

Customer First, Quality Foremost, Integrity, Honesty, Optimism, and Perseverance



ZHEJIANGBALAO


**Zhejiang Bai'ao Gas Equipment Co.,
Ltd.**

ZHEJIANG BAI AO GAS EQUIPMENT CO.,LTD

Excellent Product Quality

**Good Customer Reputation, Connecting to Realize
Value**

Excellent product quality, good user reputation, and a connection to realizing value

 **Zhejiang Bai'ao Gas Equipment Co., Ltd.**
ZHEJIANG BAI AO GAS EQUIPMENT CO.,LTD

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BAO Gas Equipment
BAIAODITISHEBEI

COMPANY PROFILE

Company Profile



Zhejiang Bai'ao Gas Equipment Co., Ltd. is located in Fuyang District, Hangzhou City, more than 30 kilometers away from the city center, with convenient transportation. West Lake is between the lake and Mount Sanqing, near Mount Huangshan, Mount Putuo is the best place for life and tourism.

Our company has a 3000m² production plant, a 500m² office, a 500m² warehouse, and corresponding employee dormitories. We have 18 permanent employees.

With 2 technical personnel and 3 after-sales service personnel, it is a production-oriented economic entity integrating scientific research, design and manufacturing, installation and commissioning.

Our company's products are developed and produced by drawing on the strengths of similar foreign products and combining them with the actual situation in China. After years of development, our products have become a large-scale gas separation equipment company in the domestic industry.

Our company manufactures PSA nitrogen generators, PSA oxygen generators, QH/QC nitrogen purification units, and AQ/FC ammonia decomposition hydrogen production units. Our products are sold well in more than 30 provinces in the oil chemical industry, textile instruments, food, automotive, heat treatment SMT, etc.

Vision
The company adheres to the principle of "technological innovation, pursuit of excellence, and honest management", and provides satisfactory products for its customers. Excellent products, strict quality assurance system, perfect sales network, provide customers with the greatest confidence guarantee

Values
User first/quality-oriented/integrity and honesty/optimism and resilience

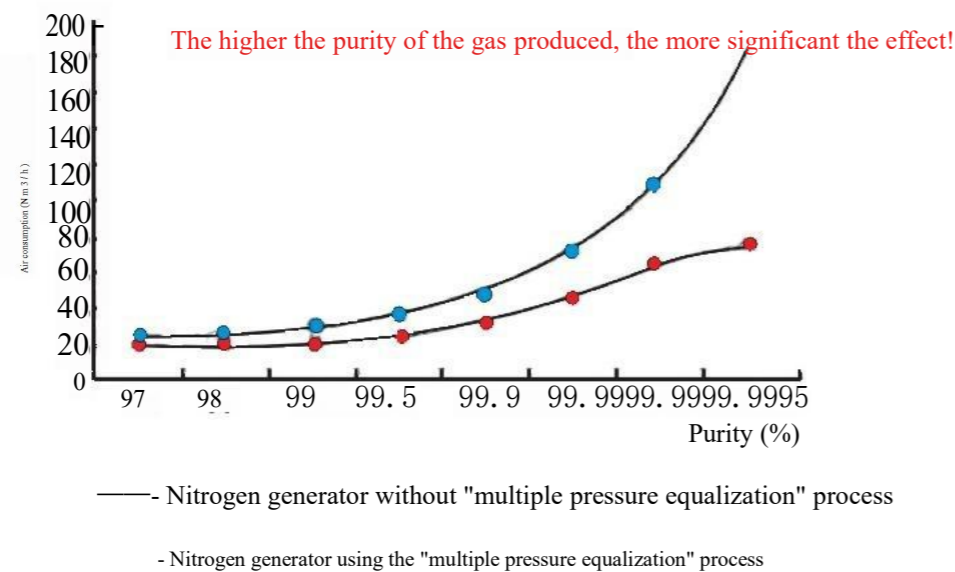


Pressure Swing

Pressure swing adsorption nitrogen/oxygen production structure process

★ "Multiple pressure equalization" method, producing high-purity nitrogen gas, significantly reducing energy consumption

In the process of PSA nitrogen and oxygen production equipment, gas pressure equalization is an important energy-saving process. Before the adsorption tower is ready to be emptied at the end of one adsorption cycle and the regeneration of the other tower is completed, both towers need to be pressurized. So, by mastering the pressure equalization method, gas loss can be effectively controlled.



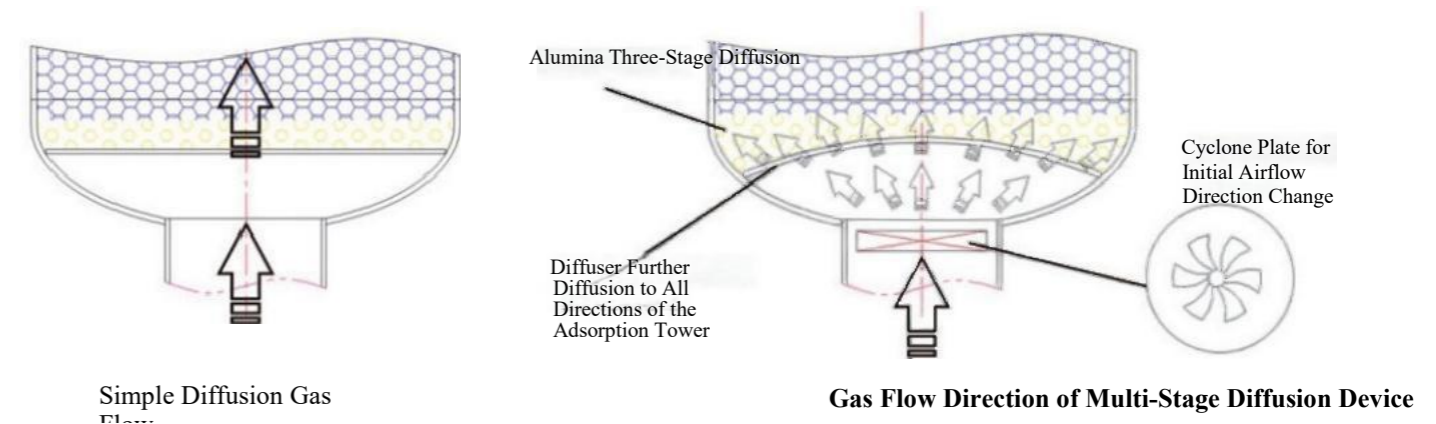
The pressure equalization process of the PSA nitrogen and oxygen production equipment designed by our company is generally divided into three parts:

- (1) Equalize the pressure on the conventional upper pressure equalizing valve;
- (2) The middle and lower pressure equalization devices and valves, as well as the middle and lower pressure equalization valves;
- (3) The organic combination of multiple secondary pressure equalization of the adsorption tower by the process nitrogen buffer tank further improves the pressure equalization effect. Our company's advanced pressure equalization process can enable the regenerated adsorption tower to reach the adsorption pressure in the shortest possible time and minimize the oxygen partial pressure inside the adsorption tower, greatly improving the efficiency of molecular sieve utilization and reducing the loss of effective feed gas.

