Nitrogen Psa Unit For Nitrogen Production Pressure-Swing Adsorption

Our Product Introduction

Basic Information

- Place of Origin: SUZHOU, CHINA
- Brand Name: SUMAIRUI GAS
- Certification: ISO9001, CE, BV, SGS, TUV, ASME, GOST,NB,NR ETC
- Model Number: OSP
- Minimum Order Quantity: 1 set
- Price: Negotiable
- Packaging Details: Exporting wooden case /Film packing
- Delivery Time: 30-45 days
- Payment Terms: L/C, T/T, Western Union, MoneyGram
- Supply Ability: 100 sets/months

Product Specification

- Flow: 20-1000Nm3/hr
- Purity: 99.99%-99.999%
- Dew Point: -80
- Pressure: 5-200 Bar
- Control Type: PLC Control
- Instrument: Included
- Mannometer: Included
- Oxygen Analyzer: Included
- Material: Stainless Steel
- Certificates: CE, ISO, ASME, GOST, KGS, NB Etc
- Medium: Clean N2
- Display: HMI
- Alarming System: Included
- Flow Meter: Included
- Customized: Yes

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Product Description

500 PSI portable N2 nitrogen generator used for laser cutting machine with nitrogen bottles system

Nitrogen production that is carried out using pressure swing adsorption (PSA) technology over a carbon molecular sieve (CMS) is considered to be a mature, cost-effective and highly efficient method to produce nitrogen to meet a wide range of purity and flow requirements. Ongoing increases in efficiency in PSA-based nitrogen-generation facilities are being driven by enhanced CMS materials (Figure 1) and process improvements. This article provides an overview of the fundamentals of PSA-based nitrogen generation, while focusing specifically on innovative practices and improved CMS materials. Together, these advances contribute to continuous improvement in PSA system performance, giving chemical process industries (CPI) plant operators a proven way to produce a reliable and low-cost supply of high-purity dry nitrogen onsite.

FIGURE 1. Carbon molecular sieve (CMS) pellets, typically manufactured from coconut shells, provide the surface area and pore structure needed to separate oxygen and nitrogen from a compressed air inlet stream

Nitrogen — in both the gaseous and liquid state — is used in a wide range of applications in many industrial sectors. These include the production of foods and beverages, chemicals and pharmaceuticals; petroleum processing; the thermal treatment of metals; the manufacture of flat glass, semiconductors and electronics; and many more. Industrial facilities that require large volumes of nitrogen always look for efficient methods of onsite nitrogen production to meet all of the specifications related to purity, flow requirements, power consumption, footprint and portability

Nitrogen gas is produced by separating air into its primary component molecules (nitrogen and oxygen), using one of two methods: 1. Traditional cryogenic fractionation of air that has been liquefied; or 2. Separation of gaseous air using pressure swing adsorption (PSA) or membrane-based separation systems. If large volumes of nitrogen with extremely high purity (99.998%) are required, cryogenic fractionation of air remains the most efficient and economical technology option [2]. This is the oldest method of nitrogen production, and it has the ability to produce both gaseous and liquid nitrogen (for daily use and as a backup supply). Cryogenic fractionation of air is typically carried out in large-scale commercial plants that then deliver the produced nitrogen to users.

However, at many CPI facilities, enriched nitrogen is produced onsite using smaller-scale PSA separation or membrane-based separation systems. PSA systems operate on the principle of physical adsorption of the oxygen in air by carbon molecular sieve materials (such as those shown in Figure 1), leaving an enriched nitrogen stream as the product; the process is illustrated in Figure 2. Today's PSA systems can economically produce nitrogen from compressed air at a variety of volumes. For instance, today's systems can handle an inlet air stream of less than 5,000 to more than 60,000 std. ft3/h, reliably producing N2 that meets purity requirements from 95 to 99.9995%

