Modular desiccant dryer

Product Using Manual

PLEASE READ THE MANUAL CAREFULLY BEFORE USE

INDEX

PROFILE

Thank you for using the modular desiccant dryer, it will provide clean compressed air to ensure your production standards are met.
Although the machine has passed strict quality control and testing, to ensure safe and reliable operation of the machine, please read the instructions carefully.。

The main purpose of this manual is to introduce the process, installation, operation, repair, maintenance, electrical control circuit and troubleshooting etc. of this modular desiccant dryer.
Before the actual operation of the dryer, the operator should pay attention to the operating requirements and conditionsprovided in the technical data, and first understand the function of each part in the system process and the operation of the whole system, so that the user can assume the flow direction during the operation or maintenance of the dryer.
If you need the services of our company or have good comments and suggestions, you are welcome to contact us at any time!

Note: Before using and operating this equipment, please read this manual carefully and make sure you understand its contents. Please keep this manual safe for future reference and maintenance requirements.

Equipment overview

01.Working principle of the modular dryer

During the manufacturing process, vibration and shock are used to tightly fill the moisture adsorbing chemical raw material, molecular sieve (alumina), in two drying groups. When the "moisture containing gas" impacts the adsorbent, according to the "constant flow direction" curve, the liquid water in the air is adsorbed under pressure. When the water adsorbed by the adsorption column reaches saturation point, instantaneous depressurization occurs and the water will desorb from the adsorbent and is ejected from the system. This dryer works on the basic principle of switching between two groups to create adsorption, desorption and regeneration to continue with the switching cycle.

02. Process sequence

Each cycle consists of four steps

1. Group A works, group B regenerates

Firstly, compressed air is used to pressurize group A > B. After rising to the working pressure, the adsorbent in group A begins to absorb the liquid water in the air, so that the pressure dew point is reduced to -30O to -70OC.

Most of the dried gas is fed into the gas pipeline, and the other small part (about 12%) is throttled to normal pressure through the regeneration control valve, and

the dew point is further reduced to enter gro.

When the adsorbent is close to water saturation point, the water is desorbed and adsorbent is regenerated. Waste water and gas is then vented through the solenoid valve muffler.

2. Group A works, group B is pressurized

After the desorption and regeneration of group B, the dryer automatically opens the solenoid valve between group A and group B to balance the pressure of the two groups in a short time, and the charging of group B is completed.

3. Group B works, group A regenerates

At this time, group B carries out adsorption drying. Most of the dried gas is also put into the gas pipeline, and a small part is throttled to normal pressure through the regeneration control valve. The dew point is further reduced and enters group A. The desiccant in group A is desorbed and regenerated.

4. Working in group B, charging in group A:

After the desorption and regeneration of group A, the dryer automatically opens the solenoid valve between group A and group B to balance the pressure of the two groups in a short time. After adsorption in group B, group A charges and the next cycle continues. The working time of adsorption is usually 3-2 minutes,

the time of charging and regeneration is generally from 1 second to 1 minute. When the machine leaves the factory, it has been matched and adjusted. It should only be adjusted if required and by qualified personnel only

03. Basic knowledge of a modular dryer

It is vital to service and maintain the dryer to ensure efficient operation and long life.

1: What is adsorption? How does adsorption occur?

Adsorption is the phenomenon that the concentration of substance changes automatically at the interface between two surfaces. All solids have the ability to adsorb the molecules, atoms or ions of the surrounding medium to their own surface in varying degrees. From the thermodynamic point of view, the reason why the solid surface can adsorb other media is that the energy on the solid surface, which is called “surface free baking”, has the tendency of absorbing other substances to reduce its surface energy.

2: What is adsorbent? What is adsorbate?

The material that has obvious adsorption effect on specific medium is called “adsorbent”. Under certain conditions, the larger the surface area of adsorbent, the stronger its adsorption capacity. Therefore, in order to improve the adsorption capacity of adsorbent, it must be possible to increase the adsorption capacity.

3: What adsorbents are commonly used in an adsorption dryer?

Commonly used adsorbents are: silica gel, activated alumina, molecular sieve.

4: What is the function of the muffler in adsorption dryer?

