1000KW/2007.04KWh

Technical scheme of energy storage system

First party（buyer）：

Second party（supplier）：

Contents

1、GENERAL RULES 3

1.1 Product Overview 3
1.2 Scope of Supply 3
1.3 Energy Storage System Topology 4

2、DETAILED INTRODUCTION OF TECHNICAL SOLUTION 5

2.1 Technical Solution 5
2.2 Cell Performance 6
2.3 Battery Module 8
2.4 Battery Cluster 11
2.5 High Pressure Tank 13
2.6 Control the confluence cabinet、distribution box 14
2.7 Fire Fighting System 15
2.8 PCS（MPS0500） 16
2.9 Layout Scheme 17

1、General Rules

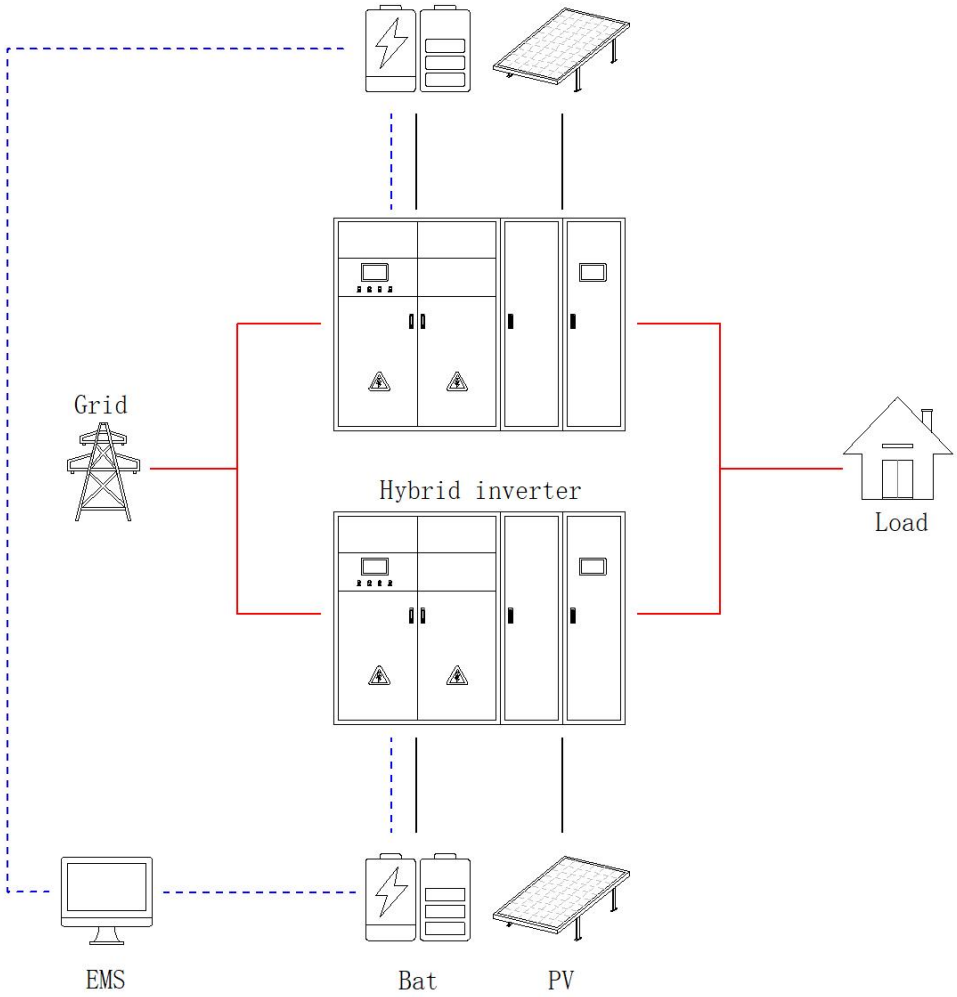
1.1 Product Overview

The product is used in power storage system, the battery is aluminum shell lithium iron phosphate battery； Modular design of battery pack for easy handling, installation, and maintenance； The battery pack can monitor and store battery pack parameters in real-time, achieving local protection.Meet the power energy storage system peak regulation, frequency regulation, peak cutting and valley filling, load dynamic tracking, off-grid backup power supply and other applications

