

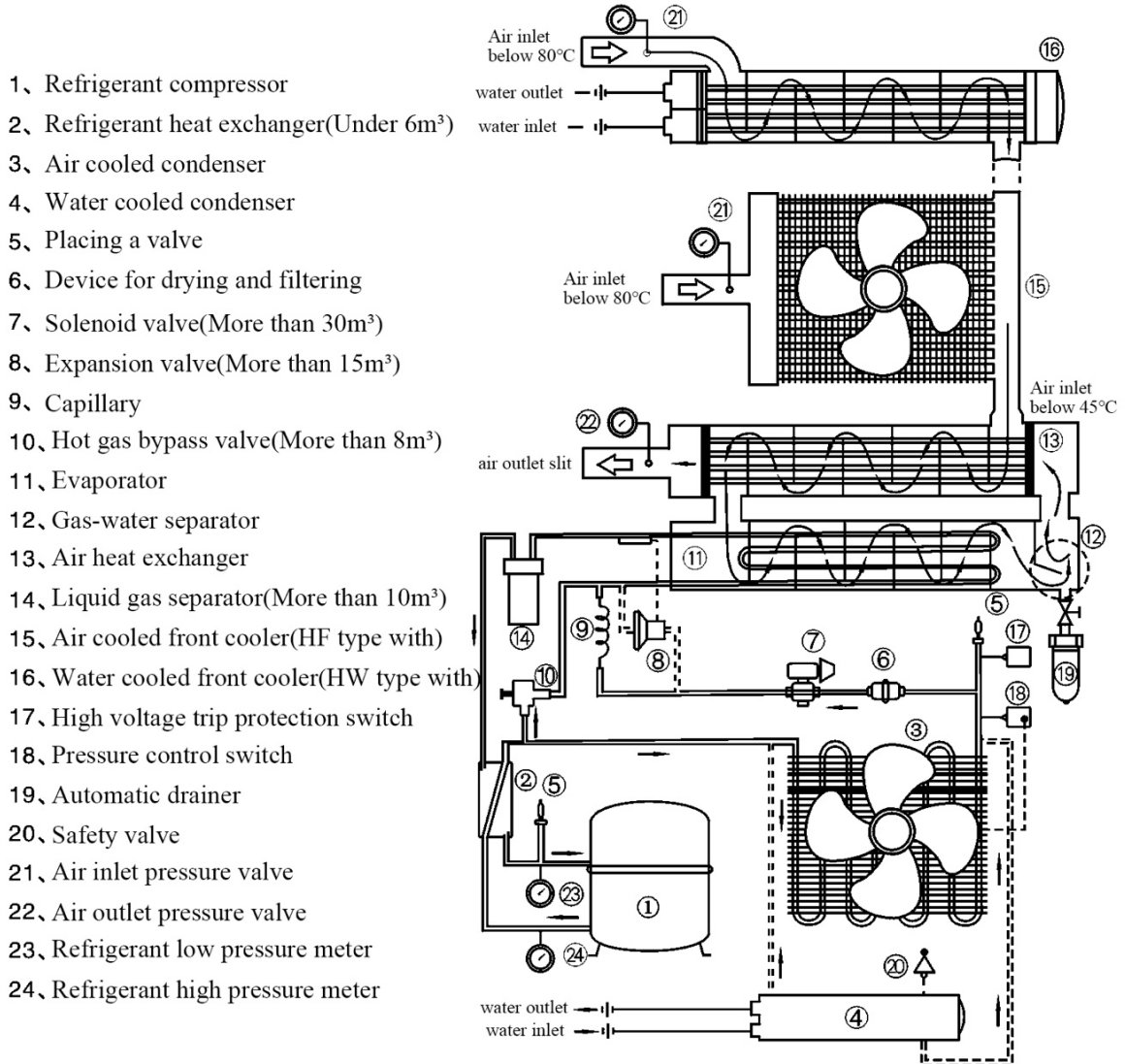
Refrigerated Air Dryer
Operation & Maintenance
Instruction

