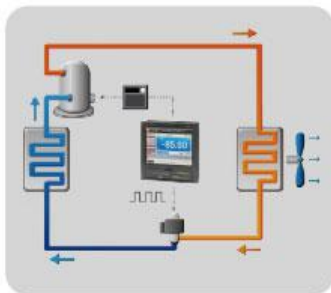
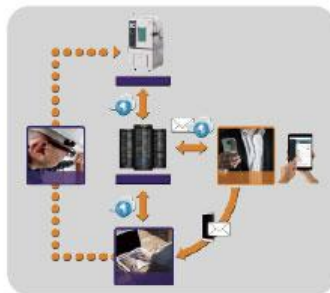


## 1. Equipment Appearance (For reference only)

# Battery Explosion Proof High & Low Temperature Chamber



Energy Conservation



Remote network system



Circuit System

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## 1、 Product description

### 1-1、 R&D background

Battery explosion-proof high and low temperature test chamber is widely used to do accelerated damp and thermal testing, alternating temperature test and constant temperature test, etc in aerospace, aviation, electronics, automobiles, batteries and other industries, and also could do routine tests at high and low temperatures. Storage at low temperature to evaluate the performance of the specimen under given environmental conditions.

### 2-2、 Product Positioning

Providing virtual space to simulate the real environment, to verify the product inspection and R & D results for aerospace, aviation, electronics, automobile, battery and other products and quality inspection institutes, research institutes, colleges and universities and other experimental units. the test chamber is to shorten the development period. An indispensable right-hand man to improve product quality and reliability.

## 2、 Product index, structure and system introduction:

### 2-1、 Technical indicators :

Model		SMC-80-CA-FB	SMC-150-CA-FB	SMC-225-CA-FB	SMC-408-CA-FB	SMC-800-CA-FB	SMC-1000-CA-FB
		SMC-80-CB-FB	SMC-150-CB-FB	SMC-225-CB-FB	SMC-408-CB-FB	SMC-800-CB-FB	SMC-1000-CB-FB
		SMC-80-CC-FB	SMC-150-CC-FB	SMC-225-CC-FB	SMC-408-CC-FB	SMC-800-CC-FB	SMC-1000-CC-FB
		SMC-80-CD-FB	SMC-150-CD-FB	SMC-225-CD-FB	SMC-408-CD-FB	SMC-800-CD-FB	SMC-1000-CD-FB
Temperature	Temperature control range	-70℃~180℃ (CA:0℃~180℃; CB: -20℃~180℃; CC: -40℃~180℃; CD:-70℃~180℃)					
	Temperature fluctuation	±0.5℃					
	Cooling rate	180.0℃~25.0℃ Cooling rate 2.0~3.0℃/min					
		25.0℃~-40.0℃ Cooling rate 1.0~2.0℃/min					
	Heating rate	-40.0℃~-70.0℃ Cooling rate 0.7~1.5℃/min					
Temperature uniformity	-70.0℃~180.0℃ Within 60 mins 3.0~5.0℃/min						
	±1.5℃ (-40.0℃~100.0℃)						
Humidity (optional)	Humidity control range	±2.0℃ (100.1℃~180.0℃ or -40.0℃~-70.0℃)					
	Humidity fluctuation	20.0%RH~98.0%RH					
	Humidity uniformity	±1.0% RH					
Material / components	Internal material	±2.0%RH					
	External material	Adopts 1.2mm thickness stainless steel(SUS304)					
	Heat insulating material	Adopts 1.2mm thickness Cold rolled steel sheet / powder spraying					
	Fan	100mm thickness polyurethane plate+10mm thickness mineral wool					
	Compressor	Centrifugal blower					
		Semi-closed Germany Bock, Germany Bitzer					

