Nitrogen Generators

Pressure Swing Adsorption (PSA)

Nitrogen On Demand

Largest Product Offering

Highest Efficiency

Highest Purity

Proven Dependability

Nitrogen Generators — Highlights & System Features

HIGHLIGHTS

√ Proven designs with over 40 years experience, GENERON® s building one of the world's largest portfolio of nitrogen generators with units from 34 Nm3/h / 22 SCFM to 3,200 Nm3/h / 2,030 SCFM.

√ Over 20,000 industrial systems installed worldwide.

√ ISO Certified facilities in Texas and California.

√ Cost advantage of a Generon IGS Nitrogen PSA Generator

- Cost saving of 50% to 300% over Bulk Liquid, Dewars and Nitrogen Cylinders.
- No safety or handling issues with bulky high pressure cylinders or dangers of cryogenic liquids
- No complicated supply contracts with ever escalating charges

SYSTEM TYPES

GENERON supplies two types of PSA Generators:

- Sequential PSA Nitrogen Generators
- Twin Tower Nitrogen Generators

GENERON technical specialist will accurately select and size your system to meet your specific requirements.

OPTIONS

- Refrigerated Dryer
- Oxygen Analyzer
- Product Flow Meter
- Air Receiver Tank
- Nitrogen Buffer Tank
- Bottle Filling Station
- Product Booster Compressor
- Feed Air Compressor
- Enhanced PLC with Telemetry
- Dew Point Analyzer
- Classified or Unclassified Areas
- Skid –Mounted Receiver Vessels

KEY FEATURES

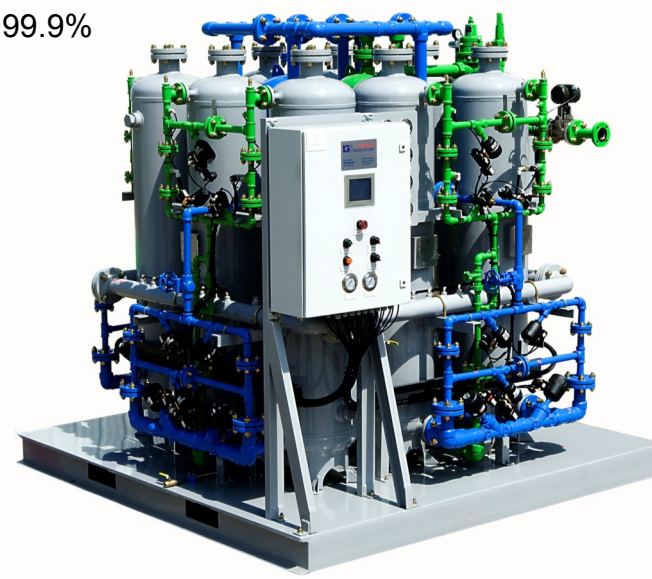
- Purities up to 99.9995%
- Automatic part load operation to 30% of design capacity
- Exhaust Muffler
- PLC Piping & Instrumentation
- Safety Valve
- Nitrogen Pressure and Flow Regulator
- Control System
- Skid Mounted
- Hour Meter
- Air Filters
- Adsorber Vessels
- Fully automated unattended operation
- Pneumatic Valves
- Pressure Switch for automated Idle-Mode

Nitrogen Sequential PSA Series

The Nitrogen Sequential PSA process consists of multiple individual Twin Tower Adsorber Vessels operating on alternating cycles. By utilizing this sequential operation of the individual PSAs, the requirement of large buffer tanks is eliminated from the process.

Input Pressures: up to 1450PSIG (10.3 barg)
Output Pressures: up to 120 PSIG (8.3 barg)
Flows: up to 374,550 SCFH (9,850 Nm3/h) @ 99.9%

Applications include FNLG, FPSOs, Platforms & anywhere high purity nitrogen is needed & space is a factor.

