

Haier

Biomedical After-sales Service Manual

Product type: [ULT Freezer](#)

Product model: DW-86L338J/388J/578J/626/728J/828J/490J/100J

DW-86W420J/100J

Product illustration:



DW-86L338J/388J



DW-86L490J



DW-86W420J



DW-86W100J

/578J/626/728J/828J



DW-86L100J

Version: 01

Prepared by:

Reviewed by:

Approved by:

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Revision record

Revision number	Revision date	Reviser	Major revision content
01	March 13, 2018	Zheng Wendong	Addition of content for model DW-86L626, replacement of the original general compressor of DW-86L626 by hydrocarbon compressor. Use of hydrocarbon refrigerants with the model and name unchanged.
02	March 26, 2020	Li Jiangtao	Addition of content for model DW-86L100J.

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I. Product features and model designation

1.1 Main functions and features of the product

1.1.1 The applicable temperature range in the ULT Freezer is $-40^{\circ}\text{C}\sim 86^{\circ}\text{C}$;

1.1.2 The design of pressure balance inside and outside the freezer facilitates door open and close; (DW-86L100J has a small door without balance hole that is easy to open)

1.1.3 The display board is divided into working area and alarm area, which can display the machine startup status, whether the network is connected, whether the voltage is increased or decreased, and lock display, at the same time, high and low temperature alarm and freezer temperature can be set;

1.1.4 With a digital display screen it can display the freezer temperature, environment temperature and input voltage at the same time;

1.1.5 Multiple fault alarms (high and low temperature alarm, sensor alarm, dirty condenser alarm, excessive ambient temperature alarm, door opening alarm, low battery power alarm, power failure alarm);

1.1.6 Two alarm modes (buzzer alarm, flashing light alarm), and startup delay protection (startup delay time can be set in accordance with user requirements);

1.1.7 With network functions and RS-232/485 data interface (optional), it can be connected to the computer, display the freezer temperature and alarm message via the computer, control the temperature and monitor whether the equipment is normal by operating the computer; (the standard interface of DW-86L100J is RS485 interface)

1.1.8 With 5 V power supply output function, it is convenient for users to use this power supply to directly power wireless network module;

1.1.9 With the remote alarm function, the alarm can be connected to other rooms to realize alarm function;

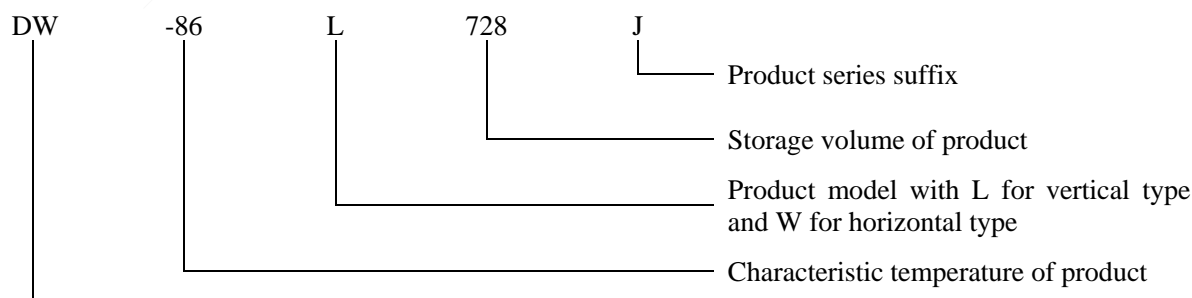
1.1.10 The serial products with "J" as suffix in model description are equipped with USB data storage module as standard configuration, which can save data, including the setting temperature and actual temperature of low and high temperature in the freezer, ambient temperature and voltage, for more than 10 years. (USB module is optional for model DW-86L626)

1.1.11 The product is equipped with two 25.5 mm test holes as standard configuration; (one 25.5 mm test hole for model DW-86L100J)

1.1.12 Equipped with casters, it is flexible, movable, lockable and supportable, and can realize micro adjustment according to requirements;

1.1.13 Can be configured with recorder, network monitoring system, SMS manager, stainless steel shelf.

1.2 Model designation



II. Product promotion points and selling points

2.1 Temperature control:

Computer controlled, digital display of temperature with adjustment unit of 1 °C, and the applicable temperature range is -40°C~ 86°C;

2.2 Safety control:

2.2.1 Multiple fault alarms (high and low temperature alarm, sensor alarm, dirty condenser alarm, excessive ambient temperature alarm, low battery power alarm, power failure alarm, door opening alarm);

2.2.2 Two alarm modes (buzzer alarm, flashing light alarm), and startup delay protection (startup delay time can be set in accordance with user requirements);

2.2.3 Safe grounding of all individual components;

2.3 Refrigerating system:

2.3.1 With optimized cascade hydrocarbon refrigeration technology and imported brand compressor, it has strong refrigeration capacity, and the refrigerant is environment-friendly and fluorine-free, which has no emission to environmental pollution;

2.3.2 Combination freezer design of high density insulation layer and VIP special insulation material has good insulation effect;

2.3.3 Independent multi-layer sealing structure and heat insulation system design can effectively eliminate frosting;

2.3.4 The specially designed computer controlled low temperature can avoid the cascade system's general wrong control to the compressor of the low temperature stage system;

2.4 Humanization design:

2.4.1 LED display screen, which can display the freezer temperature, setting temperature, ambient temperature and input voltage, set high and low temperature alarm and freezer temperature, and has fault prompt and early warning function;

2.4.2 Adjustable shelf design for easy access to items;

2.4.3 Safety door lock design with two locks (a padlock and a built-in lock with key) to prevent opening at will;

2.4.4 Innovative integrated handle design and compact caster enable the freezer to be more flexible and convenient;

2.4.5 It has network alarm and remote alarm functions, which are advanced and practical;

2.4.6 The unique 5 V power supply module solves the user's trouble of connecting a power supply separately and directly outputs 5 V power from the whole machine;

2.5 VIP

PU foam layer + VIP vacuum insulation material is used to minimize the floor area of the equipment at the same

time;

2.6 Temperature monitoring function

2.6.1 The alarm message on the device can be sent to registered mobile phone users in the form of SMS;

2.6.2 Users can send short messages to the device to query the real-time temperature and alarms;

2.6.3 The actual operating temperature in the freezer can be downloaded through USB data storage module;

2.7 Noise

It is world leading with lower noise, and it can keep a comfortable working environment, which will not make the users fidgety.

III. Product appearance and structure characteristics

3.1 New energy-saving structure series: DW-86L578J/626/728J/828J



3.2 Narrow series



3.3 Double-door series: DW-86L490J



Front view



Internal structure



Rear view

3.4 Horizontal freezer series: DW-86W100J Horizontal freezer series: DW-86W420J



Front view



Front view

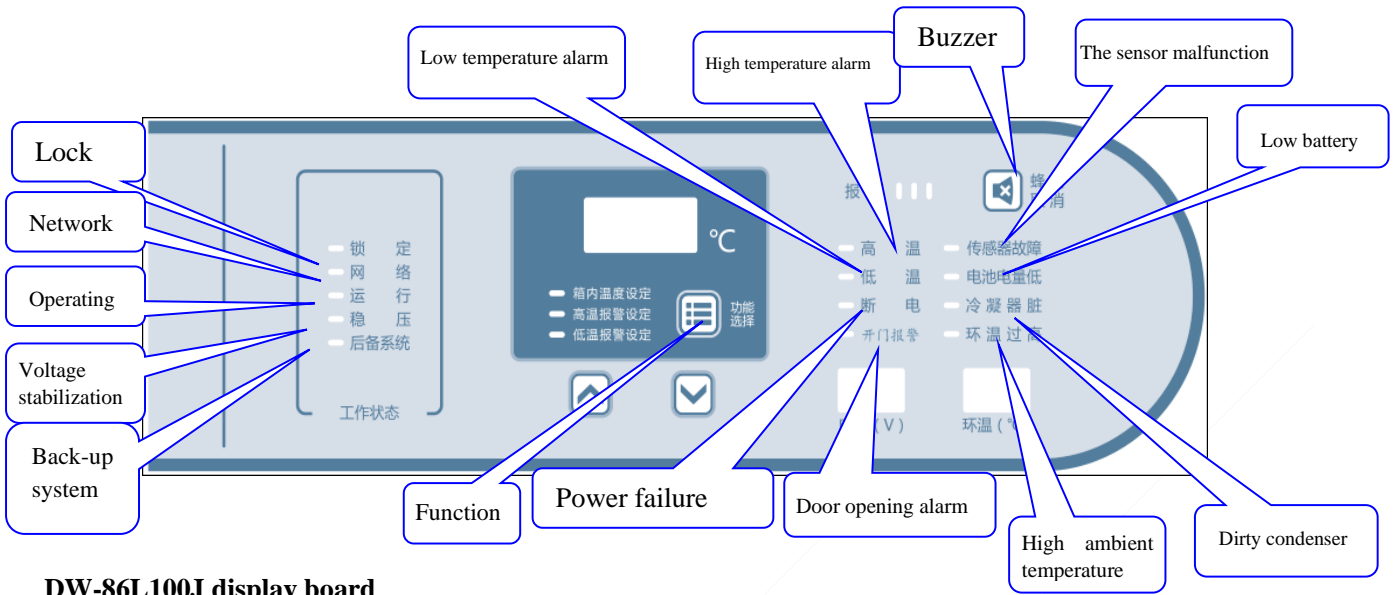


3.5 Vertical under table series: DW-86L100J



IV. Product component structure name

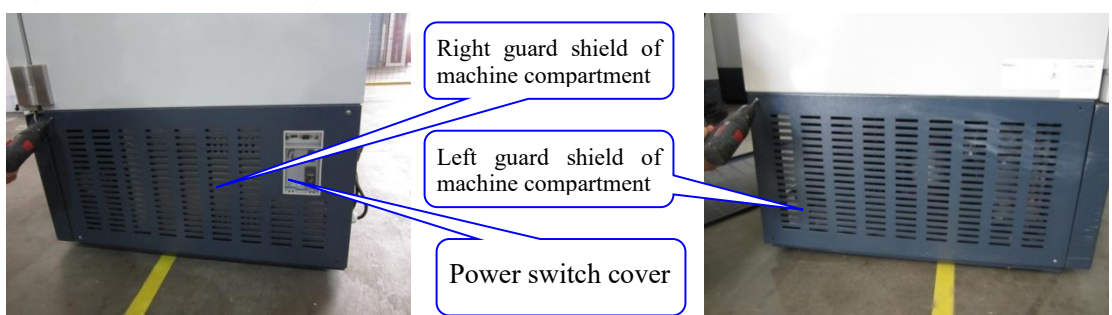
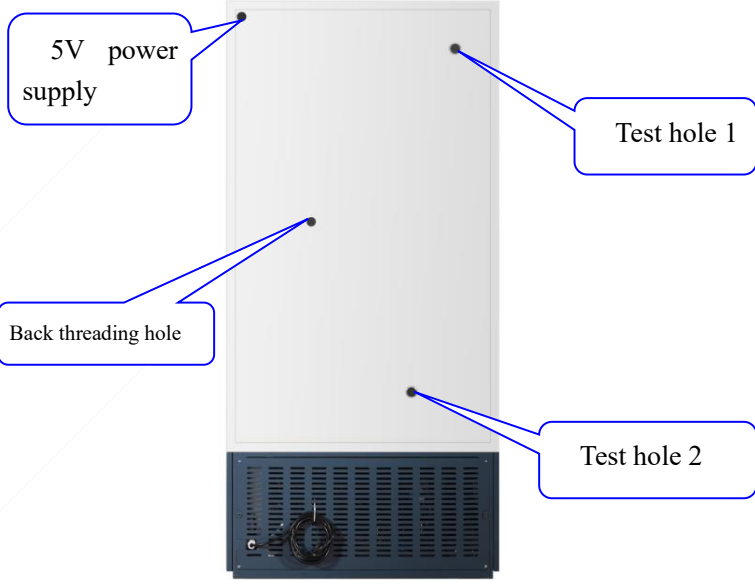
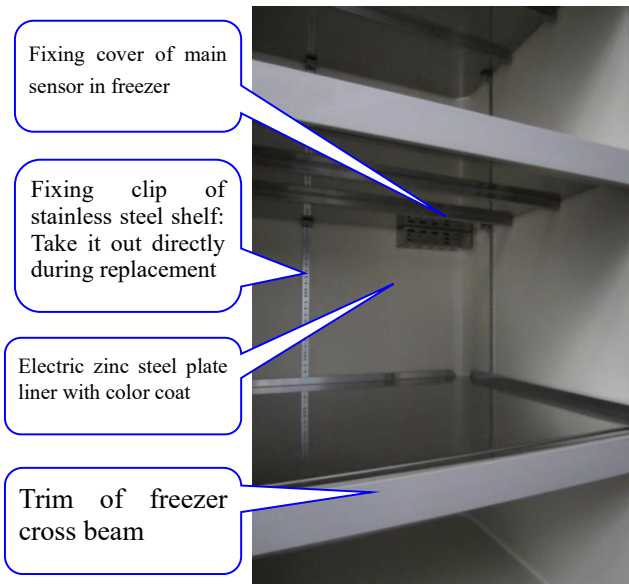
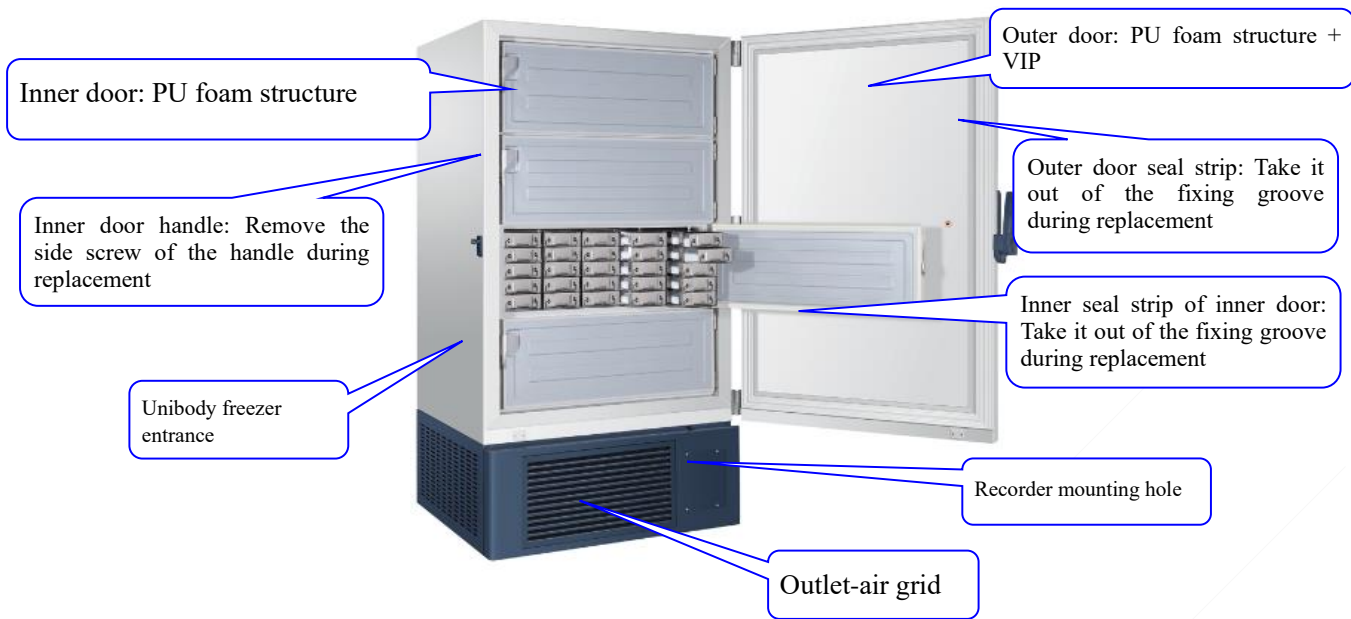
4.1 Display structure of display board

