Walk-In Cooler & Freezer Manual

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Congratulations! You have purchased a brand new TWOTHOUSAND MACHINERY CO., LTD Walk-In Cooler or Freezer. To maintain optimum performance, read and follow these instructions carefully before use and we recommend keeping this manual for regular review.

NOTE: Our products will be altered and improved in design and function at all times. Information in this manual is subject to change without notice.

1、PRODUCT INFOMATION

Twothousand is professional in manufacturing and constr ucting modular walk-in cooler and freezer, which fit a wide variety of applications in supermarkets, cained restaurants, food proc essors, hotels, non-staple seafood, grocery stores, industry, pharmacies and institutes, to name a fe w. Our walk-ins' advanced features offer exceptional ap pearance, strength and durab ility, high insulating value and energy savin g, and with t he utilization of i mported auto-control components in refrigeration systm, Twothousand walk-ins ensure thoughtful design, consistent quality, and reliable performance.

Designed according to the exact specific ations of customer, Twothousand walk-ins can be constructed into different heights, widt hs, lengths and types all with ease of assembly . As for the panel insulation we provide you with either ur ethane or polypropylene. Urethane is an ideal insulation with low coef ficient of heat transfer and high density while poly propylene is light and economical with a high insulating v alue. Besides, a range of exterior and interi or metal finishes is availa ble to fulfill your needs and budget. A vailable finishes are galvanized steel, stainless steel, embossed aluminum, galvanized steel with optional colours.

Panels

We apply the latest streamline production technique in panel manufacturing in order to offer you the best panel features:

- State-of-the-art Import high pressure polyurethane foam machine ensures the maximum insulation values possible.
- Consistent density with thermal conductivity is less than 0.024W/mK, exceeding national standard.
- Computer controlled Import panel stack fixture with scissors table and pallets guarantees a smooth and even surface. It's constant temperature and pressure setting further enhances foaming quality.
- Urethane panel's uniform density is over 40kg/m3, which provides structural rigidity and dimensional stability.
- Fire retardant is added into urethane insulation, which allows self-extinguishing time less than 3 seconds, providing a safer environment.
- Cam action-joining mechanism with tongue and groove edges offers ease and flexibility of a strong unit construction.
- A dual gasket system adds further sealing security.
- In fitting door panel is equipped with self-closing hinge to reduce unnecessary loss of refrigerated air.
- A fluorescent safety release mounted on the inner door jamb is to illuminate the door in the dark for convenience and prevent accidental entrapment of personnel within the walk in.
- The concealed heater wire circuit inside the door frame prevents condensation and frost formation at the edges of door and frame.
- Pressure relief port eliminates the damage to the vacuum compartment as a result of pressure differences between the interior and exterior spaces.

Refrigeration system

Twothousand's pursuit of excellenc e is evidenced nowhere than the application of world famous brand refrigeration components. COPELAND、L'UNITE HERMETIQUE、DAIKIN、REFCOMP、ECO、ROLLER compressors, ROLLER、 ECO and domestic high ef ficiency fan motors (in accordanc e with customer ' acquirement). ALCO, SPORLAN, and CAST EL 's refrigeration equipments, whic h are saf e, reliable and

energy-saving. EVERY CONTROL 's electronic controller syste m equipped with SCHNEIDER ' s electrical switch offers multi-functions, intelligent ized-control and user-friendly operation and allows for an optional remote data logging and control system as needed. Refrigeration equipments:

- Equipped with Phase Loss Monitor (PLM), which will tr ip when there is a faulty or lost phase to prevent motor winding damage.
- Digital thermostat for displaying room temperatures.
- Computerized and user-friendly syst em enables mac hine to go over operational cycles automatically after setting working temperatures.
- Head pressure control keeps suction and discharge pr essure within system design limits and prevents bad heat flow and air penetration damage.
- Thermal overload protection prevent s compressor overheating by usi ng lock-out thermal relay and compressor motor thermistance.
- A heater safety control is installed to prevent evapor ator heater from over-heating of coil when defrosting by shutting off power supply.