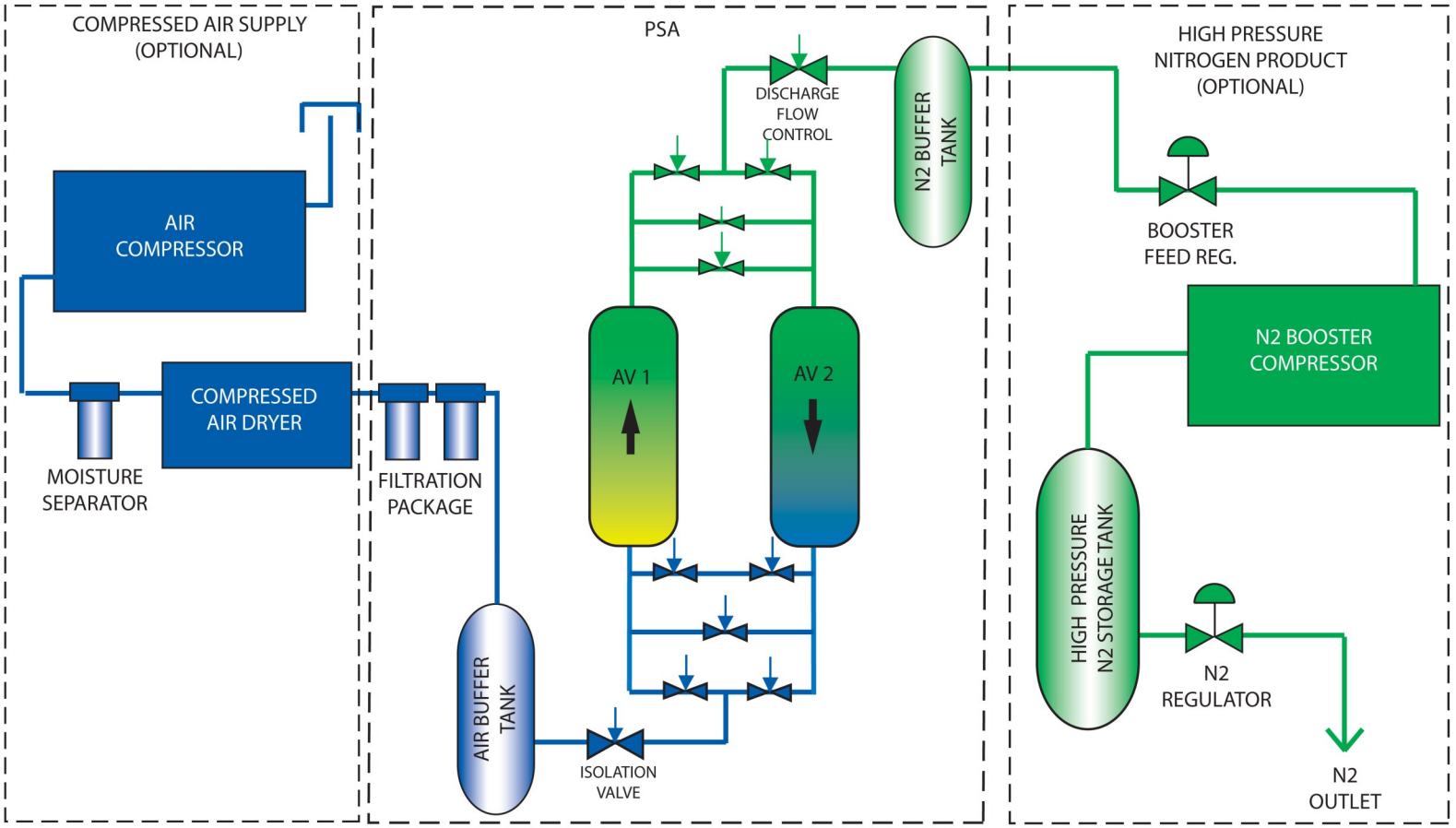


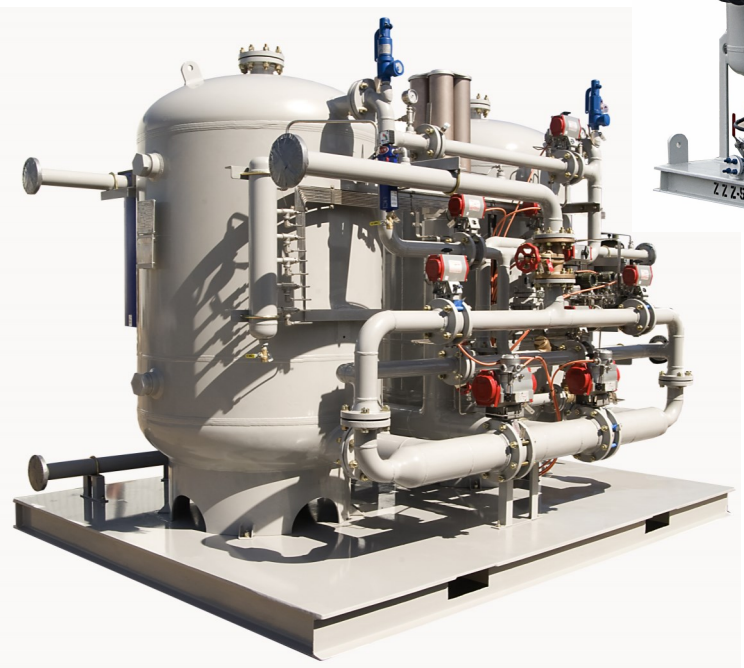
Nitrogen Twin Tower PSA

Using the most efficient Carbon Molecular Sieve on the market to date, our Twin Tower PSA System provides

Input Pressures: up to 150 PSIG (10.3 barg)
Output Pressures: up to 120 PSIG (8.3 barg)
Flows: up to 44,166 SCFH (1,160 Nm3/h)@ 99.9%

Nitrogen Generators—PSA System Components





GENERON has over 40 years experience in the design and manufacturing of Pressure Swing Adsorption (PSA) systems. We're at the forefront of this technology and have the flexibility to provide the right package to meet all customer requirements. GENERON® Nitrogen Generator Systems use the basic principle of passing air over adsorbent material which bonds with oxygen to leave a rich stream of nitrogen.