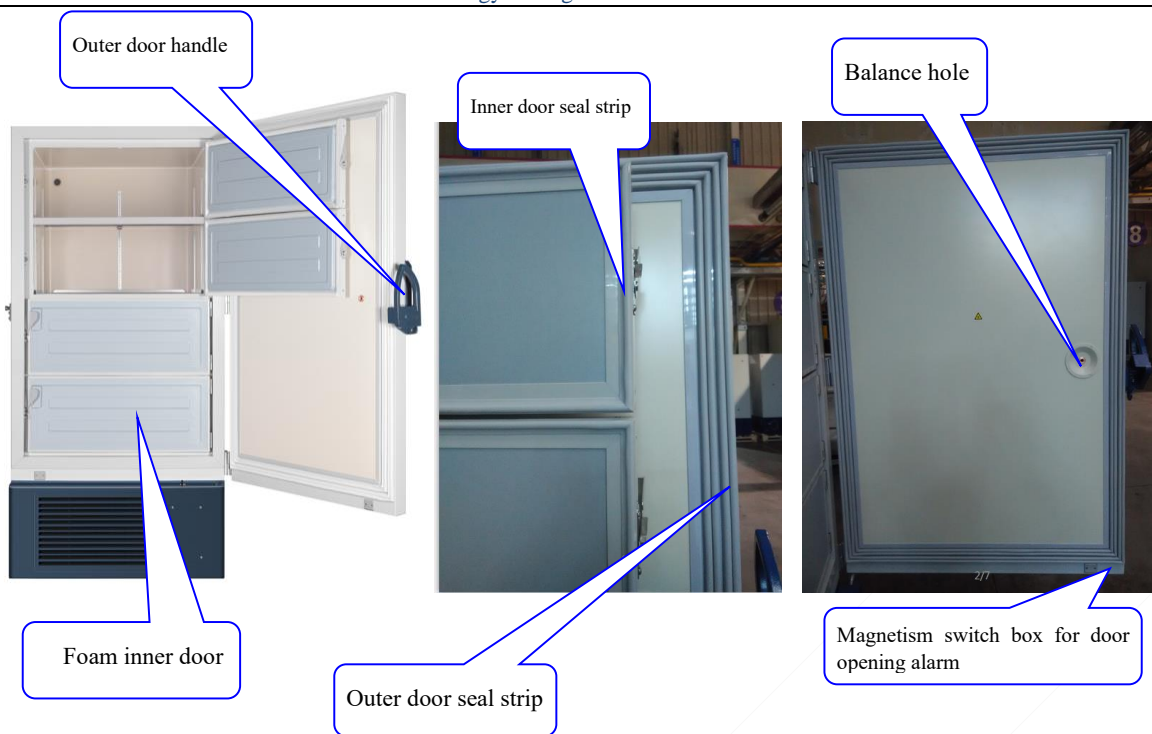


DW-86L100J display board

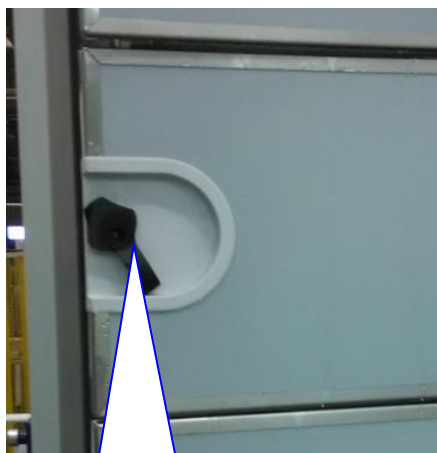


4.2 Freezer structure

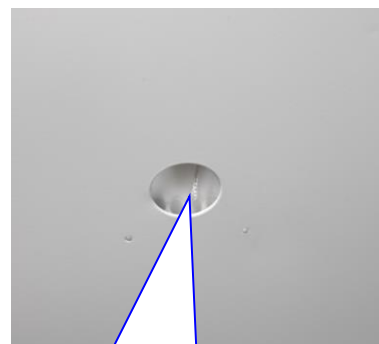




Inner door handle of J series

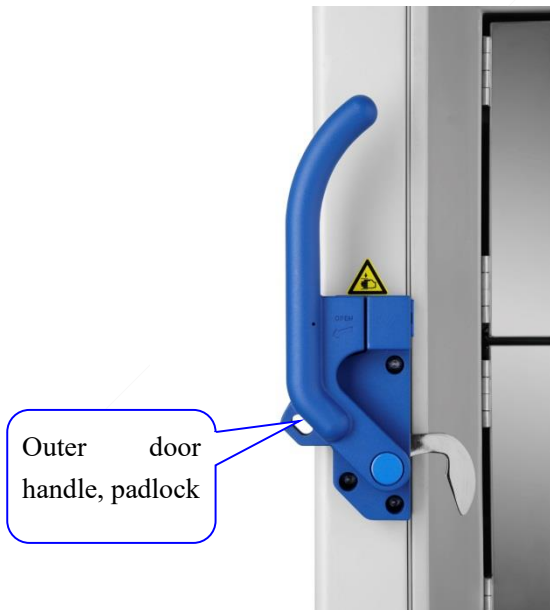
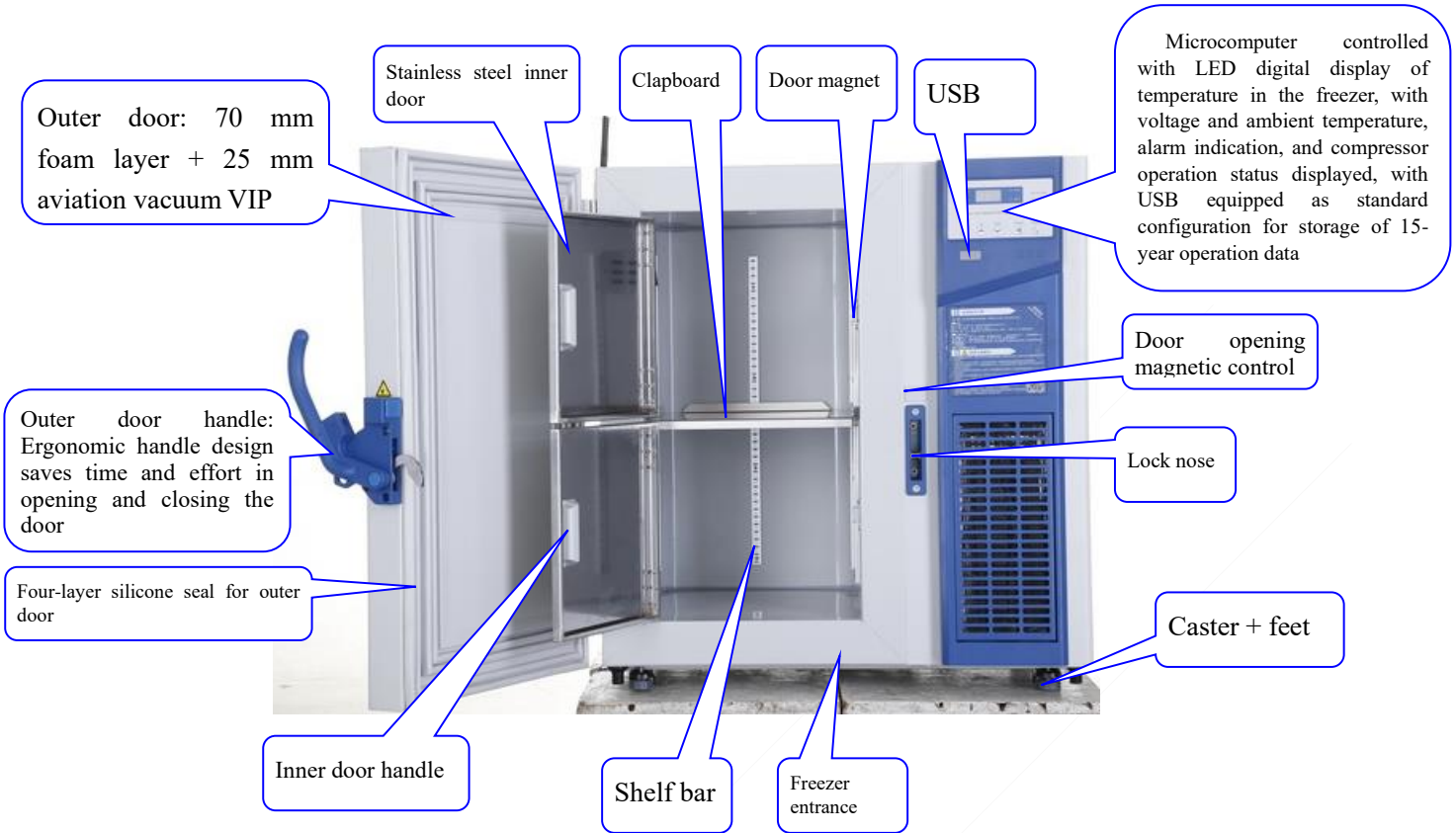


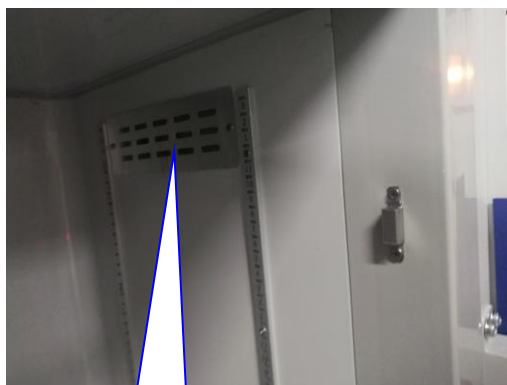
Inner door handle of model DW-86L626



Freezer back threading hole, which is a four-channel structure

Structure of model DW-86L100J





Main sensor housing



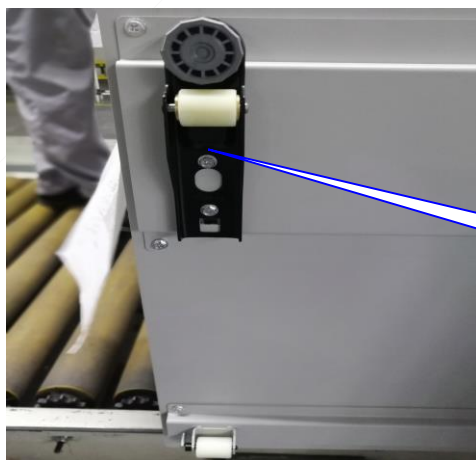
Main sensor



5 V cold chain and IoT interface

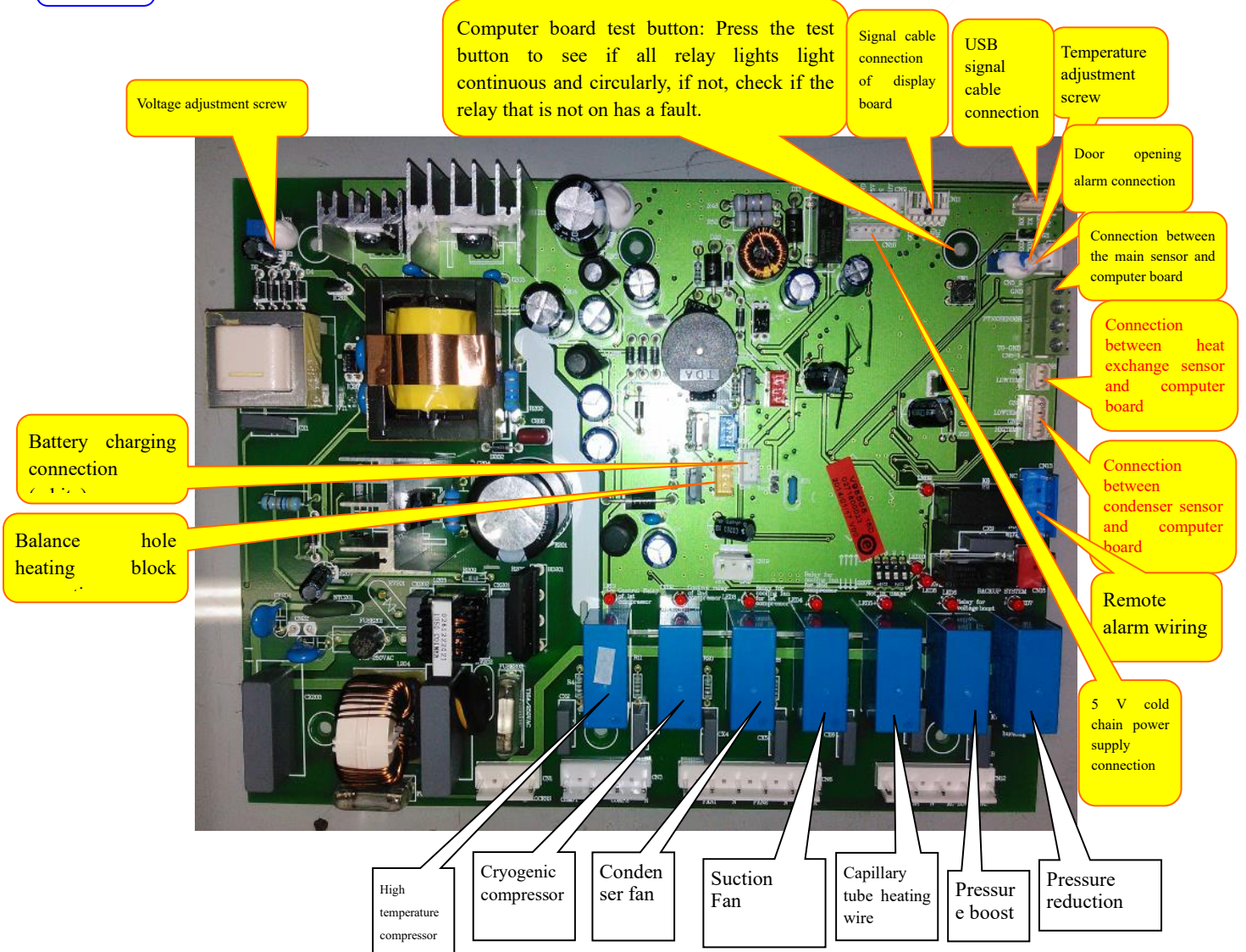
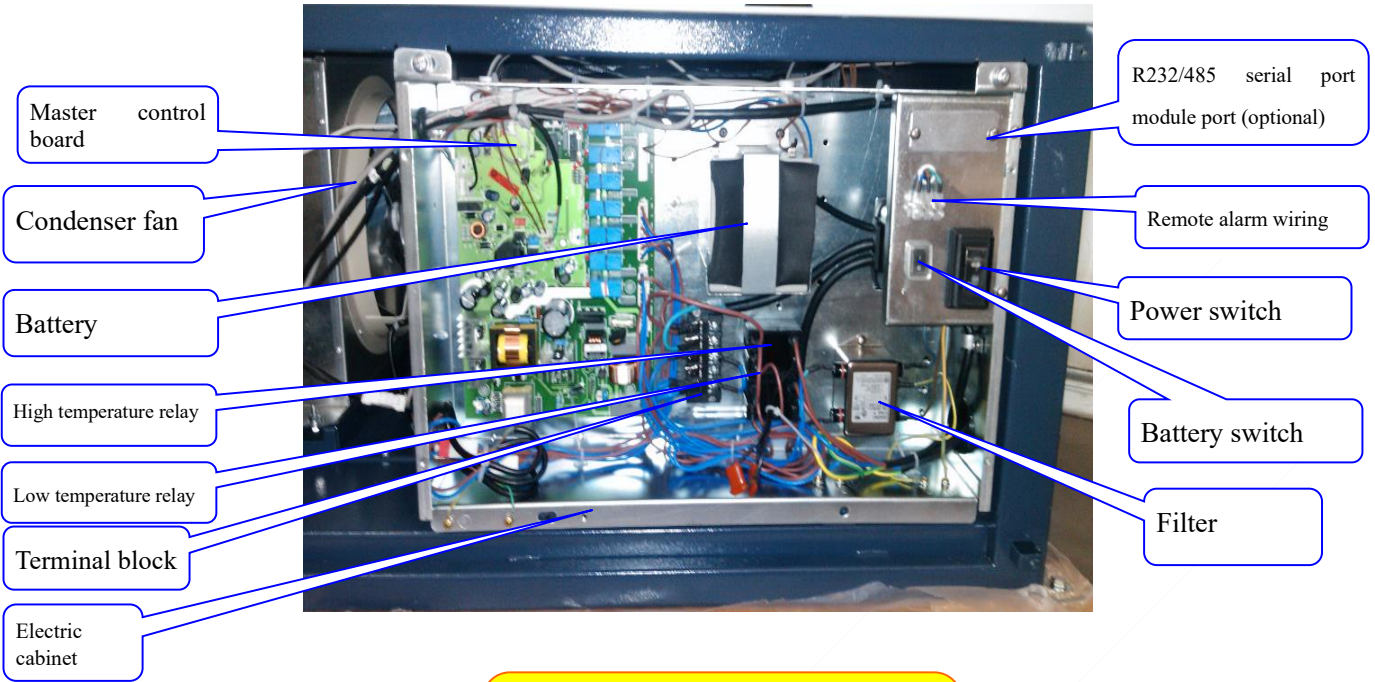
Test hole

