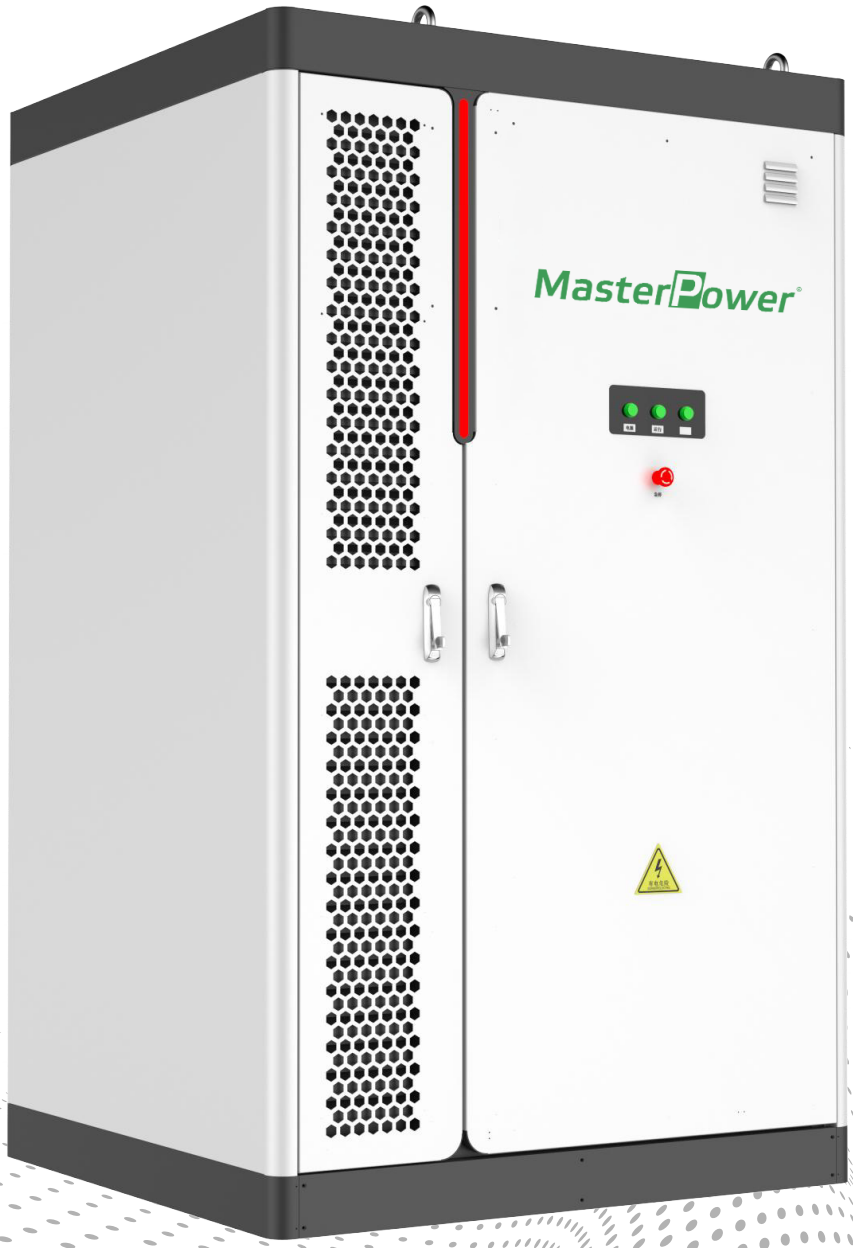
Product Specification

MF-SCS-418KWH-UE



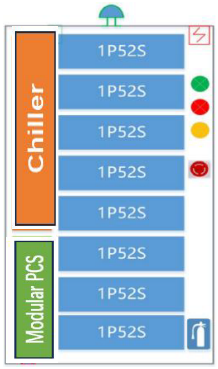
Contents

1. Product Introduction

Appearance of MF-SCS-418KWH-UE

The capacity of MF-SCS-418KWH-UE is 209kW/418kWh, including PCS, battery system (DC voltage 1165-1498V), battery management system (BMS), communication management system, thermal management system.

