Redundant Membrane Nitrogen Generator 5-3000Nm3/h Custom Capacity

Our Product Introduction

Basic Information

- Place of Origin: CHINA
- Brand Name: GASPU
- Certification: CE
- Model Number: NG
- Minimum Order Quantity: 1set
- Price: Negotiate
- Packaging Details: Plywood or other type
- Delivery Time: 70work days
- Payment Terms: T/T
- Supply Ability: 6set/month

Product Specification

- Name: Membrane Nitrogen Generator
- Condition: New
- Warranty: One Year
- Production Rate: Customized
- Capacity: 5-3000Nm3/h
- Type: Membrane Nitrogen Generator
- Shell: CS
- Pipeline: Stainless Steel
- Highlight: **PLC Redundant Membrane Separation Nitrogen Generator** , **Customized Membrane Separation Nitrogen Generator** , **Customized nitrogen separation membrane**

Our Product Introduction

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Product Description

PLC Redundant Membrane Separation Nitrogen Generator Customized

Product Specifications

Attribute	Value
Name	Membrane nitrogen generator
Condition	New
Warranty	One Year
Production rate	Customized
Capacity	5-3000Nm3/h
Type	Membrane nitrogen generator
Shell	CS
Pipeline	Stainless Steel

Redundant Membrane Nitrogen Generator System: Uninterrupted Purity for Critical Applications

This technical overview details a **high-availability membrane nitrogen generation system** engineered for mission-critical operations where continuous nitrogen supply is paramount. Designed around the principle of inherent redundancy, this system guarantees operational resilience.

Core Concept: True 2x100% Redundancy

Two independent membrane nitrogen generation units are mounted on a single skid.

Each unit is fully capable of delivering 100% of the required nitrogen capacity independently.

Automatic Failover: The system features an intelligent control system (typically PLC-based) that continuously monitors the operational status of each generator. Upon detecting any malfunction or performance degradation in one unit, the system **automatically and seamlessly switches** the nitrogen supply load to the fully operational standby unit. This occurs without manual intervention.

Optional PLC Redundancy: To further enhance system availability and control system resilience, a redundant PLC configuration can be implemented. This ensures that even a failure within the PLC itself does not compromise nitrogen supply continuity.

Working Principle: Selective Permeation

The system utilizes advanced polymer membrane technology for gas separation:

Adsorption & Dissolution: Compressed air enters the membrane separator. Gas molecules are adsorbed and dissolved onto the high-pressure side surface of the hollow fiber membranes.

Diffusion: Driven by the concentration gradient (partial pressure difference) across the membrane wall, molecules diffuse through the polymer material. The rate of diffusion is highly dependent on molecular size and polarity.

Desorption & Separation: Molecules diffuse to the low-pressure side and desorb.**Fast-permeating gases** (smaller molecules & highly polar - e.g., O_2, H_2O vapor, CO_2) pass through the membrane relatively quickly and are vented as the permeate stream. **Slow-permeating gases** (larger molecules & less polar - e.g., N_2, Ar) pass through much more slowly and are retained on the high-pressure side, becoming the purified nitrogen product stream.

Key Advantages of Membrane Separation: No phase change, no moving parts within the separator core, no regeneration chemicals required, relatively low energy consumption, simple operation, low maintenance, and compact footprint.

System Components:

Air Compressor: Provides the necessary compressed air feed.

Refrigerated Air Dryer: Removes bulk moisture to prevent membrane damage.

Filtration System (Coalescing, Adsorbent, Particulate): Removes oil aerosols, trace moisture, and particulates to ultra-low levels, protecting the sensitive membrane fibers.

Redundant Membrane Separators: The core components where nitrogen separation occurs. Each separator is self-contained for redundancy.

Nitrogen Buffer Tank: Stabilizes pressure and flow, providing a small buffer during switchover.

Control Panel (PLC): The intelligent brain managing system operation, monitoring critical parameters (flow, pressure, purity), and executing automatic switchover logic. Optional redundant PLCs maximize control reliability.

Piping, Valves & Instrumentation: Network enabling flow control, isolation, and monitoring.

Key Features & Advantages

Feature	Advantage
True 2x100% Redundancy	Guarantees continuous N_2 supply even during single generator failure, eliminating single points of failure.
Automatic Failover	Seamless switchover (<1 sec typical) upon fault detection, zero operator intervention required.
PLC Control (Redundant Option)	Precise, reliable automation; Redundant PLCs ensure control system resilience.
Membrane Technology	Simple, robust, low-maintenance separation without chemicals or complex regeneration cycles.
Continuous Operation	No downtime for regeneration, unlike PSA systems.
Compact Skid Design	Pre-engineered, pre-piped, pre-wired for faster installation and reduced footprint.
Low Operating Cost	Primarily electrical energy cost; minimal maintenance (filter changes).
High Reliability	Proven membrane technology combined with robust mechanical components & redundancy.

