

Haier

Haier Biomedical After-sales Service Manual

Product type: Ultra Low Temperature Freezer

Model: DW-86L100J/51J

Model code: BE0FT201T00/BE1202000

Product display:



DW-86L100J



DW-86L51J

Version: 03

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Approved by: Li Jiangtao
Date of issue: November 30, 2021

Revision History

Revision No.	Revision date	Revised by	Main revision content
01	March 13, 2018	Zheng Wendong	Model DW-86L626 was added. The original ordinary compressor of model DW-86L626 was changed to a hydrocarbon compressor which uses HC refrigerants. The model name remains unchanged.
02	March 26, 2020	Li Jiangtao	Model DW-86L100J was added
03	November 27, 2021	Sun Jian	Model DW-86L51J was added

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I. Product features and definition of model

1.1. Major functions and features

1.1.1. The inner temperature of the ULT freezer ranges between -40 and -86°C;

1.1.2. DW-86L100J/51J is provided with a small door body that's easy to open and no equalizing port;

1.1.3. The display board is divided into a working area and an alarm area to display whether the machine is started, whether the network is connected, whether the voltage is reduced or increased, and whether the machine is locked while setting the high and low temperature alarms and the inner temperature;

1.1.4. Digital display screen enables the display of inner temperature, ambient temperature, and input voltage simultaneously;

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

1.1.6. Two alarm modes (audible buzzer alarm and light flickering alarm), startup delay protection (the startup delay time is adjustable depending on the users' needs), and password protection.

1.1.7. The network function is available. Through the RS-232/485 data interface (optional), the freezer can connect to the computer to display the inner temperature and the alarm information, control the temperature, and monitor whether the equipment is normal; (Model DW-86L100J comes with a RS485 interface as standard)

1.1.8. **The 5V power supply output function makes it convenient for users to power the wireless network module directly;**

1.1.9. Remote alarm function is available: the alarm can be connected to other rooms to achieve the remote alarm function;

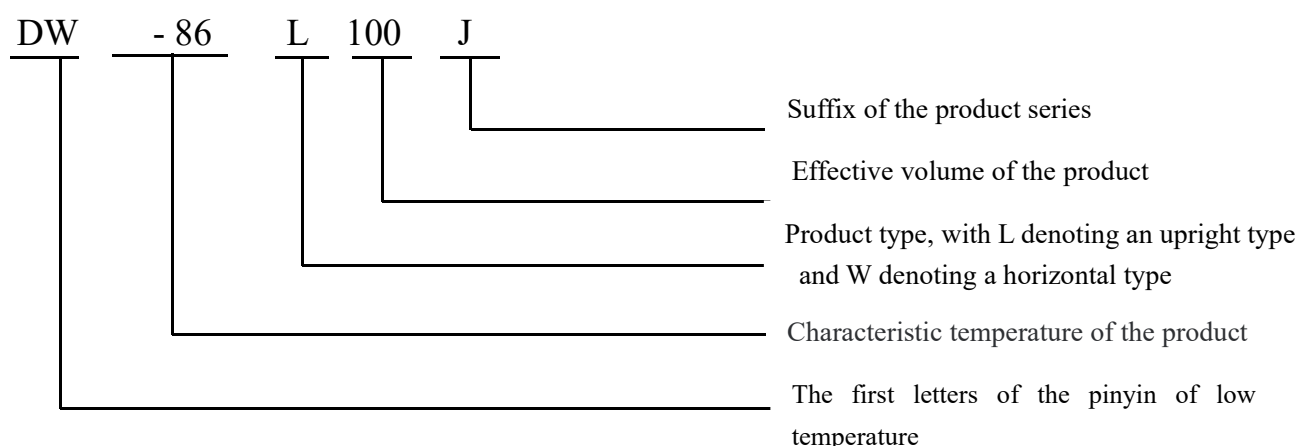
1.1.10. The product series with a suffix of "J" in the model description comes with a USB data storage module as a standard configuration. Such a USB data storage module can store data about the high and low temperature setting, the actual temperature, the ambient temperature, and the voltage inside the freezer for more than 10 years. (For DW-86L626, the USB module is optional).

1.1.11. DW-86L100J/51J comes with a 25.5mm test hole as standard configuration.

1.1.11. Casters, which are flexible, mobile, lockable, supporting, and adjustable depending on the requirements, are provided with the product.

1.1.12. Recorder, network monitoring system, SMS alert, and stainless steel shelves are optional.

1.2 Definition of model



II. Product highlights

2.1 Temperature control:

Microcomputer control and digital temperature display adjustable in units of 1 °C within the range of -40 --86°C;

2.2 Safety control:

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

2.2.2 Two alarm modes (audible buzzer alarm and light flickering alarm) and startup delay protection (the startup delay time is adjustable depending on the users' needs);

2.2.3 All independent parts are securely grounded;

2.3 Refrigeration system:

2.3.1 Optimized cascade hydrocarbon refrigeration technology; compressors of import brands; strong refrigeration capacity; CFC-free environment-friendly refrigerants emitting no pollutant;

2.3.2 A cabinet body made of high-density insulation and VIP special thermal insulation material provides superior thermal insulation effects;

2.3.3 Unique multi-layer sealing structure plus thermal insulation system design eliminate the frosting phenomenon effectively;

2.3.4 The specially designed cryogenic computer control can avoid the possible error control of low temperature compressors by a general cascade system.

2.4 User-friendly design:

2.4.1 The LCD screen can display the inner temperature, the set temperature, the ambient temperature and the input voltage, set the high and low temperature alarms and the inner temperature, and achieve fault early warning;

2.4.2 Adjustable shelf design allows easy access of items;

2.4.3 The double lock security design (one padlock and one hidden key lock) can prevent the unauthorized opening of the freezer;

2.4.4 The innovative design of one-piece handle combined with compact caters makes the product flexible and convenient;

2.4.5 Advanced and practical network and remote alarm functions are available;

2.4.6 The unique 5V power supply module can provide 5V power supply directly, liberating users from the trouble of providing a power supply separately;

2.5 VIP

The polyurethane foamed material +VIP vacuum thermal insulation material can minimize the space occupation of the equipment while providing superior thermal insulation effects at the same time.

2.6 Temperature monitoring function

2.6.1 Alarm information on the device can be sent to registered mobile phone users in the form of SMS;

2.6.2 Users can also send SMS to the device to query the real-time temperature and alarm status;

2.6.3 The USB data storage module allows users to download the actual operating temperature data of the freezer.

2.7 Noise

A world-leading low noise level, providing a comfortable working environment for the operators