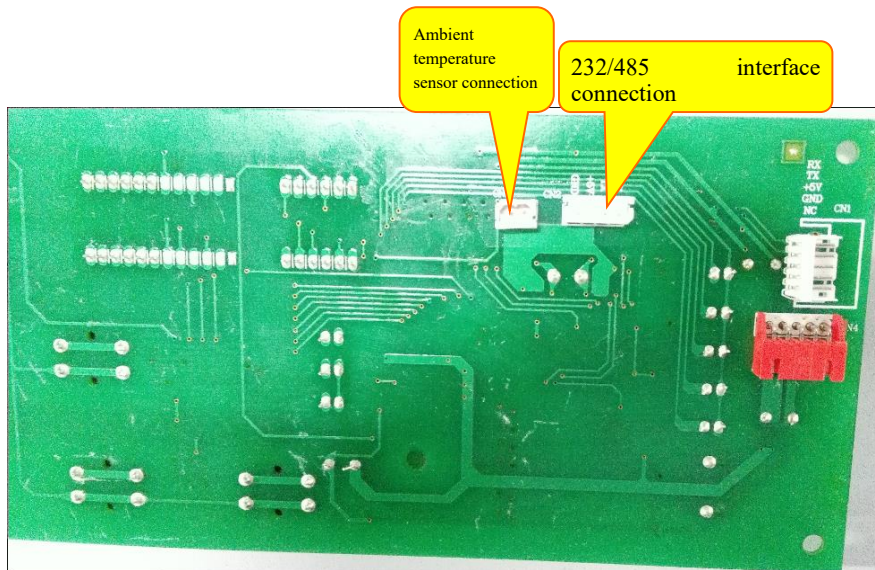
Hinge



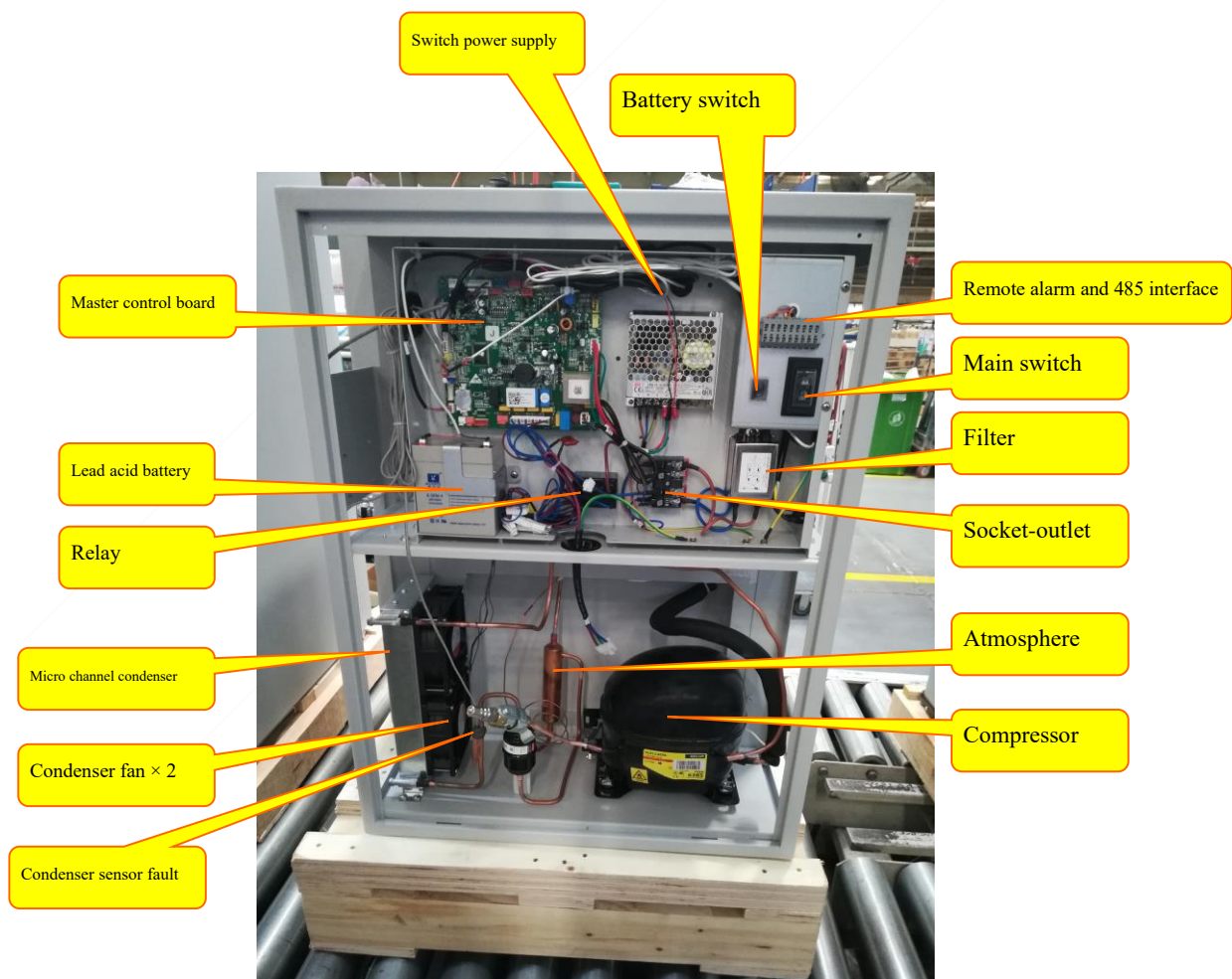
Caster and feet

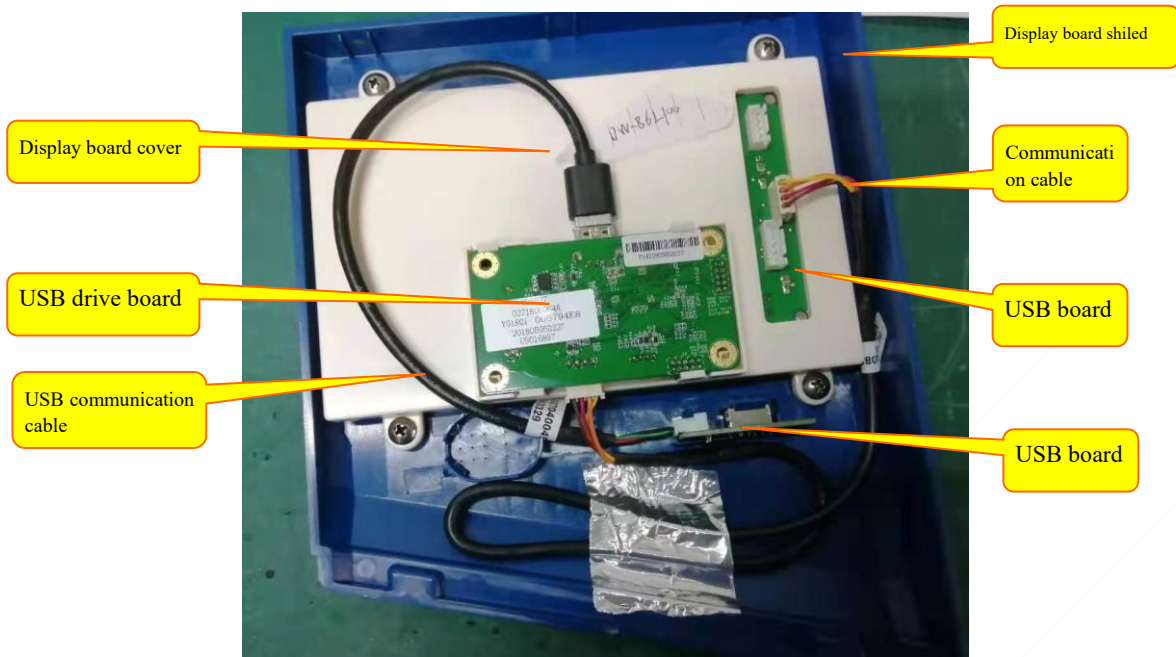
4.3 Structure of electric cabinet



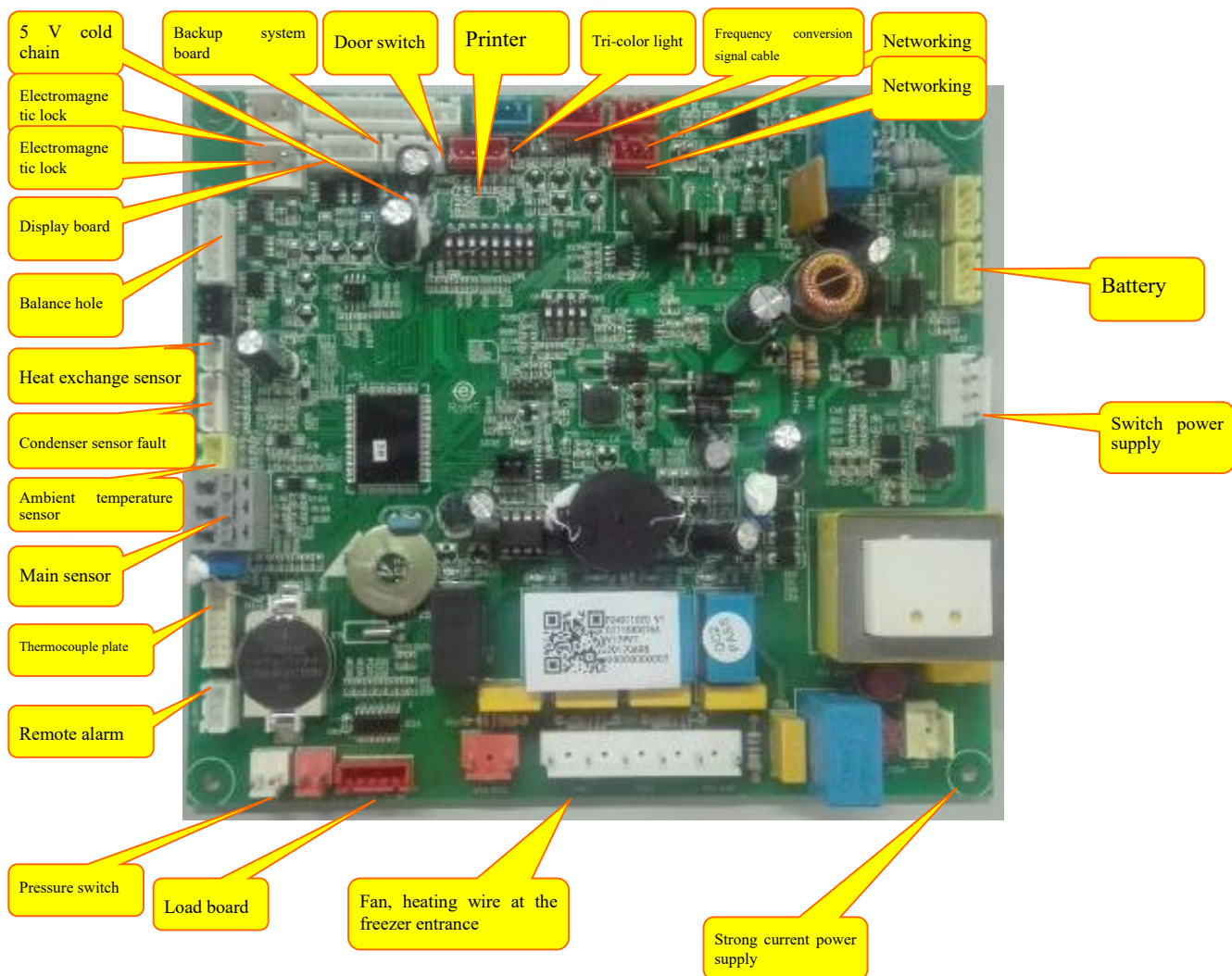


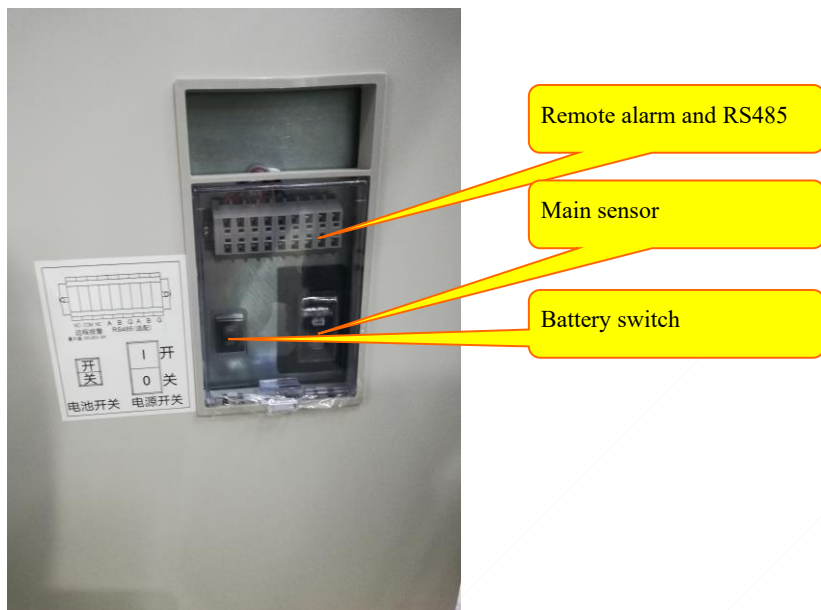
4.3.1 Electric cabinet of model DW-86L100J