The MF-SCS-418KWH-UE adopts a modular unit design, with an AC 690V output, and can be directly connected in parallel on the AC side for capacity expansion. The appearance and style of each energy block are consistent, the modular design reduces the risk of product failure, and the capacity can be flexibly configured. It adopts an outdoor compatible design with IP55 protection, and can be directly installed outdoors to save deployment costs for users.



Internal structural diagram of MF-SCS-418KWH-UE

The machine is delivered as a whole to meet the requirements of fast, phased and distributed deployment; the comprehensive battery, power grid, environment and other monitoring and management systems provide fault warning, status monitoring, maintenance reminder and other services.

Technical parameters of MF-SCS-418KWH-UE

SN	Item	Parameters	Remarks
1	Product model	MF-SCS-418KWH-UE	
2	Cell type	LFP 3.2V/314Ah	
3	Battery PACK configuration	52.3kWh	
4	Battery voltage range	1164.8~1497.6V	
5	Number of temperature monitors	224	
6	AC rated power	215kW	reduce power to 209kW
7	Maximum AC power	258kW	
8	AC current distortion rate	<3%	
9	DC component	< 0.5%Ipn	
10	Grid voltage range	690V±10%	
11	Power factor	> 0.99	
12	Adjustable range of power factor	-1 - 1	
13	Rated grid frequency	50Hz	
14	Maximum system efficiency	≥90%	
15	Charge and discharge rate	≤0.5P	
16	Depth of discharge	0~100%DOD	
17	System voltage format	IT	
18	Number of cycles	≥7000 times	
19	Charge and discharge switching time	<100ms	
20	Communication interface	LAN	
21	System protection level	IP55	
22	Operating temperature	-35℃～55℃	
23	Operating humidity	0%RH ~ 95%RH, no condensation	
24	Noise	<80dB	
25	Dimensions (W×D×H)	1400mm×1300mm×2350mm	
26	Altitude	≤2000m	

27	Thermal management mode	Air cooling (PCS) + liquid cooling (battery)	
28	Fire protection system	Aerosol + active warning	
29	Total weight	3800Kg	

Master Battery, S.L.
Paseo de extremadura, 39, 28935 Móstoles, Madrid, España
Tel. +34 918 021 649
info@masterbattery.es / www.masterbattery.es

2. Battery

2.1 Battery cell

Battery cell apperance

The battery cell is a mature standard 314Ah lithium iron phosphate (LFP) square aluminum shell cell produced by automated production line. This cell has high continuous power, high cycle life, high storage life and optimal safety.

Battery cell parameters

SN	Item	Parameters	Remarks
1	Cell type	LFP	
2	Cell capacity	≥314Ah	25℃
3	Nominal voltage	3.2V	
4	Nominal energy	≥1004.8Wh	25℃
5	Working voltage	2.5V～3.65V 2.0V～3.65V	T > 0℃ T ≤ 0℃
6	Nominal charge/discharge rate	0.5P	
7	Internal resistance	0.18±0.05mΩ	25℃,50%SOC
8	Number of cycles	7000 times	
9	Operation temperature	0~60°C charging -30~60°C discharging	
10	Storage temperature	-30~60°C	

11	Dimensions	71.65*174.7*207.11mm	
12	Weight	5.43kg±0.2kg	

2.2 Battery module

Battery module appearance

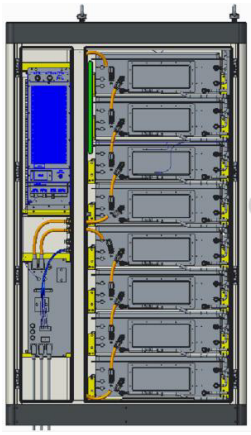
The battery module is composed of battery cells, connecting copper bars, collection wiring harness, BMU, related electrical parts and structural parts. The battery module grouping method is 1P52S, with 52 sets 314Ah batteries connected in series, the nominal voltage is 166.4V, and the specific parameters are as follows:

Battery module parameters

SN	Item	Parameters	Remarks
1	Burst mode	1P52S	
2	Module capacity	314AH	
3	Nominal voltage	DC 166.4V	
4	Nominal energy	52.3kWh	25℃
5	Working voltage	145.6V～187.2V	
6	Nominal charge/discharge rate	0.5P	
7	OPERATING TEMPERATURE	-35℃~55℃	