2、Application

Twothousand walk-ins are used in a variety of temperature ranges.

- High temperature: used for holding fruits, vegetables, eggs, medicine and wood.
- Medium temperature: used for holding meats, seafood and stuff that needs the same temperature environment.
- Low temperature: used for holding ice cream, already frozen food.
- Ultra-low temperature: used for freezing food, and in industry and pharmacy field.

NOTE: Walk-in coolers and freezers of different temperature classifica tions are equipped with dif ferent insulations and compressor types, therefore high tem perature walk-in cannot be us ed as lower temperature walk-in. Besides, low temperature walk -in used as hi gher temperature walk-in is not recommended, because walk-in operates most ef ficiently at designed condit ions. Walk-in cooler / freezer and walk-in warehouse refrigeration system are co nstructed with different materials. As a result they should not replace each other in application. The maximum load limit of a walk-in is 1 5%; warehouse refr igeration system operates with th e highest efficiency when working amount is in accordance with design capacity.

3、Installation

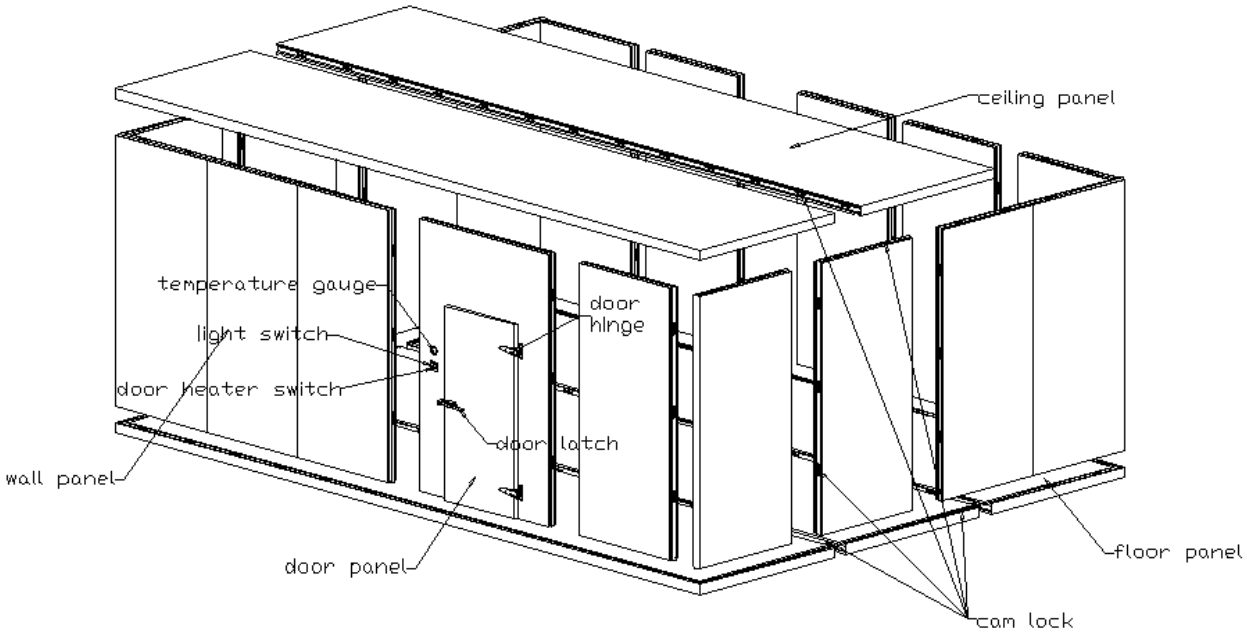
Preparation

- Job site for both walk-in compartment and refrigeration unit must be dry and even.
- Outside units should be installed membrance roof cap to keep away from heat reflection.
- Job site selection should consi der the ventilation, drainage, nois e and repair of refrigeration system, especially the assurance of good ventilation around condenser to avoid heat air re-circulation.