The function of the muffler is to reduce the noise emitted from the regeneration gas of the adsorption dryer. Because the regeneration waste gas has a certain pressure when it is discharged and the exhaust speed is high, it will cause gas turbulence and produce exhaust noise, which can generally reach 80-110db. According to relevant regulations, when the exhaust noise is greater than 75db, a muffler is required. In the adsorption dryer - due to a large amount of dust and moisture in the regeneration exhaust condensate will accumulate when the temperature is appropriate, which can cause muffler blockage.

Therefore, if the working condition of the muffler in the adsorption dryer is very bad, we should pay attention to its cleaning and maintenance on a regular basis.

04. Product features

1: Aerospace aluminium alloy, high-pressure tolerance, powder coated, double-layer anti-corrosion treatment as standard.

2: A spring-loaded tensioning device is used on the adsorption barrel to keep the desiccant compact all the time,it eliminates the friction loss caused by the loosely packed desiccant, and increases the service life of the adsorption barrel.

3: The desiccant absorbs water and releases heat, but the higher the temperature is, the worse the water absorption effect is. After modularizing the adsorption barrel, heat is evenly distributed, temperature decreases,and the water absorption effect is stronger.

4: A modular design is adopted to increase the cross-sectional area, slow down the flow rate of gas in the adsorption chamber, increase the time and contact area between gas and desiccant, and make the adsorption more thorough. The flexible modular structure design makes it compact in structure, small in volume, small in floor area and more convenient for installation.

5: The volume of a single adsorption cylinder is less than 25L, which does not belong to the special inspection

category of simple pressure vessels.

Safety specification

Notes:

This equipment is used for air drying. Please do not use this equipment for other purposes than the original setting. If you have any problems in use, please contact our company to ensure your rights and ensure that the equipment and personnel of safety. This equipment is provided with many safety facilities at the factory to ensure the safety of personnel and equipment, but users should not ignore their own safety regulations because they rely too much on these safety facilities. In particular, you should read the following precautions and understand the warning contents before operating the equipment, so as to avoid the danger to the safety of personnel or equipment due to the failure or failure of these equipment.

General safety regulations

1. Before turning on the power switch, make sure that the operator has fully understood all the contents described in this instruction manual, and that there are no persons or obstacles in the forbidden area.

2. Please memorize the position of the "main switch" to ensure that when an emergency occurs, the operator or other relevant personnel can press this switch immediately to avoid danger.

3. Please use safety equipment, such as safety shoes, safety gloves, etc. when operating the machine.

4. Do not place tools, parts or other non-essential items on the equipment table, moving parts or other positions that may interfere with the operation of the machine, so as not to hinder the

5. When operating any button, please make sure that the switch to be operated is correct. And remember not to touch the button inadvertently, so as to avoid malfunction or danger of the device.

6. When the external power supply voltage is unstable, please turn off the main power immediately to protect the equipment.

7. The maintenance of the circuit system must be operated by professionals, and the general operator is forbidden to modify or disassemble it arbitrarily.

8. The grounding must be firm to ensure the safety of personnel and machines.

9. It is forbidden to touch any electrical switch with wet hands to avoid danger of electric shock.

The hardware of the machine itself and its related parts have been debugged and locked, and must not be changed or modified arbitrarily.

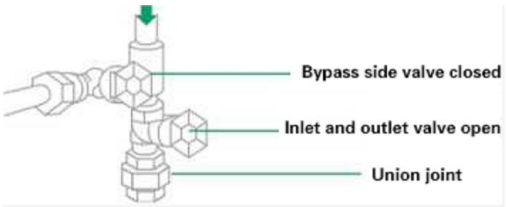
Special Notes

When understanding the influence of poor degreasing effect on the adsorbent, it is necessary to have a deeper understanding of how to install the precision filter, which will be of the most positive help to the adsorption dryer.

In order to make the oil content of the compressed air reach the standard of 0.01 ppm, a pre-filter (5) and a post-filter (0.01 u) must be installed before and after the inlet of the adsorption dryer. Never install just a post filter. Although the post-filter can reach the OIppm

standard, the stability of the pre-filter is still required. A 1u filter must be installed at the outlet of the dryer and installed in reverse. The function of this filter is to filter out the dust released by the adsorbent in the adsorption tower. Because of the dust, the air cannot enter directly. Otherwise, the filter element is more likely to be blocked. It should enter from the outer mesh of the filter and pass through the filter element to the outlet, so that the dust stays at the bottom of the filter screen and is easy to discharge, so that the filter element is less likely to be blocked.