2.3 Battery cluster

Master Battery, S.L.
Paseo de extremadura, 39, 28935 Móstoles, Madrid, España
Tel. +34 918 021 649
info@masterbattery.es / www.masterbattery.es



Battery cluster appearance

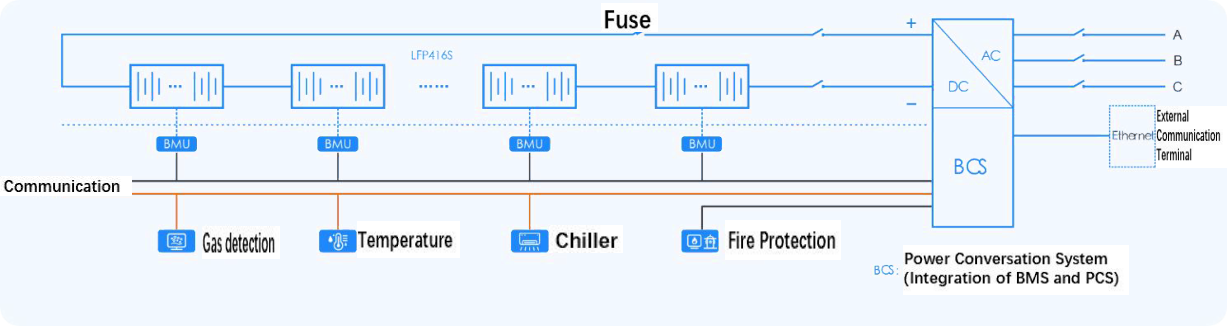
The battery cluster adopts a frame structure, and the battery modules are fixed by bolts. The battery cluster includes 8 battery modules, the modules are connected in series, and the grouping method is 1P416S. The battery modules are arranged sequentially in the energy storage cabinet from top to bottom, and are connected through dedicated connectors on the front panel. The nominal voltage is 1331.2V, and the specific parameters are shown in the table below:

Battery cluster parameters

SN	Item	Parameters	Remarks
1	Burst mode	1P416S	
2	Module capacity	314Ah	
3	Nominal voltage	DC 1331.2V	
4	Nominal energy	417.9kWh	25℃
5	Working voltage	1164.8V～1497.6V	
6	Nominal charge/discharge rate	0.5P	

3. Battery Management System (BMS)

The BMS system of the MF-SCS-418KWH-UE adopts the coordinated control technology of battery & converter. Each battery module unit (BMU) collects the battery cell voltage, temperature and the parameters of the gas that can be precipitated in the battery module to the BCS (battery & converter coordinated control unit) through the communication cable, the BCS combines other collected data (including ambient temperature, cabinet temperature, battery status and other parameters) and scheduling instructions, and takes balancing measures for the battery and power control for the converter PCS. The system topology diagram is as follows:



Architecture diagram of battery management system

The BMS system of this project shortens the battery protection and power control decision-making chain to ensure that the system is simple, stable and reliable. The following functions are available:

Combined with the dynamic environment monitoring system in the cabinet, all-round temperature management of the energy storage system is realized, a reasonable temperature management strategy formulated, ensures the allowable temperature range of the battery operation, improves the temperature consistency of the battery system, reduces the operating power consumption of the temperature control system, and improves the energy storage system efficiency.

Combined with the energy storage fire protection system, the dynamic environment monitoring system and the electrical protection mechanism, the battery information, the dynamic environment information in the battery box and the detection information of the fire protection system can be integrated to realize all-round fire warning, protection and linkage of the energy storage system, providing highly reliable fire safety assurance, and achieving effective prevention, early detection, effective isolation and protection.

Integrated with PCS, it can greatly reduce the action sequence, action delay and possibility of local fault protection failure of protection units in the energy storage system, and design the hierarchical action and linkage mechanism of protection.