Panel installation

- Lay out floor panels based on their serial number as indicated on the floor panel layout drawing.
- Insert cam wrench into holes and turn cam wrench clockwise until a solid stop to form a floor.
- Place male bottom of wall panel in female groove of floor panel and lock every wall panel with its adjacent floor and wall panel tightly in sequence.
- Proceed with ceiling panels as you do with floor and wall panels.

Installation diagram



Refrigeration system installation

Refrigeration system installation is very professional and must be perfo rmed by our company or certified company.

4、Operating instructions

Warning and Safety Information

Before Start-up

- Dedicated power supply s hould be provided for unit and should not be shared with other electrical apparatus.
- Ground wire must be properly connected to electrical cabinet screws for protection against shock hazard.
- Ground insulation resistance must be over 2 megohm.
- No flammable or explosive material should be placed in the vicinity of this appliance.

After Start-up

- Do not touch any electrical components except operating parts.
- Avoid touching air-cooled condenser and fan with hands or with other objects when they are in operation.
- Avoid touching compressor, discharge line and condenser in case of scald when in operation.
- Do not adjust safety control settings when machine is in operation for prevention of unit damage.
- Make sure all power sources are disconnected before any circuit check-up.
- When unusual noise happens during operation, stop machine immediately and take corrective action.
- When walk-ins are off-work for a long period of time, main power supply should be shut down.

Check-out before start-up

Make sure that

- All electrical terminals are correctly tightened.
- All valves are set properly for efficient operation.
- Voltage is within 10% of that indicated on the condensing unit nameplate.
- Ambient temperature range is 5°C to 40°C
- Oil level is at the designed limits.
- Thermostat and other control units are properly set.
- On initial operation or restart after a long time t he crankcase heater should be ener gized for 6 hours prior to start-up.

Start-up

Walk-ins are automatic control system design. Start-up is simply a press of ON button.

Operational check-out

- Compressor should not be forced to stop before it oper ates at least three minutes, and vice versa reset cannot be done until 3 minutes after shut-down. Freq uent start-ups are not a cceptable and there should be no more than 5 times per hour.
- The oil level should be at or slight ly above the center of the sight gl ass at normal operation c onditions. If the oil level is low, more oil of the same type should be added to bring the level up.
- Observe the condition of moisture in the liquid line sight glass. When moisture content level is over system limits, replace filter-dryer. The relations between liquid line sight glass colour and moisture content level:

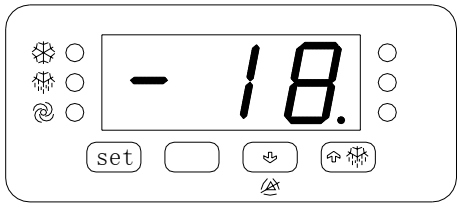
  Blue : low, normal
  Violet: slightly high, replacement of filter-dryer is recommended
  Purple: high, alarm limits, replacement of filter-dryer is necessary
  Rosiness: seriously high

NOTE: If system repair needs adding more refrigerant, replace the filter-dryer before adding.

- Inspect operational conditions of compressor , condenser and fan motor for loose screws and unusual noise. Tighten or stop and repair.
- Check piping insulation for prevention of refrigerated air loss.

5、Unit settings and operating instructions

Twothousand puts refrigeration system control at your fingertips with our new electronic controller boards. Common industry temperature and defrost presets are already programmed into the control board. Just hook up the electrical supply and you're in business. Except for changing operating temperature any modification done by uncertified trained refrigeration technician is not recommended. Control Board operation:



1. Change temperature set point:
   During normal operation, the control board powers up displaying temperature from sensor readings.

   Press (set) The display will show preset temperature and the indicator lamp will twinkle ❄ .