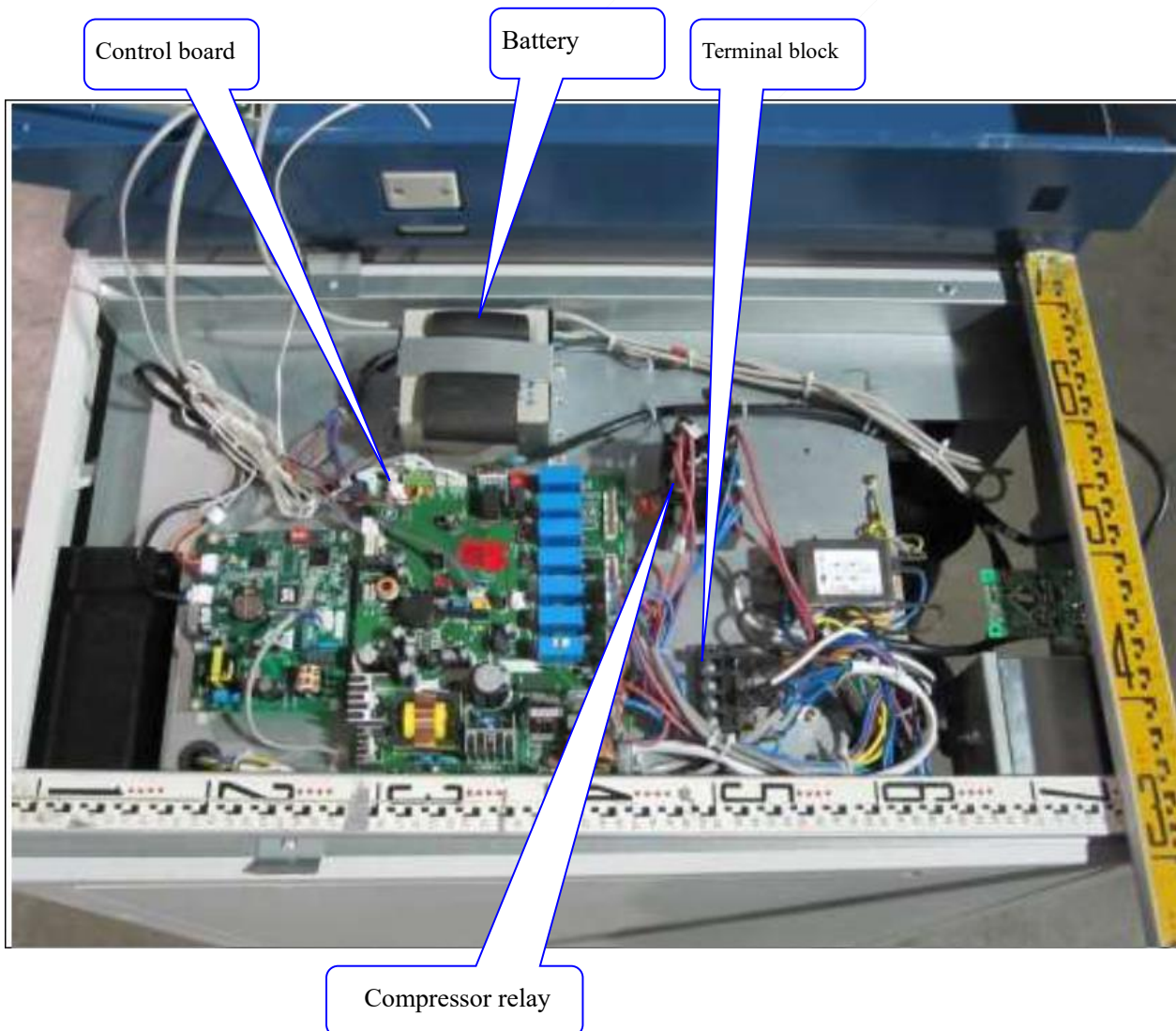


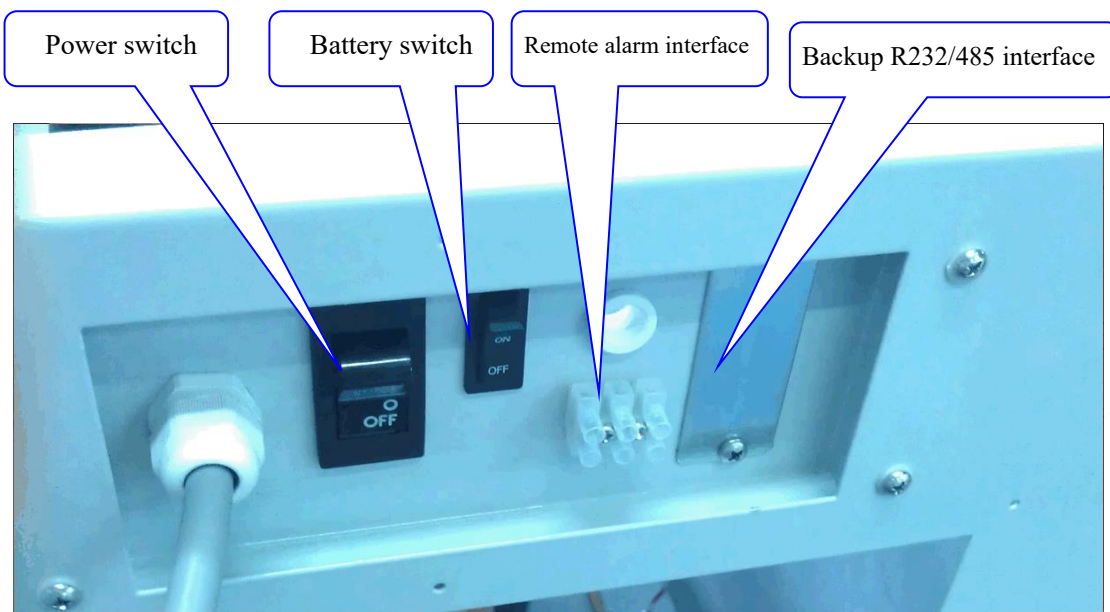
Master control board



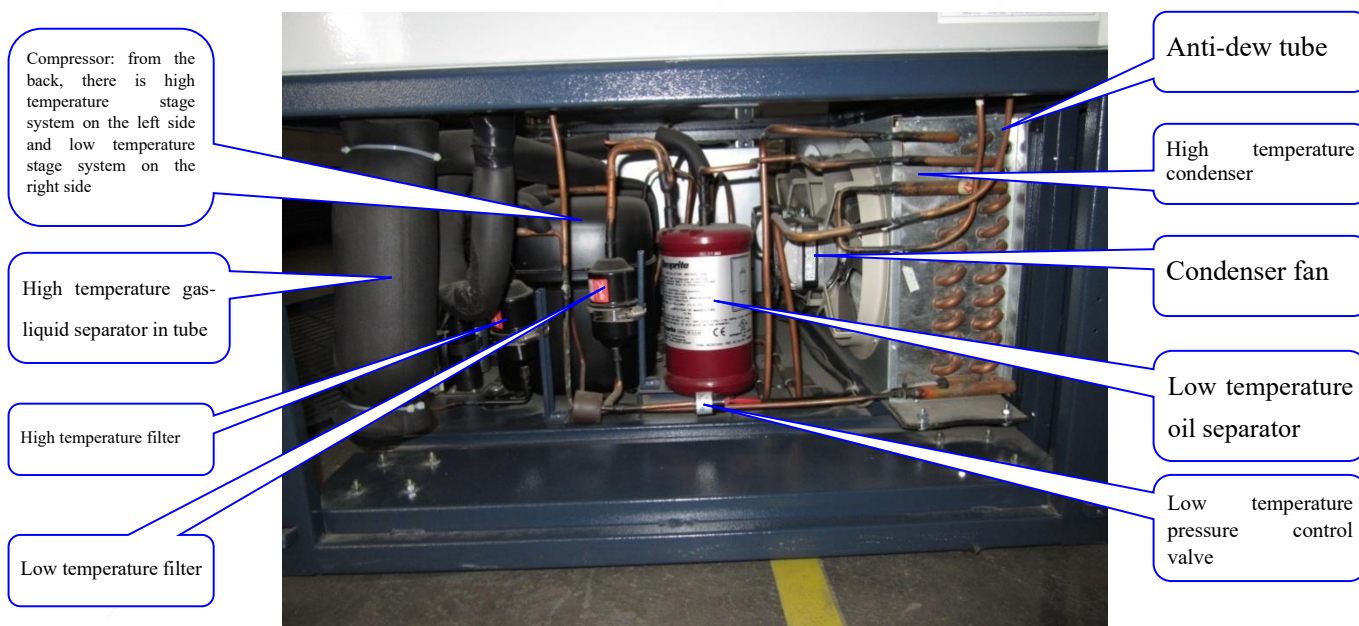


4.3.2 Installation structure of electric cabinet (DW-86W420J)

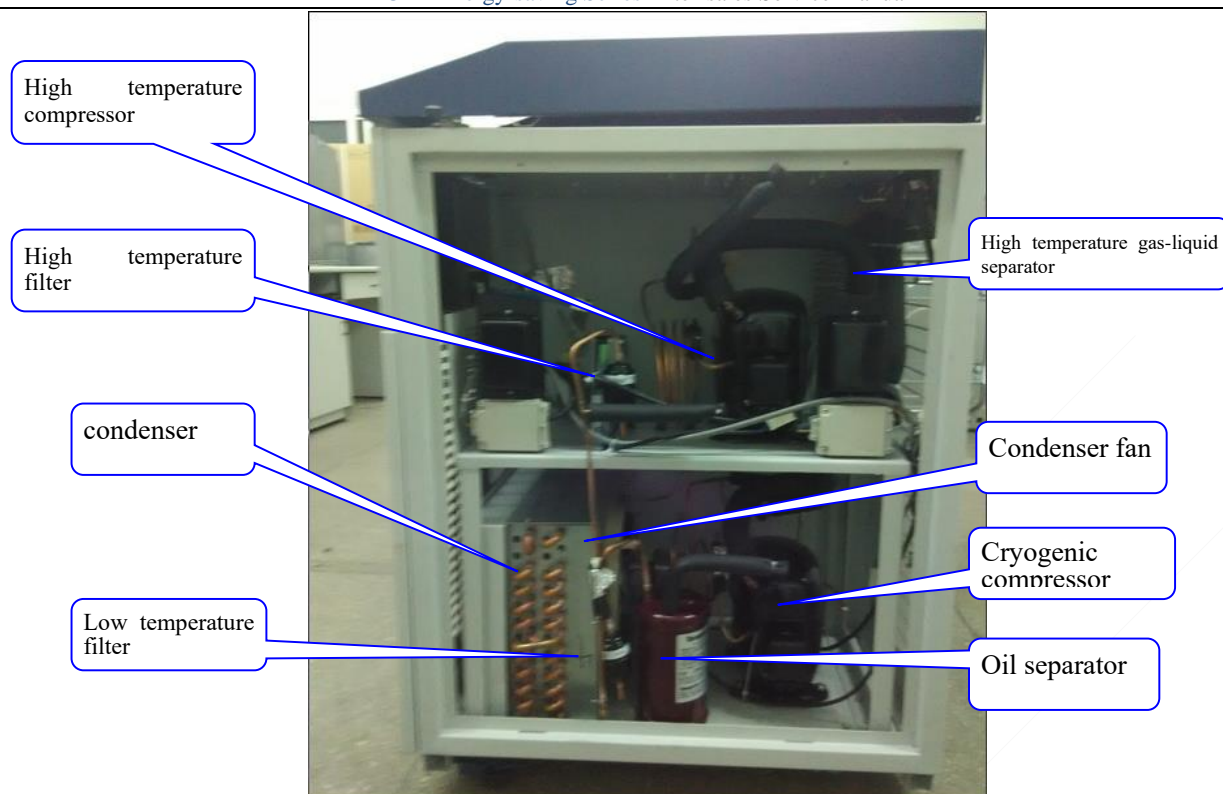




4.4 System structure



4.4.1 System structure (DW-86W420J)



V. Product instructions and product improvement

5.1 Unlocking:

First press the "Up" or "Down" button, the display screen shows "00", press " " to adjust to "06" ("06" is the password), and then press and hold the "Function Selection" button for 3 seconds, the lock indicator light is off, and it is unlocked.

5.2 Temperature setting:

In the unlocking state, press the "Function Selection" button to select "Freezer Temperature Setting", "High Temperature Alarm Setting" and "Low Temperature Alarm Setting" respectively, after the corresponding indicator lights are on, press the "Up" or "Down" button to adjust the required temperature.

****Setting method of model DW-86L100J:**

After unlocking, when the freezer temperature display area displays TS, press the "Set" button to enter, the current temperature setting value of freezer is flashing displayed, press the "Up" or "Down" button to modify the temperature setting value of freezer;

5.3 Precautions

5.3.1 After initial installation or moving of the equipment, please rotate the horizontal support legs clockwise to support the ground to ensure that the freezer does not move when it is in use. After installation and fixation, it needs to stand for 24 hours before being powered on.

5.3.2 During use, the room temperature should be kept below 28°C (if the ambient temperature is higher than 32°C, the cooling efficiency will decrease rapidly, and if the ambient temperature is higher than 32 for a long time, the compressor may be damaged or its service life will be reduced. Therefore, it is recommended to install air

conditioning in the environment where the product is used).

5.3.3 A socket should be equipped for each single equipment, and the power socket should withstand a current greater than 16 A and be reliably grounded.



5.3.4 Turn on the battery switch on the electric cabinet of the machine when it is powered on, and turn off the switch when it needs to be shut down for a long time.

5.3.5 The opening time of low-temperature freezer should not exceed 1 minute each time, and the ice water on the door seal should be wiped clean before closing to ensure good sealing effect.

5.3.6 In order to prolong the service life of the equipment and reduce its energy consumption, it is recommended to set the equipment temperature at -50°C - 80°C under the premise of ensuring the safety of the stored items.

5.3.7 This equipment is for low temperature storage of items, it is not suitable to be used as a fast freezing tank, and it cannot be used to freeze a large number of hot items or large volume liquid forcibly and rapidly.

5.3.8 If the machine does not refrigerate after 2-3 hours of power on, please unplug the power supply and contact the local after-sales service as soon as possible.

5.3.9 In case of alarm fault or other faults, please follow the prompts on the display board to eliminate the fault. If there is no prompt or fail to eliminate the fault by yourself, please do not dismantle it arbitrarily, and contact the after-sales service in time to arrange professional maintenance personnel to help eliminate the fault.

5.4 Fault code query

- 1) When the difference between the perceived condenser temperature minus the ambient temperature is greater than or equal to 13°C , the "Dirty condenser" indicator light will be on, accompanied by the corresponding buzzer alarm. Within 3 hours after the initial power on, both the indicator light and the buzzer will not alarm. ◦
- 2) In case of sensor fault, the "Sensor fault" indicator light is on;
- 3) In case of main sensor fault, the actual temperature and the main sensor fault code "E2" are displayed alternately on the display screen.



Main sensor E2
in the freezer

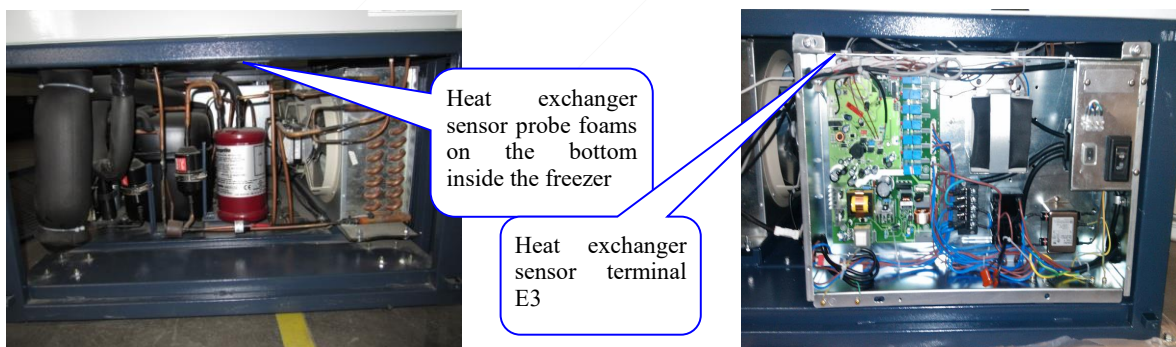
4) In case of condenser sensor fault, the actual temperature and the condenser sensor fault code "E1" are displayed alternately on the display screen.



5) In case of ambient temperature sensor fault, the actual temperature and the ambient temperature sensor fault code "E0" are displayed alternately on the display screen.



6) In case of heat exchanger sensor fault, the actual temperature and the heat exchanger sensor fault code "E3" are displayed alternately on the display screen. When -86°C is selected, in case of "E3" fault, long press the "Buzzer cancel" button for 5 seconds, "E3" fault disappears. After "E3" fault is displayed, and when the compressor of the high temperature stage system is started, the compressor of the low temperature stage system starts with a delay of 1 minute.



7) When the perceived temperature of heat exchanger sensor is greater than or equal to 90°C , the alarm displays E4.

Note: (The models are -25°C and -50°C freezer without heat exchanger sensor, therefore, there are no E3 and E4 faults)

(The model is independent back-up system freezer, therefore, there are no E0, E1, E3 and E4 faults)

Alternate display time: The actual temperature is displayed for 6 seconds, and the fault code is displayed for 2 seconds.

8) Alarm message of DW-86L100J:

Alarm	Alarm code	Status	Instruction	Buzzer + remote alarm
High temperature alarm	E00	It displays that the temperature is higher than or equal to the high temperature alarm setting temperature for over 1 minute.	The alarm light flickers and overtemperature alarm light flickers.	Buzzer alarm + remote alarm output
Low temperature alarm	E01	It displays that the temperature is lower than or equal to the low temperature alarm setting temperature for over 1 minute.	The alarm light flickers and overtemperature alarm light flickers.	Buzzer alarm + remote alarm output
Too high ambient temperature	E02	Ambient temperature is higher than or equal to 35°C for 30s.	Alarm light flicker	/
Main sensor fault	E10	When the main sensor fails.	Alarm light flicker	Buzzer alarm
Ambient temperature sensor fault	E11	When the ambient temperature sensor fails.	Alarm light flicker	Buzzer alarm
Condenser sensor fault	E12	When the condenser sensor fails.	Alarm light flicker	Buzzer alarm
Battery disconnection	E20	When the battery switch is not on, or the battery connecting line is loose.	Alarm light flicker	Buzzer alarm
Reverse battery connection	E21	It is detected that the battery is connected reversely and the signal is low level.	Alarm light flicker	Long buzzer sound alarm
Low battery	E22	Lead acid battery: When the battery is connected, the battery voltage is less than 10.5 V after charging for 24 hours.	Alarm light flicker	/
		Lithium battery: When the battery is connected, the battery voltage is less than 9.0 V after charging for 24 hours.	Alarm light flicker	/
Power failure alarm	E30	When the refrigerator is powered off.	The alarm light and the power indicator light flicker synchronously.	The buzzer alarm sounds every 3s. The display board does not display the inner temperature for 30s, and displays it normally for 5 seconds, which appear alternately + Remote alarm output
Door opening alarm	E40	The door opening signal is detected for 5 minutes.	Alarm light flicker	Buzzer alarm + remote alarm output
Dirty condenser alarm	E50	When the condenser filter is blocked, or when the condenser temperature is too high due to too high ambient temperature.	Alarm light flicker	Buzzer alarm

5.5 Probe resistance changes with temperature (probe type: NTC, which is mainly for ambient temperature sensor, condensation temperature sensor, and heat exchanger sensor)

Temperature (°C)	Resistance (KΩ)	Temperature (°C)	Resistance (KΩ)	Temperature (°C)	Resistance (KΩ)	Temperature (°C)	Resistance (KΩ)
-40	63.3	-19	17.8	2	5.8	23	2.1
-39	59.4	-18	16.8	3	5.5	24	2.0
-38	55.8	-17	15.9	4	5.2	25	1.9
-37	52.3	-16	15.0	5	5.0	26	1.8
-36	49.2	-15	14.2	6	4.7	27	1.8
-35	46.2	-14	13.4	7	4.5	28	1.7
-34	43.4	-13	12.7	8	4.3	29	1.6
-33	40.8	-12	12.0	9	4.1	30	1.5

-32	38.4	-11	11.4	10	3.9	31	1.5
-31	36.1	-10	10.8	11	3.7	32	1.4
-30	34.0	-9	10.2	12	3.5	33	1.4
-29	32.0	-8	9.7	13	3.4	34	1.3
-28	30.1	-7	9.2	14	3.2	35	1.2
-27	28.4	-6	8.7	15	3.1	36	1.2
-26	26.7	-5	8.3	16	2.9	37	1.1
-25	25.2	-4	7.8	17	2.8	38	1.1
-24	23.8	-3	7.4	18	2.7	39	1.0
-23	22.4	-2	7.1	19	2.5	40	1.0
-22	21.2	-1	6.7	20	2.4	41	1.0
-21	20.0	0	6.4	21	2.3	42	0.9
-20	18.9	1	6.1	22	2.2	43	0.9

Probe resistance changes with temperature (probe type: NTC, which is mainly for temperature sensor in the freezer)

Temperature (°C)	Resistance (KΩ)	Temperature (°C)	Resistance (KΩ)	Temperature (°C)	Resistance (KΩ)
-140	43.9	-70	72.3	0	100.0
-130	48.0	-60	76.3	10	103.9
-120	52.1	-50	80.3	20	107.8
-110	56.2	-40	84.3	30	111.7
-100	60.3	-30	88.2	40	115.5
-90	64.3	-20	92.2	50	119.4
-80	68.3	-10	96.1	60	123.2

IV. Main technical parameters of the product

6.1 List of technical parameters

Model	DW-86L578J	DW-86L728J	DW-86L338J	DW-86L388J
Technical parameter				
Product attributes	Vertical, single door			
Climate type	N			
Control mode	Microcomputer control			
Display	LED display (minimum display accuracy of 1°C)			
Temperature sensor	PT100			
Basic parameters				
Capacity (L)	578	728	338	388
Voltage frequency (V/Hz)	220~240/50	220~240/50	220~240/50	220~240/50
Power (W)	900	1000	900	1000
Current (A)	9	10	7.5	8
Internal dimensions (W*D*H) (mm)	620*716*1310 (mm)	766*716*1310 (mm)	465*630*1165 (mm)	465*630*1310 (mm)
External dimensions (W*D*H) (mm)	895*980*1960 (mm)	1041*980*1980 (mm)	812*893*1846 (mm)	812*893*1980 (mm)
Net weight/gross weight (kg) t	300/335	345/380 (kg)	238/278 (kg)	255/286 (kg)
Materials				
External material	Electric zinc steel plate coat			
Internal material	Electric zinc steel plate coat			
Insulation layer	VIP + fluorine-free PU foam layer			
Door thickness	90 mm		90 mm	
Freezer thickness	90 mm		130 mm	
Seal structure of outer	Four-layer silicone seal strip		Four-layer silicone seal strip	

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door			
Seal structure of inner door	Single-layer silicone seal strip for independent inner door		Single-layer silicone seal strip for independent inner door
Door lock	Y/1		
Product Accessories			
Number of clapboards/inner doors	3/4		3/2
Clapboard dimensions (W*D)	602*680	750*680	449*595
Caster/test hole	4/2		4/2
Compressor brand and type	Enclosed type/SECOP/2		
Compressor	SC21CNX.2		
Refrigerant type	HC-Free/H-R290 L-R290 R170		