Master Battery, S.L.
Paseo de extremadura, 39, 28935 Móstoles, Madrid, España
Tel. +34 918 021 649
info@masterbattery.es / www.masterbattery.es

BMS parameters

SN	Item	Parameters	Remarks
1	Battery voltage detection range	0～5V	
2	Battery voltage detection accuracy	± 5mV	
3	Battery voltage detection cycle	≤50ms	
4	Current detection accuracy	≤±0.2%	
5	Current detection cycle	≤50ms	
6	Temperature test range	-40～125℃	
7	Temperature test accuracy	±1℃	
8	Temperature detection cycle	≤1s	
9	Equalizing current	≤100mA	
10	SOE calculation accuracy	≤5%	
11	SOC estimation accuracy	≤3%	
12	SOH estimation accuracy	≤5%	

4. Power Conversion System (PCS)

Power conversion system appearance

The power conversion system (PCS) can control the battery charging and discharging process and perform AC-DC conversion. PCS is composed of DC/AC bidirectional converter, control unit, etc. The PCS controller receives the control command of the energy management system through communication, and controls the converter to charge or discharge the battery according to the sign and size of the power command, so as to realize regulation of active power and reactive power. The PCS controller communicates with the BMU through the CAN interface to obtain the battery pack status information, which can effectively protect the battery charging and discharging process and ensure battery safe operation.

Power conversion system parameters

SN	Item	Parameters	Remarks
1	Model	PCS-2000G2	
DC side parameters			
2	DC voltage range	1026~1500V	
3	DC rated voltage	1263V	
4	DC maximum current	209.5A	
5	Maximum DC power	258kW	
AC side parameters			
6	AC rated power	215kW	Reduce power to 209kW using
7	Maximum AC power	258kW	
8	AC rated current	180A	
9	AC voltage distortion rate	＜3%	

Master Battery, S.L.
Paseo de extremadura, 39, 28935 Móstoles, Madrid, España
Tel. +34 918 021 649
info@masterbattery.es / www.masterbattery.es

10	Rated grid voltage	690V±15%	
11	Adjustable range of power factor	-1~1	
12	Rated grid frequency	50Hz	
13	Low-voltage ride through	Support	
14	High-voltage ride through	Support	
System Parameter			
15	System maximum efficiency	Discharge 98.5%/charge 98.5%	
16	Charge and discharge switching time	＜100ms	
17	Overload capacity	1.1pu≥10min，1.2pu≥1min	
18	Communication interface	RS485/LAN/CAN/FC	
19	Protection level	IP65	
20	Cooling method	Air cooling	
21	OPERATING TEMPERATURE	-35~50℃	
22	Relative humidity	0~95%RH, no condensation	
23	Altitude	≤2000m, derating above 2000m	
24	Noise	＜75dB	
25	Dimensions (W*D*H)	630*1050*250	
26	Weight	110kg	
27	Certification	EN 62477-1,IEC 62477-1:2012,EN 55011,EN IEC 61000-6-2,EN IEC 61000-6-4:2019	

5. Liquid Cooling System

The battery thermal management system of Master Power's energy block products adopt a distributed liquid cooling solution, that is, each energy block is equipped with an independent thermal management system. The system uses chillers and ethylene glycol aqueous solution as the cooling medium.

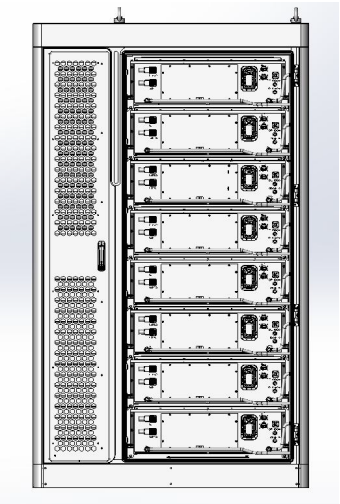
An advanced and efficient battery thermal management system has been developed through the combination of careful design, multi-dimensional simulation and full working condition testing. Each energy block contains a total of 8 sets of battery packs connected in parallel with water circuits. Each set of packs has an independent cold water flow channel and corresponding inlet and outlet. The coolant in the chiller is driven by the water pump and enters the cold water flow channel of each pack in parallel, and absorbs the heat dissipation generated inside the pack through heat conduction and convection. The coolant after the heat absorption is collected again and flows into the chiller. These Packs are electrically connected in series, and the working conditions are exactly the same. The liquid-cooled environmental control scheme with parallel current sharing further ensures that the battery is highly consistent in operating and storage environments. In the whole life cycle management of the system, a good operating environment is provided for the battery, so that the energy block has a longer life and is more efficient.

