



Black Wolf Enterprise

No.

Rev.

A/2

Product Specification

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400kWh_2h Outdoor Liquid Cooling Rack

Product Specification

Customer name:

Customer stamp: (No objection to the contents of this specification)

Customer confirmation date:



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Revision History

Rev	Revised content description	Date of issue	Revised by	Approved by
A	First issue	2024.8.17		
B	B sample design	2025.7.19		

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1. Terms definition

Table 1 Terms definition

RJETech	SB - BW
LFP	Lithium Iron Phosphate
AC	Alternating Current
DC	Direct Current
BMS	Battery Management System
BMU	Battery Management Unit
BCMU	Battery Cluster Management Unit
BSMU	Battery System Management Unit
BOL	Begin of Life
EOL	End of Line
PDU	High voltage control box
MSD	Manual Service Disconnect
PCS	Power Conversion System
SOC	State of Charge
SOH	State of Health
SOE	State Of Energy
SOP	State Of Power
UPS	Uninterruptible Power Supply
CCS	Cell Connection System
CAN	Controller Area Network
ETH	Ethernet module

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2. Product introduction

This product consists of eight 166.4V/300Ah lithium iron phosphate battery Packs and one set of high voltage control box (PDU), which are fixed in series on the electrical cabinet rack.

A 166.4V/300Ah lithium iron phosphate battery Pack consists of 52 battery cells in series, BMU, MSD, cabinet, liquid cooling plate, positive and negative connectors, communication connectors, CCS, copper bar, collection harness, and insulation materials.

The high voltage control box contains the BCMU, relays, fuses, power resistor, pre-charged resistor and other electrical components to monitor and protect battery clusters in real time.

The product has the characteristics of high energy density, wide temperature range, long life, light weight, high safety, small footprint and other characteristics.



Figure 1 Appearance of Battery Rack

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Table 2 Main Components of Battery Rack

Component	Quantity	Unit	Remark
Rack Frame	1	set	
Battery Pack	8	pcs	1P52S
PDU	1	pcs	
Liquid Cooling System	1	set	Mainframe, Plate and Conduit
Fire Protection System	1	set	Fire detector, Aerosol Extinguishing Device, Audible and Visual Alarm
BMS	1	set	BCMU, BMU

2.1 Basic parameters of battery rack

The technical parameters of this product are based on the new Pack, the measurement results at room temperature (25 ± 2)°C, humidity (55 ± 20)%.

Table 3 Battery Rack Characteristic Parameters

No.	Item	Parameter	Remark
1	Model	CL1P416S400B1	
2	Configuration	1P416S	
3	Rated Voltage	1331.2V	Standard charge and discharge
4	Rated Energy	399.36kWh	Standard charge and discharge
5	Voltage Range	1040-1497.6VDC	
6	Rated Charge/Discharge Power	0.5P	(25 ± 2)°C
7	Operating Temperature Range	-15~50°C (discharge) 5~50°C (charge)	Heating first before charging when below 0°C



8	SOC (%)		30%	(25±2)°C
9	Storage Condition	Storage Temperature	-20~0°C, 0~55°C	Less than three days
			0~40°C	Less than three months
			15~30°C	More than three months
			20~25°C	Over six months, complete charge and discharge maintenance is required
		Storage Humidity	RH≤95%	without condensation
Altitude	≤2500m	2000m		
SOC	20~50%	fully charged storage is prohibited		
10	Size	1313.2×1300×2402mm	W×L×H	
	Weight	3650kg		



	General Parameters	IP Level	Battery compartment IP65	
			Electrical compartment IP55	
		Corrosion-proof Grade	C4	
		Cooling Mode	Liquid Cooling	
		Communication Agreement	CAN\RS485\Ethernet	
		Power Connection	Fast Plug	
		Communication Connection	Fast Plug	
		AUX Power Connection	Fast Plug	
11	Standard Requirement	Battery Rack	IEC62619	
			IEC62477-1	
			EMC	
			UL1973	
			UL9540A	
			FCC	
			UN38.3	
GB/T36276				
12		Voltage Range	220±15%VAC	

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	Auxiliary power	Frequency	50/60Hz	
		Max Current	29A	

2.2 Main equipment parameters

2.2.1 Cell

The cell is a 3.2V/300Ah lithium iron phosphate cell independently developed by RJETech.

