
Refrigerated Compressed Air Dryers

operation instruction

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1. Introduction

The main purpose of this manual is teaching user how to make our equipment to be treated in exact use and maintenance. This procedure can prolong equipment's used-life and reduce trouble for assuring the quality of air dryer. This manual also offers the related data in equipment for reference & inspection. It's important to be familiar with this manual prior to starting this equipment; moreover, subject to the instruction in operation and maintenance for avoiding caused trouble of equipment.

Note: Subject to principle exactly as follows, for avoiding dangerous. Maintenance.

- Do not exceed maximum operating pressure as shown on equipment serial number tag.
- Make sure equipment is depressurized before working on or disassembling it for servicing.
- Install equipment is compliance with national and local electrical codes. (220V+5%)
- Disconnect power supply to equipment when performing any electrical service work.

2. Function Introductions

The main function of refrigerated type compressed air dryers is to remove the moisture in compressed air, lowering the compressed air temperature to 1.6oC at dew point temperature by air-to-refrigerant heat exchanger (refrigeration evaporator), and then, most of the water vapor condenses into liquid droplets which are separated out of the air stream by a separator and condensed liquid is discharged to out of the unit by auto drain, then finishing the whole drying process. If all conditions are normal, it just has about 0.59 g/m³ water vapor in dry compressed air, and its percentage of water removed can reach 93%.

3. Compressed Air & Refrigeration System Flow

■ 3-1 Compressed air flow

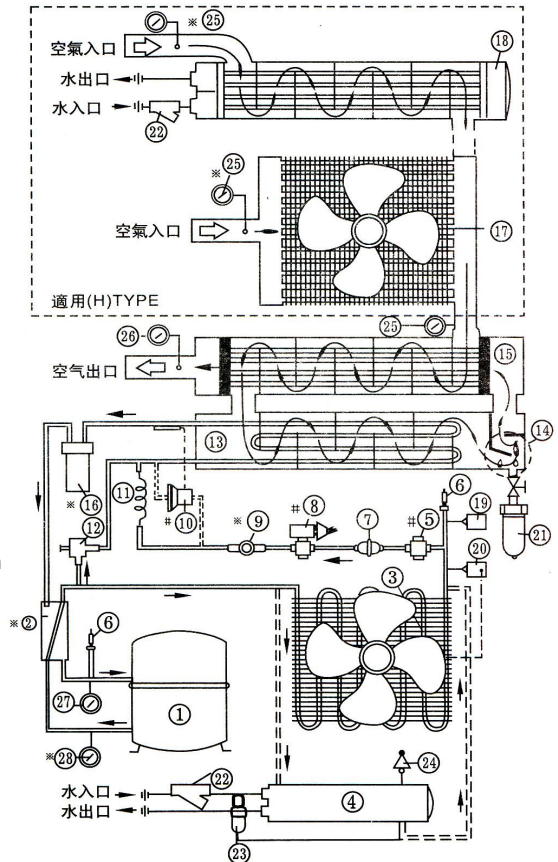
Compressed air enters the dryer, lowering the air temperature by passing air cooler (12) first, next entering an heat exchanger (7), it can condense water vapor into liquid droplets and do pre-cooling job, then entering the evaporator (6); moreover, increasing the dryer effect. Then liquid droplets are removed from the air stream in the separator (9) and automatic drain (10). Finally the dry compressed air passes through the heat exchanger where it is reheated by the incoming air, refrigeration system flow. (See Diagram 1).

■ 3-2Refrigeration system flow

Refrigerant turns into air refrigerant of high pressure and high temperature by refrigeration compressor (1). Moreover, lowering the temperature of air refrigerant-by-refrigerant heat exchanger (2) first, then enters into liquid refrigeration after heat dissipation by condenser (3). The main function of drier (4) is to dry and filter out water and impurity from refrigeration pipe. After high-pressure liquid refrigerant is expansion through capillary tube (5), then forming air and absorbing heat from compressed air in evaporator lowering air temperature, water vapor condenses into liquid droplets. Refrigerant flow returning to compressor side of inlet by through pipe, then continues use it after compressed it, then forming return route. (See Diagram 1)