★ Airflow diffusion and distribution device makes the adsorbent more conducive to full adsorption and desorption

When compressed air flows, it will flow along the shortest path. In this way, the flow rate cannot be effectively and reasonably distributed using ordinary flat desiccant beds. The flow rate in the center of the tower is much greater than that at the edge of the tower. When this happens, the adsorbent saturation in the center is much greater than that at the edge. At the same time, the air velocity in the center is much higher than the design velocity, making the adsorbent in the center prone to boiling, resulting in oxidation or breakage.

After years of research, our company has developed an airflow diffusion and distribution device. This mechanism involves three stages of redirected airflow diffusion: First, a cyclone plate initially redirects the airflow, changing its direction from straight upward to spiral upward at the adsorption tower inlet. This allows the airflow to diffuse around the adsorption tower and extends its transit time (adsorption time). Then, a diffuser further refines and evenly distributes the airflow in all directions of the adsorption tower. Finally, a three-stage diffusion process using uniform gaps in alumina ensures the airflow achieves the desired diffusion effect before passing through the separation tower bed. Therefore, this maximizes the utilization rate of the molecular sieve, significantly improving the gas production efficiency and performance of the equipment.



★ High-Quality Cylinder Compactor, the "Ultimate Protector" of Adsorbent

After years of research and development, our company has selected self-regulating cylinder compactors with self-diagnostic functions. These devices all have the following characteristics:

Self-Compressing: When the molecular sieve is descending, the molecular sieve compactor will compact the molecular sieve from top to bottom, and a check valve is installed. The compactor will always remain in place, regardless of whether the equipment is stopped or restarted.

Self-Alarm Diagnosis: The cylinder stroke can be measured or sensed externally, and alarm points can be preset.

Single Cylinder and Multi-Top Combination: Small-volume single cylinders use a compaction air source, providing more force; the multi-top design ensures more stable compaction.



BAN pressure swing adsorption nitrogen production equipment

The BAN type pressure swing adsorption deoxygenation and nitrogen production equipment is based on the principle of pressure swing adsorption, using high-quality carbon molecular sieves as adsorbents to directly obtain nitrogen from compressed air.

Advantages

1

Ready to Use, Convenient Operation

2

High efficiency and energy saving operation

3

High Purity Adjustable, Wide Range

4

Intelligent Monitoring, Worry-Free



System Process



Air Compressor	Purification System	Adsorption System	Buffer System

Main Technical

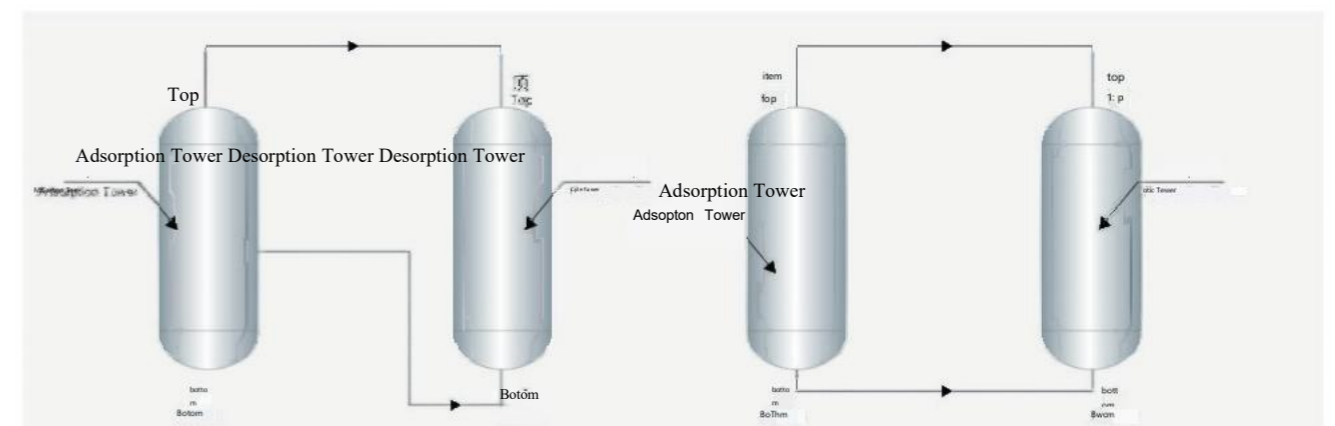
+Nitrogen flow rate 5~3000 Nm ³ /h	
+Nitrogen Purity	95~99.999%
+Nitrogen pressure 0.1~0.8MPa (adjustable)	
+Dew Point	-40~-73°C (atmospheric pressure)

Working

Based on the principle of pressure swing adsorption, high-quality carbon molecular sieves are used as adsorbents. Under certain pressure, due to kinetic effects, the diffusion rates of oxygen and nitrogen on the carbon molecular sieves differ significantly. Oxygen is largely adsorbed by the carbon molecular sieves, while nitrogen molecules are enriched in the gas phase, achieving oxygen-nitrogen separation.

Since the adsorption capacity of carbon molecular sieves for oxygen varies significantly with pressure, reducing the pressure desorbs the oxygen molecules adsorbed by the carbon molecular sieves, regenerating the carbon molecular sieves for repeated recycling.

A two-adsorption tower process is adopted, one tower adsorbs and produces nitrogen, and the other tower desorbs and regenerates, alternating in a cycle to continuously produce high-quality nitrogen.



