DETROITAIR

COMPRESSED AIR INNOVATION THROUGH TECHNOLOGY

MANUAL FOR

Modular Dryer

PLEASE READ THE MANUAL CAREFULLY BEFORE USE

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PROFILE

Thank you for purchasing this Detroit Air MDX series 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 of the MDX series modular desiccant dryer.

Before the actual operation of the dryer, the operator should pay attention to the operating requirements and conditions provided 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.

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.

01. Working principle of the MDX 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 -30°C to -70°C. 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 group B. 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.

3. 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.

4. 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.

5. Safety specification

Note: This equipment is used for air drying treatment. Please do not use this equipment for purposes other than the original function. If you have any problems during use, please contact our company to ensure your rights and interests and the safety of the equipment and personnel are met. Many safety features are provided to ensure the safety of personnel and equipment when using these models. However, users should not ignore their own safety requirements. In particular, it should be noted that the following precautions should be read and the warning contents should be understood before operating this equipment, so as to avoid harm and ensure the safety of personnel and/or 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 manual, and make sure that it is safe to do so.
2. Please remember the position of the "master switch" to ensure that in case of emergency, the operator or other relevant personnel can press the switch immediately to avoid danger.
3. When operating the machine, please use safety equipment, such as safety shoes, safety gloves, etc.
4. Do not place tools, parts or other unnecessary items on the dryer, or any other position that may interfere with the operation of the machine.
5. When operating any button, make sure that the switch to be operated is correct. And remember not to touch the button inadvertently, so as to avoid misoperation or danger.
6. When the external power supply voltage is unstable, please turn off the main power supply immediately to protect the equipment.
7. The maintenance of the circuit system must be carried out by competent personnel, and general operators are not permitted to modify or adjust any part of the system whatsoever.
8. The base-mount must be stable to ensure the safety of personnel and machines.
9. Do not touch any electrical switch with wet hands to avoid electric shock.
10. The hardware and related parts of the machine have been debugged and locked. Do not change or modify them arbitrarily.

Safety specification (cont.)

Special notes

In order to understand the influence of poor oil removal effect on adsorbent, it is necessary to deeply understand how to install the precision filter, so as to have the most positive help to the adsorption dryer. In order to reduce the oil content of compressed air to 0.01 ppm, a pre filter (5) and a post filter (0.01 U) should be installed before and after the inlet of the adsorption dryer. Do not install only the post filter. Although the post filter can reach the standard of 0.01ppm, the stability of the pre filter is still necessary. At the outlet end of the dryer, a 1U filter should be installed in reverse. The function of this filter is to remove the dust released by the adsorbent in the adsorption tower. Because of the dust, the air can not directly enter the filter element, otherwise the filter element is easily blocked. It should be entered through the outer layer of the filter, and the dust will befall to the bottom of the filter element and be discharged. This reduces the possibility of a filter blockage.

Please install bypass piping (it must be used in maintenance, please set it).

- The installation site should avoid direct rain and wind, and the outdoor shelter should be built.
- Reserve maintenance space for service personnel.

Safety specification (cont.)

Special notes

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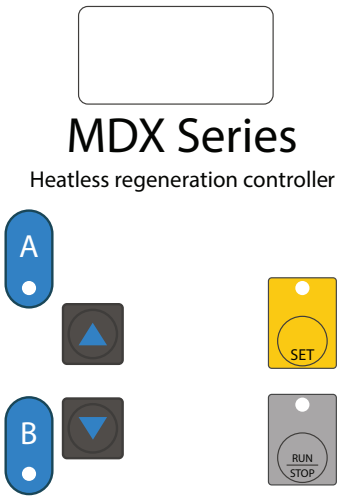
Operating panel instructions - LED PLC equipped models

One: **Introduction**

MDX controller has specifically been designed for modular type dryers in the Detroit Air range. Many improvements in quality and performance have been made over the previous generation DX series control panels.

See Figure 1.



Two: **Main function**

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

2: Control function: in the running state, the four relays control the adsorption and regeneration of A and B Towers according to the set working time value.

3: Display function: three-digit display.

Three: **Technical parameters**

1: Power supply voltage: AC220 V (+10% ~ -15%) 50 Hz;

2: Output capacity: relay output, relay contact voltage is determined by com access voltage (AC220 V or DC24 V), single relay maximum output current AC220 V / DC24 V: inductive load 0.8 A, resistive load 2A;

3: Delay error: better than ± 1% every three minutes;

4: Service conditions:

a) Altitude ≤ 2 000 m;

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

c) Environmental humidity ≤ 95%, no condensation;

There must be no obvious dust, acid, corrosive gas or substance in the surrounding air.

6. Parameter setting

The controller is divided into two states: setting state and running state (including standby state). In standby mode, press the "set" button so the controller will be in the set state. After setting, press the "start / stop" button to enter the standby mode.

Description of operation parameters

No.	Name	Meaning	Range
C1	Adsorption time	Working time of dryer Tower A or Tower B	1 ~ 999s
C2	After the set regeneration time	The product gas from Tower A or Tower B is used to regenerate the adsorbent from Tower B or tower A	1 ~ 60s
C3	Regeneration time	Regeneration time of adsorbent in Tower A or Tower B	1 ~ 999s
C4	Equalizing time	The time when the inlet valves of Tower A and Tower B are opened at the same time	1 ~ 30s
C5	Control mode	0 means positive valve (4 normally closed valves), 1 means reverse valve (2 exhaust valves are normally closed, 2 inlet valves are normally closed) 2 is diagonal valve	0 ~ 2
C6	Time display	0 for positive timing, 1 for countdown	0 ~ 1
C7	Shut down, equalize	Power on. If the regeneration valve has been opened, press the "start/ stop" key to stop working. At this time, other valves are closed, and the adsorption valve is closed after delaying the setting value of this parameter	0 ~ 99s
C8	Changing pressure times	After the regeneration delay, the number of opening and closing of the regeneration valve is set to 0 to shield the hidden parameter function	0 ~ 1
C9	The pressure relief time	Is the opening time of the exhaust valve after the end of the regeneration delay	1 ~ 999s
C10	The charging time	Is the closing time of the exhaust valve after the regeneration delay	1 ~ 999s
C11	Power on self-start mode selection	The response of power on controller after power off: 0 means no function; 1 means power off and power on, self-start and stop button are invalid; 2 means power off and power on, controller keeps the original state before power off	0 ~ 2

Note 1: adsorption time (C1) must be ≥ regeneration delay time (C2) + regeneration time (C3) + pressure equalizing time (C4).

