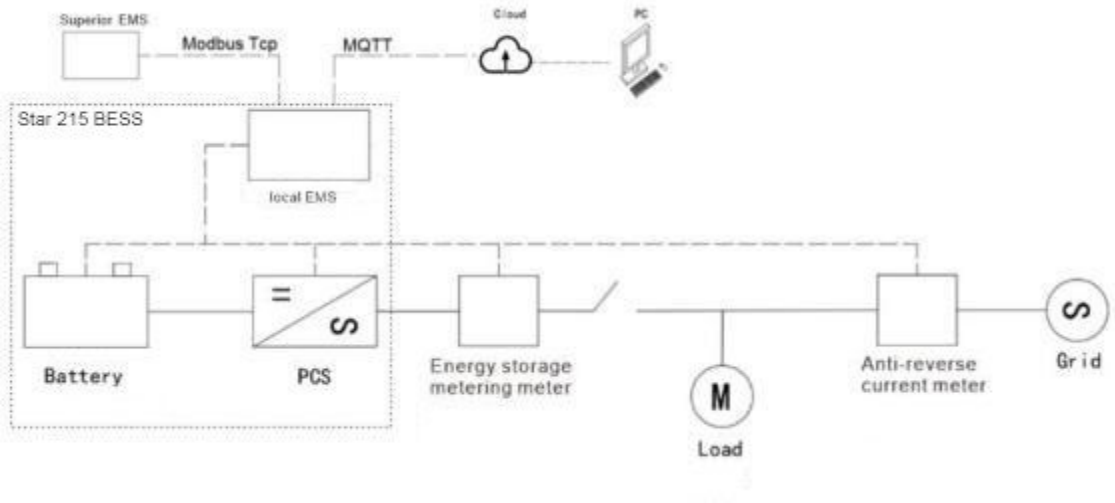


Combustible gas detect control logic



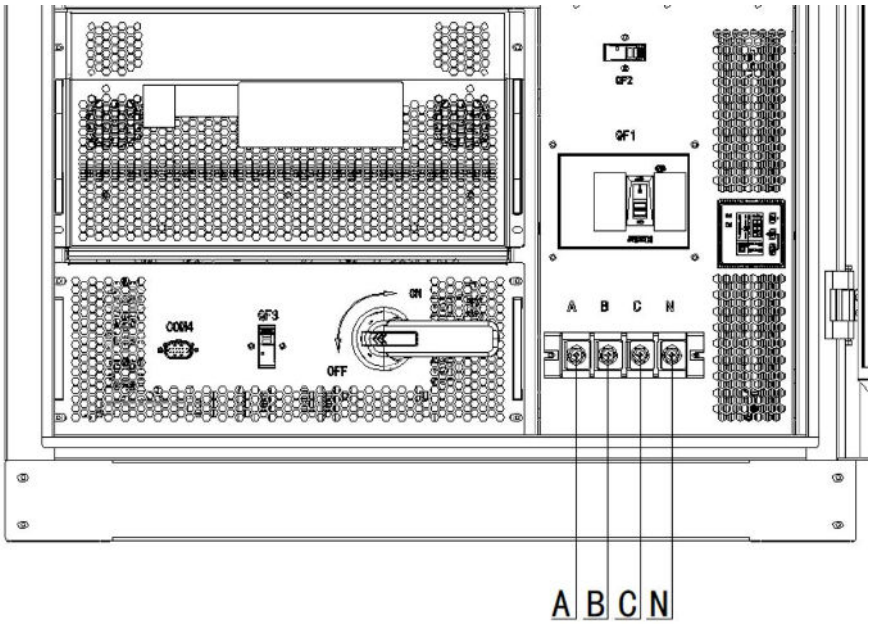
4 Product electrical connection introduction