The battery thermal management system can customize the simulated working conditions according to the historical database and site conditions of the project, then combine meteorological data to simulate the thermal-related operating status of the system's entire life cycle, and finally determine the thermal management strategy and supplement it with thermal simulation verification. After the project enters into operation, the system will upload the operating data to the cloud platform. By processing and analyzing the operating data, the thermal management strategy can be optimized and iterated.

The liquid medium has a high heat transfer coefficient, a large specific heat capacity, and a fast cooling rate, which has a significant effect on reducing the temperature of the battery pack and providing temperature field consistency of the battery cluster. The thermal management system can control the temperature of the battery cells within 35°C, and the temperature difference between the cells in the same battery cluster does not exceed 3°C.

Master Battery, S.L.
Paseo de extremadura, 39, 28935 Móstoles, Madrid, España
Tel. +34 918 021 649
info@masterbattery.es / www.masterbattery.es

6. Fire Protection System



Battery cabinet diagram

6.1 Aerosol (optional)

1、Aerosol

Aerosol calculation configuration dosage:

V=826×1254×2120mm-810×243×1095mm×8=0.47m³

W=volume x fire extinguishing concentration x calibration coefficient=0.47m ³ × 140g/m ³ × 1=65.2g

The current selected aerosol specification is 100g.

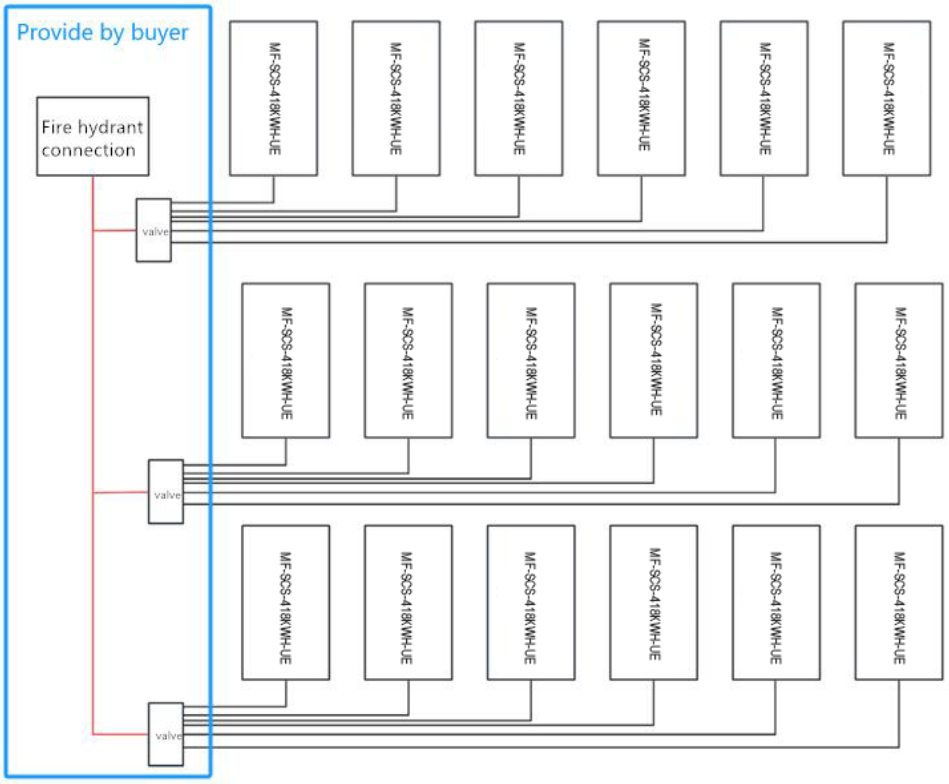
The fire type is electrical fire, choose S-type

Starting method: electric start+temperature start

Monitoring signal: dry contact feedback

2、Water fire protection plan (to be provided by the buyer)

Reserve DN20 pipes inside the energy block for rack level fire spraying, with the spraying surface being the gap on the upper side of the pack, to achieve maximum rack level cooling and fire extinguishing.



installation diagram

Master Battery, S.L.
Paseo de extremadura, 39, 28935 Móstoles, Madrid, España
Tel. +34 918 021 649
info@masterbattery.es / www.masterbattery.es