2.2.1.1 Basic parameters of cell

Table 5 Basic Parameters of Cell

No.	Item	Parameter	Remark
1	Cell Type	LFP	
2	Cell Model	72173204	
3	Cell Weight	5.4±0.27kg	Wrapped in blue film
4	Internal Resistance of EOL	≤0.2mΩ	30% SOC, 1kHz
5	Nominal Capacity	300Ah	(25±2)°C, Standard charge and discharge
6	Nominal Voltage	3.2V	
7	Rated Energy	960Wh	
8	Operating Voltage	2.50~3.65V 2.00~3.65V	T>0°C T≤0°C
9	Energy Density	≥169Wh/kg	(25±2)°C, Standard charge and discharge
10	Monthly Self-Discharge	≤3.0%	25±2°C, 30% SOC storage for 3 months

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			New cells of EOL, 25±2°C, 30% SOC, storage for 3 months
11	Maximum Continuous Charging Power	0.5P	(25±2)°C
12	Maximum Continuous Discharge Power	0.5P	(25±2)°C
13	Discharge Temperature Range	-20~55°C	
14	Charge Temperature Range	0~55°C	
15	Standard Requirement	GB/T36276	
		UL9540A	
		UL1973	
		IEC62619	
		IEC62620	
		UN38.3	
		CE-ROHS	

2.2.1.2 Dimensions of cell

Table 6 Dimensions of Cell

No.	Item	Parameter	Tolerance
1	Height (excluding pole)	204.4mm(including insulation film, including outer gasket)	±0.6mm
2	Height (including pole)	207.1mm(including insulation film)	±0.6mm

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3	Thickness	71.7mm (including insulation film)	$\pm 0.5\text{mm}$
4	Width	174.60mm(The bottom hem of the cell, including insulation film)	$\pm 0.5\text{mm}$
		174.00mm	$\pm 0.5\text{mm}$
5	Welding Area of Pole	$\text{Ø}16\text{mm}$	$\pm 0.2\text{mm}$
6	Center Distance between Positive Pole and Negative Pole	123mm	$\pm 0.3\text{mm}$

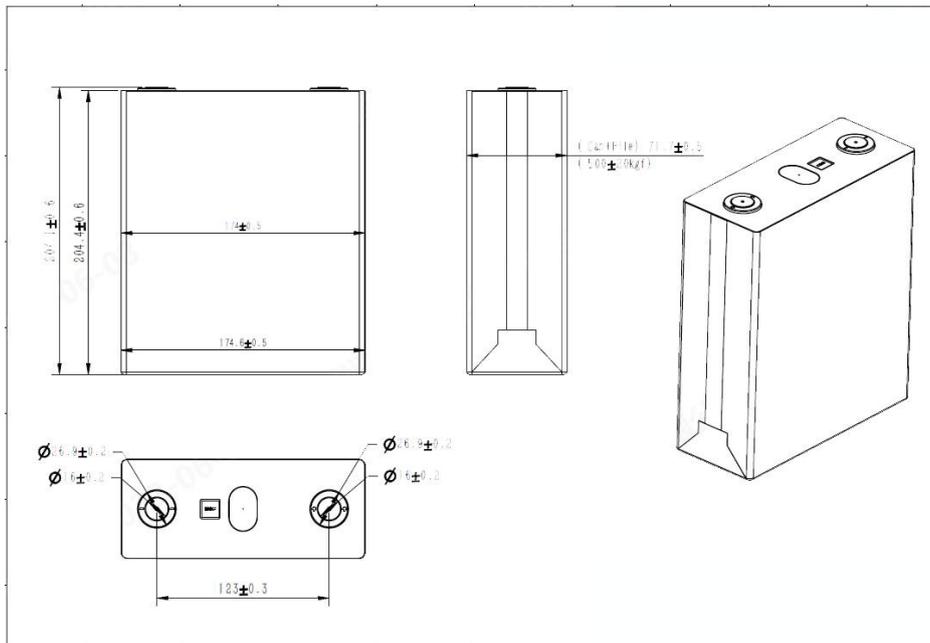


Figure 2 Drawing of Cell Dimensions

Note: The thickness is measured at a surface pressure of $5000\pm 200\text{N}$.

Cell detailed parameters can be referenced in “300Ah Cell Product Specification”.