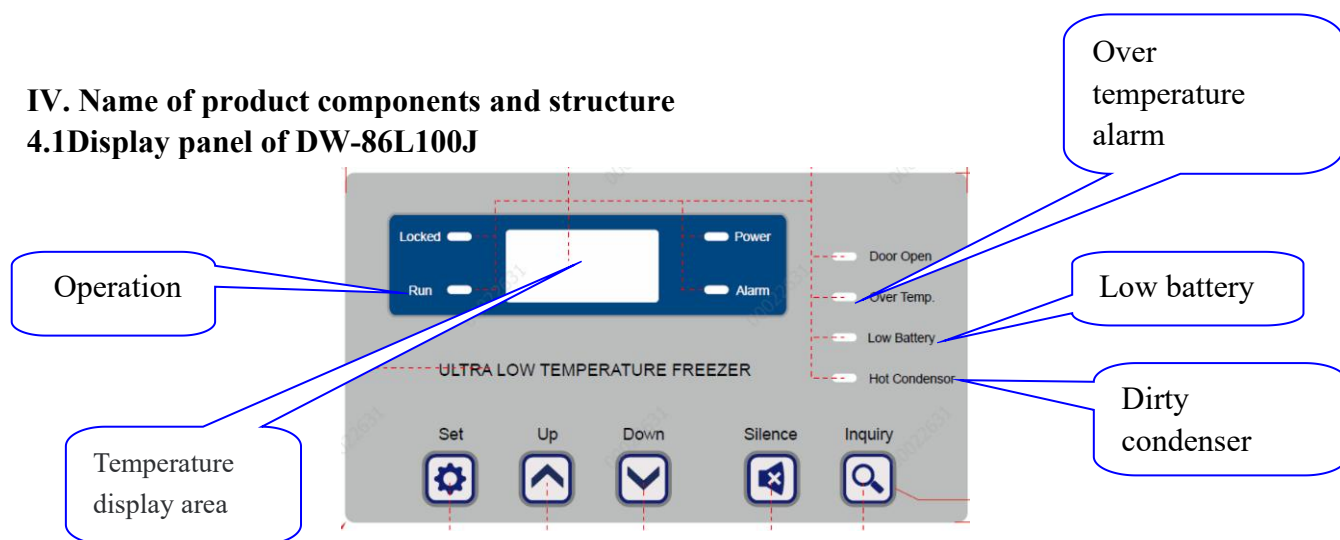
III. Appearance and structural features

Under counter series: DW-86L100J/5J



IV. Name of product components and structure

4.1 Display panel of DW-86L100J

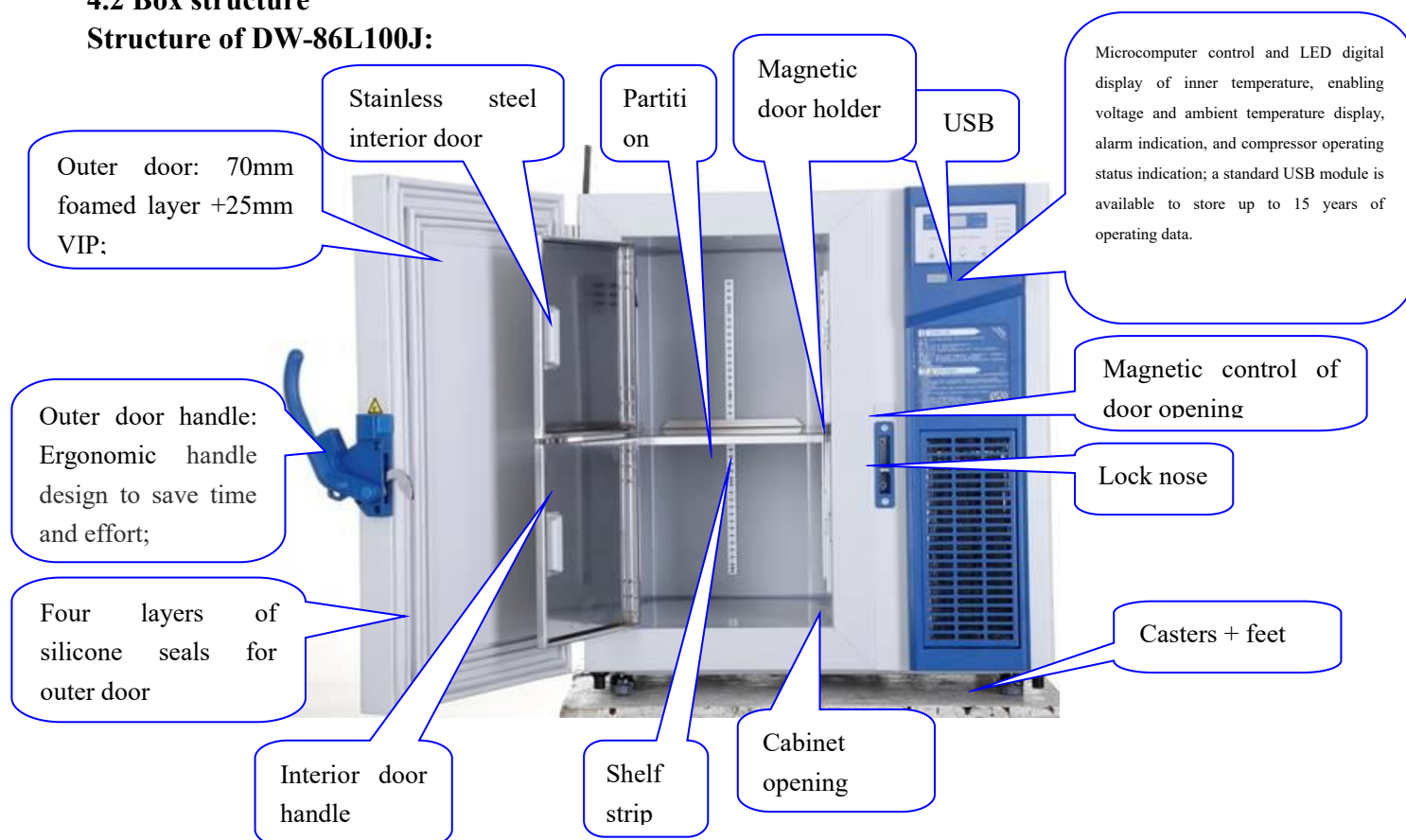


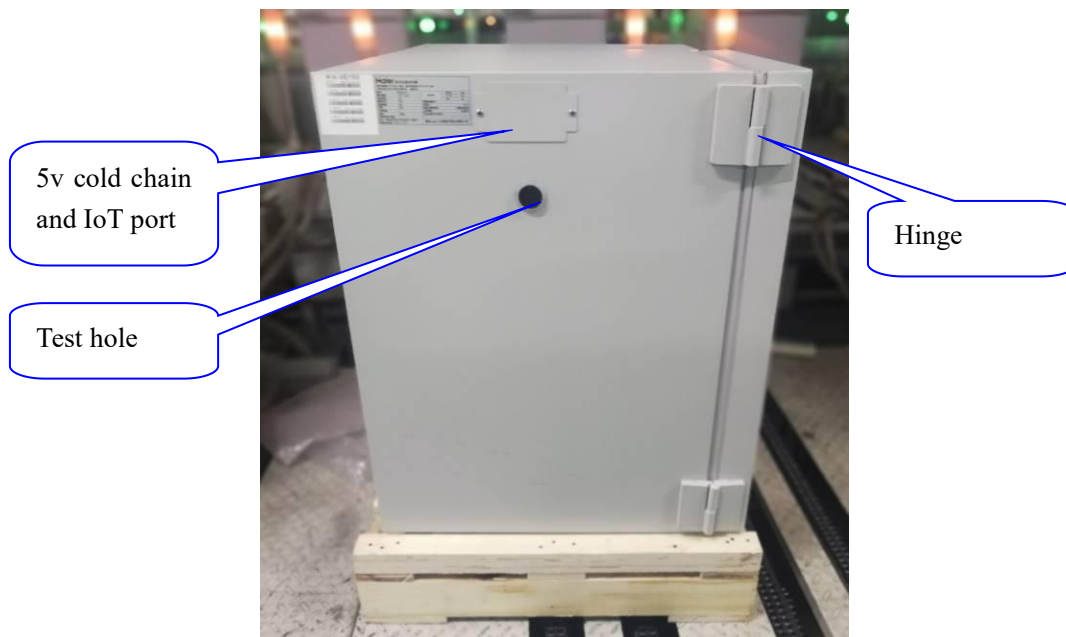
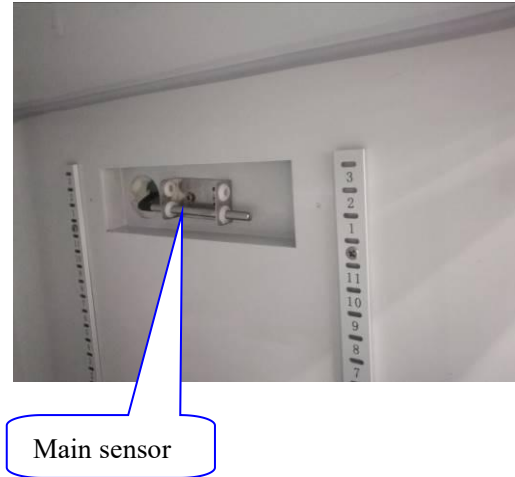
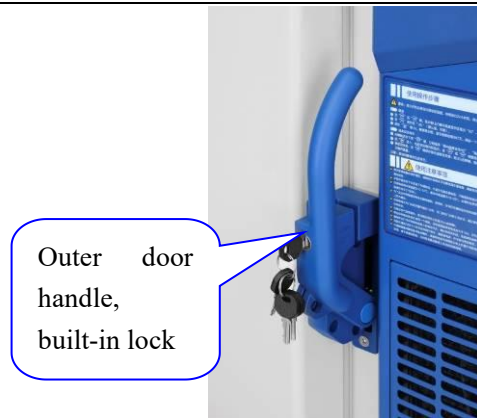
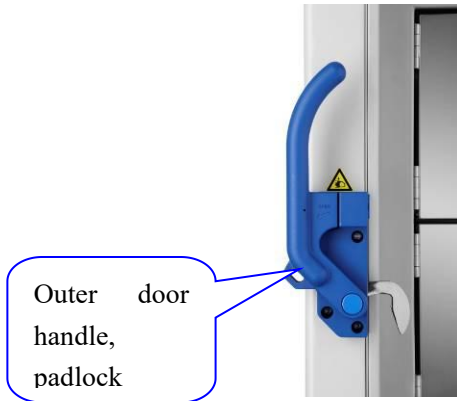
Display panel of DW-86L51J

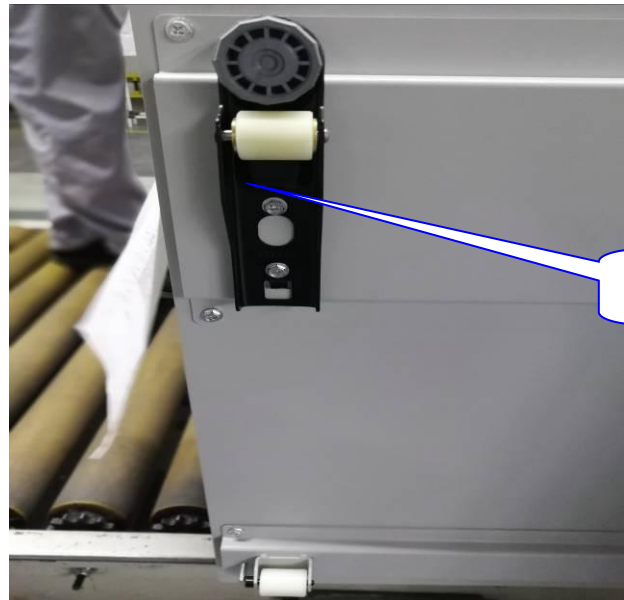


4.2 Box structure

Structure of DW-86L100J:

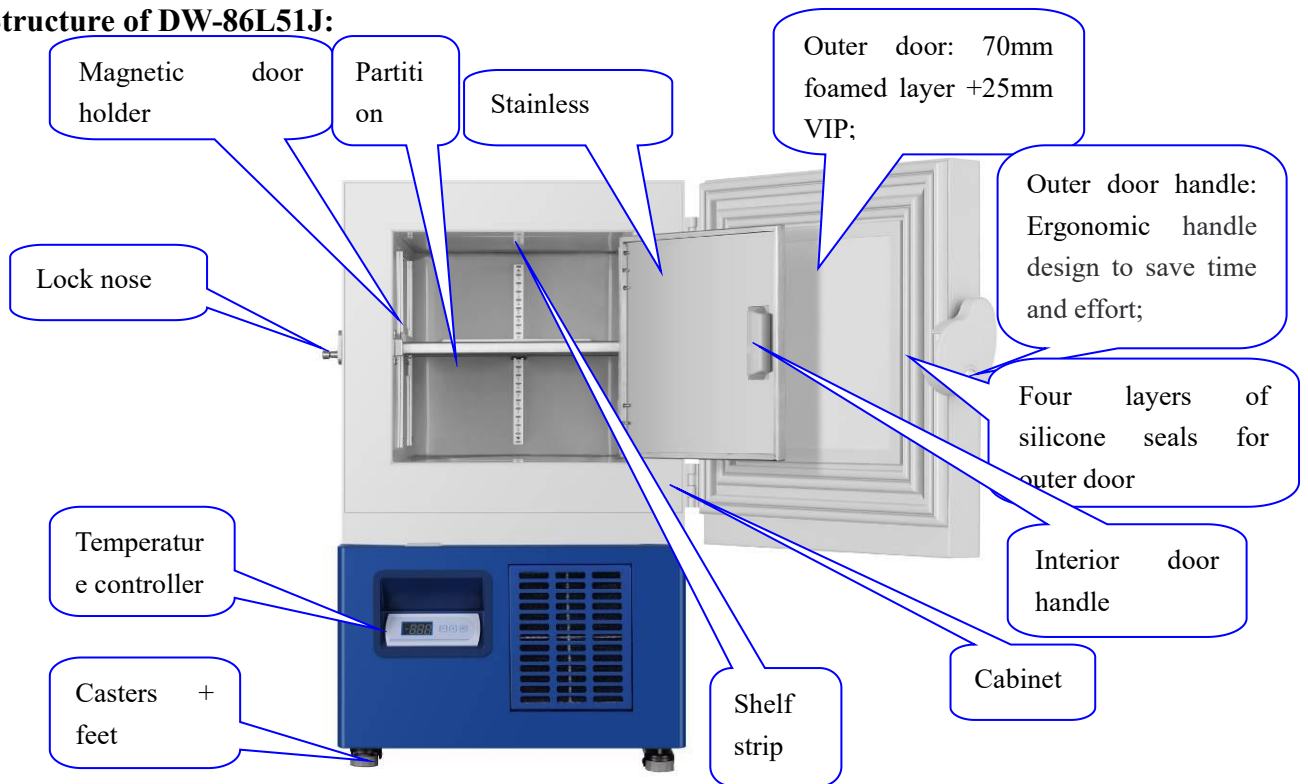






Caster and foot

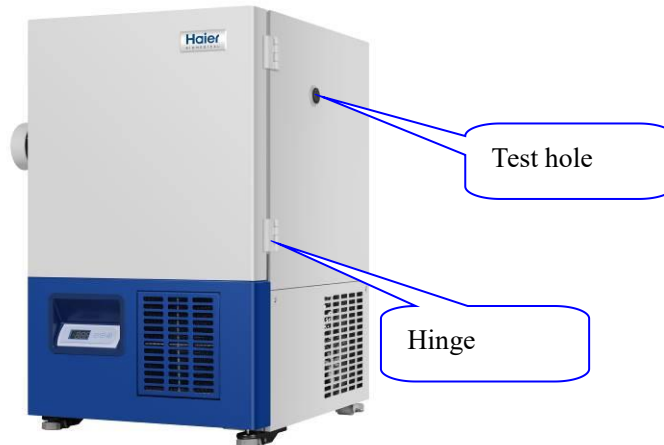
Structure of DW-86L51J:



Outer door handle, padlock

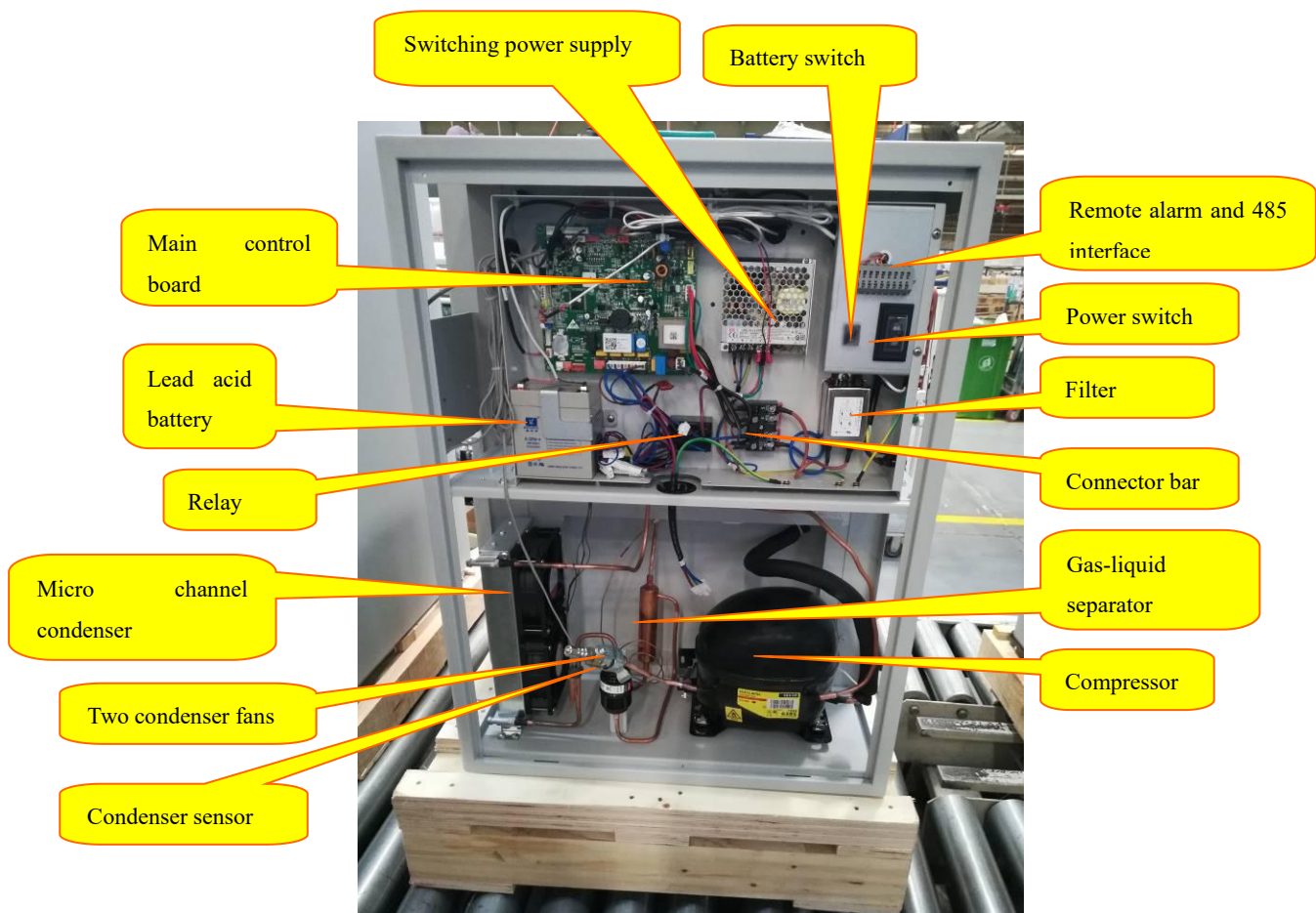


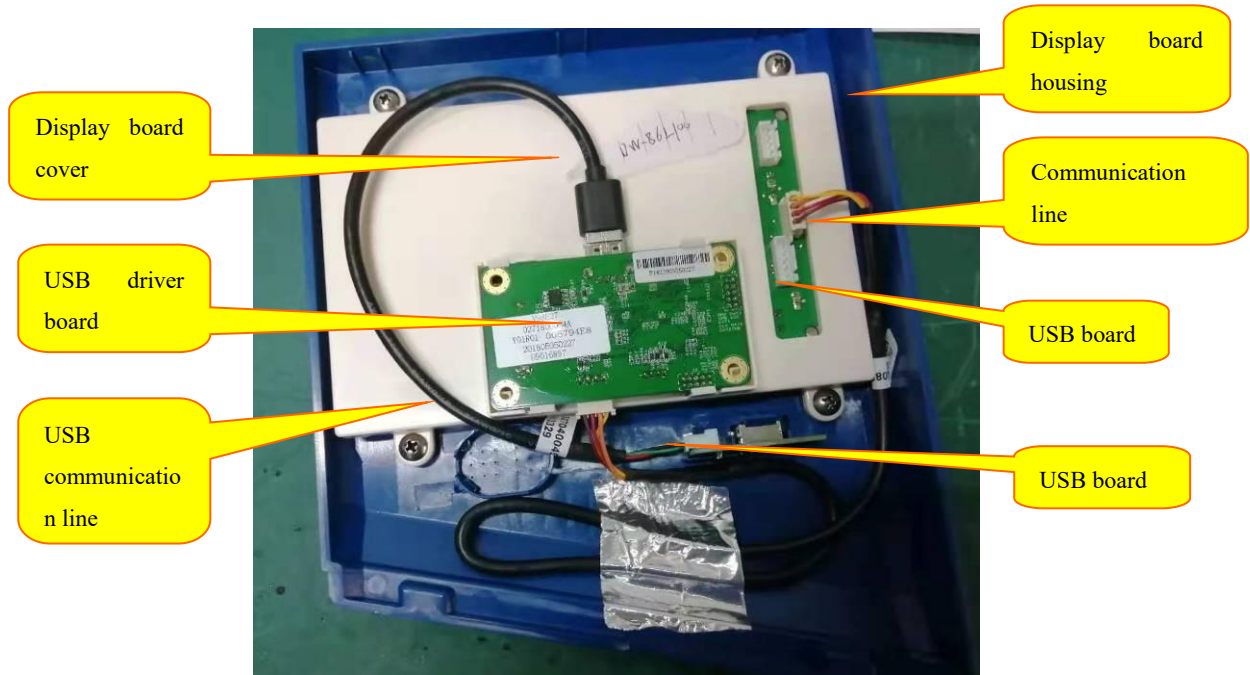
Outer door handle, built-in lock



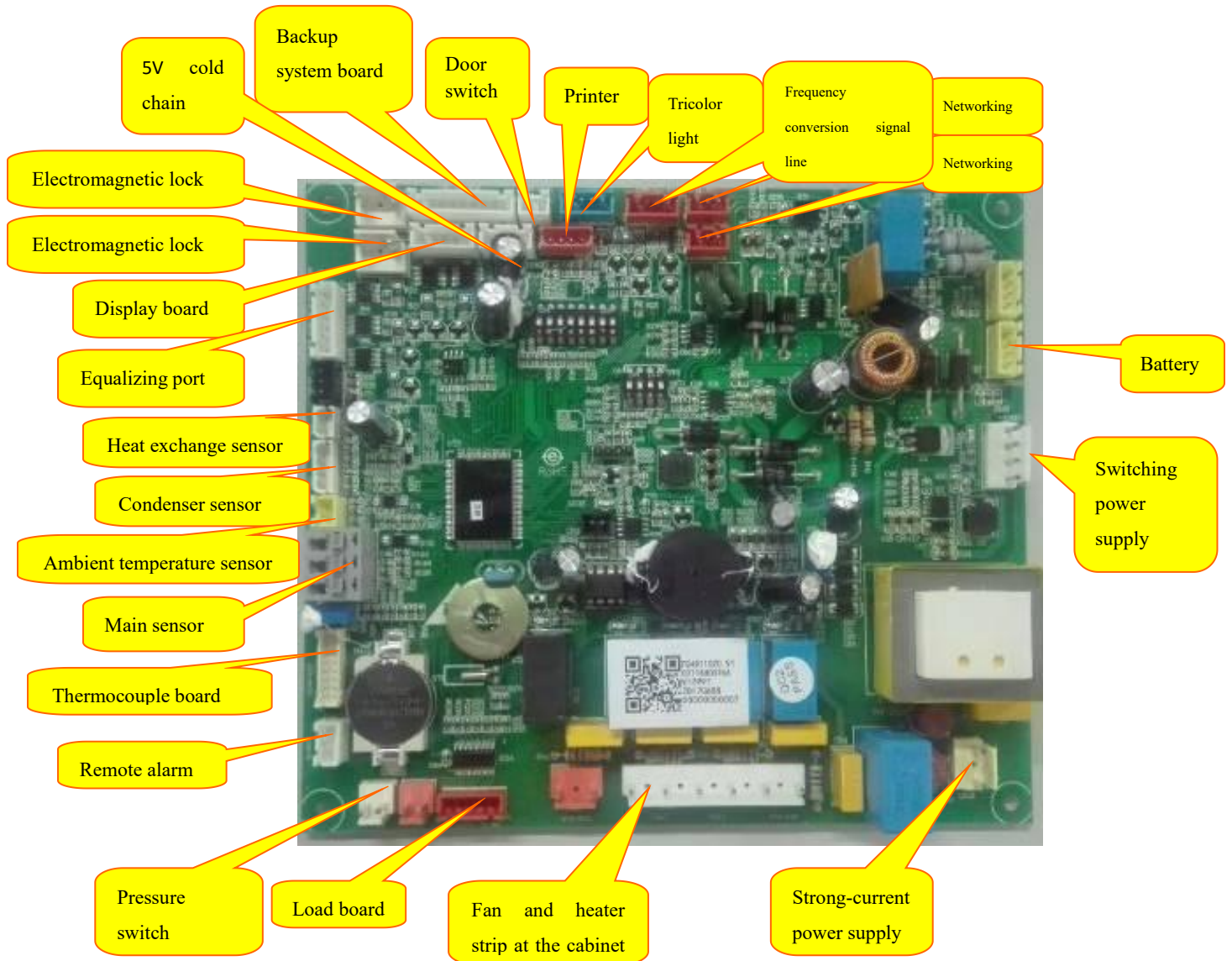
4.3 Electrical control system structure

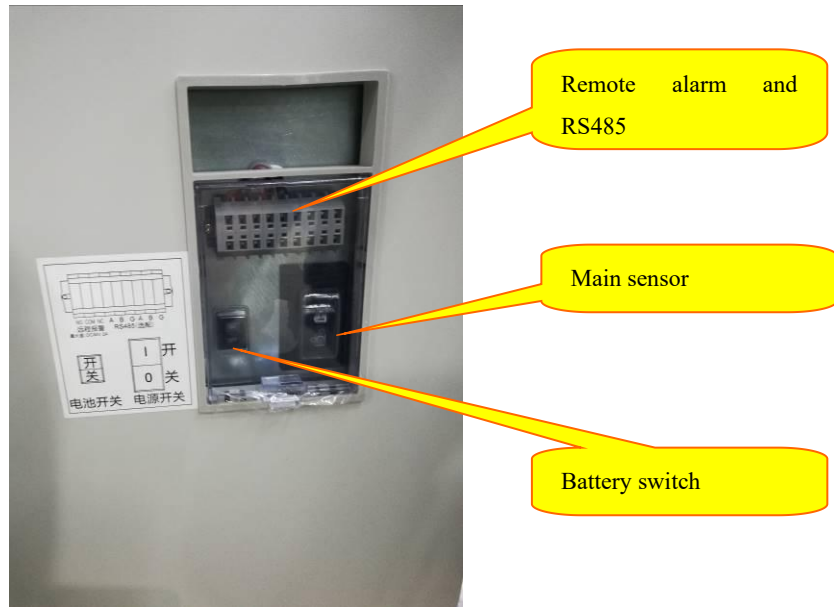
4.3. 1 Electrical control system of DW-86L100J



