

Operation Manual

For Oxygen Generator System

Model: MSPO- 93±2 (purity $\geq 93\% \pm 2$)

Jiangsu Minsheng Heavy Industry Co., Ltd

Address: Jingjiang City, Jiangsu, China Postcode:214500

Contact: Austin Feng Whatsapp/wechat/Mobile: +86 18936812998

EMAIL: msgascylinder@gmail.com Website: www.msgascylinder.com

Foreword

First of all, thank you for purchasing the M S - SLPO energy-saving zeolite molecular sieve oxygen production equipment. Before operating the equipment, you must carefully read this manual, understand the basic principles and related professional terms, and strictly follow the relevant provisions of this manual for parameter setting, start and stop, and troubleshooting.

Before the pressure is released, the equipment must not carry out any pressure-related maintenance work. Before carrying out any electrical maintenance work, be sure to cut off the power supply. Any operation related to electrification must be operated by an electrician. Any illegal operation or error may cause the equipment to work abnormally or reduce the performance and life of the equipment. Even damage the equipment and damage personal safety.

When loading, unloading, moving and installing this equipment, use lifting equipment. Do not carry the machine on the pipeline by force. For long-term storage of outdoor equipment must be covered with a canvas awning, and reinforced to prevent falling.

For major maintenance projects, not included in this manual, users can contact the company's after-sales service department, they will enthusiastically help you solve the problems encountered.

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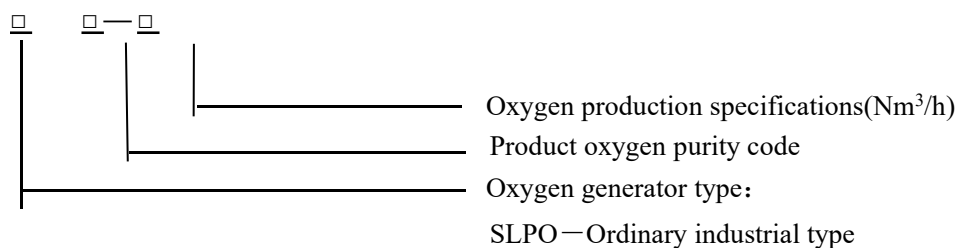
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Overview:

Pressure swing adsorption air separation oxygen production is a new technology to produce oxygen from air. Pressure swing adsorption (PRESSURE SWING ADSORPTION, PSA for short) is a physical process that approximates isothermal changes. It uses the different adsorption capacities of different components in the gas medium on the adsorbent, and the adsorbent selects when the pressure is increased. Adsorption, desorption and regeneration when the pressure is reduced. Pressure swing adsorption air separation oxygen production generally uses two adsorption towers, filled with zeolite molecular sieve adsorbent, when one adsorption tower is performing nitrogen absorption and oxygen production, The other adsorption tower is being denitrified and regenerated, so that alternating cycles continuously produce oxygen.

Model specification:

1、Name of oxygen generator



For example: SLPO90-30 represents an ordinary conventional oxygen generator. The oxygen purity of the product is 90%, and the oxygen production specification is 30Nm³/h.

2、Specification table of oxygen generator

Oxygen generator type	Oxygen purity %	Oxygen production specificationsNm ³ /h	Product oxygen pressure MPa	Product oxygen dew point °C
SL-P0	90	30	Adsorption pressure ≤0.1	≤-45

Note 1: If the user has special requirements, the specifications and basic performance parameters are different from the provisions of this standard according to the contract.

Note 2: The purity of oxygen contains traces of inert gases such as helium, neon, and argon.

Note 3: The "standard state" in this manual refers to the state of 20 °C, 0.101MPa (absolute pressure).

Note 4: The flow unit "Nm³/h" in this manual refers to the flow unit under the state of 0.101MPa (absolute pressure) at 20°C.

Note 5: Unless otherwise specified, the pressure values in this manual are all gauge pressure values.

Note 6: The dew point value in this manual is the atmospheric dew point unless otherwise specified.

