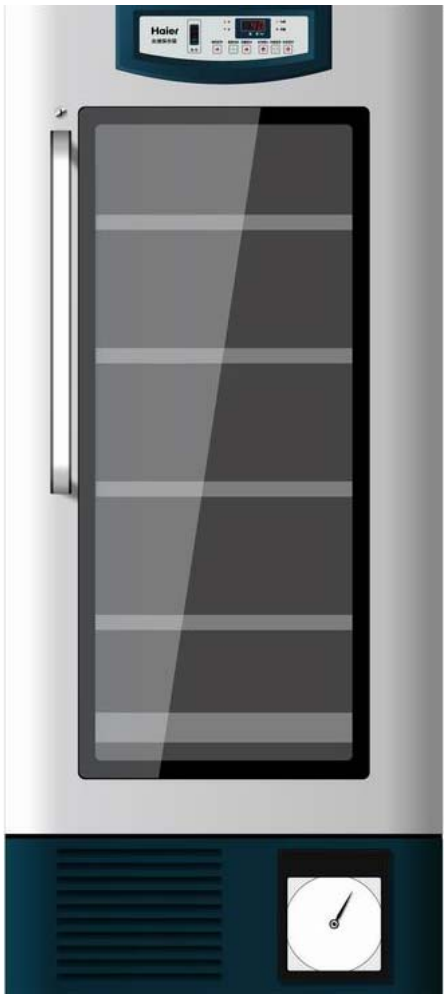
Service Manual

FILE No.HMRSM-002-02

Blood Bank Refrigerator

HXC-158•HXC-258•HXC-358

HXC-608•HXC-608A•HYC-610



Haier Medical & Laboratory Products Co., Ltd.

Effective models

This service manual is effective for following models

Model name	Product code	climate type	Voltage(V)/ Frequency(Hz)	Plug-type
HXC-158	BE06L7E1T	ST	220V/50Hz	British round plug
HXC-158	BE06L8E1T	ST	220V/50Hz	European plug
HXC-158	BE06L9E1T	ST	220V/50Hz	British flat plug
HXC-158B	BE06LA01T	ST	220V/50Hz	European plug
HXC-258	BE06MAE1T	ST	220V/50Hz	European plug
HXC-258	BE06M9E1T	ST	220V/50Hz	British flat plug
HXC-258	BE06MCE1T	ST	220V/50Hz	British round plug
HXC-358	BE06NFE1T	ST	220V/50Hz	European plug
HXC-358	BE06NDE1T	ST	220V/50Hz	British flat plug
HXC-358	BE06NEE1T	ST	220V/50Hz	British round plug
HXC-358B	BE06NGE1T	ST	220V/50Hz	European plug
HXC-358	BE06NJE1T	ST	220V/60Hz	European plug
HXC-608	BE06PJE1T	ST	220V/50Hz	European plug
HXC-608	BE06PGE1T	ST	220V/50Hz	British flat plug
HXC-608	BE06PHE1T	ST	220V/50Hz	British round plug
HXC-608B	BE06PQE1T	ST	220V/50Hz	European plug
HXC-608	BE06PTE1T	ST	220V/60Hz	European plug
HXC-608	BE06PUE1T	ST	115V/60Hz	American plug
HXC-608A	BE06PKE1T	T	220V/50Hz	European plug
HXC-608A	BE06PNE1T	T	220V/50Hz	British flat plug
HXC-608A	BE06PME1T	T	220V/50Hz	British round plug

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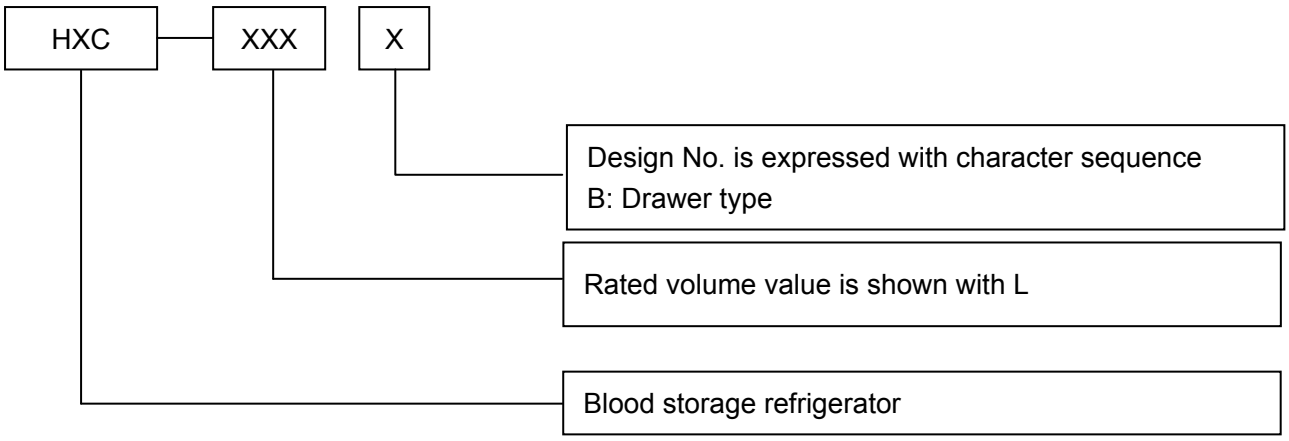
【Designation】

Regulations for type naming:



Note: rated volume can be the gross volume or effective volume; the manufacturer can decide it by him according to the actual situation. The effective volume value must be marked on the nameplate whether effective volume or gross volume is marked in the product name.

Examples:

HXC-358 means that the Blood Bank refrigerator with the temperature at characteristic temperature 4℃, horizontal and rated effective volume 358 L.

- HYC-610 is derivative of HXC-608, all the structures are the same, so that we write the service manual here.

【Safe Caution】

1. The machine is using an AC 220V/50/60HZ power. If the voltage used is lower than 198V or higher than 242V, an auto stabilizer above 4000W shall be equipped. Power line that required for lengthening shall be with a cross section no less than 1.5mm.

2. An independent private jack shall be used and reliably connected. The power line for refrigerator is equipped with three-wire, grounding-type plug which meets standard three-wire, grounding-type receptacle. In no circumstance should the third plug foot (grounding) of the power line be cut or removed. The plug shall be touchable after installation of refrigerator. Power line or plug with abrasion shall not be used. Abraded or damaged power line shall be sent to maintenance point designated by the manufacturer or be replaced by qualified personnel.

3. Hazardous articles of inflammable, explosive, materials such as acid and alkali with strong corrosion are prohibited in the refrigerator.