Model	DW-86L828J	DW-86L490J	DW-86L626
Technical parameter			
Product attributes	Single door, vertical	Double doors, vertical	Single door, vertical
Climate type	-40~-86°C		
Control mode	Microcomputer control		
Display	LED display (minimum display accuracy of 1°C)		
Temperature sensor	PT100		
Basic parameters			
Capacity (L)	828	490	626
Voltage frequency (V/Hz)	220~240/50	220~240/50	220~240/50
Power (W)	1000	900	950
Current (A)	10	8	7.5
Internal dimensions (W*D*H)	870*716*1310 (mm)	590*630*1310 (mm)	760*630*1310 (mm)
External dimensions (W*D*H)	1145*980*1980 (mm)	860*900*1980 (mm)	1035*900*1980 (mm)
Net weight/gross weight (kg) t	380/410 (kg)	295/335 (kg)	301/323(kg)
Materials			
External material	Electric zinc steel plate coat		
Internal material	Electric zinc steel plate coat		
Insulation layer	VIP + fluorine-free PU foam layer		
Door thickness	90 mm		
Freezer thickness	90 mm		
Seal structure of outer door	Four-layer silicone seal strip	Three-layer silicone seal strip	
Seal structure of inner door	Single-layer silicone seal strip for independent inner door		
Door lock	Y/1	Y/2	Y/1
Product Accessories			
Number of clapboards/inner doors	3/4		
Clapboard dimensions (W*D)	854*680	574*596	740*615
Caster/test hole	4/2		
Compressor brand and type	Enclosed type/SECOP/2		
Compressor	SC21CNX.2		
Refrigerant type	HC-Free/H-R290 L-R290 R170		

Model	DW-86W420J	DW-86W100J	
Technical parameter			
Product attributes	Horizontal, single door		
Climate type	-40~-86°C		
Control mode	Microcomputer control		

Display	LED display (minimum display accuracy of 1°C)	
Temperature sensor	PT100	
Basic parameters		
Capacity (L)	420	100
Voltage frequency (V/Hz)	220~240/50	220~240/50
Power (W)	1000	1000
Current (A)	7.5	7.5
Internal dimensions (W*D*H)	1367*462*652	470*450*480 (mm)
External dimensions (W*D*H)	2130*870*1020	769*825*1120 (mm)
Net weight/gross weight (kg) t	310/357	138/160 (kg)
Materials		
External material	Electric zinc steel plate coat	
Internal material	Stainless steel	
Insulation layer	VIP + fluorine-free PU foam layer	
Door thickness	80	
Freezer thickness	140mm	
Seal structure of outer door	Single-layer silicone seal strip	
Seal structure of inner door	/	
Door lock	Y/1	Y/1
Product Accessories		
Number of clapboards/inner doors	0/3	0/1
Clapboard dimensions (W*D)	/	
Caster/test hole	4/1	
Compressor brand and type	Enclosed type/SECOP/2	
Compressor	SC21CNX.2	NLE12.6CNL
Refrigerant type	HC-Free/H-R290 L-R290 R170	
Model	DW-86L100J	
Technical parameter		
Product attributes	Vertical, single door	
Climate type	-40~-86°C	
Control mode	Microcomputer control	
Display	LED display (minimum display accuracy of 1°C)	
Temperature sensor	PT100	
Basic parameters		
Capacity (L)	100	
Voltage frequency (V/Hz)	220~240/50	
Power (W)	680	
Current (A)	3	

Internal dimensions (W*D*H)	330*481*630	
External dimensions (W*D*H)	770*660*810	
Net weight/gross weight (kg) t	108/132	
Materials		
External material	Electric zinc steel plate coat	
Internal material	Electric zinc steel plate coat	
Insulation layer	VIP + fluorine-free PU foam layer	
Door thickness	70 mm	
Freezer thickness	70 mm	
Seal structure of outer door	Four-layer silicone seal strip	
Seal structure of inner door	Stainless steel inner door (magnet)	
Door lock	Y/padlock + built-in lock	
Product Accessories		
Number of clapboards/inner doors	1/2	
Clapboard dimensions (W*D)	316×424	
Caster/test hole	4/1	
Compressor brand and type	Enclosed type/SECOP/1	
Compressor	NLE12.6CNL	
Refrigerant type	HC-Free/R600A, R1150, R50	

6.2 Product nameplate

Take DW-86L578J as an example

Haier		Medical low-temperature refrigeration chamber for conservation		
Medical Device Manufacturing Enterprise License No.: LSYJXSCX 20100176				
Product registration No. and technical requirement No.: LXZZ 20162580180				
Model:	DW-86L828J	Refrigerant	High temperature stage	R290:150 g
Inner temperature:	-40°C~-86°C		Low temperature stage	R290:5 g
Storage volume:	828 L			R170:100 g
Rated voltage:	220 V	Power connection conditions:		Y
Rated frequency:	50 Hz	Foaming materials:		CP/IP
Power:	1000 W	Manufacture date and No.:		See the barcode on the refrigerator.
Climate class:	N	Service life:		See the Manual.
Net weight:	380 kg	Please refer to the Manual for other contents.		
Electric shock protection type:	I			
Address: Haier Industrial Park, Qingdao Economic and Technological Development Zone Service hotline: 4006 99 2008		Qingdao Haier Special Electrical Appliances Co., Ltd.		

DW-86L100J

Haier		Medical low-temperature refrigeration chamber for conservation		
Production License of Medical Instrument No.: LSYJXSCX No. 20100176				
Product registration No. and technical requirement No.: LXZZ 20162580180				
Model:	DW-86L100J	Refrigerant	R600A:	75 g
Inner temperature:	-40°C~-86°C		R1150:	15 g
Storage volume:	100 L		R50:	5 g
Rated voltage:	220 V~	Foaming materials: HFO-1233zde		
Rated frequency:	50 Hz	Manufacture date and No.:		See the barcode on the refrigerator.
Power:	680 W	Service life:		See the Manual.
Climate class:	N	Please refer to the Manual for other contents.		
Net weight:	108 kg			
Electric shock protection type:	I			
Address: Haier Industrial Park, Qingdao Economic and Technological Development Zone Service hotline: 4006 99 2017		Qingdao Haier Special Electrical Appliances Co., Ltd.		

VII. Case preventive measures, product use and daily maintenance knowledge

7.1 Principle of ultra-low temperature refrigeration:

The ULT Freezer adopts cascade refrigeration system that is usually composed of two or more refrigeration systems, which are called high temperature stage system part and low temperature stage system part respectively. High temperature stage system uses medium temperature refrigerant, and low temperature stage system uses low temperature refrigerant. Each part is a complete refrigeration system. The two parts are connected by a condensing evaporator, which is both the evaporator of high temperature stage system and the condenser of low temperature stage system. The low temperature refrigerant absorbs the heat of the object to be cooled in the evaporator of the low temperature stage system, and transfers the heat to the refrigerant of the high temperature stage system through the condensing evaporator, and then the heat is transferred to the cooling medium in the condenser of the high temperature stage system by the refrigerant of the high temperature stage system.

DW-86L100J uses auto-cascade refrigeration system with single compressor for refrigeration;

7.2 Method of use of the ULT Freezer

Method of use:

If the ULT Freezer is used for the first time, or if the ULT Freezer has been transported, or if the power is cut off (including power failure) for more than 10 hours, the ULT Freezer must be inspected before use (or before power on again). Confirm if pass the inspection.

Method of use of the ULT Freezer

- 1) The freezer must be left standing for at least 24 hours before it can be powered on.
- 2) Power on and start up the empty freezer with nothing, cool the freezer to -40°C by stages, and then to -60°C after normal on and off, and then adjust to -80°C after 8 hours of normal on and off. Observe that the freezer has been on and off normally for more than 24 hours, which proves that the performance of the freezer is normal.
- 3) After confirming that the freezer is normal as Step 2, the items can be stored in the freezer. In principle, the freezer should store items with a temperature of -60°C, which shall not account for a capacity greater than 1/3

freezer capacity.

4) Prohibition: All ULT Freezers are low temperature storage equipment, which are used to store low temperature items, and are not allowed to be used for quickly freezing plasmanate with high temperature. It is strictly prohibited to put too many relatively hot items at one time, which may cause the compressor to stay in operation for a long time, the temperature will not drop, and it is easy to burn the compressor, resulting in damage to the items in the freezer. Items must be put into in batches, cool by stages until get the required low temperature! ! !

7.3 Working principle of pressure switch

A. Principle: When the pressure in the pipeline at the pressure switch exceeds 2.1 MPa, the contact is disconnected, the ULT Freezer stops, and the pressure begins to drop. When the pressure drops to 1.35 MPa, the contact is connected, and the ULT Freezer starts up. When the pressure exceeds 2.1 MPa again, the contact is disconnected again, and the followed steps circulate in turn.

B. Precautions: When welding the pressure switch, place a wet towel on it to keep the temperature not higher than 100°C. The parameters of the pressure switch are not adjustable.

C. Parameters: Voltage: 220 V, 50 Hz, contact capacity: 6A.

7.4 Characteristics of refrigerant

1) The refrigerant is a mixed working medium, which is inflammable and explosive. Refrigerant charging place shall be well-ventilated, and ignition or sparking is not allowed nearby in case of leakage. If there is a problem in the refrigeration system, the local after-sales service site shall judge and give feedback on the problem, and the technical personnel of Medical Business Division shall instruct the local after-sales site to carry out repair and maintenance as per specific situation.

2) Refrigerant code (energy-saving): **R290 for high temperature stage system; R290 and R170 for low temperature stage system (R600A, R1150 and R50 forDW-86L100J)**

7.5 Refrigerant charging procedures:

7.5.1 Preparation

- 1) **Refrigerant (R290, R170)**
- 2) Hansen valves
- 3) Standard electronic scale (error $\leq \pm 2$ g)
- 4) Vacuum pump (≥ 4 L)
- 5) Pressure gauge (it is required to read high and low voltage at the same time) is shown in Figure 1

7.5.1 Open the system

- 1) Cut the system with fault from the end of process pipe with pipe tongs, and discharge the refrigerant in the system.
- 2) Weld the opened pipeline to the pressure gauge within 20 minutes after opening the system.

[Precautions]

*This product series is a two-stage refrigeration system, which includes two independent systems, i.e. the



high temperature stage system and low temperature stage system. Do not open the two systems at the same time during maintenance, and always separate one system from another.

*The humidity in the maintenance workshop should not be too high. In case of cloudy and rainy days, it is forbidden to open the system. All pipelines of the machine, of which the system has been opened, shall be welded immediately.

*Because the freezer has strict requirements for water in the system, when the pipelines of the freezer are open, the pipelines should be sealed with tape immediately to prevent air from entering the system, and the opened pipelines are required to be welded within 20 minutes;

7.5.3 Vacuum pumping

1) Connect the vacuum pump connector with the common connector in the middle of the pressure gauge, as shown in Figure 2

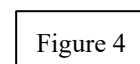
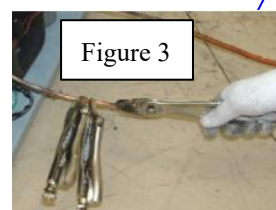
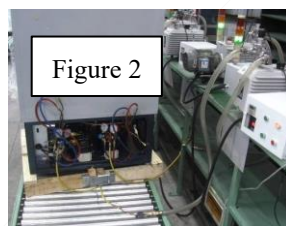
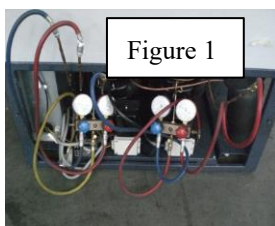
2) Turn on the vacuum pump for vacuum pumping, and the vacuum degree is required to be less or equal to 3 Pa. For pumping time, please refer to the attached precautions. See Figure 3

3) When the vacuum degree is reached, stop high pressure vacuumization first, and weld and seal the high temperature charging pipe quickly (because the refrigerant pressure is too high, the high pressure cannot be sealed when the freezer is refrigerating), and continue to vacuumize at low pressure for one hour. See Figure 4

4) Close the pressure gauge valve after one hour of low pressure vacuumization. At this time, the freezer is required to be kept in negative pressure for more than one hour to check whether the system of the freezer is in a vacuum state while observing whether the pressure gauge rises again, if this is the case, re-vacuumize more than one hour and keep the freezer in negative pressure state for more than one hour. Continue the vacuumization until the pressure does not rise, and then fill refrigerant.

[Precautions]

*Vacuum pumps with capacity more than 4 L must vacuumize for 12 hours



7.5.4 Refrigerant filling

1) When filling refrigerant for high temperature stage system, the freezer should be in a stop state, and then fill refrigerant R290 with the filling capacity specified in the attached table! (The filling sequence of refrigerants for DW-86L100J is R600A, R1150, and R50)

[Precautions]

*In order to ensure that the refrigerants are filled in place at one time, the steel cylinder must be placed upside down when filling above refrigerants, as shown in Figure 5

2) When filling refrigerant for low temperature stage system, the freezer should also be in a stop state, then fill

refrigerant R290 first followed by refrigerant R170, and this is because the pressure of refrigerant R170 is higher. The filling capacity should conform to the attached table!

3) After filling, seal the process pipe for filling, and the sealing effect is as shown in Figure 6

[Precautions]

*The filling capacity for low temperature stage system should be accurate, and minor difference may affect refrigerating effect.

*The pressure of refrigerant R170 is high and there is relatively less refrigerant in the steel cylinder. The cylinder valve should be opened slowly for filling to avoid the waste of refrigerant.

*The pressure of refrigerant R170 is too high, and the general steel cylinder can not bear too high pressure. Therefore, oxygen cylinder is used to fill refrigerant R170, the lower outlet of the steel cylinder must be blocked with screws to prevent refrigerant leakage, and the upper outlet is used for filling. When filling above refrigerant, the steel cylinder can be filled vertically and filled with gas.

*In order to ensure the accuracy of refrigerant filling, all refrigerant must be weighed with electronic scale when filling.

*If vacuum pumping and refrigerant filling are not carried out in accordance with the above requirements and operation procedures, resulting in poor or non-refrigeration of the freezer, and freezer return or exchange, once verified by the headquarters, the claim of double maintenance cost of the freezer shall be made, and cost of freezer return or exchange shall be paid by the business outlet.

*The quantity precision (gram degree) of refrigerant filling in the system of ULT Freezer is very strict, and a standard electronic scale with an error of 2 g must be prepared in the outlet before maintenance.



Figure 5



Figure 6

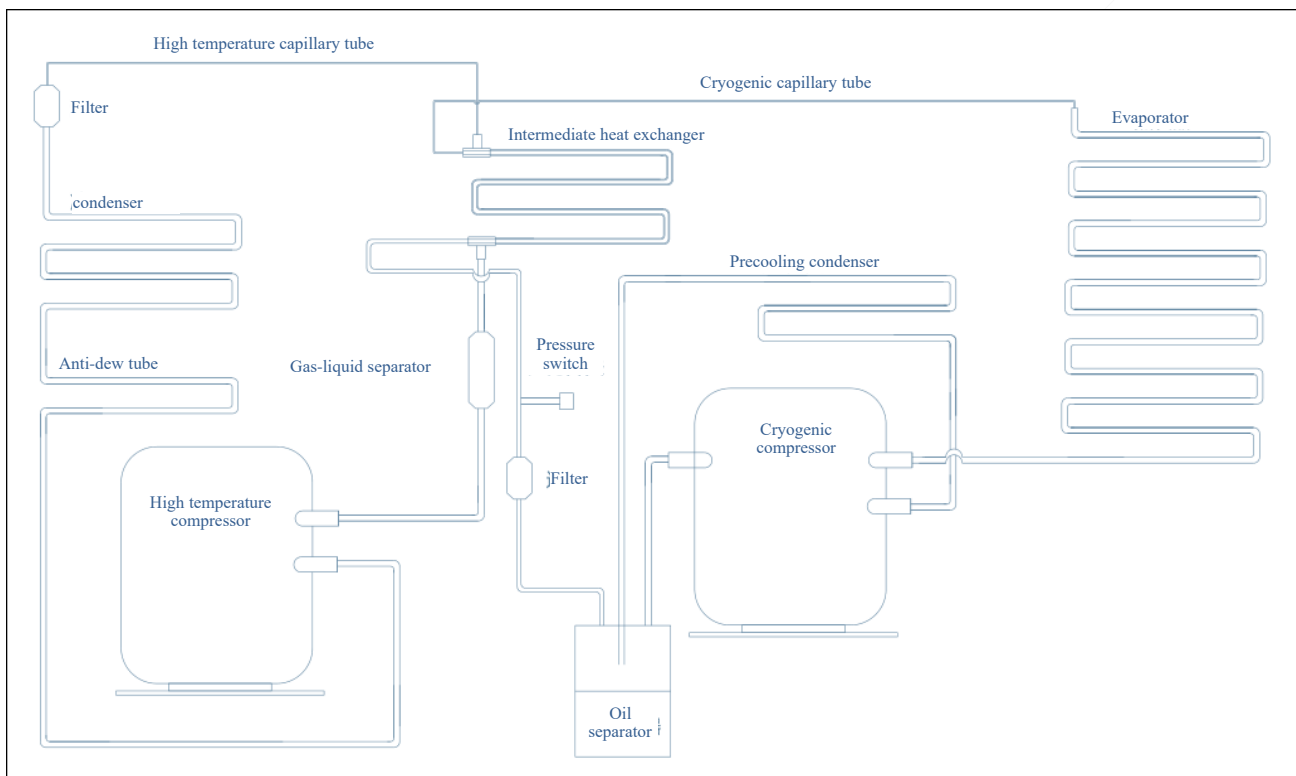
Refrigerant filling capacity of products

Model	Refrigerant (type/capacity) 1	Refrigerant (type/capacity) 2	
	High temperature stage (g)	Low temperature stage (g)	
	R290	R290	R170
DW-86L338J	150	5	65
DW-86L388J	150	5	65
DW-86L490J	150	5	90
DW-86L578J	150	5	90
DW-86L626	150	0	100
DW-86L728J	150	5	90