Model specifications and main performance parameters of this machine:

1.Model specifications

Model specifications: SLPO/90

Oxygen production: Nm³/h

Product gas atmospheric pressure dew point: ≤-40°C

Product oxygen pressure: ≤ 0.6 MPa

2. Equipment operating environment conditions

Ambient temperature: $2^{\circ}\text{C} \sim 40^{\circ}\text{C}$

Relative humidity: $\leq 80\%$

Atmospheric pressure: $86\text{KPa} \sim 106\text{KPa}$

Ventilation is good, and the surrounding air should be clean, free of oil mist and corrosive gases. 3、

3. Compressed air index

Flow rate: $\geq$ Product oxygen flow rate $\text{Nm}^3/\text{min} \times 13.8$

Pressure: ≥ 0.7 MPa

Temperature: $\leq 45^{\circ}\text{C}$

Mechanical impurities: $\leq 30\text{mg}/\text{m}^3$

Oil content: $\leq 3\text{mg}/\text{m}^3$

CO_2 : $\leq 350\text{ppm}$

C_2H_2 : $\leq 0.5\text{ppm}$

C_nH_m : $\leq 30\text{ppm}$

Acidic substance: the sum of $\sum \text{NO}_x + \text{SO}_2 + \text{HCl} + \text{Cl}_2 \leq 8\text{PPm}$.

4. Oxygen system power supply

Single phase $220 \pm 11\text{V}/50\text{HZ}$, 0.1 KW

Equipment composition

The pressure swing adsorption oxygen production equipment is composed of air purification components, air storage tank components, oxygen and nitrogen separation components, oxygen buffer tank components, and electrical control system. The process flow chart of the equipment is shown in Figure 1.

Oxygen
production
device
General
picture
schematic
diagram



1. Air purification components

Zeolite molecular sieve is the core part of pressure swing adsorption oxygen production equipment. Oil poisoning is one of the main failure forms of zeolite molecular sieve. Adsorption of water will reduce the adsorption capacity of zeolite molecular sieve to nitrogen. Compressed air discharged from an oil-lubricated air compressor usually contains oil and water, so the oil and water must be removed before the compressed air enters the oxygen-nitrogen separation module. The air purification component is composed of

pipeline filter, freeze dryer, fine filter, super fine filter, activated carbon degreaser, automatic sewage valve, ball valve, etc. Its function is to remove dust, water and oil in the compressed air. Provide clean raw material-air for oxygen and nitrogen separation components.

The main technical parameters:

Normal pressure dew point: $\leq -40^{\circ}\text{C}$

Gas content of gas outlet: $\leq 0.003 \text{ mg/m}^3$

components
Schematic
diagram
of air
purification



1.1 Pipeline filter

Compressed air first enters the pipeline filter to filter out solid particles, oil mist and moisture $>3\mu\text{m}$ in the compressed air.

The main technical parameters:

Filtration accuracy: $3\mu\text{m}$

Number of filter elements: 1

Initial pressure difference: $\leq 0.01 \text{ MPa}$

Filter replacement pressure difference: $\leq 0.035 \text{ MPa}$

Residual oil content: $\leq 5\text{PPm}$

Maximum working pressure: 1.6 MPa

Working temperature: $1.5-65^{\circ}\text{C}$

1.2 Combined or split dryer

The compressed air coming out of the pipeline filter enters the freeze dryer, The

function of the freeze dryer is to forcibly cool the compressed air to about 3 °C, and the water vapor in the air condenses into liquid water, which is separated and filtered by the water separation filter and discharged by the sewage valve. Then the normal pressure dew point of compressed air can reach about -20°C.

The main technical parameters:

Processing gas volume: supporting air compressor
Intake air temperature: $\leq 80^{\circ}\text{C}$
Ambient temperature: 2—32°C
Refrigerant: R22 or R134a
Normal pressure dew point: -20°C
Working pressure: 0.7~1.0MPa
Work rate: 0.915 KW
Power source: 220V/50Hz

1.3 Fine filter

The compressed air passes through the freeze dryer and enters the fine filter to filter out solid particles, oil mist and moisture in the compressed air $>1\mu\text{m}$.