   Press (set) with (▼) or (❄▲) to change temperature to desired se t point, then release. The range is

   -40°C ～99°C

2. Manual defrost:
   Press (❄▲) and hold for 4 seconds to initial manual defrost.
3. Indicator lamp signals
   - ❄ illuminate : condensing unit operating mode
   - ❄ twinkle: condensing unit delay mode
   - illuminate: defrosting
   - twinkle: defrost delay or draining
   - illuminate: fan rotating (for unit up to 10 H.P.)
   - twinkle: fan delay (for unit up to 10 H.P.)
4. Alarm indicator

Alarm signal	Possible reason	Corrective action
Display flashes “E0” & hum	Wrong type ro om temperature sensor, sensor open, or operating beyond design conditions	Check for sensor type, proper connection to control board and adjacent temperatures are within sensor’s allowable limits
Display flashes “E1”& hum	Evaporator sensor failure (the same symptoms as room sensor’s)	Check evaporator as you d o with room sensor
Display flashes “E2”& hum	Error memory settings	Cut power supply and reconnect
Display flashes room sen sor readings & hum	Room temperature exceeding or dropping below the alarm setpoint	Verify room temperature and check a larm setpoint

5. Silence humming:

   Press (▼) to shut down humming alarm.

6、Maintenance

Compartment maintenance

1. Surface
- Use a soft cl eaning cloth with a mild detergent to wi pe away dirt and stains on the interior and exterior mental finishes.
- Use a clean damp cloth to remove any chemical residue.
- Use a soft dry cloth to dry up finishes.

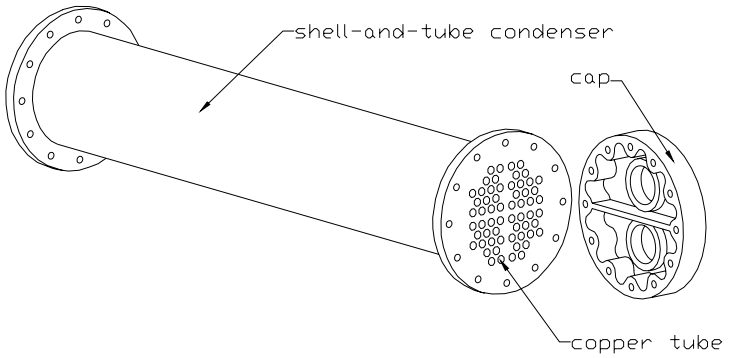
Warning: Never use abrasive and corrosive type of cleaner.
Never use any form of cleaning agent that contains any form of acid to clean galvanized aluminum panel.

2. Door gasket
   Check and clean walk-in door gaskets periodically, prevent door gasket stress and leaking.

3. Cam lock pug button
   Missing plug buttons should be replaced as necessary to eliminate moisture accumulating in the insulation.
4、Heater cable
   Ensure that door and pressure relief port heaters function properly to avoid frost or condensation appearing at exterior edges of the door on all sides.
5、Door hardware
   Check and tighten screws on hinge, latch, handle and door breaker.
   Hinges are lubricated at the factory for ease of operation. They should be lubricated every three months with petroleum jelly.
6. Storage
   Overcrowded or improper stocking prevents good air circulation blowed from fan blades.
7. Sanitation
   Always create a sanitary environment inside the compartment with periodic cleaning and disinfection.

Refrigeration unit maintenance

1. Power supply
   - Check to see that voltage is within system design limits and a balance load is drawn by each phase.
   - Check to see wire mounting nuts are secure.
   - Check contactor for proper operation and for worn contact points.
2. Heat exchanger inspection and maintenance
   - After a period of operation, air-cooled condenser is accumulated with dust, leaves and other debris, which may cause low heat distribution and inefficient operation, consequently, cleaning should be scheduled as often as conditions dictate.
     Action : Take off the baffle and use a soft brush to sweep between the fins, then blow it from inside with compressed air. NOTE: Try to avoid fin stress and bent during cleaning.
   - Water-cooled condenser is accumulated with water sediment in operation as a result of the quality of cooling water and affects refrigeration performance. If the high-pressure control of the unit exceeds design limit, check the water source and clean condensing unit. Cleaning period is determined by water quality. It is recommended to clean the shell-and-tube type condenser once a year by certified trained refrigeration technician.
     Action: Take off caps at ends and brush the inner side of the copper tube with a long bristle brush. If sediment is hard to remove, apply or other suitable cleaners.