Inequality Pressure Equalization Process

Traditional equal pressure equalization process

Technical

1. Advanced unequal pressure equalization process improves the utilization rate of carbon molecular sieve and directly reduces compressed air consumption.
2. Advanced internal components ensure uniform airflow distribution and reduce airflow impact.
3. Bai'ao Company cooperates with well-known domestic and foreign molecular sieve manufacturers, and can select the most energy-efficient products according to the user's working conditions.
4. The most reliable gas source treatment method ensures the adsorption efficiency and service life of molecular sieves.
5. The stretching and twisting filling technology makes the carbon molecular sieve filling more uniform and dense, and reduces the friction coefficient to the lowest point. Improve the reliability of long-term operation of the entire machine.
6. Adopting Siemens PLC automatic program control. And it can be adjusted according to the purity of nitrogen, and the reserved interface can be remotely controlled with a computer.
7. Valves are reliable guarantees for stable operation of equipment, with fast opening and closing speed, low gas consumption, simple structure, good sealing performance, easy installation and maintenance, and long valve seat life.
8. Adopting advanced cylinder automatic compression technology, an alarm signal is issued when there is a shortage of carbon molecular sieve in the adsorption tower. Remind users to handle it promptly and prevent the pulverization of carbon molecular sieves. Extend the service life.
9. Unqualified nitrogen automatic venting device (optional)
10. Selecting components from well-known brands ensures the quality of user products and guarantees the long-term stability of nitrogen output, purity, and pressure.



Nitrogen Application Areas and

Electronic Industry: Nitrogen Protection for Semiconductor and Electronic Component Production

Heat treatment: bright annealing, protective heating, metallurgical and magnetic material sintering, etc

Food industry: equipped with sterilization filters, can be used for nitrogen filling packaging, grain storage, vegetable and fruit preservation, alcohol packaging and protection

Carbon burning industry: underground explosion prevention and kerosene fire extinguishing

Chemical industry: nitrogen coverage, displacement, cleaning, pressure conveying, chemical reaction agitation, chemical fiber production protection, etc

Petroleum and natural gas industry: petroleum refining, nitrogen purging and leak detection of containers and pipelines, nitrogen injection for oil recovery

Pharmaceutical industry: nitrogen storage of traditional Chinese and Western medicine, stirring and conveying of nitrogen filled medicinal materials, etc

Cable industry: production of cross-linked cables and protective gas

Others: Metallurgical industry, rubber industry, aerospace industry, etc.



Main Parameter Table of BAN99.5% (Purity) Nitrogen Generator

Model	Output (Nm ³ /h)	Effective Gas Consumption (Nm ³ /min)	Air Purification System	Inlet/Outlet Diameter (mm)		Footprint (mm)
BAN-5	5	0.28	BA-0.5	DN 15	DN 15	1000X900X2000
BAN-10	10	0.55	BA-1	DN 25	DN 25	1000X900×2100
BAN-20	20	1.1	BA-2	DN 25	DN 25	1600X1000X2100
BAN-40	40	2.2	BA-3	DN 32	DN 25	1700X1200X2300
BAN-60	60	3.3	BA-6	DN 40	DN 32	1900X1600X2600
BAN-100	100	5.5	BA-6	DN 40	DN 40	4200X1000X2700
BAN-150	150	8.25	BA-10	DN 50	DN 40	5000X1000X3100
BAN-200	200	11	BA-12	DN 50	DN 40	5500X1200X3200
BAN-300	300	16.5	BA-20	DN65	DN 50	6300X1400X3300
BAN-400	400	22	BA-26	DN 80	DN 50	7000X1600X3300
BAN-600	600	33	BA-40	DN 100	DN65	7500X1600X3500
BAN-800	800	43	BA-50	DN 100	DN65	9000X2200X4000
BAN-1000	1000	51	BA-60	DN 125	DN100	12000X2400X4000
BAN-1200	1200	66	BA-70	DN 125	DN100	12000×2400X4500
BAN-2000	2000	103	BA-120	DN 150	DN 100	14000X2400X5200
BAN-2500	2500	116	BA-130	DN 150	DN100	15000*3000*5200
BAN-3000	3000	140	BA-150	DN 150	DN125	15000*3000*6000

Note: The data listed above are based on a raw material compressed air pressure of 0.8MPa (gauge pressure), gas consumption as the actual flow rate before entering the adsorption cylinder, an ambient temperature of 20°C, an elevation of 0 meters, and a relative humidity of 80%.

Main Parameter Table of BAN97% (Purity) Nitrogen Generator

Model	Output (Nm ³ /h)	Effective Gas Consumption (Nm ³ /min)	Air Purification System	Inlet/Outlet Diameter (mm)		Footprint (mm)
BAN10-97	10	0.4	BA-0.5	DN 15	DN 15	1000X900X2000
BAN20-97	20	0.8	BA-1	DN 25	DN 25	1000X900X2000
BAN40-97	40	1.6	BA-2	DN 25	DN 25	1500X1100X2200
BAN60-97	60	2.4	BA-3	DN 32	DN 25	1700X1400X2400
BAN100-97	100	4	BA-6	DN40	DN 32	1900X1500X2500
BAN150-97	150	6	BA-8	DN50	DN40	4000X900X2600
BAN200-97	200	8	BA-10	DN50	DN50	4700X1000X3100
BAN300-97	300	12	BA-12	DN65	DN50	5000X1000X3200
BAN400-97	400	16	BA-20	DN65	DN50	5400X1200X3300
BAN600-97	600	24	BA-26	DN 80	DN65	6200X1400X3300
BAN800-97	800	32	BA-40	DN 100	DN65	6800X1600X3300
BAN1000-97	1000	40	BA-40	DN 100	DN 80	7500X1600X4500
BAN1200-97	1200	48	BA-50	DN 125	DN 100	8500X2200X3800
BAN1500-97	1500	60	BA-60	DN 125	DN 100	9000X2200X4000
BAN2000-97	2000	80	BA-80	DN125	DN100	9000*2400*4000
BAN2500-97	2500	100	BA-100	DN125	DN100	9500*2400*4000
BAN3000-97	3000	120	BA-120	DN150	DN125	10000*3000*4000
BAN3500-97	3500	140	BA-140	DN150	DN125	10000*3000*4000