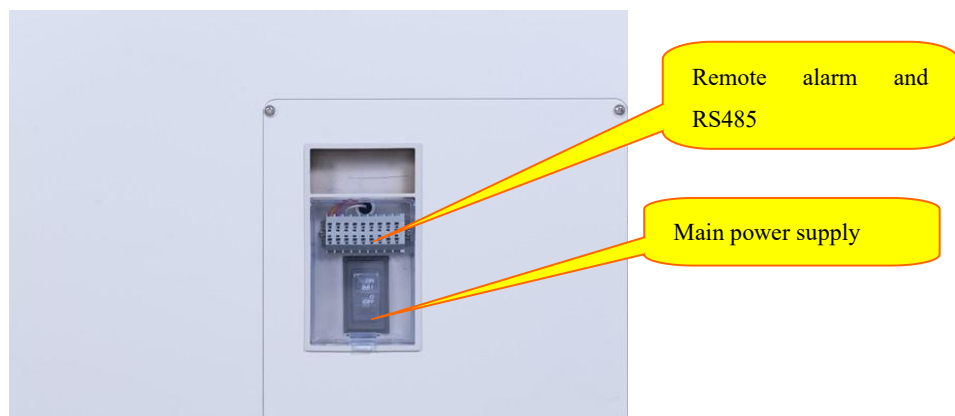
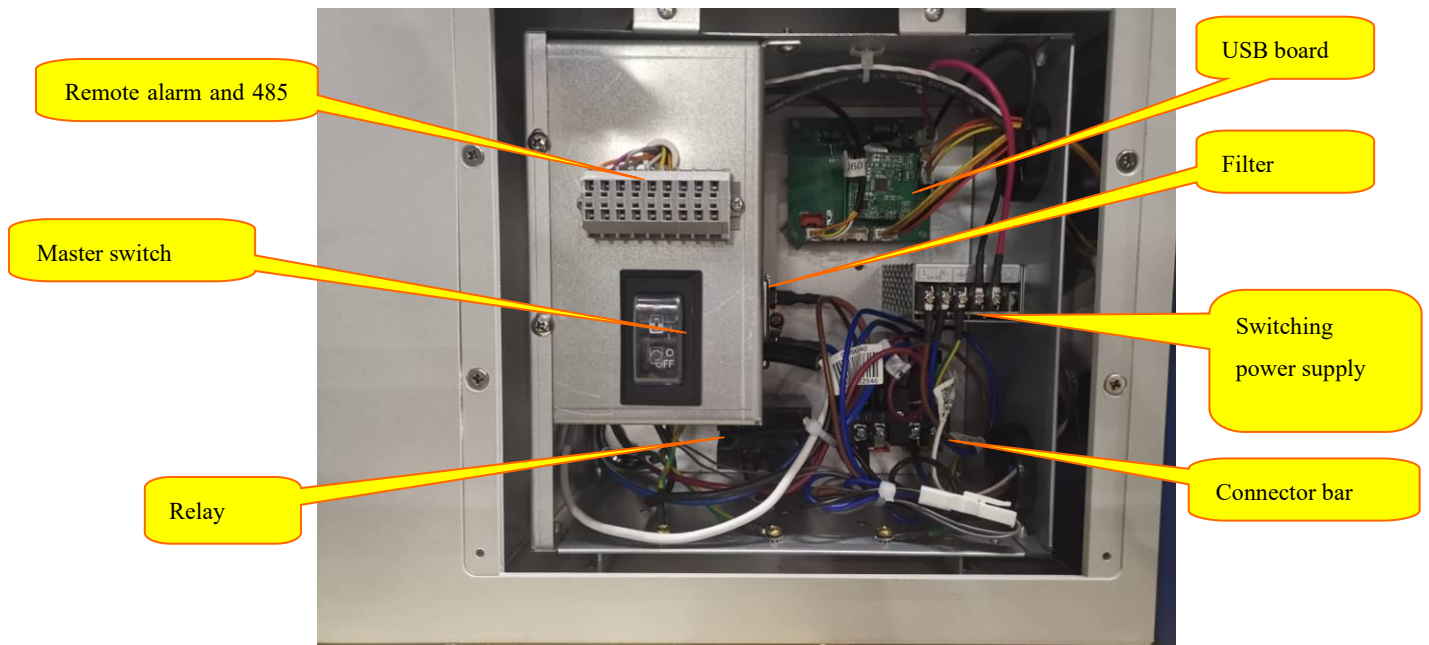


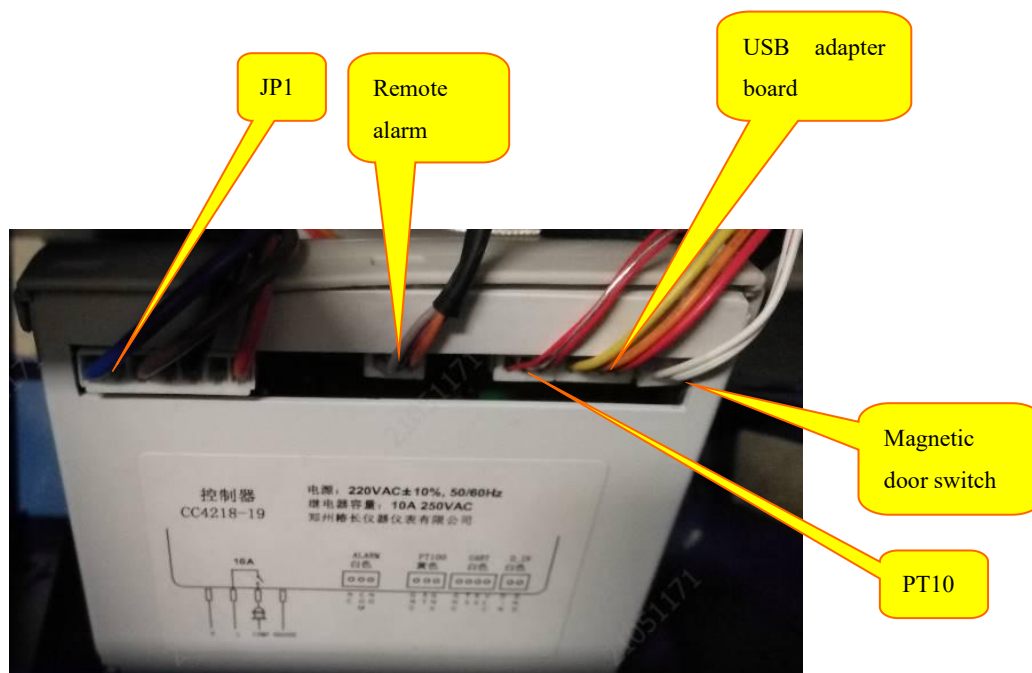
Main control board



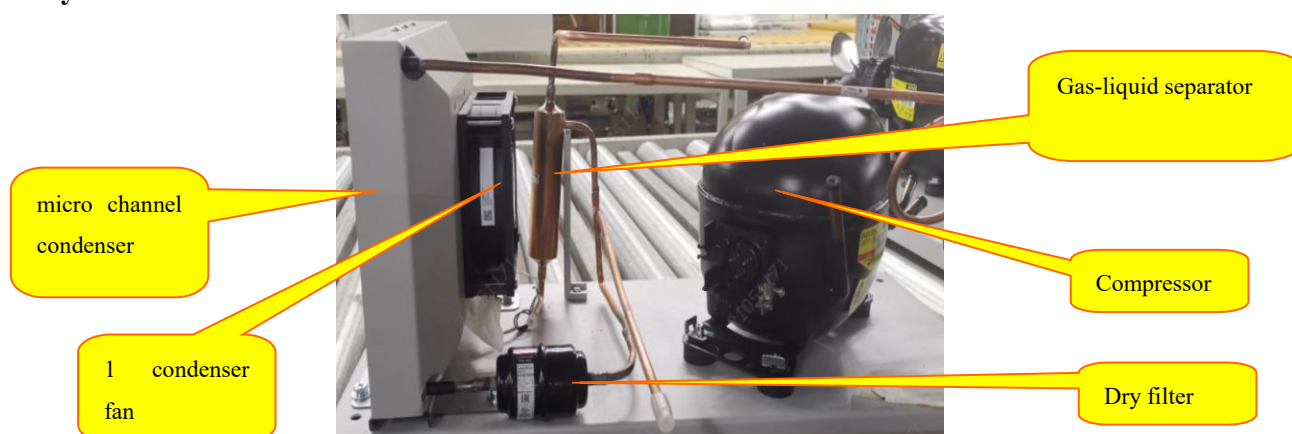


4.3. 2 Electrical control system of DW-86L51J





4.4 System structure



V. Operating instructions and product improvements

5.1 Unlocking:

First press the "UP" or "Down" key to have the display screen show "00"; then, press " " to adjust the value to "06" ("06" is the password value); finally, press and hold the "Function selection" key for 3 seconds to unlock after the locking indicator light goes off.

5.2 Temperature setting operation:

****Setting method for DW-86L100J:**

Upon unlocking, press the "SET" key to enter the setting mode when the inner temperature display area shows TS. While the current set value of the inner temperature is flickering, press the UP or Down key to modify the setting value of the inner temperature;

****Setting method for DW-86L51J:**

Press the hold SET key for more than one second to have the current set temperature show up; then, press the "UP" or "Down" key to modify the set inner temperature.

5.3 Precautions

5.3.1 Rotate the leveling legs of the freezer clockwise to extend them out to support the unit to the floor and make sure that the unit does not move during use when installing the freezer for the first time or every time after moving it. Install and fix it into place and let it stand still for 24 hours before powering it up for use.

5.3.2 The room temperature should be kept below 28 °C as far as possible. (If the ambient temperature exceeds

32°C, the cooling efficiency will decrease rapidly; if the ambient temperature exceeds 32°C for a long time, the compressor may be damaged or the service life may be reduced. Therefore, it is recommended to install an air conditioner in the environment where the product is used.)

5.3.3 Each freezer shall use a separate socket, and the power socket shall be solidly grounded and with a rated current of **greater than 10A**.

5.3.4 First turn on the battery switch on the electrical control cabinet of the machine when it is powered on; if the freezer needs to be turned off for a long time, power off the machine first before turning off this switch.

5.3.5 Open the freezer door for less than one minute at a time. If there is any ice or water on the door seal strip, wipe it clean before closing the door to ensure a good sealing effect.

5.3.6 To prolong the service life of the freezer and reduce energy consumption, we recommend you to set the temperature of the freezer between -50 ° C and -80 ° C on the premise of ensuring the safety of storage items.

5.3.7 The freezer is suitable for storing items at low temperatures. It should not be used as a quick-freezing device to conduct forced quick-freezing for a large number of hot items or large-volume liquid items.