The main technical parameters:

Processing gas volume: matching cold and dry machine
Filtration accuracy: $1\mu\text{m}$
Number of filter elements: 1
Initial pressure difference: $\leq 0.01\text{ MPa}$
Filter replacement pressure difference: $\leq 0.035\text{ MPa}$
Residual oil content: $\leq 1\text{PPm}$
Maximum working pressure: 1.6 MPa
Working temperature: 1.5-65°C

1.4 Super fine ultra filter

The compressed air then enters the ultra-fine filter to filter out solid particles, oil mist and moisture $>0.01\mu\text{m}$ in the compressed air.

The main technical parameters:

Processing gas volume: matching cold and dry machine
Filtration accuracy: $1\mu\text{m}$
Number of filter elements: 1
Initial pressure difference: $\leq 0.01\text{ MPa}$
Filter replacement pressure difference: $\leq 0.035\text{ MPa}$
Residual oil content: $\leq 1\text{PPm}$
Maximum working pressure: 1.6 MPa
Working temperature: 1.5-65°C

1. Oxygen and nitrogen separation module

The oxygen-nitrogen separation system is the main component of oxygen production equipment. It consists of two alternating working adsorption towers (the tower is filled with zeolite molecular sieve) and pipeline pneumatic valve, muffler, throttle valve, compression cylinder, check valve, floating ball valve, etc.

Function: One adsorption tower absorbs nitrogen and produces oxygen when the pressure rises, while the other adsorption tower depressurizes and denitrifies and regenerates. It works alternately in this cycle to continuously produce oxygen.

The main technical parameters:

Model number: SL-PO/90
Gas production: 6Nm³/h
Design oxygen purity: 90%
Design adsorption pressure: 0.5MPa
Dimensions:

3.1 Adsorption tower

The main technical parameters:

Design pressure: 1.1MPa
Maximum working pressure: 1.0MPa
Test pressure: 1.38MPa
Design temperature: 80°C
Working temperature: 60°C
Support type: outrigger type

3.2 Angle seat pneumatic valve

The main technical parameters:

Maximum working pressure: 1.6MPa
Control gas pressure: 0.3~0.5MPa
Switching speed: ≤0.3S
Leakage: Under the maximum allowable working pressure, the leakage is zero
Medium temperature: -20~250°C
Ambient temperature: -20~55°C
Environmental humidity: ≤95%
Material: 1Cr18Ni9Ti

3.3 silencer

Make the equipment noise meet the requirements.

Main Specifications:

Exhaust noise: ≤85dB (A)

3.4 Check valve

The gas can only pass through in one direction.

Working pressure: ≤1.6MPa

1. Oxygen buffer tank assembly

The oxygen buffer tank assembly is mainly composed of a buffer tank, a flow meter, a dust filter, a pressure regulating valve, a throttle valve, and a sewage ball valve. Its main function is to stabilize oxygen pressure, purity and flow. A sampling port is provided on the outlet side, and the oxygen content in the product gas is monitored by an oxygen analyzer.

The main technical parameters:

Maximum working pressure: 0.8MPa
Opening pressure of safety valve: 0.8MPa

4.1 buffer tank

The main technical parameters:

Design pressure: 0.84MPa

Maximum working pressure: 0.8MPa

Test pressure: 1.38MPa

Design temperature: 60°C

Working temperature: room temperature

Support type: outrigger type

4.2 Flowmeter

Measuring product oxygen flow

The main technical parameters:

Model number: MF5612

Flow range: 0-12Nm³/h

Measurement accuracy: 1.6

Working pressure: ≤0.8MPa

Range: 1:10

※Refer to the appendix "Gas Flow Conversion Table" for the flow rate conversion of the flowmeter.

4.3 Pressure regulator

Role: adjust the product oxygen pressure.