1.2 Scope of Supply

No.	Product Name	Product Model	Unit	Quantity	Remark
1	Battery System	2007.04KWH			
1.1	Battery Module	1 P 16 S	pc	140	BMU：Party B's choice Collection Line：Party B's choice
1.2	High voltagecontrol box	Standard	pc	10	BCU：party B's choice Main control wiring harness：party B's choice
1.3	Battery Rack	2 columns 8 layers	pc	10	party B's choice
1.4	Control the Confluence cabinet	800*600*1800	set	2	☑BAU and Display ☑UPS ☑Dc Circuit Breaker
2	Electric Accessory				
2.1	PCS	500KW Hybrid inverter	set	2	
2.2	EMS		set	1	
3	Energy storage container	40 feet	set	1	Including lighting, sockets, air conditioning, etc.

1.3 Energy Storage System Topology



Running logic：

Give priority to using photovoltaic to supply power to the load, and charge the battery if the photovoltaic is redundant.

When photovoltaic power is insufficient, use batteries.

When photovoltaic and batteries are insufficient, use the grid.

.Priority level of use ： photovoltaic > battery > grid

Suggested photovoltaic panel assembly mode: 10~12 panels are recommended to be connected in series for a single channel, and each MPPT module can be connected to 60KW at most (it is recommended to connect to one MPPT after 10 channels are converged).Therefore, it is suggested that the specification of photovoltaic junction box is: 10 in and 1 out.

2、Detailed Introduction of Technical Solution

2.1 Technical Solution

The energy storage system medium is the lithium iron phosphate battery with high safety and high cycle life, which has the characteristics of modularity and easy installation and maintenance. Aluminum shell unit 3.2V/280Ah, laser spot welding technology is used to form the PACK, the battery module is 1P16S/51.2V280AH rated power of14.336kWh.

The 14 cell modules in series are 1 cluster with energy 200.704kWh.

The battery system consists of 5 clusters with a total energy of 1003.52KWh, which is fed into a control bus cabinet and connected to 500KW PCS

The battery system 1 is stacked as 1 channel, with 2 channels in total, which are output to the load after parallel operation.

System Parameter Table：

Item	Parameter	Remark
Total Energy	2007.04KWh	25℃@0.5c rated
Rated Voltage	716.8V	
Working Voltage	604.8V~784V	Cell2.7V/Cell3.5V
Sustainable Charging Power	1000kW	25℃±10
Sustainable Discharging Power	1000kW	25℃±10
Transfer Efficiency	DC Side≥92%	25℃，1C
Maximum charging and discharging current of a single cluster	Current：140A	
Weight	110kg	±3kg,single module
Operating Altitude	＜2000m	≥2000m required reduction
Protection Grade	IP54	
Fire Fighting System	Gas extinguishing system	
Battery operating environment temperature	0~45℃	

2.2 Cell Performance



The battery cell adopts lithium iron phosphate battery， capacity:280Ah， nominal voltage3.2V，grade A cell，operating voltage range:2.5~3.65V，Monthly self-discharge rate of cell≤3%，The battery has passed GBT 31484-2015, GBT 31485-2015 and GBT 31486-2015 national strong test, and passed GB36276-2018 third-party test certification. And through UL1973, UL9540A, IEC62619, UN38.3, CB certification and other international third-party certification.

Item	Parameter	Remark
Cell Type	lithium iron phosphate	
Weight	5.43±0.20kg	After wrapping blue film
Factory Internal Resistance （1kHz）	0.18±0.05mΩ	27%SOC， Based on the online testing data of the production line
Rated (nominal) capacity	280Ah	(25±2)℃,Standard Charging and Discharging
Nominal Voltage	3.2V	(25±2)℃,Standard Charging and Discharging
Rated Energy	896Wh	(25±2)℃,Standard Charging and Discharging
Working voltage	2.50～3.65V 2.00～3.65V	Temperature＞0℃ Temperature≤0℃
energy density	≥160Wh/kg	(25±2)℃,Standard Charging and Discharging
Recommended SOC usage window	10%～90%	N.A.
Recommended SOC usage window	≤3.0%	Three months after shipment, the battery cells are charged to 40% SOC as standard and stored at 25 ± 2 ℃

Maximum continuous charging power	1P	(25±2)℃
Maximum continuous Discharging power	1P	(25±2)℃
Discharging temperature range	-30~60℃	N.A.
Charging temperature range	0~60℃	N.A.