Note 2: regeneration time = (pressure relief time C9 + charging time C10) x Transformation Times C8 + last.

6. Parameter setting

- Time of secondary pressure relief
- Working parameter setting

In standby mode, press the "set" key for 2 seconds (the yellow indicator light will illuminate), enter the setting mode, and the display with show "C1". At this time, press the "set" button on the panel to select the next parameter; release the "set" button to display the parameter setting value. Press the "△" button on the panel to increase the parameter value, press the "▽" button on the panel to decrease the parameter value; long press the "△" button or long press the "▽" button to increase or decrease the parameter value step by step.

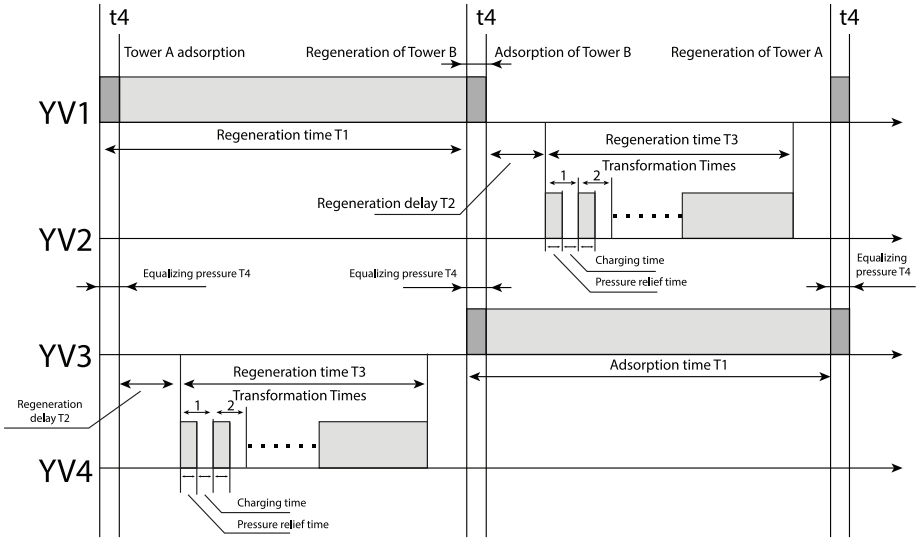
After setting, press the "start / stop" button to enter the standby mode, and the Yellow setting light is off. At the same time the setting value is saved into E2PROM and stored. Even after power failure, the set parameter value will be retained.

7. Usage

- POWER ON
- Power on (AC220 V), LCD displays "0", the controller will enter the default standby state.
- In standby mode, press the "start / stop" button, and the "run" indicator light will illuminate. The controller works according to the sequence shown in Figure 2. Four relays yv1-yv4 (yv1: adsorption of Tower A, yv2: regeneration of Tower A, yv3: adsorption of Tower B, yv4: regeneration of Tower B) act successively, A/B Tower light indicates adsorption operation, LCD countdown or positive timing shows adsorption time. For each start-up, Tower A and Tower B work in turn
- Ensure the same working time of tower A and B.

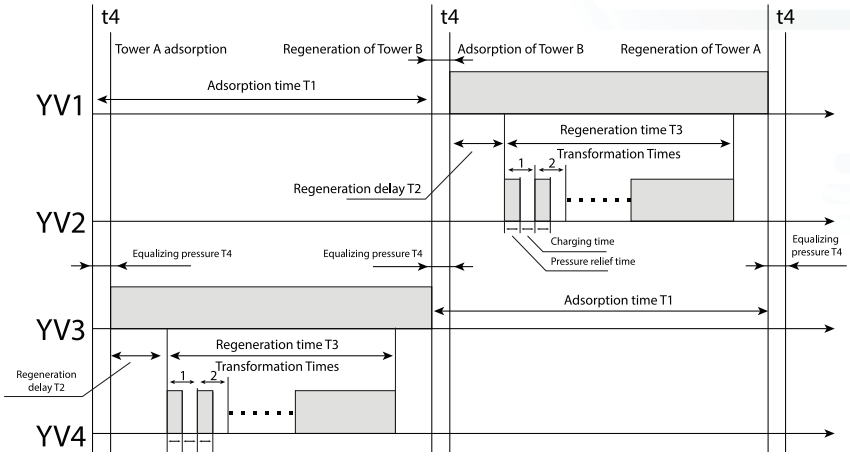
Function sequence diagram

Positive flow valve sequence:



7. Usage

Positive flow valve sequence:



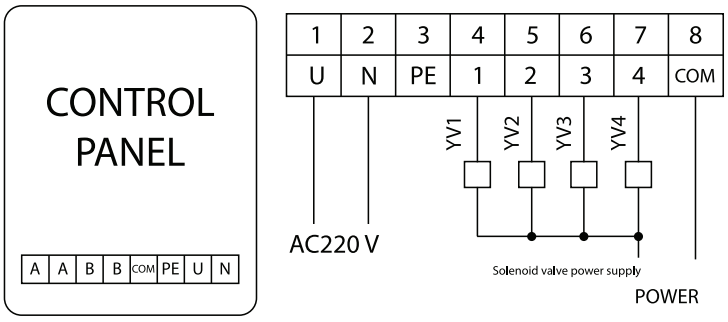
- STOP
  When running, press the "start / stop" button to stop working; the "run" indicator will turn off all relays. The control unit is powered off and the controller is reset.

