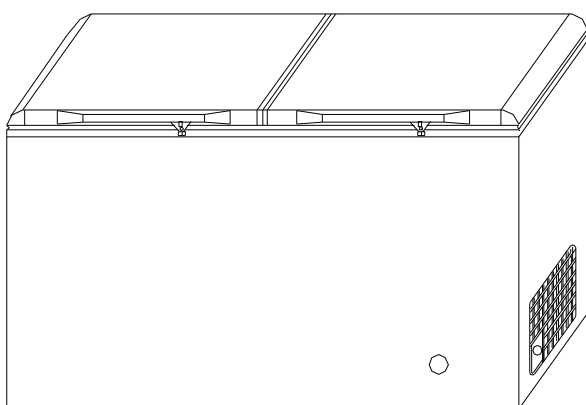


# BD-478A Freezer Service Manual



## BD-478A

### ● Features

- Door lock for safety storage
- High pressure foam cover for efficient Temperature preservation.
- Adjustable thermostat.
- Superior insulation.
- Efficient defrosted storage
- Designed for cafeterias restaurants and hotels

## Haier Group

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## PRODUCT CODE ILLUMINATION AND SERIES INTRODUCTION

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### Product Code Illumination and Series Introduction

**B**      **D**      --    □            □

**A**      **B**            **C**            **D**

**A:** The first letter of “FREEZER” in Chinese spelling.

**B:** The first letter of “FREEZER” in Chinese spelling.

**C:** Capacity. (Unit: litre).

**D:** Improve Series Number.

## **Features**

- **Door lock for safety storage**
  - **High pressure foam cover for efficient Temperature preservation.**
  - **Adjustable thermostat.**
  - **Superior insulation.**
  - **Efficient defrosted storage**
  - **Designed for cafeterias restaurants and hotels**
  - **Low power consumption 20% less than the other similar freezers**
  - **Imported high quality compressor and condenser, large freezing capacity, 1.5 times more then regular freezers**
- Freezing quick and deep freeze functions are 2 times faster then regular freezers**

## Specifications

|                            |                     |                     |
|----------------------------|---------------------|---------------------|
| Model                      | BD-388A             | BD-478A             |
| Capacity (L)               | <b>388</b>          | <b>478</b>          |
| Power Supply (V/Hz)        | <b>220V~ /50Hz</b>  | <b>220V~ /50Hz</b>  |
| Unit Dimension (W*D*H)     | <b>1420*715*810</b> | <b>1690*715*810</b> |
| Unit Weight (Kg)           | <b>72</b>           | <b>78</b>           |
| Box Dimensions (W*D*H)     | <b>1495*765*870</b> | <b>1765*765*870</b> |
| Box Weight (Kg)            | <b>84</b>           | <b>91</b>           |
| Container Quantity (40HC') | <b>66</b>           | <b>57</b>           |

### Safety Precautions

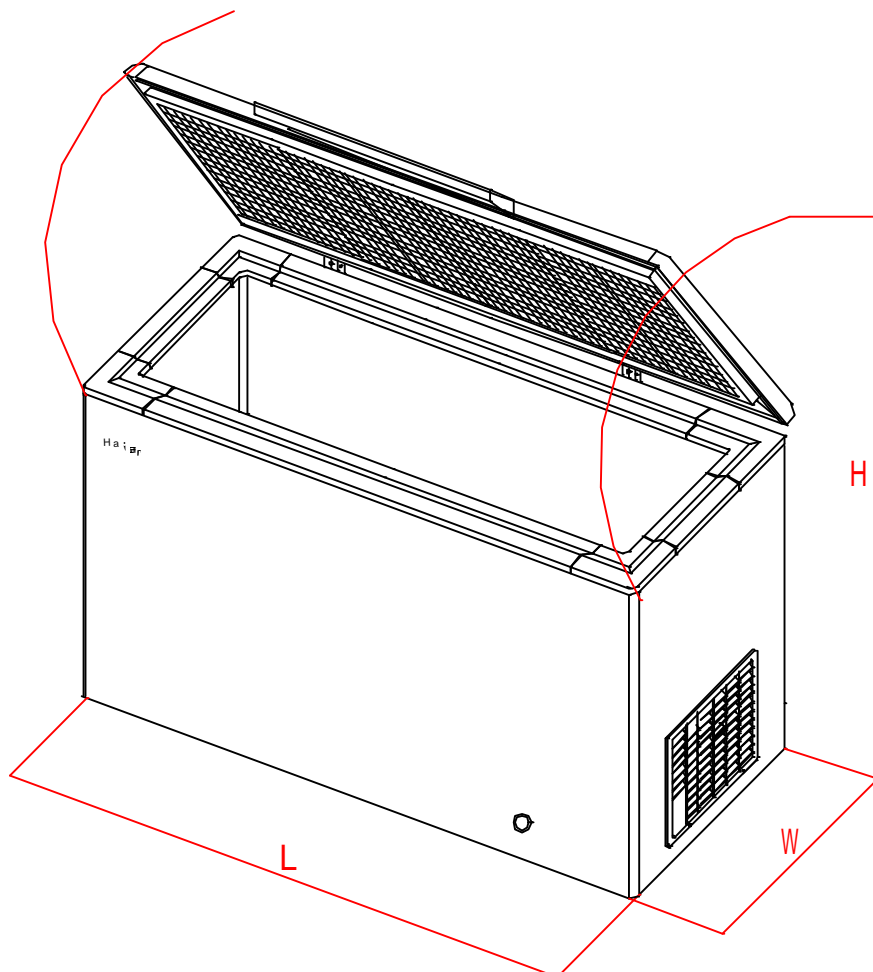
**Read all of the instructions before using this appliance. When using this appliance, always exercise basic safety precautions, including the following:**

- 1. Use this appliance only for its intended purpose as described in this uses and care guide.**
- 2. This freezer must be properly installed in accordance with the installation section. Instructions before it is used, See grounding instructions in the installation section.**
- 3. Never unplug your freezer by pulling on the power cord, Always grasp the plug firmly and pull straight out from the outlet.**
- 4. Repair or replace immediately, all electric service cords that have become frayed or otherwise damaged, Do not use a cord that shows cracks or abrasion damage along its length, the plug or the connector end.**
- 5. Unplug your freezer before cleaning or before making any repairs, Note: If for any reason this product requires service, we strongly, recommend that a certified technician perform the service.**
- 6. If your old freezer is not being used, we recommend that you remove the door and leave the shelves in place; this will reduce the possibility of danger to children.**

### Safety Precautions

- 7. This freezer should not be recessed or built-in an enclosed Cabinet. It is designed for freestanding installation only**
- 8. Do not operate your freezer in the presence of explosive fumes.**
- 9. Do not refreeze foods, which have been thawed completely.**
- 10. Do not use any electrical device or any sharp instrument in defrosting your freezer.**

## Net Dimension



| Model                  | BD-388A              | BD-478A              |
|------------------------|----------------------|----------------------|
| Unit Dimension (W*D*H) | <b>1420*715*810</b>  | <b>1690*715*810</b>  |
| Dimension (Door open)  | <b>1420*715*1470</b> | <b>1690*715*1470</b> |



### Installation and Accessory Parts

#### Unpacking Your Freezer

- 1.Remove all packaging material; this includes the foam base and all adhesive tape holding the freezer accessories inside and outside.
- 2.Inspect and remove any remains of packing, tape or printed materials before powering on the freezer.

#### Adjusting Your Freezer

- 1.Your freezer is designed for freestanding installation only. It should not be recessed or built-in.
- 2.Place the freezer on a floor strong enough to support it fully loaded.
- 3.When moving the freezer, never tilt it more than a 45-degree angle. This could damage the compressor and the sealed system.
- 4.If the freezer is tilted let it stand in an upright position for at least 24 hours prior to plugging. This is to allow the refrigerant to settle.

#### • Proper Air Circulation

- I To assure your freezer works at the maximum efficiency it was designed for, you should install it in a location where there is proper air circulation,
- I Plumbing and electrical connections.
- I The following are recommended clearances around the freezer:

Sides.....2”(50mm)

Top. ....2”(50mm)

Back.....2”(50mm)

### Installation and Accessory Parts

- I Do not over fill freezer for proper internal air circulation.

### Electrical Requirement

- I Make sure there is a suitable power Outlet (220V) with proper grounding to power the freezer.
- I Avoid the use of cutting off the third grounding , this is a dangerous practice since it provides no effective grounding for the freezer and may result in shock hazard.

### Install Limitations

- I Do not install your freezer in any location not properly insulated or heated e.g. garage etc,
- I Select a suitable location for the freezer on a hard even surfaces away from direct sunlight or heat source e.g. radiators, baseboard heaters, cooking appliances etc, Any floor unevenness should be corrected.

### INSTALLATION AND ACCESSORY PARTS

#### Installation and Accessory Parts

Once the freezer is in its proper place, plug it in an electrical outlet having 220 volts.

Set the temperature, on the temperature contrail knob."1"being the warmest and "6"being the coldest. Initially set the temperature on"3". Place food inside the freezer After using the freezer for 24 hours set the freezer to your desired setting.

In case you unplug your freezer or experience an electrical outage, allow 5 Minutes before plugging it back in.

(Note: If the freezer has been placed in a horizontal or tilted position for any period of time wait 24 hours before plugging the unit in.)

#### **Adjustable temperature dial:**

Your freezer will automatically maintain the temperature level you select. The temperature level you select. The temperature control dial has 6 settings plus 0."1"is the warmest,"6"is the coldest. Turning the dial to 0 stops cooling the freezer. Set the dial to "3"and allow 24 hours to pass before adjusting the temperature to your needs.