4.1 System topology

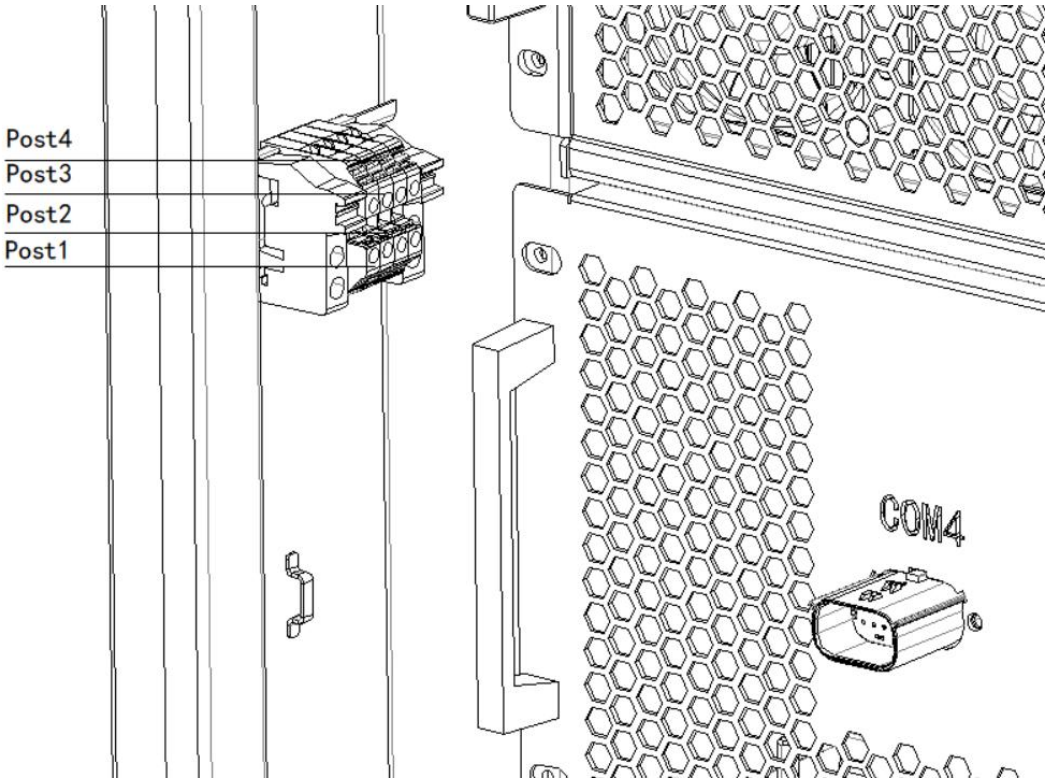


4.2 Interface definition

Interface	Terminal No.	Definition	Remark
A	A	Grid A	
B	B	Grid B	
C	C	Grid C	
N	N	Grid N	