The main technical parameters:

Model number: AR4000-02

Pressure regulation range: 0.1~1.0

Maximum working pressure: 1.6MPa

4.4 Oxygen Analyzer

Function: Monitor the oxygen content in the product gas, and output a signal to the electronic control system to judge whether the purity of oxygen is qualified. When the oxygen is unqualified, the electronic control system issues an audible and visual alarm.

The main technical parameters:

Power supply voltage: 220V/50Hz

Measuring range: 0~100%O₂

Output signal: 4~20mA

Ambient temperature: 0~45°C

Sample gas flow: 200~300ml/min

Sample gas pressure: <0.2MPa

Quantity: 1 set

5. Electrical control system

5.1 Electric control system: including programmable controller CPU, solenoid valve, indicator light, button, etc. The function is to control the equipment to start and stop, and display the operation status of the equipment.

5.1.1 PLC CPU

Function: Operate according to the compiled program, control the gain and loss of the

solenoid valve, and control the opening and closing of the pneumatic valve through the air control system. And collect and process various signals, display various operating states of the equipment.

The main technical parameters:

Model number: SCR20

Input voltage: 220V

Output voltage: 24V

Input points: 12

Number of output points: 8

5.1.2 Solenoid valve

Function: switch the gas circuit when power is on or off, control the opening and closing of the pneumatic valve.

The main technical parameters:

Model number: 4V210-08/DC24V

Power source: DC24V

Power consumption: 3.0W

Working temperature: -5~60℃

Working pressure: 0.15~0.8MPa

5.1.3 Indicator

Function: display the normal operating status of the device.

5.1.4 Button

Function: power switch, start-stop switch.

5.2 Gas control system:

It is mainly composed of two pieces of air source, ball valve, stainless steel pipe, etc. The function is to provide air source for driving the pneumatic valve switch.

5.2.1 Two-piece air source

Function: Provide a certain pressure, flow, dust-free and lubricated instrument air source when driving the pneumatic valve switch.

The main technical parameters:

Model number: AFR-2000

Pressure regulation range: 0.05~0.8MPa

Working temperature: 5~60℃

5.2.2 Ball valve

Function: instrument air circuit switch valve.

1. Safety, installation, storage and transportation:

1. Security matters

1.1 Operators must go through safety education and learning and practice of operation methods before taking up their jobs. They must independently master the operation methods of oxygen-generating equipment before they can start work.

1.2 The operator must strictly follow the instructions in the operating instructions.

1.3 Before the equipment is relieved of pressure, no maintenance work related to pressure shall be carried out.

1.4 Each set of equipment is tested and qualified before leaving the factory, and a certificate of conformity is attached, but it cannot completely prevent damage during

transportation and loading and unloading, so all aspects of the system should be carefully checked before the first start-up to prevent malfunctions.

1.5 The staff must be familiar with the fact that when the oxygen concentration in the air is less than 18%, hypoxia occurs. If it is less than 10%, it will cause paralysis of the hands and feet. If it is as low as 7%, it will cause serious unconsciousness and even death.

1.6 When working in an oxygen-deficient place (such as when entering the adsorption tower for maintenance), proper ventilation should be performed. There are two types of ventilation: natural ventilation and forced ventilation to maintain the normal oxygen content of the air in the workplace at 18% ~ 21%.

2、 Use installation technical conditions

2.1 The room of the oxygen-generating equipment should be kept ventilated, the air intake of the air compressor should be clean and pollution-free, and the indoor temperature should be maintained at 2-40°C.

2.2 The installation of oxygen-making equipment and air compressor should take measures to prevent the muffler of oxygen-making equipment from sucking air into the air compressor.

2.3 Oxygen-generating equipment only needs to be placed horizontally on a flat foundation without anchor bolts.

2.4 The distance between the oxygen generator and the building wall and other equipment should be greater than 800mm.

2.5 A drainage system is required for the equipment installation foundation to prevent water accumulation in the equipment chassis.

