NuAire Ultra Low Temperature Freezer Service Manual

Model	Picture
NU-99338JE/338JG/338JGA NU-99486JE NU-99578JE/578JGA/578JGA NU-99728JE/728JGA/728JGA NU-99828JE/828JG	
NU-99420JE NU-99420JG	

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2 Product Characteristics and Model Meaning

2.1. Main Functions and Characteristics of the Product

2.1.1. The applicable temperature scope in the ultra-low temperature freezer is -40~-86℃;

2.1.2. The freezer has the balanced internal and external pressure design and its doors can be opened and closed easily;

2.1.3. The display panel is divided into the working area and alarm area to display the machine startup condition, network connection condition, the voltage increase or decrease and locking condition. Meanwhile, the high/low temperature alarm and the temperature in the freezer can be set;

2.1.4. The digital display can display the temperature in the freezer, the ambient temperature and the input voltage, etc. at the same time;

2.1.5. Multiple failure alarms (high/low temperature alarm, sensor alarm, high/low voltage alarm, hot condenser alarm, improper ambient temperature alarm, door opening alarm, low battery capacity alarm and power failure alarm);

2.1.6. Two kinds of alarm methods (acoustic silence alarm and light flicker alarm) and multiple protection functions (start delay protection, low voltage compensation protection and HV compensation protection);

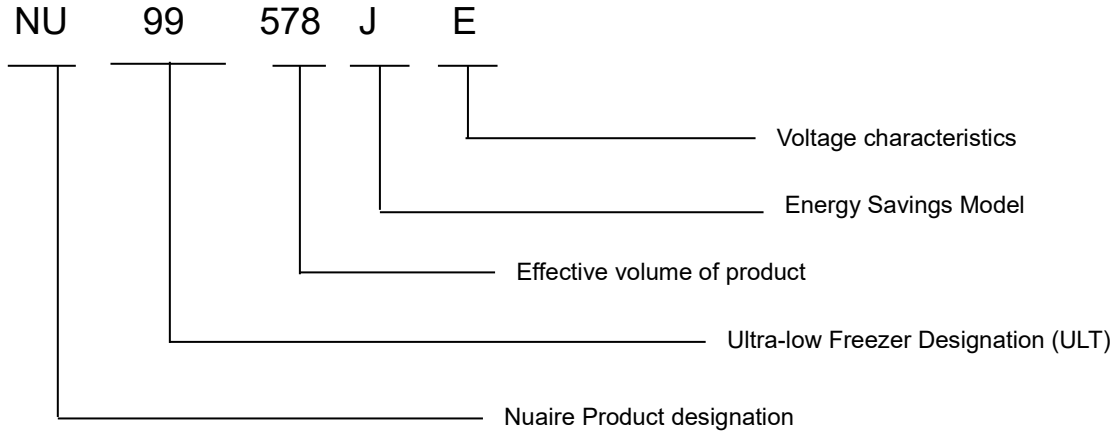
2.1.7. This product has the network function with RS-232 and RD-485 data interface and can be connected with the computer. The temperature in the freezer is displayed, the alarm information is displayed via the computer and it is also possible to control the temperature and monitor if the equipment works properly via the computer;
2.1.8. It has the remote-control alarm function and can connect the alarm device to other rooms to realize the alarm function;

2.1.9. HV/LV automatic compensation function;

2.1.10. The freezer is equipped with trundles for moving, locking and supporting flexibly and realizes the micro-adjustment according to the requirement;

2.1.11. The recorder, network monitoring system, message service and stainless-steel rack are configurable

2.2 Model Meanings



3. Product Promotional Points

3.1 Temperature Control:

The temperature is controlled by computer and displayed digitally, its adjustment unit is 1℃ and the adaptable temperature scope is -40~-86℃;

3.2 Safety Control:

3.2.1 Multiple failure alarm (high/low temperature alarm, sensor alarm, door opening alarm, hot condenser alarm, improper ambient temperature alarm, improper voltage alarm, low battery capacity alarm and power failure alarm);

3.2.2 Two alarm modes (acoustic silence alarm and light flicker alarm) and multiple protection functions (start delay protection);

3.2.3 All independent components are connected to the ground safely;

3.3 Refrigerating system:

3.3.1 Optimal cascade refrigerating technology, imported compressor and strong refrigerating capacity;

3.3.2 High-density thermal insulation layer, good insulation effect;

3.3.3 Independent multi-layer sealing structure and heat insulation technology, can avoid frosts effectively;

3.3.4 Special design of low temperature computer control, avoid that the cascade system controls the low temperature compressor incorrectly;

3.4 Individualized Design:

3.4.1 The LED display panel can display the temperature in the freezer, set temperature, ambient temperature, input voltage, can set the high /low temperature alarm and the temperature in the freezer and also has the failure alarm function;

3.4.2 Adjustable rack design for storing and fetching goods easily;

3.4.3 Safety door lock, please avoid opening door casually;

3.4.4 Integrated handle innovation design and compact trundle design, flexible and inconvenient;

3.4.5 Have network function and remote alarm function.;

3.5 VIP

It is made of PU foaming layer + 25mm VIP vacuum insulation material and can reduce the equipment coverage to the maximum extent;

3.6 Noise

Lower noise, leading in the world comfortable working environment and barely audible for the user.

4. Product Appearance Structure & Internal Structure Diagram

4.1 Energy saving series: NU-99486JE NU-99578JE/578JGA/578JGA NU-99728JE/728JGA/728JGA NU-99828JE/828JG

Front View

Internal Structural View

Rear View

4.2 Slim line series：NU-99338JE/338JG/338JGA

Front View

Internal Structural View

Rear View

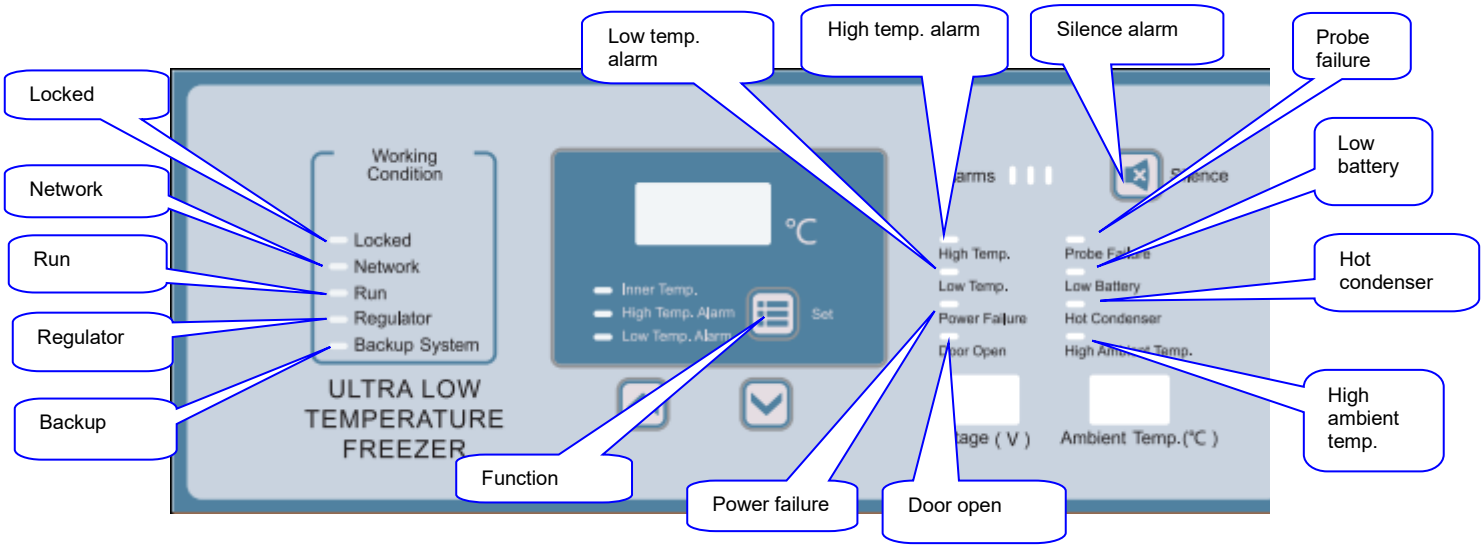
4.3 Chest series ： NU-99420JE NU-99420JG

Front View

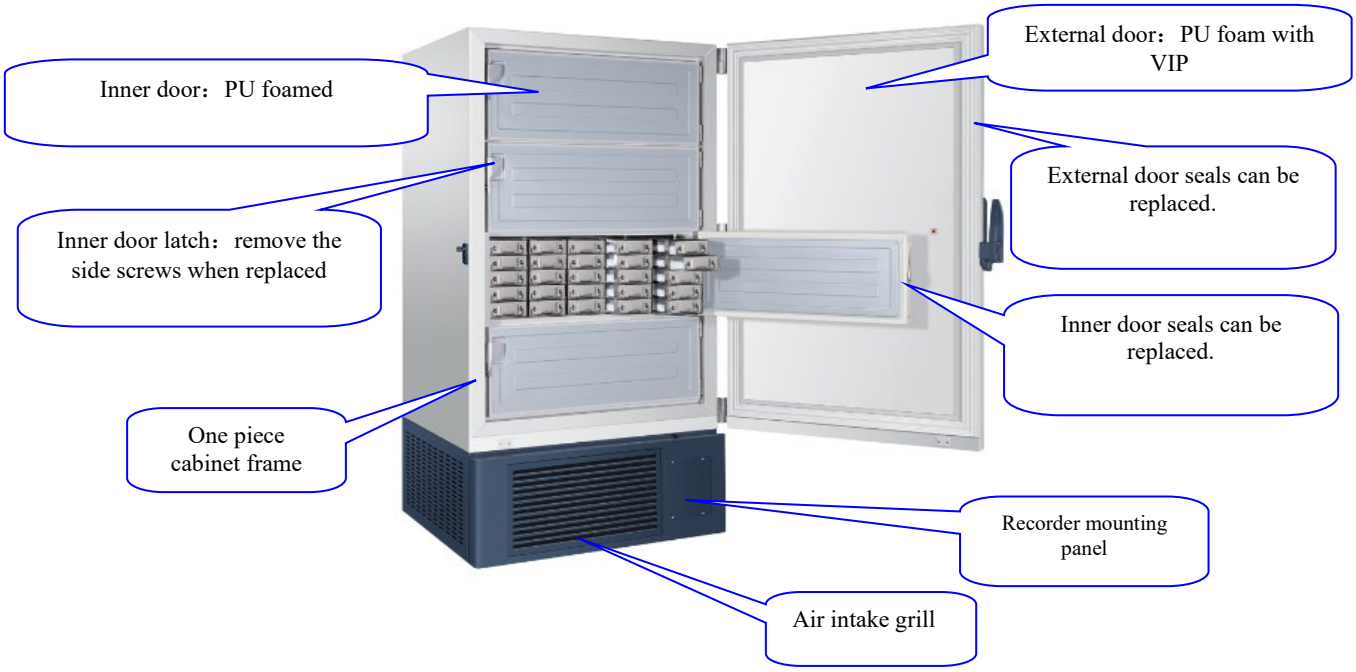
Open door View

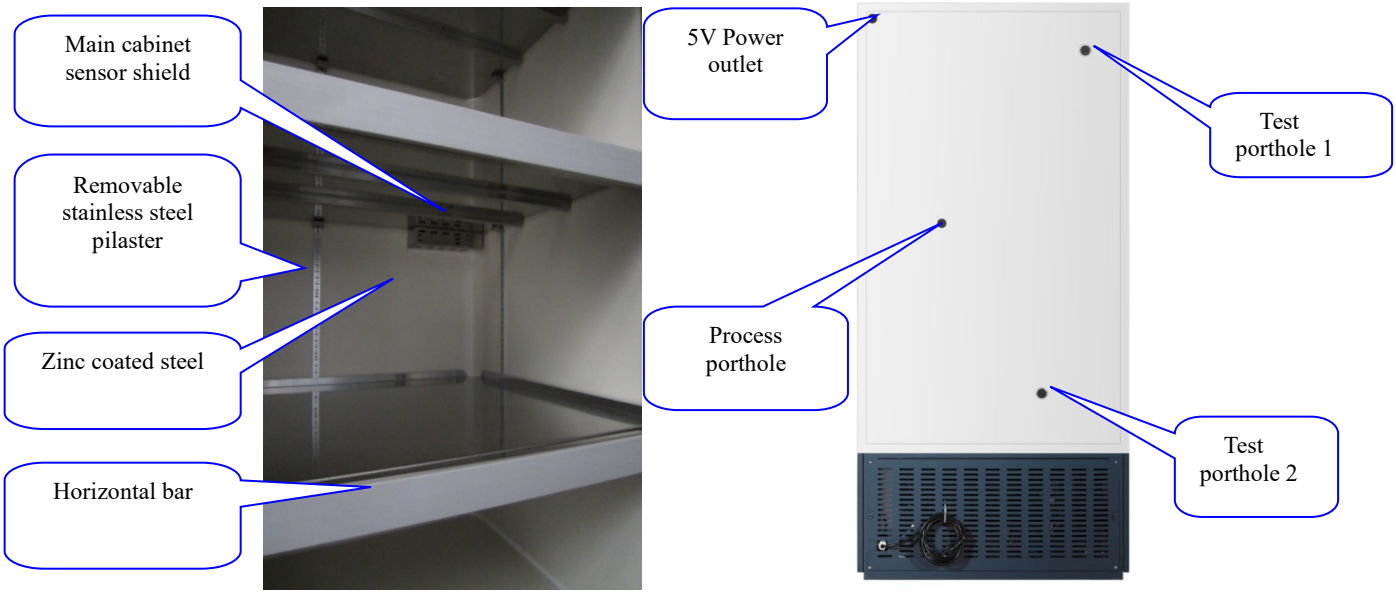
5. Product Component Structure & Names

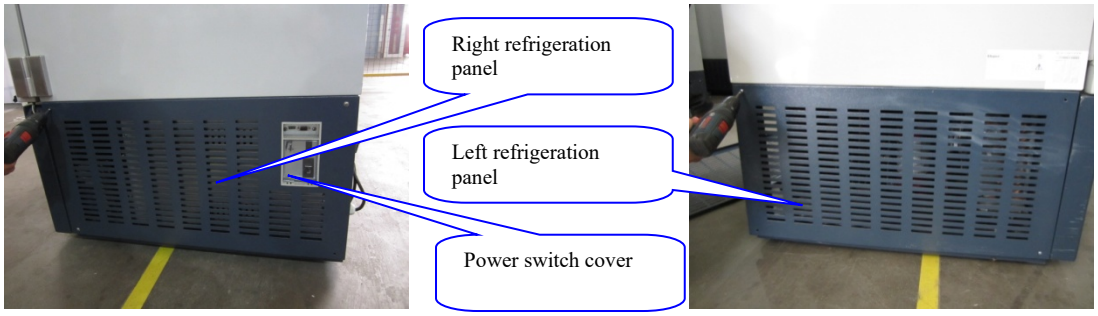
5.1 Display: NU-99486JE NU-99578JE/578JGA/578JGA NU-99420JE NU-99420JG NU-99728JE/728JGA/728JGA NU-99828JE/828JG NU-99338JE/338JG/338JGA NU-99420JE NU-99420JG