2.2.2 Battery Pack

2.2.2.1 Basic parameter

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The technical parameters of the Pack are measured based on the new cell at room temperature (25 ± 2)°C and humidity (55 ± 20)%. Specific parameters are shown in the following table.

Table 7 Battery Pack parameters

No.	Item	Parameter	Remark
1	Model	PL1P52S050B1	
2	Configuration	1P52S	
3	Nominal Voltage	166.4V	Standard charge and discharge
4	Nominal Capacity	49.92kWh	Standard charge and discharge
5	Discharge Cut-off Voltage	130 V or any cell voltage reaches 2.5V	$T > 0^{\circ}\text{C}$
		104 V or any cell voltage reaches 2.0V	$T \leq 0^{\circ}\text{C}$
6	Charge Cut-off Voltage	187.2 V or any cell voltage reaches 3.6V	
7	Maximum charge/ discharge current	192A	

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8	Rated charge/discharge current	150A	(25±2)°C	
9	operating temperature range	-15~50°C (Discharge) 5~50°C (Charge)	Heating first before charging when below 0°C	
10	storage temperature range	-20~0°C, 0~55°C	Less than three days	5%≤RH≤90%, SOC20-50%, 5%≤Humidity≤90%RH, SOC20-50%, fully charged storage is prohibited
		0~40°C	Less than three months	
		15~30°C	More than three months	
		20~25°C	Over six months, complete charge and discharge maintenance is required	
11	Power Connection	Fast Plug		
12	Communication Agreement	CAN		
13	SOC (%)	30%	(25±2)°C	
14	Weight	330kg±5kg		

2.2.2.2 Dimensions of battery Pack

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Figure 3 Appearance of the battery Pack