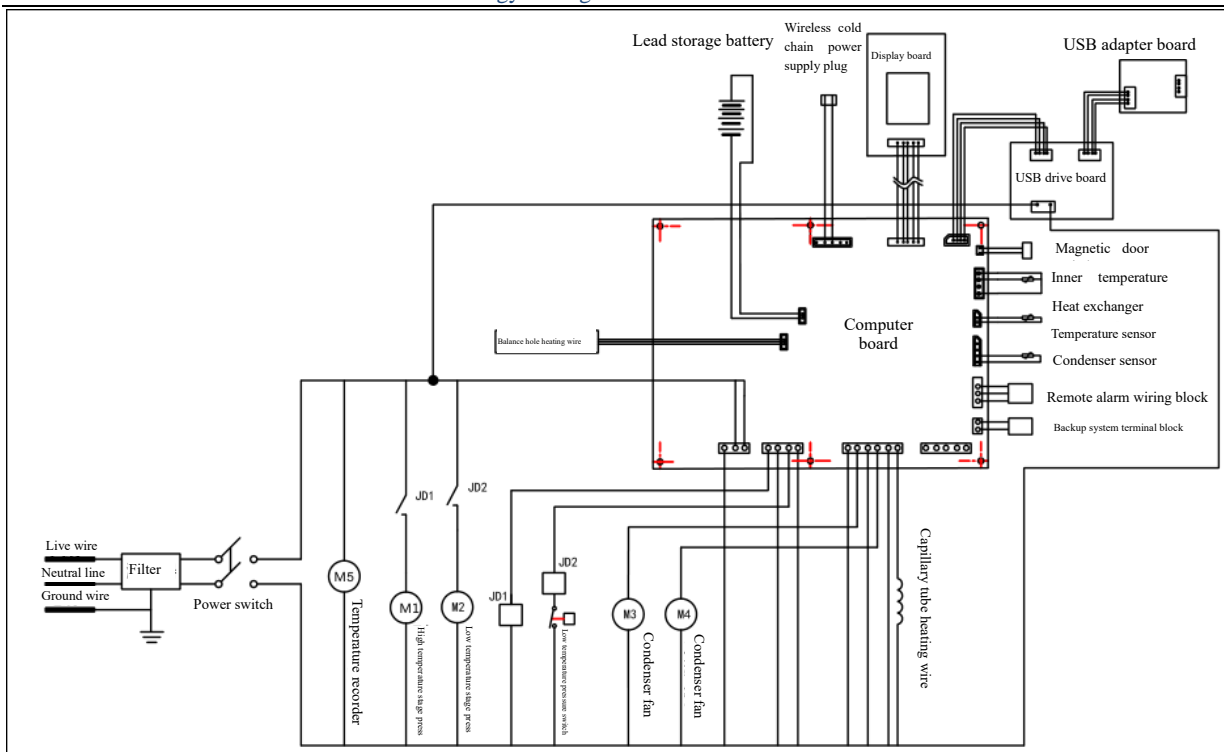
DW-86L828J	150	5	100
DW-86W100J	135	5	35
DW-86W420J	150	/	60
DW-86L100J	R600A of 75 g, R1150 of 15 g, and R50 of 5 g		

VIII. System schematic diagram and wiring diagram

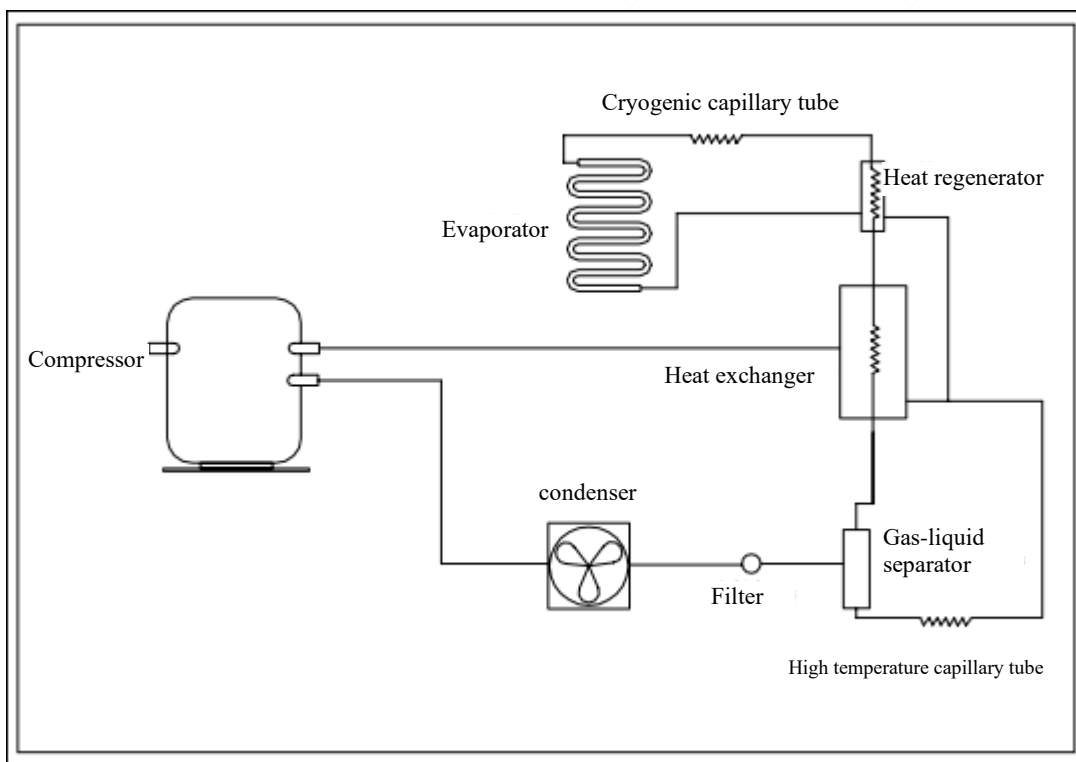
Schematic diagram:

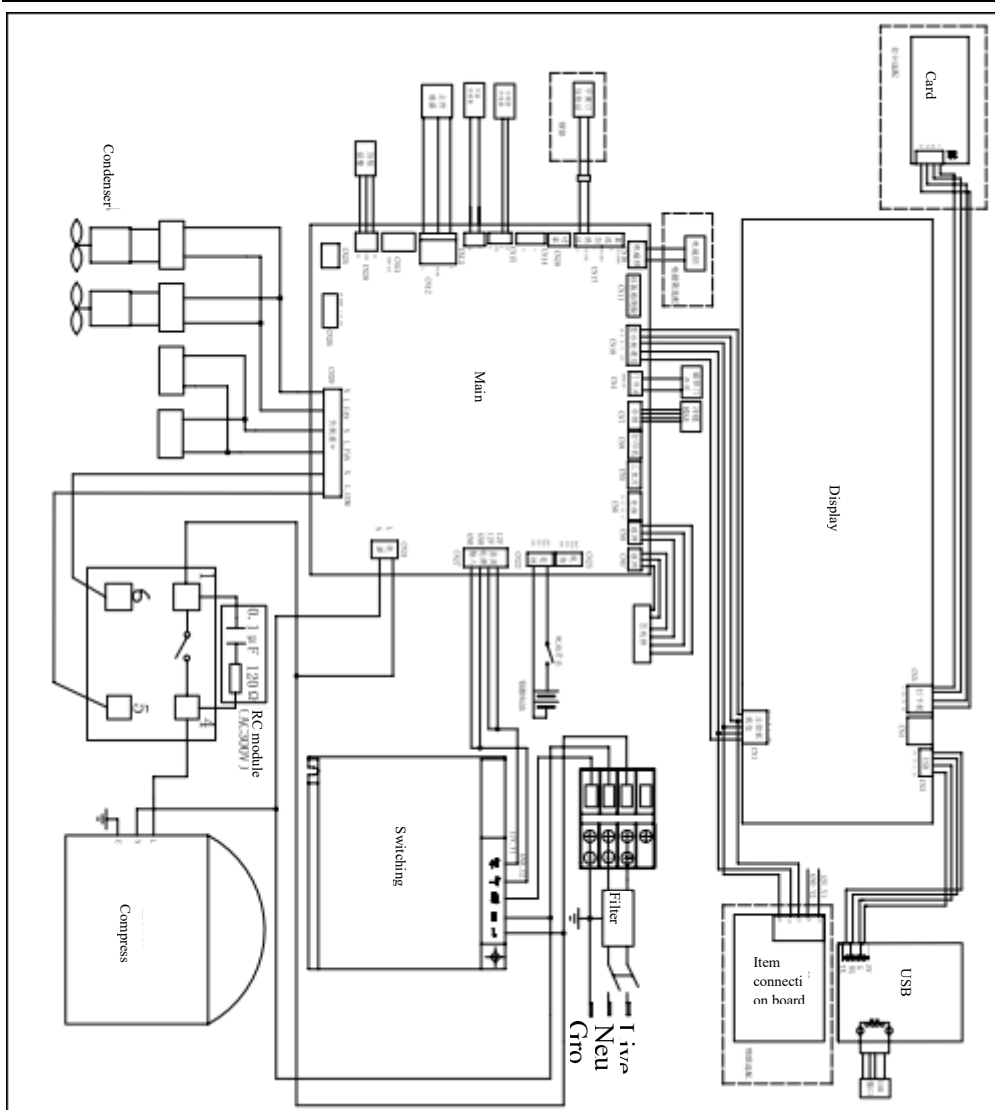


Wiring diagram:



Schematic diagram and wiring diagram of DW-86L100J





IX. Specific control, working principle and parameters

Take the display panel of DW-86L338J as an example, which is LED display.



9.1 The temperature control system controlled by computer board controls the start and stop of the compressor

1) To adjust the setting value, unlocking must be carried out first. First press "△" or "▽", the temperature setting value flashes, press "△" or "▽", input the number "06", and then press the "Function Selection" button for 5

seconds, the "Lock" light is off, enter the unlocking state, and the following settings can be carried out. Press the "Function Selection" button to circularly select the temperature setting, high temperature alarm setting and low temperature alarm setting in the freezer, and the corresponding indicator lights are on.

2) When press the "Temperature Setting" button, the setting temperature display area flashing displays the temperature setting value. At this time, press the "△" and "▽" buttons may change the temperature setting value. In case of no operation within 10s after setting, it will automatically enter the locked state and the temperature display will stop flashing, indicating that the value has been entered into the computer, otherwise the setting will be invalid. Temperature setting range is

3) During "High Temperature Alarm" setting, the setting temperature display area flashing displays the temperature setting value. At this time, press the shift and adjustment buttons can adjust the alarm setting value. In case of no operation within 10s after setting, it will automatically enter the locked state and the temperature display will stop flashing, indicating that the value has been entered into the computer, otherwise the setting will be invalid. When setting high temperature alarm, the setting temperature shall not be higher than the maximum limit, and shall not be lower than the setting temperature + 5°C.

4) During "Low Temperature Alarm" setting, the setting temperature display area flashing displays the temperature setting value. At this time, press the "△" and "▽" buttons can adjust the alarm setting value. In case of no operation within 10s after setting, it will automatically enter the locked state and the temperature display will stop flashing, indicating that the value has been entered into the computer, otherwise the setting will be invalid. When setting low temperature alarm, the setting temperature shall not be lower than the minimum limit, and shall not be higher than the setting temperature - 5°C. Otherwise, it cannot be set.

9.2 Display and alarm

After the freezer is connected to the power supply, it will enter the start-up state. All parameters displayed on the display screen are kept as the data before the last power-off. The display shows the actual temperature, setting temperature and current voltage.

Working status prompt of the display panel:

When the "Lock" indicator light is on, all settings are locked to prevent misoperation.

When the "Network" light is on, the network system is in functional mode.

When the "Operation" light is on, the cryogenic compressor is working

When the "Voltage Regulation" light is on, the voltage booster is in the process of increasing and reducing voltage.

When the "back-up System" light is on, the back-up refrigeration system is in working state;

Alarm status indications:

A. "High Temperature" indicator light: when the indicator light is on, it indicates the alarm display when the temperature in the freezer is higher than the setting value of high temperature.

B. "Low Temperature" indicator light: when the indicator light is on, it indicates the alarm display when the temperature in the freezer is lower than the setting value of low temperature.

C. **"Door Opening" indicator light: the indicator light flashes to indicate the alarm display when the door opening time exceeds the set time.**

D. "Excessive Ambient Temperature" indicator light: when the indicator light is on, it indicates that the ambient temperature is higher than 32°C.

E. "Sensor Fault" indicator light: when the indicator light is on, it indicates sensor fault.

f. "Power Failure" indicator light: when the indicator light is on, it indicates that the power line is cut off.

G. "Dirty Condenser" indicator light: when the indicator light is on, it indicates that the condenser is blocked by dirt and needs to be cleaned.

H. "Low Battery" indicator light: when the indicator light is on, it indicates that the battery power is low and needs to be charged; when the AC power is connected, the ULT Freezer will automatically charge the battery.

In case of all the alarms, the light alarm signal will flash for alarm immediately. For the high temperature and low temperature alarm messages, the buzzer alarm will start after the light flashes for 15 minutes; for the power off alarm message and excessive voltage alarm message, the buzzer alarm will start after the light flashes for 1 minute; for the dirty condenser alarm message and low battery alarm message, the buzzer alarm while the lights are flashing; for the excessive ambient temperature alarm message, when the ambient temperature exceeds 32°C (excluding 32°C), the "Excessive Ambient Temperature" indicator light will be on to alarm in the alarm display area without buzzer alarm; and when the ambient temperature exceeds 38°C (excluding 38°C), the "Excessive Ambient Temperature" indicator light will be on to alarm in the alarm display area accompanied by buzzer alarm.

The light flashing alarm cannot be canceled until the fault is eliminated; while the buzzer sound alarm can be muted for 30 minutes by pressing "Buzzer Cancel", and the buzzer sound alarm will start again after 30 minutes.

9.3 Special function setting:

Setting of password:

When the ULT Freezer is used for the first time, the unlocking password is "06". After unlocking, press the "Function Selection" and "Buzzer Cancel" buttons for 5 seconds, and the display screen displays 06. Then, press the "▲" and "▼" buttons to adjust the password. The password can be selected from 05, 06, 07...29, 30. In case of no operation within 5 seconds after password setting, the set password will come into force. When decrypting, **the display screen can display number from 01, 02, 03...98, 99.**

Startup delay time setting:

In the unlocking state, long press the "Function Selection" button and "▽" button for 5 seconds simultaneously, the screen displays the startup delay time 01 (1 minute) of the high temperature compressor when the equipment is just powered on, set the delay time 01, 02, 03 ----- 09, 10 (1 to 10 minutes are available) by pressing the "△" or "▽" button. The delay time is 1 minute by default.

Trick lock function:

The trick lock is an optional part. If the product is equipped with a trick lock, the user can log in the trick lock, become a user, and enter the password. The password can be used to directly unlock the lock. Trick lock also can help to realize management by multi-users.

(4) When the ambient temperature is higher than 35°C, if the setting temperature is lower than -82°C, it will be adjusted back to -82°C. If the ambient temperature is lower than 30°C (including 30°C), it will get back to the original setting value. (The sett values include the temperature in the freezer, high and low temperature alarm values)

(5) The setting methods of high temperature alarm and low temperature alarm are the same as that of temperature in the freezer.

9.4 Battery control requirements:

There is a battery power switch on the equipment, which should be turned on before normal startup. As long as the AC power supply meeting the requirements of the equipment is connected, the equipment will enter into normal working state. When the AC power supply is normal, the equipment can charge the battery according to the requirements. The specific requirements are as follows:

1. If the battery voltage $U = 0$ (it indicates that the battery switch is not turned on) is detected when the strong current is applied, the battery will not be charged at this time, and the low battery alarm will be given directly: the low battery indicator light will be on, the alarm indicator light will flash, and the buzzer will not sound. Purpose: Remind the user to turn on the battery switch in time;

2. Detect the voltage of the battery for 5 min when the strong current is applied, if it meets the requirements of $0 < U \leq 10.5$ V, it indicates that the battery switch is turned on. At this time, charge the battery according to the following methods: after 24 hours of continuous charging, the battery voltage is detected again for 5 min, if $0 < U \leq 10.5$ V, it indicates that the battery may have been damaged, and start the low battery alarm but continue charging. Purpose: Remind the user that the battery may be damaged and replace the battery if necessary (the alarm method is the same as above). If it is detected that the battery voltage meets the requirements of $10.5 \text{ V} < U \leq 11.5 \text{ V}$ after 24 hours of power on, the low battery alarm will not be given at this time, continue the procedure of charging for 24 hours and detecting of 5 minutes until the battery voltage reaches 12.5 V, after that, charging is not needed;

3. When the strong current is applied, detect the battery voltage for 5 min. If it meets the requirements of $10.5 \text{ V} < U < 11.5 \text{ V}$, carry out the procedure of charging for 24 hours and detecting for 5 min, there is no low battery alarm.

4. After the accidental failure of strong current, the battery shall supply power to the display screen, etc. When the battery discharge reaches $U \leq 10.5\text{V}$, the battery shall stop supplying power and the display screen shall no longer display.

In case that the battery can supply power normally, if you want to cut off the power completely, just unplug the AC power cord, and then turn off the battery switch on the freezer, and the display screen will not display. After the freezer is completely powered off, the parameters set before the power off must be able to be saved. The original setting parameters shall not be changed or lost when the freezer is turned on next time.