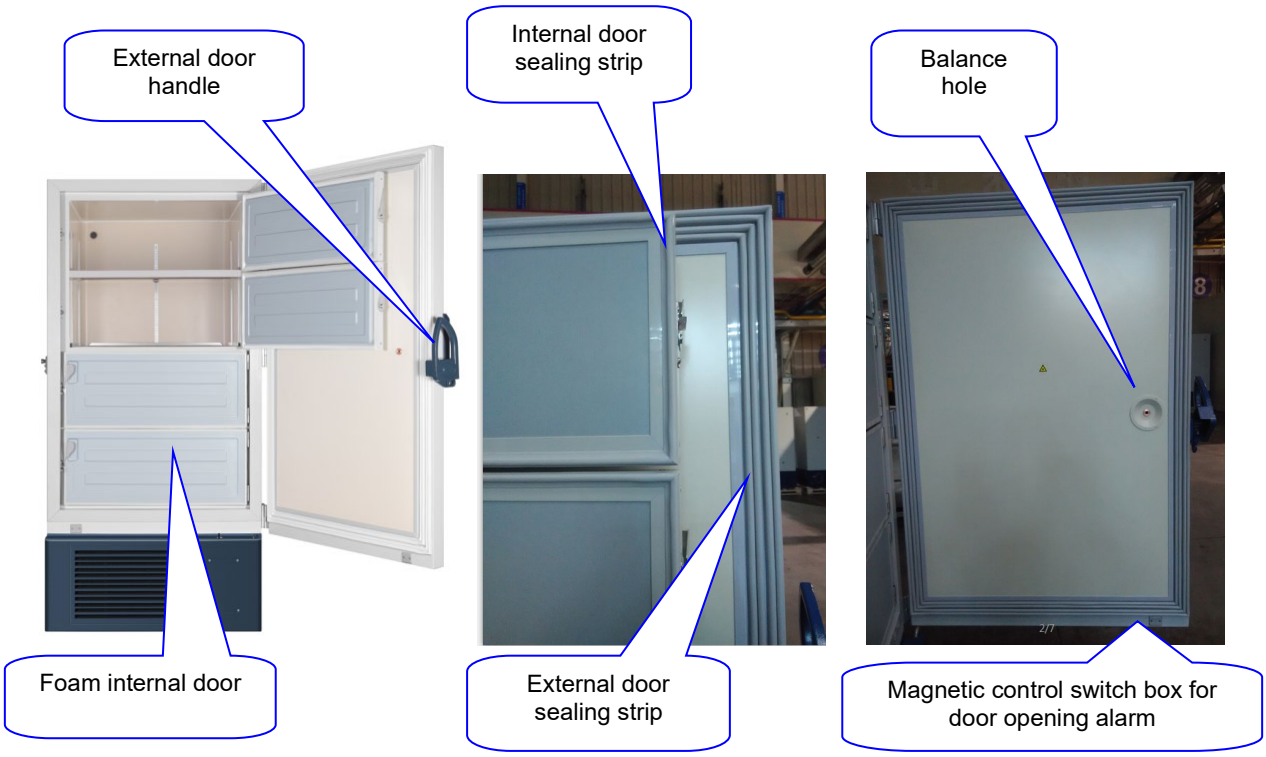


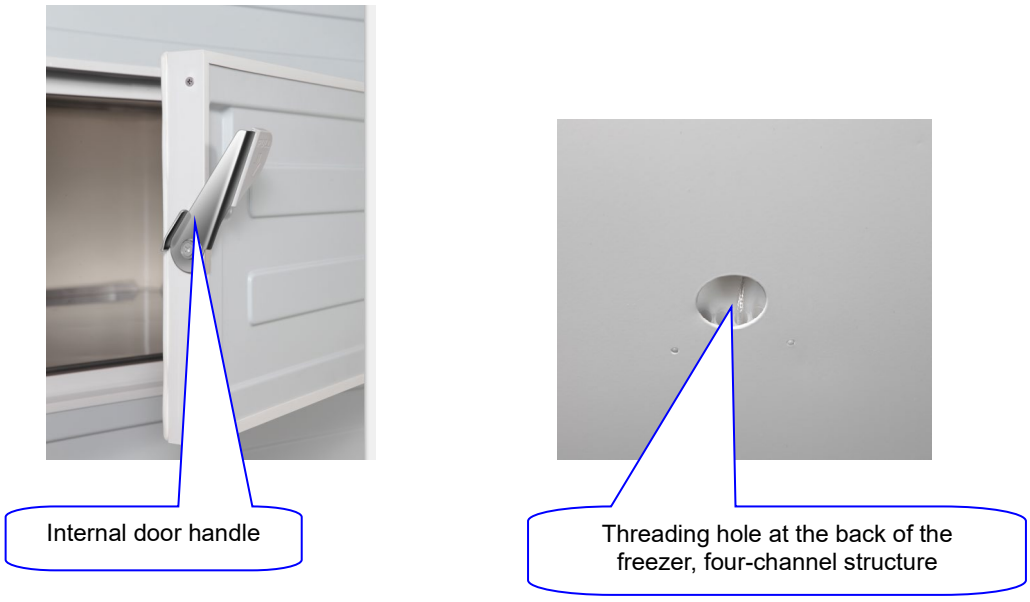
5.2.1 Cabinet Structure



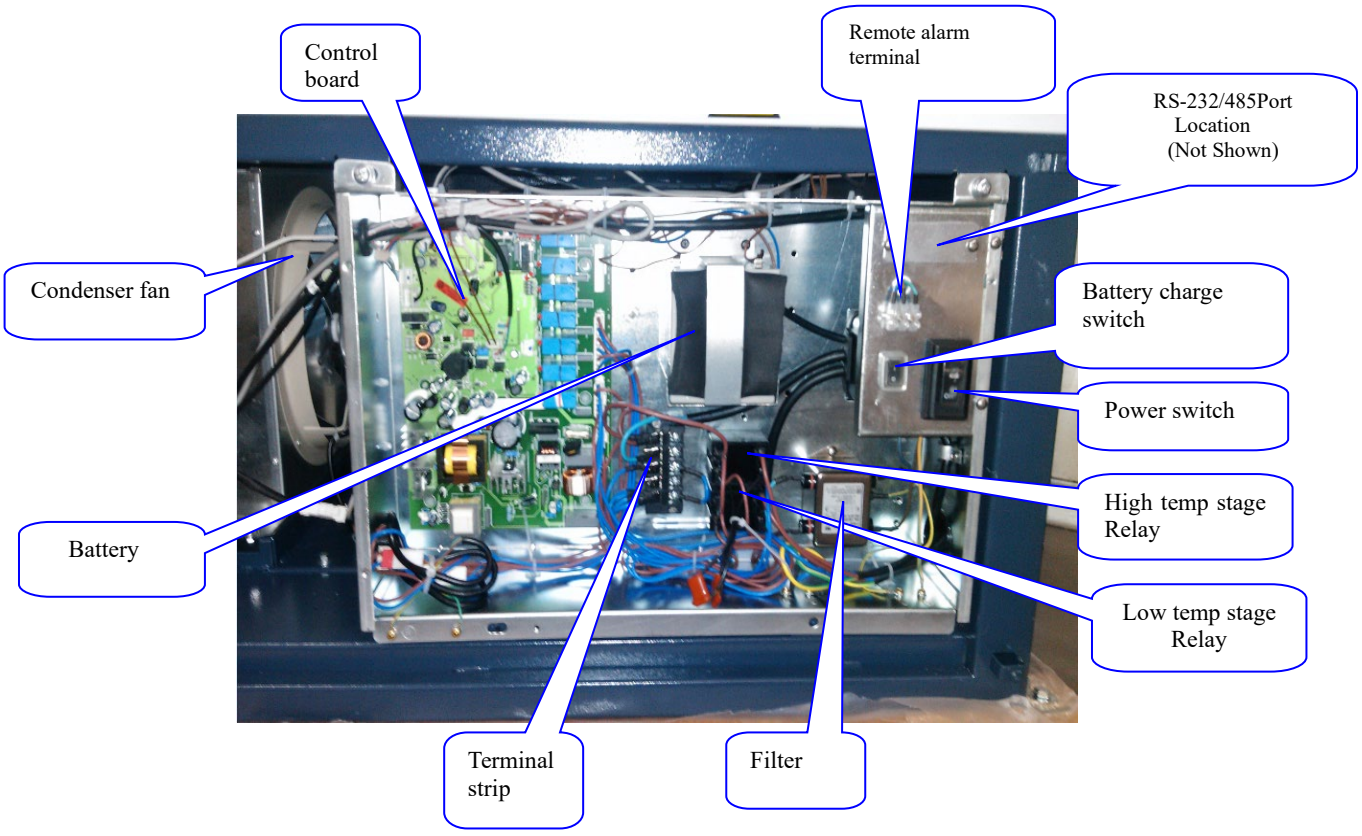


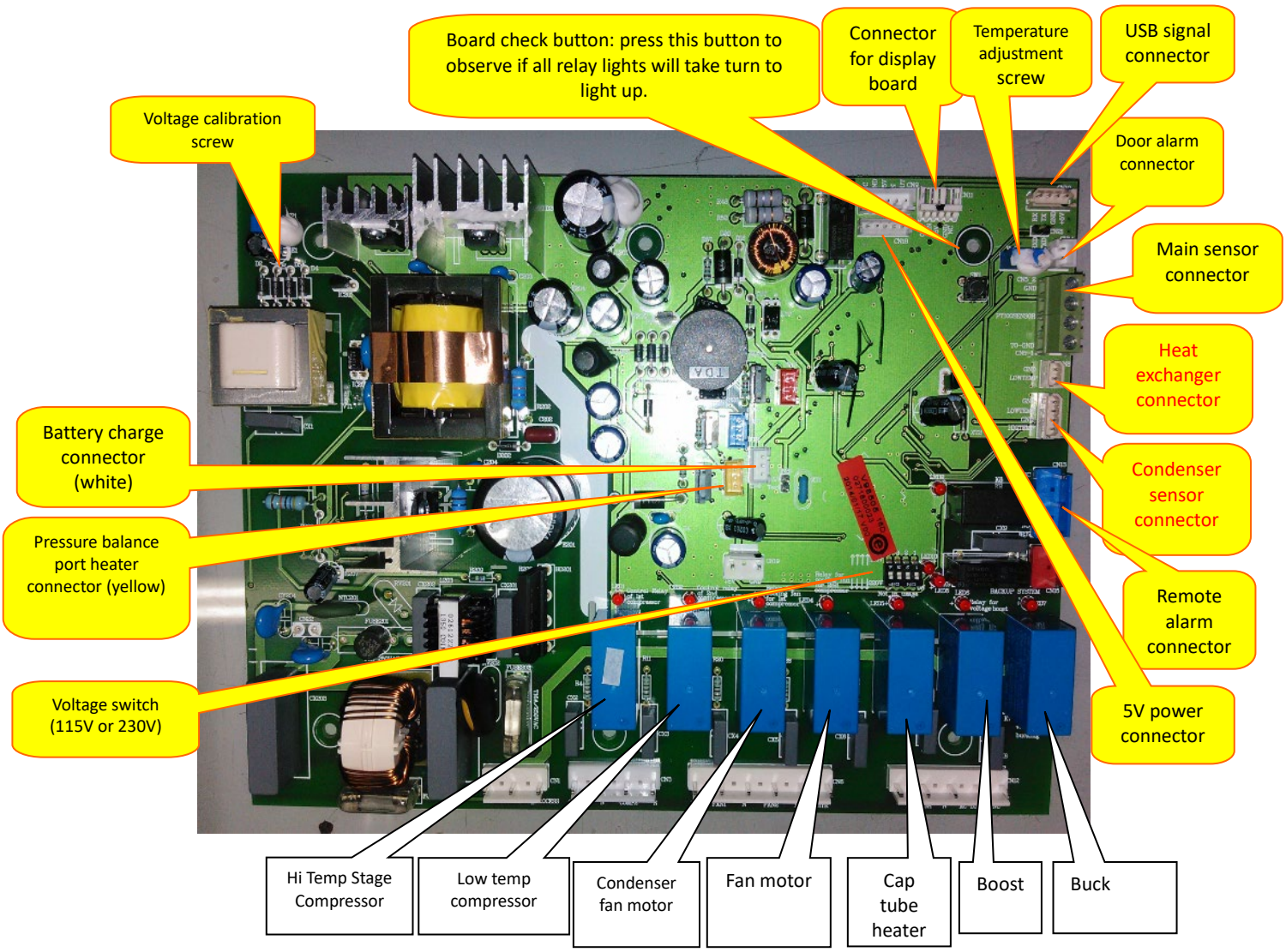


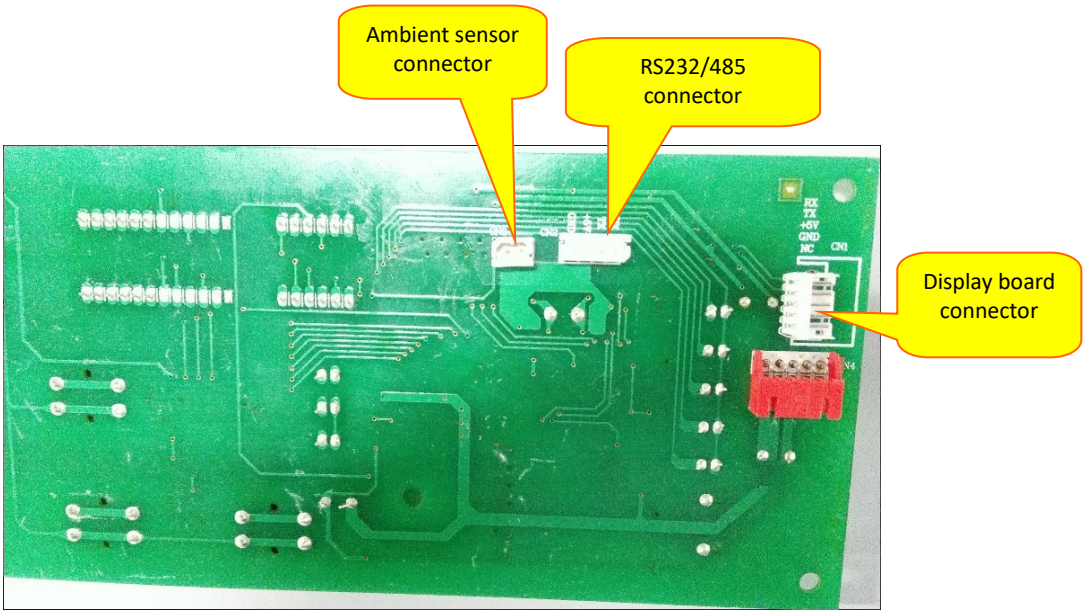

External door handle
Internal door sealing strip
Balance hole
Foam internal door
External door sealing strip
Magnetic control switch box for door opening alarm


Internal door handle
Threading hole at the back of the freezer, four-channel structure

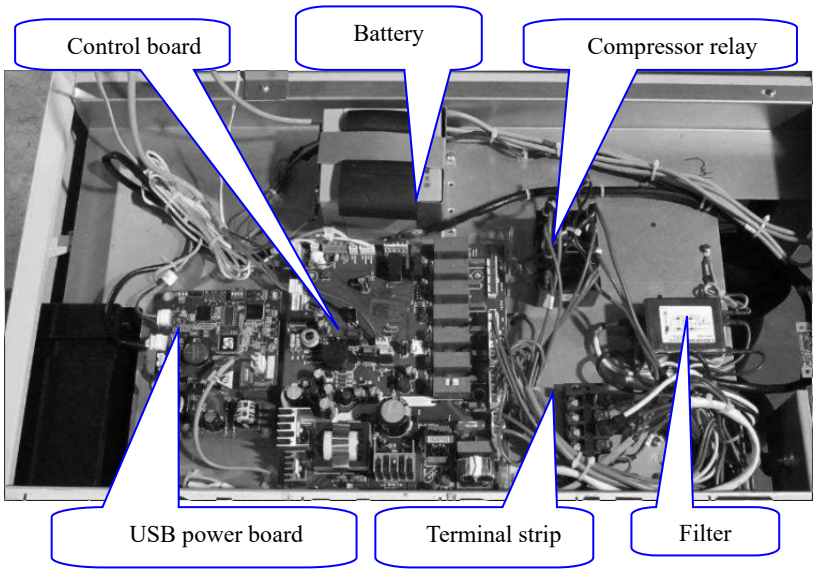
5.3.1 Electric cabinet：NU-99486JE NU-99578JE/578JGA/578JGA NU-99728JE/728JGA/728JGA NU-99828JE/828JG NU-99338JE/338JG/338JGA

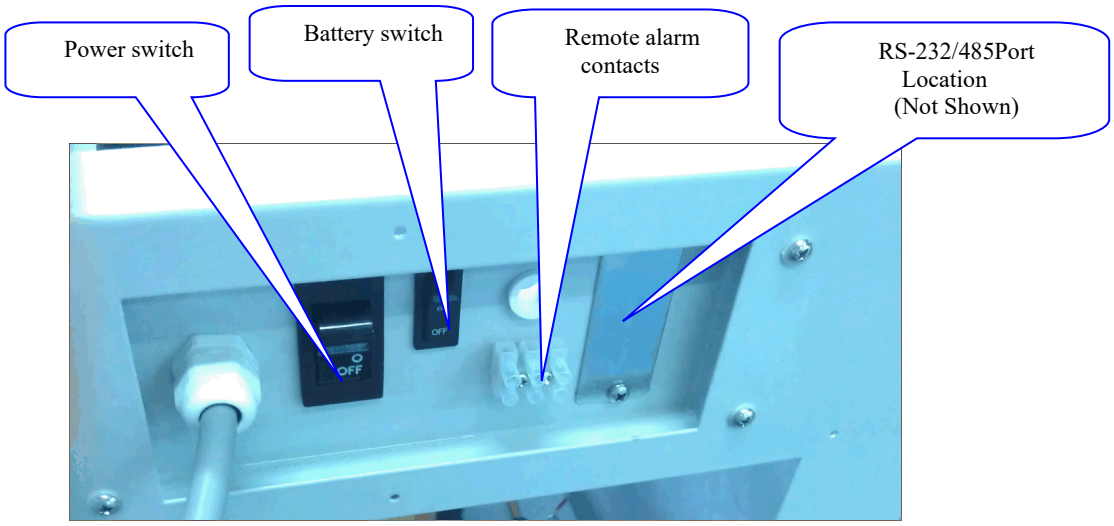



Board check button: press this button to observe if all relay lights will take turn to light up.
Connector for display board
Temperature adjustment screw
USB signal connector
Voltage calibration screw
Door alarm connector
Main sensor connector
Heat exchanger connector
Battery charge connector (white)
Condenser sensor connector
Pressure balance port heater connector (yellow)
Remote alarm connector
Voltage switch (115V or 230V)
5V power connector
Hi Temp Stage Compressor
Low temp compressor
Condenser fan motor
Fan motor
Cap tube heater
Boost
Buck


Ambient sensor connector
RS232/485 connector
Display board connector

5.3.2 Junction box: NU-99420JE NU-99420JG

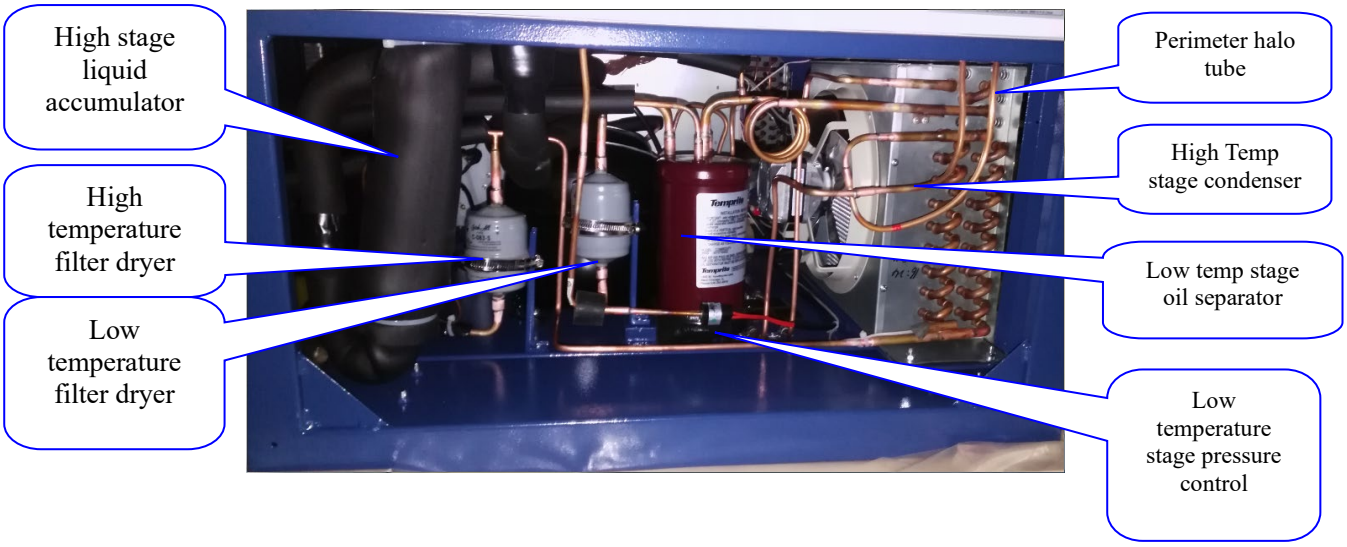


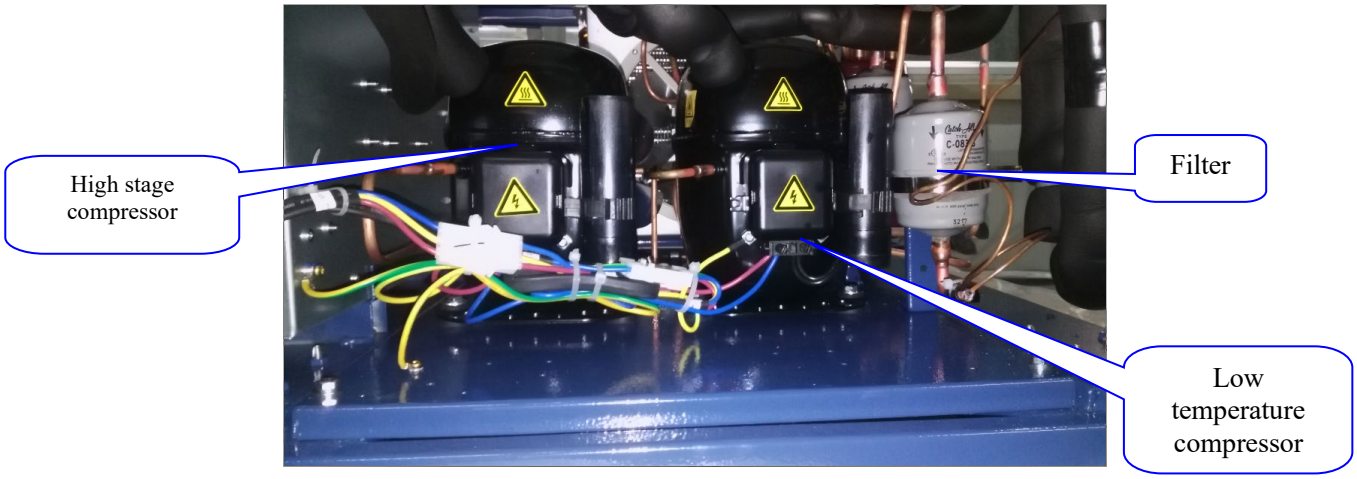


5.4 Refrigeration

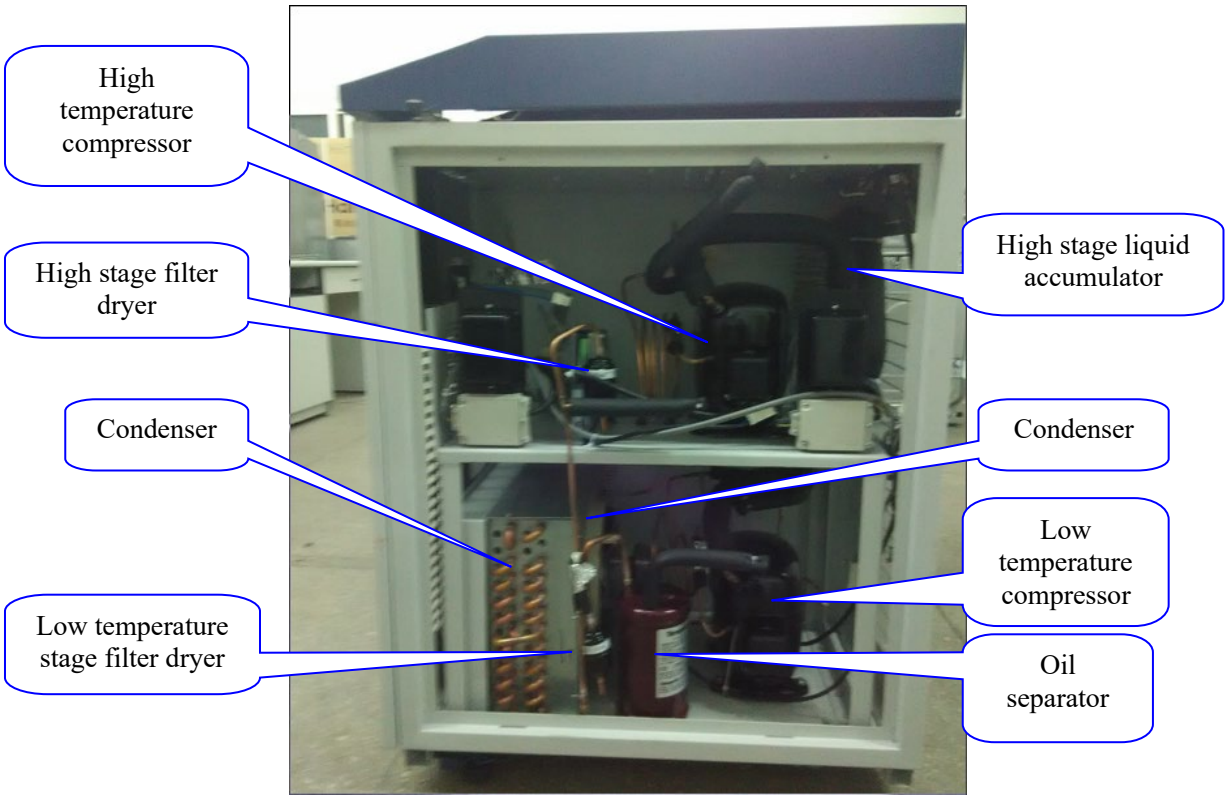
5.4.1 Refrigeration System :NU-99486JE NU-99578JE/578JGA/578JGA

NU-99728JE/728JGA/728JGA NU-99828JE/828JG NU-99338JE/338JG/338JGA





5.4 .2 Refrigeration system: NU-99420JE NU-99420JG



6. Product Use Introduction & Product Improvement Introduction

6.1 Unlocking:

Press the key “UP” or “DOWN”. When “00” is displayed on the display panel, adjust the key "UP" to “06” (“06” is the default password) and then press the key “ SET” for 3 seconds. When the lock indicator turns off, the unit is unlocked.

6.2 Temperature Setting Operation:

Pressing the key “SET” under the unlocking state will cycle through the Inner temp, High Temp alarm, and low Temp alarm setpoints. After their indicators turn on, press the key “UP” or “DOWN” to regulate the temperature.

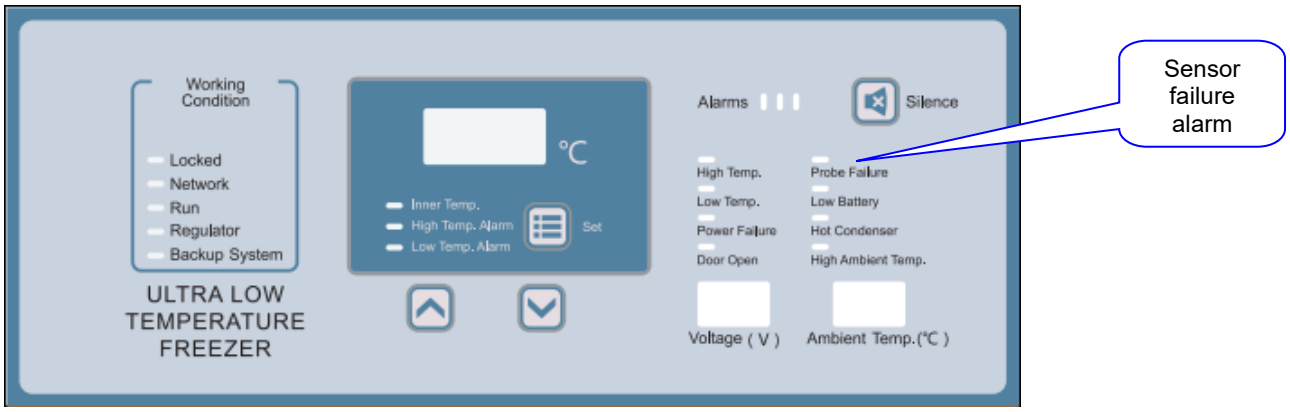
6.3 Notes

6.3.1 After you install or move the equipment for the 1st time, please rotate its horizontal trundles clockwise to make them stand on the ground and ensure the freezer does not move while using. After installation and fixation, wait 24 hours to turn unit on.

6.3.2 The ambient temperature shall be kept below 28℃. (If the ambient temperature is higher than 32℃, the cooling efficiency will go down quickly and the compressor might be damaged or its service life might be shorter if the ambient temperature exceeds 32℃ for a long time. Therefore, we advise you install an air-conditioner in the room of the product.)

6.3.3 A single freezer shall be equipped with an independent socket and the maximum current borne by the power socket shall exceed 16A and the socket shall be grounded reliably.

6.3.4 When you switch on the freezer, firstly turn on the battery switch in the electric control cabinet of the freezer, then the main power switch. If you want to shut down the freezer for a long time, please switch off the power supply and then turn off the switch.



6.3.5 The door of the low-temperature freezer shall not be opened over 1min. and the icy water on the sealing strip of the door shall be dried and cleaned to ensure the good sealing effect.

6.3.6 In order to prolong the service life of the equipment and reduce its energy consumption, we advise you set its optimal temperature between -50℃ and -80℃ when you use it, on the premise that the safety of preserved goods is ensured.

6.3.7 This product is used for preserving goods at low temperature but not for the quick-freezing purpose. It shall not be used for quick-freezing a lot of goods or large-volume liquid goods forcefully.