8. Structure size

The controller adopts a panel mount shell, the aperture size is 88 (W) × 123 (H) mm

9. Electrical wiring

The definition of terminals at the back of the controller is shown in Figure 4, and the definition of terminals in the control cabinet is shown in Figure 5.



Note: U and N are connected to AC220 V power supply, PE cannot be connected; the power supply of solenoid valve is connected in accordance with the working voltage of solenoid valves, and COM is the common access terminal of the 4-way relay (AC220 is connected to U, DC24 is connected to 24 V +). Yv1 ~ 4 is connected with 4-way solenoid valve, which is the output terminal controlled by a relay, and the output voltage is the access voltage of COM port. When the working voltage of the solenoid valve is AC220 V, please do not share the power supply of the solenoid valve with the power supply of the controller in order to avoid interference.

Operation instructions - Touchscreen equipped models

Chapter I Technical Conditions

1. Function overview

1. The control system of MDX series adsorption heatless dryers utilize PLC+LCD or touch screen displays, which are more reliable and simple than single-chip microcomputer control systems.

   Advanced technology ensures reliable performance, complete set of programmable functions, modern design, user friendly operation, installation and maintenance and uses an independent power processing module. The overall performance of the machine is very stable. MDX models have dew point and air inlet temperature display output, including a dew point energy-saving control function.

2. Technical indicators

(1) Power input: AC voltage 220v ± 5%, 50HZ/60HZ.

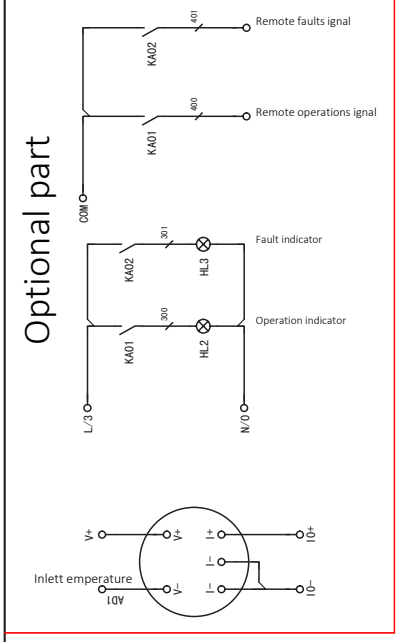
(2) Power consumption: 24W.

(3) Switch output: 6-point relay contact, voltage AC220V or DC24V, inductive current load 0.8A Resistive load: 2A

(4) Switch input: 8-point input, GND is common input.

(5) Working environment: temperature 0~50°C, humidity no more than 85%, vibration no more than 0.5g. There should be no obvious dust, acid, corrosive gas or substance in the surrounding air.

WIRING DIAGRAM - TOUCHSCREEN MODELS



Internal wiring	Terminal No.	External wiring
L	1	Power incoming line
N	2	
200	3	Tower Ai nletv alve V01
201	4	TowerB inlet valveV 02
202	5	Tower A regenerationv alve V03
203	6	Tower Br egeneration valveV 04
N7		Common zero line
N8		
GND	9	Pressure control switch
101	10	
GND	11	Common
105	12	Remote start stop switch
106	13	Remote startb utton
107	14	Remote shutdown button
V+	15	Dewp oint temperature
AD2	16	
V–	17	
IO+	18	Inlett emperature
IO–	19	
COM	20	Remote commont erminal
400	21	Remoteo peration indication
401	22	Remotef ault indication