### Installation and Accessory Parts

#### Food Storage Basket

Your Freezer has 1 or 2 removable basket. It allows you to store food more accessibly or you can remove it if not needed.

#### Defrosting and Draining The Freezer

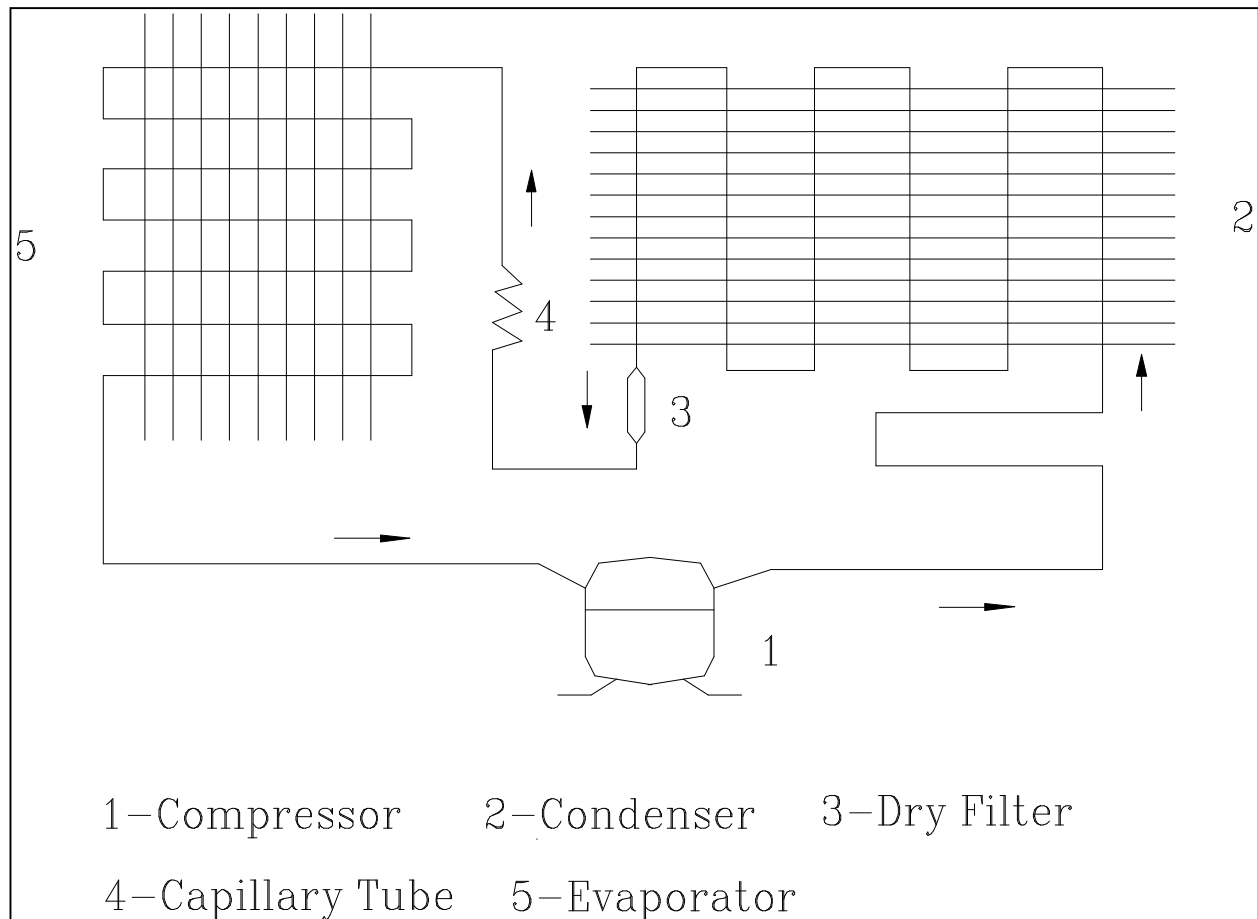
- Defrost whenever the frost becomes 5MM thick. Never use a sharp or metallic instrument to remove the frost as it may damage the cooling coils.(A punctured coil will void the warranty)
- Turn the temperature control to 0 position and unplug the unit. For draining, place a tray beneath the outer drain plug. Pull out the drain dial and rotate it so that the arrow points down ward. This will let the water flow out into the tray.
- Remove the drain plug from the inside of the freezer. Defrosting usually takes a few hours. To defrost faster keep the freezer door open. When done, push the drain dial in and turn the arrow to the up position. Re-plug the drain plug inside the freezer compartment. Note: monitor the container under the drain to avoid overflow.
- Wipe the interior of the freezer and replace the electrical plug in the electrical outlet.
- Rest the temperature control to the desired setting.

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## SYSTEM FLOW CHART

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### System Flow Chart



The refrigeration system of direct cooling single-system freezers belongs to the category of a single-temperature and single-control refrigerating system with only one evaporator and is controlled by a single temperature control.

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## FUNCTION SCHEDULE

### Function Schedule

Set the temperature, on the temperature contrail knob."1"being the warmest and "6"being the coldest. Initially set the temperature on"3". Place food inside the freezer .After using the freezer for 24 hours set the freezer to your desired setting.

In case you unplug your freezer or experience an electrical outage, allow 5

minutes before plugging it back in.

(Note: If the freezer has been placed in a horizontal or tilted position for any period of time wait 24 hours before plugging the unit in.)

#### **Adjustable temperature dial:**

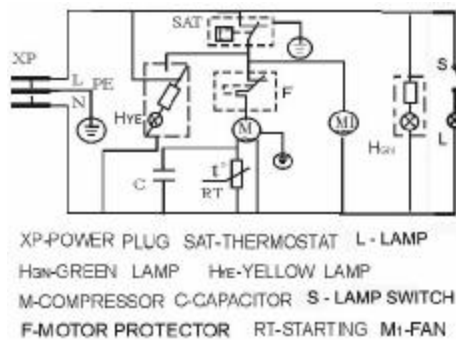
Your freezer will automatically maintain the temperature level you select. The temperature level you select. The temperature control dial has 6 settings plus 01."1"is the warmest,"6"is the coldest. Turning the dial to 0 stops cooling the freezer. Set the dial to "3"and allow 24 hours to pass before adjusting the temperature to your needs.

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## CIRCUIT DIAGRAM

### Circuit Diagram

**Brief description of principle about BD-318A/428A:**



**Brief description of principle about Thermostat:**

When the temperature in the freezer is higher and reaches the value for starting the machine, the thermostat will be closed, the compressor will run; When the temperature in the freezer is lower and reaches the value for closing the machine, the thermostat will be open, thus the compressor will be stop running.

## MAINTENANCE SERVICE AND TROUBLE SHOOTING

### Maintenance Service and Trouble Shooting

#### 12.1 System Trouble shooting

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### **12.1.1 Servicing freezer**

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**(1) Check the whole circuit of freezer, if there are wire connections came off, any wires broken, or a short circuit.**

**(2) Check the insulation of the whole freezer. At normal situation, the resistance is greater than 2 mebohms; if it is less than 2 mebohms, please make a further check of the freezer resistance. Set the voltmeter to R1 Ohm position, put the two voltmeter leads pencils into L and N terminals respectively, watch the indication of odometer. The normal value is several Ohm to tens of ohm. If the resistance is zero, means that there is a short in the freezer circuit or there is a short caused by a bad compressor or fan motor. The reason should be found out and repaired. If the resistance is too big or infinite, this means that there is broken circuit, please check and solve it.**

After the above checks, the freezer will not have any electrical problem and you can switch power on for further completely check.

## **MAINTENANCE SERVICE AND TROUBLE SHOOTING**

### **Maintenance Service and Trouble Shooting**

#### **12.1.2 Reasons of electricity leakage of freezer**



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**(1) Leakage of compressor: mainly because of serious vibration,** the motor coil of compressor contacts with the shell, the coat of enameled wire will come off some where and connect with shell. Other reasons may be over voltage, insufficient of voltage, adverse circumstances (temperature too high, ventilation and heat radiation to bad) for freezer, thermal protection unit out of order, etc. They will make the motor coil over temperature, insulation material loose, insulation is damaged then electricity will occur.

**(2) Leakage of motor connection terminals:** the connection terminals of fully enclosed compressor are made from high temperature soda glass sintered ceramics, around the terminals are filled with a high polymer. The terminals and insulation material must have the same linear expansion coefficient, the for requirement between terminals and the shell is more than 0.5 million ohm. The reason of terminal leakage is that soda glass is broken or there are conductive materials such as water, dirt, etc., adhered to terminals.