2.3 Battery Module

Battery module adopts3.2V/280ah lithium iron phosphate battery1P16S design , form51.2V/280Ah , total energy14.336kWh.At the same time, the internal collection harness and BMU are used to collect the voltage and temperature of the battery cell.

Sketch Map



The battery module parameters are listed below：

No.	Item	Spec	Remark
1	Module Size	435mm(W)*800 mm(D)*234mm(H)	±2mm
2	Nominal Capacity	280ah@1C,25℃	Tested capacity≥98%，qualified
3	Nominal Voltage	51.2V (16cells)	Shipping capacity30%-40%SOC
4	Min Working Voltage	43.2V	T > 0℃@cell 2.7V
5	Max Working Voltage	58.4V	T > 0℃@cell 2.7V
6	Composition Way	1P16S	
7	Rated Power	14.336KWH	25±2℃
8	Weight	110KG	
9	Max continuous Charging Current	140A/0.5C	20~35℃，SOC：0~90%

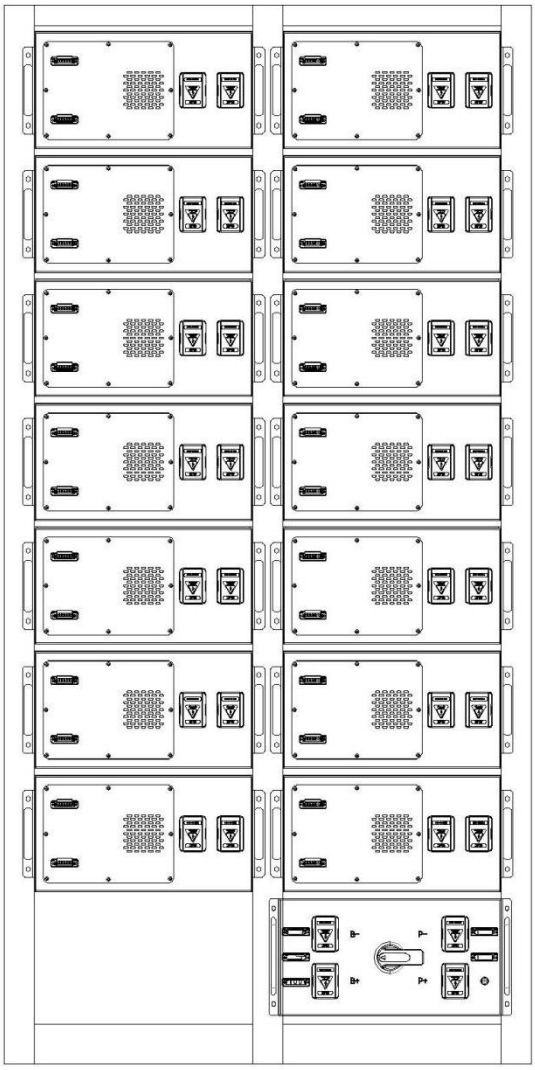
No.	Item	Spec	Remark
10	Max pulse Charging current	1C（30S）	25~35℃，SOC：0~80%
11	Max continuous Discharging Current	140A/0.5C	15~35℃，SOC：10~100%
12	Max Pulse Discharging Current	1C（30S）	20~35℃，SOC：20~100%
13	Self-discharge Rate	< 3%/月	New cell，25±2℃，30%SOC After three months storage
14	Insulation Grade	≥1000MΩ	Battery pack total positive, total negative to ground
15	Protection level of battery box	IP20	
16	Cooling Type	Air cooling	
17	Charging high temperature protection	45℃	battery temperature
18	Discharging high temperature protection	50℃	battery temperature
19	Charging low temperature protection	0℃	battery temperature
20	Discharging low temperature protection	-20℃	battery temperature
21	Cycle Times	≥6000 次	25℃±2℃ 0.5C/0.5C， @90%DOD 80%EOL
22	Working Environment Temperature Range	0～40℃	It is prohibited to use beyond the scope, as it may cause damage to the battery and pose a safety risk
23	Storage Temperature Range	-30～45℃	It is prohibited to use beyond the scope, as it may cause damage to the battery and pose a safety risk
24	Storage environment humidity（RH）	5%～95%	It is prohibited to use beyond the scope, as it may cause damage to the battery and pose a safety risk