Flow Schematic Diagram of Model XS- A (AH) Air Dryer

1. Refrigeration Compressor
2. Refrigerant Heat Exchanger
3. Air Cooled Condenser
4. Water Cooled Condenser
5. Service Valve
6. Irrigate Valve
7. Dry Filter
8. Electric Valve
9. Refrigeration Screen
10. Expand Valve
11. Capillary
12. Heating Passby Valve
13. Evaporator
14. Air-water Separator
15. Air Heat Exchange
16. Water-air Separator
17. Air-cooled Front Cooler
18. Water-cooled Front Cooler
19. High-pressure Jump Protect Switch
20. Pressure Control switch
21. Auto Drain
22. Cooler Filter
23. Water Adjust Valve
24. High-pressure Safety Valve
25. Air-inlet Pressure Meter

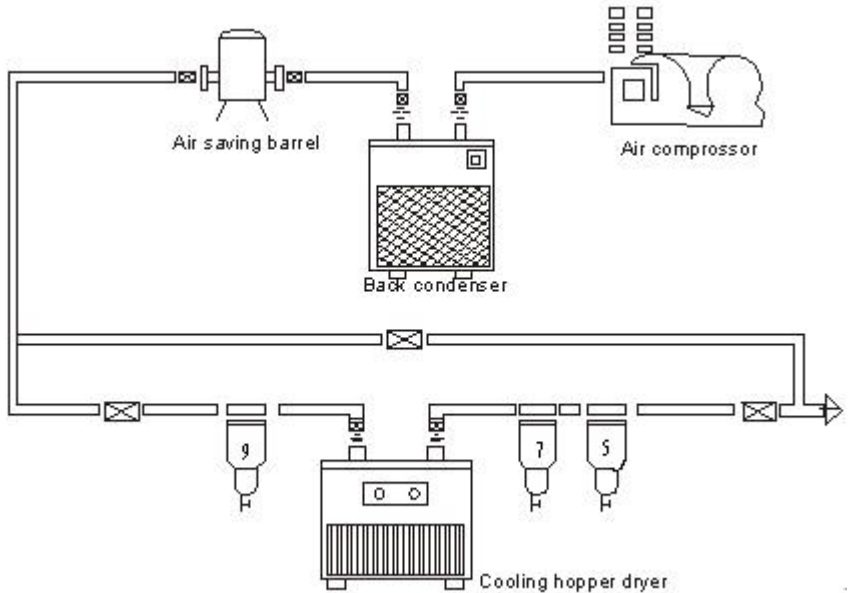


- 26. Air-outlet Pressure Meter
- 27. Refrigeration Low-pressure Meter
- 28. Refrigeration High-pressure Meter

DIAGRAM 1

4. Arranged Air Compress System

It is necessary to arrange the Machine like the following Diagram. If have high requirement to the Air Dryer, please order Absorb Dryer behind Lever 3 Filter. The order chosen of the 7*5*3*1 Lever Filter base on the technical requirement. Or consult with our technical work.



5. Usage requirement of the Air Dryer

- 1) Base on the four item of arrange to choose the back Cooler of Air Compressor, Saving Barrel, Filter and the Air Dryer. During these, the Back Cooler and Saving Barrel is necessary and it must install between the Air Compressor and Air Dryer. The Lever C Filter must be placed and other Filters only refer with your necessary.

2) Usage of work station:

Environment Temperature: $\leq 42^{\circ}\text{C}$ (Water cooler model not limited)

Inlet Temperature : XS- A $\leq 45^{\circ}\text{C}$ XS- AH $\leq 80^{\circ}\text{C}$

Inlet Pressure: 0.2Mpa-1.0Mpa (Over than 1.0Mpa may to order the goods)