	Condenser	Air cooling, water cooling					
	Refrigerant	R404A、R23					
	Evaporator	Fin - and - Tube Heat Exchanger					
	Heater	Nickel chromium alloy heating wire					
	Humidifier	Steam humidifier					
Standard configuration		2pcs $\phi$ 100MM pressure relief port, 4pcs explosion-proof door chains					
Options	Multipoint temperature monitor	Adopts Sanwood developed controller, which can be used to acquire surface temperature points of multiple products					
	C02 fire extinguisher	Automatic fire extinguishing and automatic shutdown of the machine to protect the equipment from burning					
	C0, H2 gas detector	When the battery will produce gas, it will detect gas solubility and discharge to outdoor when it exceeds the standard					
	Insulating paint	Avoid short circuit during testing					
	Exhaust valve	When the test sample produces harmful gas, ventilate and exhaust internally					
Size	Interior size(mm)W*H*D	500*500*400	500*600*500	500*750*600	800*850*600	1000*1000*800	1000*1000*1000
	Outer size(mm)W*H*D	700*1680*1180	700*1720*1275	700*1930*1290	1000*2050*1400	1200*2100*1590	1200*100*1780
	Volume (L)	80L	150L	225L	408L	800L	1000L
	Weight(kg)	280	380	450	620	680	840
Power supply		220V AC 50/60Hz 1-PH			380V AC 50/60Hz 3-PH		
Controller		SANWOOD self-developed controller, It can test the surface temperature of the sample with multiple temperature sensors.					

## 2-2、 Temperature indicators :

Temperature range	CA:0℃~180℃; CB: -20℃~180℃; CC: -40℃~180℃ CD: -70℃~180℃;
Temperature fluctuation	≤±0.5℃
Temperature deviation	≤±2℃
Temperature uniformity	≤2℃
Temperature resolution	0.01℃
Heating rate	25℃→+100℃/within 25 mins (with standard load)
Cooling rate	180.0℃~25.0℃ Cooling rate 2.0~3.0℃/min 25.0℃~-40.0℃ Cooling rate 1.0~2.0℃/min -40.0℃~-70.0℃ Cooling rate 0.7~1.5℃/min
Standard load	20kg aluminum sheet, 200W heat load

**2-3、 Humidity indicators(optional) :**

Humidity range	20%R.H~98%R.H (See temperature and humidity controllable map)
Humidity deviation	≤±3%R.H(Humidity > 75%RH) ≤±3%R.H(Humidity ≤75%RH)
Humidity fluctuation	±2%R.H
Humidity resolution	0.1%R.H

**2-4、 Sample limit and test method :**

Prohibitions	Testing and storage of explosive, flammable, volatile materials Testing and storage of corrosive substances Testing or storage of biological samples Test and storage of strong electromagnetic emission source samples Testing and storage of radioactive material samples Testing and storage of samples of highly toxic substances Testing and storage of samples that may produce highly toxic substances during testing or storage
Test standard	GB/2423.1-2008 (IEC60068-2-1:2007) low temperature test method AB. GB/T5170.5-2008 damp heat test equipment. GJB150.4 (MIL-STD-810D) low temperature test method. GB2423.3-93 (IEC68-2-3) Test Ca: Constant damp heat test method. GB2423.4-93 (IEC68-2-30) Test Db: Alternating Damp Heat Test Method

**3、 Machine structure :**

Structure	Assemble type
Inner chamber material	SUS#304 heat-resistant and cold-resistant stainless steel plate (1.2mm) inner box structure full seamless welding
Internal structure strengthening	SUS304 (2mm) stainless steel reinforcement
Outer chamber material	Electrolytic steel sheet, pickling phosphating high-grade powder baking varnish
Insulation material	Germany Bayer refractory grade high strength PU polyurethane foam insulation insulation material + ultra-fine glass fiber
Door edge	Double-layer high-tension silicone rubber seal, temperature resistant -90~180°C, lifespan up to 15 years
Observation window	The observation window is an automatic defrosting function of the

	multi-layer hollow tempered glass belt, which can ensure the frost-free and condensation phenomenon of the glass surface during any test. The explosion-proof membrane is applied to the explosion-proof membrane to prevent the impact of product explosion
Sample rack	Stainless steel sample holder 2 layers, height is adjustable, load-bearing (uniform): 20kg/layer
Moving and positioning mode	4 high load-bearing pulleys and PU horizontal angle wheels at the bottom for moving and fixing the equipment
Cable port	One on each side, with stainless steel hole cover, silicone plug, aperture Φ100
Floor bearing	≤ 100kg/m <sup>2</sup> (uniform load)
Circulating motor	Stainless steel extended shaft circulating motor ensures long-term operation and sufficient air volume operation
Circulating wind wheel	The multi-wing centrifugal circulating wind wheel is used to strengthen the shaft and aluminum alloy to make high and low temperature resistant rotating blades, so as to achieve forced convection and effectively avoid looping dead angles.
Circulating air duct	The temperature-adjusting and conditioned air duct is designed as a double air duct, which is connected to the studio but isolated. The wind path is in the form of a wind returning from the wind. The partition plate is formed by cold-bending processing of high-quality stainless steel plates, and adjustable louvers are used at the air outlet. Indirect heater, saturated humid air inlet, refrigeration dehumidification evaporator and circulating blast wind wheel are arranged in the temperature regulation air passage