## **MAINTENANCE SERVICE AND TROUBLE SHOOTING**

### **Maintenance Service and Trouble Shooting**

**If electricity leakage occurs outside the compressor, please use**

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**tetra chloromethane or alcohol to clean it. If the leakage occurs in the inner of compressor, it needs to be changed.**

**(3) Leakage of temperature controller: because of too long a period of service or too high temperature, or too much dirt, or too high humidity, there may be electricity leakage. If it has been defined that there is leakage of temperature controller, please change.**

**(4) Leakage of starting relay: during mounting and repairing, screw of relay lead is easy to contact the shell and leakage will then occur. If you suspect the relay is bad, check it. If there is leakage, please make the connections again and leave a piece of insulation paper under the screw.**

**(5) Leakage of fan: because of too high humidity of freezer environment or a bad fan controlling unit, the fan is burned after long time operation and thus causes leakage. Using voltammeter to measure the insulation resistance between each respective connection terminal and the freezer body, if the resistance is too little, means there is leakage caused by humidity; if the resistance is zero, means the fan coil is burned or short-circuited. Please change the fan.**

## **MAINTENANCE SERVICE AND TROUBLE SHOOTING**

### **Maintenance Service and Trouble Shooting**

#### **12.1.3 Troubleshooting observation**

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**(1) At normal operation conditions, the temperature around the surface of freezer evaporator is nearly the same; the thickness of frost layer is similar. If there is no frost at the surface of evaporator (bed type freezer at all of its inner wall), or only a small part at the upper, conclusion can be made that the operation of refrigeration system is not normal, the refrigerant is insufficient or there is leakage.**

**(2) Check the system tubing and make sure there is no leakage, especially at the joint connections. Refrigerant has good permeability, and it also contains a little refrigerant oil. If there is leak, there will be traces of oil at the leak points.**

#### **12.1.4 Troubleshooting by sounds**

**(1) When the freezer is working normal, high-pressure liquid refrigerant flows into the low-pressure evaporator via a capillary tube, a gas flowing sound and water flowing sound can be heard. Open the freezer door and access to the evaporator, you can hear the sound. If there is no sound or there is sound a little now and then, there must be leakage of system refrigerant or insufficient charge.**

### **MAINTENANCE SERVICE AND TROUBLE SHOOTING**

#### **Maintenance Service and Trouble Shooting**

**(2) After switching on power, Listen to the running sound of the compressor whether it is normal or not. Whether or not hear**

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**normal running sounds. If there is heavy buzz that means the motor has not been started normally. If there is bump sound, this means that the suspended spring in the compressor is broken and the compressor is running in tilt. When these matters occur, please change compressor.**

### **12.1.5 troubleshooting by touch**

**(1) Touch the cover of condenser, after continuous operation, the upper part of the cover is the warmest; the temperature of lower part is similar to room temperature. Its temperature is relative to environment temperature. The temperature in winter is low and the condenser's temperature is low too, and there is only a small part warm. In summer, the temperature is high and the temperature of condenser cover is high too, and the whole condenser is warm.**

**(2) The temperature of high-pressure exhaust pipe is high, when touching with your hand, in summer it is hot; in winter it is also hot. The temperature of low-pressure gas inlet pipe is low. In summer there is dew at the pipe wall and it will feel cool when touching; when touching in winter, it will feel cooler.**

## **MAINTENANCE SERVICE AND TROUBLE SHOOTING**

### **Maintenance Service and Trouble Shooting**

**(3) The cover temperature of The evaporator can be as low as -30℃ it will feel sticky when touching. If you'd like to touch,**

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**please move your hand over it quickly, otherwise your hand will be stuck.**

**(4) At normal operation of freezer, the temperature of filter dryer cover is similar to room temperature, only a little warmer. If the cover temperature is much higher or lower than that of environment, and there is frost, there must be problem with the refrigeration system.**

**Touching the above mentioned parts, if there is big temperature difference compared with normal, there must be problem and further decision should be made.**

### **12.1.6 System noise repair**

**Normally there are two kinds of freezer noise, one is the natural noise of compressor and fan, and the other is the resonance noise or structural noise. The natural noise of compressor and fan is controlled within a standard range, if the range is exceeded, the compressor or fan needs to be repaired or changed. The resonance or structural noise can be handled as follows:**

## **MAINTENANCE SERVICE AND TROUBLE SHOOTING**

### **Maintenance Service and Trouble Shooting**

**(1) If the freezer is not level, or if the floor is loose, please adjust the base cover or fasten the floor.**

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**(2) If noise is caused by tighten loose of screw between the base cover and freezer body, please make it tight.**

**(3) If the reason for noise is the aging rubber cushion of compressor or a loose fastening clip, please change rubber cushion, or secure clip.**

**(4) If tubing bumps against freezer body, or against each other, make adjustments accordingly to remove noise.**

**(5) If fan blade is blocked and thus causes noise, please clear the obstacles around the fan, or adjust fan blades.**

**(6) If the fan supporter is loose and noise is caused, please tighten.**

### **12.1.7 Poor freezing effect analysis and solutions**

**(1) Check the position of temperature control dial, if it is set at “weak” position, please change to “middle” or close to strong position.**

## **MAINTENANCE SERVICE AND TROUBLE SHOOTING**

### **Maintenance Service and Trouble Shooting**

**(2) Check the rear side and the top of freezer, if it is too close to the wall or not; if the freezer is under sunlight directly or if it is**

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near thermal source or not; if the room temperature is too high or not; if the condenser is blocked by cloth pieces or paper or dirt or not. Any one of these matters will affect heat radiation of condenser and refrigeration ability will be reduced.

(3) Check if there are too much food stored in the freezer, if hot food has been put in or not, Too full of food is not good for cold air circulation. Hot foodstuff can only be put in when it gets cool.

(4) Check if the freezer door has been closed well, if the door seal bar is too dirty and the door cannot be sealed well. Remove dirt and put on a little talcum powder.

(5) Frequent opening and extended opening of freezer door will reduce refrigeration ability.

### **12.1.8 How to handle the seal bar for poor sealing**

If there is too much dirt and the sealing effect is not well, please take a rag and dip in warm water and clean the seal bar. After cleaned, put on a little talcum powder. If there is still seam, you can put an electrical blower outside the seal bar and make it warm,

## **MAINTENANCE SERVICE AND TROUBLE SHOOTING**

### **Maintenance Service and Trouble Shooting**

keep the temperature at 50-60°C, press the bar to make it recover, and press the bar around by hand, so that it can recover. If this is

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**not effective, take a piece of sponge with about 10mm wide, 5mm thick, a little longer than the seam and put it inside the seal bar, i.e., the place between the bottom of seal bar and the door cushion. This will make the seam place higher and adhere to freezer body the same as other places.**

### **12.1.9 Why freezer cannot be used at low temperature environment**

**When environment temperature is below zero, the lubrication ability of freezing oil in freezer compressor will decrease, the compressor will be difficult to start or cannot be started, or Compressor damage may occur.**

### **12.1.10 How to know there is problem with compressor motor**

**It is easy to find out motor problem by checking the resistance of coil. The method is to connect the terminals of “common” and “run” using ohm- meter, the coil resistance can then be determined. Using terminals “common” and “start” can measure the resistance of starting coil. If the value is infinite, the coil must be open. If the resistance is much less than the value the motor has, there must be short circuit problem inside the motor or the windings are burned.**

## **MAINTENANCE SERVICE AND TROUBLE SHOOTING**

### **Maintenance Service and Trouble Shooting**

### **12.1.11 Freezer problem analysis and service**



| Problems   | Reasons   | Removing methods   |
|--|---|--|
| Compressor can not be started  | <ol style="list-style-type: none"> <li>1. Fuse is broken</li> <li>2. The contact of plug, socket, and cable is not good. Cable broken.</li> <li>3. The voltage is too low, 10-15% less than rated voltage</li> <li>4. The knob of temperature controller is at "rest" position.</li> <li>5. The temperature controller is out of order.</li> <li>6. Starting relay or thermal protection unit is out of order or broken.</li> <li>7. Wire broken of motor starting coil or operation coil.</li> <li>8. The compressor motor is burned or rotator and stator are blocked to dead.</li> <li>9. There is leakage of high-pressure gas valve or the shaft is embraced to dead.</li> </ol> | <ol style="list-style-type: none"> <li>1. Check if there is short circuit and solve it, if not, change capable fuse</li> <li>2. Check and connect tightly, or change.</li> <li>3. Use till voltage rises to rated value or attach a stabilizer.</li> <li>4. Rotate the knob to wanted position for suitable temperature.</li> <li>5. Change the controller.</li> <li>6. Change starting relay or thermal protection unit.</li> <li>7. Measure using <math>R \times 1</math> position of avometer, if there is wire broken, change compressor.</li> <li>8. Change compressor.</li> <li>9. Change compressor.</li> </ol> |
| Compressor starts too frequent, operation time too long, but temperature drop in freezer is too slow | <ol style="list-style-type: none"> <li>1. The distance between temperatures sensing tube of temp. Controller and evaporator are too big.</li> <li>2. The temperature controller is out of order.</li> <li>3. Food stuffs in the freezer too much, door opens too frequent and open time too long.</li> <li>4. The environment temperature is too high, humidity too high, airflow is impeded.</li> <li>5. The frost layer at the evaporator is too thick.</li> <li>6. The refrigerant is insufficient or leakage.</li> <li>7. Compressor efficiency is reduced.</li> <li>8. The drying filter is blocked.</li> </ol>  | <ol style="list-style-type: none"> <li>1 Adjust and make it close to evaporator cover.</li> <li>2.Change the temperature controller.</li> <li>3.Reduce them.</li> <li>4.Put the freezer to suitable place and make air circulate well.</li> <li>5.Remove frost regularly.</li> <li>6.Check or supplement refrigerant.</li> <li>7.Change compressor.</li> <li>8.Change new drying filter.</li> </ol>  |
| Compressor runs without stop, temperature in freezer is too low                                      | <ol style="list-style-type: none"> <li>1.The knob of temperature controller has been set to "over cooling" position.</li> <li>2.The contacting point of temperature controller is adhered.</li> <li>3.The temperature sensing probe of controller is not placed well, and causes maladjustment</li> <li>4.Compressor efficiency reduced.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Change the position to moderate.</li> <li>2. Repair or change.</li> <li>3. Adjust to suitable position, normally contact tightly with evaporator cover.</li> <li>4.Change compressor.</li> </ol>   |
| Compressor buzzes and cannot be started, thermal protection unit jump                                | <ol style="list-style-type: none"> <li>1. Voltage is too low.</li> <li>2. Starting relay out of order.</li> <li>3. The starting coil of starting motor is broken.</li> <li>4. Compressor does not run.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Supplement a stabilizer, adjust to rated value.</li> <li>2. Change starting relay.</li> <li>3. Change compressor.</li> <li>4.The shaft and piston in the compressor is blocked, please</li> </ol>  |