4. Please don't use flammable spray closely to avid fire.

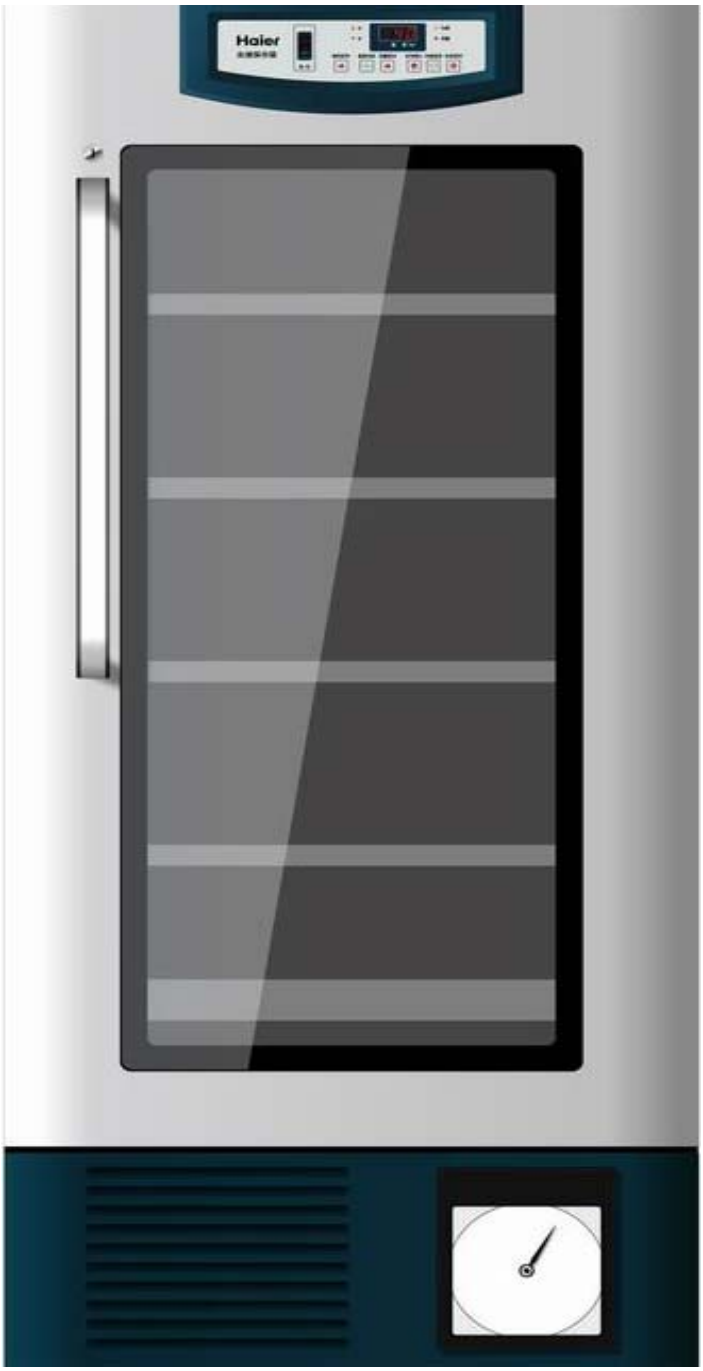
5. When there is inflammable gas such as coal gas leakage:

- Shut the valve for leakage;
- Open the door and window for ventilation;
- Don't pull out or insert power plug of the refrigerator.

6. Once the power of the refrigerator is cut, it shall be re-connected at least five minutes later to avoid damage on compressor or the system. The power shall be cut for maintenance. Do not roll or damage the power line.

7. Please wear protective equipments during accessing to the refrigerator to avoid freezing injury. When the refrigerator is scrapped, please remove the doorman. The scrapped refrigerator shall be away from fire and be sent to appointed site for disposition.

【Product appearance】




Haier

Temperature control system of blood storage refrigerator and control principles of each component

1. Haier blood storage refrigerator inside-box temperature is controlled within 4±1℃.
2. Microcomputer control, inside-box temperature is displayed digitally.
3. Full-automatic defrosting function.
4. Visual acousto-optic alarm; have real-time alarm and long-distance alarm functions, can realize over-temperature alarm, power-off alarm, and door-opening alarm.
5. Air cooling system; reliable operation, even inside-box temperature.
6. Operation instructions of control panel and each component.

Appearance of Model 09 display panel

Color definitions of indicator lamps

A. Alarm indicator lamp(red): flashing display, indicates alarm state.

B. upper temperature display indicator lamp(lime orange): when the lamp is lighting, digital tube displays upper sensor temperature.

C. Lower temperature display indicator lamp(lime orange): when the lamp is lighting, digital tube displays lower sensor temperature.

D. Upper and lower temperature display indicator lamps are lighting at the same time: display the average value of upper and lower temperature sensors.

E. Power indicator lamp(red): when the lamp is lighting, indicate that it is under master power supply state; when the lamp is flashing, it is under master power failure state.

Definitions of keys

A. ‘Buzzing Cancel’ key: at the time of buzzing alarm, cancel buzzing;

B. ‘Temperature Change’ key: change the display temperature of digital tube；

C. ‘Alarm Test‘ key: test alarm function; each time it is pressed, the buzzer gives out 3 sounds of 1Hz, meanwhile, alarm indicator lamp flashes for 3 times; if it is not under long-distance hardware alarm state, long-distance alarm relay switches off after 3s suck-shut, then determines action according to whether alarm is needed, alarm is normal, otherwise, alarm is failure; when rechargeable battery switch is not turned on, or battery electric quantity is low; press Alarm Test key once, except for above functions, “E5” is flashed on display window 3 times, 3 seconds each time.

D. More than 5 seconds ‘Sensing Selection’ key +‘Calibration Cancel’ keys: temperature setting

E. More than 5 seconds “Temperature Conversion“+“Calibration Confirmation” keys: amend the temperature value of each sensor.

F. More than 10 seconds “Buzzing Cancel”+“Alarm Test” keys: clear corrected value and reset to default parameter setting.

Initial state

The first-time power-on operation state is initial state: temperature display is the mean temperature of upper and lower sensors, temperature gear is set at 4 ℃, control whether starting up compressor or not according to temperature.

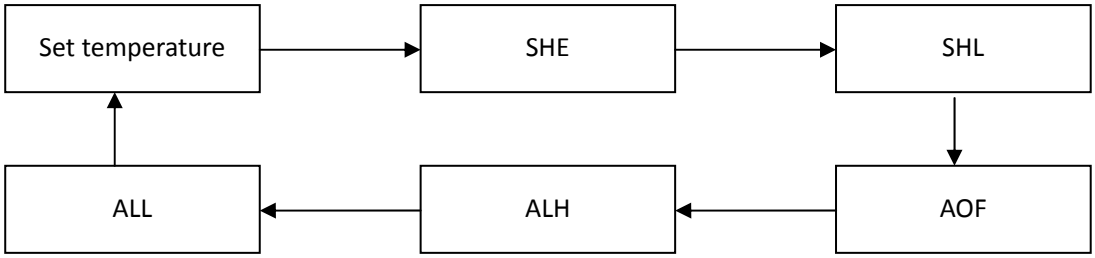
Temperature adjustment and control functions

Press ‘Sensing Selection’ key and ‘Calibration Cancel ’ key at the same time more than 5 seconds, original setting begins flashing, enter in temperature setting state; latter, each time ‘Calibration Cancel ’ key is pressed down, temperature value adds 0.1 until reach setting upper limit; system default is “8”, press again, then change to be setting lower limit again, system default is “2”, each time ‘Sensing Selection’ key is pressed down, temperature value reduces 0.1 until reach setting lower limit; system default is “2”, press again, then change to be setting upper limit again, system default is “8”, restart again;

when the temperature value that is needed to be set appears, if there is no key operation for more than 5 seconds, temperature setting will be saved in system, and the state of temperature setting control will automatically exit(default temperature setting range is 2-8 ℃).

Digital window redisplays inside-box sensor temperature value or its mean temperature value(no flash)before setting. Within 3 seconds after temperature setting is finished, under that condition that system still does not exit the state of temperature setting control, continue press ‘Calibration Confirmation’ key for 10 seconds, system enters in the state of temperature range setting, firstly, display SHE, within 4 seconds, press ‘Calibration Cancel ’ key or ”Sensing Selection” key , then it displays that temperature upper limit can be set now, default setting is 8℃, upper limit temperature can be added by pressing ‘Calibration Cancel ’ key again (can also make adjustment through “Sensing Selection” key, its adjustment value is opposite to “Calibration Cancel ”), the maximum is 20℃, the minimum is SEL, 4 seconds after adjustment, system will automatically log in the temperature setting and displays SEL, press ‘Calibration Cancel ’ key or ”Sensing Selection” key within 4 seconds, display temperature lower limit that can be set now, default setting is 2℃. lower limit temperature can be added (can also make adjustment through “Sensing Selection” key, its adjustment value is opposite to “Calibration Cancel ”) by pressing ‘Calibration Cancel ’ key again, the minimum is -5℃, the maximum is SHE, 4 seconds after adjustment, system will automatically log in the temperature lower limit