Main Parameter Table of BAN98% (Purity) Nitrogen Generator

Model	Output (Nm ³ /h)	Effective Gas Consumption (Nm ³ /min)	Air Purification System	Inlet/Outlet Diameter (mm)		Footprint (mm)
BAN10-98	10	0.44	BA-0.5	DN 15	DN15	1000X900X2000
BAN20-98	20	0.88	BA-1	DN 25	DN 25	1000X900X2100
BAN40-98	40	1.76	BA-2	DN 25	DN 25	1600X1200X2300
BAN60-98	60	2.64	BA-3	DN 32	DN 25	1700X1400X2400
BAN100-98	100	4.2	BA-6	DN40	DN 32	1900X1600X2600
BAN150-98	150	6.5	BA-8	DN50	DN40	4000X1000X2700
BAN200-98	200	8.6	BA-10	DN50	DN50	4600X1000X2700
BAN300-98	300	12.8	BA-12	DN65	DN 50	5500X1200X3300
BAN400-98	400	17.6	BA-20	DN65	DN50	6200X1400X3500
BAN600-98	600	25.5	BA-30	DN80	DN65	7000X1600X3500
BAN800-98	800	33.5	BA-40	DN 100	DN65	7500X1600X4500
BAN1000-98	1000	42	BA-50	DN100	DN 80	8500×2200X3500
BAN1200-98	1200	50	BA-60	DN125	DN100	9000×2200X4000
BAN1500-98	1500	63	BA-70	DN 125	DN 125	12000X2200X4000
BAN2000-98	2000	84	BA-100	DN125	DN100	12000*2400*4000
BAN2500-98	2500	105	BA-120	DN125	DN100	1200*2400*4000
BAN3000-98	3000	126	BA-130	DN150	DN125	13000*3000*4500
BAN3500-98	3500	147	BA-150	DN150	DN125	13000*3000*4500

Main Parameter Table of BAN99% (Purity) Nitrogen Generator

Model	Output (Nm ³ /h)	Effective Gas Consumption (Nm ³ /min)	Air Purification System	Inlet/Outlet Diameter (mm)		Footprint (mm)
BAN10-99	10	0.5	BA-0.5	DN 15	DN 15	1000X900X2000
BAN20-99	20	1.0	BA-1	DN 25	DN 25	1600X1000X2100
BAN30-99	30	1.5	BA-2	DN 25	DN 25	1600X1000X2200
BAN40-99	40	2.0	BA-2	DN 32	DN 25	1600X1200X2300
BAN60-99	60	3.0	BA-3	DN 32	DN 25	1800X1400X2400
BAN80-99	80	4.0	BA-6	DN 40	DN 32	1900X1600X2600
BAN100-99	100	5.0	BA-6	DN 40	DN 32	2000X1700X2700
BAN120-99	120	6.0	BA-6	DN 50	DN 40	4200X1000X2700
BAN150-99	150	7.5	BA-6	DN 50	DN 40	4700X1000X2700
BAN200-99	200	10	BA-8	DN 50	DN 40	5200X1000X3100
BAN300-99	300	15	BA-16	DN 65	DN 50	5800X1200X3300
BAN400-99	400	20	BA-20	DN65	DN 50	6500X1400X3300
BAN600-99	600	30	BA-30	DN 80	DN 50	7500X1600X3500
BAN800-99	800	40	BA-40	DN 100	DN 65	8000X1600X4500
BAN1000-99	1000	50	BA-50	DN 100	DN 65	9000X2200X4000
BAN1200-99	1200	60	BA-60	DN 125	DN 65	12000X2200X4000
BAN1500-99	1500	75	BA-80	DN 125	DN 80	13000X2400X4500
BAN200-99	2000	86.6	BA-100	DN125	DN100	1300*3000*4500
BAN2500-99	2500	108	BA-120	DN125	DN100	1300*3000*4500
BAN3000-99	3000	130	BA-130	DN150	DN125	15000*3300*4500
BAN3500-99	3500	151	BA-150	DN150	DN125	15000*3300*4500

Main Parameter Table of BAN99.9% (Purity) Nitrogen Generator

Model	Output (Nm ³ /h)	Effective Gas Consumption (Nm ³ /min)	Air Purification System	Inlet/Outlet Diameter (mm)		Footprint (mm)
BAN5-39	5	0.33	BA-0.5	DN 15	DN 15	1000X900X2200
BAN10-39	10	0.61	BA-1	DN 25	DN 25	1000X900X2300
BAN20-39	20	1.2	BA-2	DN 25	DN 25	1550X1150X2300
BAN30-39	30	1.9	BA-3	DN 32	DN 25	1650X1250X2400
BAN40-39	40	2.5	BA-3	DN 32	DN 25	1800X1400X2400
BAN60-39	60	3.7	BA-6	DN40	DN 32	2000X1600X2700
BAN80-39	80	5	BA-6	DN 40	DN 40	4500X900X2700
BAN100-39	100	6	BA-8	DN 50	DN 40	4700X1000X3100
BAN120-39	120	7.5	BA-10	DN 50	DN 40	4700X1000X3100
BAN150-39	150	9	BA-12	DN 50	DN 40	5000X1100X3100
BAN200-39	200	12	BA-16	DN65	DN 50	5700X1200X3200
BAN300-39	300	18	BA-26	DN 80	DN 50	6500X1500X3300
BAN400-39	400	25	BA-30	DN 80	DN 65	8000X1800X3400
BAN600-39	600	37	BA-50	DN 100	DN65	8500X2000X4500
BAN800-39	800	50	BA-60	DN 125	DN 65	12000X2200X3500
BAN1000-39	1000	61	BA-70	DN 125	DN65	13000X2200X4000
BAN1200-39	1200	75	BA-90	DN 150	DN 80	14000X2400X4500
BAN1500-39	1500	95	BA-110	DN125	DN80	9000*2400*4000
BAN2000-39	2000	158	BA-160	DN125	DN100	9500*2400*4000

Main Parameter Table of BAN99.99% (Purity) Nitrogen Generator

Model	Output (Nm ³ /h)	Effective Gas Consumption (Nm ³ /min)	Air Purification System	Inlet/Outlet Diameter (mm)		Footprint (mm)
BAN5-49	5	0.5	BA-0.5	DN 15	DN 15	1000x900x2000
BAN8-49	8	0.8	BA-1	DN25	DN25	1500X1000X2300
BAN12-49	12	1.2	BA-2	DN 25	DN25	1600X1200X2100
BAN20-49	20	2.0	BA-3	DN32	DN 25	1650X1250X2400
BAN30-49	30	3.0	BA-3	DN40	DN25	1800X1400X2500
BAN40-49	40	4.0	BA-6	DN40	DN25	4000X900×2500
BAN60-49	60	6.0	BA-6	DN50	DN32	4700X1000X3100
BAN80-49	80	8.0	BA-8	DN50	DN40	4700x1000x3100
BAN100-49	100	10	BA-10	DN65	DN40	5000X1100X3100
BAN120-49	120	12	BA-12	DN65	DN40	5700X1200X3000
BAN140-49	140	14	BA-16	DN65	DN 50	6000X1400X3300
BAN160-49	160	16	BA-16	DN 80	DN 50	6000X1400X3300
BAN180-49	180	18	BA-20	DN80	DN50	6000X1400X3300
BAN200-49	200	20	BA-20	DN 80	DN50	6500X1400X3300
BAN250-49	250	25	BA-26	DN100	DN 50	7000X1600X3500
BAN300-49	300	30	BA-30	DN100	DN50	8000X1600X3500
BAN500-49	500	42	BA-50	DN125	DN50	11000X2200X3500
BAN800-49	800	67	BA-70	DN150	DN 65	13000×2400X4500
BAN1000-49	1000	83.5	BA-90	DN125	DN65	13000*2600*4000
BAN1200-49	1200	100	BA-110	DN150	DN80	13000*3000*4000

Note: The data listed above are based on a raw material compressed air pressure of 0.8MPa (gauge pressure), air consumption as the actual flow rate before entering the adsorption cylinder, an ambient temperature of 20°C, an elevation of 0 meters, and a relative humidity of 80%.