6.3.8 If the machine does not cool down after power is on for 2-3 hours, please switch off the power supply and contact Nuaire technical support as soon as possible.

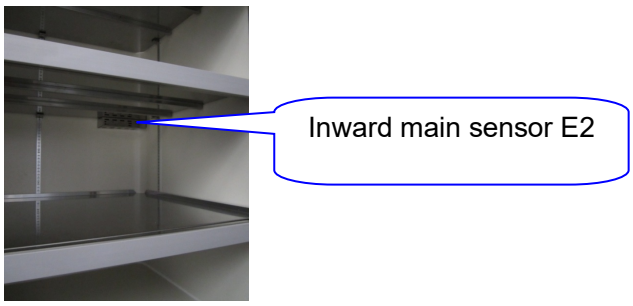
6.3.9 In case of an alarm failure or other failures, please clear the failure according to the instruction on the display panel. If there is no instruction or the failure cannot be cleared, please do not disassemble the freezer by yourself. Please contact after-sales service in time and ask professional maintainers to help you clear the failure.

6.4 Failure Code Inquiry

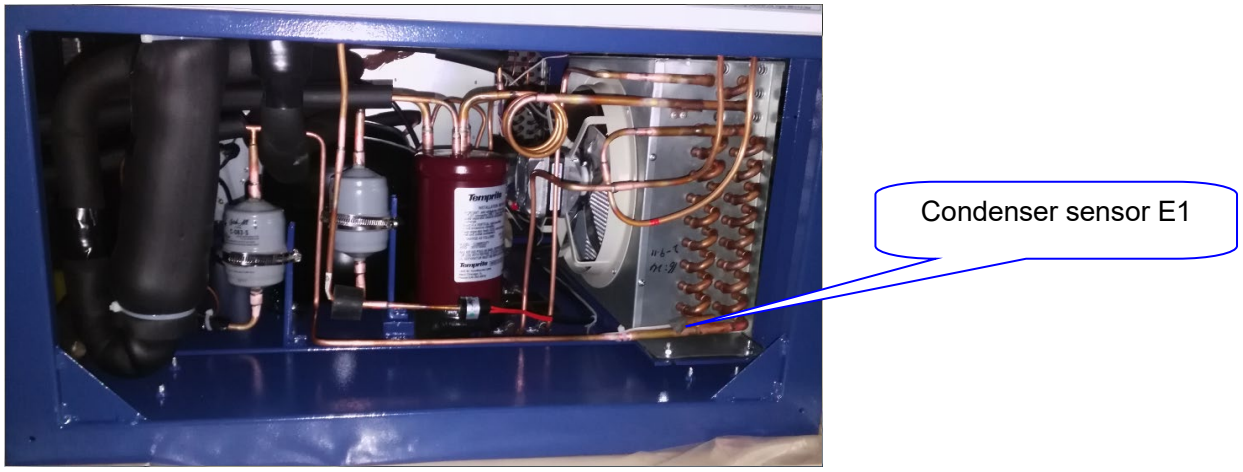
1) When the machine detects that the result of the condenser temperature minus the ambient temperature is ≥13℃ (for 5min. continuously), the “hot condenser” indicator turns on and the machine makes the relevant silence alarm. After the power supply is on, the indicator does not turn on and the machine does not make a silence alarm in 3 hours.

2) When the sensor has a failure, the indicator of the “sensor failure” turns on;

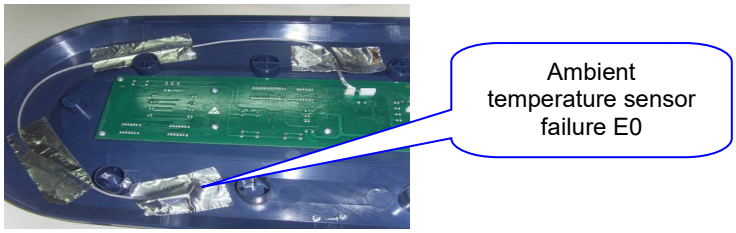
3) When the main sensor has a failure, the failure code “E2” of the main sensor and the actual temperature are displayed alternatively on the display panel.



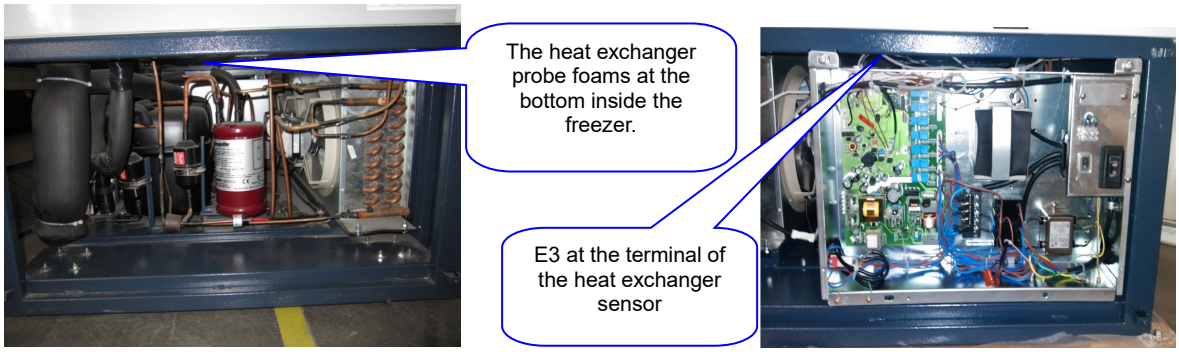
4) When the condenser sensor has a failure, the failure code “E1” of the main sensor and the actual temperature are displayed alternatively on the display panel.



5) When the ambient temperature sensor has a failure, the failure code “E0” of the main sensor and the actual temperature are displayed alternatively on the display panel.



6) When the heat exchanger sensor has a failure, the actual temperature and the failure code “E3” of the heat exchanger sensor display alternatively on the display panel. When you select -86 and “E3” appears, after you press the button for clearing the silence alarm for 5 seconds, “E3” disappears. After “E3” displays, after the high temperature compressor is started, the low temperature compressor will start with a 1 minute. delay.



7) When the temperature detected by the heat exchanger sensor is ≥90℃, the alarm displays E4.

Remark: (If the product has no heat exchanger sensor from -25℃ to -50℃, failures E3 and E4 will not happen to it.)

(If the product has an independent backup system, failures E0, E1, E3 and E4 will not happen to it.)

Alternative display time: the actual temperature is displayed for 6s and the failure code is displayed for 2 seconds.

6.5 Probe resistance changes with the change of the temperature (probe type: NTC, mainly for ambient temperature sensor, condenser temperature sensor and heat exchanger sensor)

Temperature (℃)	Resistance (KΩ)	Temperature (℃)	Resistance (KΩ)	Temperature (℃)	Resistance (KΩ)	Temperature (℃)	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 the temperature change (probe type: PT100, mainly for the temperature sensor in the freezer)

Temperature (℃)	Resistance (Ω)	Temperature (℃)	Resistance (Ω)	Temperature (℃)	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

7.Main Technical Parameters of the Product

7.1 Technical Parameter Table

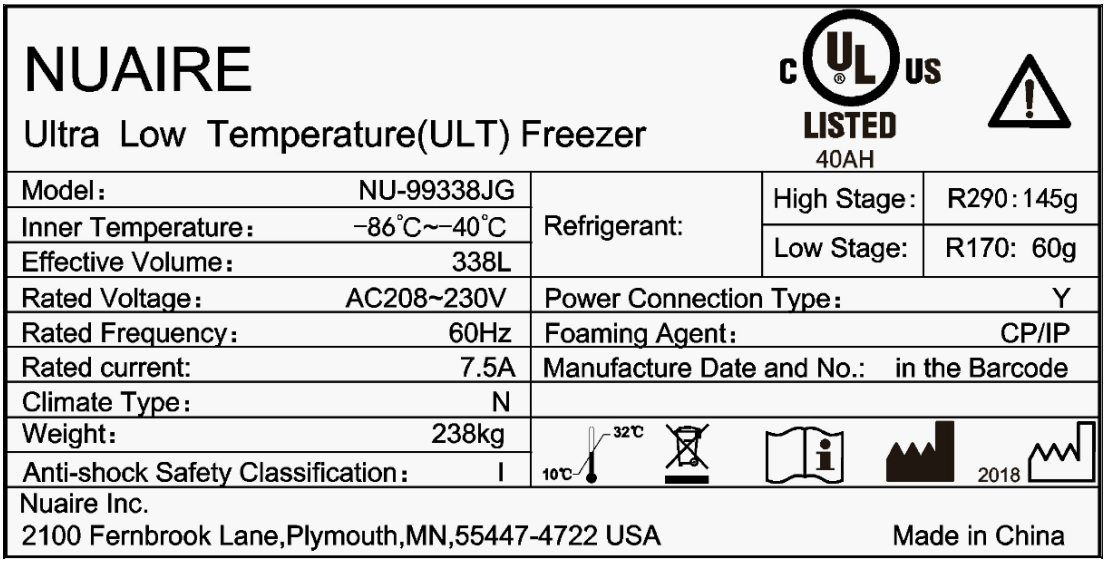
Model	NU-99578 JE	NU-99578 JG	NU-99578 JGA	NU-99728 JE	NU-99728 JG	NU-99338 JE	NU-99338 JG	NU-99338 JGA
Technical Data								
Cabinet Type	Single Door, Upright							
Climate Class	N							
Controller	Micro-processor control							
Display	LED Display with 1 C increment							
Temp Sensor	PT100							
Parameters								
Capacity(L)	578			728		338		
Power Suppiy （V/Hz）	220~240 50	208~230 60	115 60	220~240 50	208~230 60	220~240 50	208~230 60	115 60
Power（W）	750	1000	1000	1000	1000	650	1000	1000
Electrical Cueernt	6	9	18	10	10	5	7.5	12
Interior Dimension （W*D*H）	620*716*1310 (mm) 24.4*28.2*51.6 (in)			766*716*1310 (mm) 30.2*28.2*51.6 (in)		465*630*1165 (mm) 18.3*24.8*45.9 (in)		
Exterior Dimension （W*D*H）	895*980*1960 (mm) 35.2*38.6*77.2 (in)			1041*980*1980 (mm) 41.0*38.6*78.0 (in)		812*893*1846 (mm) 32.0*35.2*72.7 (in)		
Net/Gross Weight	300/330 (kg) 661/728 (lb)			345/380 (kg) 761/838 (lb)		238/278 (kg) 525/613 (lb)		
Material								
External Material	Zinc-coated steel							
Internal Material	Zinc-coated steel							
Heat preservation Material	Composite Insulation with VIP and fluoride free PU foam							
Door Thickness	90 (mm) 3.54 (in)					90 (mm) 3.54 (in)		
Enclosure Thickness	90 (mm) 3.54 (in)					130 (mm) 5.12 (in)		
Outside door sealing structure	Four silicone gaskets					Four silicone gaskets		
Inside door sealing structure	Independent door with single silicone gasket					Independent door with single silicone gasket		
door lock buckle	Y/1							
Product accessories								
Shelves/Inner Doors	3/4					3/2		
Shelves(W*D)	602*680 (mm) 23.7*26.7 (in)			750*680 (mm) 29.5*26.7 (in)		449*595 (mm) 17.7*23.4 (in)		
Castor / Test Hole	4/2					4/2		
Compressor type / quantity	Hermetically sealed X 2							
Compressor Model	SC21CNX.2 NLE12.6CN L(2018.5.1)	SC21CN LX.2(20 8~230V/ 60Hz)	SC18CM X.2(115 V/60Hz)	SC21CN X.2(220~ 240V/50 Hz)	SC21CN LX.2(208 ~230V/6 0Hz)	SC21CN X.2 NLE12.6 CNL(20 18.5.1)	SC21CN X.2(208~ 230V/60 Hz)	NLE11CN L(115V/60 Hz)
Refrigerant	HC-Free/H-R290 L-R290 R170（Refer to 8.5.4 for actual charge）							

Model	NU-99828JE	NU-99828JG
Technical Data		
Cabinet Type	Single door, upright	
Climate Class	N	
Controller	Microprocessor control	
Display	LED Display with 1 C increment	
Temp Sensor	PT100	
Parameters		
Capacity(L)	828	
Power Supply（V/Hz）	220~240V/50Hz	208~230V/60Hz
Power（W）	1000	1000
Electrical Current	10	10
Interior Dimension （W*D*H）	870*716*1310 (mm) 34.3*28.2*51.6 (in)	
Exterior Dimension （W*D*H）	1145*980*1980 (mm) 45.1*38.6*78.0 (in)	
Net/Gross Weight	380/410 (kg) 838/904 (lb)	
Material		
External Material	Zinc-coated steel	
Internal Material	Zinc-coated steel	
Heat preservation Material	Composite Insulation with VIP and fluoride free PU foam	
Door Thickness	90 (mm) 3.54 (in)	
Enclosure Thickness	90 (mm) 3.54 (in)	
Outside door sealing structure	Four silicone gaskets	
Inside door sealing structure	Single silicone gasket on independent door	
door lock buckle	Y/1	
Product Accessories		
Shelves/Inner Doors	3/4	
Shelves(W*D)	854*680 (mm) 33.6*26.8 (in)	
Castor / Test Hole	4/2	
Compressor type / quantity	Hermetically sealed compressor X 2	
Compressor Model	SC21CNX.2(220~240V/50Hz)	SC21CNLX.2(208~230V/60Hz)
Refrigerant	HC-Free/H-R290 L-R290 R170（Refer to 8.5.4 for actual charge）	

Model	NU-99420JE	NU-99420JG
Technical Data		
Cabinet Type	Single door, chest	
Climate Class	N	
Controller	Microprocessor control	
Display	LED Display with 1 C increment	
Temp Sensor	PT100	
Parameters		
Capacity(L)	420	
Power Supply（V/Hz）	220~240V/50Hz	208~230V/60Hz
Power（W）	1000	1000
Electrical Current	7.5	7.5
Interior Dimension（W*D*H）	1367*462*652 (mm) 53.8*18.2*25.7 (in)	
Exterior Dimension（W*D*H）	2130*870*1020 (mm) 83.9*34.3*40.2 (in)	
Net/Gross Weight	310/357 (kg) 683/787 (lb)	
Material		
External Material	Zinc-coated steel	
Internal Material	Stainless steel	
Heat preservation Material	Composite Insulation with VIP and fluoride free PU foam	
Door Thickness	100 (mm) 3.94 (in)	
Enclosure Thickness	140 (mm) 5.51 (in)	
Outside door sealing structure	Single silicone gasket	
Inside door sealing structure	/	
door lock buckle	Y/1	
Product Accessories		
Shelves/Inner Doors	0/3	
Shelves(W*D)	/	
Castor / Test Hole	4/1	
Compressor type / brand / quantity	**Hermetically sealed compressor X 2**	
Compressor Model	SC21CNX.2(220~240V/50Hz)	SC21CNlX.2(208~230V/60Hz)
Refrigerant	HC-Free/H-R290 L-R290 R170（Refer to 8.5.4 for actual charge）	

7.2 Product Nameplate

For example NU-99338JG



NUAIRE

Ultra Low Temperature(ULT) Freezer

c UL us LISTED 40AH

Model:	NU-99338JG	Refrigerant:	High Stage:	R290:145g
Inner Temperature:	−86˚C~−40˚C		Low Stage:	R170: 60g
Effective Volume:	338L			
Rated Voltage:	AC208~230V	Power Connection Type:		Y
Rated Frequency:	60Hz	Foaming Agent:		CP/IP
Rated current:	7.5A	Manufacture Date and No.:		in the Barcode
Climate Type:	N			
Weight:	238kg	10℃ 32℃		2018
Anti-shock Safety Classification:	I			

Nuaire Inc.
2100 Fernbrook Lane,Plymouth,MN,55447-4722 USA Made in China

8. Case Prevention Measures, Product Use and Daily Maintenance Knowledge

8.1 Refrigeration Principle of ULT Freezer:

The ultra-low temperature freezer is equipped with a cascade refrigerating system normally composing of two or more refrigerating systems, i.e. a low temperature stage and high temperature stage. For the high temperature stage, the medium-temperature refrigerant is used; for the low temperature stage, the low-temperature refrigerant is used. Each part is a complete refrigerating system, a cooling evaporator is used for linking the two parts together, and it is an evaporator of not only the high temperature stage but also the low temperature stage. The low temperature refrigerant absorbs heat from the cooled object in the evaporator of the low temperature system and then transfers the heat to the refrigerant in the high temperature system through the cooling evaporator, and then the refrigerant in the high temperature system transfers heat to the cooling medium in the high temperature condenser.

8.2 ULT Freezer Use Method

Use Method:

After the ULT freezer is used for the 1st time or moved or switched off (including power failure) over 10h, check it before being used again (or switched on again). Check and test if it is qualified.

Low temperature freezer use method:

1) The freezer shall be switched on only after it is unmoved for 24 hours.
2) Keep the freezer empty and switch it on. Firstly, reduce the temperature of the freezer to -40℃ by stage. After the freezer is switched on and off normally, reduce its temperature to -60℃. 8 hours later, reduce its temperature to -80℃ and observe if the freezer is normal after being switched on for 24 hours. If yes, The freezer is performing as expected.
3) After confirming the freezer is normal according to operation steps in step 2, you can put goods into the freezer. In principle, goods to be stored at -60℃ shall not exceed 1/3 of the container capacity.
4) NOTES: All low temperature preservation containers shall be low temperature preservation equipment and used for preserving low temperature goods but not for quick-freezing high temperature plasma products. It is strictly forbidden to put too many relatively hot goods into the freezer. Otherwise, the compressor will run continuously for a long time and might burn easily and goods in the freezer might be damaged if the temperature does not go down constantly. Goods shall be put into the freezer in batches and the temperature shall be reduced step by step, until it reaches the low temperature you need!!!

8.3 Working Principle of Pressure Switch

A. Principle: When the pressure in the pressure switch pipe exceeds 2.1 MPa, the contact is disconnected, the low temperature freezer switches off and the pressure goes down. When the pressure drops to 1.35 MPa, the contact is connected and the low temperature freezer switches on. When the pressure exceeds 2.1 MPa, the contact is disconnected again and the circulation starts sequentially.

B. Notes: When the pressure switch is burnt, put a wet towel on it and keep the temperature no more than 100℃. Parameters of this pressure switch are not adjustable.

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

8.4 Refrigerant Characteristics

1). Refrigerants are mixed and some of them are combustible and explosive. The charging place shall be ventilated. In case of leakage, it is forbidden to ignite or spark nearby. In case of any failure of the refrigerating system, the local after-sales service provider will analyze and feed it back and the engineer of Medical Business Division of Haier will give an instruction to the local after-sales service provider on maintenance according to the actual condition.

2). High temperature stage: R290; Low temperature stage: R170 (and some R290 in some units)

8.5 Refrigerant Charging Process:

8.5.1 Preparation

1) Refrigerant (R290 and R170.)

2) Hansen valve

3) Standard electronic scale (error ≤±2g)

4) Vacuum pump (≥4L)

5) Pressure gauge (high and low pressures shall be read at the same time) See Fig. 1.

8.5.2 System Cutoff

1) Cut off the failure system from the end of the process pipe with a pipe wrench and discharge the refrigerant in the system.

2) Finish welding the open pipeline with the pressure gauge in 20min. after the system is cut off.

[Notes]

*1）This series is a two-stage refrigerant system with separated high temperature stage and low temperature stage. Do not open the two systems at the same time during maintenance and make clear which system needs to be cut off.

*2）If the humidity in the maintenance workshop or if it is rainy or cloudy, it is forbidden to cut off the system and each pipeline of the system which has been cut off shall be welded well at once.

*3）Since the machine has the strict requirement for moisture in the system, each pipeline port shall be sealed up with adhesive tape immediately after it is cut off, so as to prevent from air entering the system, and also the pipeline at each port shall be welded completely in 20min.

*4）Refrigerant R290 / R170 is flammable refrigerant, so the maintenance area must be well ventilated.

8.5.3 Vacuum-pumping

1) Connect the vacuum pump adapter with the public adapter in the middle of the pressure gauge. See Fig. 2.

2) Switch on the vacuum pump for vacuum-pumping and the vacuum shall be ≤3Pa. See the attached notes for the reference. See Fig. 3.

3) When the vacuum meets the said requirement, stop pumping at high temperature firstly and quickly weld and seal up the high temperature charging pipe (the pipe cannot be sealed up when the refrigerant pressure is too high and the freezer refrigerates), and then continue vacuum-pumping for 1h at the low pressure. See Fig. 4.

4) After that, switch off the pressure gauge valve. Meanwhile, the machine shall be kept at the negative pressure for 1h, so as to check if the machine system is under the vacuum state. At the same time, observe if the pressure indicated by the pressure gauge goes up. Otherwise, vacuum-pumping for 1h shall be conducted again. Then, continue to keep the machine under the negative state for 1h above continuously, and stop vacuum-pumping and start charging until the pressure does not go up.

[Notes]

*The vacuum pump above 4L shall be pumped for 12h.

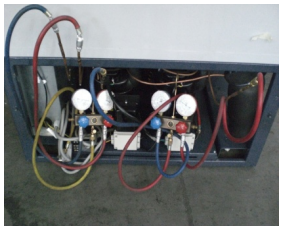


Fig. 1

Fig. 2

Fig. 3

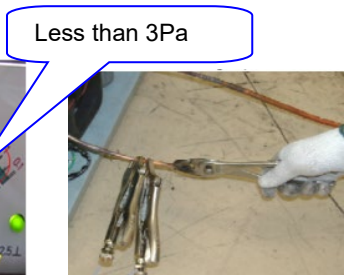


Fig. 4

8.5.4 Charging Refrigerant

1) High temperature level perfusion, machine should be in stop state, reperfusion, refrigerant R290 perfusion measure implemented according to the attached form!

2) When the low temperature refrigerant is filled, the machine shall also be off. Firstly, fill R290 refrigerant and then fill R170 refrigerant, and also the HRB refrigerant pressure shall be higher. Please strictly fill according to the attached table!

3) Seal up the charging process pipe well after charging. See Fig. 6 for the sealing effect.

[Notes]

*** In order to ensure charging the refrigerant once in place, the steel cylinder must be put upside down for charging the above refrigerant. See Fig. 5.**

[Notes]

* The low temperature refrigerant charge must be accurate, even a tiny little difference may affect the refrigerating effect.

* The R170 refrigerant pressure is high and the refrigerant charge is very low, so the steel cylinder valve shall be switched on slowly to avoid wasting the refrigerant.

* If the pressure of R170 refrigerant is too high and unbearable for a normal steel cylinder, R170 refrigerant shall be filled in an oxygen cylinder. When using, the outlet at the bottom of the steel cylinder shall be blocked so as to avoid refrigerant leakage and then you can use the outlet on the top for charging. When the refrigerant is filled as above, the steel bottle can be kept vertical for filling gas.

* In order to ensure that the refrigerant is filled accurately, a electronic scale must be used for weighing and charging all refrigerants.