setting and display AOF, press ‘Calibration Cancel ’ key or ”Sensing Selection” key within 4 seconds, display the value of currently controlled temperature difference, default setting is 0.5℃, the value of temperature difference can be added by pressing ‘Calibration Cancel ’ key (can also make adjustment through “Sensing Selection” key, its adjustment value is opposite to “Calibration Cancel ”), adjustment step value is 0.1℃ , the maximum is setting temperature 3, the minimum is 0.5℃. 4 seconds after adjustment, system will automatically log in the setting temperature and display ALH, press ‘Calibration Cancel ’ key or ”Sensing Selection” key within 4 seconds, display the temperature value of current high temperature alarm, default setting is 6℃. Lower limit temperature can be added by pressing ‘Calibration Cancel ’ key (can also make adjustment through “Sensing Selection” key, its adjustment value is opposite to “Calibration Cancel ”), the maximum is 20℃, the minimum is setting temperature ALL; 4 seconds after adjustment, system will automatically log in the temperature value of high temperature alarm, and display ALL, press ‘Calibration Cancel ’ key or ”Sensing Selection” key within 4 seconds, display the temperature value of current low temperature alarm, upper limit temperature can be added by pressing Calibration Cancel ” again, the maximum is setting temperature ALH, the minimum is -5℃, (can also make adjustment through “Sensing Selection” key, its adjustment value is opposite to “Calibration Cancel ”, default setting is 2℃. 4 seconds after adjustment, system will automatically log in the temperature value of low temperature alarm; if there is on operation within 10 seconds, system automatically exit the state of temperature setting control. Digital window redisplays inside-box sensor temperature value or its event temperature value(no flash)before setting.



Temperature of machine start-up and shutdown

1.The start-up and shutdown of compressor is controlled by control sensor RT2.

Compressor start-up temperature : setting Ts)+AOF+0.5

Compressor shutdown temperature : setting(Ts)-AOF+0.5

The downtime of compressor shall not be less than 3 minutes each time.

2.After compressor has continued operation for 1 hour and not shut down, shut down it forcedly for 5 minutes; at that time, electric heating is OFF, internal fan is operating normally.

Each time when compressor shuts down, estimate the accumulated operation time of compressor, if it is longer than 7 hours, shut down compressor.(at that time, electric heating is OFF, internal fan is operating normally.) When downtime reaches 5 minutes, or either of the temperature of upper and lower display temperatures exceeds 5.6 ℃, start up compressor.

3.When either of the upper and lower display temperatures is lower than 2.5℃, compressor is shut down forcedly, defrosting heater strip is power-off, internal fan is operating normally; downtime shall not be less than 3 minutes.

Buzzing and luminotron(ALARM)flashing-alarm function

1. Temperature requirement for over-temperature alarm: alarm temperature upper limit ALH— when either of upper and lower display temperatures is over ALH for continuous 2 minutes, start over-temperature alarm； alarm temperature lower limit—when either of upper and lower display temperatures is lower than ALL, start over-temperature alarm.

Meanwhile, when display temperature reaches requirement, that is, display temperature reaches close to setting temperature, inside-box actually-measured temperature shall be in line with display temperature.

2. Power-off alarm function: when power AC220V/110V is off, it is switched by relay, standby rechargeable battery will provide power to CPU.

After power-off, standby rechargeable battery provides power to computer panel, start buzzing alarm immediately; power luminotron on panel(ALARM)is flashing； display screen window displays inside-box upper and lower sensors' mean temperature for 1 minute, stop displaying for 2 minutes, alternately display, alarm sound can be canceled by pressing Buzzing Cancel key, but long-distance alarm function can not be canceled.

3. Sensor failure alarm: when there is a failure in either of upper (control) and lower (defrosting) sensors, buzzing alarm appears.

When appearing above alarm, buzzer gives out continuous buzzing in 1Hz, the current failure buzzing can be canceled by pressing “Buzzing Cancel” key. After 20 minutes, if alarm state continues existing, buzzing alarm would restart until “Buzzing Cancel” key is pressed again.

Door-opening alarm function

when the time of door-opening is ≥600S, luminotron on panel(ALARM)is flashing, buzzer gives out continuous buzzing in 1Hz.

Long-distance alarm function

1. Controller is working normally; long-distance alarm relay is power-on, give out no alarm.

2. ①There are two control sensors, con and alarm, use CON as first control, con failure, use ALARM as control. When both of them are failure, it is control failure.

② Either of upper and lower sensors is over-temperature;

③ Either of upper and lower (control and defrosting) sensors is failure;

④ Power AC220V/110V is power-off; (hardware alarm)

⑤ Door-opening time≥600s；

When meeting one of above five items, normally-closed contact closes, start up long-distance alarm function. (Long-distance alarm function can be realized by connecting to an electric bell.

Defrosting function

1. Normal defrosting function: each time compressor stops, start up defrosting function; after compressor starts up, defrosting stops.

2. Enter in forced defrosting function: When working environment temperature is large or there is a wet object in refrigerator, when compressor changes from shut-down into starting-up state, temperature checked by defrosting sensor is still ≤-5℃, at this time, start up defrosting relay(coil is power-on);

3. Exit forced defrosting: when upper and lower display temperature ≥5.6℃, or time ≥20min, or the temperature of control sensor and alarm sensor≥7℃, exit defrosting state, and enter in automatic normal operation.

4. Forced defrosting is at most carried out once within adjacent 24 hours. When forced defrosting starts up, compressor and fan stop operating.

Fan delay after ending forced defrosting

After forced defrosting, compressor starts up, after delaying for 3 minutes, fan starts normal operation.

Treatment of sensor failure

When a sensor is open circuit or short circuit, alarm lamp on panel is flashing(1Hz), buzzer gives out alarm.

1 Upper temperature sensor is open circuit or short circuit: display E1.

2 Lower temperature sensor is open circuit or short circuit: display E2.

3 Control sensor is open circuit or short circuit: display E3.

4 Defrosting sensor is open circuit or short circuit: display E4.

E3 display > E1 display > E2 display >E4 display >temperature display

5 When control sensor is failure, compressor is operating according to 5 minutes starting-up and 5 minutes shut-down.

Control of inner fan

When refrigerator door is open, inner fan stops operation; when refrigerator door is closed, inner fan operates normally.

The access rule of compressor and defrosting relays

Three relays are accessed according to the following order: only two of them are used at each time, one is idle, next time, another one is idle, repeat in this way again and again.

Amendment of temperature display

Press ”Temperature Conversion” Key and “Calibration Confirmation” key at the same time for more than 10 seconds, enter in the amendment state of temperature display, at this time, screen displays “D1”, can circularly select the sensor that is to be amended by press ”Sensing Selection” key again, the meaning of each code: “D1” : upper temperature sensor, “D2” : lower temperature sensor, “D3”: control sensor, “D4”: defrosting sensor, “D5”: alarm sensor. Press ”Sensing Selection” key to select the sensor that is to be amended.

Press “Calibration Cancel ” key, display the current value of sensor that is to be amended, then press “Alarm Test” key, corrected value appears, initial state is 0, the corrected value of the sensor can be added by pressing “Calibration Cancel” key, each time “Calibration Cancel ” key is pressed, displayed value increases 0.1 ℃; the corrected value of the sensor can be reduced by pressing ”Sensing Selection” key, each time “Calibration Cancel ” key is pressed, corrected value reduces 0.1 ℃; the corrected value of sensor is ±2℃.

After the completion of temperature sensor corrected value, press “Calibration Confirmation” key, or there is no operation within 2 seconds, display the current corrected sensor code, then can continue selecting the sensor that is to be amended by pressing ”Sensing Selection” key; if there is no operation within 10 seconds, automatically save corrected value and exit the amendment state of temperature display.

Requirement for rechargeable battery circuit

(1) Rechargeable battery circuit is 8V/12V and switchable. Stitching mode: set dial switch on master control panel. When dial switch is placed at 8V, 8V rechargeable battery is used; When dial switch is placed at 12V, 12V rechargeable battery is used.

(2) Charge mode:

A. Use 12V rechargeable battery. When blood storage refrigerator is power-on, check the voltage of rechargeable battery, when the voltage is lower than 11.5V, rechargeable battery shall be charged, charging voltage is 14.2V. After charging for 30 minutes, stop for 5 minute, check battery voltage, if it is lower than 13.2V, continue repeating the process of charging for 30 minutes and stopping for 5 minutes until the voltage is larger than 13.2V, then stop charging. If battery has been charged continuously for 100 hours and still fails to reach 10.8V, the battery is broken, don't charge it again, replace the battery with a new one(when refrigerator is power-on again, it is defaulted as replacing battery).