5.3.8 Unplug the power cord and contact the after-sales service as soon as possible if the freezer does not refrigerate after being powered up for two to three hours.

5.3.9 In case of alarm faults or other faults, please clear them according to the prompts of the display panel. If no prompt is available, or you cannot troubleshoot the faults by yourself, do not disassemble the freezer and, instead, contact the after-sales maintenance personnel for help timely.

5.4 Fault code query

Alarm information of DW-86L100J:

Alarm	Alarm code	Status	Indication	Buzzer alarm and remote alarm
High-temperature alarm	E00	The displayed temperature exceeds or equals to the set temperature of the high-temperature alarm, and such a condition lasts for 1min	Alarm light flickering Over temperature alarm light flickering	Buzzer alarm and remote alarm output
Low-temperature alarm	E01	The displayed temperature exceeds or equals to the set temperature of the low-temperature alarm, and such a condition lasts for 1min	Alarm light flickering Over temperature alarm light flickering	Buzzer alarm and remote alarm output
Too high ambient temperature	E02	The ambient temperature is no lower than 35°C, and such a condition lasts for 30 seconds.	Alarm light flickering	/
Main sensor fault	E10	The main sensor is at fault	Alarm light flickering	Buzzer alarm
Ambient temperature sensor fault	E11	The ambient temperature sensor is at fault	Alarm light flickering	Buzzer alarm
Condenser sensor fault	E12	The condenser sensor is at fault	Alarm light flickering	Buzzer alarm
Battery disconnected	E20	The battery switch is not turned on, or the battery connecting line gets loose.	Alarm light flickering	Buzzer alarm
Battery reversely connected	E21	The battery reverse connection signal is detected to be at a low level	Alarm light flickering	Buzzer keeping sounding
Low battery	E22	Lead acid battery: While the battery is connected, the battery voltage is less than 10.5V after charging for 24 hours,	Alarm light flickering	/
		Lithium battery: While the battery is connected, the battery voltage is less than 9.0V after charging for 24 hours,	Alarm light flickering	/
Power failure alarm	E30	Power failure of the freezer	Alarm light and power indication Light flickering synchronously	The buzzer alarm sounds once every three seconds; the display does not display the inner temperature for 30 seconds and displays the inner temperature normally for 5 seconds alternately. Remote alarm output.
Door ajar alarm	E40	Door opening signal is detected for more than 5min	Alarm light flickering	Buzzer alarm and remote alarm output
Dirty condenser alarm	E50	The condenser filter is clogged, or the too high ambient temperature causes the temperature of the sensor to be too high	Alarm light flickering	Buzzer alarm

Alarm information of DW-86L51J:

Alarm code	Code description	Triggering condition	Indication	Buzzer alarm and remote alarm
E10	Temperature sensor fault	Communication fault or sensor failure	Alarm light flickering	Buzzer alarm
E00	High-temperature alarm	The displayed temperature exceeds or equals to the set temperature of the high-temperature alarm, and such a condition lasts for 10min (default value)	Alarm light flickering	Buzzer alarm and remote alarm output
E01	Low-temperature alarm	The displayed temperature is lower than or equals to the set temperature of the low-temperature alarm, and such a condition lasts for 10min (default value)	Alarm light flickering	Buzzer alarm and remote alarm output
E30	Power failure alarm	Power failure of the freezer	Alarm light flickering	Buzzer alarm and remote alarm output
E40	Door ajar alarm	Door opening signal is detected for more than 5min (default value)	Alarm light flickering	Buzzer alarm and remote alarm output

5.5 Probe resistance variation with temperature (probe type: NTC; mainly ambient temperature sensor, condenser 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

The probe resistance changes with temperature (probe type: PT100; mainly the inner temperature sensor)

Temperature (°C)	Resistance (Ω)	Temperature (°C)	Resistance (Ω)	Temperature (°C)	Resistance (Ω)
-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

VI. Major technical parameters

6.1 List of technical parameters

Model	DW-86L100J
Technical parameter	
Product type	Vertical, single door
Climate type	-40~-86°C
Controller type	Microprocessor control
Display	LCD display (with a minimum display accuracy of 1°C)
Temperature sensor	PT100
Basic parameters	
Volume (L)	100
Voltage frequency (V/Hz)	220~240/50
Power (W)	680
Current (A)	3
Interior Dimensions (W*D*H)	330*481*630
Exterior Dimensions (W*D*H)	770*660*810
Net/Gross weight (Kg)	108/132
Material	
Exterior material	Electroplated steel sheet with powder covered
Exterior material	Electroplated steel sheet with powder covered
Insulation	VIP+ CFC-free PU foamed layer
Door thickness	70mm
Cabinet thickness	70mm
Exterior door seal	Four layers of silicone seal strips
Interior door seal	Stainless steel interior door (magnetic type)
Door lock	Y/Pad lock + Built-in lock
Product Accessories	
Number of partitions /inner doors	1/2
Partition size (W*D)	316X424

Caster/Test hole	4/1
Compressor brand and type	Hermetically sealed /SECOP/1
Compressor	NLE12.6CNL
Refrigerant type	HC-Free/R600A、R1150、R50
Model	DW-86L51J
Technical parameter	
Product type	Vertical, single door
Climate type	-40- -86°C
Controller type	Microprocessor control
Display	LCD display (with a minimum display accuracy of 1°C)
Temperature sensor	PT100
Basic parameters	
Volume (L)	51
Voltage frequency (V/Hz)	220/50
Power (W)	500
Current (A)	3
Interior Dimensions (W*D*H)	330*481*316
Exterior Dimensions (W*D*H)	532*540*806
Net/Gross weight (Kg)	73/86
Material	
Exterior material	Pure polyester paint-coated steel plate
Interior material	Pure polyester paint-coated steel plate
Insulation	VIP + Rigid polyurethane foam filling
Door thickness	70mm
Cabinet thickness	70mm
Exterior door seal	Four layers of silicone seal strips
Interior door seal	Stainless steel interior door (magnetic type)
Door lock	Y/Pad lock + Built-in lock
Product Accessories	
Number of partitions /inner doors	1/1
Partition size (W*D)	424*316
Caster/Test hole	4/1
Compressor brand and type	SECOP/DLE7.5CN
Compressor	DLE7.5CN
Refrigerant type	R600A, R1150, and R50A

6.2 Nameplate

DW-86L100J

Haier 医用低温保存箱				
《医疗器械生产许可证》编号：鲁食药监械生产许20100176号				
产品注册证号及产品技术要求号：鲁械注准20162580180				
型号：	DW-86L100J	制冷剂	R600A:	75g
箱内温度：	-40℃~-86℃		R1150:	15g
有效容积：	100L		R50:	5g
额定电压：	220V~	发泡料：		HFO-1233zde
额定频率：	50Hz	制造日期和编号：		见箱体条形码
功率：	680W	使用期限：		见说明书
气候类型：	N	其他内容详见说明书		
净重：	108kg			
防触电保护类型：	I			
住所：青岛经济技术开发区海尔工业园内		青岛海尔生物医疗股份有限公司		
顾客服务热线：4006 99 2017				

DW-86L51J

Haier 医用低温保存箱				
型号:	DW-86L51J	制冷剂	R600a:	60g
箱内温度:	-40℃~-86℃		R1150:	15g
有效容积:	51L		R50:	3g
额定电压:	220V~	防触电保护类型: I		
额定频率:	50Hz	发泡料: HFO-1233zde		
输入功率:	500W	制造日期和编号: 见箱体条形码		
气候类型:	N	使用期限: 见说明书		
净重:	73kg	其他内容详见说明书		
住所: 青岛经济技术开发区海尔工业园内		青岛海尔生物医疗股份有限公司		
生产地址: 青岛市高新区丰源路280号				
顾客服务热线: 4006 99 2017				

VII. Precautionary measures, product use and daily maintenance

7.1 Refrigeration principle of cryopreservation:

The ULT freezer uses a cascade refrigeration system. Such a refrigeration system can separate the medium-temperature refrigerants and the low-temperature refrigerants via the gas-liquid separator by compressing refrigerants at different evaporation temperatures through compressors, allows the medium-temperature refrigerants to cool and condense the low-temperature refrigerants in the intercooler and to have the low temperature refrigerants reach a liquid state, and finally achieves the refrigerating effect after throttling. The refrigeration system can create a -40~-86℃ inner storage environment for the medical freezer under the control of a microcomputer.

The DW-86L100J/51J adopts a self-cascade refrigeration system and a single stage compressor for refrigeration;

7.2 Method of use of the ULT freezer

Method of use:

The freezer must be tested before use (or before being re-energized) when used for the first time or restored from a power outage (including power failure) of more than 10 hours and every time after being moved. The freezer must

pass the test.

Method of use of the freezer:

1). The freezer must be placed still for at least 24 hours before being powered on.

2). Do not load the unit with any samples. Power up the unit to let it run down to -40°C. Let it run at -40°C for a period of time, and then lower it to -60°C. Let it run at -60°C for 8 hours, and then lower it to -80°C. Observe the unit performance for more than 24 hours for normal cycling to ensure that it is working properly.

3). Once the unit is confirmed to be operating properly following the operations in 2), it is ready to be loaded with samples. The unit shall be loaded with -60°C samples in principle, and the quantity of such samples shall not exceed 1/3 of the unit's capacity.

4). Prohibition: All freezers are cryopreservation equipment for storing items at low temperatures. They cannot be used to conduct quick-freezing for plasma products with high temperatures. They are not suitable for heavy loading with a large number of hot products at one time as the operation can cause premature compressors to overheat. Samples should be loaded in small batches. The temperature setting should be lowered incrementally, allowing the unit and products to be stabilized at each setting until the final temperature is reached.

7.3 Characteristics of the refrigerants

1). The refrigerants are flammable and explosive mixed refrigerants, so the refrigerant charging site shall be well-ventilated. In case of any leakage, do not ignite or spark in the surroundings. When something becomes wrong with the refrigeration systems, the local after-sales service staff shall judge and give back the problems so that the after-sales manager can guide them to solve the problems depending on the specific situations.

2). Refrigerant code (energy-saving type): **R600A, R1150 and R50 for DW-86L100J/51J**

7.4 Refrigerant filling process:

7.4.1 Preparations

1) **Refrigerants (R600A, R1150, and R50)**

2) Hansen valve

3) Standard electronic scale (error $\leq \pm 2\text{g}$)

4) Vacuum pump ($\geq 4\text{L}$)

5) Pressure gage (it shall be able to read high pressure and low pressure values simultaneously), as shown in

Figure 1.

7.4.2 Open system

1) Cut the faulty system from the end of the process tube with pipe tongs and drain off the refrigerants from the system.

2) Weld the tube of the system opening to the pressure gauge within 20 minutes as of the system being cut open.

[Notes]

* The humidity of the maintenance workshop shall not be too large. In the case of cloudy and rainy weather, it is forbidden to open the system. For a machine that has opened the system, the pipeline welding should be completed immediately

* As the machine is very strict on the moisture in the system, the tube shall be immediately sealed with adhesive tapes when opened to prevent air from entering the system, and the welding of the opened tube shall be completed within 20 minutes.

