NUZHUO

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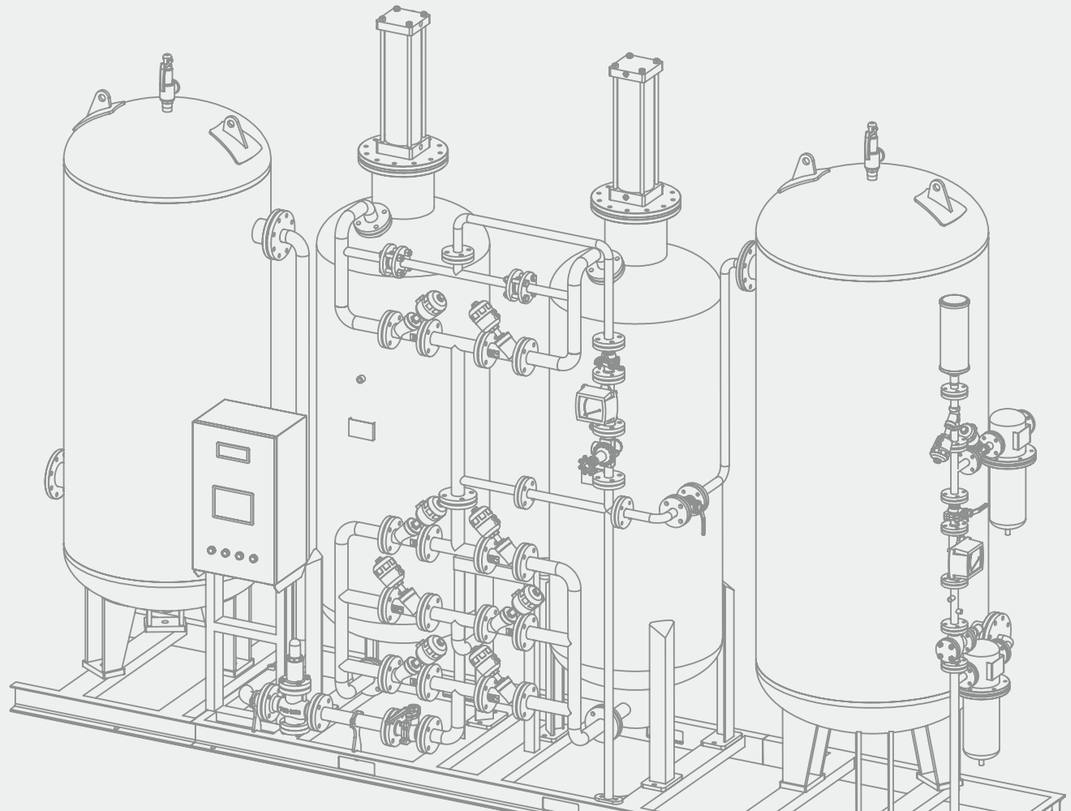
NU ZHUO

Oxygen and nitrogen air separtion unit

Intelligent control valve

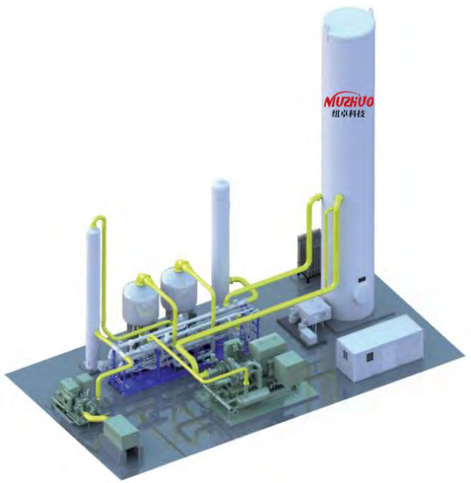
All oil free gas compressor



CRYOGENIC AIR SEPARATION SERIES

WORKING PRINCPLE

The basic principle of air separation is use cryogenic rectification to condense air into liquid and separate the air according to the evaporation temperature of each component. The two–stage rectification tower simultaneously obtains pure nitrogen and pure oxygen at the top and bottom of the upper tower. It is also possible to take out liquid oxygen and liquid nitrogen from the evaporation side and the condensation side of the main cooling respectively. The air separation in the rectification tower is divided into two stages, air is separated for the first time in the lower tower to obtain liquid nitrogen and at the same time obtain oxygen–enriched liquid air. The oxygen–enriched liquid air is sent to the upper tower for rectification to obtain pure oxygen and pure nitrogen. The upper tower is divided into two sections: with the liquid–air inlet as the boundary, the upper part is the rectification section, which rectifies the rising gas, recovers the oxygen component, and purifies the nitrogen purity, and the lower section is the stripping section to remove the nitrogen components in the liquid, separated to improve the oxygen purity of the liquid.