Table 8 Dimensions of battery Pack

W	H	L
(800±2) mm	(240±1.5) mm	(1127±3) mm

2.2.2.3 Pack panel-definition

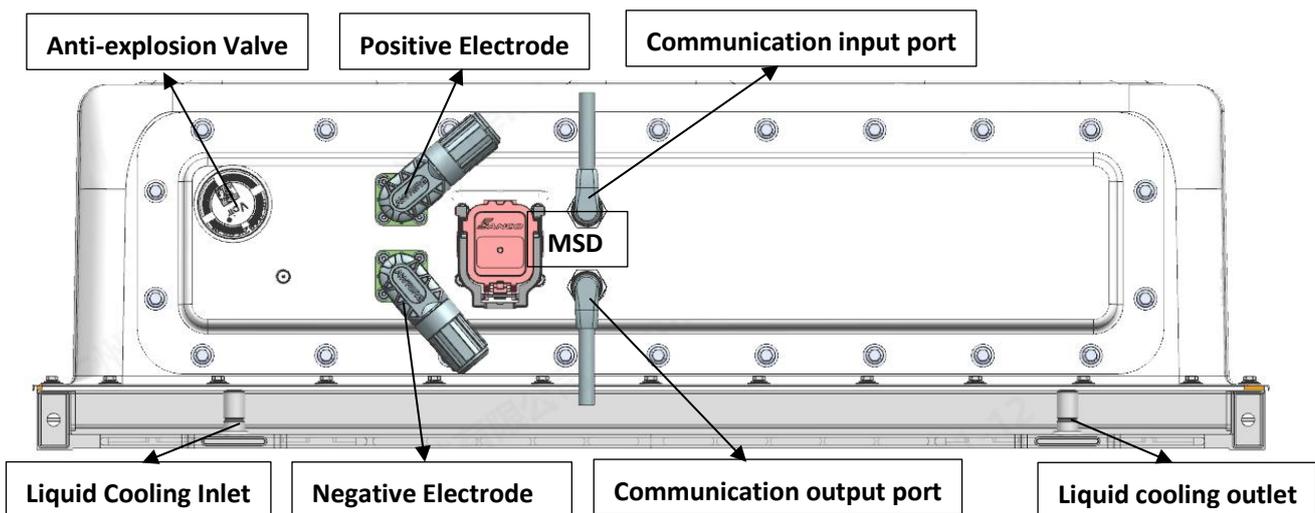


Figure 4 Pack panel definition

2.2.3 PDU

2.2.3.1 PDU panel-definition

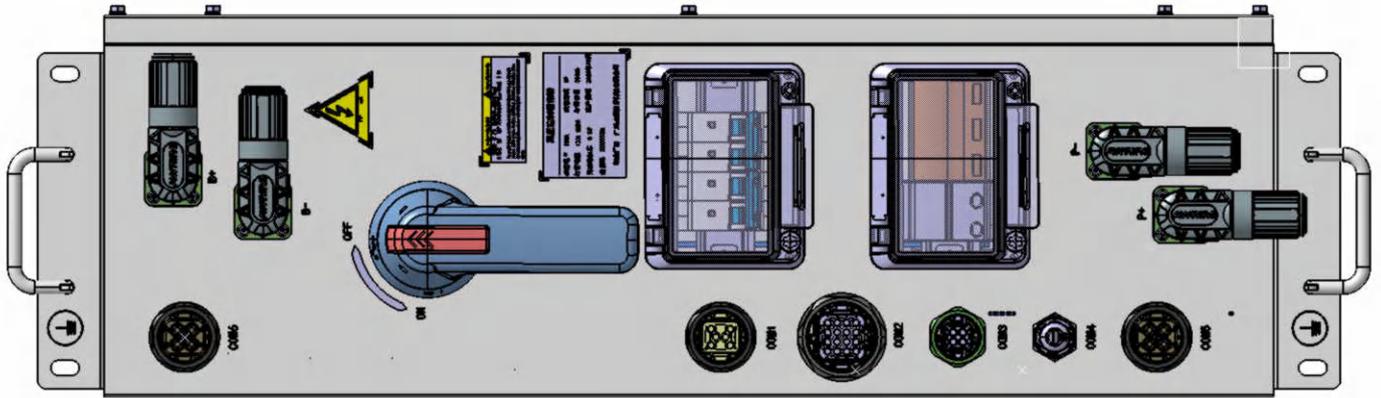


Figure 5 PDU panel-definition

2.2.3.1 PDU schematic diagram

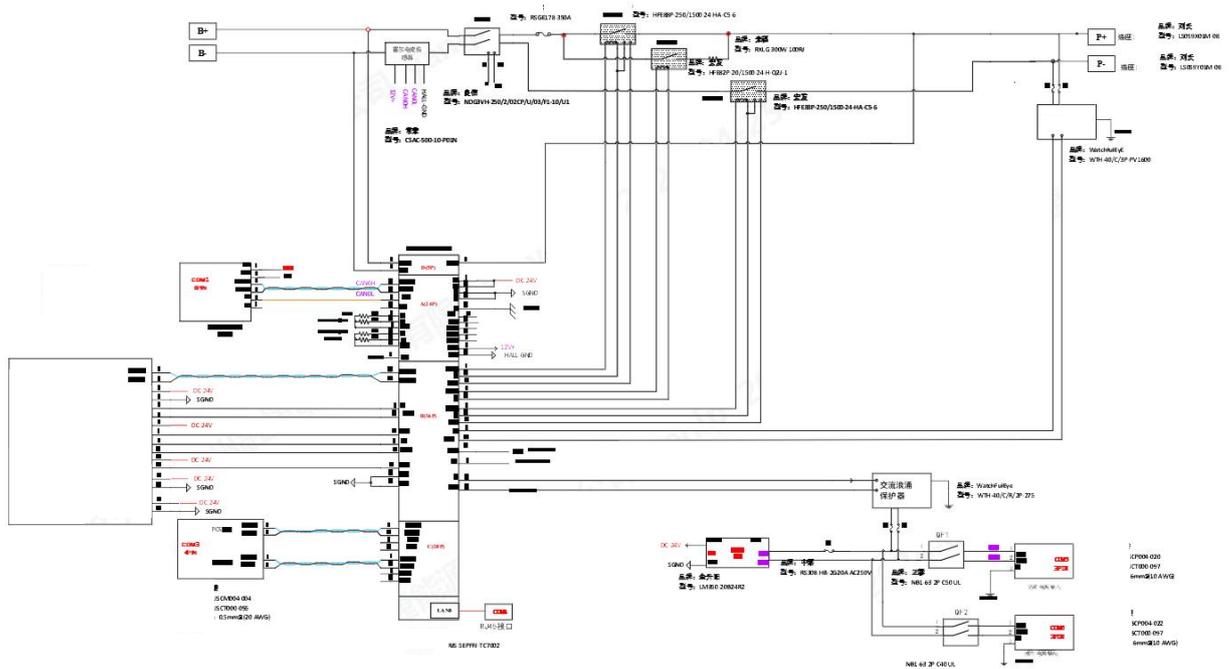


Figure 6 PDU Electrical Schematic Diagram

2.2.3.2 Interface definition

Table 9 PDU interface definition

Port	No.	Pin	Definition
COM1	1	24V	BMU communication and power supply
	2	GND	
	3	CAN0H	