18-22 Terminals are optional

Incoming line fromc ustomerp ower supply

To each solenoid valve

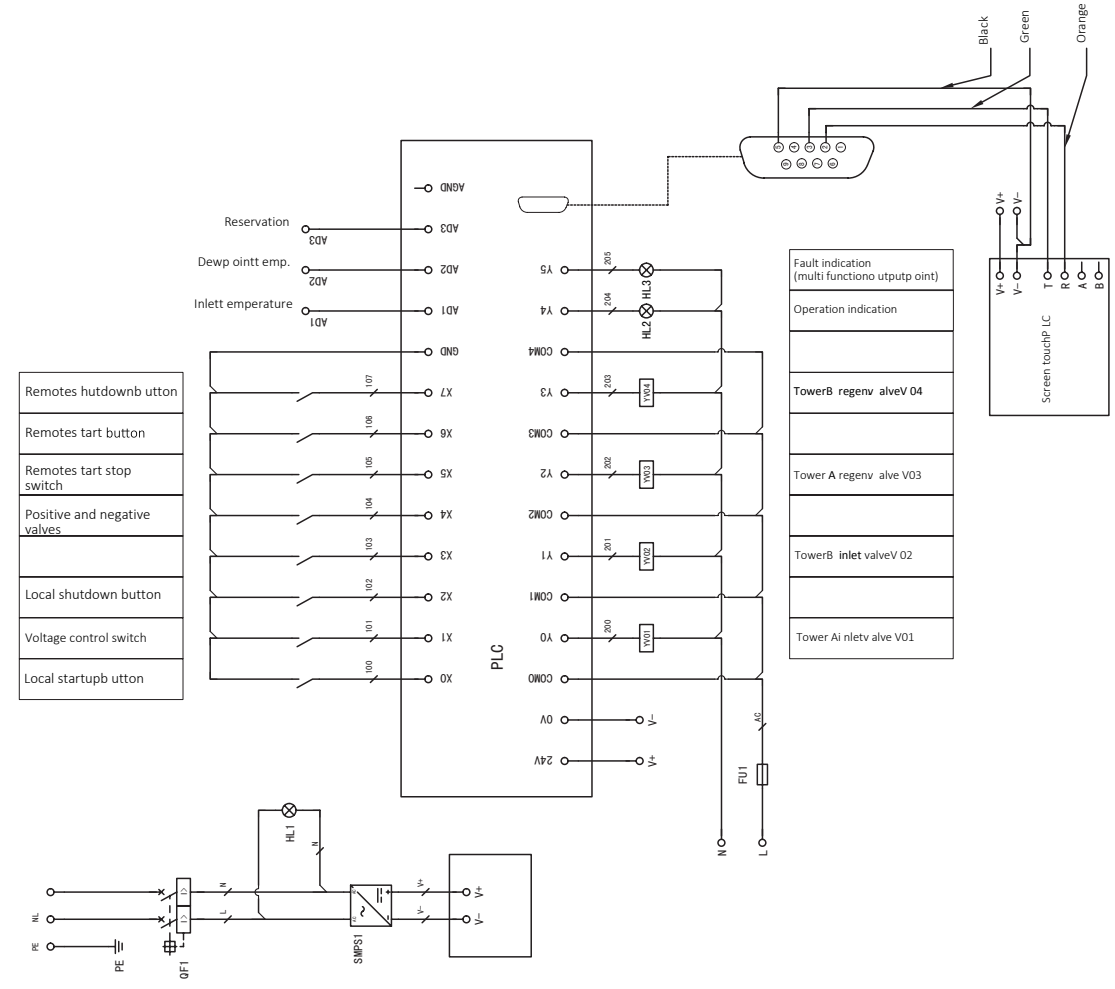
Signal from voltage control switch

From remote start stop connnect

From dew pointt emperature sensor4 -20mA

From intake airt emperature sensor PT100

Hardwired signal to DCS



System configuration suggestions:

In order to ensure the quality of compressed air treated by the dryer and extend the service life of the dryer, we recommend the following system configuration:

1. A pre filter is installed at the inlet of the dryer to deal with the liquid water, solid particles and oil mist that may exist in the compressed air. If the liquid water directly enters the adsorption tank of the dryer, the operating efficiency of the dryer will be seriously reduced, resulting in a substantial increase in the dew point at the outlet and even failure of the dryer. The oil mist will pollute the adsorbent seriously, which will not only increase the dew point, but also shorten the service life of the adsorbent. In order to prolong the service life of the filter element, it is recommended that the user configure the filter in the way of step-by-step filtration from coarse to fine. For optimal pre- and post-filtration, please refer to the diagram to determine the most effective filtration set-up for your ISO-class air requirements.
2. The long-term pressure and impact of adsorbent will produce some adsorbent dust. In order to keep the downstream compressed air clean, it is usually necessary to install a post filter. For optimal pre- and post-filtration, please refer to the diagram to determine the most effective filtration set-up for your ISO-class air requirments.
3. Users should install a bypass-valve system so that the downstream supply will not be affected during maintenance
4. The dryer should be equipped with a reliable grounding device.

Model selection method:

Under the set dew point temperature, the allowable inlet gas flow of the dryer is related to the actual working state and ambient temperature, that is, inlet gas flow = (nominal flow) x (pressure coe(cient) x (inlet temperature coe(cient) x (ambient temperature coe(cient) effective gas supply = inlet gas flow regenerative gas consumption pressure coe(cient table:

Pressure coefficient table:

Working pressure (bar)	456			789			10
Pressure coefficient	0.60	.750	.9	1.01	.1	1.21	.3

Environmental temperature coefficient table:

Environmental temperature °C	<20	20	25	30	35	40	43
Temperature coefficient	1.16	1.16	1.12	1.08	1.03	0.98	0.8

INLET temperature table:

Inlet temperature °C	20	25	30	35	40	45	50
MAD temperature coefficient table	1.11	.121	.081	.030	.98—		—
Pressure dew point -40	-4	-40-	40	-40-	40	——	

3. Functions and measurement and control contents

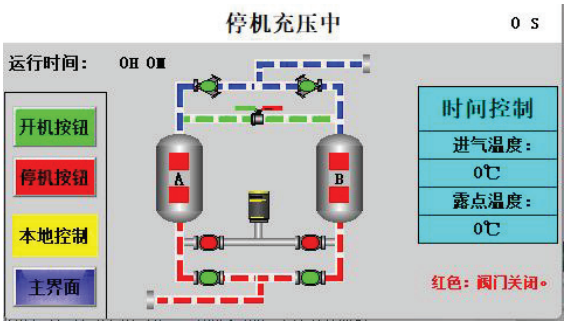
Function	Model	
Temperature acquisition/monitoring	Inline	Probe
Inlet temperature	yes	yes
Dew point temperature	yes	no
Switching value input	passageway	remarks
Chain	yes	Standard configuration
Local/remote boot	yes	Standard configuration
Time control/dew point control	no	Standard configuration
Positive valve/anti-valve	yes	Standard configuration
Switching output	passageway	remarks
Warning	yes	Standard configuration
Operation indication	yes	Standard configuration
Group A inlet and outlet solenoid valves	yes	Standard configuration
Group B inlet and outlet solenoid valves	yes	Standard configuration
Fault indication	no	Standard configuration

II Operation and Maintenance

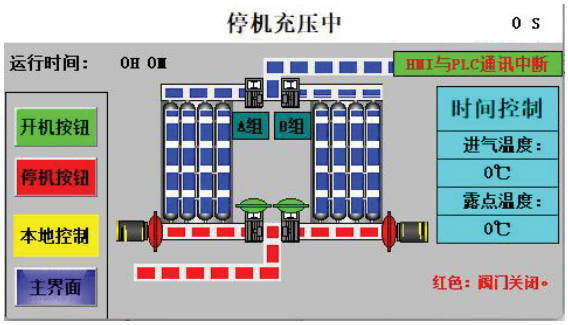
Boot screen

Connect the input power wires according to the attached figure 3 and check it correctly before powering on.
After powering-on, the screen is shown as follows:

DX Model screen display



MDX Model screen display



Key	Function and (authority)	Purpose
Start button	Shortcut function key (pressed) has no permission	Power on
Stop button	Shortcut function key (pressed) has no permission	Shutdown
Local remote control	Shortcut function key (pressed) has permission	Local or remote switch button. Note: under remote control, the touch screen can also be switched on and off.
Main interface	Shortcut function key (pressed) has no permission	Switch to the main screen

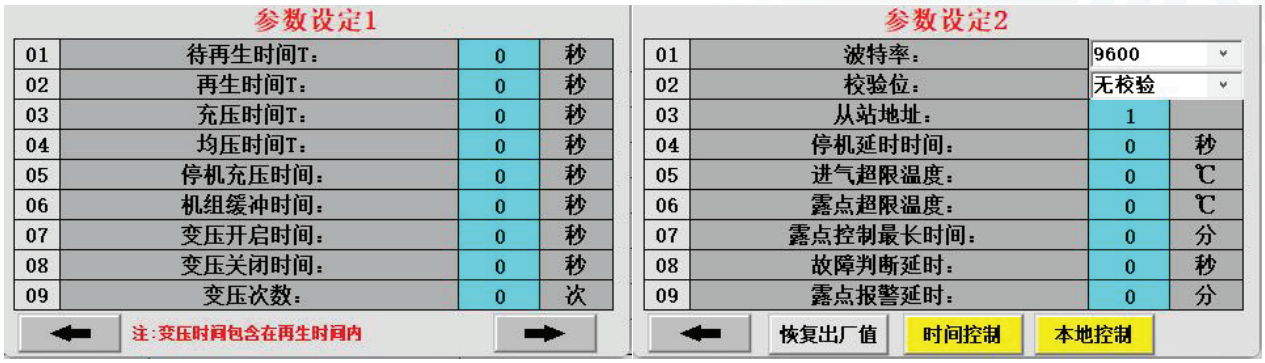
Work status table:

Display output	Function	Purpose
Stopping and charging	working condition	During the shutdown delay, it is the charging stage
Ready	working condition	The system is ready for work
Unit buffer delay	working condition	Just start the machine and buffer until the two groups of pressure balance
Group A adsorption, group B to be regenerated	working condition	Enter the adsorption state of group A and the regeneration state of group B
Group A adsorption, group B regeneration	working condition	Enter group A adsorption and group B regeneration state
Group A adsorption, group B pressurization	working condition	Enter group A adsorption and group B pressurization state
Group A adsorption, group B pressure equalization	working condition	Enter group A adsorption and group B pressure equalizing state
Group B adsorption, group A to be regenerated	working condition	Enter the adsorption of group B, and group A is waiting for regeneration
Group B adsorption, group A regeneration	working condition	Enter the adsorption state of Group B and the regeneration state of Group A
Group B adsorption, group A pressurization	working condition	Enter group B adsorption and group A pressurization state
Group B adsorption, group A pressure equalization	working condition	Enter group B adsorption, group A pressure equalizing state

3. Main Screen

Key	Function and (permission)	Purpose
User login	Function key (pressed) no **permission**	Switch to this screen.
Exit login	Function key (pressed) no **permission**	Switch to this screen.
System diagram	Function keys (pressed) are limited to manufacturers, technicians and operators	Switch to this screen.
Alarm screen	Function key (pressed) no **permission**	Switch to this screen.
Parameter setting	Function key (press) (limited to technician and manufacturer)	Switch to this screen.
Password setting	Function key (pressed) no **permission**	Switch to this screen.
`222351W`	Function key (pressed) with permission	Switch to this screen.

4. Parameter setting screen 1



Name	Set value or function description	Setting range
Shutdown charging time	30 seconds	3~999 seconds
Time to be regenerated T	5 seconds	1~3600 seconds
Regeneration time T	272 seconds	1~3600 seconds
Charging time T	30 seconds	1~3600 seconds
Equalizing time T	5 seconds	1~3600 seconds
Transformer opening time	10 seconds	0~999 seconds
Transformer closing time	10 seconds	0~999 seconds
Transformation times	5 times	0-999 times
Unit buffer time	60 seconds	3~999 seconds
Postal address	2 stations	1-255 stations
Inlet air overrun temperature	45°C (without permission)	0~300°C
Dew point exceeding limittemperature	-10 °C (without permission)	-500°C~500°C
Intake air temperature compensation	0 °C(without permission)	-500°C~500°C
Dew point temperaturecompensation	0 °C (without permission)	-500°C~500°C
Maximum dew point control	60 minutes	1~999 minutes
Working dew point temperature	-30°C	-100°C~30°C
Time/dew point control	Time/dew point control mode switching	
Local/remote control	Local/remote control mode switching	

The user can adjust the corresponding parameters according to the work needs. (To be regenerated time T+regeneration time

T+charging time T+equalizing time T, the four stages are accumulated to half a working cycle.)
Note: Since the transformation time is included in the regeneration time: (transformation opening time+transformation closing time) × Transformation times < regeneration time T

Factory parameter setting screen 2

Name	Set value or function description	Setting range
Dew point lower range limit	20°C	
Dew point lower range limit	-80°C	
Dew point temperature compensation	0°C	-500°C~500°C
Silencer replacement time	0H	0-30000 H When it is set to 0, the operation time is not limited. When it is not set to 0, the equipment alarm will not stop when the operation time is greater than the set time.
Maintenance time setting	0H	0-30000 H When it is set to 0, the operation time is not limited. When it is not set to 0, the operation time is greater than the set time, and the equipment alarms and stops.
Positive and negative valve selection button	Function key (pressed)	Positive valve: intake normally open: Anti-valve: inlet normally closed:
Main screen	Function key (pressed)	Switch to the main screen.
Run time reset	Function key (pressed)	Zeroing running time
Inlet air temperature channel on/off	Function key (pressed)	The intake air temperature channel is open or closed.
Dew point temperature channel on/off	Function key (pressed)	Dew point temperature channel open or closed
Power-on non-start/power-on self-start	Function key (pressed)	Set whether the equipment is powered on automatically
Y 5 = Fault indication/A intake valve/B intake valve/A regeneration valve/B regeneration valve	Function key (pressed)	Set the current function of PLC multi-function output point Y5

1. Alarm screen and alarm record screen.

Press the function key under the main menu to **alarm the screen or automatically switch to this screen when** the alarm occurs.