#### 4、 System introduction:

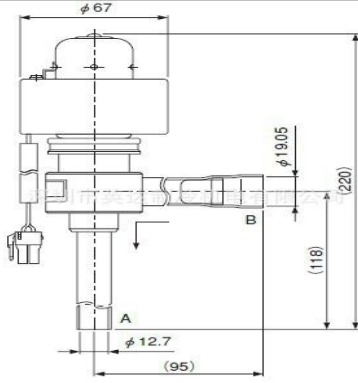

Heating wire	High-quality explosion-proof nickel-chromium alloy heating wire (high resistivity, small temperature coefficient of resistance, small deformation at high temperature and not easy to embrittlement, self-heating temperature up to 1000-1500 °C, long service life) rapid heat exchange, no hysteresis
Heating wire control	The solid state relay is used as a heating actuator, and there is no large current fluctuation and impact phenomenon, and the operation is stable.
Heating wire protection	The heating wire is provided with anti-dry protection to prevent the heater from continuously burning after the circulation fan stops for some reason, causing the heater itself to burn out or other accidents.
Humidification mode	Steam humidification method: using electronic parallel mode micro-motion humidification system
Humidifying heating	All stainless steel embedded humidification tube with anti-dry explosion



pipe	protection protector
Humidification system advantage	Humidification is rapid, saves water, saves electricity, and allows test products to heat up. The humidification and dehumidification system are completely independent, no need for extra drainage, faster than traditional surface humidification (water tray), high control precision, no scale pollution such as scale and scale, good low humidity performance, water level observation window, and easy cleaning
External water supply	Distilled water, pure water, deionized water (resistivity greater than 500 Ω·m) (provided by the user, manually added water)
Water storage device	Drawer type water tank, located in front of the machine, under the door
Water storage tank capacity	15 liters (two 15L water tanks for test chamber 800L above)

### 5. Refrigeration System :

Compressor	France Tecumseh fully enclosed compressor
Evaporator	High-efficiency components adopts a slope type evaporator (AC&R compound spoiler aluminum fins)
Condenser	Air-cooled system for equipment easy movement, etc.
Heat exchanger	SWEP plate type refrigerant cold and heat exchange design, making higher efficiency compared with traditional internal spiral
Energy-saving device	<p>Adopting throttle electronic expansion valve</p> <ol style="list-style-type: none"> <li>1. The active control of the refrigeration system is realized, and the fixed proportional adjustment of the original thermal expansion valve is not controllable. The output can be adjusted in advance and optimized for different modes and operating conditions.</li> <li>2. Due to the cyclic control feedback of the electronic expansion valve, the front end is a temperature-plus-pressure dual-sensor high-response direct control, which can provide the best evaporator liquid supply, so that the refrigeration system can achieve excellent cooling capacity in a wider working range. Output.</li> <li>3. Energy saving: the full range of electronic expansion valve self-adjustment + active adaptation to adjust the cooling capacity output, making the system more energy efficient.</li> </ol>

	<div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p>4. Energy-saving design: Adopting PID + PWM principle of VRF(refrigerant flow control) technology to achieve low-temperature energy-saving operation (electronic expansion valve according to thermal energy conditions refrigerant flow servo control technology) low temperature working state, the heater does not participate in the work, through PID + The PWM regulates the flow rate and flow direction of the refrigerant, and regulates the three-way flow of the refrigerant pipe, the cold bypass pipe, and the hot bypass pipe to achieve automatic constant temperature to the working chamber.</p> <p>This method can reduce energy consumption by 30% under low temperature conditions. The technology is based on Danish Danfoss' ETS series of electronic expansion valves, which can be used to smoothly adjust the cooling capacity for different cooling capacity requirements, that is, to achieve the compressor cooling capacity adjustment when different cooling rate requirements are met.</p>
Refrigerant	Original American DuPont Environmental Refrigerant R404A、 R23、 R508 New refrigerant R449A is optional