* The requirement for the accuracy of the refrigerant charge (g) of the ULT freezer product series is very strict. The service company must prepare a standard electronic scale with the tolerance of 2g before maintenance.

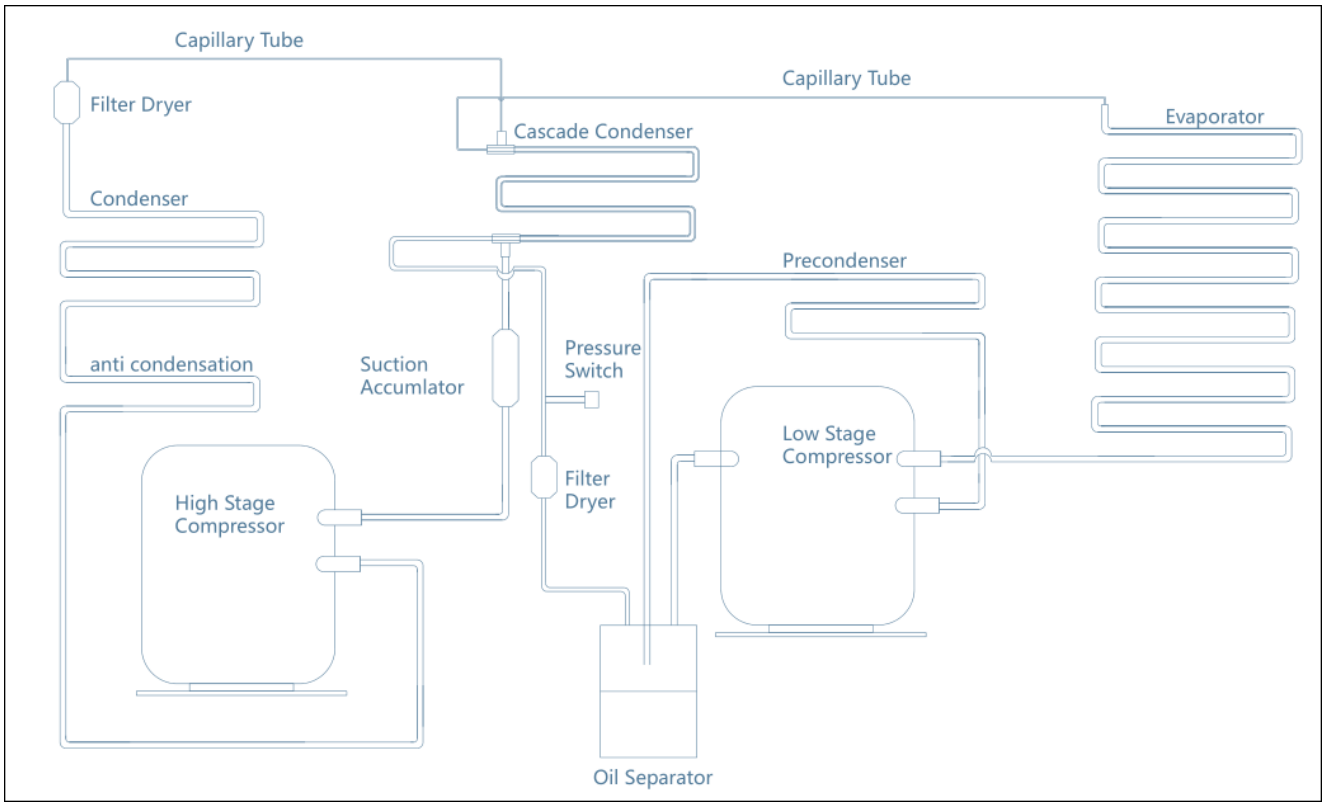
Fig. 5

Fig. 6

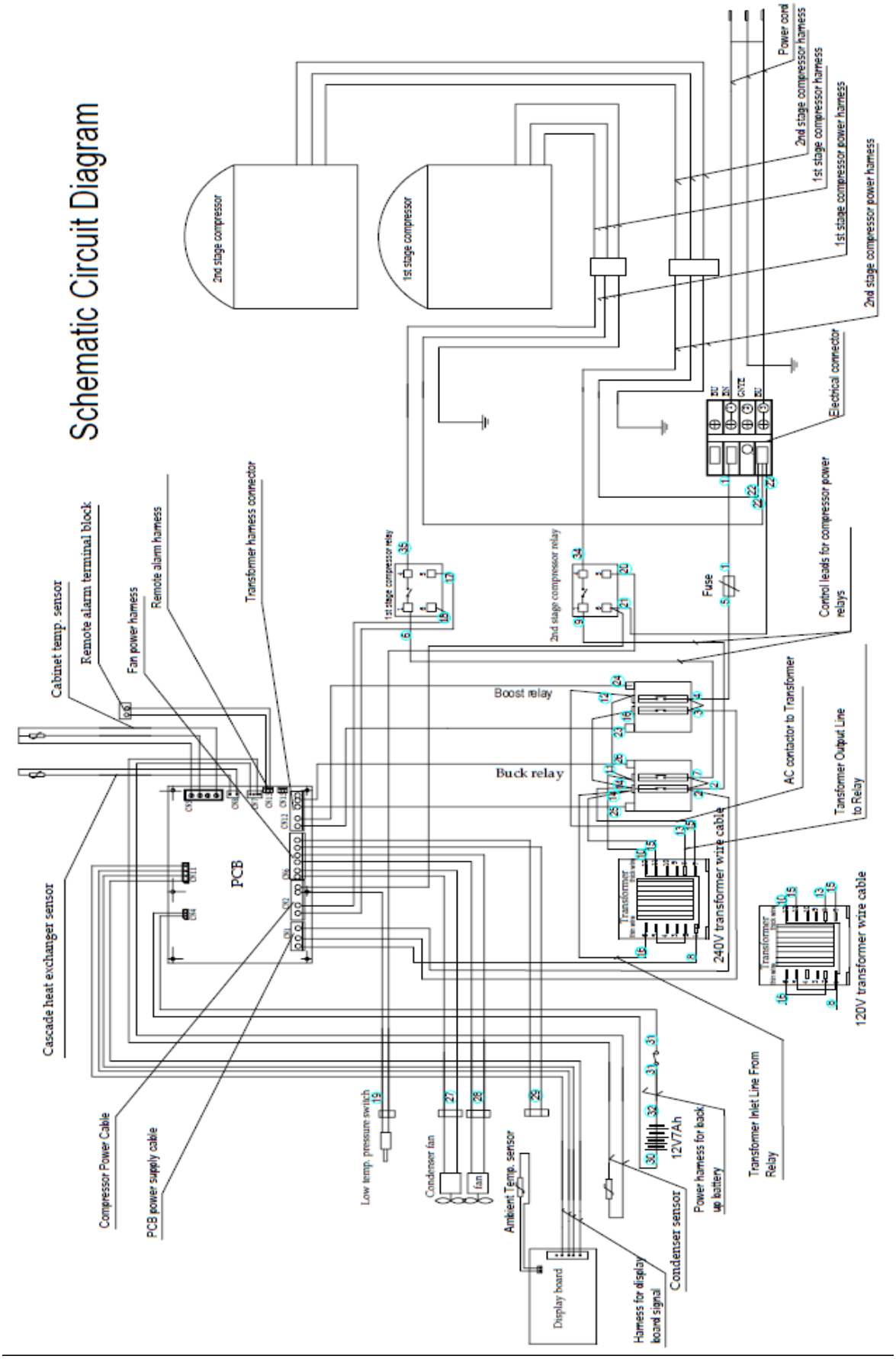
ULT Full Series Refrigerant Charge

Model	Power Supply （V/Hz）	Gas a	Gas b	
		1 stage(g)	2 stage(g)	
		R290	R290	R170
NU-99338JE	220~240V/50Hz	135	/	60
NU-99338JG	208~230V/60Hz	145	/	60
NU-99338JGA	115V60Hz	135	/	60
NU-99486JE	220~240V/50Hz	150	/	105
NU-99578JE	220~240V/50Hz	150	5	90
NU-99578JG	208~230V/60Hz	145	/	80
NU-99578JGA	115V60Hz	150	/	90
NU-99728JE	220~240V/50Hz	150	5	90
NU-99728JG	208~230V/60Hz	150	/	95
NU-99728JGA	115V60HZ	145	/	95
NU-99828JE	220~240V/50Hz	150	5	105
NU-99828JG	208~230V/60Hz	150	/	110
NU-99420JE	220~240V/50Hz	150	/	60
NU-99420JG	208~230V/60Hz	135	/	65

9. Schematic Diagram and Wiring Diagram of the System

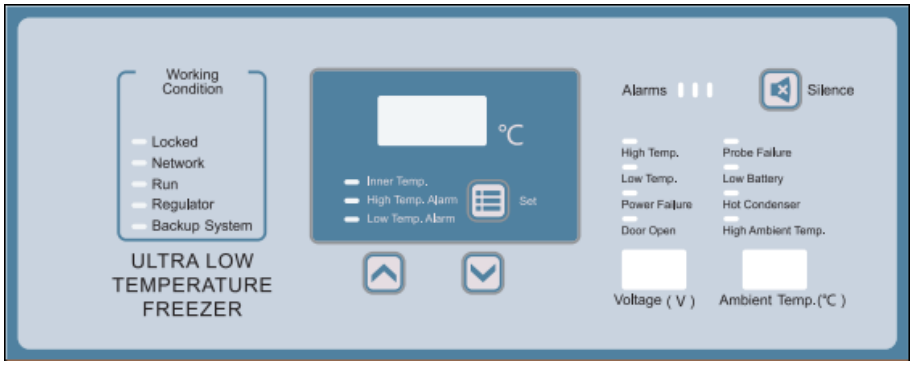


9.1 Circuit Diagram



10. Specific Control, Work Principle and Parameters

Nuaire ULT's have the temperature control system with a LED computer panel for controlling the switch-on/off state of the compressor.



10.1 Temperature control system with a LED computer panel for controlling the switch-on/off state of the compressor

1) In order to regulate the set value, firstly unlock the machine. First, press "△" or "▽". When the temperature set value flickers, press "△" to input the figure "06". Then, press the "SET" key for 5s. When the "Lock" indicator turns off, the machine is unlocked, and you can set the following values. Press the "SET" key to cycle through the temperature in the freezer, the high temperature alarm and the low temperature alarm in a round robin fashion and also the relevant indicators will turn on.

2) To set the Inner temperature, the temperature set value flickers in the temperature setting display area. At that time, press "△" or "▽" to change the temperature set value. After that, the machine will be locked automatically and the temperature display stops flickering if no key is operated in 10s, which means that the value has been input into the computer. Otherwise, the setting is invalid. The temperature setting scope is: -10 ~-86℃.

3) To set the High temperature alarm, the temperature set value flickers in the temperature setting display area. At that time, you can press "△" or "▽" keys to adjust the alarm set value. After that, the machine will be locked automatically and the temperature display will stop flickering if no key is operated in 10s, which means that the value has been input into the computer. Otherwise, the setting is invalid. The temperature set value for high temperature alarm shall neither be higher than the maximum temperature limit nor lower than the set temperature of +5℃.

4) To set the Low temperature alarm, the temperature set value flickers in the temperature setting display area. At that time, you can press "△" or "▽" to adjust the alarm set value. After that, the machine will be locked automatically and the temperature display will stop flickering if no key is operated in 10s, which means that the value has been input into the computer. Otherwise, the setting is invalid. The temperature set value for low temperature alarm shall neither be lower than the minimum limit temperature nor higher than the set temperature of -5℃. Otherwise, the value cannot be set.

10.2 Display and Alarm

After the freezer is switched on, it enters the starting mode, all parameters on the display panel will remain the same with data before it is switched off last time, and the actual temperature, set temperature and current voltage are displayed on the display panel.

Working condition indicators on the display panel:

If the indicator of "Locking" turns on, it means all settings are locked to avoid maloperation.

If the indicator of "Network" turns on, it means the network system is working.

If the indicator of "Run" turns on, it means the low temperature compressor is working.

If the indicator of "Regulator" turns on, it means the voltage supercharger starts increasing or decreasing the voltage.

If the indicator of "Backup System" turns on, it means the standby refrigerating system is working.

Alarm state indications:

A. “High temperature indicator: if the indicator turns on, the alarm will be displayed because the temperature in the freezer is higher than the maximum temperature set value;

B. “Low temperature indicator: if the indicator turns on, the alarm will be displayed because the temperature in the freezer is lower than the minimum temperature set value;

C. "Door open" indicator light: light flash said the door more than set time and alarm display.

D. If the indicator of “Too High Ambient Temperature” turns on, it means the ambient temperature is higher than 32℃;

E. If the indicator of “Probe Failure” turns on, it means the sensor has a failure;

F. If the indicator of “Power-off” turns on, it means the power circuit has a failure;

G. If the indicator of “Hot Condenser” turns on, it means that the condenser filter is dirty and shall be cleaned.

H. If the indicator of “Low Battery” turns on, it means the storage battery capacity is low and shall be recharged; when the AC power is supplied, the low temperature freezer will charge the storage battery automatically.

If all alarms are given, the visual alarm will flicker immediately for high and low temperatures, and then the buzzer will start the acoustic alarm after the light flickers for 15min.; after the visual alarm for power failure and improper voltage flickers for 1min., the buzzer will start to alarm; when the visual alarm for hot condenser and low battery capacity flickers, the buzzer will also make an acoustic alarm at the same time; if the ambient temperature exceeds 32℃ (excluding 32℃), the indicator of “Too High Ambient Temperature” in the alarm display area will turn on and alarm but the buzzer will not alarm; if the ambient temperature exceeds 38℃ (excluding 38℃), the indicator of “Too High Ambient Temperature” in the alarm display area will turn on and alarm and the buzzer will also alarm.

The flickering light alarm will not stop until the failure is cleared; you can press “Silence” to stop the acoustic alarm of the buzzer. Then, the buzzer keeps silent for 30min. but starts to alarm again afterwards.

10.3 Setting of Special Functions:

Password Setting:

When the low temperature freezer is used for the first time, the default unlocking password is “06”. After unlocking, if you press the key “SET” and “Silence” at the same time for 5s, “06” will display on the display panel. Then, you can press “▲” and “▼” to change the passwords among 05, 06, 07…29 and 30. If no key is operated is 5 seconds after the password is set, the freezer will be locked automatically and the new password will be effective. The figures can display from 01, 02, 03….98 to 99 on the display panel.

Set the start delay time:

When the freezer is unlocking, if you press the “SET” Key and the “▽” key at the same time for 5s, when the panel displays the freezer is just switched on, the high temperature compressor will be started with a delay of 01 (1min.). Then, you can press “△” or “▽” to set the delay from 01, 02, 03 …. 09 to 10 (optional from 1min. to 10min.) and the default delay is 1min.

Coded Lock Function

The coded lock is optional. If the product is equipped with a coded lock, the user can log on the coded lock to become a user and input the password to unlock directly so as to realize multi-people management.

(4) When the ambient temperature is higher than 35℃, if the set temperature is lower than -82℃, the temperature will be regulated to -82℃; if the ambient temperature is lower than 30℃ (including 30℃), the ambient temperature will return to the original set value.

(5) The same temperature setting method is used for the high temperature alarm and low temperature alarms.

10.4 Battery Control Requirement:

There is a battery power switch on the equipment, and the switch shall be opened before normal startup. As soon as the AC power required by the equipment is switched on, the equipment will enter the normal working state. When the AC power is normally supplied, the equipment can be charged to the storage battery according to the requirements, and the specific requirements are as follows:

1. When strong power is supplied, if the battery voltage U=0 is detected (indicating that the battery switch is not turned on), under this state, charging will not be enabled, and alarm of low battery will be directly generated: the low battery indicator turns on, alarm indicator flashes, and beeper does not sound. Purpose: to remind the user to switch on the battery in time;

2. When strong power is supplied, constantly test the battery voltage for 5min, if it meets 0＜U≤10.5V, it means that the battery is switched on, then please charge the battery according to the mode as below: after constantly charging for 24h, test the battery voltage for 5min, if it still meets 0＜U≤10.5V, it means that the battery is damaged, the alarm of low battery is generated, but charging is continued. Purpose: to remind the user that the battery may be damaged, replace the battery if necessary (alarming mode is the same as above);

After supplying power for 24, test the battery voltage, if it meets 10.5V＜U＜11.5V, alarm of low battery will not be generated, it keeps charging for 24hours, and testing for 5min till the battery voltage has reached 12.5V, then charging no longer go on;

3. When strong power is supplied, constantly test the battery voltage for 5min, if it meets 10.5V＜U＜11.5V, it enables the program of charging for 24hours and testing for 5 minutes,

and it alarms if the battery is low.

4. When the strong power is cut off by accident, the battery shall supply power to the display screen, when the battery has been discharged to U≤10.5V, the battery will stop supplying power, and the display screen no longer displays.

Under the condition that the battery can normally supply power, if you want to cut off power supply, please disconnect the AC power wire, then switch off the battery of the equipment to cut off power supply, and the display screen no longer displays. After complete cutoff of power supply, it is required that the parameters set before cutoff of power supply can be saved. The original setting parameter shall not be changed or lost automatically when the equipment is started again.

10.5. Temperature Deviation Adjustment Method:

Under the unlocking mode, if you press the “SET” key, the display panel will display a value for adjustment between +5 to -5℃. After that, the computer board will save the value automatically.

Example 1: -80℃ is displayed on the machine of a user, but the user measures that the temperature in the freezer is just -70℃, so the difference is 10℃. In order to lessen the difference, the temperature deviation can be adjusted by +5℃. Thus, the -75℃ is displayed but the temperature in the refrigerator is still -70℃. When the machine is switched on and refrigerates, the displayed temperature and the temperature measured by the user will both drop at the same time;

Example 2: -80℃ is displayed on the machine of a user. The machine cannot reach lower temperature because the ambient temperature of the user is too high. However, it is required that -82℃ shall be displayed. Then, the temperature deviation can be adjusted by -2℃. Thus, the temperature display is -82℃.

10.6 Condenser Fan Control:

When the compressors is on, two fans are on; when two compressors are off, two fans are on or off according to the following circumstances: if the ambient temperature is not lower than 20℃, the two fans will be on; if lower than 20℃, one fan will be on and the other one will be off; when the ambient temperature is lower than 12℃, two fans will be off.

10.7 Remote Alarm Function

According to the remote alarm function requirement, the freezer will have the constant ON alarm or Constant OFF alarm functions which can be selected according to the demand. In case of high temperature, low temperature or external power failure (no matter if the standby battery switch is on or off), the remote alarm function can be enabled.

10.8 Compressor Control

When power is just switched on, the time will delay according to the setting of the user (the default delay is 1min.). If the freezer meets the switch-on condition, the high temperature compressor will be started. After that, if the heat exchanger sensor temperature is not higher than -20℃ in 10 minutes, the low temperature compressor will start.

When compressors are switched on and off normally, if the freezer meets the switch-on condition, the high temperature compressor will start. One minute later, if the heat exchanger sensor temperature is not higher than -20℃ in 1 minutes, the low temperature compressor will start.

Normally, it takes no less than 10 minutes for compressors to switch on and no less than 5 minutes for them to switch off.

If the freezer meets the switch-off condition, there will be no output from the output terminal of the low temperature compressor and the output terminal of the high temperature compressor.

If -40℃ is selected during the operation of 3.2.1, other steps are the same with the operation for -86℃ except that the judgment condition for the start of the low temperature compressor is changed to 5℃ (30℃ for switching off).

When the freezer is supplied with strong current for the first time, after the low temperature compressor (continuously) works for 16 hours, it shall be turned off for 10 minutes forcefully and then run again automatically. If it not the first time, after the low temperature compressor runs continuously for 5 hours, it shall be switched off for 10 minutes. and then run again automatically.

10.9 Voltage Calibration

The operation function of voltage calibration is added on the display panel. In detail, when the display panel is unlocked, when you press the key “Silence Alarm” and the key “▽” for 5 seconds at the same time, the current voltage deviation is displayed and then you can press “△” or “▽”to increase or reduce the voltage. The voltage always goes up or down by 1V and its regulation range is from -9V to 9V. The initial value of the voltage deviation is 0.

10.10 Setting Adjustment

When power is switched on for the first time, after the display panel is unlocked, if you press “Function Selection and “▲” for 5 seconds, the display panel will display -86. Then, if you press “▲” or “▼”, -86, -150, -50, -40, 380 and 88 will be displayed circularly. If no key is operated in 5s after setting, the display panel will be locked automatically and the selected value will become valid. After you exit the selected value, the actual temperature will be displayed again. If you do not select a set value, the default will be -86. After your selection is valid, the relevant function will be implemented. Besides, the display panel has the memory function. 88 is an independent backup system.

10.11 USB data download and time setting

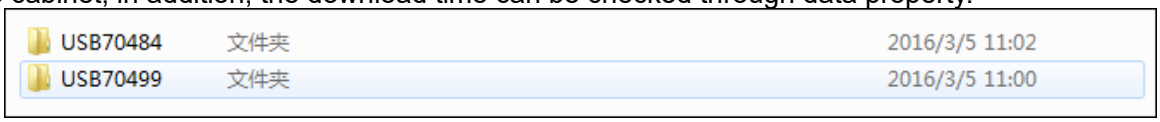
The USB output function is added for the computer board, and the test data of set temperature in the cabinet, actual temperature in the cabinet, ambient temperature, voltage, and set temperatures of high-temperature alarm and low-temperature alarm can be exported with the USB Stick. The computer board can automatically acquire and save the test data of more than 10 years. Data is acquired every 6 minutes and is saved automatically after it is fully stored. After the USB Stick has been plugged in, the computer automatically identifies and begins to import data to the USB stick. During the data export process, after unlocking the display panel, if the inside temperature display area shows "USB" with flashing, it means that the data export is in progress and not completed yet. If the temperature display area in the box is stably displaying "ALL", it means that data export is completed, the USB Stick can be taken off from the USB interface. The exported data is in .CSV format

USB Stick interface recording data time setting (current system time setting):

After unlocking, hold the "▽" for 3 seconds, then the temperature display area in the box shows "1P" stably, press the "Function Selection" button, the temperature display area in the cabinet flashes the year (ex-factory value 10), press the "△" button or "▽" button to select year, it displays circularly from 10 to 99, for example: to set at 2013, please select 13, and press the "Function Selection" button to save. Later, the temperature display area in the box displays "2P" stably, press the "Function Selection" button, the temperature display area in the box flashes the month (ex-factory value 01), press the "△"

button or "▽" button to display circularly from 01 to 12, after selecting the current month, press the "SET button to save. Thereafter, the inside temperature display area steadily shows "3P"; press "SET" button and the inside temperature display area shows Date with flashing (factory default 01); press "△" button or "▽" button to select the current date from 01 - 31 (circulating display), and then press "SET" button to save and confirm. Thereafter, the inside temperature display area steadily shows "4P"; press "SET" button and the inside temperature display area shows Hour with flashing (factory default 01); press "△" button or "▽" button to select the current hour from 00 - 23 (circulating display), and then press "SET" button to save and confirm. Later, the temperature display area in the box displays "5P" stably, press the "Function Selection" button, the temperature display area in the cabinet flashes the minute (ex-factory value 01), press the "△" button or "▽" button to display circularly from 00 to 59, then press the "SET" button to save, later, the temperature display area in the box displays "1P" again for setting from 1P-5P. After setting, press the "Function Selection" button for 5 seconds to automatically save and exit. Thereafter, the inside temperature display area will normally show the inside temperature. Note: During the above-mentioned setting of 1P-5P, the parameters may be adjusted selectively by pressing the "△" button or "▽" button. If 1P (year) is displayed in the temperature display area in the box and if the year (1P) month (2P) does not need to be adjusted, the day (3P) is reset directly, please press the "△" button to select day (3P), and press the "SET" button, then the temperature display area in the box flshes the date, press the "△" button or "▽" button to adjust the current day, then press the "SET" button to save. Thereafter, the inside temperature display area shows Hour (4P); if necessary, press "SET" button to adjust; if not, press "△" button to Minute (5P) for minute settings; after completing settings, long press "SET" for 5s to save and exit, and then the inside temperature display area will normally show the inside temperature. During the above-mentioned setting of 1P-5P, after the setting of any one parameter, if the other parameters are not required to be adjusted, directly hold the "SET" button for 5 seconds to save and exit.