	4	CAN0L	
	5	IO1	
	6	NC	
COM2	1	RS485A	Fire protection system, Liquid cooling system and dehumidifier communication
	2	RS485B	
	3	Fire power supply+	Fire-fighting system power supply
	4	Fire power supply-	
	5	Smoke/temperature alarm+	Fire alarm signal
	6	Smoke/temperature alarm-	
	7	Fire action alarm+	Fire system start signal
	8	Fire action alarm-	
	9	Sound and light alarm power supply+	Sound and light alarm power supply
	10	Sound and light alarm power supply-	
	11	Door-open alarm+	Door opening alarm signal
	12	Door-open alarm-	
	13	Power supply for dehumidifier+	Dehumidifier power supply



	14	Power supply for dehumidifier-	Reserved
	15	Reserved power supply+	
	16	Reserved power supply-	
COM3	1	CAN1H	Communicate with PCS
	2	CAN1L	
	3	CAN2H	Communicate with EMS
	4	CAN2L	
COM4	/	RJ45	Reserved
COM5	1	AC-L	AC power input
	2	AC-N	
	3	PE	
COM6	1	AC-L	Liquid cooling system power supply
	2	AC-N	
	3	PE	

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2.2.4 Battery rack dimensions

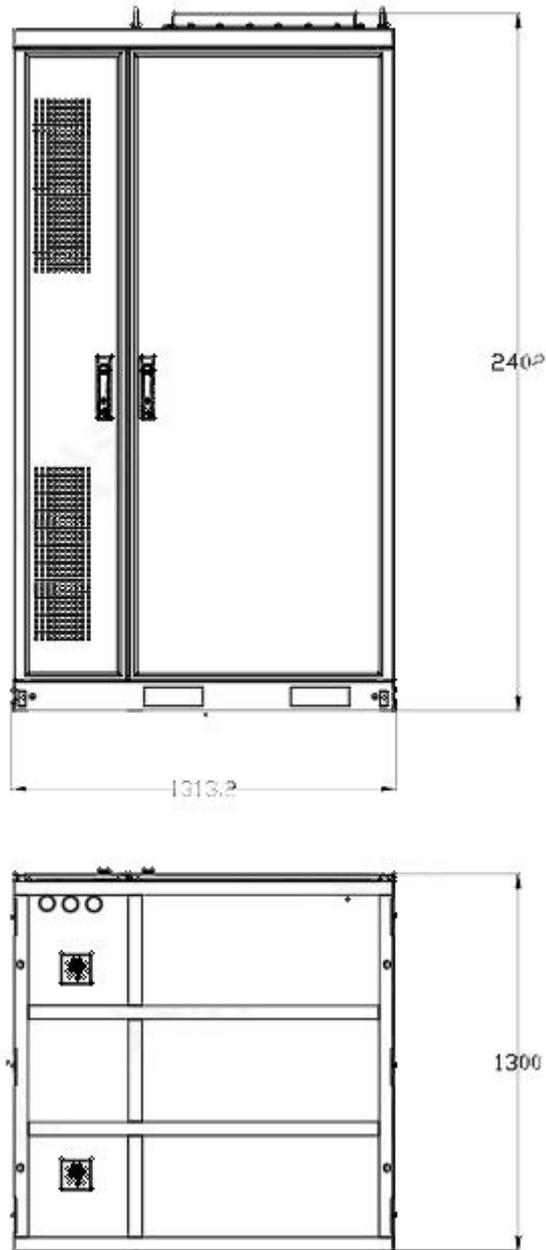


Figure 7 Battery rack dimensions

2.3 Information of switch

Table 10 Information of switch

No.	Switch	Name of switch	Function
1	QF1	Breaker	To connect and cut off the AC 220V Power Supply

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2	QF2	Breaker	To connect and cut off the power supply of liquid cooling system system
3	QF3	Disconnecter	To cut off the output of battery system.
4	SPD1	AC Surge Protector	Surge prevention
5	SPD2	DC Surge Protector	
6	KG	Key Switch	To turn on and turn off the rack

2.4 Communication Protocol

Adopt RJETech standard communication protocol

BMS information can be referenced in BMS specification

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2.5 Mechanical Interface

2.5.1 Foot Margin

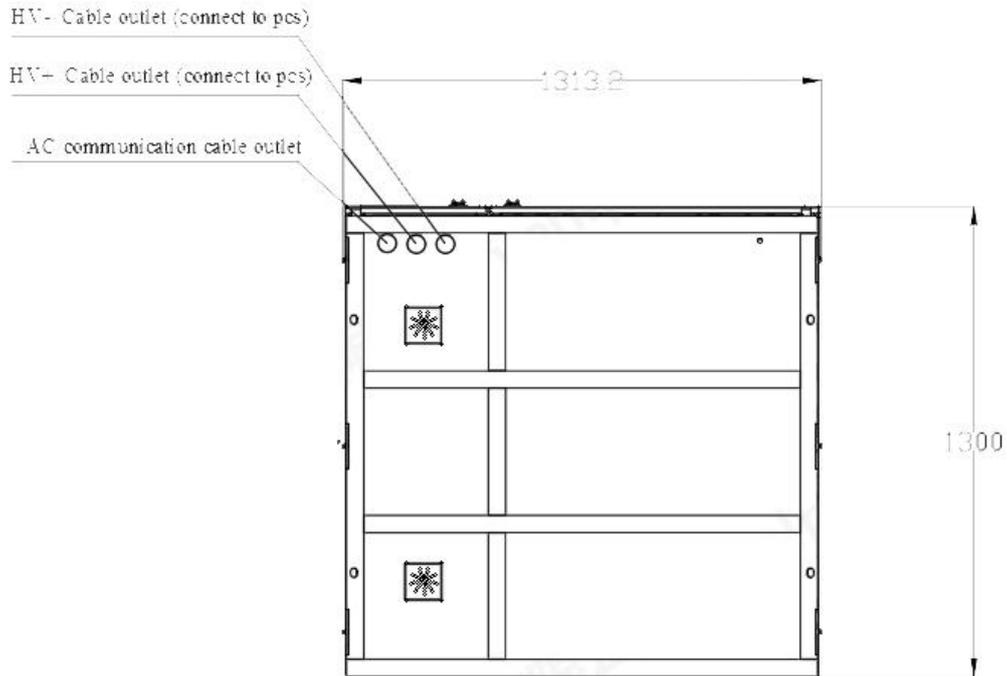


Figure 8. Foot margin and main interface of battery rack

2.5.2 Layout of the rack

Varied layouts of the rack are presented in the figures below:

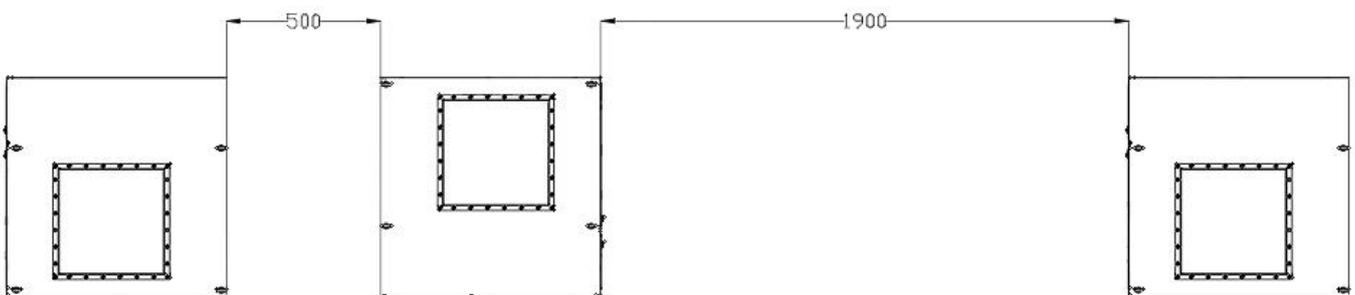


Figure 9 Back-to-back arrangement (Top view)

For back-to-back arrangement, the minimum clearance between racks is 500mm, and the recommended clearance between the front side of the rack and another rack is 1900mm.

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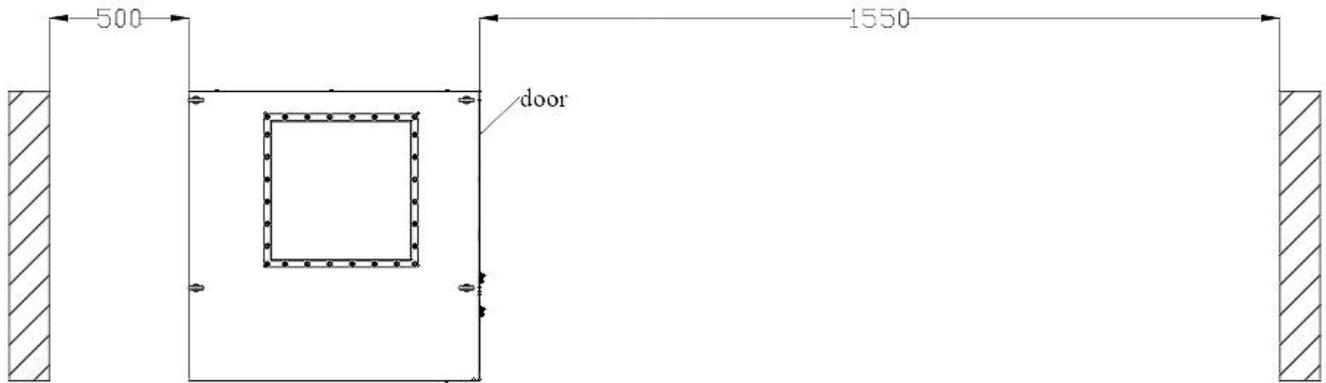
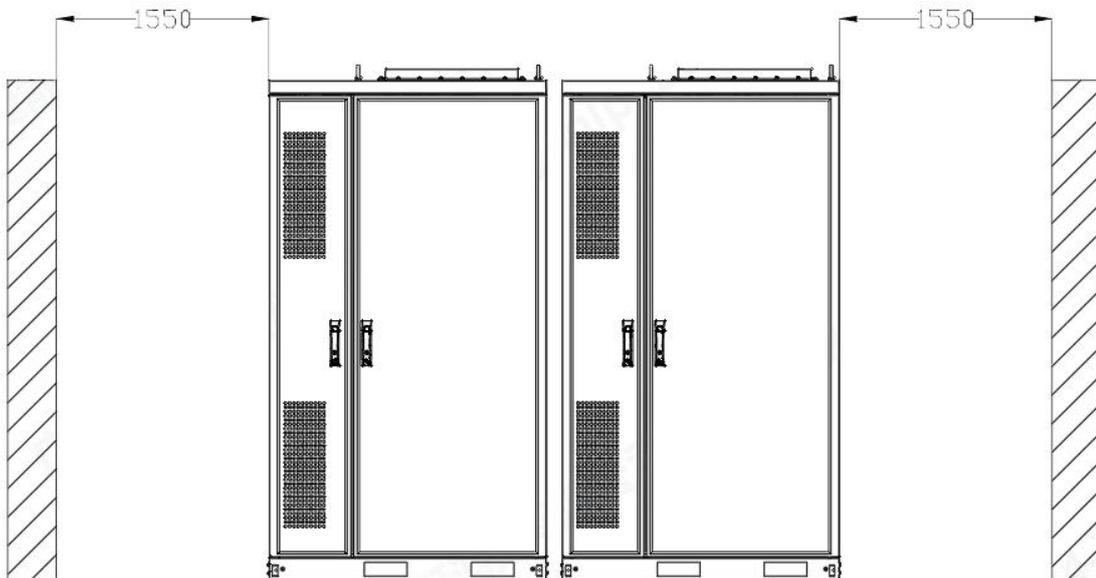


Figure 10 Back-to-enclosure arrangement (Top view)

For back-to-enclosure arrangement, the minimum clearance between the back side of rack and the enclosure is 500mm, and the recommended clearance between the front side of rack and the enclosure is 1550mm. (For installation and maintenance).



The minimum distance between cabinets is greater than 20mm, and the distance between cabinet and the wall is not less than 1550mm.