7.4.3 Vacuum supply

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

2) Start the vacuum pump to evacuate until the vacuum degree becomes $\leq 3\text{Pa}$. Please refer to the notes attached for the evacuation time. See Figure 3

3) After reaching the required vacuum degree, stop high-pressure evacuation first, and weld and seal the high-temperature filling tube quickly (as the refrigerant pressure is too high, the tube opening cannot be sealed when the machine is refrigerating). Then, continue to evacuate at low pressure for one hour. See Figure 4.

4) Close the pressure gauge valve after one hour of low-pressure evacuation. Then, maintain the machine in a

negative pressure state for more than one hour to check whether the machine system is in a vacuum state and observe whether the pressure gauge rises. Otherwise, evacuate for more than one hour again, and continue to maintain the machine in a negative pressure state for more than one hour. Repeat the evacuation operations until the pressure does not rise before conducting refrigerant charging.

[Notes]

* For a vacuum pump above four liters, the evacuation time shall be 12 hours.

Below 3Pa



Figure 1

Figure 2

Figure 3

Figure 4

7.4.4 Filling refrigerants

1) During refrigerant filling, the filling amount shall be subject to the attached table. (For DW-86L100J/51J, the sequence of refrigerant filling is R600A, R1150, and R50)

[Notes]

* To ensure one-time proper refrigerant filling, the cylinder must be inverted during the filling of the above refrigerants, as shown in Figure 5.

2) After filling, seal the process tube of filling as shown in Figure 6.



Figure 5



Figure 6

[Notes]

* The refrigerant filling amount must be accurate. Even a small difference will affect the refrigeration effect.

* To ensure the accuracy of refrigerant filling, all refrigerants must be weighed with an electronic scale before filling.

* Failure to perform the evacuation and refrigerant filling operations according to the above requirements and procedures may cause poor refrigeration or no refrigeration of the machine, as well as product exchange and return. In this case, the Headquarters will claim for double maintenance costs of the machine if such act has caused additional repair and hold the service outlet to be fully responsible if product exchange or return has occurred.

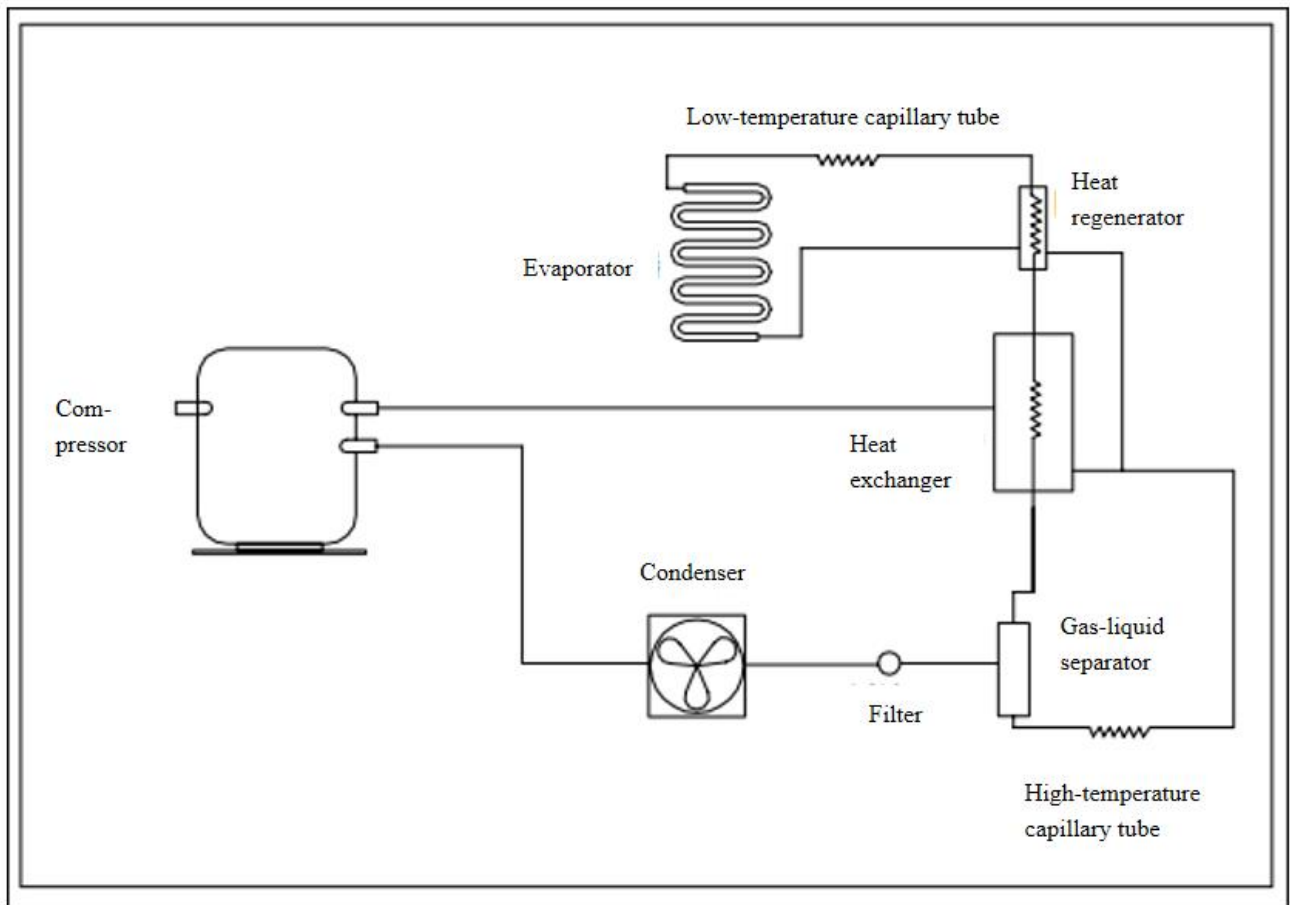
* The ULT freezer product is very strict on accuracy (accurate to gram) of the refrigerant filling amount, so each service outlet must prepare a standard electronic scale with an error of less than 2g before repair.

Refrigerant filling amount of the products

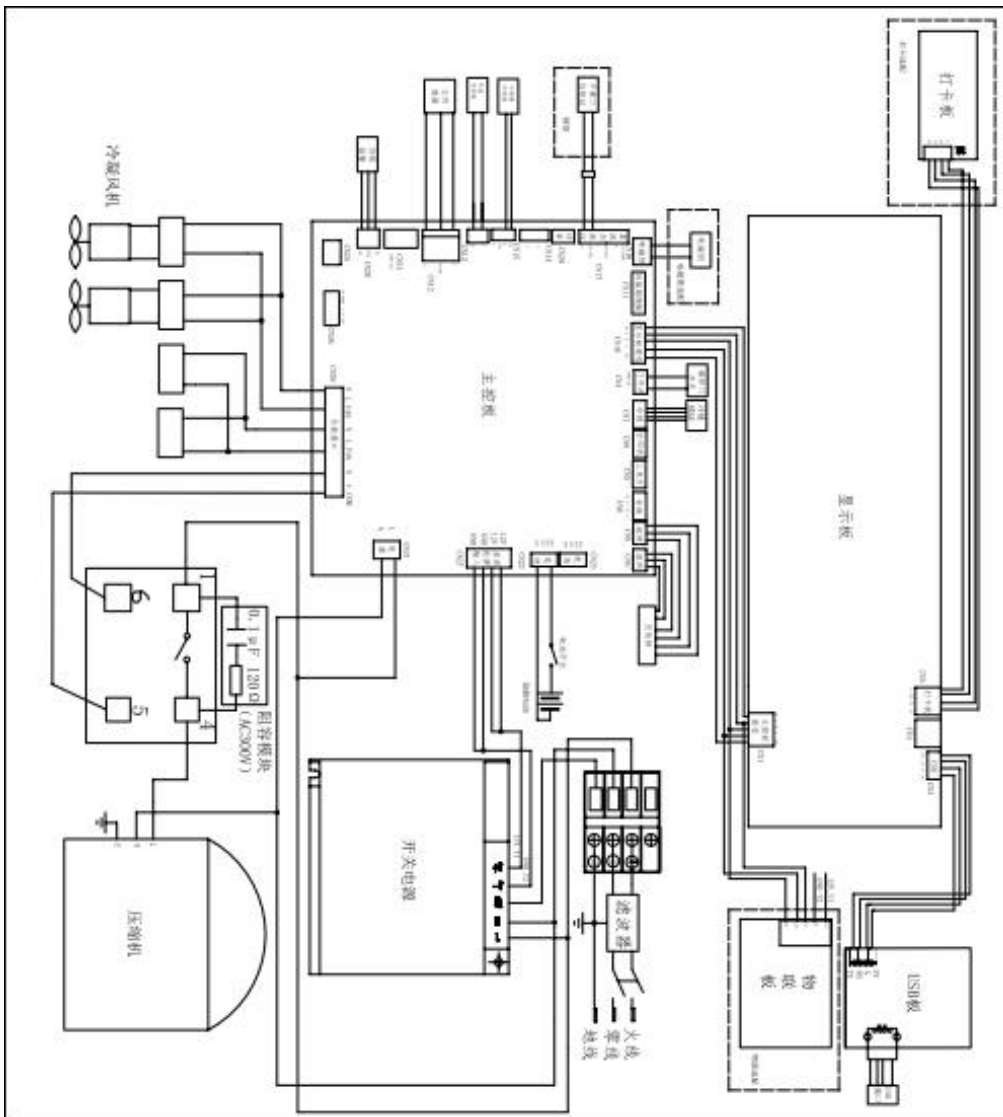
Model	Refrigerant (Type/quantity) 1		Refrigerant (Type/quantity) 2	
	High-temperature stage (g)		Low-temperature stage (g)	
	R600A		R1150	R50
DW-86L100J	75 (65)		15 (27)	5 (0)
DW-86L51J	60		15	3

VIII. System schematic diagram and wiring diagram

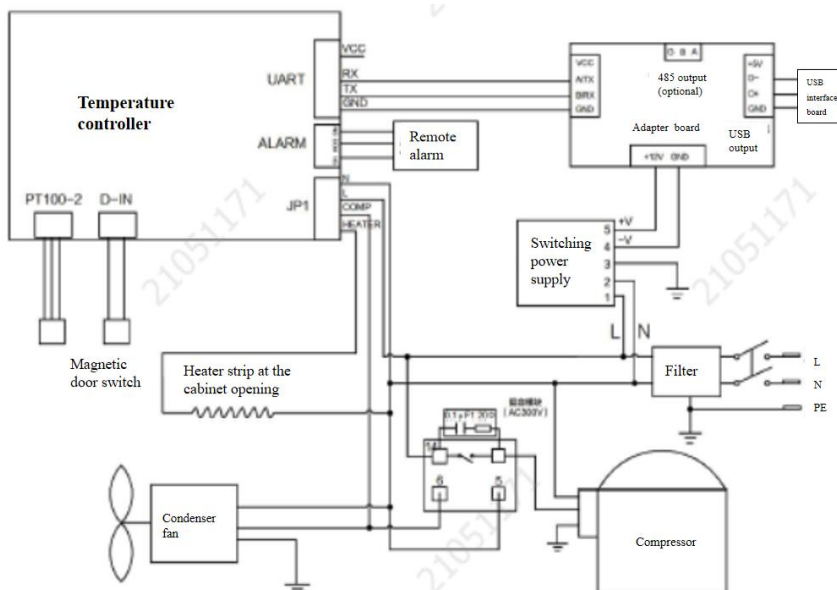
Schematic diagram of DW-86L100J/51J



Wiring diagram of DW-86L100J:



Wiring diagram of DW-86L51J:



IX. Specific control, working principle, and parameters

Display panel and LED display of DW-86L51J



9.1 Panel description

1) Three digital tubes: used to display temperature in the range of -99.9 to 85.9 °C with the minimum display resolution of 0.1;

2) Three keys: respectively , , and ; used to set parameters;

A)  key

In normal mode, the panel displays the set temperature if this key is pressed and held for more than 1 second and enters the parameter menu if the key is pressed and held for more than 3 seconds.