The export data packet is in the form of a folder and the name is "USBXXXXX", where, "XXXXXX" is the code of the USB driving computer board chip, the code of the USB drive computer board chip of every cabinet is different, different folders will be saved after exporting data of different cabinets with the same memorizer, which is convenient for identifying. The specific files inside the USB data packet are non-editable in ".CSV" format, the previous data will be covered with the latest downloaded data of the same cabinet, in addition, the download time can be checked through data property.



10.12 Door opening management (unavailable to DW-86W100/420)

When the door is opened for a long time, the alarm shall be generated. Specific requirements: the sound and visual alarm shall be made when the door opening time exceeds X minutes. The X value is adjustable from 0-20 minutes, and the default is 5 minutes. Adjustment method: After unlocking, press and hold "Silence Alarm + SET + △", and it displays 05, which means that the default time delay is 5min, and press "△" or " ▽ " button to adjust the parameter value. After setting, it automatically saves and exits.

10.13 Balanced port heating wire control

When the temperature in the cabinet is over -35℃, the heating wire of the balanced port does not heated; when the temperature in the cabinet is lower than -35℃ (including -35℃), the balanced port heating wire will be enabled to heat. The balanced port heating wire is supplied with DC 12V from the computer board.

10.14 Computer-board power failure alarm

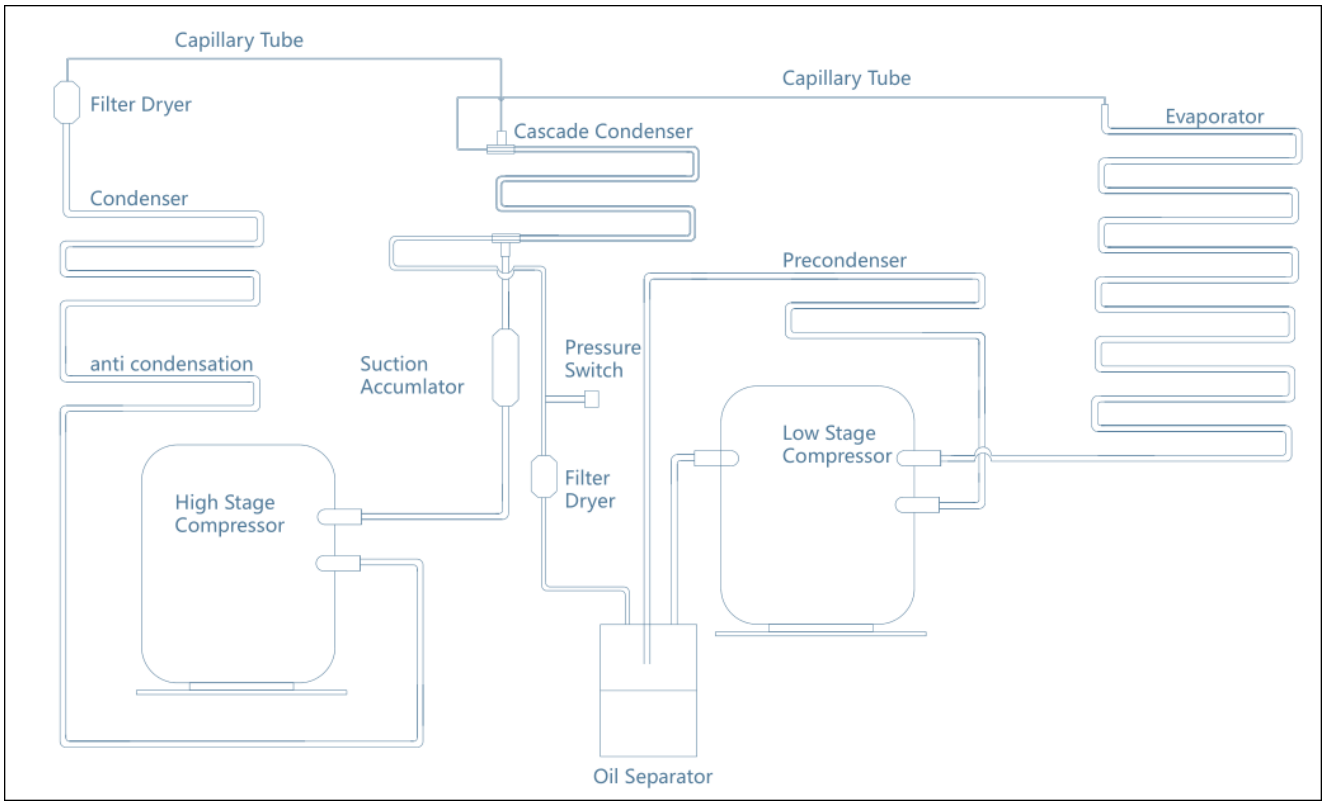
Once the switching power supply is damaged due to short circuit of the transformer winding output of the switching power supply and no + 12V output is available, the inside-box temperature display zone immediately flicker-displays "EEE", and the alarm indicator lamp synchronously flickers and gives a buzzing alarm.

11. Refrigeration Cycle Prospective and Plan

11.1 Refrigeration Principle

The ultra-low temperature freezer is equipped with a cascade refrigerating system normally composing of two or more refrigerating systems, i.e. low temperature stage and high temperature stage. For the high temperature stage, the medium-temperature refrigerant is used; for the low temperature stage, the low-temperature refrigerant is used. Each part is a complete refrigerating system, a cooling evaporator is used for linking the two parts together, and it is an evaporator of not only the high temperature stage but also the low temperature stage. The low temperature refrigerant absorbs heat from the cooled object in the evaporator of the low temperature system and then transfers the heat to the refrigerant in the high temperature system through the cooling evaporator, and then the refrigerant in the high temperature system transfers heat to the cooling medium in the high temperature condenser.

11.2 Refrigeration Cycle Prospective and Plan



12. Installation & Disassembly Process

12.1 Installation Position

12.1.1. Prevented from direct sunshine

12.1.2. Good surrounding air ventilation condition

12.1.3. Prevented from a lot of dust

12.1.4. Prevented from mechanical vibration or shock

12.1.5. Ambient temperature: 5℃~28℃; maximum ≦ 32℃; the most ideal temperature: 18℃~25℃; the air-conditioning system shall be used if necessary.

12.1.6. Working Position Height of the Equipment: Lower than 2000m.

12.1.7. Working humidity: <80%RH. If the maximum working temperature is 32℃, the humidity shall be lower than 57%RH.

12.1.8. Input voltage: <220±10%.

*Note: Since the ULT freezer is sensitive to the ambient temperature, it will not work normally if its installation fails to meet the above requirements.

Please use the equipment after improving the environment.

12.1.9. Battery charging principle: There is a storage battery power switch on this equipment and this switch shall be turned on before the freezer is switched on. As long as the switch is on, the AC equipment which meets the relevant requirement will work normally. When AC power is supplied, the equipment will charge the storage battery according to the relevant requirement. If the AC power has a failure, the storage battery will supply power to the display panel for normal supply. When the storage battery charges to the voltage ≤10.5V, the battery will stop power supply and the display panel will not display. Power can be switched off thoroughly and the display panel will not display as long as you disconnect the AC power line and then switch off the equipment when the battery can supply power normally.

12.2 Product Carrying and Unpacking

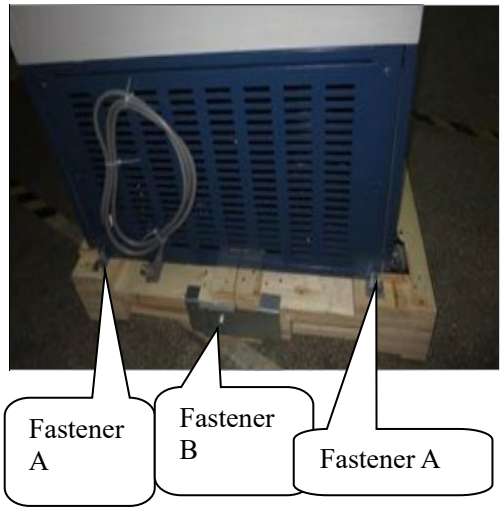
12.2.1 Carrying: As the product is very heavy, a forklift or pallet jack shall be used for carrying it so as to avoid damages to people and the product.

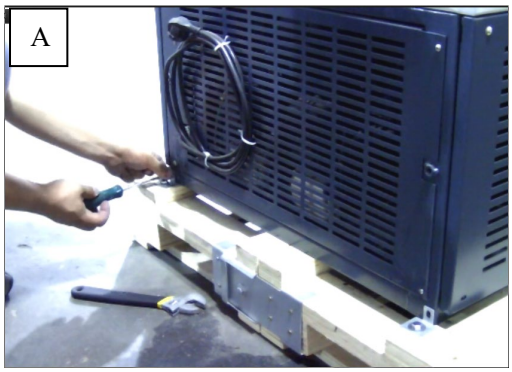
12.2.2 Unpacking: The product package composes of a wooden pallet + EPE vertical column winding package + carton. A forklift or pallet jack shall be used to plug into the bottom of its pallet for carrying it.

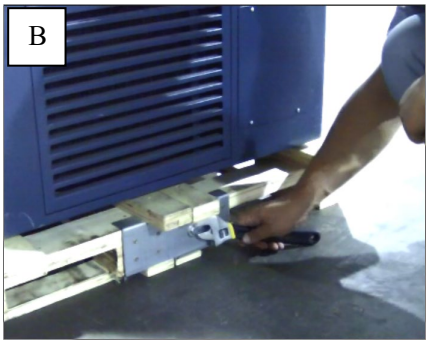
See the pictures below for its package.

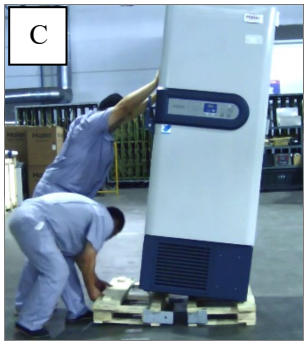
Removing the Wooden Support Plate:
1. Remove the two fixing parts "A" connecting the back of engine compartment of the complete machine to the wooden support plate using a cross recess screw, as shown in Figure A

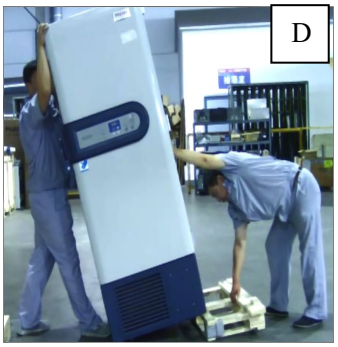
2. Remove the kingbolts "B" from the fixing parts connecting the two sections of the wooden support plate using a monkey wrench, as shown in Figure B
3. Push the cabinet crossing, and pull out the wooden support plate as shown in Fig. C and Fig. D.











12.3 The Product Enters the Placement Room.

12.3.1 Difficulty in entering the door:

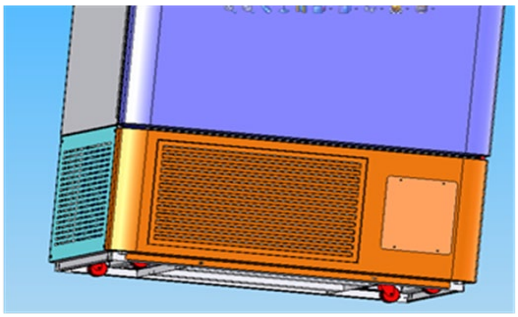
If it is impossible to enter the room without the pallet because of the door height in the room where the user wants to place the refrigerator, the user can consider disassembling the front cover of the compartment and open the external door by 180º. Regarding the disassembly of the front cover of the compartment, please see below:

Note: Normally, we do not suggest the disassembly of the front cover of the compartment.

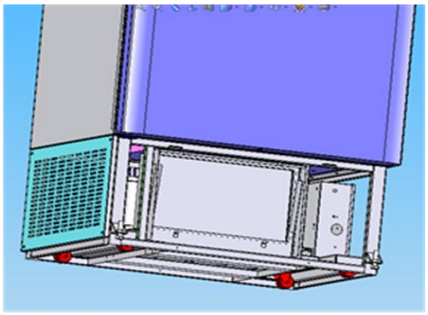
12.3.2

① Remove the two screws below the front cover of the compartment.

② Disassemble the front cover.



Tighten screws of the front cover of the compartment.



Disassemble the front cover of the compartment

③Open the external door by 180º.

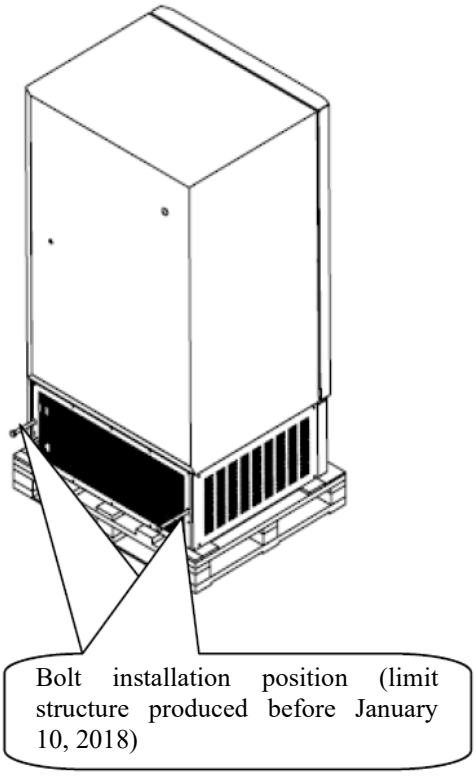
After the product enters the door, assemble the front cover of the compartment to its original condition.

Note: The front cover shall be reassembled in place. Otherwise, safety and performance problems might be caused!

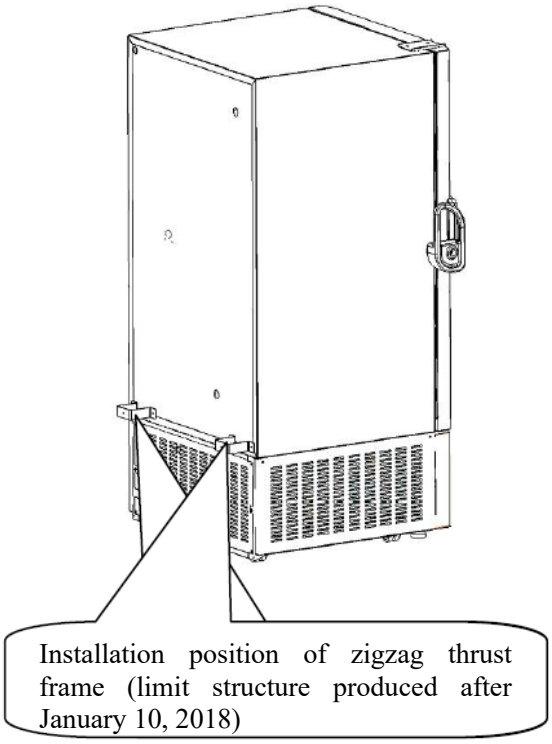
When the freezer is carried, its protection box shall neither be collided nor scratched, and the maximum inclination angle shall be no more than 45° (the angle with the horizontal direction), so as to avoid the refrigerating system suffers a failure and its normal use is affected.

12.4 Installation of freezer spacer

To guarantee the heat dissipation needed by the normal operation of the ultra-low temperature freezer, effective back spacer is designed for the product to guarantee the effective distance of the ultra-low temperature freezer from the wall body. Refer to the following figure for specific installation position:



Bolt installation position (limit structure produced before January 10, 2018)



Installation position of zigzag thrust frame (limit structure produced after January 10, 2018)

Notice: Follow the illustration to position and install the spacer brackets on the lower back of the freezer. The spacers keep a proper distance between the freezer and the back wall to ensure sufficient ventilation.

13.Typical Troubles & Solutions and Common Q&A

13.1 Typical Troubles & Solutions

A. The displayed temperature is different from the actual testing temperature of the machine:

As our displayed temperature is at some point in the freezer but the temperature detected by the user is at another point in the freezer, surely they may be different. Furthermore, an error may exist between the testing tool of the user and our temperature probe;

B. The difference between the upper and lower temperatures in the freezer is too big:

Our machine refrigerates from top to bottom, so the temperature at the top is lower than the temperature at the bottom, the difference between the upper and lower temperatures is large, the temperature difference of similar international products is 5~8ºC, and the temperature difference of our products is basically lower than 6 ºC. Besides, the large difference between the upper and lower temperatures may also be caused if the door is opened and closed frequently;

C. Why is the voltage increased when the machine is started?

In order to ensure the normal operation of the machine, our machine has the voltage increase and decrease function. When the voltage of the user is lower than 183V, the machine will not be able to start. Thus, the user shall check if his circuit is normal;

D. The user sets the temperature as -86 ºC. Why does it rise to **-82** ºC?

In order to ensure the service life of the machine, our product will be adjusted back to -82℃ if the set temperature is lower than -82℃ when the ambient temperature is higher than 35℃ and also return to the original set value if the ambient temperature is lower than 30℃ according to the design;

E. Why does the temperature rise quickly when the door is opened? Why does the temperature of other brands rise slowly?

⑴ The temperature of the ULT freezer is low and much lower than the ambient temperature. Our probe is more sensitive, so the temperature rises more quickly when the door is opened;

⑵Computer boards and temperature probes of other brands are increased with the slower temperature return function. Therefore, the temperature rises slowly when the door is opened for the display panel display the same temperature for a long time with the temperature before the door is opened (e.g. Meiling products).

F. Why are E0 and other signs displayed?

E2 is displayed in case of the main sensor failure, E1 is displayed in case of the condenser sensor failure and E0 is displayed in case of the failure of the ambient temperature sensor. Check if the above circuits are connected correctly. If not, the after-sales service provider shall maintain or replace them.

G. What should I do if the machine moves when the door is opened?

Trundles are installed for moving, locking and supporting the machine flexibly and also realizing the slight adjustment according to the requirement. After the machine is installed in place, the front two trundles shall be fixed, so as to avoid moving the machine when the door is opened.

H. Why is it impossible to open the door of the low temperature freezer?

There are two reasons:

First, the difference between internal and external temperatures is big, which causes the door under the negative pressure. In this case, the user can use a thin sheet iron to insert into the gap between the sealing strip and the door to make air enter the freezer;

Second, goods placed by the user into the freezer contains water, which causes that water flows to the sealing strip and the door gets frozen and cannot be opened. In this case, please use a tool to open the door.

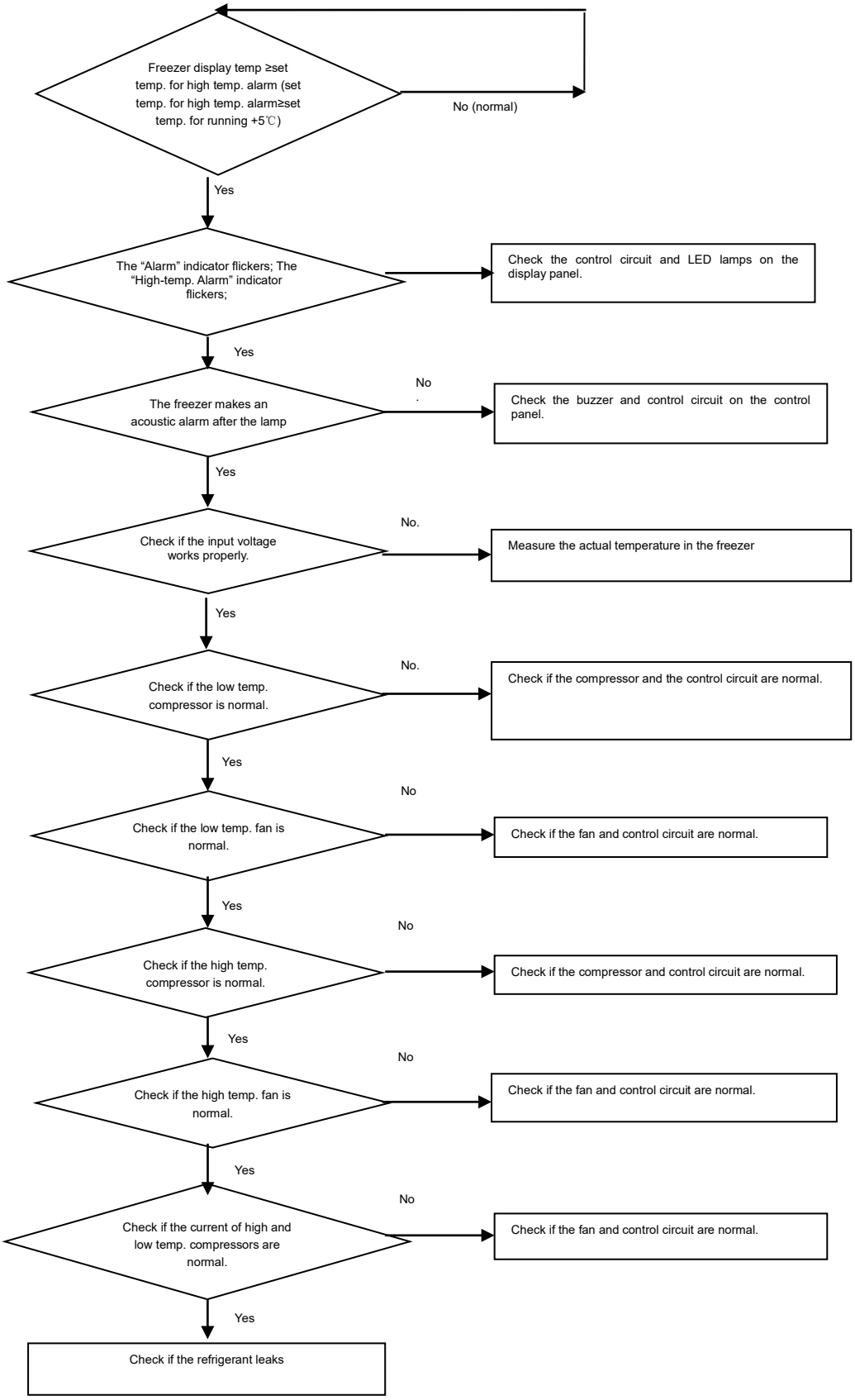
13.2 Common Q&A

Question	Reason Analysis	Maintenance Measures
1. The high temperature compressor cannot start.	1. Power switch or fuse failure	Use the multi-meter to measure the switch or fuse resistance and check if the switch is damaged. If so, replace the fuse or power switch.
	2. The plug-in part of the cabin is damaged.	Check if the plug-in joint f the cabin circuit is damaged or the harness falls down. If so, replace the relevant harness.
	3. Line contact failure	Check if the power harness is connected improperly or disconnected. If so, repair it until it is connected normally.
	4.Display panel and control panel circuit failure	Use the multi-meter to measure the circuit resistance and check if the harness has a short circuit or open circuit failure. If so, replace the harness if it is impossible to maintain it.
	5. Relay, starting capacity or thermal protector damage	Check the relay, capacitor or heat protector/. Check if any electronic part is burnt. If so, replace the electronic part.
	6. Compressor failure	On condition that other parts are switched on normally, check if the connection plug of the compressor is normal. Meanwhile, observe the surface temperature and abnormal noise of the compressor. If the compressor does not heat up or the makes abnormal noise, it is damaged and shall be replaced; when it is changed, the oil separator and the dry filter shall also be changed at the same time.
	7. Too low voltage of the user	Check if the display panel voltage of the product is covered in the rated voltage scale (220V±10%). Meanwhile, use a multi-meter to measure and check if the voltage exceeds the scope when the power is switched on for operation. If the voltage is too low or too high, please prepare a stable voltage supercharger.
2. The low temperature compressor cannot start.	1. The same reason for starting failure of the high temperature compressor	On condition that other parts are switched on normally, check if the connection plug of the compressor is normal. Meanwhile, observe the surface temperature and abnormal noise of the compressor. If the compressor does not heat up or the makes abnormal noise, it is damaged and shall be replaced; when it is changed, the oil separator and the dry filter shall also be changed at the same time.
	2. Pressure switch failure	Use the multi-meter to measure the resistance of the circuit and check if the harness has a short circuit or open circuit failure. Then, replace the harness if it is impossible to maintain it.
	3.Poor refrigeration performance of high temperature compressor	If the low temperature compressor fails to start after the high temperature compressor is started for 10min., it means the high temperature compressor has poor refrigeration performance. In this case, check if the circuit and pipeline of the high temperature system are welded well (check if there is a leakage), and also troubleshoot.
3. Fan failures	1. The patch cord of the fan falls.	Check if the patch cord of the fan falls or not connected. If so, rework the thread residue and wire connection.