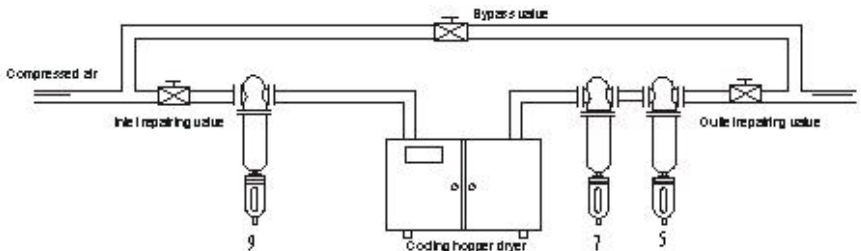
Quantity of Cooler Water: Account on 0.18 t/h with every dealing 1Nm³/min

Cooler Water Temperature: Inlet water temperature $\leq 35^{\circ}\text{C}$

Cooler Water pressure: 0.2-0.4Mpa

6. Installation of the Air Dryer

- 1) Place smoothly on the ground
- 2) Deal scaling with the outlet of the Air Compressor to the inlet of the Air Dryer's pipe, and can't use the easy saving water bend pipe.
- 3) Keep machine separate the environment for over 1 meter to ensure easy operate and fix and daily maintain. Air cooler ensures airness expediting and Water cooler ensure the inlet water pressure over 0.2 Mpa than outlet water pressure. The diameter of the pipe must fit for the water flux. Inlet water temperature must lower than 32°C and must be clean (fit for filter in the water inlet).
- 4) Air Dryer is a machine for refrigeration. So it must be avoid the strong shake and lean when it to be moved, loaded or installed.
- 5) To add the Repairing valve and Bypass valve on the inlet of the Air Dryer. As the following diagram:
- 6) To avoid shaking and impulse need to add the saving barrel to the back of Air compressor.
- 7) Water cooler should be place the signal pipe, and forbid to using one pipe together with other Water Cooler machine.



8) Installation of the electric

- A. Only set on power switch and don't use the setup switch together with other machine
- B. The pressure wave should near 5%.
- C. The place pipe should to avoid the section too small or long to cause the pressure voltage drop.

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- D. Install a set of electric element beside of the power, for example the setup switch and the air switch and the fuse and so on.
 - E. To touch the ground rightly.

7. Note Item of the Operation of the Air Dryer

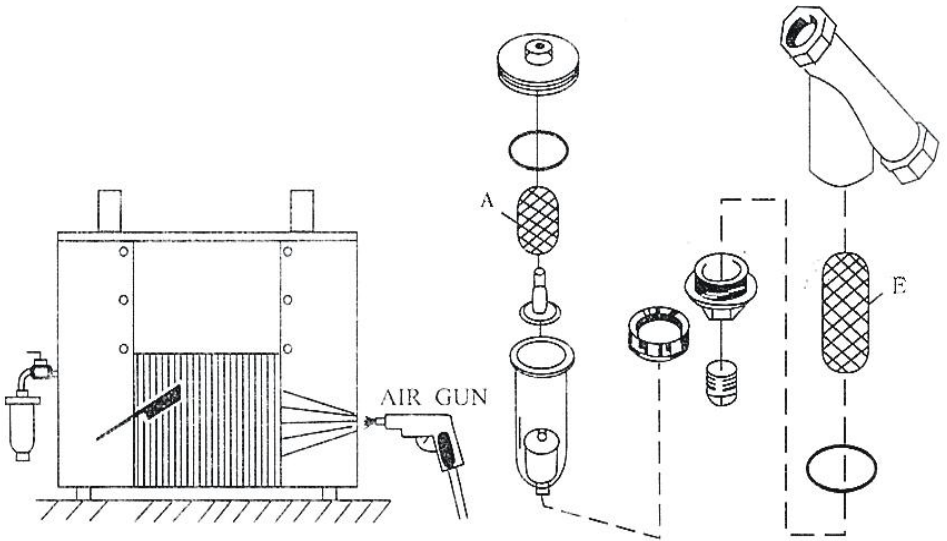
- 1) Check the five step fitting the requirement of the usage or not.
- 2) Check the power: the voltage and the phase fit for the requirement or not, and the electric touch line right or not.
- 3) Air cooler: the airness of the condenser is expedite or not.
Water cooler: the water pipe is expedite or not and the water pressure and the quality or the temperature fitting for the requirement or not.
- 4) The Filter of the Air Dryer install right or not.
- 5) The Bypass valve and the inlet repairing valve is closed or not and the outlet repairing is opened or not.
- 6) The Auto Drain ball valve is opened or not.
- 7) Check the machine with the refrigerate pressure meter to look the data of the machine is normal or not and on the normal the data of high-pressure meter and the low-pressure meter is equal or not.
- 8) Check the machine with the timing relay to set the delay time and the setting time data or not.
- 9) The air leave in the pipe is taken out or not.
Air cooler to observer the fan having the auto turn on or off capacity:
XS-06-1A(AH): turn on the fan (low pressure :0. 24 Mpa), off the fan (low pressure:0. 2Mpa)
XS- A(AH)-Over 2A(AH): turn on the fan (low pressure:0.44Mpa or high-pressure 1.6Mpa), off the fan (low pressure:0. 4Mpa or high-pressure 1.4Mpa).
Water cooler: the low-pressure data of refrigerate will stabilization between with the 0.4Mpa-0.45Mpa.And the high-pressure data of the refrigerate will stabilization between with the 1.4-1.6Mpa. After above condition we can take the Air Dryer as work normal. And after setup the air compressor and the saving air barrel pressure data to 0.7Mpa, can open slowly the compressor inlet-repairing valve to compress air and the pressure will add to the machine slowly. Forbid to open the inlet-repairing valve fierce to cause the shock wave inside the machine or to attain the Evaporator and so on elements.
In addition, forbid to turn on or off the machine to many time to avoid attaining the compressor motor.
- 10) Order of the closing machine:
Close the Air compressor and the inlet repairing valve first then to close the Air Dryer.