|   |  |   |
|---|--|---|
| repeatedly.   |  | change.   |
| After short time of operation, over load protection unit cuts off               | <ol style="list-style-type: none"> <li>1. The voltage is too high.</li> <li>2. Over load protection unit is not good, it jumps earlier.</li> <li>3. Starter contacting point is adhered.</li> <li>4. There is short circuit in compressor.</li> <li>5. There is mechanical problem in the compressor.</li> <li>6. Temperature around compressor is too high.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Supplement a stabilizer and adjust its value to rated.</li> <li>2. Change over load protection unit.</li> <li>3. Change starting relay.</li> <li>4. Change compressor.</li> <li>5. Change compressor.</li> <li>6. Increase heat radiation space.</li> </ol>   |
| Too much noise when compressor runs   | <ol style="list-style-type: none"> <li>1. The floor is loose.</li> <li>2. The freezer body is not stable and in level.</li> <li>3. When compressor runs, friction between tubes and freezer body causes resonance.</li> <li>4. Compressor fixing screw is loose.</li> <li>5. The vibration absorption cushion for compressor fixing is too tight, or too loose or ageing.</li> <li>6. Compressor inside noise is too big or vibration absorption suspending spring is broken.</li> </ol> | <ol style="list-style-type: none"> <li>1. Reinforce the floor.</li> <li>2. Make the freezer body stable.</li> <li>3. Move the tube a little away to avoid friction.</li> <li>4. Make the screw tight.</li> <li>5. Adjust the degree of tight or loose of vibration absorption cushion, or change cushion.</li> <li>6. Change compressor.</li> </ol> |
| There is no frost at evaporator   | <ol style="list-style-type: none"> <li>1. There is serious leakage of refrigerant.</li> <li>2. There is dirt blocked the capillary or system.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Check leakage, make welding repair, and fill refrigerant again.</li> <li>2. Clean the capillary or change filter.</li> </ol>  |
| Frost at evaporator is not full   | <ol style="list-style-type: none"> <li>1. There is some leakage of refrigerant.</li> <li>2. There is dirt block, but not serious.</li> <li>3. Refrigeration quantity of compressor is reduced.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check leakage, make welding repair, and fill refrigerant again.</li> <li>2. Clean the capillary and filter.</li> <li>3. Change compressor.</li> </ol>   |
| Evaporator frosts too rapid, frost layer too thick or frozen to ice             | <ol style="list-style-type: none"> <li>1. Food put into freezer contains water.</li> <li>2. Too much food has been stored.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Please let or make food dry after cleaning, then store it.</li> <li>2. Store only corrects quantity of food.</li> </ol>   |
| Electricity leakage of freezer body, you will feel tingle when touching by hand | <ol style="list-style-type: none"> <li>1. Freezer body has not been connected to the ground.</li> <li>2. The compressor terminal contacts body shell and causes short circuit.</li> <li>3. When the components of electrical system get wet, insulation ability is dropped, electricity leaks.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Make the ground connection as stipulated.</li> <li>2. Change compressor.</li> <li>3. Check carefully step by step, if insulation is seriously damaged, please change; remove wet parts and put them into drying box to make them dry.</li> </ol>  |
| Electricity leakage of fan  | <ol style="list-style-type: none"> <li>1. Environment temperature too high or insulation ability of insulator is dropped.</li> <li>2. There is short circuit between fan coils or the fan coil is burned.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Change fan.</li> <li>2. Change fan.</li> </ol>  |
| Fan too noisy   | <ol style="list-style-type: none"> <li>1. The blade of fan is blocked or fan supporter is loose.</li> <li>2. The clearance of fan axle is too big.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Clear obstacles around the fan or tighten the supporter.</li> <li>2. Change the fan.</li> </ol>   |

|   |   |  |
|---|---|--|
| The fan doesn't run   | 1. Check if any connection has come off.<br>2. Check if the fan is burned.                              | 1. Change the fan.<br>2. Change the fan.   |
| Electricity leakage of temperature controller                         | 1. The service time is too long.<br>2. The environment is too dirty.<br>3. Humidity is too high.        | 1. Change temperature controller.<br>2. Use brush to remove dust.<br>3. Make the temperature dry and control the environment humidity. |
| Temperature controller out of order                                   | 1. There is leakage of temperature sensing medium.<br>2. Damage of cam of contacting point spring, etc. | Change temperature controller.   |
| The probe of temperature sensing tube doesn't contact evaporator well | It has not been mounted to position or changed during transportation.                                   | Mount it again.  |

### 12.1.12 Procedure for fan change

- (1) Switch off power and open the fan protection cover.
- (2) Remove the fan bolts by using fork wrench or universal tool.
- (3) Loosen the fan blade and take it out.
- (4) Take the fan out from the space between compressor and tubes.
- (5) Mount new fan from the space between the compressor and tubes, put blade onto position and secure it by using a fork wrench or universal tool.
- (6) Make a test run; check if the operation is normal, if there is any blocking of blade.
- (7) Make sure not to bend or damage tubing during removal and installation.

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### 12.1.13 Procedure for temperature controller change

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**(1) Switch off power.**

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**(2) Remove side protection cover.**

**(3) Unscrew fastening nut.**

**(4) Hold the base end of temperature sensing tube and the controller, pull out downward.**

**(5) Change with new temperature controller.**

## **12.2 Common freezer problems**

### **12.2.1 Freezer cannot be started**

**When switching on power, the freezer cannot be started. Determine first that the failure is caused by inside or outside factors. The factors may be:**

#### **(1) Outside factors**

**① The fuse is burned, or the contact of plug and socket is not well, or the voltage is too low.**

**② The knob of temperature controller is set to off position.**

#### **(2) In side factors**

**① Electrical problem of freezer (normally caused by connection terminals coming off or not in good contact).**

**② Temperature controller out of order (contact point are burned or switch element is damaged, etc.).**

**③ The start capacitor is bad.**

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**④ The starter relay or overload protector is bad. A bad starter normally is caused by a burn a contact points or the welded point has come off; a**

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bad thermal protection unit is normally caused by burn contact points or a bad heating wire.

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⑤ The motor winding are burned.

⑥ The compressor shaft is broken and blocking the cylinder.

### **12.2.2 Operation of freezer is not normal**

Freezer starts when power is switched on, but after a few seconds or 1-2 minutes, it stops automatically and will start again in several minutes. It stops again within a very short time period after starting. If it runs like this

Continuity and can not work normally; there are several reasons for this matter:

#### **(1) Big fluctuation of voltage**

The voltage required for proper operation is 220V olts. If the voltage is too high, the current flowing through the starter will increase accordingly. When it exceeds the permissible value, the starting contact point will keep in connection state for a long time and cannot be released in time (at normal situation, the motor starting coil will cut off in about 1s after starting). This will make the coil temperature rising rapidly, and then the thermal protection unit cuts off the circuit and stop operation. When power is cut off, the temperature of thermal protection unit reduces quickly and will switch power on when reaching the reset temperature. At this time, if the contact point has not been released, the starting contact point could not contact tightly and it is in false connection. This will make the compressor tremble; thermal protection unit will open after a short time.

#### **(2) Operating amperage too high**

Freezer operation current is too big and will not operate normally. There are two reasons way:

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**First, the freezer stops automatically after a few seconds after starting,**

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several minutes later it starts again and stops automatically again. With in cycles like this and the motor, or starter, and thermal protection unit will burn up after a long time. The main reason is: the motor coil is shorted at some parts.

Second, the freezer operates a certain time after starting, but it will stop automatically before the temperature reduces before the desired temperature is reached. After several minutes, it will start again, and the electricity consumption increases bad. The reason is that the insulation around the motor windings bad.

## **12.3 Service and technical requirements of a R134a freezer**

### **12.3.1 Refrigeration equipment requirements**

The compressor, condenser, evaporator, drying filter must be special for R134a freezer and not be confused.

### **12.3.2 Repair equipment Requirements**

- (1) The evacuation and fill machine is special only for R134a use.
- (2) Other equipment (such as pressure gauge) has no special requirements, but once it is used for R134a freezer, it can be no longer for other use.