shell-and-tube type condenser construction

- Drain pan of cooling tower used in water-cooled unit should be cleaned every month and cooling water should be changed with good quality water.
- Allow sufficient clearance around air-cooled condenser for a supply of ambient air to the condenser, and removal of heated air from the condensing unit. If the condenser unit is located in a hermetic place, a circulating fan with air flow range not lower than condenser fan must be mounted on the wall to remove heated hair.
- Check to see condenser and fan set screws are tightened as required.
- The evaporator section of a system should be checked at least once a month for proper defrosting because the amount and pattern of frosting can vary greatly. The frost build-up is dependent on the temperature of the room, the type of product being stored, how often new product is brought into the room and percentage of time the door to the room is open. If there is occasional heavy frost, defrost manually by pressing on the control board and holding for 4 seconds. Refrigeration resets automatically after manual defrost. If frequent manual defrost is needed, adjust thermostat and shorten defrost cycle.
- Check the drain pan for proper drainage.

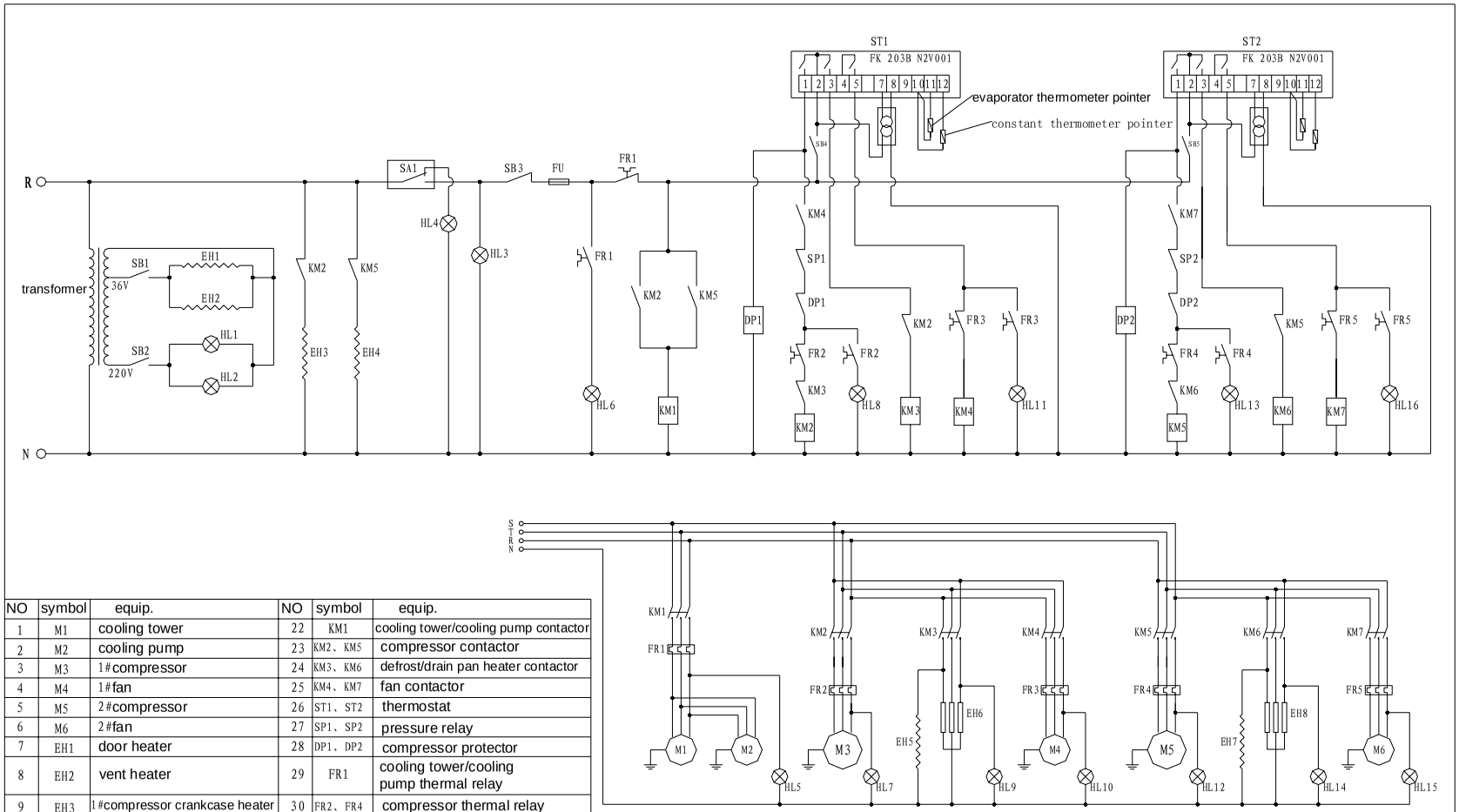
3. Check piping system
   - Look for signs of oil stains on interconnection piping, which indicates possible leak inside.
   - Inspect the oil level. It should be always at or slightly above the center of the sight glass at normal operation conditions. If the oil level is low, more oil of the same type should be added to bring the level up.
4. Data reference
   High and low pressure gauges (if equipped) should be observed for its value. System design limits are as follows:

Cooler type	Refrigerant type	Low pressure range (kg/cm2)	High pressure range (kg/cm2)
High temperature	R22	2 ～ 5	12 ～ 18
Medium temperature	R22	1～ 2	12 ～ 18
Low temperature	R502	0.4 ～ 1	10 ～ 16

5. Other general maintenance
   - Reduce door opening frequency and time. Add additional PVC strip curtains as needed to.
   - Avoid collision on unit body, door, fan, motor and electrical cabinet.
   - Keep water or any moisture stuff away from electrical cabinet.
   - Check for loosen parts on unit body and door hardware and take proper action.

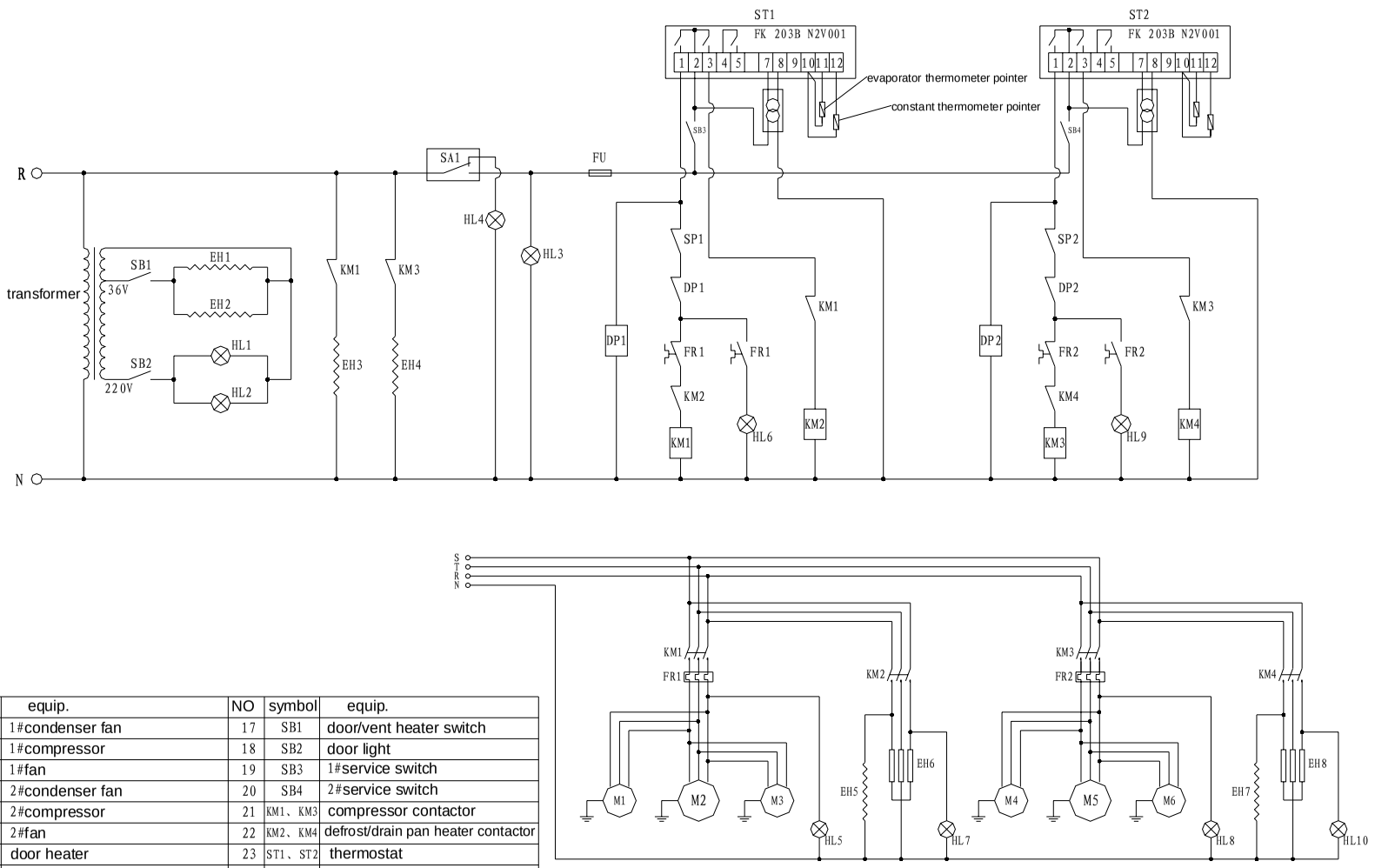
7、Electrical wiring diagram

NOTE: The wiring diagram included in this manual is only for reference. Real construction should adhere to the actual planning drawing.



NO	symbol	equip.	NO	symbol	equip.
1	M1	cooling tower	22	KM1	cooling tower/cooling pump contactor
2	M2	cooling pump	23	KM2、KM5	compressor contactor
3	M3	1#compressor	24	KM3、KM6	defrost/drain pan heater contactor
4	M4	1#fan	25	KM4、KM7	fan contactor
5	M5	2#compressor	26	ST1、ST2	thermostat