Main Parameter Table of BAN99.999% (Purity) Nitrogen Generator

Model	Output (Nm ³ /h)	Effective Gas Consumption (Nm ³ /min)	Inlet Diameter (mm)	Outlet Diameter (mm)
BAN10-59	10	1.2	DN15	DN15
BAN20-59	20	2.3	DN25	DN25
BAN40-59	40	4.6	DN25	DN25
BAN60-59	60	6.8	DN32	DN25
BAN100-59	100	11.5	DN40	DN25
BAN120-59	120	13.6	DN40	DN25
BAN150-59	150	17	DN50	DN32
BAN200-59	200	23	DN50	DN40
BAN300-59	300	34	DN100	DN40
BAN400-59	400	45.5	DN125	DN50
BAN600-59	600	68	DN150	DN50
BAN800-59	800	91	DN150	DN65

Pressure Swing Adsorption Oxygen Generator

Pressure Swing Adsorption Oxygen Generator uses high-quality zeolite molecular sieves as adsorbents and utilizes the pressure swing adsorption principle to directly obtain oxygen from compressed air.



System Process





Main Technical

+Oxygen Flow Rate	1~1000Nm/h
+Oxygen Purity	80~95% (standard is 93%)
+Oxygen Pressure	0.1~0.5MPa (Adjustable)
+Dew Point	-40~-70°C

Working

This oxygen generator, carefully developed based on the "PSA" pressure swing adsorption principle, uses high-quality oxygen-generating zeolite molecular sieves as adsorbents to directly separate and produce oxygen from the air at room temperature. Compressed air, after purification and drying pretreatment, achieves oxygen and nitrogen separation under pressure swing adsorption (PSA). Due to the selective adsorption characteristics of molecular sieves, nitrogen is adsorbed within the molecular sieve, while oxygen is enriched in the gas phase and output as the product. This system is equipped with two adsorption towers: one for adsorption and oxygen production, and the other for desorption and regeneration, alternating in a cycle to continuously produce oxygen.

Main Technical

BAO93 type oxygen purity 90~93%

Model Specifications	Gas production (Nm ³ /h)	Air consumption (Nm ³ /h)	Nominal inlet diameter DN (mm)	Nominal outlet diameter DN (mm)	Air Purification System	Equipment footprint (mm)
BAO-3	3	0.64	25	15	BA-1	1300X1200X2000
BAO-5	5	1.10	25	15	BA-2	1400X1300X2000
BAO-10	10	2.15	32	15	BA-3	1500X1300X2300
BAO-15	15	3.23	40	15	BA-6	1600X1400X2500
BAO-20	20	4.30	40	15	BA-6	3100X800X2500
BAO-25	25	5.38	40	25	BA-8	3400X900X2800
BAO-30	30	6.45	50	25	BA-10	4800X1000X3100
BAO-40	40	8.60	50	25	BA-10	4300X1200X3000
BAO-50	50	10.75	65	25	BA-16	4600X1200X3200
BAO-60	60	12.90	65	25	BA-16	5200X1400X3400
BAO-80	80	17.20	80	25	BA-20	5700X1600X3300
BAO-100	100	21.50	80	25	BA-25	6100X1600X3800
BAO-120	120	25.80	100	25	BA-30	6500X1600X4800
BAO-150	150	32.25	100	40	BA-40	7400X2200X3500
BAO-200	200	43.00	125	40	BA-50	9500X2200X4100

Note: The above data are based on a design standard of 0.8 MPa (G) raw air, an ambient temperature of 20°C, a 0-meter elevation, and 80% relative humidity. The equipment footprint does not include purification components. (Subject to final design specifications)

Technical

1. Utilizing pressure swing adsorption as the main process principle, mature and reliable.
2. Reasonable configuration of all related system components, low failure rate.
3. Perfect process design, optimal usage effect.
4. Intelligent interlocking unqualified oxygen venting device to ensure product oxygen quality.
5. Complete machine shipped directly from the factory, no indoor foundation installation required.
6. Pipeline pairing and installation are convenient.
7. Variable cycle switching, with adjustable purity within a certain range.
8. Reasonable internal components, uniform airflow distribution, and reduced high-speed airflow impact.
9. Unique molecular sieve protection measures extend the service life of zeolite molecular sieves.
10. Optional oxygen device flow rate, purity automatic adjustment system, remote control system, etc.
11. Easy to operate, stable to run, highly automated, and capable of unmanned operation.

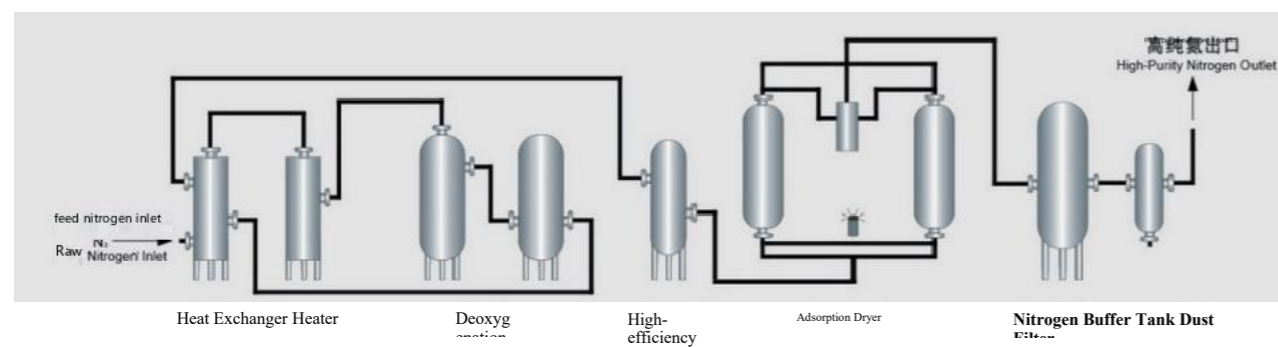
Carbon-borne

BCN Carbon-supported Nitrogen Purification Equipment

At a certain temperature, residual oxygen in nitrogen reacts with carbon provided by a carbon-supported catalyst in an oxidation reaction: $C + O_2$. The resulting CO_2 is removed by pressure swing adsorption (PSA) and deep dehydration to obtain high-purity nitrogen.