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### **12.3.3 Service procedure**

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**(1) Operation method of repairing equipment (please see instruction manual).**

**(2) Special requirements**

- ① The time interval from opening of compressor to the beginning of evacuation can not exceed 10 minutes.**
- ② The evacuation time shall not be less than 45 min.**
- ③ In case there is leakage of freezer, if leakage occurs at high-pressure end, it is repairable. Please blow high purity N<sub>2</sub> before welding. If leakage occurs at low-pressure end, Check system pressure, if the system has no pressure, the freezer has to be scrapped and change with new one, if there is pressure, it is repairable.**

### **12.3.4 Changing procedure of R134a compressor**

- (1) Switch power off: Open the protection cover by using cross screwdriver or universal**
- (2) Screwdriver.**
- (3) Remove electrical parts of compressor.**

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- (4) Remove the four mounting bolts of compressor by using fork wrench or universal tool.**

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**(5) Remove the compressor.**

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**(6) Install new compressor and new filter dryer and weld them. The open time of system shall not be more than 10 min.**

**(7) Connect the R134a recovery unit to the low sideline of the compressor, and then evacuate. The evacuation time shall not be less than 45 min.**

**(8) Fill system with R134a according to its original quantity.**

**(9) Check if there is any leakage at welded point by using soapsuds.**

**(10) Use clean gauze to wipe away welding powder and flux.**

**(11) Connect the electrical controlling unit of compressor.**

**(12) Mount and adjust temperature controller.**

**(13) Switch on power for test run, check unit operation.**

### **12.3.5 Compressor installation and brazing procedures**

**(1) Install new compressor.**

**(2) Compressor is not allowed to suck in air directly for check or other test.**

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**(3) When changing with new compressor during service, the seal plug shall be opened last and make the brazing and evacuation immediately.**



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**(4) When seal plug of compressor is removed, if there is no gas flowing sound (no pressure), the compressor shall not be used.**

**(5) Compressor has no seal plug it cannot be used.**

**(6) There should be no grease adhered to service operator's hands.**

**(7) The unpacking of the filter dryer of freezer should be opened right before use.**

## **12.4 Application and maintenance of freezer**

### **12.4.1 Product characters**

**(1) Completely green environmental bed type freezer uses R134a as the refrigerant, which is recognized internationally. It has an ozonosphere depletion coefficient ODP=0.**

**New climate type design: commercial freezer uses wide temperature zone design. At 38°C(100° F) high temperature, the freezer can start and stop freely.**

**(2) New refrigeration system design: it takes dual direction refrigeration system, thus increases refrigeration speed and prolongs compressor life.**

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### **12.4.2 Notice for use**

**(1) The freezer should level, the tilting angle when moving shall not be**

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**greater than 45° , so that the sliding door could not move out from its guiding slot and other accident will not happen.**

**(2) The clearance between freezer and other objects should be more than 30 cm for ventilation and heat radiation.**

**(3) Please don't leave the freezer at humid or corrosive gas area.**

**(4) Freezer should be placed at a place with proper ventilation, away from heat source, and avoiding direct sunlight.**

**At the first application, please wait some time for operation (in summer 6 hours, in winter, 4 hours), when the temperature inside the freezer has**

**(5) reached to -15°C and below, then you can put food in. If food is put in too early, it may get damaged, as the temperature is still high.**

**(6) Do not over pack refrigerator.**

**(7) Place food by reasonable sorts, try to power open door frequency and time so as to reduce the loss of refrigeration and reduce consumption.**

**(8) There are four wheels at the bottom of freezer, but it can only be used for short distance and on level road movement. If it is required to move frequently, please put the freezer onto a strong trolley base.**

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**(9) As this type freezer is often used outdoors, please make sure that the plug is firm, so that unnecessary loss caused by infirm plug can be avoided.**

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- (10) Cold drinks and snacks, which contain much milk and needs to be stored at low temperature, please try to put them at lower part of freezer.
- (11) When the freezer is used outdoors, please keep unit away from direct sun light. Frequently clean the inside and outside of freezer especially the cabin part including condenser, compressor, etc.

### 12.4.3 Safety notice of product

- (1) The freezer needs to be on a separate ground circuit with a 5A minimum carrying capacity.
- (2) If the electrical cable needs to be extended, the cross section of extending wire should not be less than 1.5mm<sup>2</sup>.
- (3) There must be reliable ground connection for the freezer; ground line is not allowed to connect to water pipe, gas pipe, etc.
- (4) Once the freezer is cut off, at least 5 minute must be waited for starting again, otherwise the compressor or refrigeration system will be damaged.
- (5) Explosive, flammable and volatile substance, liquid filled glass containers, alkalis or corrosive acids are not or be stored in freezer.
- (6) Do not let children play in freezer compartment so as to avoid suffocation or damage to freezer.

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### 12.4.4 Maintenance

**Frost removal:** At the inner container, there will be frost layer after using some time. If the layer is too thick, it will affect refrigeration and increase

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**electricity consumption.**

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- (1) At a regular period, when the frost layer reaches about 5mm, please remove it by plastic shovel.**
- (2) When removing frost, switch power off, take out stored food and place in a cool place. In order to accelerate frost-removing speed, containers with warm water can be put into compartment.**
- (3) When frost buildup has melted, pull out the drainage plug wipe freezer so water can drain out. Compartment down with a dry cloth.**
- (4) Cleaning: For safety reason, please disconnect before cleaning so as to avoid electrical shock or damage to unit.**
- (5) When cleaning the freezer, please use soft cloth or sponge and dip in water or soap water (non-corrosive neutral detergent is available). After cleaning please make it dry by using cloth so as to avoid rust.**
- (6) Please clean the condenser, compressor in the cabin and dust proof element by using soft brush regularly, so as to keep good refrigeration effect. (Dust proof element 2-3 days)**
- (7) Down time: If the freezer has extended down time, please disconnect power supply, and wipe unit clean according to the above-mentioned methods. Open the door, till it is dry and then seal for storage.**

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#### **12.4.5 Standard procedure of maintenance**

- (1) Cleaning unit cabinet: Take a cross screwdriver, remove the cabinet board and rear protection cover. Take a brush and wipe away dust from**

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**condenser, fan, compressor and temperature controller. Wipe clean and avoid damaging pipes and electrical parts.**

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- (2) Switch on power and check the freezer operation. If not normal, check and repair.**
- (3) Check all brazing connections. If the black paint has peeled off and there is rust, please grind the surface slightly using No.0 grinding paper. When the rust is removed, wipe it with clean towel. Then take a brush and dip in alcoholic paint and paint the welded points and pipes.**
- (4) Check the casters and change if there is any damage.**
- (5) Check the power cord, if there is any wear or damage, please change.**
- (6) Take an avometer and check if the resistance of ground resistor is normal.**
- (7) Check the insulation by using, if it is abnormal; please check the circuit and various components.**
- (8) If the trademark is damaged or lost, please change with new Haier trademark.**
- (9) Wipe the inside and outside of freezer clean. If freezer will be off for a long time, wipe water away, and put the freezer into a plastic bag and leave it at a dry warehouse with good air convection and a level floor.**

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#### **12.5**

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## **12.5.1 Freezer repair tool and equipment**

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**(1) Recovery machine**

**(2) N<sub>2</sub> container, O<sub>2</sub> container, acetylene container and torch kit.**

**(3) Thermometer.**

**(4) Voltmeter.**

**(5) Test pencil.**

**(6) Manifold gauges**

**(7) Flathead screw driver.**

**(8) Philip screwdriver.**

**(9) Needle nose pliers, notch pliers, sealing pliers.**

**(10) Hansen valve.**

**(11) Tube cutters.**

## **12.5.2 Notice for use**

**R134a filling equipment can only be used specially for R134a refrigerant,**

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**(1) It is not allowed to fill R134a by R12 filling equipment.**

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**(2) Please keep the pliers, pipe cutting unit and Hansen valve clean, and keep them away from grease dirt.**

### **12.5.3 Procedure for filling equipment**

#### **(1) Preparation before use**

- ① **Visually inspect recovery machine for abnormalities, etc.**
- ② **Keep all valves closed to equipment until really to proceed.**

#### **(2) Evacuation**

- ① **Connect recovery machine hoses to system fittings**
- ② **Switch on power.**
- ③ **Switch on motor.**
- ④ **Open all related valves.**
- ⑤ **Observe the pointer of vacuum meter when it is accessing the mark -1.**
- ⑥ **Evacuation time shall not be less than 45 min.**
- ⑦ **After evacuation close valves.**

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- ⑧ **Switch off motor.**

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### **(3) Filling**

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- ① **Determine the filling quantity first according to the freezer being repaired. (Each small mark of the liquid tube is 25g, each big mark is 100g).**
- ② **Open all related valves.**
- ③ **When the liquid level has reached filling quantity, close valves.**

### **(4) Test run**

- ① **After filling, turn on power to freezer for test run. Observe the unit operation.**
- ② **Switch off power.**

## **12.6 Freezer noise**

### **12.6.1 Freezer noise sources**

**Freezer noise comes from the expanding with heat and contracting with cold of compressor, evaporator or condenser; from the contacting or resonance of pipes; from the flowing of refrigerant; or from the vibration of freezer because the floor is not level, etc.**

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### **12.6.2 Compressor**



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**Freezer noise mainly comes from the compressor. The Compressor generates various sounds. There are continuous and not continuous, periodic and not periodic. Their frequencies may be from tens of Hertz to thousands of Hertz. Reasons for compressor noise are:**

**(1) There are two pieces thin elastic steel slice inside the compressor (gas in valve and gas out valve), when the freezer starts, each steel slice will open and close about 47 times per second, this will cause vibration sound. At the same time, the open and close of steel slice will contacts other parts and also make sound. The continuous buzz we heard is this kind of sound.**

**(2) When compressor is produced, there must be clearance between components. When freezer is running, the existing of clearance will make some components touch and gives out sound. Especially, at starting and stopping, the forces acted on compressor components changes greatly and bigger sound will be generated.**

**(3) Noise of flowing liquid**

**The running process of compressor is a continuous gas in and out process.**

**If the pressure of refrigerant gas breathed in or exhausted out changes suddenly, vibration sound will be generated.**

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**(4) Resonance sound of compressor components**

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**Compressor parts, such as compressor body, exhaust tube, noise eliminator in compressor, supporting spring, etc., will cause resonance sometimes and give out sound.**

**(5) Collision between body and shell**

**Compressor body is suspended by three pieces of spring or supported by spring in the shell. At starting or stopping, forces acted on compressor changes greatly and sometimes make the body contact its shell and makes sound. This situation is of short duration.**

**(6) The electromagnetic sound of a hermetically sealed motor, is relatively small**

### **12.6.3 How is the sound of water flowing generated?**

**Answer: When liquid refrigerant is flowing especially through the evaporator, there will sound like water flowing. This sound is different, for the evaporator used and assembly technologies during producing are different. If there is not this sound at freezer operation, and evaporator cannot make refrigeration, condenser is not hot, this means there is restriction or there is a refrigerant leak.**

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### **12.6.4 Gas flowing sound**

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**At operation of compressor, it breathes in and exhausts out gas continuously. When liquid refrigerant flows through capillary, there will be gas jet and makes sound of gas flowing. This is normal sound and may be different for various freezers as compressors and evaporators used are different.**

### **12.6.5 Why there is sudden “cluck” sound or “pattering” sound from freezer?**

**Answer: This is the sound of expanding with heat and contracting with cold of condenser and evaporator, or the sound of ice at evaporator surface because of sudden heat or cold. This sound may occur at the following situations:**

- (1) Newly bought freezer, the internal stress of materials has not been eliminated. With time going on, the stress of materials will disappear and it is less possible to make this sound.**
- (2) Temperature in the freezer is not uniform just after frost melting.**
- (3) When open door and take out food, the evaporator feels hot suddenly.**
- (4) Temperature changes greatly of condenser and evaporator several minutes after starting or stopping of freezer.**

**Expand with heat and contract with cold is natural law, and this sound is normal.**

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### **12.6.6 Why the freezer’s noise increases after using**

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## **sometime?**

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**Answer:** After half a year or one year's use, clearance will increase because of wear of inner components, and compressor's noise will increase accordingly. Then it will get stable till the whole life of freezer.