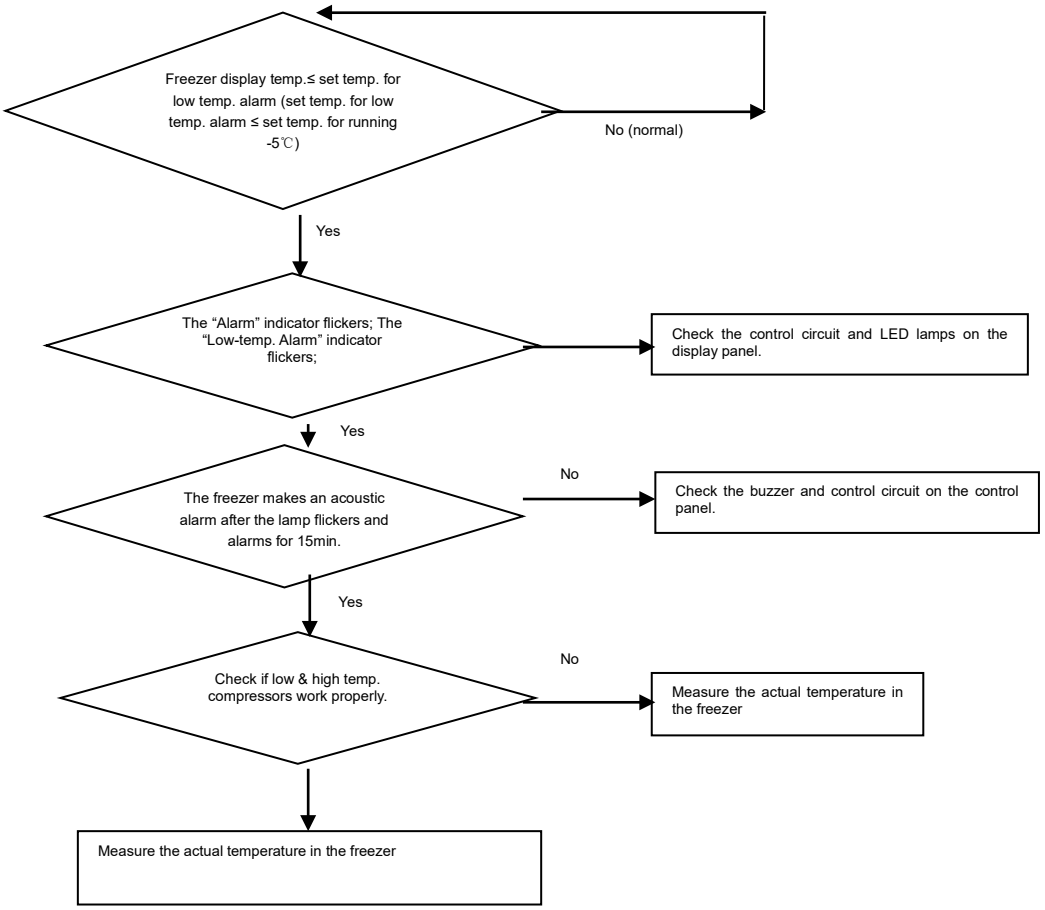
	2. The fan blade is blocked by foreign matters.	Check if any fan blade collides the wall, makes noise and not equipped when it rotates, troubleshoot the blade and remove surrounding foreign matters and keep the blades running normally.
	3. Fan damage	Use the multi-meter to measure the resistance at each end of the circuit of the fan and check if the spindle rotates properly. If so, replace the fan.
4. High temperature in the compartment	1. The temperature set at the shutdown point is high.	Check if the product temperature set point meets the demand of the customer. If not, reset the temperature.
	2. Refrigerant leakage	Check all welds, find leakages in the entire compartment and repair the welds. Then, refill refrigerant.
	3. Temperature probe damage	If an abnormal code alarm displays on the display panel, e.g. E0/E1/E2/E3, it means the temperature probe of the product has a failure. Meanwhile, check if patch cords are connected well. If so, it means the temperature detection wire is damaged and shall be changed.
	4. The capillary or system is dirty and blocked by grease.	Open the system, clean the capillary or replace the filter.
	5. High ambient temperature	If the ambient temperature is high, please install an air-conditioner to reduce the ambient temperature.
	6. Condenser blockage	Check if the condenser is dirty and alarms. If so, please clean the filter screen in time.
5. E0 alarm	When the input voltage of the ambient temperature sensor is ≥4.9V, the sensor has an open circuit; when ≤0.1V, it has a short circuit.	1. Check if the terminal of the ambient temperature sensor is plugged in improperly or falls, and if the sensor is damaged.
		2. Check if plug-in terminals of the sensor on the display panel are loose or contact poorly; and check if the display panel is damaged.
6. E1 alarm	When the input voltage of the condenser sensor is ≥4.9V, the sensor has an open circuit; when ≤0.1V, it has a short circuit.	1. Check terminals of the ambient temperature sensor are plugged in improperly or fall; check if the sensor is damaged.
		2. Check if plug-in terminals of the sensor on the display panel are loose or contact poorly; and check if the display panel is damaged.
7. E2 alarm	When the input voltage of the main sensor is ≥4.9V, the sensor has an open circuit; when ≤0.1V, it has a short circuit.	1. Check terminals of the main sensor are plugged in improperly or fall; check if the sensor is damaged.
		2. Check if plug-in terminals of the sensor on the main control panel are loose or contact poorly; and check if the main control panel is damaged.
8. E3 alarm	When the input voltage of the heat exchanger is ≥4.9V, the sensor has an open circuit; when ≤0.1V, it has a short circuit.	1. Check terminals of the heat exchanger sensor are plugged in improperly or fall; check if the sensor is damaged.
		2. Check if plug-in terminals of the sensor on the display panel are loose or contact poorly; and check if the display panel is damaged.
		3. Change to the backup sensor.
		4. When “E3” alarm appears, it will disappear after you press the key “Silence” for 5s. After the high temperature compressor starts for 1min., the low temperature compressor will start.

9. Hot condenser alarm	When the result of the condenser temperature detected by the condenser probe is ≥13 ℃ (for 5min. constantly), an alarm happens.	1. Open the front grille and clean the filter screen.
		2. Check if the condenser probe is too close to the outlet of the condenser.
		3. Use the adhesive tape to wind the probe of the condenser.
10. Low battery capacity alarm	When the capacity of the storage battery is ≤10.5V, the low battery capacity alarm happens.	1. Check if the storage battery expires.
		2. Check if wire terminals on the battery switch are plugged in well or if the switch is damaged.
		3. Check if the charging circuit is normal: After the freezer is switched on for 5min., check if there is voltage output from the storage battery terminal on the main control panel and also the output voltage shall be 12V.
11. Uneven temperature in the freezer	The temperature difference in the freezer is too big.	1. The temperature at the top is higher, check the door sealing strip and change the internal door to ensure the good sealing proper.
		2. The temperature at the bottom is higher, open the system again and increase the low temperature refrigerant R170 (or use the needle valve to increase cold media directly)
12. Display panel display EEE	Control panel power transformer fault	Once the switching power supply is damaged due to short circuit of the transformer winding output of the switching power supply and no + 12V output is available, the inside-box temperature display zone immediately flicker-displays "EEE", and the alarm indicator lamp synchronously flickers and gives a buzzing alarm.

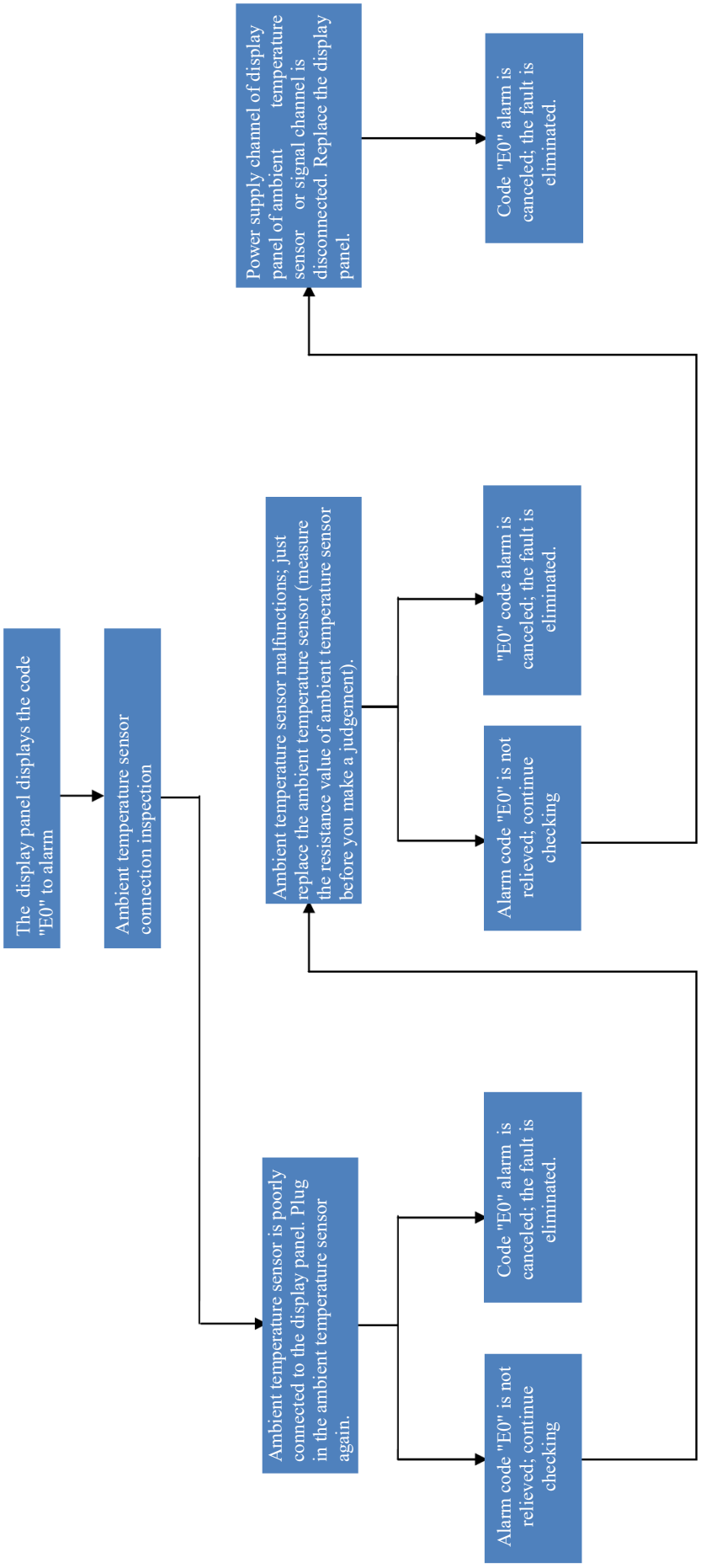
High Temperature Alarm Solution:



Low Temperature Alarm Solution:



"E0" Alarm Solution



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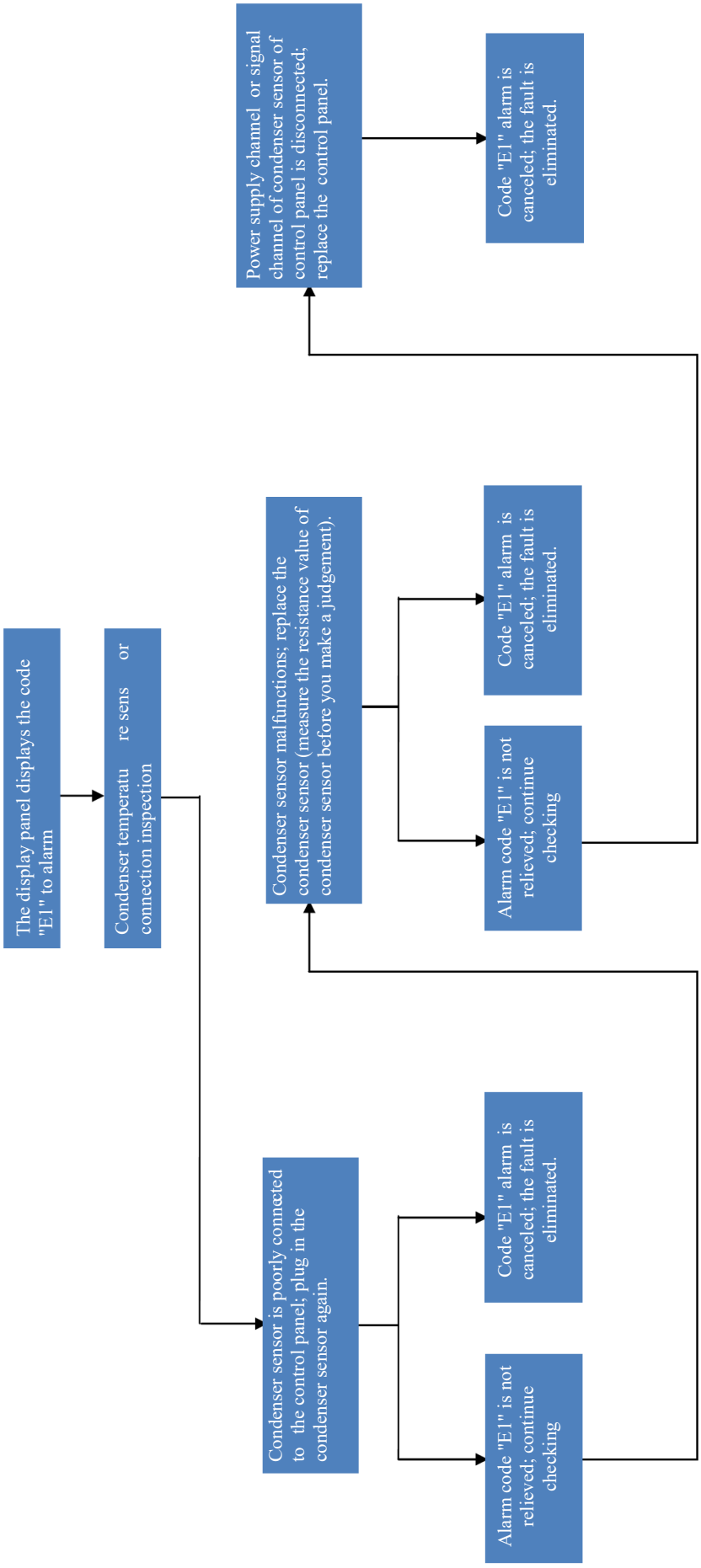
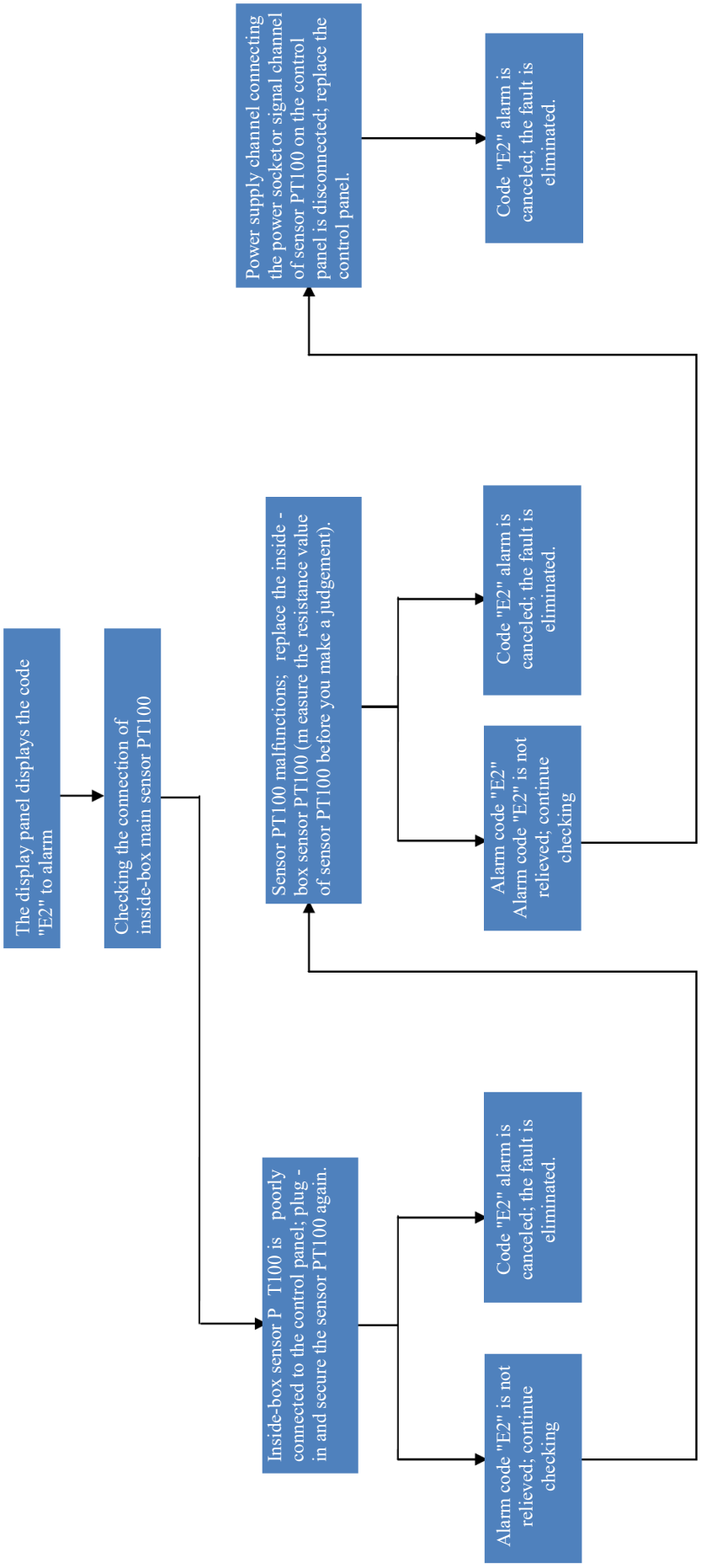
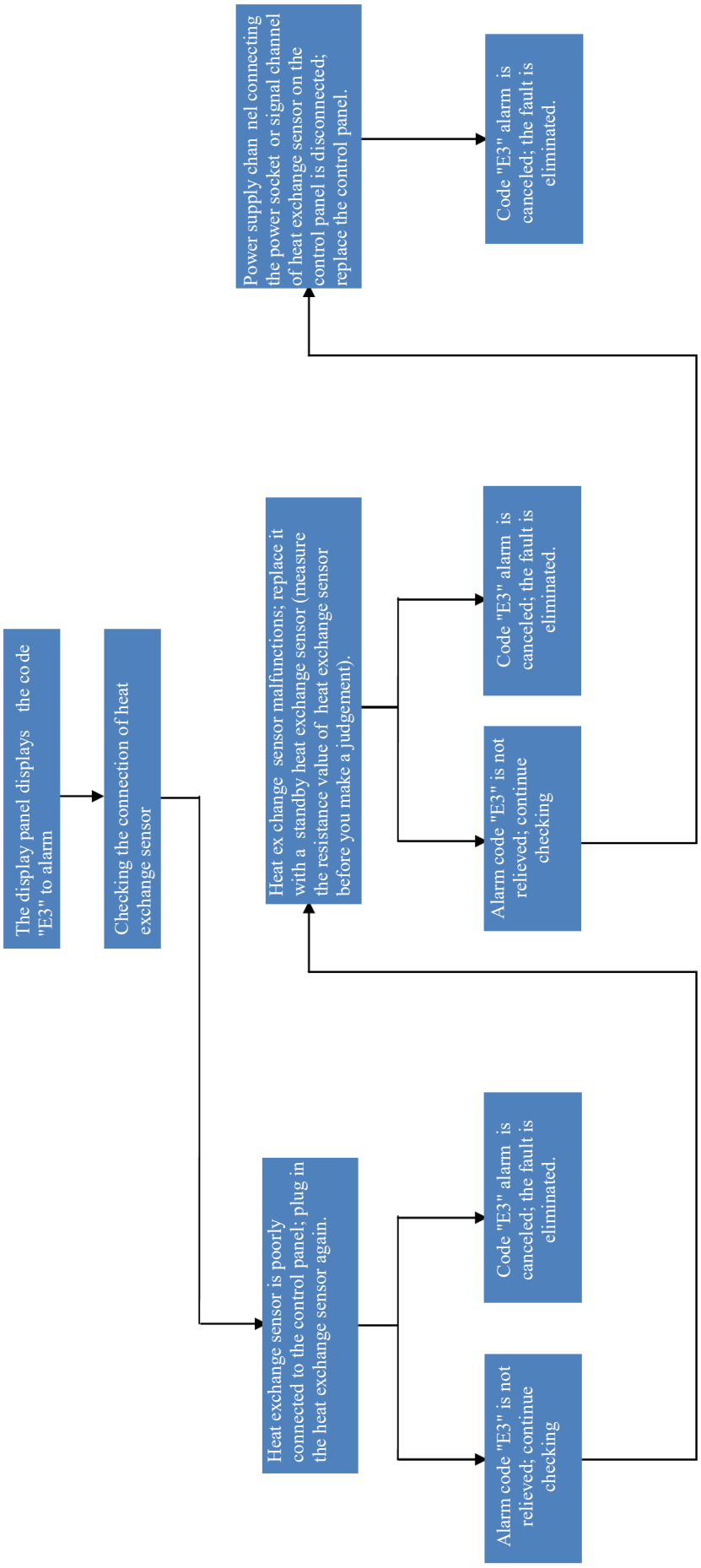
"E1" Alarm Solution