9.5 Adjustment method of temperature drift

In the case of unlocking, press the "Function Selection" button, and the display board will display a value, which can be adjusted between $+5^{\circ}\text{C}$ ~ -5°C , and the computer board will automatically save it after adjustment.

Example 1. The display temperature of a user's freezer is -80°C , but the temperature in the freezer measured by the user is -70°C , and the difference between them is 10°C . In order to reduce the temperature difference between them, the temperature drift can be adjusted by adding 5°C , at this time, the displayed temperature is -75°C , and the temperature inside the freezer is still -70°C . As the freezer is turned on for refrigeration, the displayed temperature and the measured temperature decrease at the same time;

Example 2. The display temperature of a user's freezer is -80°C , and the temperature of the freezer cannot reach a lower temperature because the user's ambient temperature is too high, but the user requires that the display temperature must be -82°C , at this time, the temperature drift can be adjusted by deducting 2°C . Display

temperature, and the display temperature is

(For DW-86L100J: After unlocking the display board, long press the combination button of "Up" + "Down" for 5s, enter the unlocking password (which is 16 by default and is adjustable within 00~99) of after-sales/factory parameter level, press the "Setting" button to confirm the unlocking, and set the parameters of after-sales and factory after unlocking. After entering the after-sales/factory parameter level, press the "Up" or "Down" button to select the Ct parameter, and then press the "Set" button to modify the parameter value;

Ct: For pt100 main sensor temperature calibration, the default value is 0, the calibration range is $\pm 10^{\circ}\text{C}$, and the adjustment step is 1; press the "Up" or "Down" button to modify the setting value of pt100 temperature calibration;)

9.6 Control of condenser fan:

When the compressor is turned on, the two fans are turned on; when the two compressors are turned on, the two fans shall be turned on or off according to the following conditions: when the ambient temperature is higher than 20°C , the two fans are turned on; when the ambient temperature is lower than 20°C (excluding 20°C), one fan is turned on, the other is turned off; when the ambient temperature is lower than 12°C (excluding 12°C), both the fans are turned off.

9.7 Remote alarm function

Remote alarm function is required to have normally open alarm and normally closed alarm function, which can be selected according to the needs. **In case of high temperature, low temperature and external power failure (no matter whether the back-up battery switch is on or not), the remote alarm function is started.**

9.8 Control of compressor

When it is just powered on, delay the delay time set by the user (the default time is 1 minute). If the start-up conditions are met, start the high temperature compressor and delay for 10 minutes from the start-up of the high temperature compressor; if the temperature of the heat exchanger sensor is lower than -20°C (including -20°C), the low temperature compressor will be turned on.

When the compressor starts and stops normally, if the start-up conditions are met, start the high temperature compressor, if the temperature of the heat exchanger sensor is lower than -20°C (including -20°C) after 1 min, the low temperature compressor will be turned on.

When the compressor is in normal operation (start and stop), the start-up time of the compressor is not less than 10 min and the shutdown time is not less than 5 min. ◦

If the shutdown conditions are met, the output terminals of low temperature compressor and high temperature compressor have no output.

In the operation of 3.2.1, when -40°C is selected: except that the judgment condition for starting the low temperature compressor is changed to 5°C (30°C for shutdown), the others are the same as those at -86°C .

When the strong current is firstly applied, if the low temperature compressor (continuously) works for 16 hours, the compressor is forced to shut down for 10 minutes, and then automatically resumes operation. In other times, execute as below: the low temperature compressor is forced to shut down for 10 minutes after 5 hours' continuous operation, and then automatically resumes operation.

9.9 Voltage calibration

Operation function on the display board is added for voltage calibration. The specific operation procedures are

as follows: press the "Alarm Cancel" button and "▽" button for 5 seconds when the display board is unlocked, at this time, the display board displays the current voltage deviation, and then uses the "△" and "▽" buttons to calibrate the voltage increase and decrease. Voltage adjustment each time is conducted by 1 V, and the voltage adjustment range is -9 V~9 V. The initial voltage deviation is 0.

(For DW-86L100J: After unlocking the display board, long press the combination button of "Up" + "Down" for 5s, enter the unlocking password (which is 16 by default and is adjustable within 00~99) of after-sales/factory parameter level, press the "Setting" button to confirm the unlocking, and set the parameters of after-sales and factory after unlocking. After entering the after-sales/factory parameter level, press the "Up" or "Down" button to select the CU parameter, and then press the "Set" button to modify the parameter value;

CU: For voltage calibration, the default value is 0, the voltage calibration range is ± 9 V, and the adjustment step is 1;

Press "Up" or "Down" button to modify the set value of voltage calibration)

9.10 Adjustment of setting value

In the initial state of power on, after unlocking, press the "Function Selection" and "▲" buttons for 5 seconds simultaneously, and the display screen displays -86°C. By pressing the "▲" and "▼" buttons, it can circularly display -86°C, -150°C, -50°C, -40°C, 380°C, 88°C. In case of no operation within 5 seconds after selection of setting value, it will automatically enter the lock state, and the selected value will come into force. Exit the selected value, it continues to display the actual temperature. When the setting value is not selected, the default setting value is -86°C. Execute the corresponding function of the displayed value, which is selected to be effective. And it has memory function. 88°C applies to the independent back-up system.

9.11 USB data download and time setting

The USB output function is added on the computer board, which can export the setting temperature in the freezer, actual temperature in the freezer, ambient temperature, voltage, setting temperature of high temperature alarm, setting temperature of low temperature alarm, and temperature test data by U flash disk. The computer board can automatically collect and store test data of more than 10 years. The data is collected every 6 minutes, and is automatically saved after collection. When the data storage is full, insert the U flash disk, it will automatically recognize and import data to the U flash disk. In the process of data export, after the display board is unlocked, if the freezer temperature display area flashing displays "USB", it indicates that data export is in progress and has not been completed. If "ALL" is stably displayed in the freezer temperature display area, it indicates that data export is completed, and the U flash disk can be removed from the USB interface. The format of export data is .CSV.

Time setting of recording data for U flash disk interface (current system time setting):

After unlocking, long press "▽" for 3 seconds, then "1P" is stably displayed in the freezer temperature display area, press the "Function Selection" button, the freezer temperature display area flashing displays the year (factory value of 10), press the "△" button or "▽" button to select the year, which circularly displays from 10 to 99. For example, if the year as 2013, select 13 and press the "Function Selection" button to save and confirm. After that, the freezer temperature display area displays "2P" stably, press the "Function Selection" button and the freezer temperature display area flashing displays the month (factory default of 01), press the "△" button or the "▽" button, it circularly displays from 01 to 12, and press the "Function Selection" button to save and confirm after selecting the current month. After that, the freezer temperature display area displays "3P" stably, press the "Function Selection" button and the freezer temperature display area flashing displays the date (factory default of 01), press the "△" button or the "▽" button, it circularly displays from 01 to 31, and press the "Function Selection" button to save and confirm

after selecting the current date. After that, the freezer temperature display area displays “4P” stably, press the “Function Selection” button and the freezer temperature display area flashing displays the hour (factory default of 01), press the “△” button or the “▽” button, it circularly displays from 00 to 23, and press the “Function Selection” button to save and confirm after selecting the current hour time. After that, the freezer temperature display area displays “5P” stably, press the “Function Selection” button and the freezer temperature display area flashing displays the minute (factory default of 01), press the “△” button or the “▽” button, it circularly displays from 00 to 59, and press the “Function Selection” button to save and confirm after selecting the local current minute time, afterwards, "1P" is displayed again in the freezer temperature display area, and 1P-5P can be reset. After setting, long press the "Function Selection" button for 5 seconds, then it saves and exits automatically. After that, the freezer temperature display area displays the freezer temperature normally.

Note: In the above setting process of P1-P5, you may pointedly select and adjust the parameters through the “△” button or the “▽” button. For example, if the freezer temperature display area displays 1P (year), and there is no need to adjust the year (1P) and month (2P), you may directly reset the date (3P). Press the “△” button to select the date (3P) and then press the “Function Selection” button, and the freezer temperature display area flashing displays the date, press the “△” button or the “▽” button to adjust the current date, and press the “Function Selection” button to save and confirm. After that, the hour time (4P) will be displayed in the freezer temperature display area. If it is necessary to adjust, press the "Function Selection" button to enter the setting; if it is not necessary to adjust, press the "△" button to enter the minute time (5P) to set. After the setting of minute time (5P), long press the "Function Selection" button for 5 seconds to save and exit. After that, the temperature display area displays the freezer temperature normally. In the above setting process of P1-P5, after setting any parameter, if other parameters do not need to be adjusted, you can directly press the "Function Selection" button for 5 seconds to save and exit.

The exported data package is in the form of folder, named "USBxxxxx", of which the "XXXXXX" is the number of USB drive computer board chip. The USB drive computer board number of each freezer is different, and using the same memory to import data from different freezers will store different file packages for easy identification. The specific files in the USB data package are in the format of ". CSV", which is editable. The data downloaded from the same freezer at different times will cover the previous data with the latest downloaded data. Meanwhile, the download time can be queried through the data attribute.

	USB70484	文件夹	2016/3/5 11:02
	USB70499	文件夹	2016/3/5 11:00

9.12 Door opening management

When the door is opened for a long time, it needs to generate an alarm. Specific requirements: when the door opening time exceeds X minutes, sound and light alarm will be given. The value of X is adjustable from 0 to 20 min, and the default value is 5 min. Adjustment method: after unlocking, press "Buzzer Cancel + Function Selection + △", it displays 05, which means that the default delay is 5 min. Press the "△" or "▽" button to adjust the parameter value, and it will automatically save and exit after the setting is completed.

(DW-86L100J: The display board is unlocked and the locking indicator light is off. Then, long press the "Up" button for 5s to enter the user parameter level; after entering the user parameter level, press the "Up" button or "Down" button to select the seven parameters: dA, T1, T2, P6, IC, PS1 and CL1, and after selecting one of the parameters, press the "Setting" button to modify the parameter value selected;

dA: The door opening alarm delay, which is 5 min by default and adjustable between 1~30 min;

Press "Up" or "Down" button to modify the setting value of door opening alarm delay;)

9.13 Control of balance hole heating wire

When the temperature in the freezer is higher than -35°C , the heating wire at the balance hole dose not heat; when the temperature in the freezer is lower than -35°C (including -35°C), the heating wire at the balance hole is connected for heating. The heating wire of the balance hole is powered by DC 12 V output from the computer board.

9.14 Control of capillary tube heating wire (Cancel capillary tube heating wire after November 2016)

Capillary tube heating includes automatic heating mode and manual heating mode. Manual forced heating is mainly used for maintenance and inspection, which is not allowed to be operated by users. Forced heating is mainly used for oil blockage fault during temperature rise of the system, and the specific operations are as follows: in unlocking state, press "Up + Down" buttons simultaneously for 5 seconds to enter the forced heating procedure of capillary tube, at this time, the compressor is forced to stop, and at the same time, "H" is long displayed on the rightmost digital tube of the original freezer temperature display area on the display board, after a delay of 3 min, the capillary tube heating wire is switched on to start heating, heating is completed after a forced heating time of 10 min, then the compressor starts up by normal procedure after a delay of 3 min, while the freezer temperature display restores the display of the freezer temperature. The forced heating procedure is completed.

9.15 Computer board power failure alarm

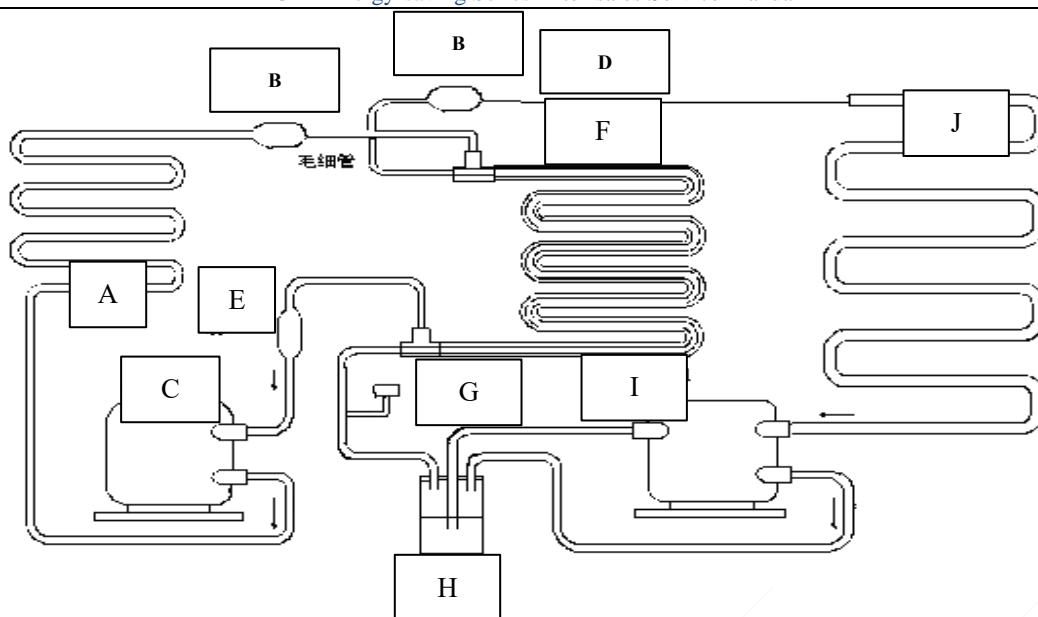
In case of switching power supply damage due to output short circuit of the isolation transformer winding of the switching power supply, and there is no +12 V output, the freezer temperature display area will immediately flashing display EEE, the alarm indicator light will flash synchronously, and the buzzer will give an alarm.

X. Perspective view and pan view of refrigeration cycle

10.1 Refrigeration principle

The ULT Freezer adopts cascade refrigeration system that is usually composed of two or more refrigeration systems, which are called high temperature stage system part and low temperature stage system part respectively. High temperature stage system uses medium temperature refrigerant, and low temperature stage system uses low temperature refrigerant. Each part is a complete refrigeration system. The two parts are connected by a condensing evaporator, which is both the evaporator of high temperature stage system and the condenser of low temperature stage system. The low temperature refrigerant absorbs the heat of the object to be cooled in the evaporator of the low temperature stage system, and transfers the heat to the refrigerant of the high temperature stage system through the condensing evaporator, and then the heat is transferred to the cooling medium in the condenser of the high temperature stage system by the refrigerant of the high temperature stage system.

10.2 Perspective view and pan view of refrigeration cycle



- | | |
|------------------------------|-----------------------|
| A -----Condenser | B -----Dry filter |
| C -----One stage compressor | D -----Capillary tube |
| E ----- Gas-liquid separator | F -----Heat exchanger |
| G ----- Pressure switch | H -----Oil separator |
| I ----- Two stage compressor | J----- Evaporator |

XI. Installation and disassembly process

11.1 Installation location:

- 11.1.1 Avoid exposure to direct sunlight
- 11.1.2 The surrounding air is well-ventilated
- 11.1.3 Avoid excessive dust
- 11.1.4 Avoid mechanical swing or vibration
- 11.1.5 The ambient temperature is between 10°C and 28°C; the maximum temperature is not more than 32°C. The optimal temperature is between 18°C and 25°C, and the air conditioning system shall be used if necessary.
- 11.1.6 Height of equipment working position: lower than 2000 m
- 11.1.7 Working humidity: lower than 80% RH If the maximum working temperature is 32°C, the humidity should be lower than 57% RH.
- 11.1.8 Input voltage: Within 220±10%.

*Note: Because the ULT Freezer is sensitive to the ambient temperature, if installed in an environment other than the above, it will not operate normally. Please use the freezer after improving the environment.

11.2 Product handling and package removal

11.2.1 Handling: The product is very heavy, so forklift or pallet jack shall be used to avoid damage to personnel and

product.

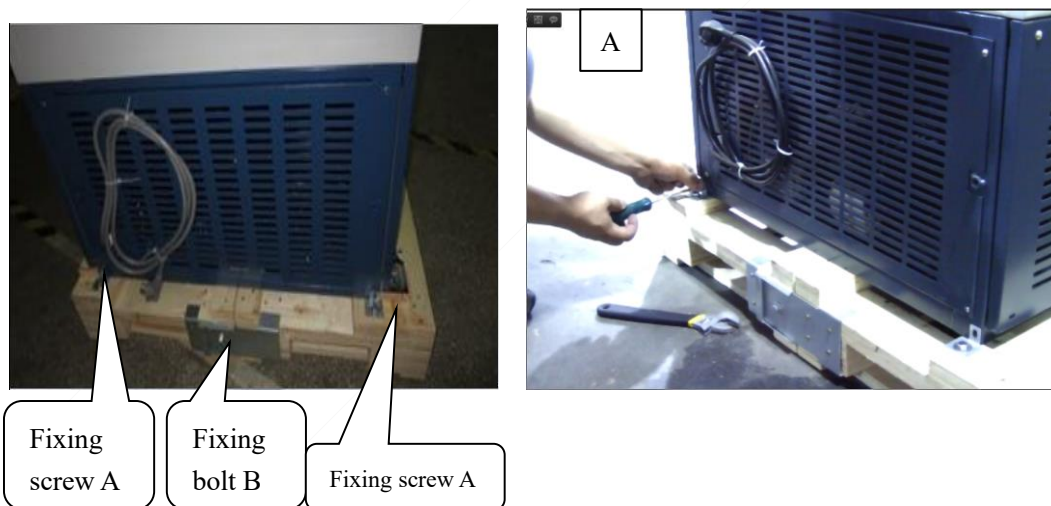
11.2.2 Package removal: The packaging of the product is made of wooden pallet, honeycomb corrugated film wrapping and carton box. During handling, the forklift or pallet jack shall be inserted into the bottom for handling.