### **12.6.7 Why freezer's noise increases after stop use for sometime?**

**Answer:** After long time stop of freezer, the crankshaft of compressor may be blocked by dirt brought in by lubrication oil or blocked by freezing lubrication oil because of low temperature. For this reason, compressor cannot be started, or noise will increase after starting, and the wear of crankshaft will increase too. It is better that freezer doesn't stop use. Sometimes newly bought freezer also has this characteristic. After a period operation, it will get normal.

### **12.6.8 How to reduce freezer's noise?**

At present, all kinds of freezers have the problem of noise. Scientists have been seeking a method to solve it but to little effect. The final solution depends on new improvements and developments in technology.

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### **12.6.9 why freezer noise changes greater at night?**

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**Answer:** This is because the affection of freezer noise to people is relative to the level of environmental sound. In noisy city or shops, people feel the noise is little, while in countryside or quiet living room will feel the same noise greater. This is the reason that people feel the freezer gets noisier at home than at shop.

### **12.6.10 What are the national stipulations for freezer noise?**

**Answer:** Regarding the side effect of noise to people's health and the technological level freezer industry can reach at present, standardized stipulations for freezer noise is made in national standard GB8059.1-87: family use freezer with the volume below 250L, noise $\leq$ 52 dB(A) sound power level. The noise at offices we stay everyday or other public places is much higher than this freezer noise.

### **12.6.11 Why freezer noise measured at home is incorrect?**

**Answer:** Because at home there is not the environment conditions for freezer noise measuring, and the value measured is not effective. The conditions for noise measuring are stipulated in national standard as the followings:

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**(1) In semi-sound eliminating room or in sound eliminating room without sound wave reflection.**

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**(2) Put freezer onto 5-10mm elastic cushion.**

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**(3) Freezer must be empty and running at least 30 minutes before measuring. If normal stop happens, please make the measurement 3 minutes after freezer starting again.**

**(4) 4 measuring positions are required, they are 1m away from freezer at front, back, front left, front right respectively. The height is 1/2 of freezer; the instrument is accurate sound level meter (A weighted).**

### **12.6.12 What's the different between national noise standard 52dB(A) and ministry of light industry standard 42dB?**

**Answer: The noise of 52dB(A) in national standard is the sound power level. Under the measuring conditions stipulated in national standard, measure the freezer noise at four points, take the average of indicated reading at greater noise situation, calculate the arithmetic average value of the four points. This value is the average sound pressure level of noise, the calculation formula is:**

$$L_w = (L_{PA} - 2) + 10 \lg S$$

**where:  $L_w$ —sound power level, dB**

**$L_{PA}$ -average sound pressure level of measuring surface, dB**

**$S$ —the envelope area of measuring surface,  $m^2$**

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**The standard 42dB of the ministry of light industry is the noise pressure level measured 1m away from freezer door. This value plus 10 is the**

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**approximate value of sound power level.**

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The restriction to noise in national standard is more strict and scientific. At present, freezer noise is required to take sound power level stipulated in national standard.

### **12.6.13 Why the noises of it type freezers are different?**

**Answer:** The noise of each qualified freezer ex-factory is within the range of national standard. Different types of freezers have different powers, compressors used are not the same neither, and so their noises are different. Even for same type freezers, as the noise of compressors are different, their differences to national standard 52dB(A) are not the same, and the noises are different.

### **12.6.14 Why there are greater noises at starting and stopping of freezer?**

**Answer:**

**(1)** At the starting of freezer, starting relay will make sound. The acceleration of motor will cause vibration of compressor and makes sound.

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**(2)** When freezer stops, because of inertial rotation, there will be vibration sound from compressor.

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**(3) When freezer stops, the compressor decelerates, high pressure and low pressure at gas exhausting tube and returning tube will get balance, thus causes sound of compressor.**

**(4) At the starting of compressor, if the voltage is low, the hammer type-starting relay will make loud sound. Even if stabilizer is equipped with, measurement should be made in time. If it cannot reach the requirement of stabilizing, there must be quality problem with it, please don't use in case the voltage output is low.**

**For the previous reasons, freezer makes sound at starting and stopping.**

### **12.6.15 Why sometimes noise at far distance is greater than at near distance?**

**Answer: Because the transfer of freezer noise has relations with freezer position, room space, etc. The sound wave giving out at freezer operation will reflect when it touches wall or furniture. So it is possible that at a far distance, it is noisier than near distance. So it is not correct to make decision of big sound just by it can be heard meters away.**

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### **12.6.16 How to determine that the sound is noise or normal?**



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**Answer: Normally speaking, freezer noise within the range of national standard is normal. But if there is continuous sound of metal contacting from compressor, please check and solve the problem in time.**

## **12.7 National standard for noise**

There are stipulations in Items 6.5.7.1 and 6.3.6.1.of GB/T 8059.3-1995.

### **12.7.1 When freezer is running for freezing, there will be no obvious noise?**

The noise of sound power level of freezer with the volume 250L and below, measuring according to the stipulations in item 6.3.6.1, will not greater than 52dB(A).

Sound power level noise of freezing freezer with fan

300L below  $\leq 55\text{dB(A)}$

300-400L(including 400L)  $\leq 60\text{dB(A)}$

401-500L(including 500L)  $\leq 63\text{dB(A)}$

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### **12.7.2 Noise test**

At the geometrical center of measuring field, put the freezing freezer onto an elastic base (5-6mm thick elastic rubber cushion). The freezer should be

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empty. Turn the knob of temperature controller to middle or near to strong position and close the door or cover. Make the measurement at least 30 min. after freezer operation.

During test, if the freezer reaches the temperature the knob stipulated, and the freezer stops, the measurement must be interrupted and resume 3min. after the freezer starts again.

The test environment is semi-sound-eliminating-room. Other test field must comply with the stipulations in GB4214.

The test of noise is carried out as shown in figure 8. Put sound transfer units to measurement point 1,2,3,4, measure the sound level by sound level meter (A weighted). Take the greater readings and calculate the average value. The arithmetic average value of these four points is taken as the average sound pressure level noise.

According to the testing result, sound power level of the freezer being measured can be calculated out.

$$L_W=(L_{PA}-2)+10LgS$$

Where:  $L_W$ --A sound power level, dB (datum value is 1PW);

$L_{PA}$  --average sound pressure level of measuring surface,

dB(datum value is  $20 \mu Pa$ );

$S$ —measuring surface enveloped area,  $m^2$

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Assume  $l_1$ ,  $l_2$ ,  $l_3$  is the length, width, height of freezer respectively, unit is m.

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$$A=l_1/2 +d \quad b=l_2/2 +d \quad c=l_3/2 +d$$

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Take  $d=1m$

Then  $S=4(ab+bc+ac)$

The positions of measuring points are shown in table 4.

## **12.8 Measuring technology of freezer performance parameter**

### **12.8.1 Measuring content**

The measuring technology of freezer includes measurement of refrigeration property and measurement of safety requirement of electrical parts. The following items must be done before ex-factory: (1) appearance requirement; (2) cooling speed; (3) leakage of current; (4) insulation resistor (cool state); (5) electrical intensity; (6) starting performance; (7) ground resistor; (8) sealing performance of refrigeration system; (9) documents and accessories.

Spot tests for ex-factory are: (10) store temperature; (11) insulation resistor (wet state and hot state); (12) electrical intensity (wet state and hot state);

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(13) Electricity consumption; (14) noise and vibration; (15) electroplated parts; (16) painting cover; (17) protection of anti-electric shock; (18) cables; (19) door opening force; (20) freezing ability; (21) rising up speed of

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temperature with load.

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Type tests include items (1), (2), (8), (9), (10), (13), (17), (18), (20), (21) and the followings: (22) total effective volume; (23) ice producing ability; (24) frost melting performance; (25) heat insulation performance and anti dew; (26) gas tightness of door seal; (27) duration of door bar and handle; (28) strength of supporting bracket and similar parts; (29) internal freezer material and smell; (30) firmness of freezer and transportation test.

## **12.8.2 Test method and instrument**

### **12.8.2.1 Sealing performance test of refrigeration system**

In this test, freezer is put to positive pressure room, temperature is 16-32°C. Leakage inspection instrument is set to 0.5g of yearly leakage, check every position of refrigeration system. Leakage at any point shall not greater than 0.5g. Leakage inspection instrument normally used includes H-25 of American GE product and Halogen instrument HLD4000 made by a German company.