8. Adjust of the Air Dryer

Our entire machine pass adjusts before out of the factory. And In generate, the user of below 12A(W) can use the machine install and operation illustration directly to open the machine. Over 15A(W) model machine should let our technical worker to adjust the machine for you. The operation people should take in our operation train first. During the using, if the machine having abnormal phenomena, should relate with our company. And under leading of our technical worker adjust some valve. Forbid to operate blindness and cause to attain machine and the element.

9. General Maintenance Information

- 1) Clean the Air-cooling condenser usually to avoid the bott effect on the heating efficiency. Clean way like following diagram
- 2) Check the automatic drain is needed to prevent sludge and contamination everyday. If clog, please clean them by according to dissolve diagram
- 3) Clean the Water-cooling with the clean water and note to clean the filter to avoid the pipe jam and can't expedite. The clean way like diagram 4. (If there is no water filter, should add a filter net on the inlet of the pipe. If the auto drain doesn't work, can use the drain by hand but it must exhaust the water in time to avoid the water inlet the air.
- 4) Note the three phases electric run with no phase.
- 5) Note to listen the compressor run in clam and no noise or not.
- 6) Note to touch the air inlet and outlet temperature with different temperature. (Normal condition is near 10-17℃)..
- 7) The environment temperature of the Air Dryer does not fit below to 10℃, to avoid attaining the compressor because of lacking the oil.
- 8) Clean the dust on the outside box usually.



10. Trouble Shooting

A) Pressure-drop is too much

Symptom	Possible Cause	Corrective Action
Pipe system is error	Pipe valve hasn't open complete	Open the pipe valve completely
	Pipe diameter is too small	Use larger pipe
	Pipe is too long, so the pipe bend and connector are too much	Redesign pipe system
	Improper pipe arrangement due to two or more air compressors share the same dryer	Redesign pipe system
	Filter in pipe system has blocked	Clear filter or replace new one
	Too much air leakage on pipe system's bend connector	Check bend connector

Air flow exceed rated value	Air flow is higher than compressor's rated air discharge capacity and the pressure drops automatically	Replace compressor with larger air discharge capacity
		Reduce air flow
The condensing water in Evaporator is frozen	Temperature switch or pressure switch has faulty	Check and adjust switch or replace new one
	Error of expansion valve or heat-air bypass valve	Check to see the pipe system has blocked or not, adjust switch or replace new one
	Air flow is too small	Enlarge air flow