6	M6	2#fan	27	SP1、SP2	pressure relay
7	EH1	door heater	28	DP1、DP2	compressor protector
8	EH2	vent heater	29	FR1	cooling tower/cooling pump thermal relay
9	EH3	1#compressor crankcase heater	30	FR2、FR4	compressor thermal relay
10	EH4	2#compressor crankcase heater	31	FR3、FR5	fan thermal relay
11	EH5	1#evaporator drain pan heater	32	HL1、HL2	door light
12	EH6	1#evaporator defrost heater	33	HL3	proper power supply light
13	EH7	2#evaporator drain pan heater	34	HL4	failure power supply light
14	EH8	2#evaporator defrost heater	35	HL5	cooling tower/cooling pump operating light
15	SA1	phase loss monitor			
16	FU	heater	36	HL6	cooling tower/cooling pump malfunction light
17	SB1	door/vent heater switch	37	HL7、HL12	compressor operating light
18	SB2	door light	38	HL8、HL13	compressor malfunction light
19	SB3	emergency switch	39	HL9、HL14	defrosting/draining light
20	SB4	1#service switch	40	HL10、HL15	fan operating light
21	SB5	2#service switch	41	HL11、HL16	fan malfunction light

electrical wiring diagram for water-cooled unit (>10H.P.)