### **12.8.2.2 Insulation resistor**

This test is to check the insulation performance of freezer. The resistance is measured with a voltage of 500V DC added to live parts and accessible metal parts. The resistance must be not less than 2 million ohm.

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### **12.8.2.3 Electrical intensity**

This test is to check the electrical intensity of live parts and all accessible metal parts. The testing equipment is flashover and breakdown unit,

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voltage is 1650V (50Hz) for 2s. At the test, there will not flashover and breakdown occurring.

#### **12.8.2.4 Ground resistor**

Check the voltage drop between freezer ground connection point and accessible metal parts, using AC power of load empty voltage not over 12V and 10A current. Calculate the resistance according to the current and voltage drop. Ground connection resistance shall not exceed 0.1 ohm.

#### **12.8.2.5 Leakage of current**

When testing, give 1.06 times rated voltage to the freezer, and make the test at operation status. The test complies with GB4706.1-84, the leakage current testing instrument is made in accordance with the stipulations. The leakage current measured shall not exceed 1.5mA.

#### **12.8.2.6 Noise test**

This test is carried out at semi sound eliminating room. The freezer is put to the geometrical center of room, on a 5-10mm thick elastic cushion. The freezer should be empty when testing. Turn the knob of temperature controller to middle or near to strong position and close the door. Test after the freezer has running more than 30 minutes. The freezer noise power level, 250L and below,  $\leq 52\text{dB(A)}$ ; 250L above  $\leq 55\text{dB(A)}$

### **MAINTENANCE SERVICE AND TROUBLE SHOOTING**

#### **Maintenance Service and Trouble Shooting**

#### **12.8.2.7 Test method of refrigeration performance**

(1) 4 or 6 freezers can be tested simultaneously at the test room. The

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material of enclosure structure of test room is made up of 10mm thick polyurethane or polystyrene, which has good insulation. There are air re-treatment motor sets in the test room. Air comes into the room from the ceiling of porous plate with uniform pressure, so as to assure airflow speed in the room not over 0.25m/s and thus keep the room temperature uniformly.

The temperature of test room is adjustable within the range of 10-43°C.

(2) Temperature requirements for different climate freezers please refer to table 6-1.

Each test point shall keep the stipulated environment temperature, the fluctuation range is  $\pm 0.5K$ . Within the range of 2m heights away from the test platform, the vertical temperature gradient shall not exceed 2K/m.

**Table 6-1 Different climate sorts for freezers**

| Climate types      | Symbols | Suitable temperature (°C) | Measuring temperature (°C) |
|--------------------|---------|---------------------------|----------------------------|
| Sub-temperate zone | SN      | 10-32                     | 25                         |
| Temperate zone     | N       | 16-32                     | 25                         |
| Sub-tropical zone  | ST      | 18-38                     | 25                         |
| Tropical zone      | T       | 18-43                     | 32                         |

(3) Environmental humidity: normally the relative humidity is 45-75%.

## MAINTENANCE SERVICE AND TROUBLE SHOOTING

### Maintenance Service and Trouble Shooting

(3) Test pack: Use the rectangle packs of following dimensions as the load of freezer.

(4) Table 6-2 Test packs for freezer performance

|        | Dimensions (mm) | Mass (g) | Note  |
|--------|-----------------|----------|---|
| Small  | 25×50×100       | 125      | In the geometrical center of 500g pack, there is a thermal element; this pack is called M pack. |
| Middle | 50×100×100      | 500      |   |
| Big    | 50×100×200      | 1000     |   |

The contents of test packs are (take 1000g pack as the datum): hydroxyethylmethylcellulose 230g; water 764.2g; sodium chloride 5g; parachlorometacresol 0.8g. The freezing point of filling of pack is -1°C, its thermal property is similar to lean beef.

(5) Temperature measuring gauge: The measuring of temperature normally use platinum resistor. There are two types:

Put the platinum resistor directly into test pack (M pack) when measuring

a. Its temperature;

b. Insert the platinum resistor into the center of four tin electroplated copper columns, the diameter and height of column is the same 15.2mm.

The measuring equipment is temperature-measuring bridge with the accuracy of ±0.3K.

## MAINTENANCE SERVICE AND TROUBLE SHOOTING

### Maintenance Service and Trouble Shooting

(6) Humidity measuring instrument: the measurement of relative humidity is wet and dry bulb method. Put the dry bulb thermometer and wet bulb thermometer (enclose 1.5-2 layers of degreased gauze at the temperature

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sensing parts of thermometers, and put the bottom end of gauze into distilled water) under the blowing of wind with the speed of 2.5-3m/s. Record the temperature of dry bulb thermometer, and calculate the relative humidity using the <<Relative humidity referring table for environment test>> GB6999-86.

#### **(7) Cooling speed**

Leave the freezer at test room, room temperature is 32℃, the inner temperature of freezer gets balance with room temperature (temperature difference +-1K). Close freezer door and let the freezer running continuously. Record the time needed for storage temperature  $t_m$  to reach  $t_m(\text{max})$  in accordance with table 13-3, cooling temperature  $t_m$  to reach +14℃, and the time the freezing temperature reaches the corresponding star level. According to standard, 250L below freezer will not exceed 2h; 250L-500L freezers will not exceed 3h.

#### **(8) Freezing ability**

The freezing ability of freezer shall not be less than 90% of rated ability.

## **MAINTENANCE SERVICE AND TROUBLE SHOOTING**

### **Maintenance Service and Trouble Shooting**

#### **(9) Electricity consumption**

Leave the freezer at test room, climate temperatures are: SN, N, and ST



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types 25°C; T type 32°C.

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Test time is 24h. The consumption of storage freezer and storage and freezing freezer shall be less than 115% of rated; freezing freezer is less than 110% of rated.

Other tests to be done: the measurement of temperature of storage

(10) Freezer and freezing freezer; test of storage temperature, ice producing ability, etc.

**Table 6-3 Storage temperature of freezer**

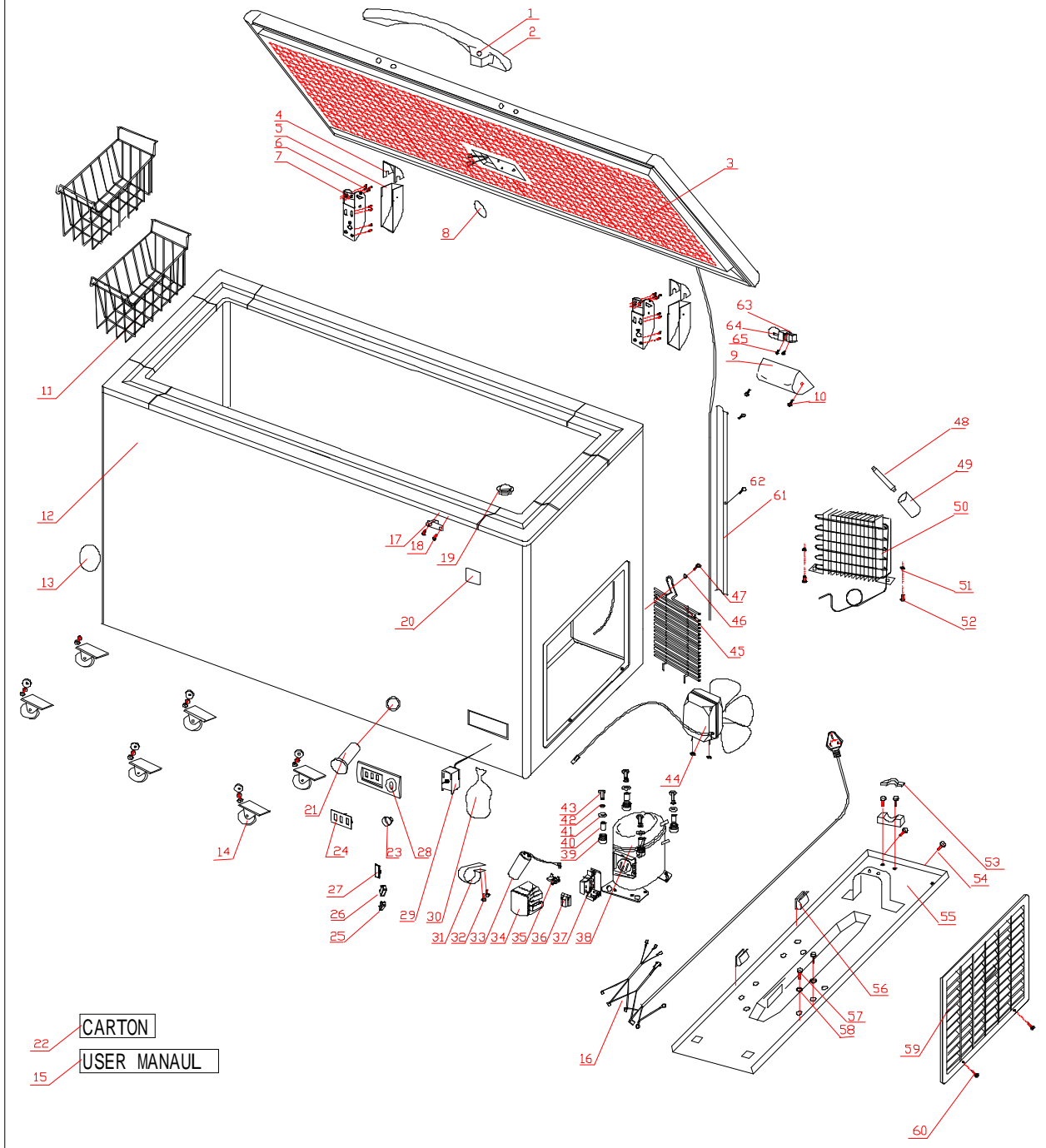
| Climate type  | Climate type | Environment temp(°C) | Storage Cabin                   |                   | Cooling cabin           | Freezing cabin   |
|---------------|--------------|----------------------|---------------------------------|-------------------|-------------------------|--|
|               |              |                      | $t_1, t_2, t_3$                 | $t_m \text{ max}$ |                         |  |
| Sub-temperate | SN           | 10                   | $-1 \leq t_1, t_2, t_3 \leq 10$ | 7                 |                         | Complies with  |
|               |              | 32                   |                                 |                   |                         |  |
| Temperate     | N            | 16                   | $0 \leq t_1, t_2, t_3 \leq 10$  | 5                 | $8 \leq t_{cm} \leq 14$ | One star $\leq -6$<br>Two stars $\leq -12$<br>three stars $\leq -18$ |
|               |              | 32                   |                                 |                   |                         |  |
| Sub-tropical  | ST           | 18                   | $0 \leq t_1, t_2, t_3 \leq 12$  | 7                 |                         |  |
|               |              | 38                   |                                 |                   |                         |  |
| Tropical      | T            | 18                   |                                 |                   |                         |  |
|               |              | 43                   |                                 |                   |                         |  |