The packaging scheme is shown below.

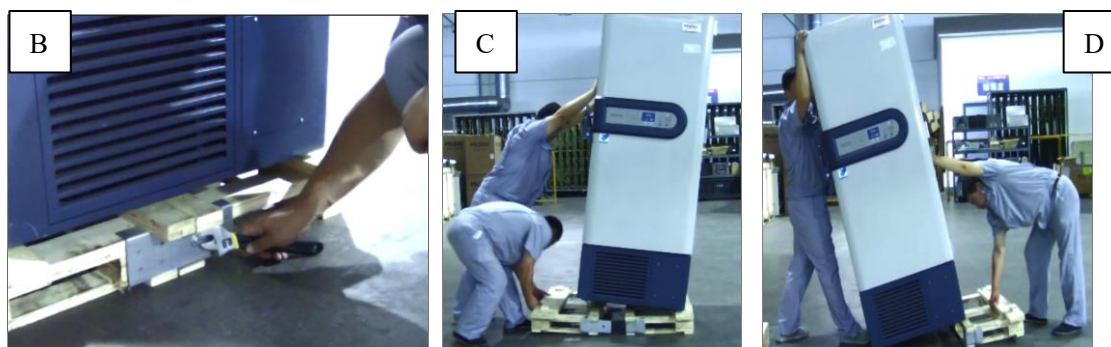


Removal of wooden pallet:

1. Firstly, remove the fixing connector A between the machine compartment back and the wooded pallet with a phillips screwdriver, as shown in Figure A;
2. Secondly, remove the fixing connector king bolt B between the two parts of the wooden pallet with adjustable wrenches, as shown in Figure B;
3. Finally, the maintenance personnel push the freezer and pull out the wooden pallet according to the methods in Figure C and Figure D.



Fixing screw A Fixing bolt B Fixing screw A



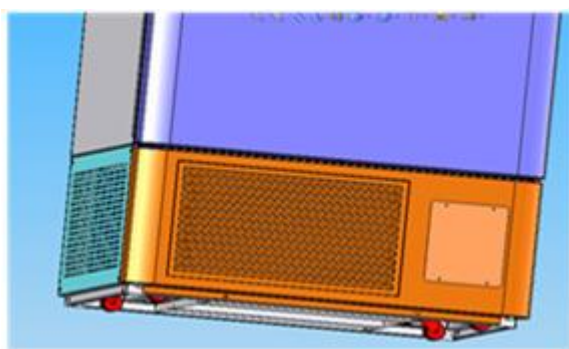
11.3 Put the product in storage room

11.3.1 Difficulty in entering: if the height of the door of the room, which is required by the customer for placing the freezer is lower than the freezer without pallet, and there is no other way, the method of removing the machine compartment front shield and opening the outer door by 180° can be considered. Removal of machine compartment and precautions are as follows.

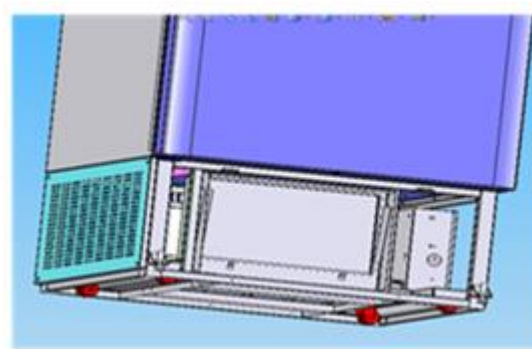
Note: Generally speaking, it is not recommended to removing the machine compartment front shield.

11.3.2 ① Remove the two screws under the machine compartment front shield.

② Remove the front shield.



Fixing screw for machine compartment front cover



Remove the machine compartment front cover

③ Open the outer door by 180°.

After the product enters the door, install the machine compartment front shield as it is.

Note: It must be installed in place, otherwise it will cause safety and performance problems!

Avoid bumping and scratching during handling. During handling, the maximum tilt angle should not exceed 45° (angle with horizontal direction) to avoid refrigeration system fault and affect normal use.

XII. Consultation on typical faults and solutions, and FAQ

12.1 Typical faults and solutions

A. Inconsistency between the display temperature and actually measured temperature of the freezer;

Because the display temperature is the temperature of a certain point in the freezer, the temperature measured by the user is the temperature of another point in the freezer, and there must be temperature difference between different positions, besides, there is also a certain error between the user's measuring tool and our temperature sensing probe;

B. Excessive temperature difference between upper and lower parts of the freezer:

Because the freezer starts cooling top down, the temperature on the top is lower than that at the bottom, besides, there is also a large temperature difference between the upper and lower parts. The temperature difference of similar products in the world is between 5~8°C, and that of our products is basically not higher than 6°C. In addition, frequent opening and closing of the door by users will cause large temperature difference between the upper and lower parts;

C. What is voltage increase start?

In order to ensure the normal operation, the freezer has the function of increasing or reducing the voltage. When the user's voltage is lower than 183 V, the freezer cannot be started, and at this time, the user needs to check whether the circuit is normal;

D. How the temperature rises to -82°C if the user set the temperature at -86°C?

In order to ensure the service life of the freezer, the products are designed as below: when the ambient temperature is higher than 35°C, if the setting temperature is lower than -82°C, it will be adjusted to -82°C. If the ambient temperature is lower than 30°C (including 30°C), it will get back to the original setting value.

E. Why does the temperature rise quickly when opening the door? Why are other brands slow in temperature rise?

(1) The temperature of the ULT Freezer is low, and there is a large temperature difference between the freezer temperature and the ambient temperature. Our freezer's temperature sensing probe is more sensitive, so the temperature rises quickly when opening the door;

(2) Other brands have added the function of slow temperature rise in the design of computer board and temperature sensing probe, so the temperature rises slowly when opening the door or the same temperature as that before opening the door for a long time (such as products of Meling).

F. What is the reason for displaying E0 and other symbols?

It displays E2 for main sensor fault, E1 for condenser sensor fault, and E0 for ambient temperature sensor fault. Check whether the circuits are normal, otherwise carry out maintenance or replacement by after-sales personnel.

G. How to deal with the movement of the freezer when opening the door?

Equipped with casters, the freezer is flexible, movable, lockable and supportable, and can realize micro adjustment according to requirements; After the freezer is installed at the user's designated position, the front two casters should be fixed to prevent the freezer from moving when opening the door.

H. Why does the door of the ULT Freezer cannot be opened?

There are two cases:

The first is that the temperature difference between inside and outside is large, which leads to the negative pressure of the door. The treatment method is as follows: insert a piece of thin iron sheet between the door seal strip and the door body to let the air enter;

The other case is that there is moisture when the user stores goods, which causes the water to freeze at the seal strip and the door cannot be opened. The treatment method is to open the door with a tool.

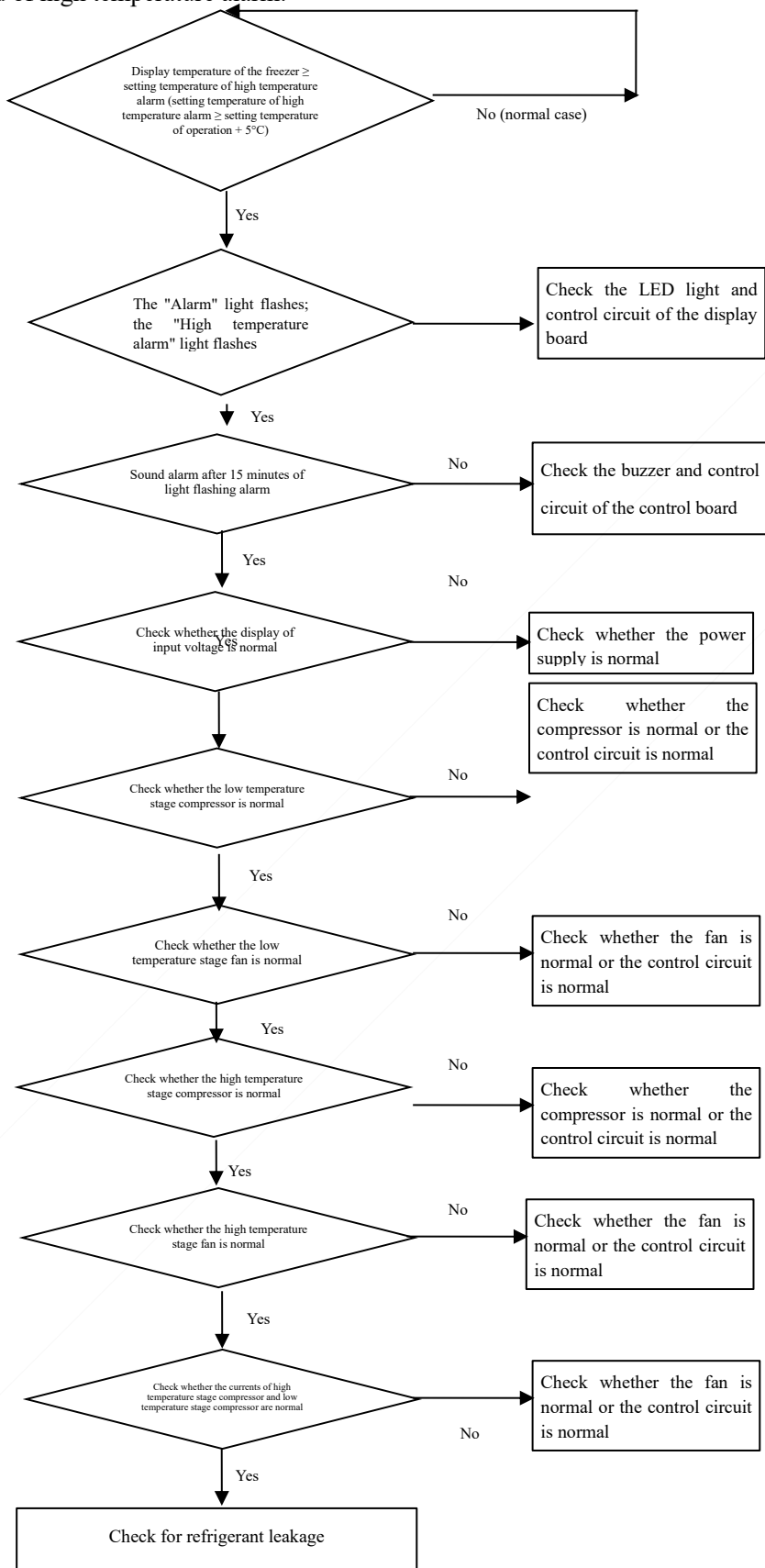
12.2 Troubleshooting of common problems

Problem	Cause analysis	Maintenance measures
1. High temperature stage compressor does not start	1. Power switch or fuse fault	Measure the resistance of the switch or fuse with a multimeter, if it is confirmed that the switch is broken, replace the fuse or power switch.
	2. The connector for machine compartment is damaged.	Check whether the socket of machine compartment connecting wire is damaged or the harness is dropped, and replace the corresponding patch cord.
	3. Poor wire contact	Check whether the patch cord is poorly connected or not connected, and repair it until the connection is normal.
	4. Wiring fault of display board and control board	Measure the resistance of the connecting wire with a multimeter to determine the harness short circuit or open circuit fault, and then replace the harness if it is unable to be repaired.
	5. Relay, starting capacitor or thermal protector is out of order	Check the relay, capacitor or thermal protector for signs of burned black or scorched of electrical parts, and replace the electrical parts if it is the case.
	6. Compressor fault	In other cases with normal power on, check whether the connection plug of the compressor is normal, and observe the surface temperature and the abnormal noise, etc. of the compressor at the same time. If the compressor is not hot or the noise is abnormal, the compressor is out of order, so replace the compressor; when replacing the compressor, the oil separator and dry filter should be replaced as well.
	7. Too low voltage of the user	Check whether the voltage on the display board of the product is within the rated range ($220\pm 10\%$). At the same time, use a multimeter to measure whether the voltage is overvoltage under the condition of power on. If the voltage is too low or too high, the customer is required to provide a voltage regulator.
2. Low temperature stage compressor does not start	1. Same as the causes of not starting of high temperature compressor	In other cases with normal power on, check whether the connection plug of the compressor is normal, and observe the surface temperature and the abnormal noise, etc. of the compressor at the same time. If the compressor is not hot or the noise is abnormal, the compressor is out of order, so replace the compressor; when replacing the compressor, the oil separator and dry filter should be replaced as well.
	2. Pressure switch is out of order	Measure the harness of pressure switch with a multimeter for short circuit and open circuit, and at the same time, check whether the copper pipe of pressure switch is damaged, and replace the pressure switch in case of fault.
	3. Poor refrigeration of high temperature stage system	If the low temperature compressor does not start after 10 min of the startup of high temperature stage system, it indicates poor refrigeration of high temperature stage system. Check whether the circuit and pipeline welding of high temperature stage system is good (if any blockage and leakage), and deal with the fault.
3. The fan does not work	1. The fan is dropped	Check whether the fan connector wire is dropped or not, and reprocess the wire head and butt installation
	2. Fan blade are blocked by foreign matters	Check whether there is wall collision noise or not in the rotation of fan blades, treat the blades and surrounding foreign matters, and keep the blades running normally.
	3. The fan is out of order	Measure the resistance at both ends of the fan wiring with a multimeter and check for short circuit or open circuit, and observe whether the rotation shaft rotates at the same time. If as the cases above, please replace the fan.
4. High	1. High setting temperature of	Check whether the setting temperature of the product is set

temperature in the freezer	shutdown point	according to the customer's requirements, if not, reset the temperature.
	2. Refrigerant leakage	Check all welding points of machine compartment, find out leakage points and repair welding. Refill refrigerant.
	3. Temperature sensing probe is out of order.	If the display board displays an abnormal code alarm, such as E0/E1/E2/E3, it indicates the fault of temperature sensing probe of the product. At the same time, check whether the patch cord is normal, if it is normal, it means that the temperature sensing wire is out of order, replace the corresponding temperature sensing wire.
	4. The capillary tube or system is blocked by dirt or oil	Open the system to clean the capillary tube or replace the filter.
	5. High ambient temperature	In case of high ambient temperature, please add air conditioning and reduce the room temperature.
	6. Blockage of condenser	In case of dirty condenser alarm, please clean the filter screen in time.
5. E0 alarm	When the input voltage of the ambient temperature sensor is ≥ 4.9 V, the sensor is open circuited; when the input voltage of the ambient temperature sensor is ≤ 0.1 V, the sensor is short circuited.	1. Check whether the terminal of the ambient temperature sensor is improperly connected or dropped, and whether the sensor is damaged.
		2. Check whether the sensor connector terminal on the display board is loosened or poor contacted, and whether the display board is damaged.
6. E1 alarm	When the input voltage of the condenser sensor is ≥ 4.9 V, the sensor is open circuited; when the input voltage of the condenser sensor is ≤ 0.1 V, the sensor is short circuited.	1. Check whether the terminal of the ambient temperature sensor is improperly connected or dropped, and whether the sensor is damaged.
		2. Check whether the sensor connector terminal on the display board is loosened or poor contacted, and whether the display board is damaged.
7. E2 alarm	When the input voltage of the main sensor is ≥ 4.9 V, the sensor is open circuited; when the input voltage of the main sensor is ≤ 0.1 V, the sensor is short circuited.	1. Check whether the terminal of the main sensor is improperly connected or dropped, and whether the sensor is damaged.
		2. Check whether the sensor connector terminal on the main control board is loosened or poor contacted, and whether the main control board is damaged.
8. E3 alarm	When the input voltage of the heat exchanger sensor is ≥ 4.9 V, the sensor is open circuited; when the input voltage of the heat exchanger sensor is ≤ 0.1 V, the sensor is short circuited.	1. Check whether the terminal of the heat exchanger sensor is improperly connected or dropped, and whether the sensor is damaged.
		2. Check whether the sensor connector terminal on the main control board is loosened or poor contacted, and whether the display board is damaged.
		3. Replace it with the spare sensor.
		4. In case of "E3" alarm, long press the "Buzzer Cancel" button for 5 seconds, "E3" alarm will disappear. One minute after the startup of the high temperature stage system, the low temperature stage system starts.
9. Dirty condenser alarm	When the difference between the condenser temperature detected by the condenser probe and the ambient temperature is larger than or equal to 17°C (lasting for five minutes), the alarm will occur.	1. Open the front grille and clean the filter screen
		2. Check whether the condenser probe is too close to the condenser outlet
		3. Wrap the condenser probe with tape
10. Low battery alarm	When the battery power is lower than or equal to 10.5 V, the low battery alarm will appear.	1. Check whether the battery is out of its service life.
		2. Check whether the terminal on the battery switch is well-connected or the switch is damaged.
		3. Check whether the charging circuit is normal: after 5 minutes of strong current on the refrigerator, test whether the battery terminal on the main control board has voltage output, and the output voltage should be ≤ 5 V.

<p>11. The temperature in the freezer is not uniform</p>	<p>Large temperature difference in the freezer</p>	<p>1. If the top temperature is too high, treat the door seal and replace the inner door to ensure good sealing performance; 2. If the bottom temperature is too high, restart the system and add refrigerant R508B for low temperature system (Or add refrigerant with a needle control valve).</p>
<p>12. The display board displays EEE</p>	<p>Power transformer fault of control board</p>	<p>In case of switching power supply damage due to output short circuit of the isolation transformer winding of the switching power supply, and there is no +12 V output, the freezer temperature display area will immediately flashing display EEE, the alarm indicator light will flash synchronously, and the buzzer will give an alarm.</p>

Treatment method of high temperature alarm:



Treatment method of low temperature alarm:

