



## Technical Specification



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## 1. Equipment Appearance (For reference only)



### **Product description:**

Battery explosion-proof temperature chamber provides a virtual space to simulate real environment. It is used to do accelerated thermal testing, alternating temperature test and constant temperature test, etc. It is widely applied in aerospace, aviation, electronics, automobile, battery and other products and quality inspection institutes, research institutes, colleges and universities and test labs, etc. It can also do routine tests at high and low temperatures, storage at low temperature to evaluate the performance of the specimen under given environmental conditions.

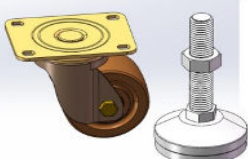
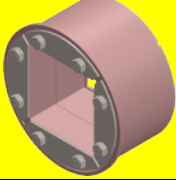
## 2. Technical specifications:

|                       |                         |                                                                  |
|-----------------------|-------------------------|------------------------------------------------------------------|
| Model No.             |                         | SM-1000-CC-FB-HL7/CO2/WC                                         |
| Internal chamber size |                         | 1000x1000x1000mm (W*H*D)                                         |
| External chamber size |                         | (W1200*H2313*D2594mm)-Not include protruding parts               |
| Volume                |                         | 1000L                                                            |
| Temperature           | Temperature range       | -40°C~150°C                                                      |
|                       | Temperature fluctuation | ≤±0.5°C                                                          |
|                       | Temperature uniformity  | ≤2.0°C                                                           |
|                       | Cooling rate            | 2°C/min (average, with load)                                     |
|                       | Heating rate            | 5°C/min (average, with load)                                     |
|                       | Load                    | 100KG battery                                                    |
| Material / components | Internal material       | Adopts 3.0mm thickness stainless steel (SUS304)                  |
|                       | External material       | Adopts 1.5mm thickness cold rolled steel sheet / powder coating  |
|                       | Insulating material     | 100mm thickness polyurethane plate + 10mm thickness mineral wool |
|                       | Fan                     | Centrifugal blower                                               |
|                       | Compressor              | DORIN/ BIZER/BOCK/FRASCOLD                                       |
|                       | Condenser               | Water cooled                                                     |
|                       | Refrigerant             | CO2 (R744)                                                       |
|                       | Evaporator              | Fin-and-Tube heat exchanger                                      |
|                       | Heater                  | Nickel chromium alloy heating wire                               |
| Power supply          |                         | AC 3 phase 380V 50Hz                                             |
| Controller            |                         | SIEMENS PLC+HMI                                                  |

## 3. Sample limit and testing standards:

|                |                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Prohibitions   | <p>Testing and storage of corrosive substances</p> <p>Testing or storage of biological samples</p> <p>Test and storage of strong electromagnetic emission source samples</p> <p>Testing and storage of radioactive material samples</p> <p>Testing and storage of samples of highly toxic substances</p> <p>Testing and storage of samples that may produce highly toxic substances during testing or storage</p> |
| Test standards | <p>GB/2423.1-2008 (IEC60068-2-1:2007) low temperature test method AB.</p> <p>GB/T5170.5-2008 damp heat test equipment.</p> <p>GJB150.4 (MIL-STD-810D) low temperature test method.</p>                                                                                                                                                                                                                            |

## 4. Chamber structure:

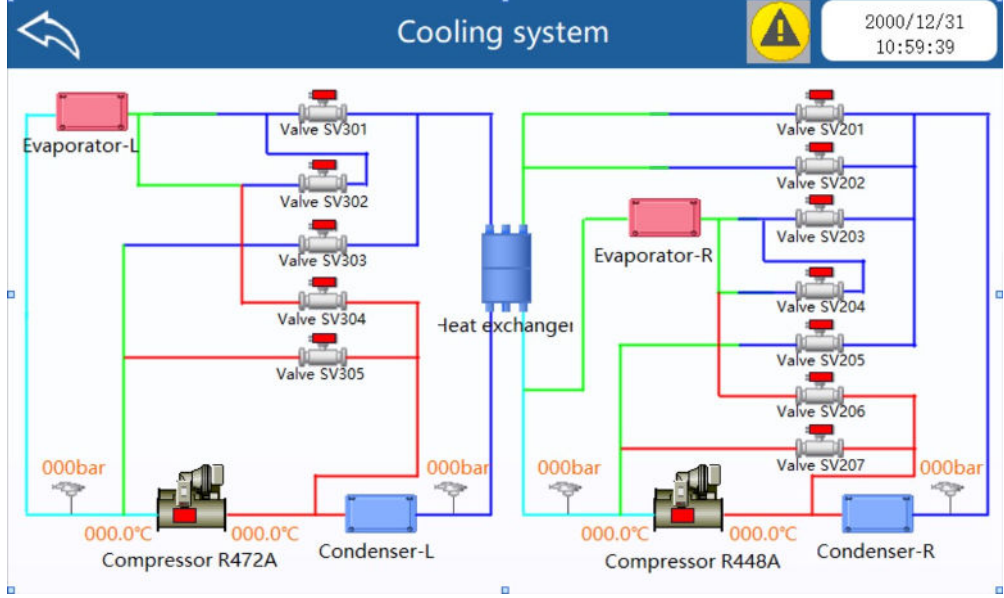
| Structure                        | Assemble type                                                                                                                                                                                                                                                                                                                  |                                                                                       |
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| Inner chamber material           | SUS#304 heat-resistant and cold-resistant stainless steel plate (3.0mm) inner box structure full seamless welding                                                                                                                                                                                                              |    |
| Internal structure strengthening | SUS304 (5mm) 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 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 shelf                     | 3 pcs, height is adjustable, load-bearing is 100kg/layer ((uniform)                                                                                                                                                                                                                                                            |                                                                                       |
| 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                       | Each 3pcs cable hole on left and right side, total 6pcs (Φ150mm)<br>MCT models not supplied by SANWOOD                                                                                                                                                                                                                         |  |
| Floor bearing                    | ≤ 100kg/m2 (uniform load)                                                                                                                                                                                                                                                                                                      |                                                                                       |
| Circulating motor                | Stainless steel extended shaft circulating motor ensures long-term operation and sufficient air volume operation                                                                                                                                                                                                               |                                                                                       |
| Circulating wind wheel           | Multi-wing centrifugal circulating wind wheel is used to strengthen 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.                                                                                         |                                                                                       |

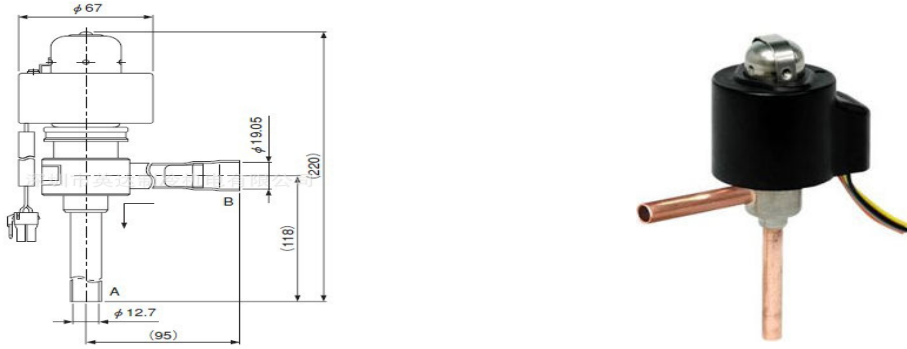
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| Circulating air duct | The temperature-adjusting and conditioned air duct is designed as a double air duct, which is connected to the studio but isolated. The wind path is in the form of a wind returning from the wind. The partition plate is formed by cold-bending processing of high-quality stainless steel plates, and adjustable louvers are used at the air outlet. Indirect heater, refrigeration dehumidification evaporator and circulating blast wind wheel are arranged in the temperature regulation air passage |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 5. Heating system introduction:

|                   |                                                                                                                                                                                                                                                                                                         |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Heater            | 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 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.                                                                                                                                                      |
| Heater 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.                                                                                        |

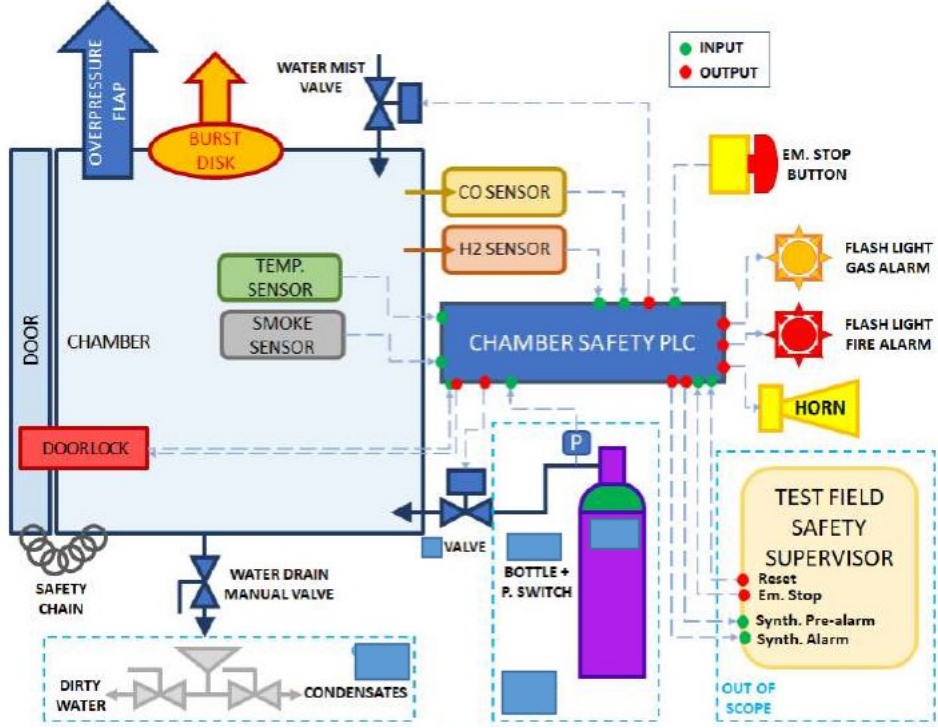
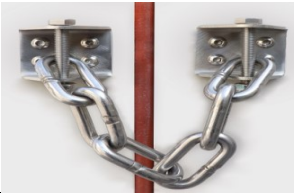
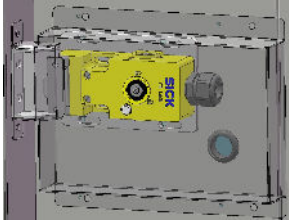
## 6. Refrigeration system:

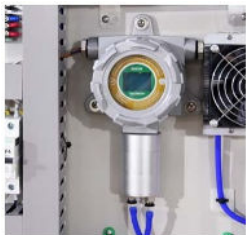
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| Refrigeration System monitor |                                                                                                                                 |
| Compressor                   | DORIN/ BIZER/BOCK/FRASCOLD                                                                                                                                                                                          |
| Evaporator                   | High-efficiency components adopts a slope type evaporator (AC&R compound spoiler aluminum fins)                                |
| Condenser                    | water-cooled                                                                                                                                                                                                        |
| Heat exchanger               | SWEP plate type refrigerant cold and heat exchange design, making higher efficiency compared with traditional internal spiral  |

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| 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.</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>  <ol style="list-style-type: none"> <li>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.</li> </ol> <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          | CO2 (R744)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

#### 7. Safety devices (As per EUCAR Hazard Level 7)

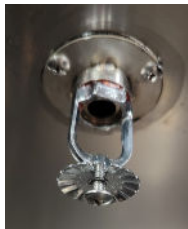
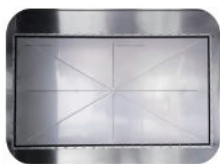
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| EUCAR level 7 | Refer to EUCAR level 7, for possible hazards caused by batteries, configure corresponding prevention and alarm devices. |
|---------------|-------------------------------------------------------------------------------------------------------------------------|