PROCESS FLOW

1.Air Compressor, Air be compressed to 0.5–0.7Mpa by air compressor
2.Pre–cooling, The air is pre–cooled to 5–10, in the pre–cooling unit, and the moisture is separated.
3.Air purification system, Removing the remained moisture, carbon dioxide and hydrocarbons of compressed air in the molecular sieve purifier;
4.Air expansion, The air expands and cools in the turbo expander and provides the cooling capacity required by the device
5.Heat Exchange, The air exchanges heat with the refluxing oxygen, nitrogen, and dirty nitrogen in the heat exchanger of the fractionation tower, and is cooled close to the liquefaction temperature, and the refluxed oxygen, nitrogen, and dirty nitrogen are repeatedly heat exchanged to the ambient temperature.
6.Cooling, Cooling the liquid air and liquid nitrogen before the throttling of the nitrogen in the chiller.
7.Distillation, The air is rectified and separated in the rectification tower, and the product nitrogen is obtained at the top of the upper tower, and the product oxygen is obtained at the bottom of the upper tower.

DEVICE CONFIGURATION

Air Compression System:

Imported centrifugal air compressor, high efficiency, low consumption, stable and reliable operation

Pre–cooling System:

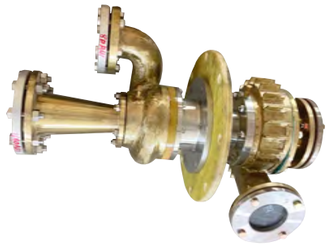
The original imported screw refrigeration compressor and the air–conditioning unit combined with all imported refrigeration components are equipped with a water separator, manual and imported automatic drains to drain water regularly

Air Purification System:

The purifier adopts a vertical single–layer bed with simple and reliable structure and low resistance loss, built–in filter, blowing off and purifier regeneration at the same time, high–efficiency electric heater ensures complete regeneration of molecular sieve

Turbo Expander System:

The turbo expander adopts gas bearing, which is simple and reliable, easy to operate, and high efficiency. The cold box of the expander is set separately for easy maintenance.

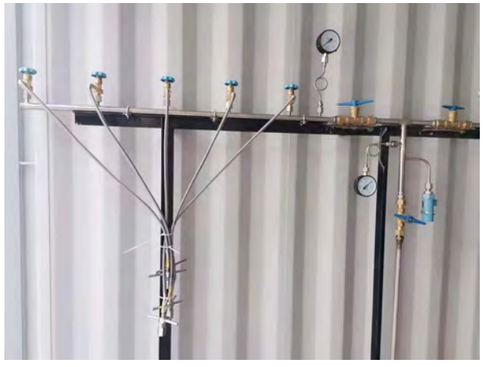


Fractionating Column System (Cold Box):

The heating, cooling, liquid accumulation and purification of the fractionating tower can be completed in one way, and the operation is simple, quick and easy. Adopt aluminum plate–fin heat exchanger, aluminum convection sieve plate tower, the entire fractionating tower equipment pipeline adopts argon arc welding, the tower body and main pipeline in the cold box are made of high–strength aluminum alloy or stainless steel to increase the strength, Reduce the torsion damage of the pipeline. The equipment brackets, pipes and valve brackets in the cold box shall be made of stainless steel or aluminum alloy. The cold box is insulated with pearl sand and slag wool to ensure that the loss of cold capacity is minimized. The cold box structure guarantees the overall strength and the requirements of anti–seismic and wind resistance, and guarantees the load–bearing capacity of the cold box. When the cold box is running, it is equipped with airtight protection and safety devices. The main equipment in the cold box is equipped with electrostatic grounding. The cold valve and pipeline in the cold box all connections are welded, and flange connections are avoided.

O_2, N_2, Ar Booster and Filling System:

Single gas production, Internal compression process (Cryogenic liquid pump, High pressure vaporizer, Filling manifold)
Multi–gas production, External compression process (Oxygen & nitrogen & argon booster, Filling manifold)

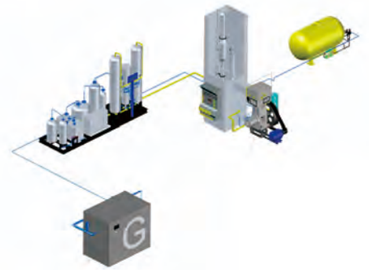


Instrument and Electric Control System:

Siemens imported brand, Fully automatic production system, Digital control system
Equipment layout drawing(according to civil engineering design), Process pipe design drawings, Instrument electrical design drawings, etc.

NZDN High Purity Nitrogen Air Separation Unit

High–purity nitrogen equipment can adopt forward flow and reverse flow, single–tower, double–tower and other process organization methods to meet the requirements of different pressure levels of customers. The whole device can be controlled by DCS or PLC system.