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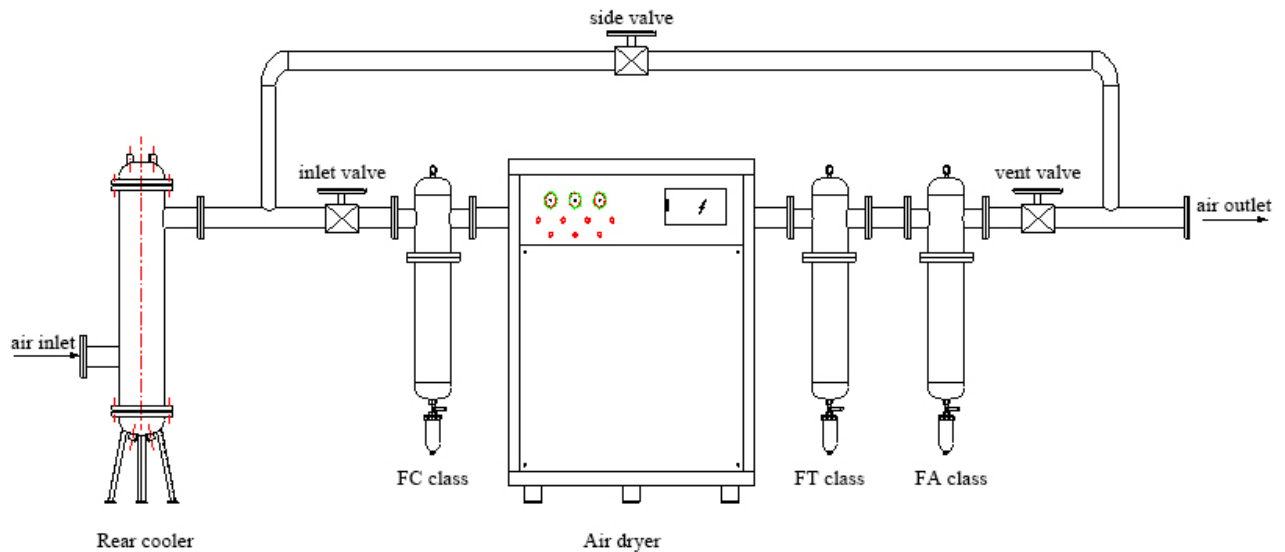
Dear user, in order to use this equipment properly, please read this manual carefully and carry out the steps described in this manual strictly. If the equipment fails, please examine the equipment according to the troubleshooting list in this manual carefully, or contact agents authorized by our company, or dial our after-sale service hotline for assistance. If you maintain the equipment regularly, you will bring out its best performance. We hope that this product will facilitate your work and thank you very much for using this machine!

Chapter 1: Device system flowchart



Saturated compressed air of higher temperature enters the pre-cooler of cold dryer to exchange heat with the cold dry air from evaporator and then enters the evaporator of refrigeration system when its temperature is reduced to exchange heat with cooling vapor for the second time to reduce its temperature to the evaporating temperature of cooling medium. During the two cooling courses, the water vapor in the compressed air is turned into liquid and flows into the vapor-liquid separator. The liquid separated in the separator is drained out of the equipment through automatic drainer (not charted). The compressed dry air of lower temperature enters the pre-cooler to exchange heat with the saturated air to increase its temperature and the compressed dry air of low moisture (dew point) and low relative humidity is obtained at the outlet. Pre-cooler, evaporator and vapor-liquid are the three major parts of the air flow system in cold dryer.

Chapter 2: Device installation and testing



The following drawing shows the standard installation of the equipment. The C grade filter should be installed in principle to avoid the contamination on heat exchanger surface of refrigeration dryer caused by the unfiltered compressed air.

Notes:

- A clearance of no less than 1 meter should be left around the refrigeration dryer.
- The refrigeration dryer can be installed without foundation, but the ground must be leveled.
- T and A filters can be selected and fixed accordingly. Please refer to the user's manual of filter for installation.
- If this equipment is to be used together with piston compressor, a buffering gas container should be installed before the refrigeration dryer to eliminate the effect of the pulsation of air source.

Warning:

The power supply of refrigeration dryer shall be single phase 115V 60HZ or 230V 60HZ. In order to guarantee the proper operation, individual electrical cabinet conforming to the power requirements must be installed.