|                                          |                                                                                                                                                                                                                                                                                                 |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                          |                                                                                                                                                                                                               |
| Explosion-proof safety design of chamber |                                                                                                                                                                                                                                                                                                 |
| Internal chamber structure and material  | <p>The material of high and low temperature indoor chamber 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.</p>                                                 |
| Insulation design                        | <p>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.</p> |
| Window design                            | <p>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.</p>                                                                                                                 |
| Explosion proof chains for chamber door  | <p>Designed with an explosion-proof safety door handle. Adding an explosion-proof chain to prevent the explosion during the test.</p>                                                                      |
| Electronic code lock                     | <p>1. Prevent irrelevant person open the door during operation.<br/>2. Lock the door when the chamber internal temperature is at specified value (normally higher than ambient temperature).</p>           |
| Pressure release device                  |                                                                                                                                                                                                                                                                                                 |

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                        |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Explosion-proof pressure relief port   | <p>The chamber is designed with explosion proof pressure relief port which is used to relieve pressure inside chamber (the maximum pressure which activates pressure relief port is 0.104MPa). When the pressure inside chamber increases due to abnormal working conditions, the port is automatically opened to relieve pressure and quickly discharge high pressure gas when battery explodes.</p>                                                            |                                                                                     |
| Fire extinguishing system              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                        |
| Fire detection                         | <p>1. Temperature sensor for abnormal rapid temperature rising</p> <p>2. Smoke detector</p>                                                                                                                                                                                                                                                                                                                                                                      |   |
| Audible and visual alarm               | Combined siren and flashing light RED                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                    |
| Intake and exhaust device              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                        |
| Intake and exhaust device              | <p>The test chamber is equipped with 1 set of intake and exhaust device. 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 operator.</p>                                          |  <p>进排气装置<br/>Intake and exhaust device</p>                                       |
| Gas leak detection alarm               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                        |
| Gas detection type and operation       | <p>Configure flammable gas concentration monitoring (CO, H<sub>2</sub>). If flammable gas is released and reaches a certain concentration during the test, the equipment will alarm and automatically stop.</p> <p>The H<sub>2</sub> 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> |                                                                                   |
| Nitrogen connector                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                        |
| Nitrogen connector                     | DN25mm connector reserved at left side of chamber to connect nitrogen supply from the laboratory.                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                        |
| Battery surface temperature monitoring |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                        |

|                                        |                                                                                                                                                                                                                                                                                      |                                                                                                                                                |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 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. |  <p>电池表面温度监控<br/>Battery surface temperature monitoring</p> |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|

## Other options

|             |                                                                                                                                                                                             |                                                                                     |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Water spray | Water extinguishing nozzle with controlled solenoid valve (to be placed as high as possible in the chamber) - a valve to evacuate the water inside the Climatic Chamber. Control by the PLC |  |
| Burst Disk  | Burst Disk                                                                                                                                                                                  |  |