During temperature setting, this key can save the settings when pressed.

In parameter setting mode, the panel displays the parameter value and the parameter name alternately when the SET key is pressed; when the key is pressed and held for 3 seconds, the panel will save the parameter and exit the setting mode.

While the buzzer is sounding, pressing the  key will delay the alarm.

B)  key

During temperature setting, this key can increase the value of the set temperature.

In parameter setting mode, pressing this key can move to the next parameter or increase the parameter value.

C)  key

During temperature setting, this key can decrease the value of the set temperature.

In parameter setting mode, pressing this key can move to the previous parameter or decrease the parameter value.

During power-on, pressing  can show up the software version number.

3) Other key functions:

A) In the power-off state, pressing and holding the  key for five seconds can end battery discharge;

B) When strong current is applied, a long press of the  and  keys for 5s can show up CF, clear party E's parameters, and restore the factory defaults.

9.2 Display and alarm

Alarm parameters:

Parameter	Description	Category	Minimum	Maximum	Unit	Default value
/b	Buzzer enabling	A	0	1	-	1
AH	Temperature difference of high-temperature alarm	A	0	50	°C	10
AL	Temperature difference of low-temperature alarm	A	0	50	°C	10
Ad	Over-temperature alarm delay	A	0	99	Min	10

As	Initial power-up alarm delay	A	0	360	Min	180
Ae	Buzzer delay time	A	0	99	Min	30
Pt	Battery duration in case power failure	B	0	100	H	0
Ad2	Door ajar alarm delay	A	0	30	Min	5

Parameter description:**/b: buzzer enabling**

/b = 1: Enable buzzer alarm;

/b = 0: Shield buzzer alarm;

AH: the temperature difference of high-temperature alarm

When the temperature of the sensor exceeds or equals to the set temperature plus AH, and such a condition lasts for a time longer than Ad, the high-temperature alarm will be triggered.

Then, the alarm indicator light begins to flicker, and the buzzer sounds if it has been enabled.

Note: When AH = 0, no high-temperature alarm will be triggered.

AL: the temperature difference of low-temperature alarm

When the temperature of the sensor is lower than or equals to the set temperature minus AL, and such a condition lasts for a time longer than Ad, the high-temperature alarm will be triggered. Then, the alarm indicator light begins to flicker, and the buzzer sounds if it has been enabled.

Note: When AL = 0, no low-temperature alarm will be triggered.

Ad: the over-temperature alarm delay

When an alarm condition occurs, the buzzer and the alarm indicator light will alarm after a delay time of Ad. If the alarm condition is lifted during the delay, the alarm delay will be cancelled, and the timer will be cleared.

As

When the machine is powered on for the first time, a judgment will be made as follows:

If $As \geq Ad$ and the high temperature and low temperature alarm conditions are met after a delay of As, the buzzer and alarm indicator light will start to alarm. Afterwards, the alarm delay time shall be subject to Ad.

If $As \geq Ad$ and the high temperature and low temperature alarm conditions are still met after a delay of Ad, the buzzer and alarm indicator light will start to alarm. Afterwards, the alarm delay time shall be subject to Ad.

Ae: the buzzer delay time

When an alarm occurs, the buzzer will sound if it has been enabled. If you press the  key to close the buzzer, the alarm will be delayed. After the time of Ae (min), if the alarm still exists, the buzzer will sound again. However, if the Ae is set as 0, the buzzer will not be started again.

Pt Battery duration in case of power failure

The duration that the battery can support the temperature controller to display; when the Pt is set to 0, the battery is allowed to discharge all the time to support the display of the temperature controller.

Ad2: the door ajar alarm delay

When the door opening time reaches the set value of the parameter Ad2, the door ajar alarm will be triggered.

If the alarm condition is lifted during the delay, the alarm delay will be cancelled, and the timer will be cleared.

9.3 Special function setting:

- 1 When the  key is pressed and held for more than 3 seconds, the display screen will show the parameter code "PS" (password);
- 2 Pressing the  key to enter password setting;
- 3 Press  and  to scroll the number to "-15";
- 4 Press the  key to confirm the password.
- 5 Press  and  to scroll the parameter name;
- 6 Press the  key to show the value of the corresponding parameter;

7 Press  or  to increase or decrease the parameter value;

8 Press the  key to temporarily save the modified parameter value and return to parameter display;

9 To change other parameters, repeat 5 to 8.

10 Press the  key for more than 3 seconds to save the modified parameters and exit the parameter setting program.

If no key operation is performed within 30 seconds, the system will exit the Settings automatically and lock the controller, and the parameters are not saved.

9.4 Battery control requirements:

DW-86L51J has no battery or battery switch. The temperature controller comes with a battery for alarm use only. So there is no battery control requirement.

9.5. Adjustment method of temperature offset:

1 When the  key is pressed and held for more than 3 seconds, the display screen will show the parameter code "PS" (password);

2 Press  and  to scroll the parameters;

3 Press the  key to select the parameter, and the set value of the parameter shows up;

4 Press  or  to increase or decrease the parameter value;

5 Press the  key to temporarily save the modified parameter value and return to parameter display;

6 To change other parameters, repeat 3 to 5.

7 Press the  key for more than 3 seconds to save the modified parameters and return to normal display.

9.6 Control of condenser fan:

The condenser fan starts or stops synchronously with the compressor.

9.7 Remote alarm function

The remote alarm uses a 5A explosion-proof SPDT (single-pole double-throw) relay for dry output. The specific control is as follows:

When the machine is normal without any alarm, the remote alarm relay shall be electrically energized;

In case of overtemperature (high-temperature or low-temperature) alarm, power failure alarm, or door ajar alarm of the freeze, the remote alarm relay is de-energized, and the remote alarm function is triggered.

9.8 Compressor control

When the sensor temperature is lower than or equal to St+ rd2, and such a condition lasts for 1min, the compressor stops working. When the sensor temperature is greater than or equal to St+rd1 and such a condition lasts for 1min, the compressor starts to work. The minimum time for each startup of the compressor is 3 minutes. St is the set startup temperature, and rd1 and rd2 are temperature difference control.

9.9 Voltage calibration

The voltage calibration is an operating function of the display panel. The specific operation is as follows: While the display panel is unlocked, press and hold the "Alarm Cancellation" key and the "▽" key simultaneously for 5 seconds, and the display panel shows the current voltage deviation; then, press the "△" key or the "▽" key to decrease or increase the voltage for calibration. For each press of the "△" key or the "▽" key, the voltage will increase or decrease by 1V within the range of -9V- 9V. The initial value of voltage deviation is 0.

(DW-86L100J: after the display panel is unlocked, press and hold the "UP" key + the "Down" key for 5 seconds; enter the unlocking password of the after-sales/factory parameter layer (which is 16 by default and adjustable between 00 and 99), and press the "SET" key to confirm the unlocking; then, set the after-sales and factory parameters after unlocking. After entering the after-sales/factory parameter layer, press the "UP" or "Down" key to select the CU parameter, and then press the "SET" key to modify the parameter value;

CU: voltage calibration value which is 0 by default and adjustable with the range of ±9V at a step size of 1;

Pressing the "UP" key or "Down" key can modify the voltage calibration setting)

DW-86L51J has no voltage calibration function.

9.10 Setting adjustment

- 1 When the  key is pressed and held for more than 3 seconds, the display screen will show the parameter code "PS" (password);
- 2 Press  and  to scroll the parameters;
- 3 Press the  key to select the parameter, and the set value of the parameter shows up;
- 4 Press  or  to increase or decrease the parameter value;
- 5 Press the  key to temporarily save the modified parameter value and return to parameter display;
- 6 To change other parameters, repeat 3 to 5.
- 7 Press the  key fore more than 3 seconds to save the modified parameters and return to normal display.

9.11 USB data download and time setting

The computer board has a USB output function, supporting the export of test data such as the set inner temperature, actual inner temperature, ambient temperature, voltage, high-temperature alarm set temperature, and low-temperature alarm set temperature with a USB disk. It can automatically collect and store temperature and other test data for more than 10 years. It collects and stores the test data once every 6 minutes automatically. After the storage space is used up, the latest data will automatically replace the earliest data stored. When a USB disk is plugged in, the computer board will recognize it automatically and start importing data into it. During the data export, uP shows up, and after data export is completed, Ed shows up. The temperature data exported by the USB are in the format of .CSV. The exported data records include four items: serial number, time, set temperature and actual temperature, which are recorded according to the set period T1.

Data recording time setting of the U-disk interface (current system time setting):

Press and hold the "△" key or the "▽" key for 3 seconds, and the time setting screen displays "P1". Press the "△" or "▽" key to switch between "P1" (year), "P2" (month), "P3" (day), "P4" (hour), and "P5" (minute). Press the "■" key to set the corresponding time, and press and hold the "■" key for three seconds to save and exit. During the setting of P1- P5, after setting any parameter, if no other parameter needs to be adjusted, press and hold down the "■" key for three seconds to save and exit.

Parameter	Description	Minimum	Maximum	Unit	Default value
P1	usb time (Year)	21	99	Year	-
P2	usb time (Month)	1	12	Month	-
P3	usb time (Day)	1	31	Day	-
P4	usb time (Hour)	0	23	Hour	-
P5	usb time (Minute)	0	59	Minute	-

9.12 Door opening management

Ad2: the door opening alarm delay, which is 5 min by default and adjustable between 1 and 30 min. Pressing the "UP" or "Down" key can modify the set value of the door opening alarm delay;

X. Installation and disassembly process

10.1 Installation site:

- 10.1.1. Avoid direct sunlight.
- 10.1.2. The surrounding air circulation is good.
- 10.1.3. Avoid excessive dust.
- 10.1.4. Avoid mechanical swaying and vibration.
- 10.1.5. Ambient temperature: 5°C to 28°C; Maximum 32 ° C; ideal temperature is 18 ° C to 25 ° C; an air conditioning system shall be used when necessary.
- 10.1.6. Altitude of the equipment operating position: Lower than 2000m.
- 10.1.7. Operating humidity: Lower than 80%RH. For the maximum operating temperature of 32 °C, the humidity shall be less than 57%RH.
- 10.1.8. Input voltage: within 220±10%.

*Note: As the ULT equipment is sensitive to ambient temperature, it cannot run normally if installed in an environment other than the above. Please improve the environment before using the machine.

10.2 Product handling and packaging removal

10.2.1 Handling: As the product is very heavy, a forklift or hydraulic truck is required for the handling of it to avoid damage to personnel and the product.

10.2.2 Packaging removal: The packing method of the product is wood pallet + honeycomb corrugated wrapping film + carton. During transportation, a forklift or hydraulic vehicle is required to insert into the bottom of the bottom pallet for handling.

The packaging scheme is shown below.