B. Use 8V rechargeable battery. When blood storage refrigerator is power-on, check the voltage of rechargeable battery, when the voltage is lower than 7.4V, rechargeable battery shall be charged; at the time of charging, the voltage applied on both ends of battery is 9.5V. After charging for 30 minutes, stop for 5 minute, check battery voltage, if it is lower than 9.2V, continue repeating the process of charging for 30 minutes and stopping for 5 minutes until the voltage is larger than 9.2V, then stop charging. If battery has been charged continuously for 100 hours and still fails to reach 6.5V, the battery is broken, don't charge it again, replace the battery with a new one.

C. Rechargeable battery circuit has anti-inverse-plugging-in design. If battery positive and negative electrodes are connected inversely, control panel buzzer would give out a sound continuously.

When 220V power and battery switch are OFF at the same time, if solely opens battery switch, display panel has no display; when 220V power and battery switch are connected

at the same time, cut off the normal power supply of 220V power storage battery to display panel.

Technical improvement process introduction of blood refrigerator

Blood (drug) storage refrigerator computer panel and battery replacement and maintenance process.

(8 V battery computer panel is replaced with a 12 v battery computer panel or battery)

1. Since June, 2009, all models of batteries of Haier blood (drug) storage refrigerator have been replaced with 12V batteries(the production of 8V batteries was stopped), meanwhile, corresponding control panel(new special number: 0074091548)and power panel(new special number: 0074091549)were changed at the same time, the detailed replacement process is introduced as below:

1.1. Latest blood refrigerator computer panel can support 12V or 8V rechargeable battery at the same time(there is a battery transfer switch on control panel, make corresponding conversion according to V number of battery).

1.2. When replace Model 09 new computer panel, firstly, check machine battery is 8V or 12V, if it is 12V battery, only need to replace the computer panel that needs to be replaced; if it is 8V battery, the power panel(special number: 0074090956) and control panel(special number: 0074090957)on original machine need be replaced at the same time.

Note: at the time of replacement, battery transfer switch needs to be adjusted to corresponding position.

1.3. New power panel special number is 0074091549, new control panel special number is 0074091548. The layout of each connecter on new computer panel and connection method are the same as old computer panel; When replacing computer panel, just plug each terminal into new computer panel according to original plugging-in method.

1.4. Compared with original computer panel, a two-core connecting line is added to new 12V computer panel between master control panel and power panel(special number:

0070401668).

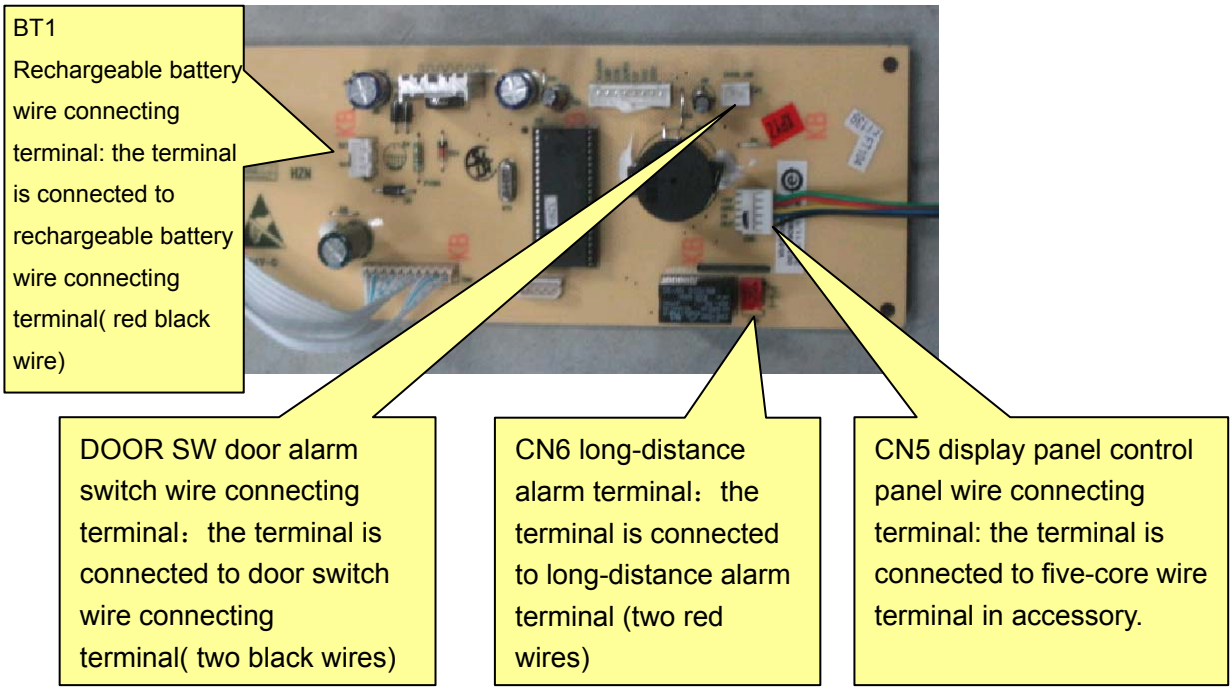
1.5. In future maintenance, if a battery needs to be replaced due to a failure, if it is 12V battery, may directly apply for 12 V battery replacement(special number: 0074091430)；if it is 8V battery, 12 V battery, power panel and control panel, and the connecting wire of power panel and control panel shall be replaced at the same time.

Note: at the time of replacement, battery transfer switch needs to be adjusted to corresponding position.

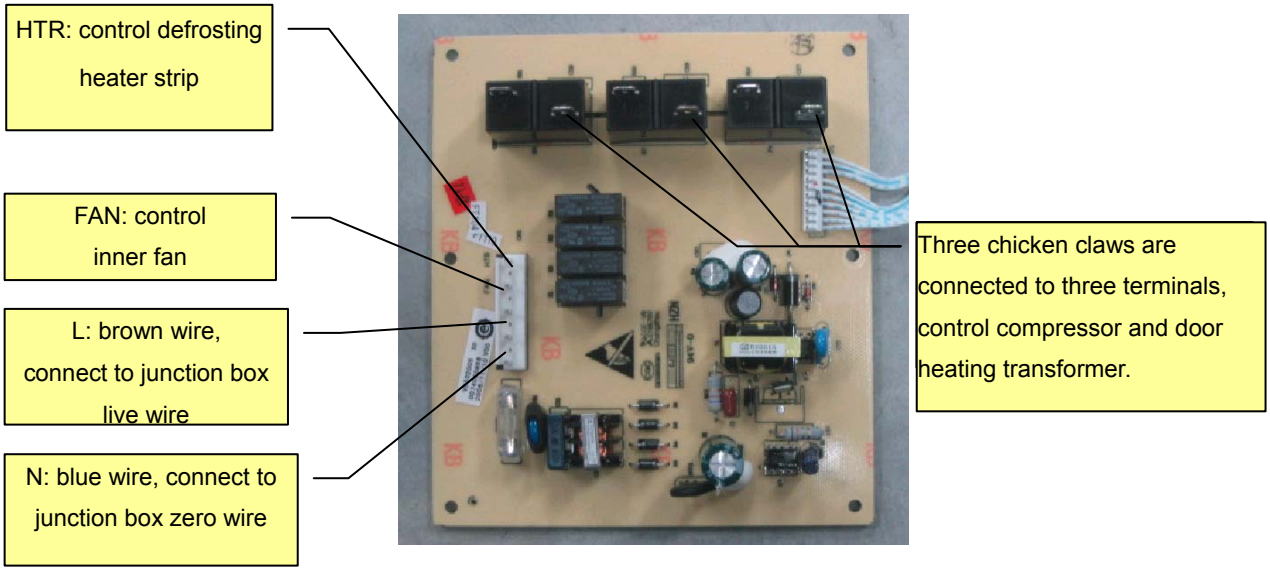
In brief, in future maintenance course of blood (drug) storage refrigerator, if it is an earlier-stage 8V battery machine, in case of battery failure, when can not apply for 8V battery, can apply for 12V battery replacement, meanwhile, need to apply for replacing control panel and power panel, and convert battery switch to 12V position; if it is any part failure of control panel or power panel, under the condition of using original battery, firstly, apply for original parts to make replacement, if can not obtain original parts, need to apply for replacing Model 09 control panel or power panel at the same time, battery transfer switch shall be adjusted to corresponding position.