Chapter 3: Instructions

3.1 Device working conditions

Power supply	Voltage: 115V 60HZ or 230V 60HZ Please refer to the nameplate for parameters as for special equipments
Working pressure	Rated 0.8 MPa (0.6 MPa ~1.0 MPa) Please refer to the nameplate for parameters as for high-pressure equipments
Inlet air temperature	Standard type: rated 38°C,maximum 45°C; High temperature type: rated65°C maximum 80°C
Cooling water (Water cooling type)	water pressure: 0.2-0.5Mpa water inlet temperature: 31°C water outlet temperature: 37°C Water quality: neutral water with PH6.5~7.5, without observable solid impurities
Environment	Environmental temperature: Air cooling type (A): $\geq 2^{\circ}\text{C}$, $\leq 38^{\circ}\text{C}$ Water cooling type (W): $\geq 2^{\circ}\text{C}$, $\leq 45^{\circ}\text{C}$ Environmental humidity: 80% Above sea level; less than1000m Surroundings: no caustic fumes around Installation method: indoor (installation without base is allowed)

3.2 Operating instructions

A、 Check the following items before starting the device

- 1) All valves on the pipe network shall be at the ready-to-work condition pipe system:
- 2) Turn on the cooling water valve and maintain the pressure within 0.2—0.5MPa and the temperature below 31°C.
- 3) The indications of high-pressure gauge and low-pressure gauge of cooling medium on the panel are normal and approximately equal (note: there is only low-pressure gauge for small equipment)
- 4) Examine the power supply and make sure the rated value doesn't exceed $\pm 10\%$.

B、 If the above-mentioned items are normal, start the equipment.

- 5) Press the “start” button, and the cooling medium compressor will start thereafter:
- 6) Observe the panel, when the type of refrigerant is R22 , the high pressure gauge of cooling medium should slowly increase to about 1.6MPa and the low pressure gauge of cooling medium should slowly reduce to about 0.4MPa. The equipment has now entered the normal working condition:

Other common cooling medium shown in the following table:

Refrigerant Type	High pressure gauge of cooling medium (MPa)	Low pressure gauge of cooling medium (MPa)
R134a	1.1	0.2
R22	1.6	0.4
R410a	2.3	0.7

- 7) First, start the dryer for 3~5 minutes; secondly, start the inlet air valve; finally, start the outlet air valve according to the load rate until it reaches the rated load.
- 8) Check the inlet/outlet pressure gauge (the difference of the two readings within 0.03MPa is acceptable)
- 9) Check the status of the automatic drainer.
- 10) Keep a record of the working condition of dryer, inlet/outlet air pressure, cooling medium high pressure low pressure etc.
- 11) Stop steps: first, stop the outlet air valve; secondly, close the inlet air valve: and finally, press the “stop” button.

3.3 Notes

Please pay close attention to the following issues when using the refrigeration dryer:

- 1) Avoid long term operation without load.
- 2) Don't start the cooling medium compressor again and again and don't start over 6 times within an hour.
- 3) In order to guarantee the air quality, please carrying out the start and stop steps strictly.
Start: run the dryer for 3~5minutes before starting the air compressor or inlet valve.
Stop: turn off air compressor or outlet valve and then turn off the dryer.
- 4) Make sure the bypass valve connecting the inlet and outlet pipe is turned off in operation to avoid the unprocessed air flow into the low reach pipe network.
- 5) The air pressure shall not exceed 0.95MPa. (As for high-pressure equipment, please refer to the nameplate of the machine)
- 6) The inlet air temperature shall not exceed 45°Cfor standard type and 80°C for high-temperature type.
- 7) The temperature of cooling water shall not exceed 31°C.
- 8) Don't start the equipment when the temperature is less than 2°C
- 9) The delay of the relay in the electrical control cabinet shall not be set less than 3 minutes.
- 10) Normally, only the start or stop button shall be used.
- 11) Wind-type refrigeration dryer cooling fan is controlled by pressure switch when the refrigeration dryer works in a low temperature environment, it is normal if the fan doesn't work. The fan will start automatically as the pressure of cooling medium increases.

3.4 Daily maintenance of device

- ✓ Blow the dust, ash and fiber of the wind cooled condenser with compressed air regularly.
- ✓ Automatic drainer tends to be blockaded by pollutant in condensed water and please clean the stainless-steel filter screen regularly by water or soap.
- ✓ Clean the water condenser regularly.
- ✓ Routine inspection: power supply, water supply and gas supply conditions. Observe and keep the reading on the panel of the refrigeration dryer.

Chapter 4: Trouble-shootings of common faults

The internal and external causes of faults of the desiccators are as follows. The causes and troubleshooting are presented here.