2.6 In the case where the fixed end is not reliably fixed, it is strictly forbidden to pipe in the equipment.

2.7 The pollutants discharged from the sewage outlet should be discharged outdoors to avoid polluting the site.

2.8 See Figure 3 for the external dimensions of the oxygen generator, and Figure 4 for the plan layout.

3. Storage and transportation conditions

3.1 It is strictly forbidden to stand under the lifting object when loading or unloading the lifting equipment.

3.2 Oxygen production equipment should be protected from inversion, collision, rain, and severe vibration during transportation.

3.3 The oxygen generator should be stored in a dry, clean, well-ventilated warehouse with no corrosive substances around. For short-term open storage and transportation, cover with rain cloth, and the equipment should not be in direct contact with the ground.

1. Equipment operation

1. Pneumatic valve status table when the equipment is opened and shut down (for the valve number, please refer to the process flow chart)

1.1 Timing chart of pneumatic valve action when starting:

name	Code	Time			
		1-65S	2-1S	3-2S	4-65S
Intake	QV ₁	K	B	B	B

valve	QV₂	B	B	B	K
Vent	QV₃	B	B	B	K
	QV₄	K	B	B	B
Pressure equalizing valve	QV₅	B	B	B	B
	QV₆	B	B	K	B
	QV₇	K	K	K	B
	QV₈	K	K	B	K
Unqualifie d valve	QV₉	According to the instrument set oxygen concentration is lower than the set value automatically drain			
Outlet valve	QV₁₀	According to the instrument, the oxygen concentration is higher than the set value			
The factory setting of the instrument is 80%					

Note: "K" means the valve is "open" and "B" means the valve is "closed".

1.2 All pneumatic valves are closed when stopped.

2. The instrument reading of the machine during normal operation (for the instrument number, please refer to the process flow chart)

No	Item	meter	Reading	Remarks
1	Inlet pressure of oxygen generator	P	0.6-0.7 MPa	Air pressure
2	Adsorption tower pressure	P	0.55~0.65MPa	
3	Outlet gas pressure	P	0.5 -0.6MPa	Adjust the pressure regulator
4	Regeneration gas pressure	P	0.3 MPa	Adjust the pressure regulator
5	Oxygen flow	FL	Oxygen outgassing about 2 times	Adjust throttle
6	Oxygen flow rate of oxygen analyzer	P950	Trace gas	Needle valve on the instrument

4. Device failure alarm phenomenon

4.1 Product oxygen purity alarm:

4.2 If the product gas does not meet the purity requirements, the instrument will emit a light alarm.

Note: When the product oxygen purity alarm occurs during the operation of

the equipment, the user can first reduce the oxygen production to ensure that the gas is used, and then check the oxygen production equipment to find the cause.

5、Boot operation

5.1 Preparation before starting:

- (1) All valves should be in the correct on/off position.
- (2) Check whether each supporting equipment is in normal state.
- (3) Whether the power supply is within the normal range.

5.2 Startup steps

- (1) Turn on the power switch of the electric control cabinet.
- (2) Turn on the freeze dryer and pre-cool for 3 to 5 minutes. (This device is activated by one key)
- (3) Gas supply: Turn on the gas source to supply gas to the whole machine.
- (4) Open the regulating pressure reducing valve (0.6-0.7MPa).
- (5) Open the ball valve to drain, then close.
- (6) Adjust the pressure regulating valve in the two-piece gas source so that the gas pressure P2 reading of the instrument is within the range of 0.4~0.5MPa.
- (7) Set the lower limit of the oxygen content of the oxygen analyzer to 80%.
- (8) Turn on the operation switch of the electric control cabinet, the control system starts, the solenoid valve acts according to a predetermined procedure, the pneumatic valve also acts correspondingly, and the oxygen generator enters the operation process.
- (9) After the pressure is stabilized, adjust the inlet pressure regulator of the adsorption tower to make the pressure gauge read 0.6-0.65MPa.
- (10) After the oxygen-nitrogen separation system works for 2 to 3 cycles, adjust the throttle valve to the recorded opening, output oxygen to the oxygen buffer tank, and adjust the needle valve to the recorded opening.
- (11) Adjust the pressure regulating valve so that the oxygen pressure reading at the outlet of the oxygen buffer tank reaches the set value of 0.5-0.6MPa.
- (12) Open the throttle valve and adjust the needle valve on the oxygen analyzer to make trace gas out of the oxygen analyzer, and the oxygen analyzer enters the automatic detection state.
- (13) Slowly open the throttle valve to make the flow meter reading reach the set value of the machine.