## 6、 Control system

Controller model	Sanwood-5600
Temperature/humidity setting accuracy	0.01°C/0.1%RH
Temperature/humidity control accuracy	±0.5°C/±3%RH
Setting time capacity	0 H 1 M ~ 9999 H 59 M
Program time capacity	120 groups of 50 segments, 999 cycles, Time0 H 1 M ~ 590 H 59 M
Arithmetic control	The intelligent microcomputer PID+SSR/SCR can automatically forward and reverse the two-way synchronous output, including advanced slope control logic, which can set the temperature and humidity synchronization slope, and



	the control precision is stable and accurate.
Communication interface unit	Standard communication interface device with RS-232 and SD, can be connected and controlled simultaneously with computer (PC), equipped with full Chinese PC software, providing communication protocol

## 7、 Product explosion-proof function description:

1、 Explosion-proof safety design of chamber	
Inner box structure and material	The material of high and low temperature indoor box is made of high-strength stainless steel plate, and the whole machine is combined and integrated to prevent the damage of the box caused by the impact of the battery explosion.
Insulation design	Germany Bayer refractory grade high-strength PU polyurethane foam insulation and insulation material, the fire rating reaches Class A flame retardant, which can prevent the spontaneous combustion of the test box after the fire and explosion under abnormal battery test conditions.
Window design	The observation window is covered with tempered glass and an explosion-proof membrane is applied to prevent the impact of the explosion of the battery on the personnel.
Test chamber door chain	Designed with an explosion-proof safety door handle. Adding an explosion-proof chain to prevent the explosion of the explosion-proof box when the battery is tested in the experiment.
2、 Pressure release device	
Explosion-proof pressure relief port	The studio design explosion-proof pressure relief port is used to monitor the pressure in the cabin (the standard design pressure limit reached when the explosion-proof port is released is 0.104 MPa ). When the pressure inside the box increases due to abnormal working conditions, the pressure is released. The port is automatically opened to relieve the destructive pressure inside the box and quickly discharge high pressure gas when the battery explodes.
3、 Fire extinguishing system	
CO2 Fire extinguishing device	It is equipped with a set of CO2 fire extinguishing device, with automatic control solenoid valve and manual control. It can be set up with combustible gas detection probe or temperature sensor linkage, used to burn CO2 gas when the battery is on fire
Fire extinguishing operation	1. Automatic control method: The controller is equipped with a combustible gas detector and a multi-point temperature control system. Connect to the PLC controller to operate on the display unit. The combustible gas detector measures the concentration of the explosive gas, displays and sets the alarm

	<p>value of the concentration on the man-machine interface, and the multi-point temperature control system measures the surface of the battery and the experimental temperature, and can set the absolute temperature or the difference alarm temperature of the test. To monitor the possibility of battery explosion, flammable gas detector and multi-point temperature control system, set two levels of alarm value, the first level is the notification signal, the second level is the fire extinguishing action signal, when the gas concentration exceeds the first level If the concentration or temperature sensing system exceeds the first-level temperature warning value controller, the sound and light signal will be emitted to notice there is a problem that the fire extinguishing system is automatically activated beyond the second level.</p> <p>2. Manual fire extinguishing process: In order to avoid the alarm device automatically starting due to high sensitivity or misoperation, the following safety protection devices use sound and light alarms to remind the user to choose manual fire extinguishing according to the actual situation:</p> <p>(1) The explosion-proof device is opened, the intake and exhaust devices are automatically opened, the buzzer and the alarm light are activated, and the test chamber is stopped.</p> <p>(2) The temperature detection of the sample is detected, the buzzer and the alarm light are activated, and the test chamber is stopped.</p> <p>(3) The video monitoring system monitors when a fire breaks out</p> <p>(4) Visual inspection battery with smoke or bubble leakage situation</p>
<p>4、 Intake and exhaust device</p>	
<p>Intake and exhaust device</p>	<p>The test chamber is equipped with 1 set of intake and exhaust devices. The panel operation switch can automatically and manually control the intake and exhaust operations, quickly introduce a large amount of air, and discharge the harmful gas in the test chamber out of the test chamber and connect it to the outside of the experiment through the exhaust duct. To avoid harmful gas damage to people</p>
<p>5、 Gas leak detection alarm</p>	
<p>Gas detection type and operation</p>	<p>Configure flammable gas concentration monitoring (CO, H2). If flammable gas is released and reaches a certain concentration during the test, the equipment will alarm and automatically stop.</p> <p>The H2 range is 0 to 10% with an accuracy of 1%;</p> <p>The CO range is 0 to 1000 PPM with an accuracy of 1 PPM.</p> <p>The flammable gas concentration exceeds the limit alarm and can automatically discharge harmful gases.</p>