2. User login and password setting screen.

Press the function key under the main menu to automatically switch to this screen when the **user logs in**.

Button Table:

User name	Function and authority	Initial password
Factory	Maximum authority	1111
Technician	Partial permissions	2222
Operator	Minimum permissions	3333

Users can operate the device according to their own permissions, and modify their own password in the password setting screen. When there is no need to operate the device, users can enter the exit login screen to exit, which can protect the operation security of the device.

Modbus communication

1 Connect PC and controller

1. Communication protocol
   This machine adopts standard MODBUS communication protocol with a baud rate of 9600. The transmission mode adopts RTU mode, and the bits of each byte are: one start bit, eight data bits, one parity bit, one stop bit and CRC cyclic redundancy detection.

2 Details of mailing address:

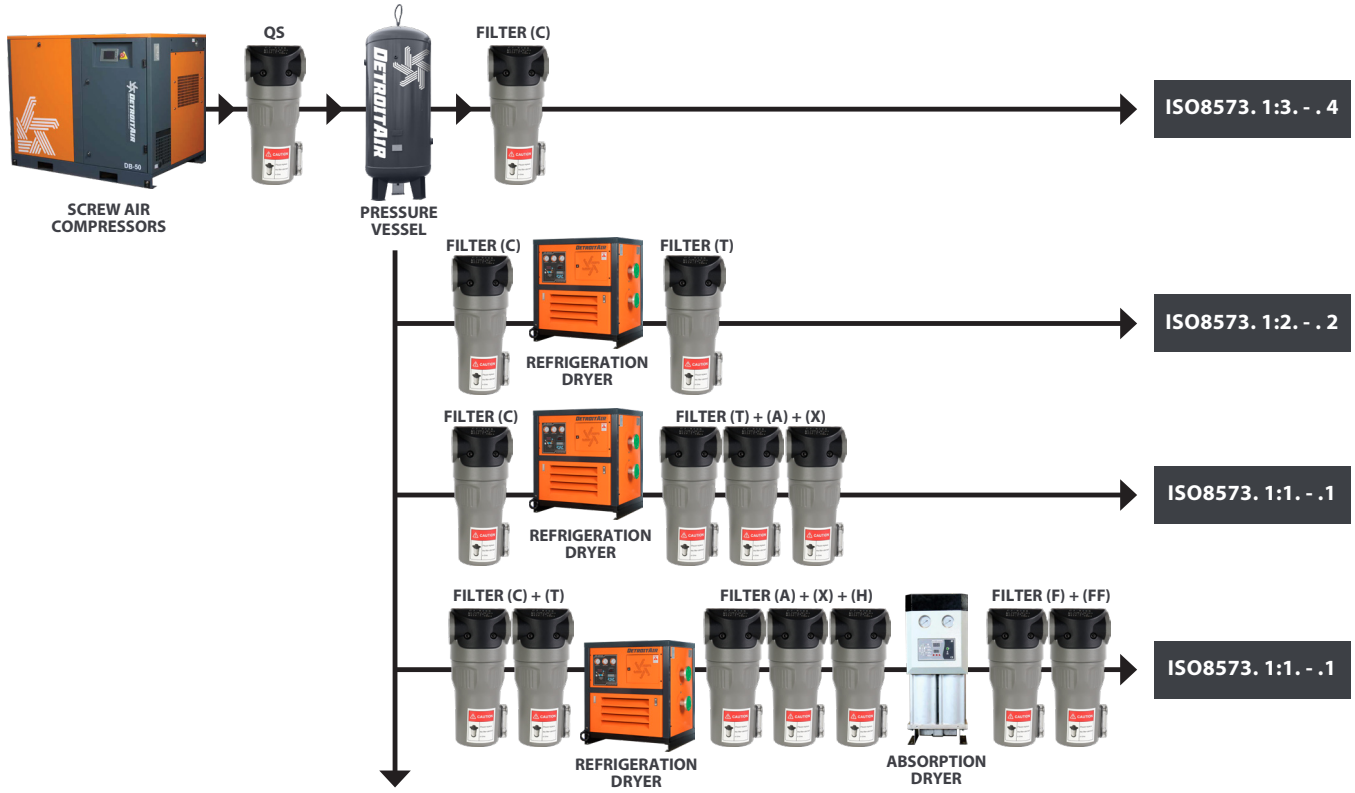
1. The slave address of this device: 2 (configurable). Baud rate: 9600 (settable), parity check: none (settable).