2. Introductions of original control panel and power panel and Model 09 control panel and power pane:

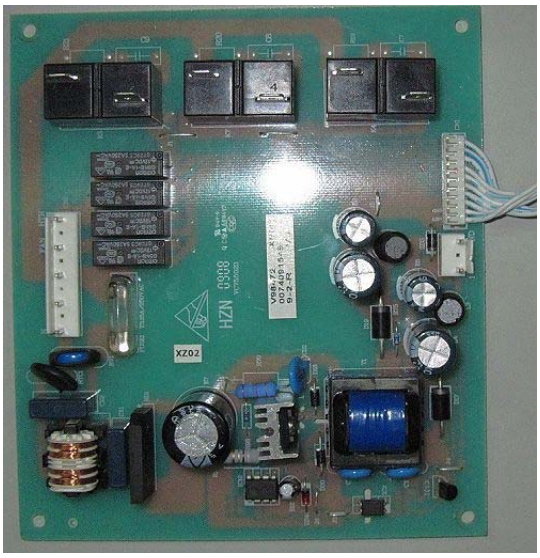
Original 8V rechargeable battery blood refrigerator computer panel—control panel:



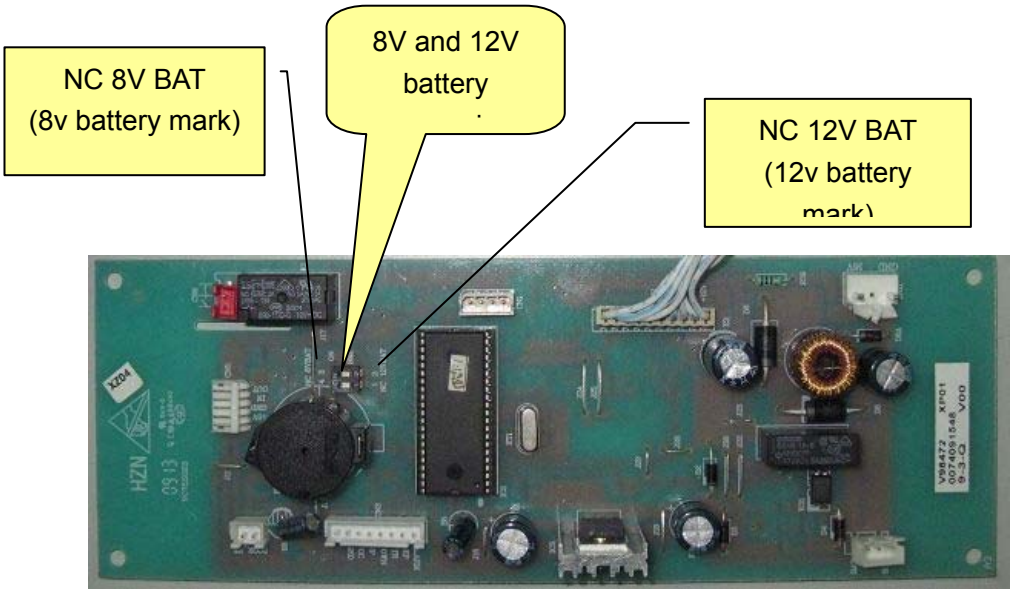
Original 8V rechargeable battery blood refrigerator computer panel— power panel:



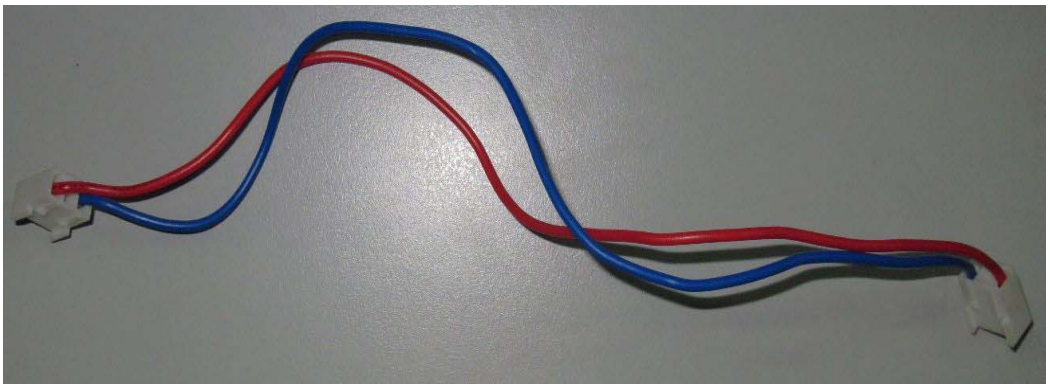
New 12V rechargeable battery blood refrigerator computer panel— power panel(special number: 0074091549)



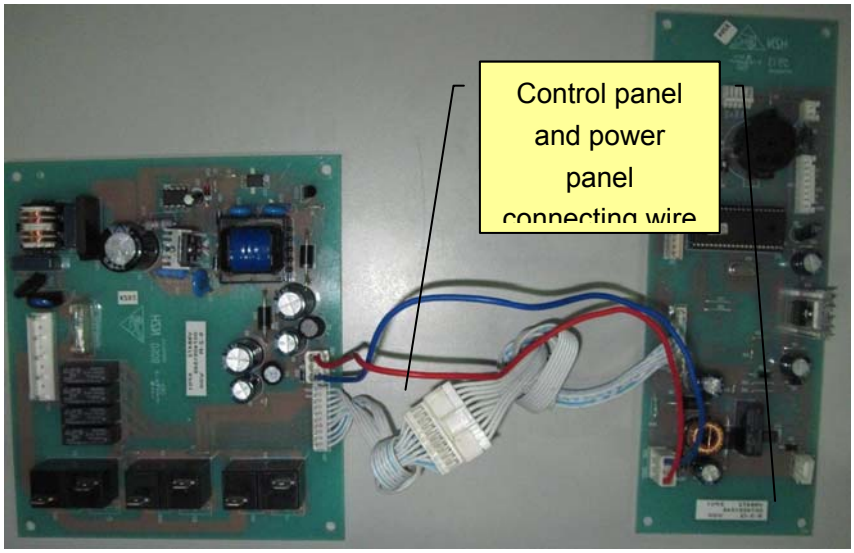
New 12V rechargeable battery blood refrigerator computer panel—control panel (special number: 0074091548)



New 12V rechargeable battery blood refrigerator control panel power panel connecting line(special number: 0070401668)

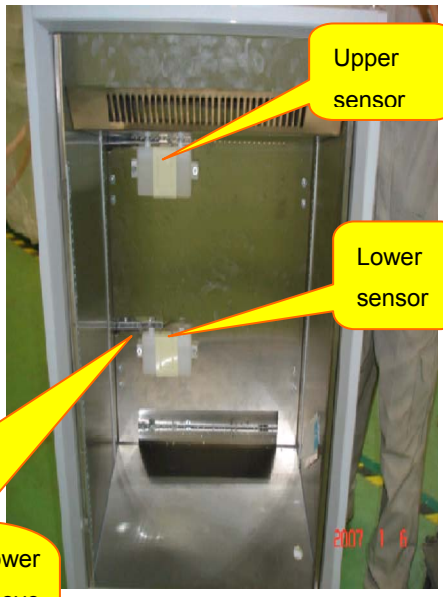


Replacement method: After replacing new computer panel, oppositely plug the white line socket between control panel and display panel together, use control panel and power panel connecting line to connect the two computer panels, other terminals are plugged into new computer panel according to original plugging-positions on old computer panel.