6、Shutdown operation

- (1) Close the throttle valve to stop oxygen supply.

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- (2) Record the opening of the needle valve LV2, and close the throttle valve LV2.
 - (3) When the pressure reading of the adsorption tower is equal to or less than 0.02MPa, turn off the operation switch of the electric control cabinet, and the "PC" machine stops working.
 - (4) Turn off the power switch of the electric control cabinet, close the throttle valve of the oxygen analyzer, and the oxygen analyzer stops working.
 - (5) Turn off the freeze dryer.
 - (6) Stop the gas supply.
 - (7) Close the ball valve.
 - (8) Open the ball valve to discharge the sewage and close the pressure.
 - (9) Turn off the power.

End, waiting for the next boot.

7.Restart operation after instantaneous power failure

Adjust the flow control valve LV5 so that the product oxygen flowmeter FL reading reaches half of the set value, and then slowly adjust the flow control valve (about 1/8 turn every 2min) to make the product oxygen flowmeter FL reading reach the set value.

8. Precautions for operation

8.1 Adsorption towers, buffer tanks, degreasers, and air storage tanks are all Class I pressure vessels and should be inspected regularly in accordance with relevant national regulations. And accept the supervision and inspection of the local pot inspection office.

8.2 When overhauling the equipment, the components of the instrument gas pipeline and each pipeline must be reduced to zero before disassembling.

8.3 When opening the flow regulating valve, it must be slow, otherwise, the flow rate of the gas will be too fast will damage the flowmeter.

8.4 Read the instruction manuals of supporting equipment and instruments such as air compressors, cold dryers, filters, flow meters, nitrogen analyzers, etc., use them correctly, and maintain and strictly follow the requirements of the instruction manuals. The precautions should be clear.

8.5 There must be someone on duty during the operation of the machine. Check whether the meter reading is normal, whether there is an alarm, and make a log record every half an hour. If there is an alarm, it must be repaired in time.

8. Equipment Maintenance

1. Equipment maintenance requirements

1.1. Zeolite molecular sieve is the core of oxygen production equipment. In order to prevent pollution and failure, it is necessary to strictly control the oil content of air compressor exhaust and gas source, and regularly replace the activated carbon in the filter element and deoiler.

1.2. Regularly check the pressure gauge of the compressed cylinder. If there is no pressure or the pressure drops during the desorption process, it means that the cylinder cannot normally compact the zeolite molecular sieve. The fault should be eliminated in time to prevent the zeolite molecular sieve from being compacted and causing the molecular sieve

powdering. . When the molecular sieve gap reorganization or normal wear and tear occurs and the carbon level alarm occurs, the zeolite molecular sieve should be stopped in time.

1.3 In the process of operation, if a large amount of black dust is ejected from the vent of the muffler, it should be stopped in time to find out the reason to avoid the increase of zeolite molecular sieve powdering.

1.4 The storage, transportation and loading and unloading of zeolite molecular sieve will not be harmful to the human body. When filling zeolite molecular sieve, you can wear goggles, breathing filter and exhaust fan. After filling, the skin contact area should be washed with soap.

1.5 If an oxygen purity alarm occurs, the cause should be found in time and the fault should be eliminated.

1.6 When the equipment is running continuously, the air tightness of each pipeline connection should be checked frequently, and there should be no air leakage; the operating status of the pneumatic valve and freeze dryer should be checked regularly.

1.7. When the equipment is left unused or used intermittently for a long time, it should be turned on once a month for four hours each time to ensure that the equipment is always in a standby state.