• Please install bypass piping (it will be used during maintenance, be sure to install)



• The installation site should avoid direct exposure to wind and rain, and a rain shed should be built outdoors.

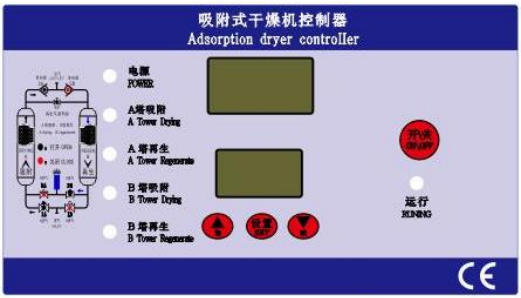
• Reserve maintenance space for service personnel.

Operation panel instructions

01. Introduction

The controller of the heatless regenerative adsorption suction dryer adopts a special timing controller developed by a single-chip microcomputer. It can control the adsorption and regeneration of the two towers A and B of the adsorption dryer according to the delay time set by the user. The heatless regeneration adsorption

dryer controller is a newly developed controller by our company, which is suitable for the controller of 4 valve structure.



Picture1

02. Main functions

1. Setting function: In the setting state, various parameters can be set through two buttons.

2. The four relays control the adsorption and regeneration of the two towers A and B of the adsorption dryer according to the set working time value.

3. Display function: two-line display of three-digit digital tube.

4. Preset function: The delay time parameter must conform to the formula T1 > T2+T3+T4. When the parameters are adjusted, it will automatically detect whether the above rules are met.

5. Delay function: in the running state, the four relays can be delayed on and off according to the specified sequence according to the set delay time.

6. Temperature display function: You can choose whether to display the temperature or not.

7. Positive and negative valve function: You can choose whether the tower adsorption relay is a positive valve (open when energized) or a reverse valve (closed when energized).

8. Parameter memory function: all parameters of the system can be memorized after power off.

9. Automatic reversing function: according to the system state at the time of last shutdown, it can be determined whether tower A or B will be adsorbed first at the next start.

tower adsorption.

10. Remote control function: If remote control is selected, the switch of the system can only be controlled by the remote switch. When the remote switch is closed, the system enters the power-on state, and when the remote switch is disconnected, the system is in a non-working state.

7. Technical parameters

1. Power supply voltage: 220V (+10% ~ -15%) 50\60Hz;

2. Output capacity: 4-way valve, power supply is AC220V

3. Delay accuracy: ±3% of the working cycle;

4. Conditions of use:

a) Altitude ≤ 2 000 meters;

b) Working environment temperature: -25°C ~ 55°C;

c) Ambient humidity≤95%, no condensation;

d) There is no obvious dust, acid, corrosive gas or substance in the surrounding air.

Parameter settings

The controller has two states:

1.Set state

Press and hold the "plus" and "minus" keys simultaneously for 3 seconds before power off and on again to enter the manager parameter menu

At other times, long press the setting key for 3 seconds to enter the user parameter menu.

2. Operating status

Press the on/off button to run.

Operation parameter description

User parameter menu				
No.	Name	Meaning	Range	Factory settings
F1	Adsorption time t1	Adsorption time of single tower of suction dryer	1～600s	300s
F2	Regeneration delayt2	Delay from adsorption to regeneration	1～60s	5s
F3	Regeneration timet3	The duration of each regeneration	1～600s	240s
F4	Pressure equalization timet4	Each time tower A and tower B are opened at the same time, the time to perform pressure equalization	1～30s	5s
Manager parameter menu				
F5	Dew point overrun alarm temperature	The maximum allowable dew point temperature (note that the dew point over-limit alarm is compared after a 15-minute delay, and the real-time dew	-99～80°C	-10

		point temperature is greater than the set temperature)		
F6	Dew point temperature upper limit	Temperature value corresponding to 20mA current	0～100°C	20
F7	Dew point temperature lower limit	Temperature value corresponding to 4mA current	-99～0°C	-80
F8	Temperature correction	Correction value for dew point temperature measurement	-80～80°C	0
F9	Dew point temperature alarm enable output	Dew point temperature is too high, or too low to enable output	ON：utput OFF：not output	OFF
F10	Temperature shield	Whether to display the temperature in the downward working state (when it is set to ON to shield, the total working time of each step will be displayed)	ON：Shield OFF: Not shield	ON
F11	Remote switch enable	Whether to use remote switch	ON： Enable OFF: Unable	OFF
F12	Positive valve and reverse valve selection	Adsorption valve normally open and normally closed selection	ON： Anti valve OFF： Positive valve	OFF
F15	Shutdown equalization time	Shutdown and pressure equalization: power-on operation, if the regeneration valve has been opened, press the stop button to stop working, and then power off after the pressure equalization time of the intake valve has elapsed.	0～512s	30s