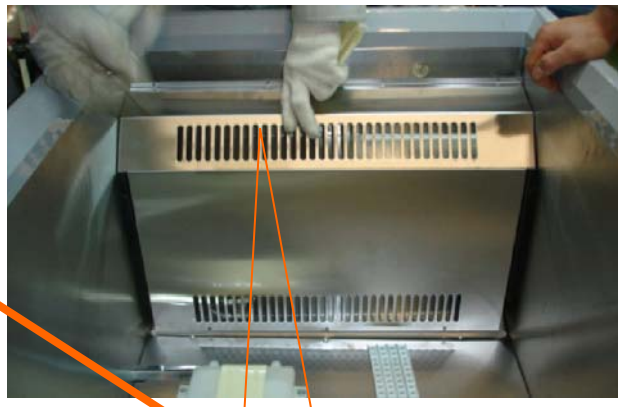

Control panel
and power
panel
connecting wire

Box structure of Haier new product blood storage refrigerator

Take blood storage basket in blood refrigerator out (if it is stainless steel drawer, the drawer needs to be removed), the

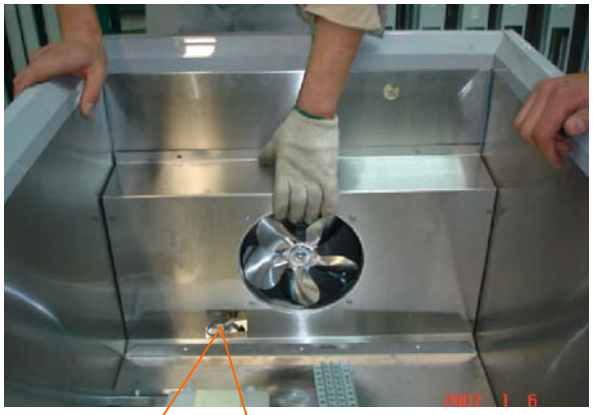


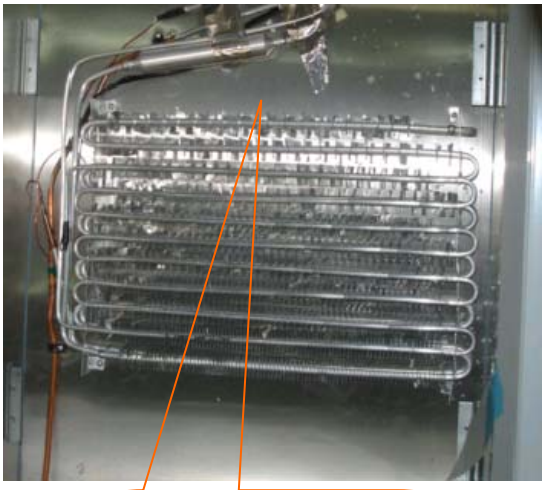
Take off the covers of upper and lower sensors, expose sensor probes, remove temperature-sensing stainless steel trim strips and upper and lower sensors with a screwdriver.



Remove the screws that fix fan shield, take fan shield out.

Remove the screws that fix vertical plate, take the vertical plate out of box.



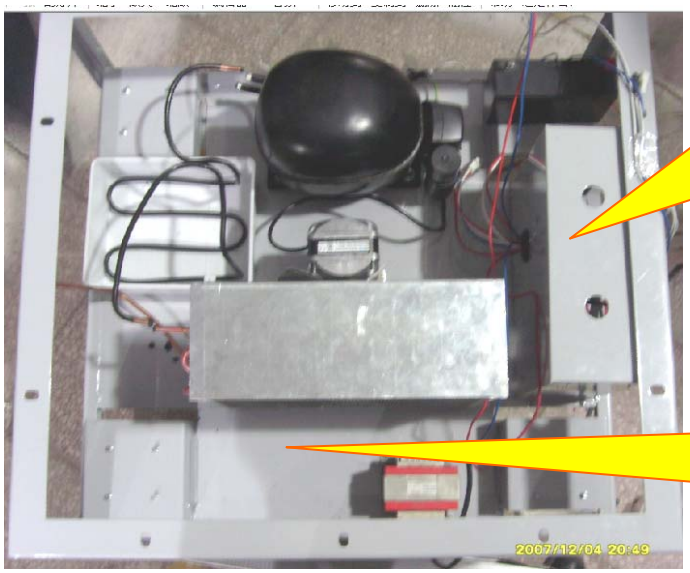


Remove the attaching clamp of control sensor beside inner fan (the attaching clamp fixes control sensor and alarm sensor

Cut off the rope that fixes defrosting sensor, remove defrosting sensor.

Rear

Left



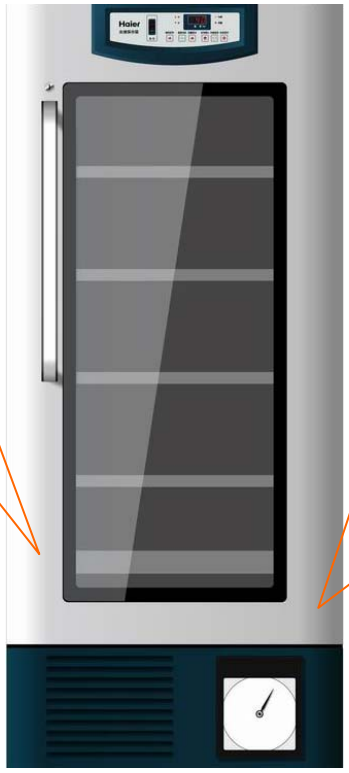
Engine chamber inner electrical control box, can open from the right side of engine chamber, and make

After removing screws and welded pipe, the compressor bottom board can be

Front

Door Body Instructions of New Product - Blood Storage Refrigerator

Door body structure: Fill foam on all sides, the middle is electric heating glass; electric heating of glass and start-stop of



Outgoing lines of lower hinge of door body are: Connecting line of glass heating wire is connected to the transformer inside the cabin; connecting line of display board is connected to the control board inside the electric control system of cabin; connecting line of lamp switch on the door body is connected to the ballast and null line. Glass on the door body has

Recorder Installation, Operation and Maintenance Manual

1. Power Supply:

The recorder uses alternating current under normal working condition. If AC power supply is abnormal, the recorder is equipped with backup power supply, green LED starts to flicker, means that main power supply is out of order; otherwise green LED is always on. The recorder has power cord or fixed transformer is connected to AC power supply. If fixed transformer is connected to AC power supply, as shown in Fig. 6, it can be connected to AC 115V, 50~60HZ or AC 230V, 50~60HZ main power supply.

2. Temperature Sensing Probe:

(1) Most of temperature recorders have a temperature sensing probe. If the recorder has a temperature/humidity probe, when the recorder uses the probe, take off the plastic cap on the temperature sensing probe; when it requires cleaning, push down the plastic cap.

(2) If you use own temperature sensing probe, we will tell you how to install:

The recorder can accept current input (such as 4~20mA), voltage input (such as 0~1V, 0~5V, 1~5V, or 0~10V), or 100Ω resistance.

3. Notes:

(1) When the recorder is switched on, don't touch the end of transformer. In order to prevent electric shock hazard, before turning on the recorder, take off the power plug. If the recorder is equipped with backup battery, disconnect 9V battery to avoid damaging the recorder or consuming battery.

(2) 6-inch recording disk is embedded in one metal shell, recording disk on the recorder should be fastened by four bolts, loosen the bolt, lightly move the recording disk, microprocessor board is exposed. In addition, the recorder can fasten the recording

disk through tightening two bolts at upper right corner and lower right corner. Move away two bolts and the recording disk can be turned on.

4. PC Control Panel:

J3 and J4 are external terminals, can provide at most two pens of signal input, J4 is used to connect to the probe that provides the voltage signal for the recorder. 5V voltage is provided for external probe.

5. Replace Recording Paper:

Press the paper changing button 3# for about one second until the recording pen starts to move to left of paper, and then loosen the button. When the recording pen is completely moved to outside of recording paper, counterclockwise loosen the bolt in the middle of paper, move away recording paper, replace new paper, align the time line on the paper and time line slot on the recording disk. Refer to Fig. 5 and confirm the time line slot. Fasten newly the middle bolt so as to fasten recording paper. Press the paper changing key 3# for about 1 second, the recording pen starts to move toward recording paper. Check whether recording pen is easy to use; if it is not easy to use, adjust the cross beam of recording pen and make the pen point contact with recording paper.