Typical Performance Parameters

Parameter	Typical Specification Range	Notes
Nitrogen Flow Capacity	10 - 500+ Nm^3/h	Per generator unit. Skid capacity = (2x).
Nitrogen Purity	95% - 99.9%	Adjustable based on feed air pressure & flow.
Dew Point	-40°C to -70°C PdP	Achieved by feed air drying quality.
Operating Pressure	7 - 12 barg	Membrane specific. Impacts flow/purity.
Feed Air Quality	ISO 8573-1 Class 1.4.1 or better	Critical for membrane life & performance.
Switchover Time	< 1 second	Ensures uninterrupted downstream flow.
Ambient Temperature	5°C to 50°C	Standard operating range.
Power Supply	380-480VAC, 3Ph, 50/60Hz	Standard industrial.

Technical Specifications

No.	Item	Specification
1	Product Name	**Membrane nitrogen generator**
2	Type	**Membrane**
3	Inlet IA Dew point	Below-20
4	N2 Capacity	5-3000Nm3/h
5	N2 purity	Min95% Max99.5%
6	Material	SS
7	Vessel standard	ASME SEC VIII DIV.1
8	Pipeline standard	ASME B31.3
9	Power	According to design
10	Size	According to design
11	Weight	According to design
12	N2 tank	Option

Equipment Features

Efficient and energy-saving: The membrane separation nitrogen generator adopts advanced membrane separation technology, which has a high nitrogen recovery rate and low energy consumption. Compared with traditional nitrogen production methods, membrane separation nitrogen production machines have significant advantages in energy conservation.

Easy to operate: The membrane separation nitrogen generator is easy to operate and can achieve continuous nitrogen production by simply following the equipment requirements. Meanwhile, the equipment has a high degree of automation, which can reduce manual intervention and operational errors.

Green and environmentally friendly: The membrane separation nitrogen generator does not require the use of any chemical agents or additives in the process of producing nitrogen, nor does it produce any pollutants or waste. It is a green and environmentally friendly nitrogen production method.

Widely used: The membrane separation nitrogen generator is suitable for various industrial fields that require high-purity nitrogen, such as chemical industry, electronics, food, medicine, etc. At the same time, different specifications and models of membrane separation nitrogen generators can be provided according to the different needs of users.

Frequently Asked Questions (FAQ)

Q: What happens if one membrane generator fails?

A: The system's PLC instantly detects the malfunction (e.g., low flow, low purity, pressure drop). It automatically closes valves isolating the failed unit and opens valves to bring the standby unit fully online, maintaining nitrogen supply without interruption. The switchover typically happens in milliseconds to seconds.

Q: Does the nitrogen purity change during switchover?

A: The system is designed to minimize purity fluctuation. The buffer tank provides a small reservoir. The standby unit maintains its operating pressure and flow settings, ready for immediate full-capacity production. Purity dips, if any, are marginal and very brief.

Q: Why choose membrane redundancy over a larger single unit?

A: Redundancy addresses **availability**. A single larger unit becomes a single point of failure. Redundant 2x100% ensures continuous operation during planned maintenance or unexpected failure. It offers significantly higher uptime guarantees.

Q: What maintenance is required?

A: Primary maintenance involves regular replacement of inlet air filters (coalescing, particulate, activated carbon) based on operating hours and environment, plus periodic replacement of membrane modules (typically every 5-10+ years, depending on air quality). The PLC system requires minimal maintenance.

Q: When is PLC redundancy recommended?

A: Specify PLC redundancy for applications where **any** interruption in nitrogen supply, including a PLC hardware fault, is unacceptable. This is common in safety-critical processes, continuous production lines where stoppages are extremely costly, or remote unmanned facilities.

> *This redundant membrane nitrogen generator system represents the pinnacle of reliability for continuous nitrogen supply. By integrating dual, fully independent membrane generators with automatic failover and optional PLC redundancy on a single compact skid, it delivers unparalleled operational uptime and process security. Its reliance on simple, proven membrane separation technology ensures low lifecycle costs and minimal maintenance. This solution is ideal for industries like oil & gas, chemical processing, electronics manufacturing, pharmaceuticals, and food packaging, where uninterrupted high-purity nitrogen is essential for safety, product quality, and operational efficiency.* ***Secure your process continuity with guaranteed nitrogen purity.***

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