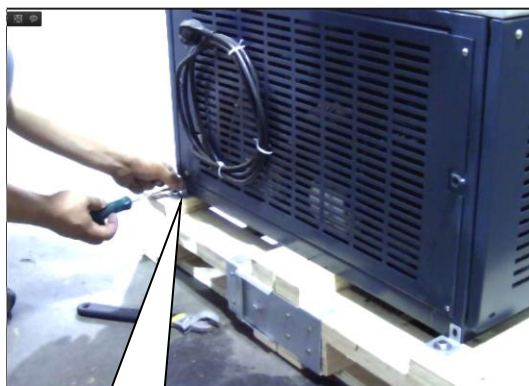


Removal of the wood pallet:

1. First, remove with a screw driver the two fixed connecting pieces A between the compressor compartment of the machine and the wood pallet, as shown in Figure A.
2. Finally, the maintenance personnel shall push the two sides of the cabinet alternately so that the wood pallet can be lifted up.



Fixing screw A



Fixing screw

10.3 Placement of the product

Note: The freezer must be installed into place; otherwise it will cause safety and performance problems.

Avoid bumping or scratching the freezer during handling. During the handling, the maximum tilt angle of the freezer shall not exceed 45° (the angle between the freezer and the horizontal direction); otherwise, a failure of the refrigeration system may be caused, and the normal operation of the freezer may be affected.

XI. Common faults and troubleshooting and FAQ

11.1 Common faults and troubleshooting

A. The displayed temperature is inconsistent with the measured temperature of the machine:

The displayed temperature is the temperature at a certain point inside the freezer, while the temperature detected by the user is the temperature at another point inside the freezer. There must be a difference in temperature because they are different locations. Also, a certain error may exist between the user's testing tool and our temperature sensing probe.

B. The temperature difference between the upper and lower parts of the freezer is too large:

Because our machine is cooled from the top down, the temperature of the upper part is lower than that of the lower part, and the temperature difference between the two parts is also large. The temperature difference of similar products in the world is 5~8°C, while ours is basically within 6 °C. In addition, users' frequent opening and closing of the door will also result in large temperature difference between the upper and lower parts

C. What's voltage boost startup?

To ensure normal operation, the machine is equipped with a function of increasing or decreasing the voltage. When the supply voltage is lower than 183V, the machine cannot be started. In this case, the user needs to check whether the power line is normal.

D. Why the set temperature is -86°C, but the refrigerator temperature rises to -82°C?

To ensure the service life of the machine, our product has a design that when the ambient temperature is higher than 35°C, if the set 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), the set temperature will be adjusted to the original set value;

E. Why the temperature of the freezer rises so fast when the door is opened, while freezers of other brands have no such a problem?

(1) The temperature of the ULT freezer is very low, which means that there is a large temperature difference between it and the ambient temperature, and our temperature sensing probe is very sensitive, so the temperature rises faster when the door is opened.

(2) Product of other brands have added a delayed temperature rise-up design to the computer boards and the temperature sensing probes, so they seem to rise up slowly when the door is opened or display for a prolonged time the temperature before door opening (for example Meling's products).

F. What are the reasons for displaying E0 and other symbols?

E2 indicates main sensor fault. E1 indicates condenser sensor fault. E0 indicates ambient temperature sensor fault. When such symbols are displayed, check whether the connections of the above parts are normal; otherwise, contact the after-sales service for replacement.

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

Casters, which are flexible, mobile, lockable, supporting, and adjustable depending on the requirements, are provided with the product. After the machine is installed in the designated position, the user shall fix the two front casters to prevent machine movement when opening the door.

H. What is the problem that the door of the cryogenic freezer cannot be opened?

There are two cases:

The first case is that the large difference between inside and outside temperature results in a negative pressure state of the door body. The handling method is to insert a thin iron sheet between the door seal strip and the door body to let air in;

The second case is that the items stored contain water which flows to the seal strip and gets frozen, making the door body unable to be opened. The handling method is to open the door with tools.

11.2 Common problems and troubleshooting

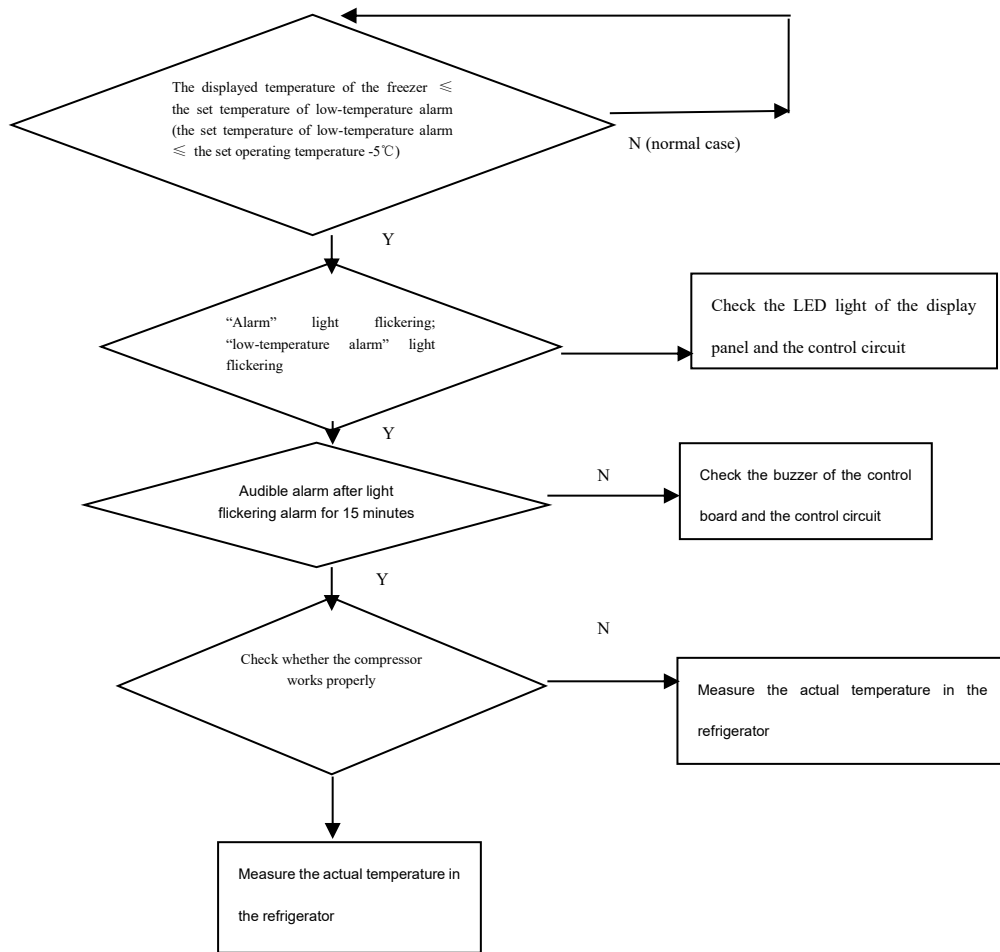
Problem	Cause analysis	Troubleshooting
1. The high-temperature stage compressor does not start	1. The power switch or the fuse is at fault	Use a multimeter to measure the resistance of the switch or fuse. If the switch is broken, replace the fuse or power switch.
	2. The connector for the connecting line of the compressor compartment is broken	Check whether the connector for the connecting line of compressor compartment is damaged and whether any wiring harness falls off; replace the corresponding connecting wire, if so.
	3. Poor contact	Check whether any connecting wire is improperly connected or not connected; if any, restore it to normal connection.
	4. Wiring faults of the display panel and the control board	Use a multimeter to measure the resistance of the connecting wire to check whether any wire harness is short-circuited or open-circuited; if any wire harness is not repairable, replace it with a new one.
	5. The relay, starter capacitor or thermal protector is faulty	Check the relay, capacitor, or thermal protector for burning signs of any electrical parts. Replace the burned electrical parts, if any.
	6. Compressor fault	If other parts can be powered normally, check whether the connectors of the compressor are normal and observe the surface temperature and abnormal noise of the compressor. If the compressor is not hot or has abnormal noise, the compressor is broken and needs to be replaced. To replace the compressor, the oil separator and the dry filter shall be replaced at the same time.
	7. The power voltage is too low.	Check whether the voltage of the display panel is within the rated range ($220\pm 10\%$), and use a multimeter to measure whether the voltage under the condition of energized operation is overvoltage. In the case of either too low or too high a voltage, ask the customer to provide a voltage stabilizer.
2. The low-temperature stage compressor does not start	1. The same as the high-temperature stage compressor	If other parts can be powered normally, check whether the connectors of the compressor are normal and observe the surface temperature and abnormal noise of the compressor. If the compressor is not hot or has abnormal noise, the compressor is broken and needs to be replaced. To replace the compressor, the oil separator and the dry filter shall be replaced at the same time.
	2. The pressure switch is at fault	Use a multimeter to check whether the wire harness of the pressure switch is short-circuited or open-circuited, and check whether the copper tube of the pressure switch is damaged. In case of any fault, replace the pressure switch.

	3. Poor refrigeration effect of the high-temperature stage compressor	If the low-temperature stage compressor fails to start within 10min as of the startup of the high-temperature stage compressor, it indicates that the high-temperature stage compressor has a poor refrigeration effect. In this case, check the circuits and tube welding of the high-temperature stage system for blockage and leakage. Deal with the fault, if any.
3. The fan does not work	1. The connecting line of the fan falls off	Check whether the connecting line of the fan falls off or whether it is not connected; if so, process the wire end and reconnect the wire.
	2. The fan blade is blocked by foreign matter	Check whether the fan blade cannot rotate or whether it has collision noise when rotating; if so, remove the foreign matters on the blade or in the surroundings to keep the blade running properly
	3. The fan is broken	Use a multimeter to measure the resistance of the connecting line of the fan to see if it is short-circuited or open-circuited, and observe whether the rotating shaft is rotating. Replace the fan, if necessary.
4. The temperature inside the freezer is high	1. The set temperature of the stop point is high	Check whether the temperature setting of the product conforms to the customer's requirements. If not, reset the temperature.
	2. Refrigerant leakage	Check the welding spots of the compressor compartment for leaking points and conduct repair welding. Refill the refrigerants.
	3. The temperature sensing probe is broken.	If the display screen prompts an abnormal alarm, such as E0/E1/E2E/E3, it indicates that the temperature sensing probe is faulty. Meanwhile, check whether the connecting wires are normal. If normal, it indicates that the temperature sensing wires are broken; then, replace the corresponding temperature sensing wires.
	4. The capillary tube or system is blocked by dirt or grease	Open the system to clean the capillary tube or replace the filter
	5. The ambient temperature is high	If the ambient temperature is too high, add an air conditioner to cool down the room temperature
	6. The condenser is blocked	If the dirty condenser alarm occurs, please clean the filter screen timely.
5. E10 alarm	Temperature sensor failure	1. Check the terminals of the ambient temperature sensor for poor contact or falloff; check whether the sensor is damaged.
		2. Check the sensor terminals on the display board for looseness or poor contact; check whether the display board is damaged.
11. The temperature inside the freezer is uneven	The temperature difference is too large inside the freezer.	1. If the temperature of the top part is too high, handle the door seals and replace the inner door to ensure a good sealing effect;
		2. If the bottom temperature is too high, re-open the system. Replenish the low temperature refrigerant R508B (or directly use needle valve to add refrigerant)

Processing method of high-temperature alarm:



Processing method of low-temperature alarm:



XII. Exploded view and list of spare parts



DW-86L100J
Exploded parts 1



DW-86L51J
Exploded parts 1