6. Recording System:

The model of pen has a multi-hole plastic ink cartridge, is fastened at the outer edge of cross beam of metal pen. Pen cap is used to protect the recording pen during the transportation of recording pen or the recording pen is not used. When the pen cap should be removed, gently lift up the pen beam, take off the pen cap, lightly put the pen in place, don’t make the pen heavily fall on the recording paper suddenly; otherwise may damage the pen point and make the recording line on recording paper unclear. Place the pen cap in a safe place for future use.

If recording pen contact is poor, lightly bend the center of cross beam of recording pen, but don't use too large force, only make the pen lightly contact with recording paper. Notes: When ink of recording pen is almost used up, pen color will become shallow; it means that recording pen should be replaced.

7. Replace Pen:

Notes: No ink recorder (for example, make use of pressure inductive recording paper) doesn't need to replace recording pen. The recorder have red and blue ink pens, can be seen from red and blue pen handles; pen handles are fastened at the end of cross beam of pen through a U-shaped clamp. For the convenience of replacement, fasten the cross beam of pen using two bolts. Loosen the plastic U-shaped clamp, take away old pen and change into new pen.

8. Adjust the Cross Beam of Recording Pen:

(1) In order to check and adjust the precision of recording pen, press the paper changing key 3# until pen away from recording paper, press newly 3# key until pen newly return to recording paper. Make the recording pen pause at the outermost temperature line of recording paper, and then return to starting recording position. If the pen is not paused at the above positions, it should balance the recording pen through adjusting 1#(left)or 2#(right)arrow key.

(2) When recording pen is returned to recording paper and paused, you can adjust the pen position within 5 seconds using 1# or 2# arrow key.

(3) For one double-pen recorder, each pen will pause at the outer edge of temperature curve, and make an adjustment using 1# or 2# arrow key. If it is time for adjusting the first pen, the second pen will pause at the outer edge of temperature curve; make an adjustment at the time.

(4) When replaces pen or paper, make an adjustment newly according to the above methods, otherwise the recorder error will cause incorrect recorded temperature.

9. Precision Check of Recorder:

The recorder has been precisely adjusted before leaving the factory; therefore, the recorder should work for 24 hours before adjustment. If it really should be adjusted, please conduct according to the following procedures. Pay attention not to place the temperature and humidity sensors in any solution.

(1) Place a standard thermocouple in one solution bottle, together with recorder thermocouple.

(2) If there is curve drawing on the recorder, compare the temperature on recording paper drawn by the recording pen with temperature of thermocouple.

For double-pen recorder, compare the temperature of the second pen and temperature of the second standard thermocouple.

(3) If it should be adjusted, calibrate using 1# or 2# arrow head, make two temperatures consistent. Press the key for 5 seconds, recording pen starts to move.

(4) For double-pen recorder, you should first select the recording pen that requires calibration. Press 1# key to select red pen, press 2# key to select blue pen, press 1 or 2 key until LED is off, and then operate as described in 3.

10. Backup Battery:

Green LED is always on, which means that battery and main power supply are normal; position of LED is as shown in Fig. 5. If main power supply is out of order or electric quantity of backup battery is insufficient, green LED will flicker, it means that main power supply is out of order or the battery should be replaced; under the circumstances, the recorder only can normally work 24 hours.

11. Fastening and Replacement of Battery:

4-inch, 6-inch and 10-inch recorders

In order to replace the battery, open the recorder door first, the battery is located in the top right corner of recorder.

Notes: It only can be replaced by 9V alkaline battery.

12. 8-inch Recorder

Notes: When the recorder is connected to main power supply, don't touch the transformer terminal. In order to avoid electric shock, before replacing the battery, disconnect the recorder from main power supply. In order to replace the battery on 8-inch recorder, open the recorder door first, and then loosen the bolt on the right side of recording disk, open the recording disk, the battery is fastened on the back of recording disk. It only can be replaced by 9V alkaline battery.

13. Optional Alarm, Control Relay:

(1) **Notes:** When the recorder is connected to main power supply, don't touch the transformer terminal. In order to avoid clicking, before connecting the relay terminal, disconnect the recorder and main power supply first. If the recorder is equipped with backup battery, disconnect 9V battery to avoid damaging the recorder or consuming electric quantity of battery.

(2) Temperature recording disk on 6-inch recorder embedded in metal shell is fastened by four screws, loosen the screw, remove the recording disk, and then the relay being fastened on the back of recorder disk is exposed. In addition, some recorders have a recording disk with hinge, fastened by two screws in the lower part and upper part of recording disk. Twist two screws off, and then open the recording disk with hinge. On 8-inch recorder, one screw on the right is fastened the shell of recording

disk, loosen the screw, open the recording disk, the relay terminal should be exposed. If you don't know how to connect the relay terminal, please contact with COBEX recorder company.

(3) The relay on the recorder is self-locking, that is to say, relay contact is off or on (even it is not powered off) unless the recorder has the signal for changing the contact position.

(4) The position of relay terminal blocks is as shown in Fig. 1. Notes: Red, black and white lines have been provided as the external connection module of relay. When the recording pen is located on the right side of control point, connection position NC will be closed; when recording pen is located on the left side of control point, NC will be opened.

(5) Relay current is divided into the following maximum values:

2.0 amperes at AC 30V;

0.6 ampere at AC 125V;

0.6 ampere at AC 110V

Warning: If relay current exceeds standard, it may damage the recorder.

14. Set up the Control Point of Relay:

In order to set up the recording pen's position on recording paper, confirm the closing time of relay contact according to the following methods:

(1) Press the paper changing key 3# until pen beam starts to move outside paper, after a while, recording pen will move outside recording paper. When newly press the paper changing key 3#, the recording pen moves back to recording paper, and stay at the outermost scale mark for a short time.

(2) Recording pen will return to the position of the first control point, green LED will go out. When the recording pen is stayed in five seconds, it is allowed to adjust the

control point using 1# or 2# allow key. When time for adjusting control point is 5 seconds, green LED is on, the recorder starts to work.

(3) If the recording pen has two control points, the recording pen is moved to the second control point; it can adjust the second control point within 5 seconds. Each pen with two control points can make use of relay closing to control the maximum temperature and minimum temperature. After adjusting the control point for 5 seconds, LED is on; the recording pen is moved to current temperature position, the recorder starts to work.

15. Range Selection of Recording Paper:

(1) If the temperature range of your temperature recorder is stored in the memory of recording disk, the following conditions are suitable for you.

The temperature selection range of recorder is stored in the recorder in the manner of program.

Notes: Recording paper must match with the temperature range of selected recorder; otherwise the recording pen's position above recording paper can not consistent with measured temperature. In addition, if the recorder keeps still at the center or at the edge of recording paper, it means that temperature range of selected recorder is abnormal. The recorder inside has a safety protection device; when current measured temperature is not within the selected range, the recording pen will move to the maximum temperature.

(2) The recorder has at most 8 optional ranges, can select a suitable range according to following methods:

After the recorder is switched on and run normally (record temperature), press the paper changing key 3#, until recording pen is away from recording paper. When recording pen is away from recording paper, press left arrowhead 1 or right arrowhead 2 for about 5

seconds, and then loosen the key. If presses 1 key, green LED will flicker once; if presses 2 key, green LED will flicker twice. Press left arrowhead 1 key to increase temperature range, press right arrowhead 2 key to reduce temperature range. After completing the temperature range selection, press paper changing key 3# until recording pen returns to recording paper, selected temperature range will be stored in the recorder memory.