## Eucar level 7 Safety Matrix (for reference)

| Item                  | Test cycle | Door lock | Novec 1230 release | Water Mist release | Equipment Horn | Orange flash light | Red flash light | Novec 1230 Released Panel | Watermist released panel | Smoke extraction fan | Fire water discharge | Signal to Supervisor (AVL) |
|-----------------------|------------|-----------|--------------------|--------------------|----------------|--------------------|-----------------|---------------------------|--------------------------|----------------------|----------------------|----------------------------|
| CO Level 1            | continue   | OFF       | OFF                | OFF                | off            | ON                 | OFF             | OFF                       | OFF                      | ON                   | ON                   | YES                        |
| CO Level 2            | stop       | ON        | off                | OFF                | ON             | ON                 | OFF             | off                       | OFF                      | OFF                  | ON                   | YES                        |
| H2 Level 1            | continue   | OFF       | OFF                | OFF                | off            | ON                 | OFF             | OFF                       | OFF                      | ON                   | ON                   | YES                        |
| H2 Level 2            | stop       | ON        | off                | OFF                | ON             | ON                 | OFF             | off                       | OFF                      | OFF                  | ON                   | YES                        |
| smoke Alarm           | stop       | ON        | OFF                | off                | off            | OFF                | ON              | OFF                       | off                      | OFF                  | ON                   | YES                        |
| temperature anomaly   | stop       | ON        | OFF                | off                | off            | OFF                | ON              | OFF                       | off                      | OFF                  | ON                   | YES                        |
| Door opened           | stop       | OFF       | OFF                | OFF                | OFF            | OFF                | OFF             | OFF                       | OFF                      | OFF                  | ON                   | YES                        |
| Em.Stop               | stop       | OFF       | OFF                | OFF                | ON             | OFF                | OFF             | OFF                       | OFF                      | OFF                  | ON                   | YES                        |
| Manual spraying water | stop       | ON        | OFF                | ON                 | ON             | OFF                | ON              | OFF                       | ON                       | OFF                  | OFF                  | yes                        |
| Manual spray 1230     | stop       | ON        | ON                 | OFF                | ON             | off                | on              | ON                        | OFF                      | OFF                  | ON                   | yes                        |
| Manual smoke exhaust  | stop       | on        | OFF                | OFF                | OFF            | OFF                | OFF             | OFF                       | OFF                      | ON                   | ON                   | yes                        |
| smoke+temperature     | stop       | on        | on                 | off                | on             | off                | on              | on                        | off                      | off                  | ON                   | yes                        |

## 8. Control system

|                    |                                                                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Controller         | SIEMENS PLC+HMI                                                                                                                                            |
| Display            | 640x480 dot matrix, 7 inch TFT color LCD display                                                                                                           |
| Running mode       | Program mode, fixed value method                                                                                                                           |
| Setting mode       | English menu, touch screen input                                                                                                                           |
| Program capacity   | Editable program<br>Quantity: Max 120<br>Steps: Max 100<br>Number of cycles: Max 999<br>Program can be linked (link program serial number can be selected) |
| Display resolution | Temperature: 0.01℃<br>Time: 0.01min                                                                                                                        |
| Communication      | Ethernet and USB.                                                                                                                                          |

|                     |                                                                                                                                        |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| function (standard) |                                                                                                                                        |
| Control mode        | BTC balance temperature control mode + DCC (Intelligent Cooling Control) + DEC (Smart Electrical Control) (Temperature Test Equipment) |

## 9. Main parts introduction

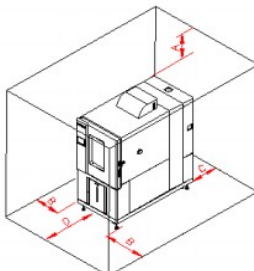
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| Controller                  | SIEMENS PLC+HMI            |                                                                                       |
| Compressors                 | DORIN/ BIZER/BOCK/FRASCOLD |                                                                                       |
| Oil separator               | Emerson                    |    |
| Heat exchanger              | SANWOOD customized         |    |
| Condenser                   | SANWOOD customized         |    |
| Evaporator                  | SANWOOD customized         |    |
| Drying filter               | Denmark Danfoss            |    |
| Non-return valve            | Denmark Danfoss            |    |
| Solenoid valve              | Denmark Danfoss            |    |
| Condensing pressure switch  | Denmark Danfoss            |    |
| Leakage protection switch   | France Schneider           |   |
| AC relay                    | France Schneider           |  |
| Thermal relay               | France Schneider           |  |
| Phase rotation relay        | Switzerland Carlo Gavazzi  |                                                                                       |
| Solid-state relay           | Switzerland Carlo Gavazzi  |                                                                                       |
| Temperature sensor          | Taiwan Thermoway           |                                                                                       |
| Circulating motor           | Taiwan Yuzheng             |                                                                                       |
| Over temperature protection | South Korea RAINBOW        |                                                                                       |

## 10. Product safety protection device:

|                      |                                                                                                                                                                                                                                                                                                                                              |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Refrigeration system | <p>Compressor over-pressure protection</p> <p>Compressor motor overheat protection</p> <p>Over current protection of compressor motor</p> <p>Cooling water supply under pressure protection (for water cooled type)</p>                                                                                                                      |
| Chamber protection   | <p>Adjustable test product over temperature protection</p> <p>Test space temperature fuse protection</p> <p>Air conditioning channel limit over temperature protection</p> <p>Ultra-high temperature protection inside the controller</p> <p>Fan motor overheat protection</p> <p>Chamber inside and outside pressure balance protection</p> |

|                  |                                                                                                                                          |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Other protection | <p>Total power phase sequence and phase loss protection</p> <p>Whole machine leakage protection</p> <p>Load short circuit protection</p> |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------|