(1) Pressure drop increase

Cause analysis		Cause analysis
Pipe system fault	The pipe system valve is not open fully.	Fully open the valve
	Too small diameters of pipes, too long pipe length or too many elbows.	Redesign the piping system.
	Pipe system filter blockage	Clean or replace the filter medium
	Pipe system leakage	Decide the leaking point and fix it.
Condensed water frozen inside evaporator	Poor set or control of low-pressure switch	Reset or replace the valve of low-pressure switch.
	Fault or poor set valve of expansion valve and heated air bypass valve	Reset or replace the valve
The air volume exceeds the rating volume of desiccators		Reduce the air flow
		Replace air compressor or refrigeration desiccators

(2) Refrigeration dryers start failure

Cause analysis		Corrective measures
Power supply system fault	External fault-line	Find out the cause and treat accordingly to restore power supply
	Fuse burning or air switch tripping	Find out the cause and treat accordingly to restore power supply
Start failure with proper power supply	Voltage abnormality	The voltage shall be 115V±10% or 230V±10%
	Control circuit fault	Replace with a new one
	Control circuit fault	Find out the cause and treat accordingly
	Poor electric contact	Fix or replace with a new one
	Reset failure after protection system tripping	Find out the cause of tripping, treat accordingly and then reset
	Compressor fault	Check the compressor and treat accordingly
	Internal MP action of compressor	Reset when the compressor gets cool

(3) Poor automatic drain system

Cause analysis		Corrective measures
Drain failure or poor drain	Working pressure is lower than 0.15Mpa	Proper working pressure of automatic water drainer is within 0.2~1.0Mpa
	Filter screen blockage in water drainer	Clean the filter screen
	The preceding ball valve of water drainer is not opened	Open the filter screen
	Drainpipe blockage	Clean the pipe
	Draw off valve damage	Replace the float ball inside water drainer or replace the water drainer

(4) Poor drainage

Cause Analysis		Corrective measures
Poor installation and piping system	Bypass valve fails to close or to be closed fully	Close the bypass valve
	The air doesn't pass through the dryer	Open the inlet valve
	The dryer is not leveled in installation	Horizontalization
	Loped automatic drainer	Horizontalization
	The drainage system is higher than automatic drainer	Redesign the drainage pipe system
Poor drain system	Ball valve of drainer fails to open	Open the ball valve
	Water drainer blockage of damage	Clean or replace drainer
Cooling medium system fault	Too high cooling medium condensing pressure	Adjust the water flow governing valve, expansion valve, hot-gas bypass valve or pressure switch
	Too high air inlet temperature	Add a rear condenser
	Cooling medium leakage	Decide the leakage, fix the leakage, and refill cooling medium
	Compressor fault	Check the compressor

(5) Bad working performance with proper operation of dryer

Cause analysis		Corrective measures
Too low indication value of cooling medium evaporating pressure gauge	Cooling medium leakage	Decide & fix the leakage & refill cooling medium
	Cooling medium pipe blockage	Replace cooling medium desiccant, vacuumize and refill cooling medium
	Expansion valve or hot-gas bypass valve fault	Reset or replace the valve
	Poor evaporating pressure gauge	Replace it
	Too low cooling water temperature	Reduce the cooling water flow
Too high indication value of cooling medium evaporating pressure gauge	Too high air inlet temperature	Install rear condenser to reduce atmospheric temperature
	Expansion valve or hot-gas bypass valve fault	Reset or replace the valve
	Condenser blockage	Clean the condenser
	Too high cooling water temperature	Improve the cooling water temperature
	Cooling medium compressor fault	Check compressor and treat accordingly
Too high indication value of cooling medium condensing pressure gauge	Cooling medium pipe blockage	Check pipe system and treat accordingly
	Condenser scaling or blockage	Clean the condenser
	Too high cooling water temperature or too small water flow	Adjust the water flow governing valve preset valve to improve cooling water conditions
	Pressure gauge damage	Replace the pressure gauge
	Pressure gauge damage	Check compressor and treat accordingly
Overload running	Too high air inlet temperature	Install rear condenser
	Too much air process capacity	Reduce the load or replace the device
	Cooling medium leakage	Decide the leakage, fix it and refill cooling medium

(6) Bad operation of compressor after starting

Cause analysis		Corrective measures
Voltage abnormality	Trip soon after start	Find out the fault and treat accordingly
Start failure with proper electric system	Poor contact of cooling medium pressure switch	Replace pressure switch
	Overload tripping caused by too large load	Decrease the load and restart
	Condenser scaling or blockage	Clean the condenser
Frequent tripping of overload relay	Poor oil pressure switch or oil pressure failure	Adjust or replace with a new one
	Compressor overload	Reduce the air process flow
	Air inlet temperature too high	Install rear condenser to reduce temperature
	Poor environment ventilation and too high temperature	Take measures to improve environment conditions
	Too low preset values of overload relay	Set the value again
	Too high cooling water temperature	Take measures to bring down the water temperature