System Process



Main Technical

+ Nitrogen output	10-20000 Nm ³ /min
+Nitrogen Purity	≥99.9995%
+ Nitrogen pressure	0.1~0.7 MPa (adjustable)
+Dust content	≤0.01um
+ Oxygen content	≤ 5 ppm
+Dew Point	≤-60°C.

Technical

◎ Good stability, oxygen content strictly controlled below 5 ppm.

◎ Low moisture content, atmospheric dew point ≤ -60 °C

High purity, nitrogen purity ≥ 99.9995%

◎ Non hydrogen is suitable for processes that have strict requirements for hydrogen and oxygen.

Main Technical

Pure nitrogen purity 99.9%

Model Specifications	General Nitrogen Consumption (Nm ³ /h)	Pure Nitrogen Output (Nm ³ /h)	Catalyst Loss (kg/month)	Installed Power / Practical Power (kW)	Cooling water (t/h)	Equipment footprint (mm)
BCN-10	11	10	5.0	3.4/1.3	0.1	3800X1200X2300
BCN-20	22	20	10.0	6.8/2.6	0.2	4500X1200X2300
BCN-30	33	30	15.0	10.2/3.9	0.2	5000X1300X2400
BCN-40	44	40	20.0	13.6/5.2	0.3	5500X1300X2400
BCN-50	55	50	25.0	17.0/6.5	0.4	5700X1300X2400
BCN-50	66	60	30.0	20.4/7.8	0.5	6000X1300X2400
BCN-80	88	80	40.0	27.2/10.4	0.6	7500X1200X2600
BCN-100	110	100	50.0	34.0/13.0	0.8	8500X1200X3100
BCN-150	165	150	75.0	51.0/19.5	1.1	9500X1300X3100
BCN-200	220	200	100.0	68.0/26.0	1.5	11000X1600X3200
BCN-250	275	250	125.0	85.0/32.5	1.9	11500X1600X3300
BCN-300	330	300	150.0	102/39	2.2	12000X1600X3300
BCN-400	440	400	200.0	136/52	3.0	13500X2000X3500
BCN-500	550	500	250.0	170/65	3.7	14000X2000X4500
BCN-600	660	600	300.0	204/78	4.4	14000X2000X4500
BCN-800	880	800	400.0	272/104	5.9	18500X2200X3500
BCN-1000	1100	1000	500.0	340/130	7.4	20000X2500X4000
BCN-1200	1320	1200	600.0	408/156	8.8	14000X5000X4500
BCN-1500	1650	1500	750.0	510/195	11.0	18000X6500X3500
BCN-2000	2200	2000	1000.0	680/260	14.7	21000X7000X4000

Note: The above data is based on a design benchmark of 0.8 MPa (G), 99.9% raw material nitrogen, ambient temperature of 20°C, 0-meter elevation and 80% relative humidity (the footprint is subject to the final design)

BAM membrane separation nitrogen generator

At a certain temperature, residual oxygen in nitrogen reacts with carbon provided by a carbon-supported catalyst in an oxidation reaction: $C + O_2$. The resulting CO_2 is removed by pressure swing adsorption (PSA) and deep dehydration to obtain high-purity nitrogen.

Working

According to the differences in solubility and diffusion coefficients of various gases in compressed air in membrane modules, the relative permeation velocity of gases passing through the membrane module varies. Gases with faster permeation rates, such as hydrogen and oxygen, are enriched on the permeation side of the membrane module, while gases with slower permeation rates, such as nitrogen and argon, are enriched on the stagnation side of the membrane, achieving the goal of oxygen nitrogen separation.

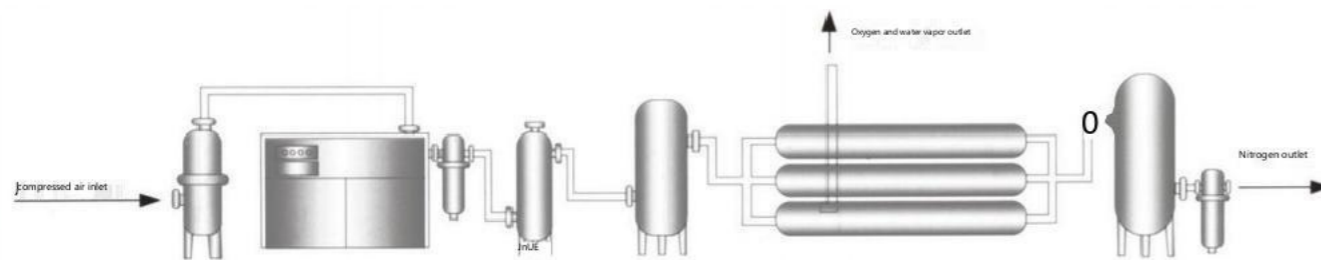
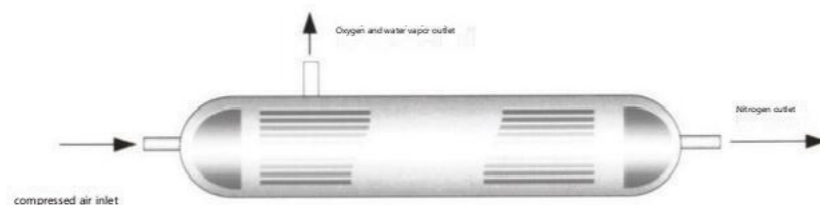
Technical

- +Increasing membrane components can expand the nitrogen production of the system.
- + Imported PLC intelligent program controller, fully automatic operation.
- +The purity is freely adjustable by flow rate between 95% and 99.9%.
- +Imported original membrane components, it only takes a few minutes from start-up to normal gas supply, and the lifespan of the membrane assembly can reach up to ten years. +Lightweight, compact structure, and easy installation.