No.	Item	Spec	Remark
25	Working environment humidity（RH）	≤85%	It is prohibited to use beyond the scope, as it may cause damage to the battery and pose a safety risk

2.4 Battery Cluster

Battery Cluster: series of 14battery modules is one cluster, capacity:200.704kWh。

List of equipment for clusters		
No.	**Equipment**	**Remark**
1	Battery Module	1P16S
2	Frame	2 columns 8 layers
3	High Pressure Tank	Standard high pressure box
4	BMS	Three-level architecture
5	Connecting Copper bars	Series copper row in the battery cluster
6	BMS Communication Collection Harness	



Sketch Map

No.	Item	Spec	Remark
1	Battery Rack		
2	Nominal Capacity	280ah@1C,25℃	Tested capacity≥98%，qualified
3	Nominal Voltage	716.8V	Shipping capacity30%-40%
4	Working Voltage	604.8V~784V	
5	Max continuous Charging Current	140A@25℃	
6	Max continuous Discharging Current	140A@25℃	
7	Nominal weight (single cluster)	About185 kg	
8	Nominal energy	215.04kWh	25℃@0.5c rated
9	*Insulation standard	Battery case insulation resistance > 1GΩ(1000VDC)	Refer to GB36276-2018
10	*Pressure resistance standard	3110VDC，No breakdown or flash-over	Refer to GB36276-2018
11	Maxi single-unit charging voltage	3.65V	Any battery cell, beyond the range of use will damage the battery, and there is a safety risk
12	Single-unit min discharge voltage	2.5V	Any battery cell, beyond the range of use will damage the battery, and there is a safety risk
13	Discharging over current protection	145A@5S	interval > 10min Any battery cell, beyond the range of use will damage the battery, and there is a safety risk
14	Discharging over current protection	45℃	Battery temperature in the battery module
15	Discharging high temperature protection	50℃	Battery temperature in the battery module
16	Charging low temperature protection	0℃	Charging low temperature protection

No.	Item	Spec	Remark
17	Discharge low temperature protection	-20℃	Discharge low temperature protection
18	Working Temperature Range	0~40℃	It is prohibited to use beyond the scope, as it may cause damage to the battery and pose a safety risk

2.5 High Pressure Tank

The high-voltage box of the battery cluster is carefully designed for the number of access battery modules, with control devices, fuses and obvious power off devices, with fault alarm, fault protection, safety protection and other functions to ensure the electrical safety of the battery, and has the emergency stop function and the function of disconnecting the system step by step during maintenance.The effect of high altitude on switching disconnection and voltage resistance is considered in all special DC switches. The battery cluster high voltage control box is equipped with total positive contactors, total negative contactors, pre-charging circuits, fuses, moulded case circuit breakers, etc. All contactors should be able to accept the control of the battery management system.



2. 5. 1Main electrical equipment of the high-voltage box

List of equipment for clusters		
No	**Electrical Equipment**	**Remark**
1	moulded case circuit breaker	For the protection and emergency cutting-off of the entire circuit
2	DC contactor	Used to control circuit on/off
3	BCU	Control device
4	Connector	Power cable input / output
5	Pre-charging resistance	Precharge circuit
6	Current diverter	Current collection
7	Fuse	For the protection of the entire circuit

2.6 Control the confluence cabinet、distribution box

2.6.1 Cabinet body

1、The cabinet body is welded with high-quality cold-rolled steel plates, with a frame thickness of no less than 2mm and an internal sheet metal thickness of no less than 1.5mm.