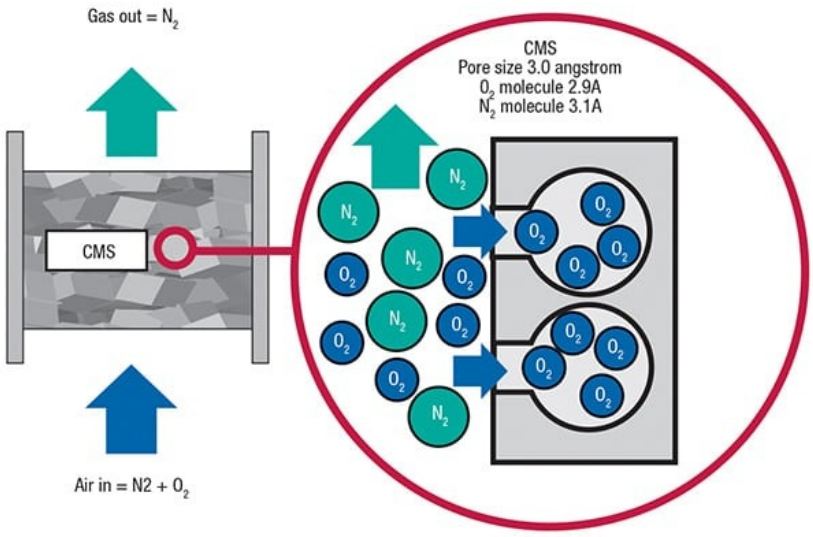

FIGURE 2. Within the CMS pellets, oxygen is preferentially adsorbed, allowing a nitrogen-rich product stream to be captured for use onsite

However, the capital and operating costs of a PSA system are directly correlated with the purity of the nitrogen produced, and these costs climb rapidly once nitrogen with purity greater than 99.5% is required. In some cases, it can be cost-effective to produce higher-purity nitrogen by first producing 99.5%-purity nitrogen using a PSA system, and then using a palladium or copper unit to remove residual levels of oxygen in the nitrogen product. Such systems can bring down residual oxygen to 1–3

ppm.

SELECTING THE RIGHT SYSTEM
When selecting the most appropriate nitrogen-production process, several parameters should be considered. Purity and capacity are the most important factors that can affect the choice of production methodology, and hence, have a direct impact on the unit cost of the nitrogen produced. The use of a PSA nitrogen-generation system, which can be designed to meet all types and patterns of nitrogen flow — steady, periodic and erratic — has grown in popularity during the last several decades, thanks to the simplicity, performance, flexibility, reliability and relatively low capital and operating costs of this production route. However, the optimal nitrogen-production rate using a PSA system based on CMS pellets is around 3,000 Nm3/h of N2 produced (>95% purity). Within that range, PSA is a more economical option than O2/N2-separation by air liquefaction and cryogenic separation, or by membrane-based separation. The principles of PSA-based nitrogen-generation technology using CMS and several important aspects of process engineering knowhow are discussed below.

CARBON MOLECULAR SIEVES
CMS is part of a special class of activated carbons that have non-crystalline (amorphous) structure with a relatively narrow pore-size distribution. This material provides molecular separations based on the rate of adsorption of nitrogen, rather than the differences in adsorption capacity between oxygen and nitrogen. Figure 2 shows the inner structure of a CMS material that is appropriate for the separation (removal) of O2 molecules from N2 molecules in the compressed-air inlet, to yield an enriched nitrogen stream (Note: Carbon molecular sieves are selective for oxygen, while zeolite molecular sieves are selective for nitrogen).

The Benefits of an Onsite Nitrogen Generating System

Benefits compared to previous models
Higher quality materials
Lower energy consumption
Shorter lead time
Longer N2 generator lifetime
How did we do it
Simplification – 80% less parts used in our production process
Automation – state-of-the-art welding and bending robots
Modular isolation – two standard size PSA pressure vessels for all capacities
Service and maintenance
A smaller power consumption requires a smaller compressor. As a result, you will not only save on energy but also on running/service costs of the compressor. Furthermore, the stainless-steel valves have a longer lifetime than brass.