The adsorption separation is accomplished in the following process steps:

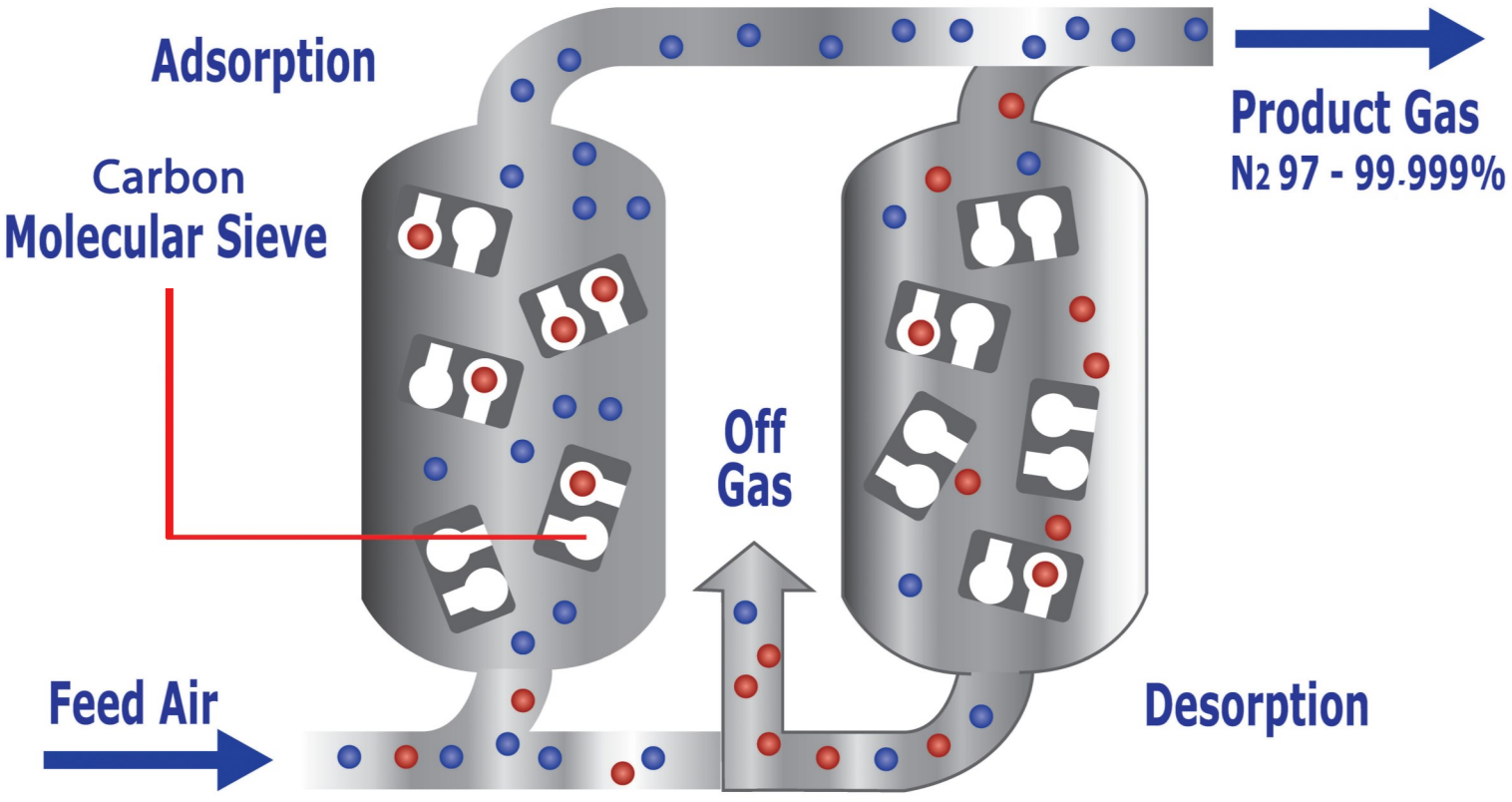
1. **FEED AIR COMPRESSION AND CONDITIONING**
   The ambient (inlet) air is compressed by an air compressor, subsequently dried by an air dryer and filtered before entering the process vessels.