System Process Flow

Membrane Separation Working Principle Diagram
 CO_2, O_2, Ar, N_2
 The relative penetration rate of "fast" is "slow"



Purification System Membrane Separation System Buffer System

Main Technical

+Nitrogen Production	5-2000 Nm ³ /h
+Nitrogen Purity	95~99.9%
+Nitrogen Outlet Pressure	≤1.2 MPa
+Dew Point	-48℃~-73℃

Main parameters of BAM-A type membrane nitrogen generator: Purity 95%

Model	N Production (Nm ³ /h)	Effective Gas Consumption (Nm ³ /min)
BAM10-95	10	0.35
BAM20-95	20	0.7
BAM40-95	40	1.4
BAM60-95	60	2.0
BAM100-95	100	3.6
BAM150-95	150	5.3
BAM200-95 II	200	7
BAM300-95	300	10.5
BAM400-95	400	14
BAM600-95 II	600	21
BAM800-95	800	28
BAM1000-95	1000	3
BAM1500-95	1500	52.5
BAM2000-95	2000	70
BAM2500-95	2500	87.5
BAM3000-95	3000	105
BAM3500-95	3500	122.5

Main Parameters Table for BAM-B Type Membrane Nitrogen Generation, Purity 97%

Model	N Production (Nm ³ /h)	Effective Gas Consumption (Nm ³ /min)	Air Purification System
BAM10-97	10	0.44	BA-0.5
BAM20-97	20	0.87	BA-1 two
BAM40-97	40	1.8	BA-2
BAM60-97	60	2.7	BA-3
BAM100-97	100	4.5	BA-6
BAM150-97	150	6.6	BA-8 two
BAM200-97	200	8.7	BA-10
BAM300-97	400	17.5	BA-20
BAM600-97	600	26.5	BA-30
BAM800-97	800 two	35.5	BA-40
BAM1500-97	1500	67.5	BA-80
BAM2000-97	2000	90	BA-100
BAM2500-97	2500	112.5	BA-120
BAM3000-97	3000	135	BA-150
BAM3500-97	3500	157.5	BA-170

Main Parameters Table for BAM Standard Type Membrane Nitrogen Generation, Purity 99.5%

Model	N ₂ Production (Nm ³ /h)	Effective Gas Consumption (Nm ³ /min)	Air Purification System
BAM5-295	5	0.42	BA-0.5
BAM10-295	10	0.82	BA-1
BAM20-295	20	1.6	BA-2
BAM40-295	40	3.3	BA-6
BAM60-295	60	5	BA-6
BAM80-295	80	6.6	BA-8
BAM100-295	100	8.3	BA-10
BAM150-295	150	12.5	BA-16
BAM200-295	200	16.5	BA-20
BAM300-295	300	24.5	BA-26
BAM400-295	400	32.8	BA-40
BAM500-295	500	41	BA-50

Note: The above data are based on a design benchmark of 0.8 MPa (G), 99.5% raw material nitrogen, ambient temperature 20℃, 0-meter elevation, and 80% relative humidity

VPSA Vacuum Pressure Swing

VBAO VPSA Oxygen Generator

The VPSA (Pressure Swing Adsorption) vacuum desorption oxygen generator mainly consists of a blower, vacuum pump, switching valve, adsorber, and oxygen balance tank. Raw air is pressurized by a Roots blower and enters the adsorber, which is filled with oxygen molecular sieves. Moisture, carbon dioxide, and nitrogen are adsorbed to produce oxygen. When a certain adsorption level is reached, a vacuum pump is used to evacuate the system, and the adsorbed moisture, carbon dioxide, nitrogen, and small amounts of other gases are extracted and discharged into the atmosphere, regenerating the adsorbent. The above process steps are automatically controlled by a PLC and switching valve system.

Main Technical

+Oxygen production 100-5000 Nm ³ /h	
+Oxygen Purity	70~94%
+Outlet pressure ≤20KPa (can be boosted)	
+Annual operating rate	≥95%



Main Technical

Model	Oxygen production Nm ³ /h	Oxygen purity%	Oxygen pressure Kpa	Unit power consumption min Kwh/m ³ O ₂	Start-up time	Annual operating rate %	Installed power KW		Cooling water consumption m ³ /h	Floor space m ²
							10KV	380V		
VBAO-200	200	90-93	10~20	0.36-0.38	≤45	≥95	118	380V	6	15×15
VBAO-250	250						150	380V	6	15×15
VBAO-300	300						177	380V	6	15×15
VBAO-350	350						206	380V	7	16×15
VBAO-400	400						220	380V	7	16×15
VBAO-450	450						235	380V	8	16×15
VBAO-500	500						260	380V	8	18×15
VBAO-600	600						275	380V	9	18×15
VBAO-800	800						390	380V	9	18×15
VBAO-1000	1000						487	380V	10	21×15
VBAO-1300	1300						650	380V	11	21×18
VBAO-1500	1500						780	380V	12	21×18
VBAO-2000	2000						960	380V	14	24×18
VBAO-2500	2500						1215	380V	16	24×20

Note: Instrument air pressure 0.5~0.6MPa, dew point -20~-40°C; cooling water pressure ≥0.2MPa, temperature ≤32°C, water quality is industrial circulating water (floor space dimensions are subject to final design)

Application

- ◎Metallurgical industry: Electric arc furnace steelmaking, blast furnace ironmaking oxygen enrichment
- ◎Non-ferrous metallurgical industry: Lead smelting, copper smelting, zinc smelting, aluminum smelting
- ◎Environmental protection industry: Drinking water treatment, waste gas treatment, pulp bleaching
- ◎Chemical industry: Various oxidation reactions, ozone production, coal gasification
- ◎Medical industry: Oxygen bars, oxygen therapy, sports health care
- ◎Aquaculture industry: Marine and freshwater aquaculture
- ◎Other industries: Fermentation, cutting, glass furnaces, air conditioning, waste incineration