2、The cabinet protection level is not lower than IP30。

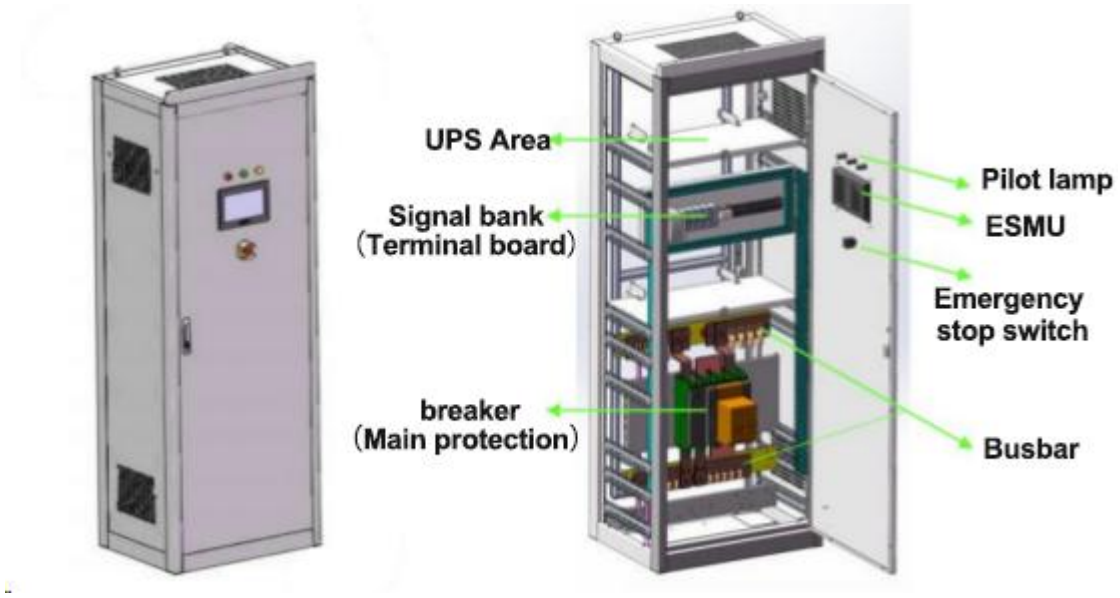
3、The incoming and outgoing methods of the cabinet body are bottom in and bottom out, and the bottom adopts a detachable movable cover plate。

4、The cabinet design meets the requirements of natural ventilation, with good heat dissipation performance. The four corners of the cabinet top are equipped with detachable lifting rings and bases.

5、Cabinet color RAL7035, brow red white characters。

6、Bus cabinet size: based on actual conditions
Distribution box size ： based on actual conditions

2.6.2 Appearance diagram



2.6.3 Secondary circuit

1、The control loop adopts copper core flexible wire that meets the insulation requirements.

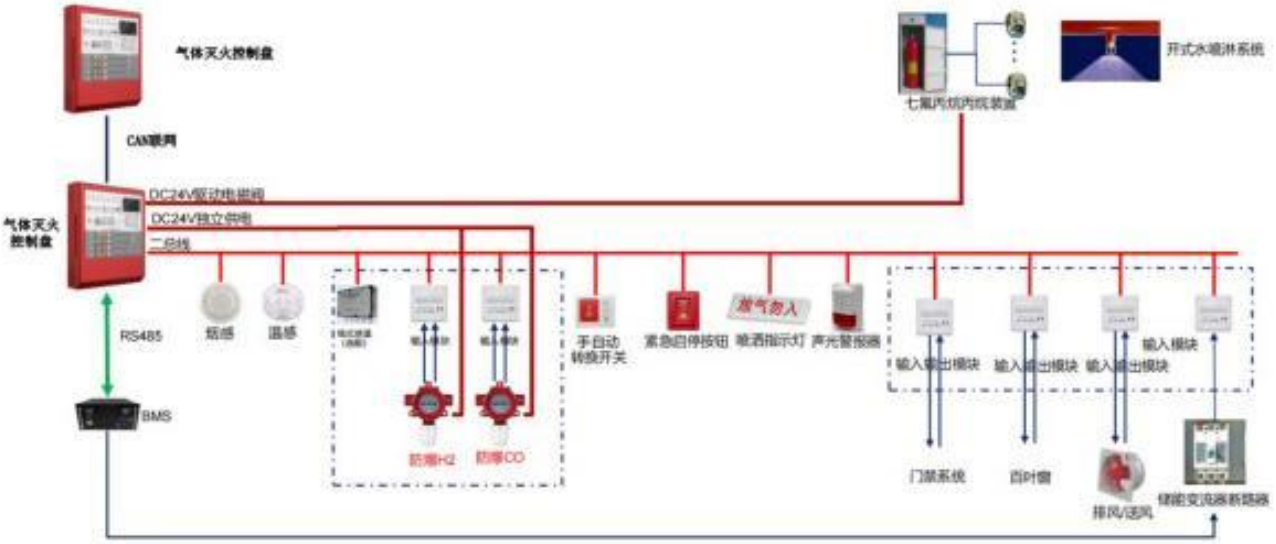
2、All lead joints shall be pre-insulated nose.