Mailing address list:

Parameter name	Modbus address	Data type	Available function codes	Read / Write	Unit	Explanation
Intake air temperature	40001	16-bit signed integer	0x03	read-only	°C	
Dew point temperature	40002	16-bit signed integer	0x03	read-only	°C	
Inlet solenoid valve of tower A	40004.0	Bit	0x03	read-only		
Inlet solenoid valve of tower B	40004.1	Bit	0x03	read-only		
Regeneration solenoid valve of tower A	40004.2	Bit	0x03	read-only		
Tower B regeneration solenoid valve	40004.3	Bit	0x03	read-only		
Operation indication	40004.4	Bit	0x03	read-only		
Fault indication	40004.5	Bit	0x03	read-only		
Remote control indication	40004.6	Bit	0x03	read-only		
Remote startup of tower A	40005.0	Bit	0x03,0x06	Read and Write		
Remote startup of tower B	40005.1	Bit	0x03,0x06	Read and Write		
Remote shutdown	40005.2	Bit	0x03,0x06	Read and Write		
System running time_ H	40006	16-bit unsigned integer	0x03	read-only	Hour	
System running time_ M	40007	16-bit unsigned integer	0x03	read-only	branch	
Cumulative system running time	40008	16-bit unsigned integer	0x03	read-only	Hour	
Work phase countdown	40009	16-bit unsigned integer	0x03	read-only	second	
Working stage	40010	16-bit unsigned integer	0x03	read-only		0. During shutdown and charging, 1. absorption of tower B, waiting for regeneration of tower A 2. absorption of tower B, regeneration of tower A 3. adsorption of tower A 4. adsorption of tower B, charging of tower A 5. adsorption of tower B, equalizing of tower A 6. adsorption of tower A, waiting for regeneration of tower B 7. adsorption of tower A, regeneration of tower B 8. adsorption of tower A 9. adsorption of tower A, charging of tower B 10. adsorption of tower A, equalizing of tower B 11. preparation 12. unit buffer time 13. adsorption of tower B, dew point energy saving of tower A 14. adsorption of tower A, dew point energy saving of tower A 15. shutdown delay

CONNECTION DIAGRAM

MEET THE REQUIREMENTS OF ALL INDUSTRIES



ISO 8573-1:2010 COMPRESSED AIR CONTAMINANTS AND PURITY CLASSES								
CLASS	PARTICLES				WATER			OIL
	By Particle Size (maximum number of particles per m3) See Note 2			By Mass	Vapor Pressure Dewpoint		Liquid	Liquid, Aerosol, & Vapor See Note 1
	0.1 µm < d ≤ 0.5 µm	0.5 µ m< d ≤ 1.0 µm	1.0 µm < d ≤ 5.0 µm	mg/m3	°C	°F	g/m3	mg/m3
0	As specified by the equipment user or supplier and more stringent than class 1							
1	≤ 20,000	≤ 400	≤ 10	-	≤ -70	≤ -94	-	≤ 0.01
2	≤ 400,000	≤ 6,000	≤ 100	-	≤ -40	≤ -40	-	≤ 0.1
3	-	≤ 90,000	≤ 1,000	-	≤ -20	≤ - 4	-	≤ 1
4	-	-	≤ 10,000	-	≤ +3	≤ +37	-	≤ 5
5	-	-	≤ 100,000	-	≤ +7	≤ +45	-	-
6	-	-	-	0 – ≤ 5	≤ +10	≤ +50	-	-
7	-	-	-	5 – ≤ 10	-	-	≤ 0.5	-
8	-	-	-	-	-	-	≤ 5	-
9	-	-	-	-	-	-	≤ 10	-
X	-	-	-	> 10	-	-	> 10	> 5
	MICROBIOLOGICAL CONTAMINANTS				OTHER GASEOUS CONTAMINANTS			
	No purity classes are identified				No purity classes are identified Gases mentioned are: CO, CO2, SO2, NOX, Hydrocarbons in the range of C1 to C5			

Note 1: ISO 8573 Oil includes aerosol, vapor in the range of C6+, and liquid oil. Liquid oil is typically sampled when wall flow is present, contamination is suspected, or results are greater than 5 mg/m3. Trace can provide a separate kit for liquid oil testing.

Note 2: For Particle Class 0, 1, & 2 (0.1 - 0.5 µ range only), a laser particle counter with a high-pressure diffuser is required. Rental of this equipment is available on a reservation basis. Contact us for details. To qualify for Particle Classes 0 through 5, there can be no particles greater than 5µ present.

In some cases, Trace uses alternative sampling techniques or analytical methods to those specified in ISO 8573, for details see Smith White Paper, 2012.

Air & Gas Specifications referenced above may be viewed and/or purchased from: ANSI - American National Standards Institute

8. Quality control process chart

System process

The wet inlet compressed air first enters the pre filter, and then enters the drying group (tower) through the inlet control valve (A). During the adsorption process, the water vapour is removed from the air flow and adsorbed in the adsorbent. The dry air flow is discharged from the drying tower and flows to the check valve (F1), and then directly flows out to the rear filter to remove the adsorbent dust in the filter. At the same time, in the drying cycle, 10% of the outlet drying air flows downward through the regeneration flow control valve, then flows to the regeneration / pressure storage control valve (D) through the tower and is discharged to the atmosphere through the outlet muffler. In this way, the adsorbent in the regeneration group (tower) can be regenerated by very dry low-pressure air flow, and the water vapour originally adsorbed in the adsorbent can be discharged.

After a preset time, the automatic solid-state timer will close the regeneration / pressure storage control valve (D), slowly build up the pressure in the tower, and finally reach the condition equal to the inlet pressure. At this time, the inlet control valve (A) will close and open the inlet control valve (B) at the same time, and another regeneration / pressure storage control valve (C) will open. In this way, the air flow is directed to the drying group tower. At the same time, the tower transforms into a regeneration group and begins to regenerate. At this time, the regeneration air flow flows through the regeneration flow control valve to the regeneration / pressure storage control valve (C). A refrigeration dryer should be installed before the adsorption dryer: it is well known that the temperature of compressed air increases significantly, usually up to 50°C to 70°C, and contains water vapour with a relative humidity of 100%. As far as the main functions of the MDX dryer are concerned, ideally, the temperature of the compressed air should be reduced to about 0°C to 2°C , with a pressure dew point of about 2°C , and the water vapour, with a relative content of about 97%, can be removed. The refrigeration dryer is a one-time investment , and its mechanical and electrical power consumption is small, so there are basically no “consumable” parts. It can greatly reduce the load of the adsorption dryer and prolong the service life of the expensive adsorbent by separating out the vast amount of water vapour in the compressed air before the final stage of drying.