TECHNICAL INDICATORS

High Purity Nitrogen Equipment（NZDN）			
Nitrogen Purity	≥99.9997%	Raw Material Medium	Air
Phase State	Gas Phase	Temperature State	Normal Temperature
Operation Cycle	≥24 Months	Start Time	~ 12 Hours

SPECIFICATIONS CLASSIFICATION

Model	Unit	NZDN -200	NZDN -300	NZDN -400	NZDN -700	NZDN -1000	NZDN -1600	NZDN -3000
Nitrogen Production	Nm^3/h	200	300	400	700	1000	1600	3000
Liquid Nitrogen Production	L/H	/	10	10	20	40	60	150
Nitrogen Purity	$PPmO_2$	≦3	≦3	≦3	≦3	≦3	≦3	≦3
Nitrogen Pressure	MPa.A	0.34~1	0.34~1	0.34~1	0.34~1	0.34~1	0.34~1	0.34~1
Device Occupied Area	m^2	95	150	220	260	300	320	410

NZDO Cryogenic Oxygen Air Separation Unit

The cryogenic oxygen production & oxygen&nitrogen production process introduces a low-pressure process into the air separation equipment, which reduces the energy consumption of the air separation and improves the safety of operation. Corresponding chemical software is used in process calculation and unit equipment design for process distillation calculation and structure calculation to ensure advanced and reliable equipment.

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The company designed and developed a skid-mounted purification system to minimize on-site piping installation time

TECHNICAL INDICATORS

Cryogenic Oxygen Air Separation Unit（NZDO）			
Name	Oxygen Gas	Pressure	20MpaG（Adjustable）
Purity	≥99.6%	Operation Cycle	12 Months
Start Time	~ 24 Hours	Single Column, Internal compression Process	

Cryogenic Oxygen&Nitrogen Air Separation Unit（NZDON）			
Name	Oxygen&Nitrogen Gas	Pressure	20MpaG(Adjustable)
Oxygen Purity	≥99.6%O_2	Nitrogen Purity	≥99.99%
Start Pressure	1.0MPaG	Double column, External compression Process	

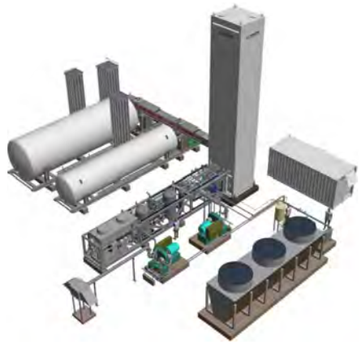
SPECIFICATIONS CLASSIFICATION

Model	Unit	NZDON -50-50	NZDON -80/160	NZDON -180-300	NZDON -260-500	NZDON -350-700	NZDON -550-1000	NZDON -750-1500	NZDONAR-1200-3000-30Y
Oxygen Production	Nm^3/h	50	80	180	260	350	550	750	1200
Oxygen purity	$\%O_2$	≧99.6	≧99.6	≧99.6	≧99.6	≧99.6	≧99.6	≧99.6	≧99.6
Nitrogen Production	Nm^3/h	50	160	300	500	700	1000	1500	2000
Nitrogen Purity	$PPmO_2$	≦10	≦10	≦10	≦10	≦10	≦10	≦10	≦5
Liquid Argon Production	Nm^3/h	—	—	—	—	—	—	—	30
Liquid Argon Purity	$PpmO_2$+ $PPmN_2$	—	—	—	—	—	—	—	≦1.5$PpmO_2$ +4$PPmN_2$
Liquid Argon Pressure	MPa.A	—	—	—	—	—	—	—	0.2
Unit Consumption	Kwh/ Nm^3O_2	≦1.3	≦0.85	≦0.68	≦0.68	≦0.65	≦0.65	≦0.63	≦0.55
Device Occupied Area	m^2	145	150	160	180	250	420	450	800

NZDONAr-Y Cryogenic Liquid Air Separation Unit

Liquid air separation equipment requires more cooling capacity than gas air separation equipment.

According to the different production of liquid air separation equipment, we adopt a variety of different refrigeration cycle processes, turbine expander refrigeration, low temperature pre-cooling refrigeration, circulating compressor high and low pressure expander refrigeration, etc., through various methods to achieve reduction Energy consumption goals. The control system adopts DCS or PLC control system, and auxiliary field instruments, so that the whole set of equipment is simple to operate, stable and reliable.



SPECIFICATIONS CLASSIFICATION

Model	Unit	NZDO -180y	NZDO -250y	NZDO -400y	NZDON-1200y/300y	NZDONAR -1300y/200y/40y	NZDONAR -2700y/300y/90y
Liquid Oxygen Production	Nm^3/h	180	250	400	1200	1300	2700
Liquid Oxygen Purity	$\%O_2$	≧99.6	≧99.6	≧99.6	≧99.6	≧99.6	≧99.6
Liquid Oxygen Pressure	MPa.A	0.2	0.2	0.2	0.2	0.2	0.2
Liquid Nitrogen Production	Nm^3/h	—	—	—	300	200	300
Liquid Nitrogen Purity	$PPmO_2$	—	—	—	≦5	≦5	≦5
Liquid Nitrogen Pressure	MPa.A	—	—	—	0.5	0.5	0.5
Liquid Argon Production	Nm^3/h	—	—	—	—	40	90
Liquid Argon Purity	$PpmO_2$ +$PPmN_2$	—	—	—	—	≦1.5$PpmO_2$ +4$PPmN_2$	≦1.5$PpmO_2$ +4$PPmN_2$
Liquid Argon Pressure	MPa.A	—	—	—	—	0.2	0.2
Device Occupied Area	m^2	250	300	350	850	-4000	-4500