1.8. Refer to the instruction manuals or documents of filters, freeze dryers, compressed air cylinders, angle seat pneumatic valves, manual valves, flow meters, oxygen analyzers, solenoid valves, pressure vessels, etc. for regular maintenance.

2. Routine equipment maintenance table

For the following items, under normal circumstances, check at least once a day, and check according to the requirements of the following table, and make a record of the inspection situation and processing results.

No	project	Check content	Maintenance period
1	Switch status of each valve	Whether the valve switch status is correct	When the equipment is turned on or off
2	Muffler exhaust status	Whether the muffler discharges dust	During operation
3	Buffer tank drain valve blowdown	Whether the sewage is normal	Before starting and after stopping
4	Air storage tank blowdown valve blowdown	Whether the sewage is normal	Before starting and after stopping
5	Filter automatic blowdown	Whether the sewage is normal	During operation
6	Differential pressure before and after the filter	Whether the adsorption pressure drops	During operation
7	Meter reading	Is it normal	During operation
8	Air source triple unit lubricator	Whether the oil cup has enough oil surface	During operation
9	Operating state of air compressor and freeze dryer	Whether the outlet temperature, oil level, etc. are normal	During operation
10	Airtightness of each pipe connection	Whether leak	During operation

Nine, equipment failure and troubleshooting

No	Fault phenomenon	cause of issue	elimination method
1	Long-term alarm for unqualified purity	1. Excessive gas production; 2. The adsorption pressure drops; 3. The pressure difference of the freeze dryer is large; 4. The pressure difference of the filter is large; 5. The pneumatic valve does not move or leaks; 6. The oxygen analyzer fails; 7. Molecular sieve failure.	1. Adjust gas production 2. Check the air compressor or gas source; 3. Overhaul the freeze dryer; 4. Replace the filter element; 5. Overhaul corresponding solenoid valve and pneumatic valve; 6. According to the instructions of the oxygen analyzer; 7. Replace molecular sieve.
2	Silencer spraying dust	1. The carbon molecular sieve is not compacted; 2. The brown mat under the adsorption tower is damaged; 3. The steel wire mesh of the getter in the middle of the adsorption tower is damaged.	1. Check the orifice plate on the cylinder and adsorption tower; 2. Replace the brown mat under the adsorption tower; 3. Replace the wire mesh.
3	Zeolite molecular sieve particles are discharged from the drain valve of the buffer tank	The upper seal failure of the adsorption tower	Stop and check the upper seal of the adsorption tower
4	Air storage tank drain valve discharges small particles of activated carbon	The steel wire mesh of the lower hole pipe of the oil remover is damaged.	Replace steel wire mesh of lower hole pipe of oil remover
5	Air tank drain valve drains oil	1. Activated carbon fails; 2. The reading of the filter differential pressure gauge is greater than 0.035MPa; 3. The automatic sewage valve does not discharge sewage; 4. The oil content of the air compressor exhaust is too high.	1. Replace the activated carbon; 2. Replace the filter element; 3. Overhaul the automatic drain valve; 4. Refer to the instruction manual of the air compressor.
6	Freeze dryer failure		Refer to the instruction manual of the freeze dryer

Note: When the third or fourth fault occurs, please stop immediately and contact the Shenlong service hotline.

10. Service life reference table of wearing parts and wearing parts

No	Wearing parts, wearing parts	Service life reference value	Remarks
1	Pipe filter element	8-10 months	No replacement is required when the suction pressure is normal.
2	Fine filter element	8-10 months	No replacement is required when the suction pressure is normal.
3	Superfine filter element	8-10 months	No replacement is required when the suction pressure is normal.
4	Oxygen molecular sieve	Normal operation, maintenance for more than 3 years	The decline in technical indicators is not obvious and there is no need to add or replace.
5	Pneumatic valve seal	1.5 million times	No replacement is required when the action is normal and there is no leakage.
6	The electromagnetic valve	1.5 million times or more	No replacement is required when the action is normal.
7	Dust filter	10 months	No replacement is required when the product pressure is normal.

For the air compressor, please refer to the instruction manual of the air compressor