3、All terminals are under the Weidmuller or Phoenix brand.。

4、 The panel, cabinet, and electrical equipment should be labeled according to the circuit requirements, and the label should be clear and not easy to fall off.

2.7 Fire Fighting System

The WZ-Q/Z-1230-6/1.6/170 perfluorohexaneketone fire detection tube fire extinguishing device is a temperature sensing and self starting fire extinguishing device that is pre-designed, assembled, and equipped with linkage control functions according to preset conditions, including perfluorohexaneketone storage containers and spray components. The WZ-Q/Z-1230-6-1.6/170 perfluorohexaneketone fire extinguishing device consists of a perfluorohexaneketone storage container, container valve, pressure signal transmitter, fire detection tube type initiator, perfluorohexaneketone fire extinguishing agent, pressure gauge, alarm, etc. The container stores perfluorohexaneketone fire extinguishing agent



2.8 PCS（MPS0500）






Technical Specification	MPS0030	MPS0050	MPS0100	MPS0150	MPS0250	MPS0500
AC(on-grid)						
Max output power(kVA)	33	55	110	165	275	550
Rated power(kW)	30	50	100	150	250	500
Rated voltage(V)	400					
Rated current (A)	43	72	144	216	361	722
Voltage range(V)	320~460					
Rated frequency (Hz)	50/60					
Frequency range(Hz)	45~55/55~65					
THDi	<3%					
Power factor	1lagging~1leading					
AC connection	3W+N+PE					
Transformer ratio	100/400	200/400	270/400	270/400	270/400	315/400
AC(Off Grid)						
Max output power(kVA)	33	55	110	165	275	550
Rated power(kW)	30	50	100	150	250	500
Rated voltage(V)	400					
Rated current(A)	43	72	144	216	361	722
THDu	≤1% linear; or≤5% nonlinear					
Rated frequency(Hz)	50/60					
Overload capacity	110% long-term					
Photovoltaic input						
Max.PV input voltage(V)	1,000					
Max.PV power(kW)	60/120	60/120	120/180/240	120/180/240	300/360	600/660/720
MPPT voltage range(V)	250-850					
MPPT voltagerange@fullload(V)	450-850					
Battery						
Battery voltage range(V)	250~850	320~850	420~850	420~850	420~850	500~850
Max. charging power(kW)	60/120	60/120	120/180/240	120/180/240	300/360	600/660/720
General data						
Dimension W*D*H(mm)	800*800*1,900	800*800*1,900	1,200*800*2,050	1,200*800*2,050	(600*720*2,050)*1+ 1,200*800*2,050	(600*720*2,050)*2+ 1,600*1050*2,050
Weight(kg)	620/650	720/750	1,120/1,150/1,180	1,250/1,280/1,310	1,980/2,010	3,265/3,295/3,325
Operation temperature(℃)	-30 ~ 55					
Relative humidity	0 ~95% non-condensing					
Ingress protection	IP20					
Noise emission(dB)	<70					
Altitude	5,000m(>3,000 Derating)					
Cooling	Air Cooling					
Display and communication						
Display	LCD touch-screen					
BMS communication	RS485, CAN					
EMS communication	RS485, TCP/IP					
Certificates	EN62109-1/-2, EN62477-1, EN61000-6-2, EN61000-6-4, South Africa NRS097-2-1:2017, Pakistan & India IEC61727, IEC62116,IEC 61683					

2.9 Layout Scheme

System layout diagram (subject to final confirmation drawing)：