F20	Power-on self-start	ON: Automatically turn on after a sudden power failure during operation, OFF: not turn on automatically	ON： Enable OFF: Unable	OFF
F21	Slave address	Communication: Baud rate: 9600, even parity, 8 bits, 1 stop bit.	1～255	1
F22	Transform	After the regeneration delay expires, the	0-10times	

	times	number of times the regeneration valve is opened and closed. If set to 0, the hidden parameter function will be shielded.		0
F23	Decompression time	After the regeneration delay expires, the time for the exhaust valve to open	0-512s	0
F24	Charging time	After the regeneration delay expires, the time for the exhaust valve to close	0-512s	0

Notes: The time setting satisfies: T1>T2+T3+T4; in order to prevent user parameter setting errors, the controller can judge by itself and limit the upper limit of each parameter.

Running parameter settings

In the setting state, press the "Set" button on the panel (the function at this time is parameter selection) to select the parameter number; press the "▲" or "▼" button on the panel to modify the parameter value.
When setting, the upper digital tube displays "F01", which means that the first parameter is currently set; the lower digital tube displays the parameter setting value.
Press and hold the "▲" or "▼" button for more than 3 seconds, the set value will increase rapidly, and it will increase by 1 each time when it is pressed intermittently

After the setting is completed, press the "ON/OFF" button to enter the running state, and the set value is written into the E2PROM and stored, that is
The set parameter value can still be retained after the power is turned off. If there is no key operation for 15 seconds in the setting state, it will automatically exit the setting state and the parameters will be automatically saved.

8. Usage

- Power-on

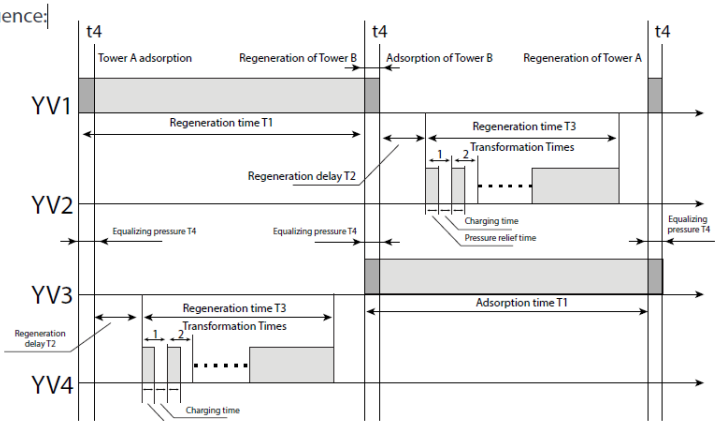
Power on (AC220V), the digital tube of the controller starts to count down for 10 seconds, and then enters the running state. At this time, if you press the "ON/OFF" button, the controller will enter the standby state.

- ***start up***

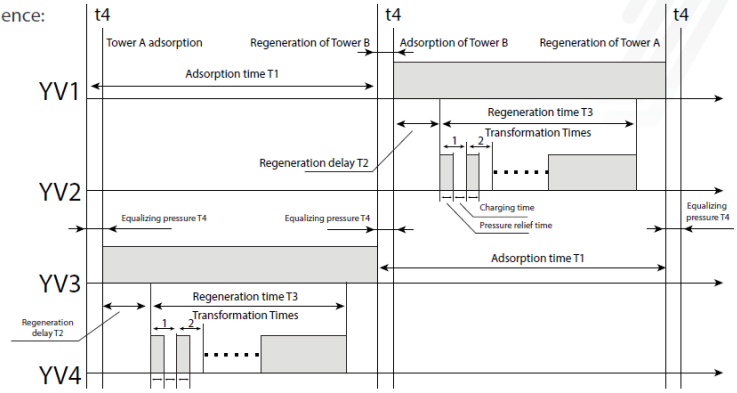
In the standby state, press the "ON/OFF" button, the "RUN" indicator lights up. The controller works according to the sequence in Figure 2. The four relays act in succession, the corresponding light-emitting tube indicates the working state, and the digital tube counts down or counts up to display the adsorption time.