## 11.Product safety use conditions

|                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                     |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Installation site requirements       | <p>Leveled ground, good ventilation,no flammable,explosive or aggressive gas and powder</p> <p>No strong electromagnetic radiation source</p> <p>With drainage near the machine(within 2 meters)</p> <p>Ground load-bearing capacity: not less than 800kg/m<sup>2</sup></p> <p>Leave space around the machine for maintenance</p> <p>A: not less than 30cm</p> <p>B: not less than 50cm</p> <p>C: not less than 70cm</p> <p>D: not less than 100cm</p>      |  |
| Operation environmental conditions   | <p>Temperature: 5°C~35°C</p> <p>Relative humidity: &lt; 85%RH</p> <p>Air pressure:86~106kpa</p>                                                                                                                                                                                                                                                                                                                                                             |                                                                                     |
| Power supply                         | <p>AC 380V three phase four-wire + protective ground wire</p> <p>Voltage allowable fluctuation range: <b>AC (1±10%) 380V</b></p> <p>Frequency allowable fluctuation range: <b>(1±10%) 50Hz</b></p> <p>Protective earthing wire grounding resistance is less than 4Ω</p> <p>Users are required to configure a device with a considerable capacity of air or power switch at installation site, and this switch must be used exclusively for this device.</p> |                                                                                     |
| Requirements for storage environment | <p>When the chamber doesn't work, the ambient temperature should be kept within 0~35°C (without freezing)</p> <p>When the ambient temperature is lower than 0 °C, the water remaining in the equipment should be drained to prevent the water in the pipeline from freezing and damaging the pipeline.</p>                                                                                                                                                  |                                                                                     |
| Other tips                           | <p>Opening the door of the chamber during test will cause temperature or humidity fluctuations inside the chamber.</p> <p>If the door is opened several times during the test or the door is opened for a long time or the test sample emits moisture, the heat exchanger of the refrigeration system may freeze and may not work properly.</p>                                                                                                             |                                                                                     |



## Optional Safety Accessories

### Multiple sample surface temperature probes

It is used to measure the temperature of the desired measuring point in the temperature (humidity) chamber, or to measure the surface temperature of the sample.



### Explosion-proof pressure relief port

When the pressure in the test chamber is too high, quickly release the pressure in the chamber.



### Video surveillance

Convenient to check the test status of the samples in the chamber.



### Electronic lock

During the test, the door of the test space is locked by an electronic door to prevent non-operating personnel from opening the door.



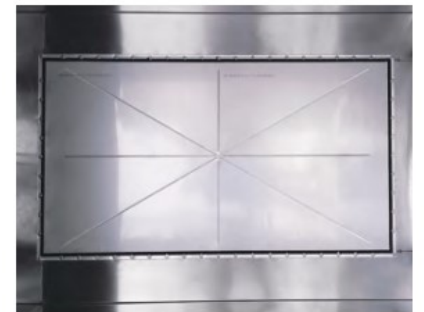
### CO<sub>2</sub> fire extinguishing system

Fire suppression by using carbon dioxide, with fire detection system.



### Bursting disc

A certified bursting disc relieves the pressure, an exhaust duct with service access quickly removes the gas.



### Inner chamber fireproof coating

The fire rating reaches Class A flame retardant, to prevent the spontaneous combustion of the test chamber after the battery test is abnormal due to fire and explosion.



### Gas monitoring system (H<sub>2</sub> / CO)

Used to monitor hazardous gases in the test chamber, including alarm and lighting.



### GN<sub>2</sub> Purification

Permanently inert the test space with nitrogen (N<sub>2</sub>) or argon (Ar). reduce the oxygen concentration to ≤ 5%.