B) Air Dryer's water removing result isn't good

Symptom	Possible Cause	Corrective Action
Pipe system is abnormal	Bypass valve hasn't closed	Close bypass valve
	The air hasn't passed through air dryer	Open air dryer's air inlet completely
	Air dryer isn't placed parallelly	Place air dryer parallelly
	Auto Drain has incline	Place auto drain vertically
	Pipe for draining is higher than auto drain	Redesign draining pipe
Air flow is too much large	Pressure-drop is too much large	Redesign compressed air source
Drain system is abnormal	Auto drain is wrong or drain valve has problem	Clean or replace new one
	Auto drain's front valve hasn't opened	Confirm that the front valve is on full-open position
Display of Cooling Medium's evaporating temperature is abnormal	Dew point is too high or too low	Adjust pressure switch, water flow switch, expansion valve and heat-air bypass valve
	Atmosphere temperature and inlet temperature is too low	Keep machine working continuous
	Circumstance air is too dreggy, ventilation is no good	Select better position to place machine or improve ventilation
	Cooling medium has leakage	Remove leakage and re-supply cooling medium

C) Can't operation

Symptom	Possible Cause	Corrective Action
The power supply can't supply voltage	Fuse has broken	Check the condition of earth connection, check if the fuse has broken or there is short circuit.
	Wire has broken	Find the broken point and repair
The power supply works normally but can't startup machine	Voltage is abnormal	Make the input voltage on the range shown on nameplate
	Switch has faulty	Replace
	Connector has faulty	Replace
	Over Current Relay has faulty	Replace
	High-low voltage switch has faulty	Replace
	Startup Breaker has faulty	Replace
	Capacitor has faulty	Replace
	Temperature Switch, Flow Switch has faulty	Replace
Switches are all normal, but still can't startup machine	High-low voltage switch or over-current relay hasn't reset after jumping off.	Find the reason for jumping off, then reset the switch or relay
	Compressor has faulty	Replace
	Wire has loosen	Find the loosen place and fasten

D) Running is not good after startup

Symptom	Possible Cause	Corrective Action
Voltage is abnormal	After startup, the circuit is short and cause a dust smell	Reset circuit and switch, find the reason of abnormal voltage
High-voltage switch jump off. After reset, the machine can't	Voltage switch or temperature switch has faulty to cause fan stop working	Replace switch
	The fan has faulty	Replace

startup	Overload switch jump off	Check
	Condenser is too dirty	Clean
	Capacitor has faulty	Replace
Over Current Replay jumps off	Voltage switch or temperature switch has faulty to cause fan stop working	Replace
	Hydraulic switch has faulty	Replace
	Continuous startup for several times	The interval between two startup should be 3 minutes
	Compressor has overloaded	Reduce air flow
	Circumstance temperature or air dryer's inlet temperature	Improve ventilation or add cooling device
	Fuse has broken	Replace
	Contactor has faulty	Replace
	Cooling water hasn't recycled	Check cooling water

E) Normal operation but bad effect in drain

Symptom	Possible Cause	Corrective Action
Incorrect pipe arrangement system	Hot gas by-pass valve isn't closed fully	Close the valve tightly
	Air flow doesn't flow thru dryer	Open all valves at inlet to dryer
	Dryer is not laid flat	Lay flat the unit
Incorrect compressed air	Over flow rate	Add dryer
	High inlet temp. (Over 80oC)	Add aftercooler or increase HP, improve ventilation
	High ambient temp. (Over 40oC)	Improve ambient temp.
	Incorrect air pressure	Normal valve: 2-25kg/cm2
Incorrect cooling system	Leaky refrigerant	Remedy the leak, re-charge refrigerant
	Damaged valves	Replace
	Refrigerant pipe lines are clogged	Replace drier, vacuumize and re-charge refrigerant
	Breakdown of pressure switch	Replace
	Breakdown of condenser or cooler motor fan	Replace

	Condenser fins clogged	Clean
Incorrect auto-drain system	Drain valves are breakdown or not fully opened	Renew or open valves
	Incorrect working pressure	Back to normal pressure 2-25 kg/cm ²
	Auto drain declined	Lay flate & reset
	Strainer is clogged	Clean (refer to maintenance items)
	Drain lines clogged	Clean
	Drain lines are higher than auto drain's	Reset the drain lines
	Trouble of drain float	Replace