16. Specification of Recorder:

Input: Normal input voltage: Single-phase AC115/230V, normal input current: 40mA/20mA

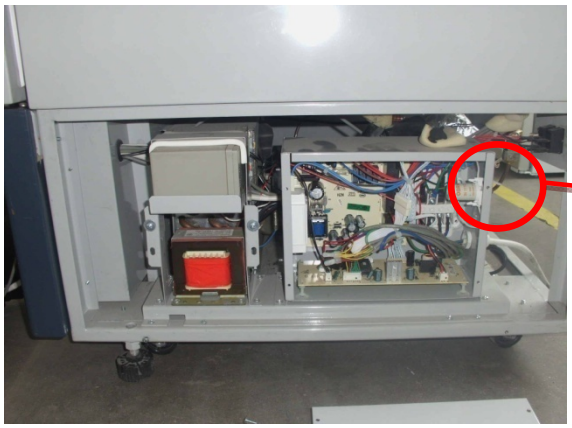
Warning: Relay current exceeds standard, may damage the recorder.

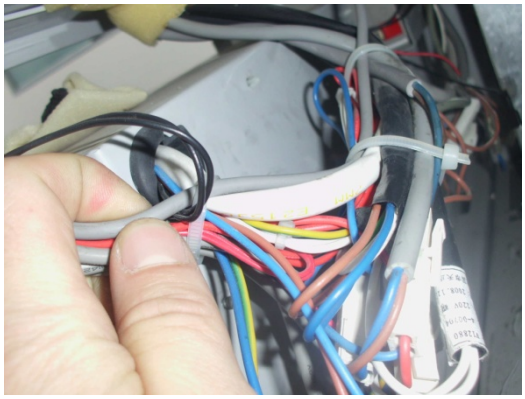
17. Detailed Description of Recorder Installation

(1) Remove the cover plate of recorder first.

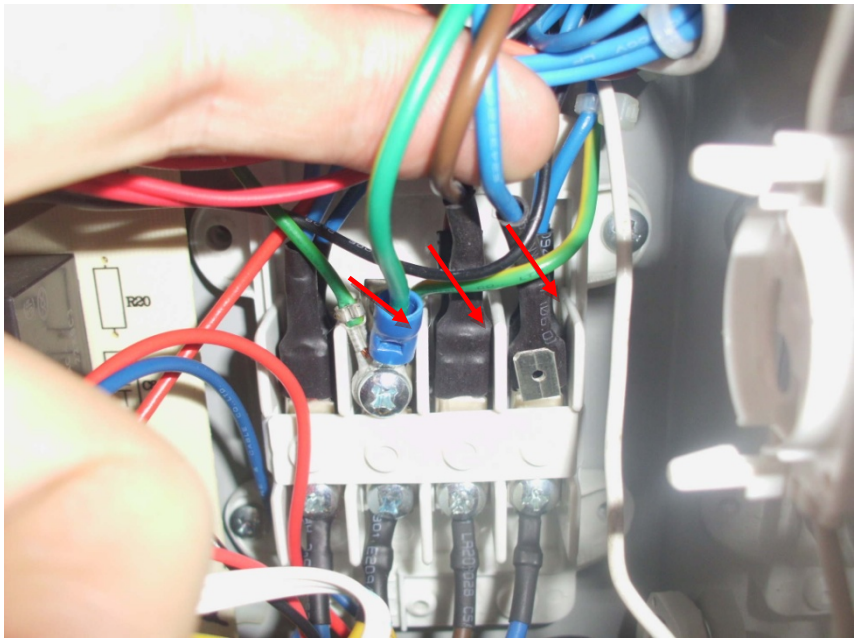
(2) Make white wiring harness of recorder pass through marked round hole.

(3) Remove the right side plate of cabin and cover plate of electric control box; make white wiring harness pass through electric control box from the threading hole in the upper right part of electric control box.

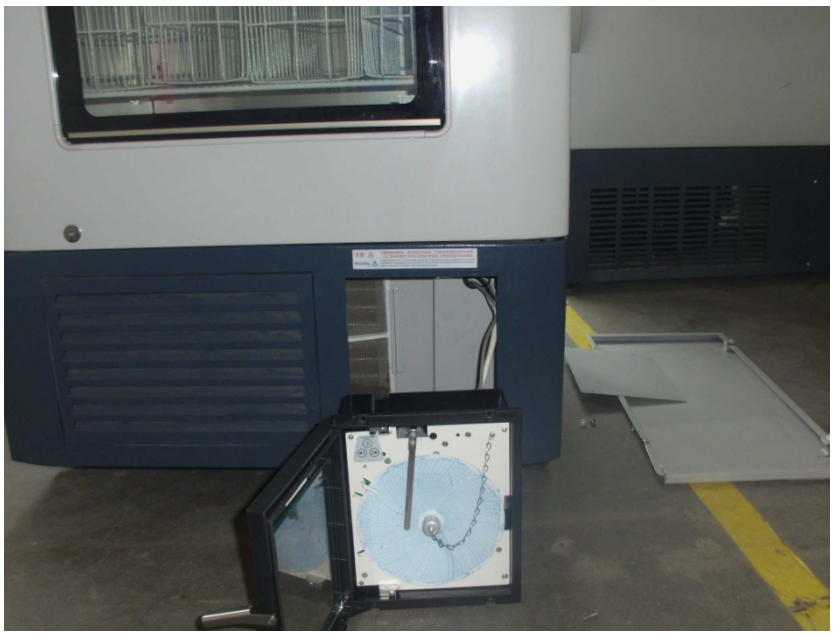




(4) Fasten three terminals on the connector bar inside the electric control box according to the graphical position.



(5) Fasten the recorder at the removed cover plate using the screw, install the cover plate of electric control box and right side plate of cabin.



Normal Faults Analysis and Maintenance Measures

Problem		Cause Analysis	Maintenance Measures
1. Temperature inside the cabinet is not uniform; temperature difference of upper and lower part is too big.		1. Internal fan failure	Replace the fan.
		2. Fan duct is blocked up by obstacles.	Remove the obstacles.
		3. Door switch is broken.	Replace the door switch.
		4. Computer board is out of order.	Replace the computer board.
2. Display board doesn't display the value.	Display E4	1. Battery switch is not turned on or damaged.	Turn on the switch and replace the switch.
		2. Rechargeable battery is broken.	Replace the rechargeable battery.
	Display E3	3. Defrost sensor has open circuit fault or is damaged.	Repair or replace.
	Display E2	4. Control sensor has open circuit fault or is damaged.	Repair or replace.
	Display E1	5. Lower display sensor has open circuit fault or is damaged.	Repair or replace.
	Display E0	6. Upper display sensor has open circuit fault or is damaged.	Repair or replace.
3. Refrigerator refrigeration is poor.		1. Serious leakage of refrigerant	Check the leakage and refill the refrigerant.
		2. Filth blockage of capillary or system	Clean the capillary or replace the filter.
4. Recorder failure		1. Record temperature is not correct.	Check the recorder.
		2. Recording paper can't record temperature.	Remove by adjusting the recording pen.
		3. After disconnecting the recorder battery, the lamp is not on.	Check whether the upper and lower connectors are connected in place.
5. No alarm		1. Connection is not in place.	Check the installation.
		2. Control board failure	Replace the control board.

Problem	Question & Answer	Measures
1. Temperature inside the case is too high or too low	Display temperature has a certain relation to ambient temperature; if temperature is too high or too low, it can solve the problem through adjusting the control temperature.	For the specific operation method, see the attached instructions.
2. Surface of external glass door is hot.	Adopt imported electric heating external glass door, surface heating is normal, not out of order.	
3. There is deviation between display temperature and measured temperature.	Display temperature refers to the temperature on the surface of temperature measuring box. When blood bank is run stably, it equals to the surface temperature of stored blood bag; while the thermometer measures the air temperature inside the box at the time, and varies within a certain range, thus can't correctly reflect the blood bag temperature at the time.	
4. Recorder temperature has deviation.	Record temperature of recorder reflects the measuring point temperature inside the box, it is normal that it has a certain deviation from display temperature; if the temperature deviation at the position measured by thermometer is very large, it can be calibrated according to the method introduced by the instructions.	
5. There is seeper at the bottom of box after running for a period of time.	If there is a small amount of seeper, it should be periodically wiped off by a towel. If there is a lot of seeper, check whether the drainpipe is blocked or drainage is smooth, unblock with a piece of fine iron wire.	

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