NO	symbol	equip.	NO	symbol	equip.
1	M1	1#condenser fan	17	SB1	door/vent heater switch
2	M2	1#compressor	18	SB2	door light
3	M3	1#fan	19	SB3	1#service switch
4	M4	2#condenser fan	20	SB4	2#service switch
5	M5	2#compressor	21	KM1、KM3	compressor contactor
6	M6	2#fan	22	KM2、KM4	defrost/drain pan heater contactor
7	EH1	door heater	23	ST1、ST2	thermostat
8	EH2	vent heater	24	SP1、SP2	pressure relay
9	EH3	1#compressor crankcase heater	25	DP1、DP2	compressor protector
10	EH4	2#compressor crankcase heater	26	FR1、FR2	compressor thermal relay
11	EH5	1#evaporator drain pan heater	27	HL1、HL2	door light
12	EH6	1#evaporator defrost heater	28	HL3	proper power supply light
13	EH7	2#evaporator drain pan heater	29	HL4	failure power supply light
14	EH8	2#evaporator defrost heater	30	HL5、HL8	compressor operating light
15	SA1	phase loss monitor	31	HL6、HL9	compressor malfunction light
16	FU	heater	32	HL7、HL10	defrosting/draining light

electrical wiring diagram for air-cooled unit (⩾ 10H.P.)

八、Trouble-shooting

Malfunction	Possible Cause	Solution
Power is on, but control board does not display	1. Phase loss or fuse blown 2. Power phase open or transformer shorted 3. Control board failure	1. Check wiring for breaks and replace fuse 2. Check Transformer output voltage (12V) 3. Replace control board
Control board displays, but compressor does not run	1. Compressor relay tripped 2. Hi-Lo pressure safety switch shut down 3. Defective contactor or coil 4. Room temperature is lower than operation setpoint 5. Internal thermal overload tripped 6. Compressor malfunction	1. Determine reason and take correct action 2. Determine type and cause of shutdown and correct it before resetting safety switch. 3. Repair or replace 4. Reset operation temperature setpoint 5. Wait until compressor cools down for reset 6. Check compressor motor winding
High discharge pressure	1. Dirty condenser coil 2. Fan not running 3. System overcharged with refrigerant	1. Clean 2. Check fan motor and its electrical circuit 3. Reclaim excess refrigerant
Low discharge pressure	1. Insufficient refrigerant in system 2. Low suction pressure	1. Check for leaks. Repair and add charge. 2. See corrective steps for low suction pressure
High suction pressure	1. Excessive load. 2. Expansion valve overfeeding	1. Reduce load 2. Regulate superheat
Low suction pressure	1. Lack of refrigerant 2. Plugged suction filter. 3. Evaporator dirty or iced. 4. Fan not operate 5. Expansion valve underfeeding	1. Check for leaks. Repair and add charge 2. Replace suction filter. 3. Clean and defrost 4. Check fan motor and circuit control 5. Regulate superheat
Large difference between actual room temperature and set point on control panel	1. Incorrect room temperature sensor placement, wire too long, sensor contactor open	2. Re-position sensing point of temperature sensor, enlarge wire section, reconnect sensor
Heavy frost builds up on evaporator fins	3. Too much time between defrost cycles or incomplete defrosts	4. Manual defrost and adjust defrost cycle
High temperature alarm	1. Overload and Open door excessively 2. Bad refrigeration performance 3. Heavy frost build-up on evaporator	1. Reduce load and door opening 2. See corrective steps for discharge and suction pressure malfunctions 3. Manual defrost and adjust defrost cycle
Coil not clearing of frost during defrost cycle.	1. Heater malfunction 2. Not enough defrost cycles per day.	1. Check heater operation. 2. Adjust defrost control
Ice accumulating in drain pan	1. Defective heater. 2. Drain line plugged.	1. Check or replace 2. Clean drain line.
Display screen flashes & hum	See Alarm Indicator	See Alarm Indicator