- ***Timing work diagram***

Positive flow valve sequence:



Reverse flow valve sequence:



2. The meaning of indicator light and digital tube display

Indicator light	Meaning	Indicator light	Meaning
Power	Power indicator, always on	B Tower Drying	Lights up when tower B is adsorbing
A Tower Drying	Lights up when tower A is adsorbing	B Tower Regenerate	Lights up when tower B regenerates
A Tower Regenerate	Lights up when tower A regenerates	Runing	On when power on, off when standby

Digital Tube		Meaning	
		On state	Off state
Display temperature	up	work time countdown	close display
	down	T1 sensor input temperature	T1 sensor input temperature
temperature is not displayed	up	Working time down	Time of one work cycle
	down	Current process duration	Close display

9. Fault code

1.E1: Sensor failure (remove the high temperature sensor probe, use a universal resistance at (90-210) ohms is normal).

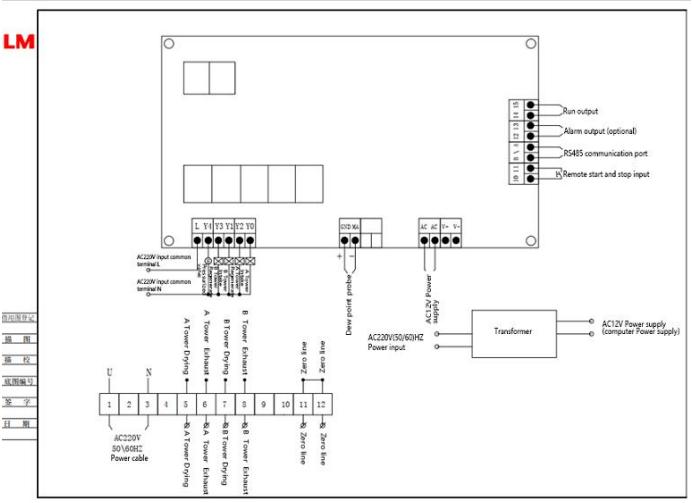
2. Prompt if the temperature is too high or too low: when the measured temperature is greater than or equal to [F05], it will prompt that the temperature is too high, and “HHH” will be displayed alternately when the temperature is displayed. When the temperature is below the minimum value (-50°C), the temperature will be displayed. "LLL" is displayed alternately.

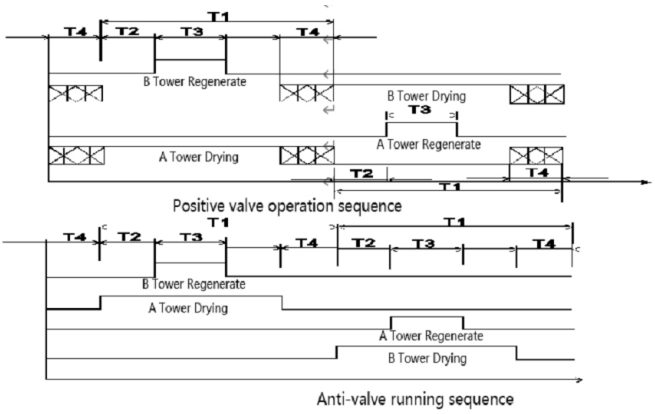
10. Installation wiring

Use 12T binding posts for wiring. For the definition of each port, see the wiring mark in the box.

11. Warranty services of repair, replacement and refund

This product is responsible for free "three guarantees" within one year after it is sold, but the repair cost will be charged for the damage caused by improper use of the user.





12. Quality and service guarantee

Quality and Service Guarantee High-quality after-sales service depends on leading technology and experienced after-sales service personnel. Store enough spare parts. In order to provide better after-sales service and adhere to the service concept of "customer needs, we think, brand first, goodwill is gold", our company has established a perfect after-sales service system. The company's technical support department gathers senior service engineers in the industry, and all engineers have received professional technical training. Their dedicated service attitude and professional service technology have won unanimous praise from customers.

When the user changes the application scope, our company will make software and hardware upgrade plans in time according to the actual situation. When our company's application software and hardware have upgraded versions, we will notify your company in time and provide corresponding upgrade services. When the hardware equipment of the system has updated products, our company will notify users in time and provide new product information and solutions.