F) Auto Drain has faulty





Symptom	Possible Cause	Corrective Action
Auto Drain has faulty	Working pressure is below 1.5kg/cm ²	Increase working pressure
	Pipe has blocked	Clean
	Drain damage or not open completely	Replace or open it completely
	Drain is incline	Adjust position and fix it
	Drain's filter has blocked	Clear
	Working pressure is too high	Decrease working pressure
	Drain pipe has blocked	Clean
	Evaporator's pipe has blocked or rusted	Beyond using life and replace

1 Technique Index

- **Temperature display range: -20~100℃** (The resolution is 0.1℃)
- **Power supply: 220V ± 10%** (Product supply voltage to the product label shall prevail)
- **Temperature sensor: NTC R25=5k Ω ,B(25/50)=3470K**

2 Operating Guide

2.1 Meaning of the index lights on the panel

Index light	Name	Light	Flash
	Refrigeration	Refrigerating	Ready to refrigerate, in the state of compressor start delay pro
	Fan	Fanning	-
	Defrost	Defrosting	-
	Alarm	-	Alarm state

2.2 Meaning of the LED display

Alarm signal will alternate display temperature and warning code. (Axx)

To cancel the alarm need recharge the controller. Display code as follow:

Code	Meaning	Explain
A11	External alarm	Alarm from external alarm signal, refer to the internal parameter code “F50”
A21	The dew-point sensor fault	The dew-point sensor broken-line or short circuit (The dew-point temperature display “OPE” or “SHr”)
A22	Condensation sensor fault	The condensation broken-line or short circuit (Press “▼” will display “SHr” or “OPE”)
A31	The dew-point temperature fault	If alarm occurred in the dew-point temperature higher than the set value, can choose whether closing down or not (F51).

		The dew-point temperature alarm will not occurred when compressor starts in five minutes.
A32	Condensation temperature fault	If alarm occurred in the condensation temperature higher than the set value, can choose whether closing down or not. (F52)

2.3 Temperature display

After power on self-test, the LED display the dew-point temperature value. When press on“▼”, it will display the temperature of condenser. Reverse will back to display the dew-point temperature.

2.4 Cumulative working hours display

Pressing on the“▲▼”at the same time, will display the compressor accumulated operational time. Unit: hours

2.5 Higher level operation

Long press “M” 5 seconds to enter parameter setting condition. If have set the command, will display word “PAS” to hint import the command. Using press“▲▼”to import the command. If the code is right, it will display parameter code. Parameter code as followed table:

Category	Code	Parameter name	Setting range	Factory setting	Unit	Remark
	F51	The way of dealing with dew-point temperature alarm.	0 - 1	1	-	0 : Only alarm, not close. 1: Alarm and close.
	F52	The way of dealing with condensation temperature alarm.	0 - 1	1	-	0 : Only alarm, not close. 1: Alarm and close.

System means	F80	Password	OFF 0001 -- 9999	OFF	-	OFF means no password 0000 System means clearing password
	F83	Switch machine state memory	YES - NO	YES	-	
	F85	Display the compressor accumulated operational time	-	-	Hou r	
	F86	Reset compressor accumulated operational time.	NO - YES	NO	-	NO: not reset YES: reset
	F88	Reserved				
Testing	F98	Reserved				
	F99	Test-self	This function can attract all relays in turn, and please don't use it when the controller is running!			
	End	Exit				

3 Basic Operating Principle

3.1 Compressor control

After controller powered on, the compressor will delay for a moment to protect itself (F21). The indicator light will flicker at the same time. If checked external input is alarming, the compressor will stop.

3.2 Fan control

Fan default under control of condensing temperature. It will open when temperature is higher than (including) set point (F42) , closed when lower than the set point - return difference (F43) . If condensation sensor fails, the fan output along with the compressor.