EXPLODED VIEW

Exploded View

## Exploded View

Edition:2005 12 01    Marketing model: BD-388A/478A



## LIST OF PARTS

### Parts list

| No. | Spare parts number | Spare parts description in english | Model        | QTY. | Price list | Failure rate | the proportion of the spare-part stock | Remark |
|-----|--------------------|------------------------------------|--------------|------|------------|--------------|--|--------|
| 1   | 0070803227         | Lock                               | BD-388A/478A | 1    |            | 0.931%       | 1.400%                                 | *      |
| 2   | 0070804794         | Handle                             | BD-388A/478A | 1    |            | 0.168%       | 0.200%                                 | X      |
| 3   |                    | Door                               | BD-388A      | 1    |            | 0.490%       | 0.500%                                 | X      |
|     | 0070810207         |                                    | BD-478A      | 1    |            | 0.490%       | 0.500%                                 | X      |
| 4   | 0072040003         | Top hinge cover                    | BD-388A/478A | 2    |            | 0            | 0.050%                                 | X      |
| 5   | 0072040011         | Bottom hinge cover                 | BD-388A/478A | 2    |            | 0            | 0.050%                                 | X      |
| 6   | 0077050002         | Screw                              | BD-388A/478A | 16   |            | 0            | 0                                      | X      |
| 7   |                    | Hinge                              | BD-388A      | 2    |            | 0.140%       | 0.280%                                 | X      |
|     | 0078090002         |                                    | BD-478A      | 2    |            | 0.140%       | 0.280%                                 | X      |
| 8   | 0072040402         | Insolution fill cap(small)         | BD-388A/478A | 2    |            | 0            | 0                                      | X      |
| 9   | 0072060009         | Lamp cover                         |              |      |            |              |  |        |
| 10  | 0077050051         | Screw                              | BD-388A/478A | 2    |            | 0            | 0                                      | X      |
| 11  | 0070102849         | Food basket                        | BD-388A/478A | 2    |            | 0.007%       | 0.007%                                 | X      |
| 12  |                    | Outer cabinet                      | BD-388A      | 1    |            | 0.189%       | 0.189%                                 | X      |
|     | 0070810205         |                                    | BD-478A      | 1    |            | 0.189%       | 0.189%                                 | X      |
| 13  | 0070201812         | Insolution fill cap(large)         | BD-388A/478A | 1    |            | 0            | 0                                      | X      |
| 14  | 0070800197         | Castor                             | BD-388A/478A | 6    |            | 0.168%       | 0.200%                                 | *      |
| 15  | 0070503876         | Use manual                         | BD-388A/478A | 1    |            | 0            | 0                                      | X      |
| 16  | 0070401608         | power Wire                         | BD-388A/478A | 1    |            | 0.056%       | 0.056%                                 | *      |
| 17  | 0071150025         | Lock nose                          | BD-388A/478A | 1    |            | 0            | 0.010%                                 | X      |
| 18  | 0077050051         | Screw                              | BD-388A/478A | 2    |            | 0            | 0                                      | X      |
| 19  | 0070200676         | Drain stopper                      | BD-388A/478A | 1    |            | 0            | 0                                      | X      |
| 20  | 0070504852         | LOGO                               | BD-388A/478A | 1    |            | 0            | 0                                      | X      |
| 21  | 0072040012         | Drain plug                         | BD-388A/478A | 1    |            | 0            | 0                                      | X      |
| 22  | 0070504220A        | Carton                             | BD-388A      | 1    |            | 0            | 0                                      | X      |
|     | 0070504926A        |                                    | BD-478A      | 1    |            | 0            | 0                                      | X      |
| 23  | 0070202887         | control knob                       | BD-388A/478A | 1    |            | 0            | 0                                      | X      |
| 24  | 0070202886         | panel cover                        | BD-388A/478A | 1    |            | 0            | 0                                      | X      |
| 25  | 0075050003         | yellow light                       | BD-388A/478A | 1    |            | 0.010%       | 0.020%                                 | *      |
| 26  | 0075050008         | Green light                        | BD-388A/478A | 1    |            | 0.010%       | 0.020%                                 | *      |
| 27  | 0072040202         | Light cover                        | BD-388A/478A | 1    |            | 0            | 0                                      | *      |

|    |            |                               |              |   |  |        |        |   |
|----|------------|-------------------------------|--------------|---|--|--------|--------|---|
| 28 | 0070202885 | Panel control                 | BD-388A/478A | 1 |  | 0      | 0      | X |
| 29 | 0075040013 | Thermostat                    | BD-388A/478A | 1 |  | 0.392% | 0.600% | * |
| 30 | 0072070010 | Thermostat protecting-bag     | BD-388A/478A | 1 |  | 0      | 0      | X |
| 31 | 0070102761 | Capacitor clip                | BD-388A/478A | 1 |  | 0      | 0      | * |
| 32 | 0077010062 | Screw                         | BD-388A/478A | 1 |  | 0      | 0      | X |
| 33 | 0075020333 | Capacitor                     | BD-388A/478A | 1 |  | 0.010% | 0.030% | * |
| 34 | 0075020357 | Terminal cover                | BD-388A/478A | 1 |  | 0      | 0.005% | * |
| 35 | 0075020335 | Over load over heat protector | BD-388A/478A | 1 |  | 0.010% | 0.020% | * |
| 36 | 0075020168 | PTC starting                  | BD-388A/478A | 1 |  | 0.010% | 0.030% | * |
| 37 | 0075020356 | Terminal board                | BD-388A/478A | 1 |  | 0      | 0      | X |
| 38 | 0074090595 | Compressor                    | BD-388A/478A | 1 |  | 0.777% | 0.116% | * |
| 39 | 0075020001 | Rubber spacer                 | BD-388A/478A | 4 |  | 0      | 0      | X |
| 40 | 0075020305 | Compressor sleeve             | BD-388A/478A | 4 |  | 0      | 0      | X |
| 41 | 0075020136 | Compressor spring washer      | BD-388A/478A | 4 |  | 0      | 0      | X |
| 42 | 0075020137 | Compressor washer             | BD-388A/478A | 4 |  | 0      | 0      | X |
| 43 | 0075020010 | Ground screw                  | BD-388A/478A | 4 |  | 0      | 0      | X |
| 44 | 0074090308 | Fan                           | BD-388A/478A | 1 |  | 0.063% | 0.100% | * |
| 45 | 0071210004 | Engine room cover             | BD-388A/478A | 1 |  | 0      | 0      | X |
| 46 | 0072130038 | Screw                         | BD-388A/478A | 1 |  | 0      | 0      | X |
| 47 | 0077010036 | Screw                         | BD-388A/478A | 1 |  | 0      | 0      | X |
| 48 | 0074180001 | Filter drier                  | BD-388A/478A | 1 |  | 0.119% | 0.200% | * |
| 49 | 0079020006 | Hot shorten tube              | BD-388A/478A | 1 |  | 0      | 0      | X |
| 50 | 0070804041 | Condensor                     | BD-388A/478A | 1 |  | 0.056% | 0.056% | * |
| 51 | 0077070006 | spring washer                 | BD-388A/478A | 2 |  | 0      | 0      | X |
| 52 | 0077050006 | Ground screw                  | BD-388A/478A | 1 |  | 0      | 0      | X |
| 53 | 0072060002 | Wire clip                     | BD-388A/478A | 1 |  | 0      | 0      | X |
| 54 | 0077010022 | Philip screw                  | BD-388A/478A | 2 |  | 0      | 0      | X |
| 55 | 0070803499 | Compressor supporter          | BD-388A/478A | 1 |  | 0      | 0      | X |
| 56 | 0071250271 | Wire clip                     | BD-388A/478A | 2 |  | 0      | 0      | X |
| 57 | 0077050006 | grounding screw               | BD-388A/478A | 2 |  | 0      | 0      | X |
| 58 | 0077070006 | washer                        | BD-388A/478A | 2 |  | 0      | 0      | X |
| 59 | 0072220007 | Compartment grill             | BD-388A/478A | 1 |  | 0      | 0      | X |
| 60 | 0077010022 | Philip screw                  | BD-388A/478A | 2 |  | 0      | 0      | X |
| 61 | 0070203146 | Wire cover                    | BD-388A/478A | 1 |  | 0      | 0      | X |
| 62 | 0077010036 | Screw                         | BD-388A/478A | 1 |  | 0      | 0      | X |

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