Model of OSP High purity PSA nitrogen generator

Item	Nitrogen purity (Nm3/hr)							Dimensions	Weight
	95%	99%	99.5%	99.9%	99.99%	99.995%	99.999%	(L*W*H) mm	KG
OSP5	21	13	11	8	5	4.2	3	1100*600*1700	300
OSP10	38	29	25	15	10	7.5	6.1	1200*650*1800	350
OSP20	80	56	52	32	20	16	14	1600*1000*2200	450
OSP40	160	116	105.2	67.2	40	34	28	1800*1000*2200	600
OSP60	252	174	157.8	100.8	60	51	45	1900*1200*2200	750
OSP80	339.2	232	211	132	80	70	62	2000*1200*2400	980
OSP100	420	290	263	168	100	90	78	2100*1600*2500	1300
OSP150	630	435	394.5	252	150	135	120	2500*1800*2600	1600
OSP200	848	580	526	336	200	180	160	2800*1900*2850	2200
OSP250	1060	725	657.5	420	250	225	200	3100*2000*3200	2600
OSP300	1270	870	780	500	300	260	240	3900*2600*3400	3850
OSP400	1696	1160	1052	672	400	360	320	4500*3250*3600	5000
OSP500	2120	1450	1300	840	500	450	400	4900*3600*3800	6500
OSP600	2540	1740	1578	1000	600	540	480	5300*3600*3900	7800
OSP800	3390	2320	2100	1340	800	720	640	5600*3900*4100	10200
OSP1000	4240	2900	2630	1680	1000	900	800	5800*4000*4500	11800

Design reference :

Compressed air inlet pressure 7.5 bar(g)/108 psi(g)
Air quality 1.4.1 according to ISO 8573-1:2010
Nitrogen outlet pressure 6 bar(g)/87psi(g)
Nitrogen quality 1.2.1 according to ISO 8573-1:2010.
Designed working temperature max 50
Dew point at Nitrogen outlet - 40

Notes:

OSP nitrogen generator max working pressure 10 bar(g)/145psi(g)
Following request of PSA on-site nitrogen generator will be customized :
Working pressure 10 bar(g)/145 psi(g)
Dew point - 50
Plug and play
Movable/containerized
Other special requirements as per site conditions

Nitrogen Generator Applications

Here are the five most popular nitrogen generator applications in the industrial industry.

Food Packaging

Modified Atmosphere Packaging (MAP) with nitrogen and nitrogen-CO2 gas mixes are often used in the food packaging industry to preserve perishable items by preventing spoilage, ensuring freshness, maintaining flavour, and extending the product shelf life. Onsite nitrogen generation is highly beneficial in the food packaging industry to maintain a quality product. Food packagers can save hundreds of thousands of dollars by having an onsite system installed.

Beverage Storage, Transport, and Dispensing

Like the food industry, the beverage industry can also improve from having onsite nitrogen generating systems. These systems make it more efficient to transport beverages to end users such as juice packagers, vintners, breweries, and other manufacturers of beverage dispensing systems.

Laser Cutting

The success of a laser cutter depends on a lean and efficient shop, which is why it is highly beneficial to generate your own nitrogen onsite. If you are currently purchasing high-pressure cylinder gas, you can achieve incredible cost savings by switching to a local system. Bulk liquid nitrogen systems for laser cutting typically have purge losses of up to 20% of the gas you are purchasing. An onsite nitrogen generator will eliminate these costly purge losses.

Electronics Manufacturing and Soldering

Many solder applications require high-purity nitrogen to reduce dross on solder spots and reduce surface tension. High-purity nitrogen allows solder to cleanly breakaway from the solder site. Having an onsite nitrogen generating system is the most cost-effective way to meet your nitrogen requirements.

Fuel and Chemical Tank Inerting

The ideal inert gas for blanketing or purging fuel and chemical tanks is nitrogen. Having an onsite nitrogen system will reduce your costs and allow you to have a 24/7 nitrogen supply to meet your requirements.

Nitrogen Generator Services from SUMAIRUI GAS

Onsite nitrogen generators are extremely efficient and cost-effective for various industrial applications. By installing an onsite system, all you need to focus on is maintenance, while your investment pays for itself over time. We offer the following nitrogen generator services:

Maintenance Services

For help with installation, our team offers around-the-clock service support. If you require maintenance for your existing system, we will ensure that your nitrogen generator is running in great condition, so you can get back to your operations. For nearly three decades we have been helping our clients significantly reduce their industrial nitrogen and oxygen costs by utilizing leading-edge technologies such as onsite nitrogen and oxygen generating systems. We displace the requirement of having to purchase the gas. Instead, we sell our business clients the technology and equipment they need to make their own gas on site.

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