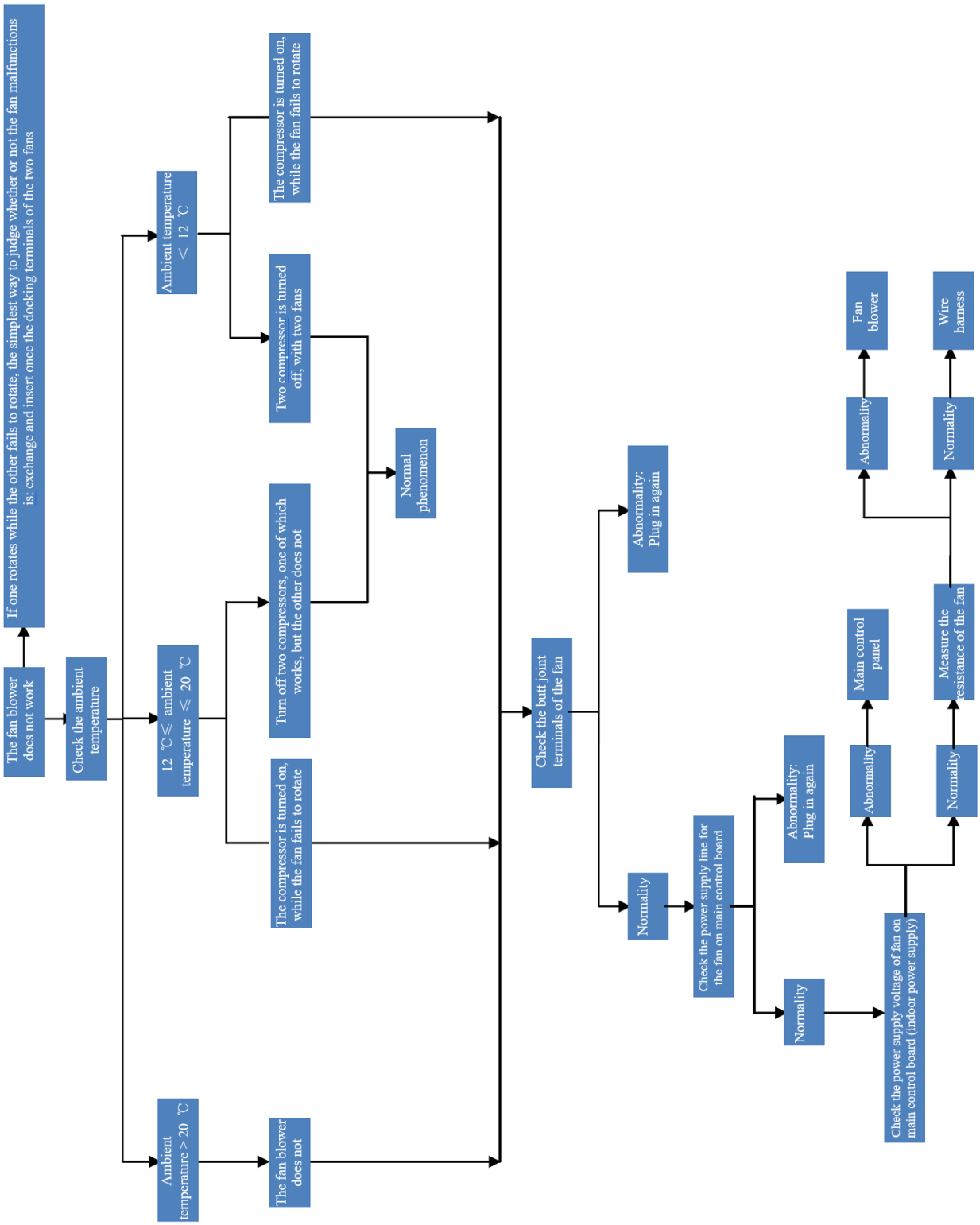
"E2" Alarm Solution



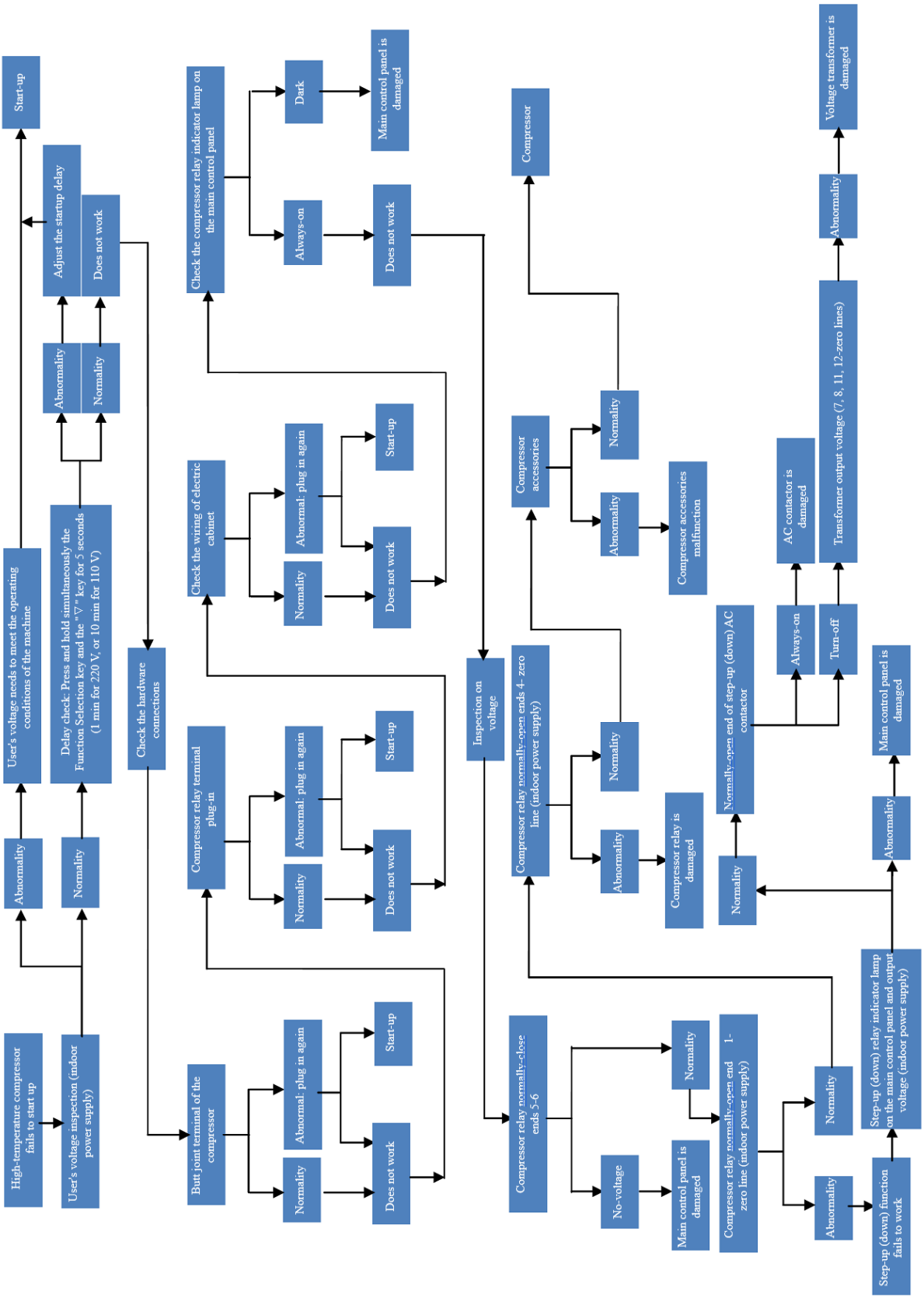
"E3" Alarm Solution



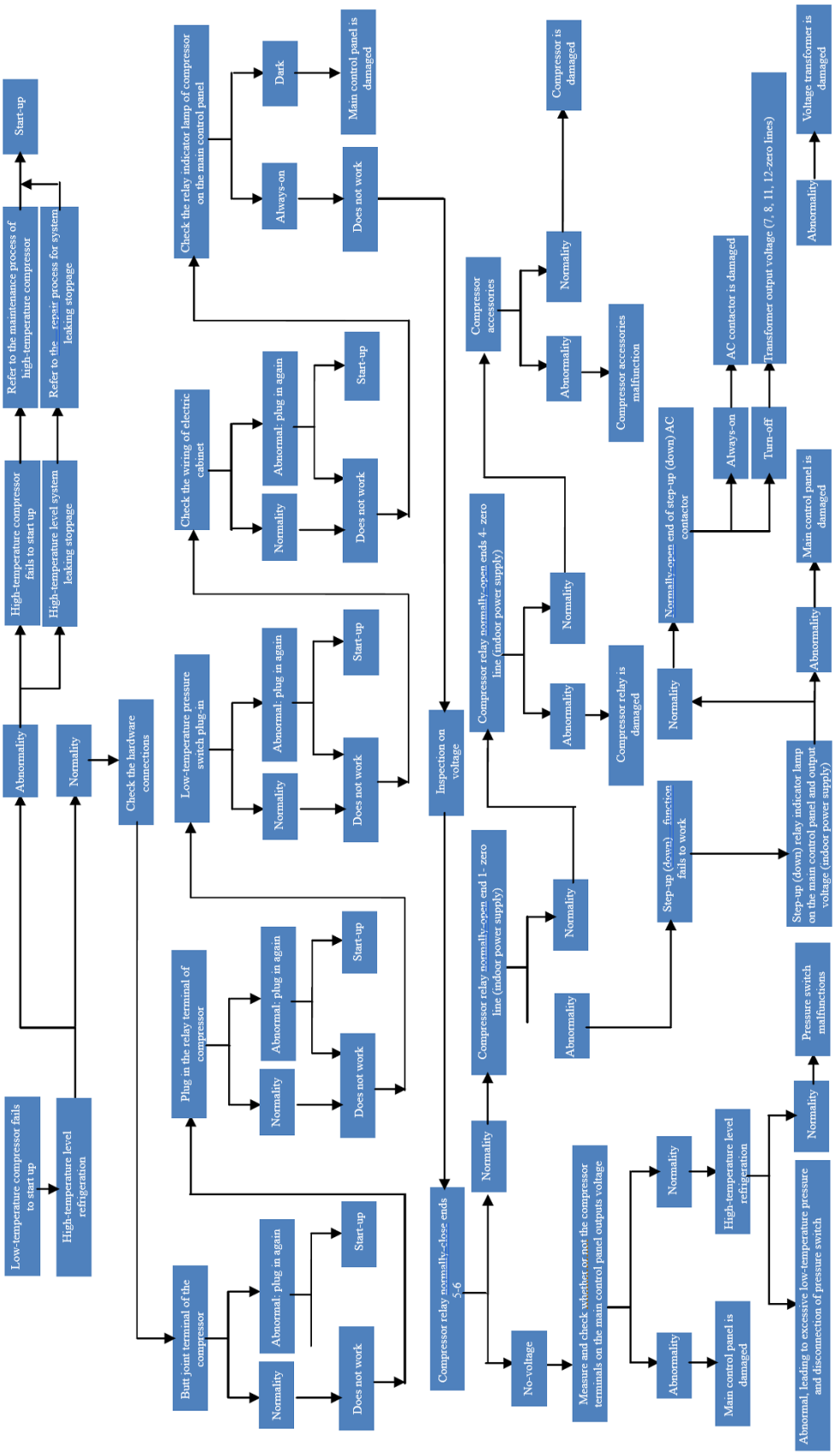
Solution to "Fans fail to work"



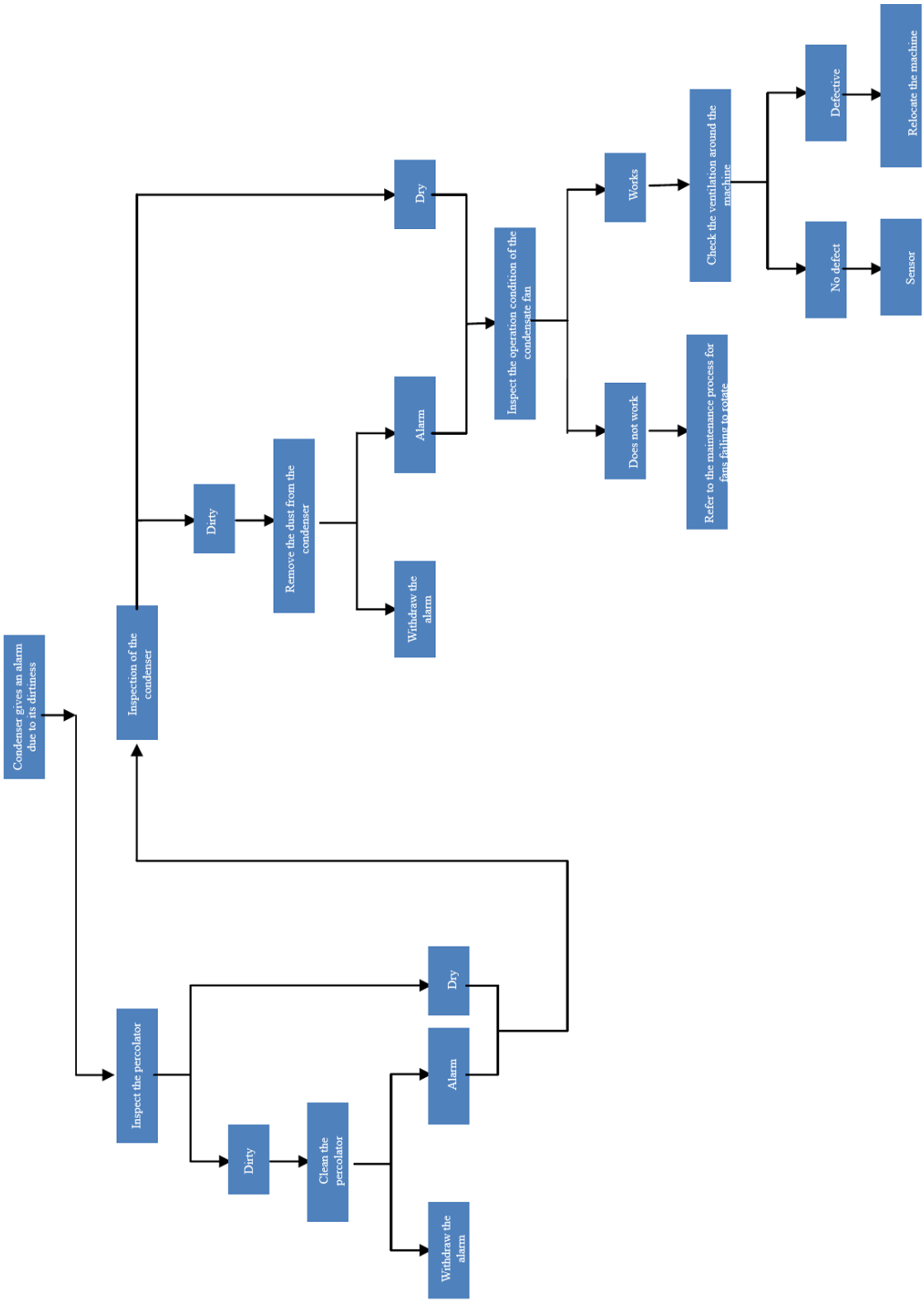
Solution for checking high-temperature compressor failing to start up



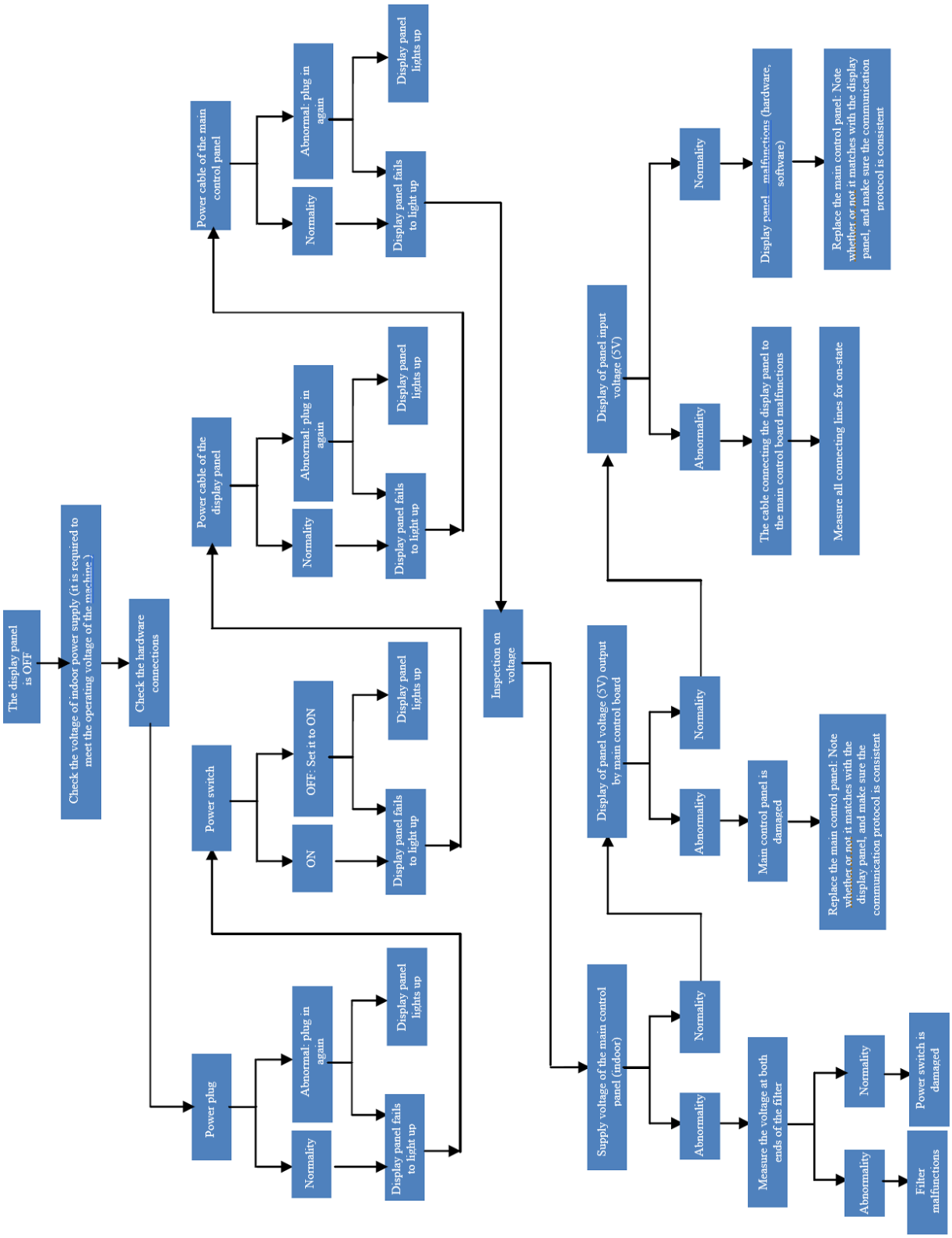
Solution for checking low-temperature compressor failing to start up



Solution to condenser alarm fault



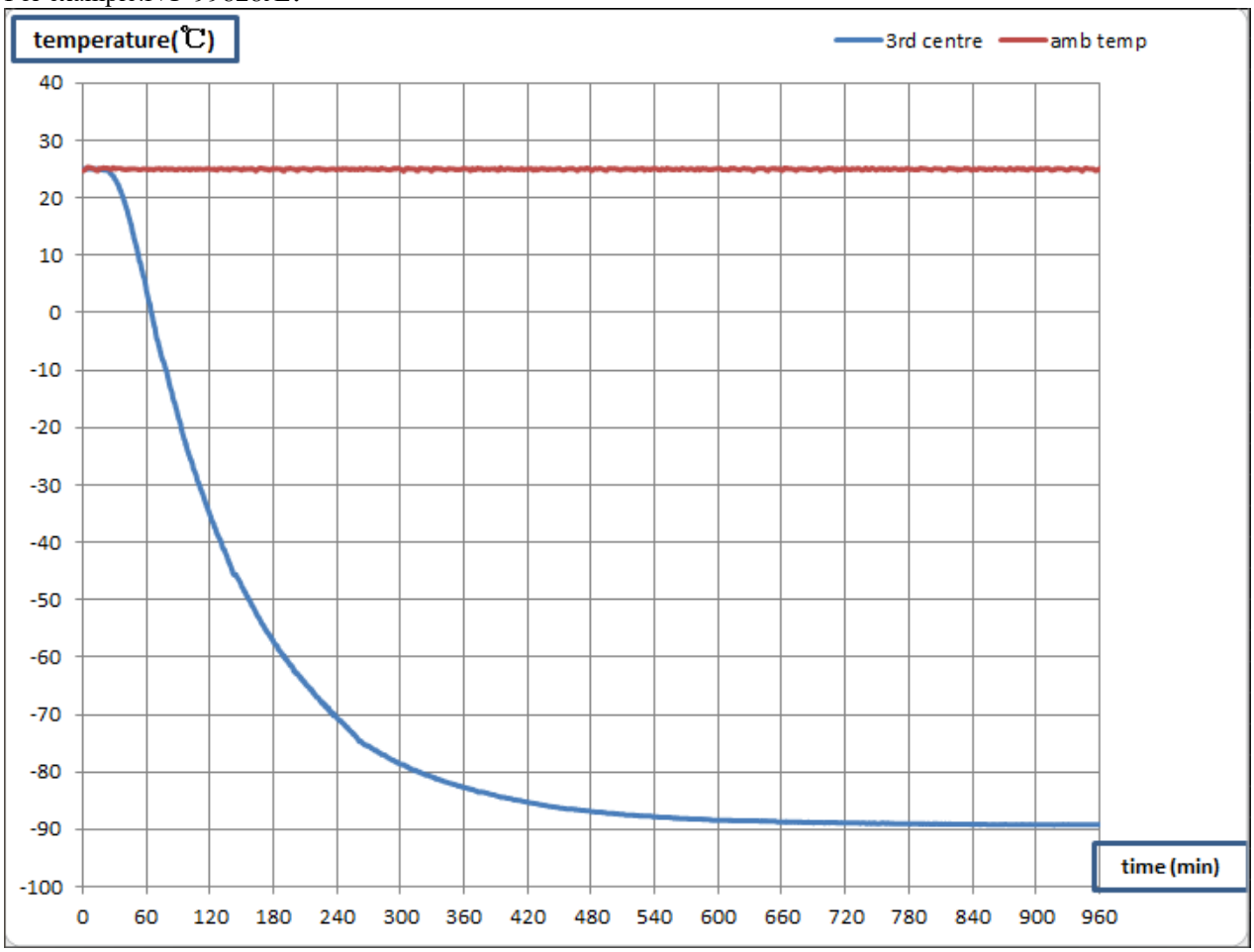
Solution to display panel NG fault



14. Post-maintenance normal cooling curve data of refrigeration system

To guarantee that the post-refrigeration-system-maintenance performance data of ultra-low temperature products can meet the original design requirements, please compare the Layer-3 central cooling rate of the product when system maintenance is over (While ambient temperature ranges from 22 ℃ to 25 ℃ and the box is kept empty, the time taken for the center temperature of the 3rd layer to drop from ambient temperature to -80℃) .