The relationship between the adsorption dryer and precision filter is as follows: Dust and impurities in the air are mixed with oil compounds after being compressed. If they are not transported to the adsorption dryer directly through the precision filter, they will adhere to the surface of adsorbent, reduce the contact area between adsorbent and air, and gradually reduce the regeneration capacity of adsorbent. Therefore, it is very important to use the precision filter to remove the impurities and oil in the air for the adsorption dryer to maintain highest efficiency.

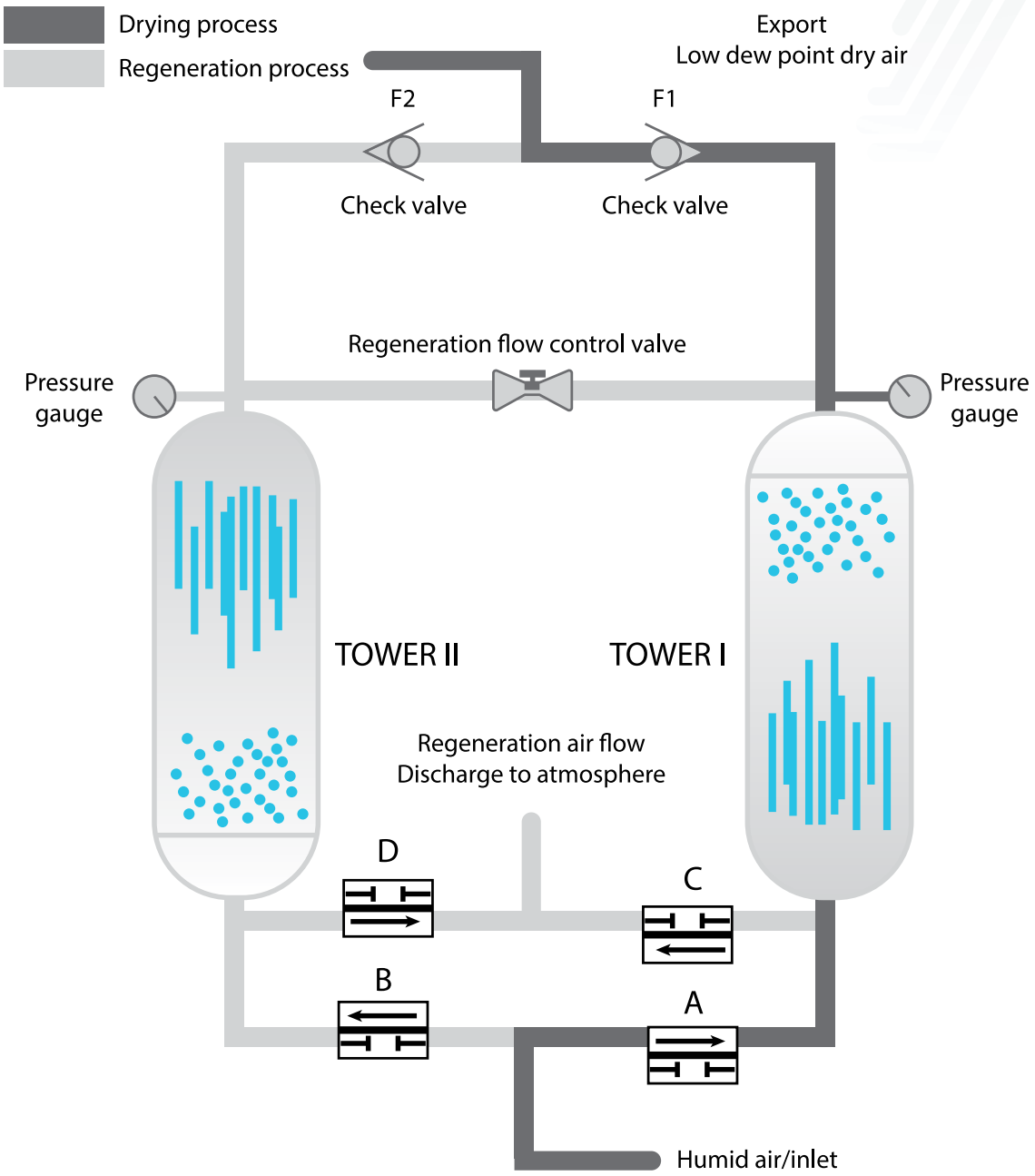
The main raw material of adsorption dryer is adsorbent, which is consumable and expensive. Its service life largely depends on the temperature, humidity and purity of the inlet air. An adsorption dryer is the most effective compressed air purification system. It is unscientific that it does not need to be matched with freezing dryer and precision filter. To sum up, refrigeration dryer and high-quality precision filtration must be installed before the adsorption dryer, and improper decisions must not be made in order to save costs.

Treatment of dust released by adsorbent :

The adsorbent of this adsorption dryer is medium 3 to 5mm granular type. Due to the impact and backpressure friction in the system, there will be a small amount of dust separated from the dryer and discharged with the air. Therefore, a dust filter (0.01ppm) must be installed at the outlet of the dryer and installed reversely, so that the dust will fall on the outside of the filter element and drop to the bottom of the filter housing. Dust is easily discharged keeping the filter element free from blockage.

For further assistance and support with this product, please contact your local Detroit Air service and installation agent.

8. Quality control process chart (cont.)



Adsorbent replacement weights.

MODEL	FLOW RATE M ^{3}/ min	Adsorbent Weight - Kilograms
MDX-15A	1.6	14.8
MDX-20A	2.6	22.6
MDX-30A	3.5	32.5
MDX-50A	7	65
MDX-80A	10.5	97.5
MDX-100A	14	130
MDX-125A	17.5	162.5
MDX-150A	21	195
MDX-175A	25	260
MDX-200A	32	330
MDX-250A	40	390
MDX-300A	53	520