Application areas and comparison with cryogenic methods

Project categories	Cryogenic air separation oxygen production unit	Pressure Swing Adsorption Vacuum Desorption Oxygen Generator
Separation Principle	Air is liquefied, and separation is achieved based on the different boiling points of oxygen and nitrogen.	Pressure adsorption and vacuum desorption are used to achieve separation by utilizing the different adsorption capacities of oxygen and nitrogen.
Process Characteristics	Complex process flow, requiring compression, cooling/freezing, pretreatment, expansion, liquefaction, fractionation, and operating temperature below -180 degrees Celsius.	Simple process flow, requiring only compression/vacuum separation; operating temperature is ambient temperature.
Main Features of the Equipment	Many moving parts, complex structure, and many supporting instruments and control components, including centrifugal air compressor (or oil-free air compressor), vapor separator, air purifier, heat exchanger, reciprocating expander, and filter separation tower.	Fewer moving parts, simple equipment, fewer supporting instruments and control components, including blower, adsorption tower, vacuum pump, and oxygen storage tank.
Operational characteristics	Complex operation, cannot be started immediately upon use. Because it operates at ultra-low temperatures, the equipment must undergo a pre-cooling start-up and a period of ineffective energy consumption (low-temperature liquid accumulation and heating purging) before being put into normal operation. The longer and more frequent the start-up and shutdown times, the higher the unit energy consumption of the finished gas. Operators require extensive specialized technical training and rich practical experience.	Simple operation, start-up and shutdown as needed. Operation control and monitoring are all implemented by PLC, with short start-up and shutdown times, less than 5 minutes. Furthermore, continuous operation and shutdown for extended periods will not affect the operating conditions. No need for regular shutdown for inspection and maintenance. Operators can start operating the equipment after a short technical training period.
Scope of application	Requires multiple gas products including oxygen, nitrogen, and argon; oxygen purity greater than 99.5%.	Extracts a single gas with a purity of 90-95%.
Maintenance characteristics	Centrifugal air compressor, condensing steam engine, and expander have high requirements and specifications; maintenance of heat exchangers in the fractionation tower requires specially trained and experienced personnel.	Maintenance of blowers, vacuum pumps, and programmable valves is routine and can be performed by ordinary maintenance personnel.
Civil Engineering and Installation Features	The unit is complex and occupies a large area, requiring a dedicated plant. The separation tower requires a freeze-proof foundation, resulting in high construction costs. An installation team with experience in air separation is required; the installation cycle is long, the difficulty is high (for fractionation towers), and the installation cost is high.	The unit has a small external structure, saves space, and can be installed using conventional methods with a short installation cycle and low cost.
Automatic Program Safety	With multiple units, especially when using high-speed turbine expanders, malfunctions can easily affect the normal operation of the equipment. Skilled operators are required for supervision. Operation at extremely low temperatures or even high pressures poses a risk of explosion, as evidenced by numerous cases.	After startup, it can operate fully automatically and unmanned. Because it operates at normal temperature and low pressure, there are no unsafe factors. There is no risk of explosion, as evidenced by numerous cases.
Purity Adjustment	Inconvenient purity adjustment, high oxygen production cost	Convenient purity adjustment, low oxygen production cost
Oxygen production cost	Energy consumption ~1.25kwh/m ³	Energy consumption less than 0.35kwh/m ³
Total investment	High investment	Low investment

Blower-type Thermal Regeneration Adsorption

Waste heat regeneration dryer: A new type of adsorption dryer, which is neither a heated regeneration type nor a heatless regeneration type, but a temperature and pressure swing adsorption type. It uses the heat of the high-temperature exhaust gas from the air compressor to directly heat the regenerating desiccant, so that the adsorbent is completely regenerated. Therefore, it can make full use of its own energy and has energy-saving effect.

Compressed air waste heat regeneration dryer has a double tower structure. The towers are filled with adsorbent. When one adsorption tower is performing the drying process, the other adsorption tower is performing the desorption process. The compressed air waste heat regeneration dryer mainly consists of the following equipment: two alternating adsorption towers, a silencer system, an air cooler, a vapor-liquid separator, optional auxiliary electric heating system, a switching valve, a control system, and an air source processing unit, etc.



Refrigerated Air Dryer

The refrigerated dryer is based on the principle of refrigeration dehumidification. It uses an evaporator to exchange heat with hot, humid compressed air, causing the gaseous moisture in the compressed air to condense into liquid water. This liquid water is then separated by a gas-liquid separator and discharged outside the machine.



Heatless Regenerative

The heatless regeneration compressed air dryer is based on the principle of pressure swing adsorption, using a microporous desiccant to adsorb water molecules and dry compressed air.



Micro-heat Regenerative Adsorption

This product combines the advantages of both hot and heatless regeneration methods. The regenerated gas regenerates the desiccant after being heated, which improves the regeneration effect and reduces the amount of gas consumed during regeneration.



Combined low dew point dryer

The combined low dew point compressed air dryer (abbreviated as: combined dryer) is a low dew point drying device that integrates a refrigerated dryer and an adsorption dryer.

The refrigerated dryer has the advantages of no air loss and low energy consumption, while the adsorption dryer has the advantage of a low dew point.

The combined low dew point dryer developed by our company combines the advantages of both refrigerated dryers and adsorption dryers. Through reasonable pipeline connections and capacity matching, it maximizes the advantages of both and achieves the highest cost performance.

The combined dryer mainly combines a refrigerated dryer and an adsorption dryer, and sometimes adds corresponding filtration, dust removal, and oil removal devices to make the dryer adaptable to more complex operating environments.



High-efficiency Oil

This system integrates three-stage purification: cyclone separation, pre-filtration, and fine filtration. It directly blocks oil in compressed air. Through cyclone separation, gravity settling, and layer-by-layer filtration of coarse and fine filters, it thoroughly removes oil, water, and dust from compressed air. The filtration accuracy of the treated compressed air can reach 0.1um, and the residual oil content is less than 0.01PPm.



High-efficiency Oil-water Separator

Integrating cyclone separation and condensation filtration for two-stage purification, it directly intercepts oil and water in compressed air. Through cyclone separation, inertial collision, and gravity settling, it removes $\geq 98\%$ of oil, water, and dust from compressed air.



Precision Filter

This product mainly removes oil, liquid water mist, and dust from compressed air. It features high efficiency, ease of use, and low operating costs. This product is divided into different stages: C, Three levels: T and A. Level C filtration accuracy is $\leq 3 \mu\text{m}$, removing 99.999% of free water; Level T filtration accuracy is $\leq 1 \mu\text{m}$, removing 99.99% of free water; Level A filtration accuracy is $\leq 0.01 \mu\text{m}$, removing 99.9% of free water.



Sterilizing Filter

This filter uses imported hydrophobic polytetrafluoroethylene (PTFE) material to produce sterile compressed air through condensation and separation. It is an ideal gas-organic solvent sterilization filter. It is mainly used in the pharmaceutical, fermentation, food and beverage, brewing, and biological product industries.



Activated Carbon Filter

Activated carbon fiber is used as the filter material, which has strong adsorption performance and can filter out residual oil and odors in compressed air. It is suitable for compressed air purification systems in food, beverage, and pharmaceutical industries. When configuring the system, a Class C, Class T, Class A or other filters need to be installed before it.