For example:NU-99828JE：

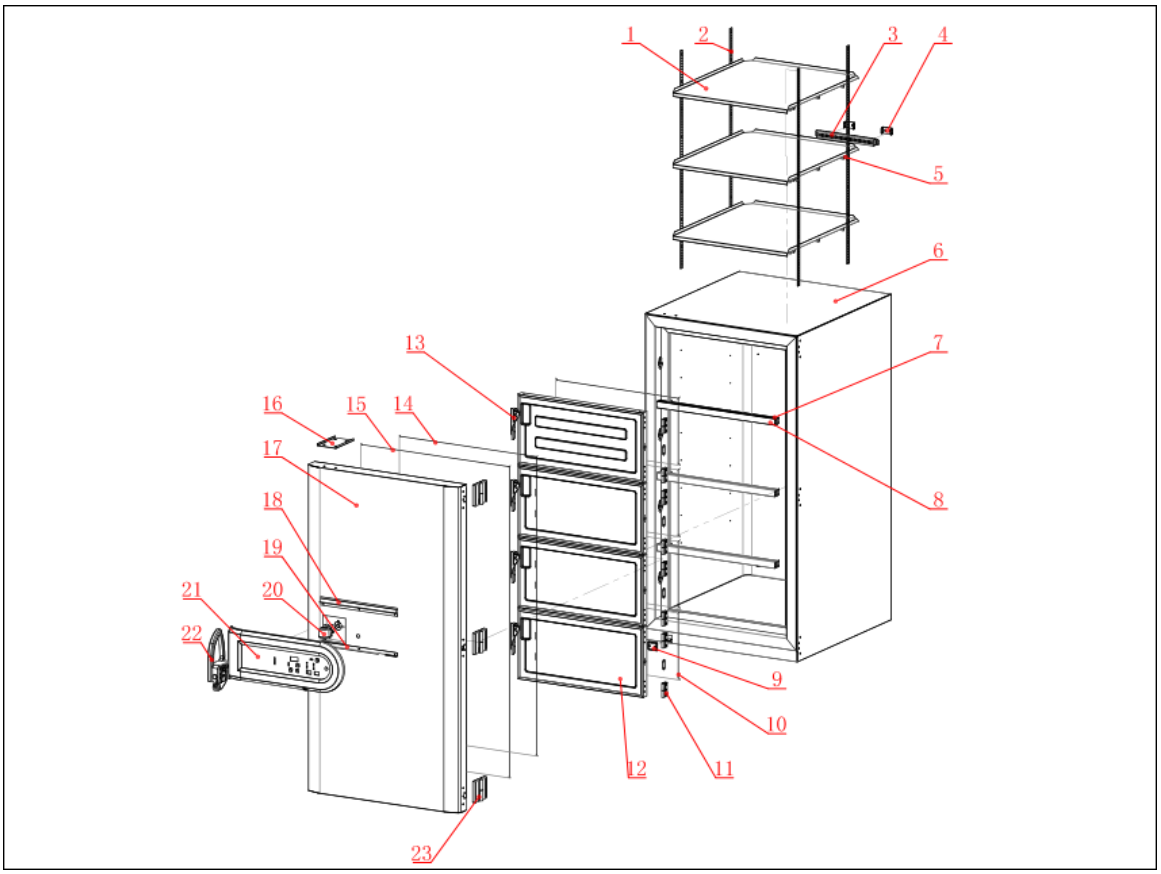


Model	Power Supply （ V/Hz)	Pull down （min)
NU-99338JE	220-240V50Hz	≤230
NU-99338JG	208-230V60Hz	
NU-99338JGA	115V60Hz	≤245
NU-99420JE	220-240V50Hz	≤275
NU-99420JG	208-230V60Hz	
NU-99578JE	220-240V50Hz	≤270
NU-99578JG	208-230V60Hz	
NU-99578JGA	115V60Hz	
NU-99728JE	220-240V50Hz	≤335
NU-99728JG	208-230V60Hz	≤370
NU-99828JE	220-240V50Hz	≤335
NU-99828JG	208-230V60Hz	
NU-99486JE	220-240V50Hz	≤300

15. Explosive view of spare parts

15.1 Enclosure

15.1.1 model: NU-99578JE/578JGA/578JG/728JG/728JE/828JG/828JE



Serial numbers of spare parts	Name of parts	NU-99828JE NU-99828JG	NU-99728JE NU-99728JG	NU-99578JE NU-99578JG/JGA
1	Shelf	0270100590	0270101535	0270101712A
2	Shelf strip	0270100174A		
3	Sensor shield	0270101337		0270100585
4	Sensor holder	0270101338		0270100584
	Inside-box main sensor PT100	0074091183		
5	Shelf clip	0270100175		
7	Beam	0270102128	0270101572	0270101680
8	Beam decorative strip	0270200660A	0270200660	0270200682
9	Magnetic control box cover	0270200659		
10	Internal door seal	0270200592D	0270200653	0270200592A
11	internal door hinge	0270101381		
12	Internal door	0270804069	0270801321	0270803150
13	Internal door handle	0270101508		
14	Outer door silicone seal	0270200590A	0270200652	0270200652B

15	Inner seal of outer door	0270200590B	0270200651	0270200652A
17	External door	0270803800 (Produced after 2018.1.12)	0270801320 (Produced after 2018.1.12)	0270803633 (Produced after 2018.1.12)
18	Upper holder of display panel cover	0270100565		
19	Lower holder of display panel cover			
20	Vacuum relief valve	0270803613		
21	Display panel protection cover	0270200161 (Before 2018.1.11) 0270200984 (after 2018.1.12)		
	Display board	0271800024		
22	External door handle	1】Handle (0270100327B) /Handle fix board (0270100327C) /Lock latch plate (0270100327D) /Bearing (0070107121) -before 2018.1.11 2】Handle (0270100327E) /Handle accessory (0270100327F) /Lock latch plate (0270103284A) /Handle fix board (0270103284) -after 2018.1.12		
	Lock	0270101174 (before 2018.1.11) 0270101174B (after 2018.1.12)		
23	External door hinge	0070107087 (galvanized silvery hinge) 0070107087A (painted gray hinge)		

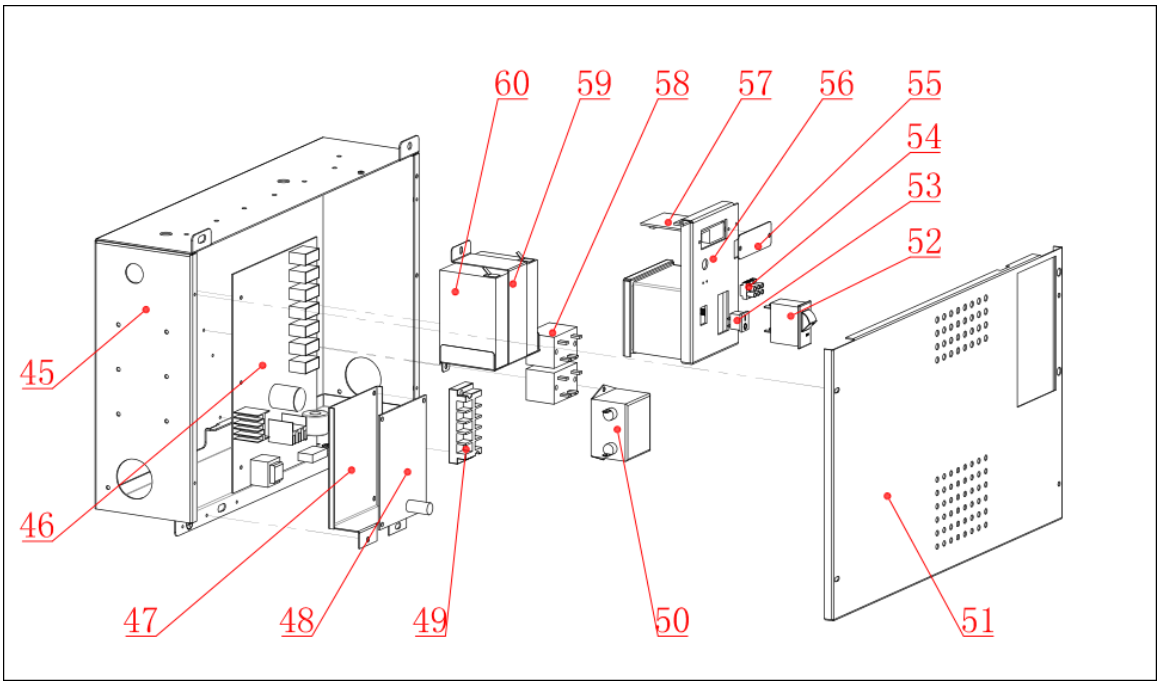
15.1.2 NU-99338JE/338JGA/338JG

Serial numbers of spare parts	Name of parts	**NU-99338JE/338JGA/338JG**
1	Shelf	0270101224
2	Shelf strip	0270100174A
3	Sensor shield	0270100585 (same with NU-99490J)
4	Sensor holder	0270100584 (same with NU-99490J)
	Main control sensor PT100	0074091183 (same with NU-99490J)
5	Rack clip	0270100175
7	Beam	0270102175
8	Beam decorative strip	0270200660B
9	Magnetic control box cover	0270200659
10	Internal door seal	0270200592E
11	Inner door seal	0270101381
12	Inner door	0270803496
13	Inner door handle	0270101508
14	Outer seal for outer	0270200590D

	door	
15	Inner seal for outer door	0270200590C
17	Outer door	0270803416 (after 2018.1.12)
18	Upper holder of display panel cover	0270100565 (same with NU-99490J)
19	Lower holder of display panel cover	
20	Vacuum relief valve	0270803613
21	Display panel protection cover	0270200161 (before 2018.1.11) 0270200984 (after 2018.1.12)
	/Display board	0271800024
22	Outer door handle	1】Handle (0270100327B) /Handle fix board (0270100327C) /Lock latch plate (0270100327D) /Bearing (0070107121) -before 2018.1.11 2】Handle (0270100327E) / Handle accessory (0270100327F) /Lock latch plate (0270103284A) /Handle fix board (0270103284) -after 2018.1.12
	Lock	0270101174 (before 2018.1.11) 0270101174B (after 2018.1.12)
23	Outer door hinge	0070107087 (galvanized silvery hinge) 0070107087A (painted gray hinge)

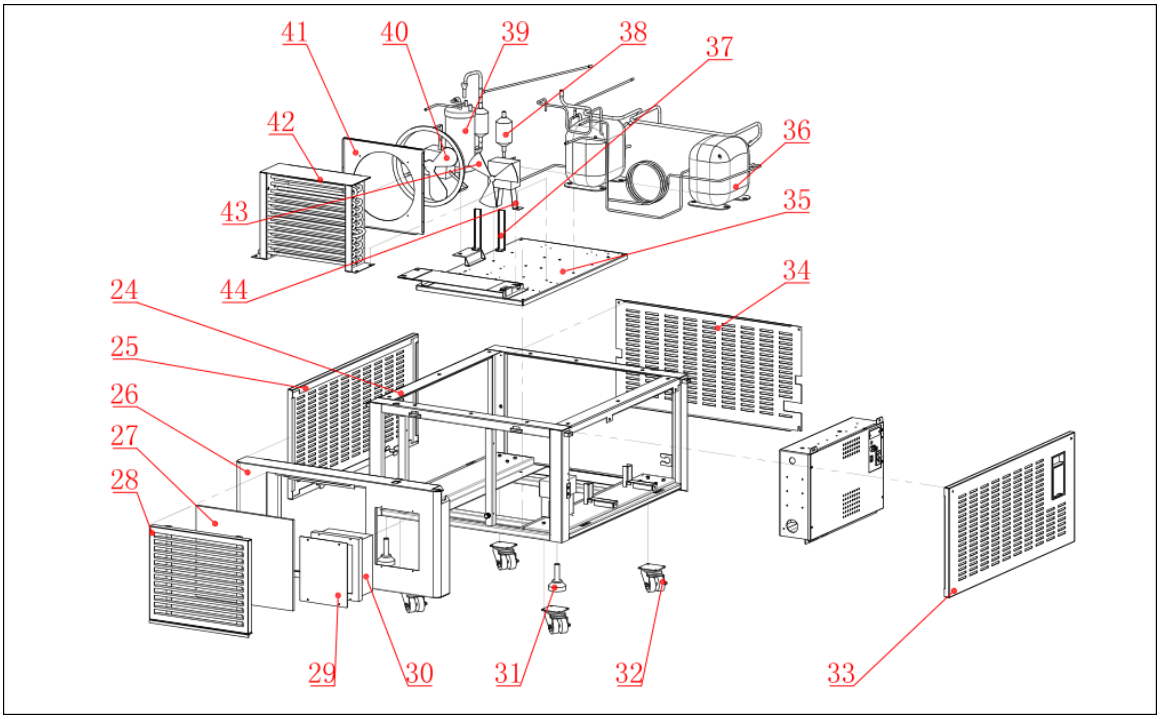
15.2 Electronic control module

15.2.1 NU-99578JE/578JGA/578JG/728JG/728JE/828JG/828JE/486JE NU-99338JE/338JGA/338JG



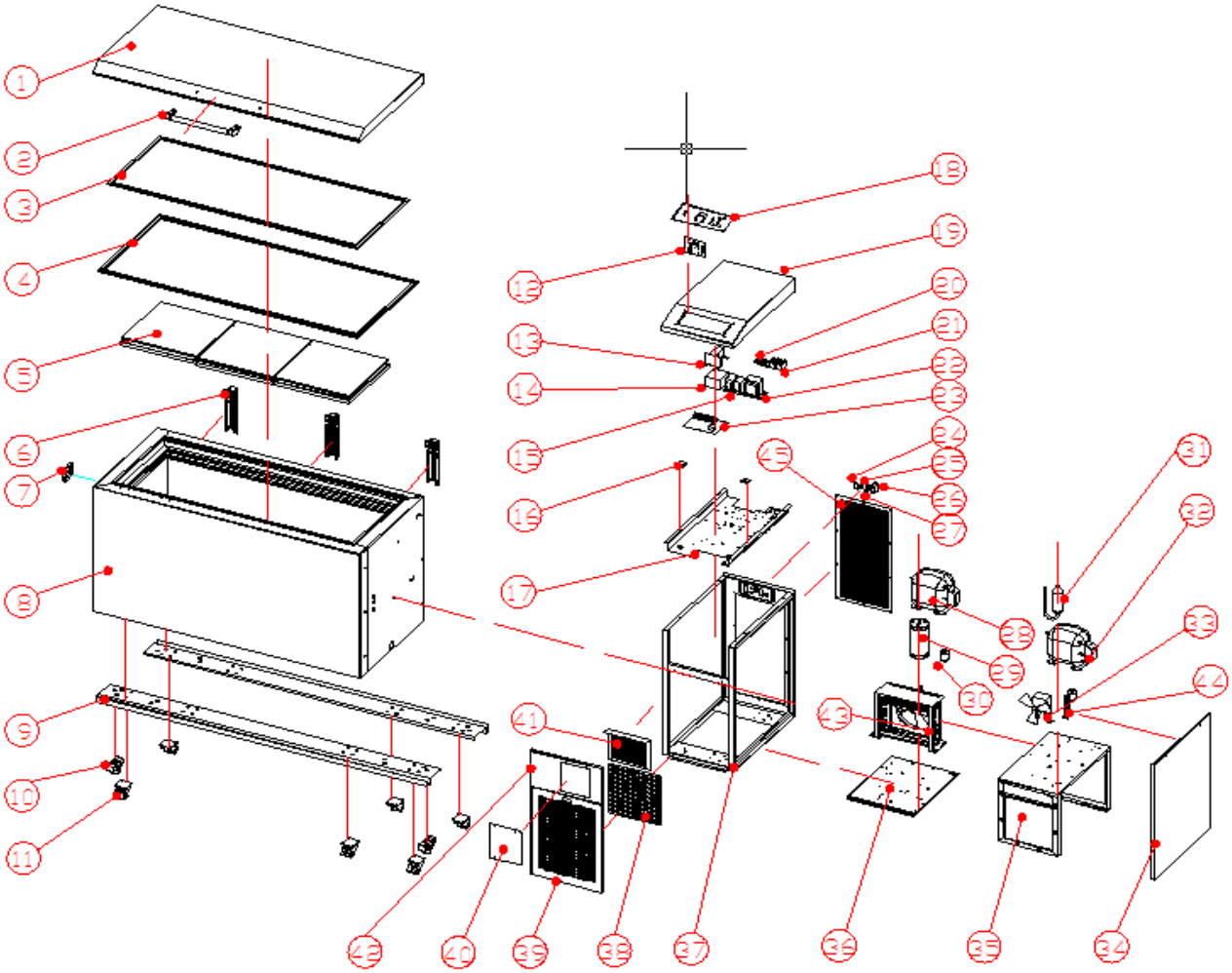
Part S/N	Part Name	Power Supply	Part No.	Change Recod
45	Electric box	Universal	0270101784	
46	Control board	Universal	0271800023	
47	USB drive board holder	Universal	0270101361	
48	USB drive board	Universal	0271800064	
49	Terminal blocks	Universal	0274300007	
50	Wave filter	220V	0274000337	
		115V	0074600001A	
51	Top cover of electric box	Universal	0270100619	
52	/Power switch	220V	0274000098	
		115V	0274000098A	
53	Battery switch	Universal	0074000074A	
54	Remote alarm terminal strip	Universal	0274300008A	
55	R232 baffle (with hole)	Universal	0270100625	
	R232 baffle (no hole)	Universal	0270100622	
56	Explosion-proof switch box	Universal	0270803102	
57	R232/485 control board	Universal	0274000091	
58	Relay	220V	0034000993	
		115V	0074091407	
59	Battery fix clip	Universal	0270101010	

15.3 Refrigeration Compartment



Item	Part Name	NU-99338JE/338JGA/338JG	NU-99486JE	NU-99578JE/578JGA/578JG	NU-99728JG/728JE	NU-99828JG/828JE
25	Left cover of cabin	0270100778A	0270102117	0270101762A	0270101594	
26	Front cover of cabin	0270101206E	0270102114AE	0270101721C	0270101560E	
27	Filter screen	0270102159			0270102160	
28	Front air-inlet grate	0070106933			0270100177	
29	Cover of chart recorder	0070107359				
30	/Chart recorder	0074090520C				
32	Caster	0070101872C				
33	Right cover of cabin	0270100779A	0270102115	0270101761A	0270101595	
34	Back cover of cabin	0270101205	0270102116	0270101720A	0270101559	
36	(220V/50)/Compressor(220V/50HZ)	0074000429T				
	(220V/60)/Compressor (220V/60HZ)	0274000381 /	0274000381			/
	(115V/60)/Compressor (115V/60HZ)	/ /	/	0274000382	/	/
38	Filter drier	0270700509				
	Filter drier clamp	0270102961				
39	Oil separator	0070700552				
40	Suction fan(220V/50/60)	0074090857A				
	Suction fan(115V/50/60)	/ /	/	0074090857B	/	/
42	Condenser	0270700349			0270700234	0270700349
43	Blower fan(220V/50/60)	0074090858				
	Suction fan(115V/50)	/ /	/	0074091408	/	/
44	Fan holder	0071220036				
	Gas- liquid separator	0070701865				
	Pressure switch	0070700606				

15.4 NU-99420JE/JG



Item S/N	Part Name	Part No.	QTY for per unit	Unit
1	Door assembly	0270804024	1	EA
2	Handle	0270200092	1	EA
3	Inner seal for outer door	0270200434A	1	EA
5	Internal door	0270802766	3	EA
6	Hinge	0270100099	3	EA
7	Lock latch plate	0070106913	1	EA
10	Leveling leg	0070106932	2	EA
11	Caster	0070101872C	6	EA
12	Display board	0271800024	1	EA
18	Display board holder	0270200066	1	EA
19	Top cover of cabinet	0270100158	1	EA
20	Terminal blocks	0274300007	1	EA
21	Relay	0034000993	2	EA
23	Control board	0271800023	1	EA
24	RS232/RS485 baffle	0270100622	1	EA
25	Remote alarm terminal strip	0274300008A(currency for new models)	1	EA
26	Power switch	0274000098	1	EA
27	Battery switch	0074000074A	1	EA
28	Low temperature stage compressor（220V50Hz)	0074000429T	1	EA
	Low temperature stage compressor（220V60Hz)	0274000381	1	EA
29	Oil separator	0070700552	1	EA
30	Filter	0270700509（Parker)	2	EA
	Filter drier clamp	0270102961	2	EA
31	Gas- liquid separator	0070701865	1	EA
32	High temperature stage compressor(220V50Hz)	0074000429T	1	EA
	High temperature stage compressor(220V60Hz)	0274000381	1	EA
33	Suction fan	0074090857A	1	EA
	Blower fan	0074090858	1	EA
34	Side cover of cabinet	0270100159	1	EA
38	Filter screen	0270200166A	1	EA
39	Lower front cover of cabinet	0270100155	1	EA
40	Cover of Chart recorder	0070107635	1	EA
41	Fan cover	0270100097	1	EA
43	Condenser	0270700349	1	EA
44	Filter holder	0270100082	1	EA
45	*Back cover of cabinet*	*0270100096*	*1*	*EA*
	pressure switch	0070700606	1	EA