6、 Battery surface temperature monitoring
Battery surface temperature detection function, if the surface temperature of the battery under test is too high or reaches the temperature we set, the device will alarm and stop, and can be graded to prevent the battery under test from exploding due to excessive temperature.
7、 Video monitoring device
Equipped with a video surveillance system, installed outside the cabinet. It is used to monitor the sudden occurrence of the test piece during the test, and to prevent sudden danger. The observation effect of the surveillance camera is clear and comprehensive, and the angle of the surveillance camera can be adjusted as needed. The irradiation range of the camera can be irradiated to 3/5 of the total volume in the box, and the test sample is placed in the middle area of the box. The computer is provided by the user.

## 8、 Main parts introduction

Controller	Sanwood-5600
Refrigeration Compressors	France Taikang fully enclosed compressor 2 pieces
Temperature and humidity sensor	Taiwan Songqi PT100
Evaporator	Taiwan Zhongli
Condenser	Air-cooled condenser
Heating wire	Taiwan Feiyang alloy heating wire
Expansion valve	Denmark DAFOSS
Electromagnetic valve	Denmark DAFOSS
High and low voltage switch	Denmark DAFOSS
Dry filter	The United States ALCO
Circulating motor	Yili
AC contactor	Germany Schneider
Relay	Japan Izumi
Cooling fan	Taiwan Jianzhun
Refrigerant	The United States DuPont Environmental Refrigerant
Over temperature protection	Korea RAINBOW
Circulating wind wheel	Yili

## 9、 Product safety protection device

1、 Test chamber over temperature protection ( the independent adjustment temperature protector)
2、 Attached no fuse protection switch

- 3、 Heater overtemperature protection switch
- 4、 Compressor overload overheating
- 5、 Compressor high and low pressure protection
- 6、 Compressor overcurrent protection switch
- 7、 System overcurrent protection device
- 8、 Fast fuse
- 9、 Fuseless switch
- 10、 Line fuse
- 11、 Attached vertical three-color warning light: yellow for power on; green for operation; red for fault

## 10、 Product safety conditions

Site requirements	Flat floor, well ventilated, free of flammable, explosive, corrosive gases and dust There is no strong electromagnetic radiation nearby
Indoor environmental conditions	Temperature: 5℃~35℃ Relative humidity: <85%RH Air pressure:86~106kpa
Equipment requires power	AC 380V three-phase four-wire + protective ground wire Voltage allowable fluctuation range: AC (1±10%) 380V Frequency allowable fluctuation range: (1±1%) 50Hz Protective earthing wire grounding resistance is less than 4Ω Users are required to configure a device with a considerable capacity of air or power switch at the installation site, and this switch must be used exclusively for this device.
Humidification water requirements	It is required to have tap water next to the equipment and the filter has been installed. The inlet pipe is connected by 8 mm quick connector.

## 11、 Quality assurance

From the date of acceptance inspection, the company provides free repair (except damage caused by natural disaster, abnormal power, improper use or improper maintenance),and the purchaser is in compliance with the conditions of custody, use and installation rules. Next, due to the failure of the test box manufacturing quality problems, the supplier will send maintenance personnel to perform free maintenance according to the service commitment time after being notified.
<b>Configuration technical information and accessories:</b>
Technical information: product certificate, instruction manual, warranty card, etc. ; Extra distribution of wet ball gauze

<b>Packaging and shipping methods</b>
Packing: Shipping container that meets the requirements of QB/BWD008-2001 Mode of transport: freight
Training: Your company's operator can operate the machine skillfully.
According to the requirements of the contract, training can be conducted on site when installing and debugging equipment for users and putting into use; The user can be arranged to conduct on-site technical training when the equipment is factory-planned, so that the customer can understand the performance of the equipment, train the correct use method, operation and use, routine maintenance, common fault detection and elimination, and reduce the malfunction caused by improper use of the equipment. Customers save on maintenance costs.