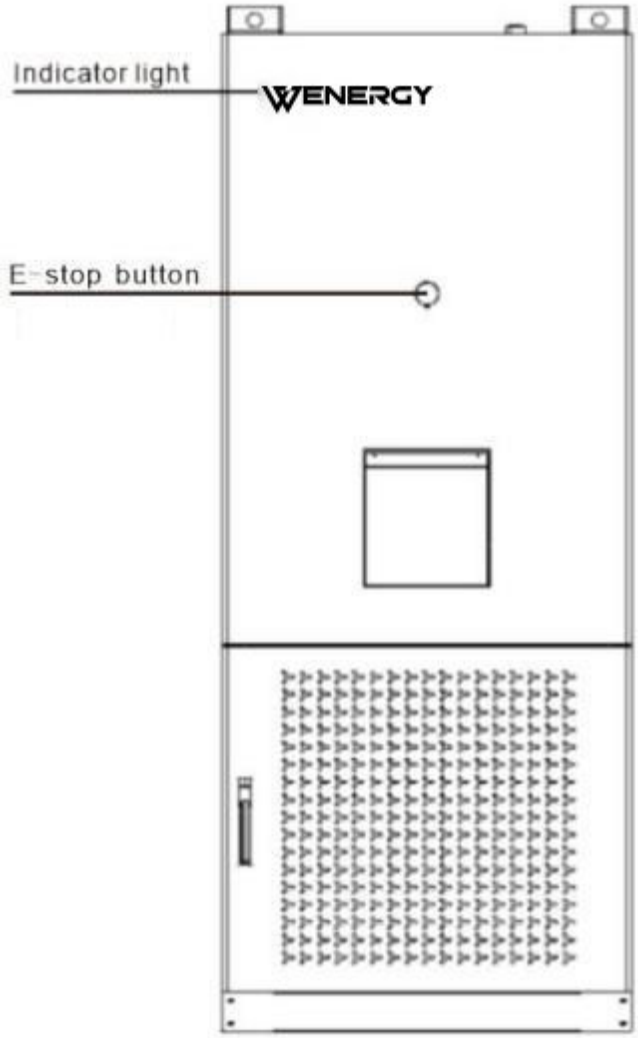


Interface	Terminal number	Definition	Remark
Post1	485A1	Metering meter (485A)	
Post2	485B1	Metering meter (485B)	
Post3	485A2	Anti-reverse current meter (485A)	
Post4	485B2	Anti-reverse current meter (485B)	



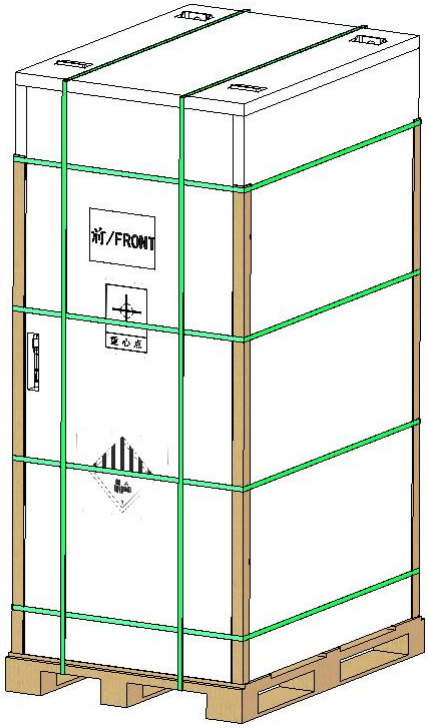
4.3 Indicator light and button definition

Display	Terminal No.	Definition	Remark
Red light		Fault	
Green light		Normal	
E-stop		Stop	In case of emergency, press this button to stop the Star 215



5 Product transportation requirements

5.1 Packing introduction



Package drawing

5.2 Note for the transportation

Suitable for trucks and ships, transport should be covered, sun protection, civilized loading and unloading. The box containing the product is allowed to be transported by any means of transport, Battery in the loading and unloading process, should be carried lightly, strictly prevent throwing, rolling, heavy pressure. Avoid rain during transportation, direct snowfall and mechanical impact.

5.3 Transportation environmental requirements

According to battery characteristics, Star 215 must meet the following requirements during storage and transportation, to maximize the protection of battery performance:

Allowable storage temperature: -30~60°C

Allowable storage humidity: 5%～95%

6 Contact information

Telephone
+86-731 **8256 6160** (CHN) +65 **9622 5139** (SGP) +1 (0) **949 678 2338** (USA)

WhatsApp
+86 **181 7589 6293**

ADD:
CHN - 25th Floor, North Tower, Jinmao Plaza, Yuelu District, Changsha City, Hunan Province， China
SGP - No. 18 Boon Lay Way #05-145, TradeHub 21 Singapore 609966
USA - 5900 Balcones Drive Suite 100 Austin TX, 78731 USA

E-mail: export@wenergypro.com / wenergyUSA@wenergypro.com
https://www.wenergystorage.com