3.3 External alarm

When external alarm occurs, stop the compressor and fan. External alarm signal has 5 modes (F50): 0: without external alarm, 1: always open, unlocked, 2: always open, locked; 3: always closed, unlocked; 4: always closed, locked. “Always open” means in normal state, external alarm signal is open, if closed, the controller is alarm; “Always closed” is on the contrary. “Locked” means that when external alarm signal becomes normal, the controller is still in the alarm state, and it needs to press any key to resume.

3.4 Command

In order to prevent irrespective persons from changing the parameters, you can set a password (F80), and if you have set a password, the controller will hint you to enter the password after you press the key “M” for 5 seconds, you must enter the correct

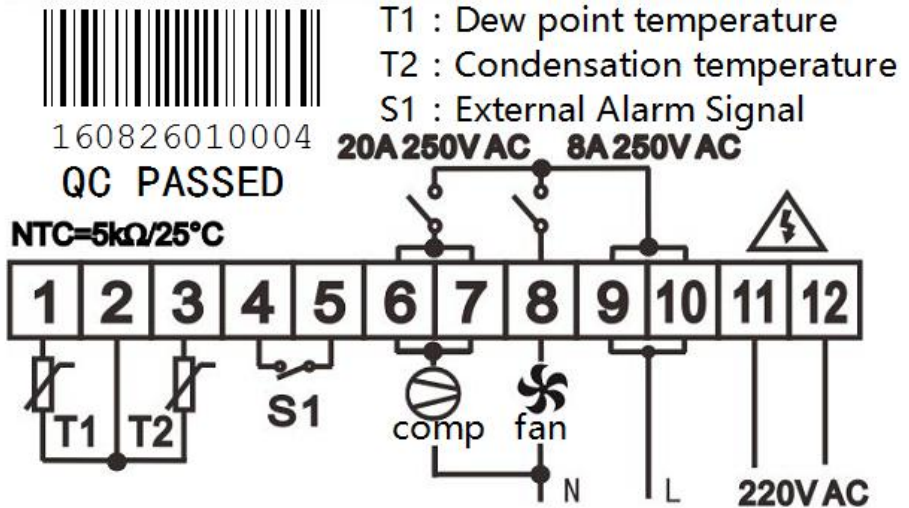
Category	Code	Parameter name	Setting range	Factory setting	Unit	Remark
Temperature	F11	dew-point temperature warning point	10 - 45	20	°C	It will warning when the temperature higher than the set value.
	F12	Condensation temperature warning point	42 - 70	65	°C	
	F18	Dew-point sensor amendment	-20.0 – 20.0	0.0	°C	Amend dew-point sensor error
	F19	Condensation sensor amendment	-20.0 – 20.0	0.0	°C	Amend condensation sensor error
Compressor	F21	Sensor delay time	0.0 – 10.0	1.0	Minute	

Fan/ Antifreezing	F31	Start antifreezing demand temperature	-5.0 – 10.0	2.0	°C	It will start when dew-point temperature lower than the set value.
	F32	Antifreezing return difference	1 - 5	2.0	°C	It will stop when dew-point temperature higher than F31+F32.
	F41	The second way the output mode.	OFF 1-3	1	-	OFF: close fan 1. The fan under the control of condensation temperature. 2. Fan worked at the same time with compressor. 3. Antifreezing output mode.
	F42	Fan start temperature	32 - 55	42	°C	It will start when condensation
	F43	Fan close temperature return difference.	0.5 – 10.0	2.0	°C	temperature higher than the set value. It will close when lower than set return difference.

Alarm	F50	External alarm mode	0 - 4	0	-	0: without external alarm 1 : always open, unlocked 2 : always open, locked 3: always closed, unlocked 4: always closed, locked
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password, and then you can set the parameters. If you don't need the password, you can set F80 to "0000". Notice that you must remember the password, and if you forget the password, you can not enter the set state.

4 Wiring Diagram



5 Notes

- Please use the temperature sensor allocated by our company.
- If compressor power is less than 1.5HP, can direct control by internal relay. Otherwise need to connect ac contactor.
- Fan loaded with no more than 200w.
- We have installed a 460V transformer to 220V, and the customer is connected to the 460V/60hz power supply, which can be directly used