韩国三元控制器  
South Korea  
SAMWONTECH  
Controller



LED指示灯  
LED indicating light



金属机械按钮  
Metal mechanical  
button



2xΦ100mm测试孔  
2Φ100mm  
cable port



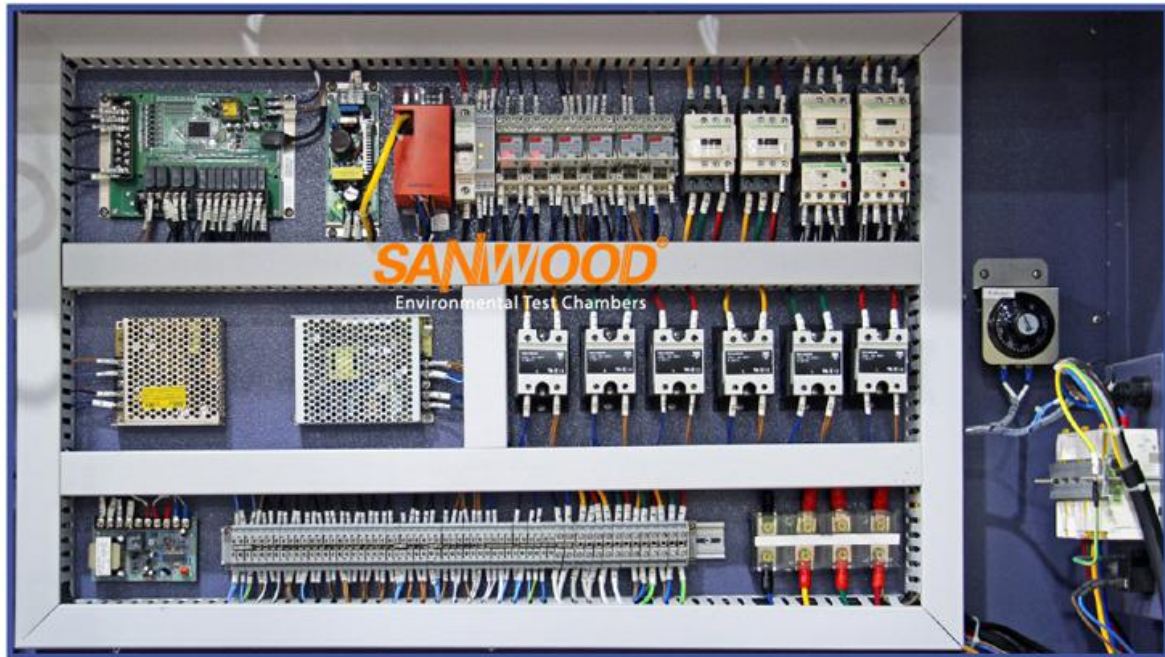
水平调节轮  
Horizontal  
regulating wheel



防爆门锁  
Explosion-proof  
door lock



电路系统--核心配件  
Circuit System - Core Accessories



交流接触器 (施耐德--法国)  
**AC contactor**  
Schneider-France



温控开关(rainbow-韩国)  
**Temperature Detect Switch (TDS)**  
RAINBOW-South Korea



漏电开关(施耐德--法国)  
**Leakage switch**  
Schneider-France



电源供应器(明纬-台湾)  
**Power supply**  
Mingwei-Taiwan



继电器(佳乐-瑞士)  
**Relay**  
Carlo Gavazzi - Switzerland



继电器(佳乐-瑞士)  
**Relay**  
Carlo Gavazzi - Switzerland

冷冻系统--核心配件  
Refrigeration System - Core Accessories



全封闭式压缩机(泰康--法国)  
Fully enclosed compressor  
Tecumseh-France



压缩机(比泽尔-德国)  
Compressor  
Bitzer-Germany



过滤器(丹佛斯-丹麦)  
Filter  
Danfoss-Denmark



膨胀阀(丹佛斯-丹麦)  
Expansion valve  
Danfoss-Denmark



压力开关(丹佛斯-丹麦)  
Pressure switch  
Danfoss-Denmark



油分离器(艾默生-美国)  
Oil separator  
Emerson - American



冷凝器  
Condensator



电磁阀(丹佛斯-丹麦)  
Solenoid valve  
Danfoss-Denmark





可选配件  
Optional Accessory



视频监控装置  
Video monitoring device



电池表面温度监控  
Battery surface temperature monitoring



进排气装置  
Intake and exhaust device



自动滤水系统  
Automatic water filtration system



防积热装置  
Thermal protection device



氢气感应装置  
Hydrogen induction device



顶部防爆泄压口  
Top explosion-proof pressure relief port



电子温度传感器  
Electronic temperature sensor



冷水机  
Water chiller



电子密码锁  
Electronic coded lock



喷淋灭火装置  
Sprinkling device



液氮灭火装置  
Liquid nitrogen fire extinguishing device