2. **PRESSURIZATION AND ADSORPTION**
   The pre-treated air is passes into a vessel filled with Carbon Molecular Sieve (CMS) where the oxygen is adsorbed preferentially in the CMS pores so that nitrogen with an adjustable purity (down to a residual O2 content of 50 ppm) remains in the gas stream. Before the adsorption capacity of the CMS is fully utilized, the nitrogen separation process is interrupted, and the switching of the adsorber vessels is initiated.

3. **DESORPTION**
   The saturated CMS is regenerated (i.e. the adsorbed gases are released) by means of pressure reduction below that of the adsorption step. This is achieved by a simple pressure release system. The resultant waste stream is vented into atmosphere. The regenerated adsorbent can now be used again for the generation of nitrogen.

4. **NITROGEN RECEIVER**
   Adsorption and desorption take place alternately at equal time intervals. This means that the continuous generation of nitrogen can be achieved with two adsorbers, one being switched at adsorption and the other at regeneration. Constant product flow and purity is ensured by a connected product buffer vessel that stores the nitrogen at purities up to 99.9995% and pressures up to 8.3 bar (g) / 120 PSIG.

5. **NITROGEN PRODUCT**
   The result is a constant stream of on-site produced high purity nitrogen at cost significantly below that of liquid or bottled gases.



Nitrogen Generators — Which Technology to use?

GENERON is in an unique position, where we offer both Nitrogen PSA Systems and Nitrogen Membrane Systems. Our sales and engineering team will be with you to help you decide which technology is right for your application. GENERON has been designing and manufacturing both PSA and Membrane systems for over 40 years.

Generon IGS Selection Chart				
System Type	**Purity**	**Pressure**	**Ease of Operation**	**Ambient Temperature**
Pressure Swing Adsorption (PSA)	PSAs are ideal for generating high purity nitrogen up to 99.999%	Product delivery pressures up to 170 PSIG (11.72 barg)	PSA reliable, having 8 switching valves.	PSA performance declines as temperature rises to a max of 104°F (40°C) (% depending on product purity).
Hollow Fiber Membrane	Membrane Systems are ideal for generating nitrogen between 95% and 99%	Pressures available up to 500 PSIG (34.47 barg)	Membrane systems are relatively simple with no moving parts to maintain	Membrane Systems perform well up to 145°F (63°C) with no performance loss

So Why GENERON?

COST SAVINGS

You can save up to 300% of Nitrogen costs by generating your our nitrogen on-site.

By generating your on nitrogen on site, you can dramatically reduce your nitrogen consumption costs.

Save on:

- Delivery Costs
- Bulk Liquid Evaporation Loss
- Monthly Cylinder / Tank Rental Fees
- Handling and Purchasing Costs
- Site Liability Insurance

RELIABILITY / EXPERIENCE

The key to making the investment in nitrogen Generation equipment is purchasing from a dependable company. GENERON has thousands of systems that have been installed worldwide.

GENERON has over 40 years of experience of designing and manufacturing Pressure Swing Adsorption (PSA) systems. Our systems have are designed for on shore and offshore applications.

Other Generon® Products

Primary Compression Packages

All custom designed to your specifications

Twin Tower Desiccant Air Dryers

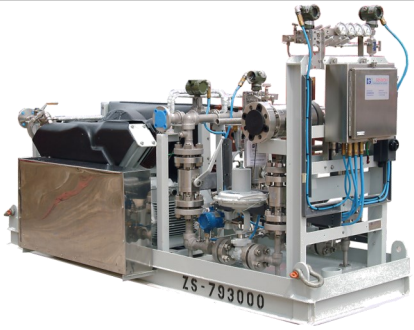
Custom designed to your specifications in the Oil & Gas and Petrochemical Industries.

Nitrogen Membrane Generators

Available in flows up to 4,000 SCFM

Post Compression Packages

Custom designed systems available up to 5,000 PSIG



Process Gas Separation Systems

Membrane and PSA systems available, H2, CH4, CO2, He, SF6

Booster Compressors

Custom systems available to meet your specifications with Zone II rating, Class I, Div II

General Mills
POET Engineering
Airgas
La Fabril
Valley National Gases
Acamp
Omega Nutrition
Dometic USA
Elab
Metal Tech
Seadrill Offshore
Agilent Technologies
Scott Gross Welding
Celta
Advanced Composites
ITASA
Mohawk
BJ Services

General Electric
Spectrum Controls
Delphi
Ecka Granules
Proton Energy
Northwest Equipment
Mahle
DJA
Ansen Corporation
Conelec of Florida
Cenovus Energy
PCC Airfoil
Innomag
Spectrum Controls
Delphi
Ecka Granules
One Source Toxicology
Precision Air Drilling

3M
Ormex
City of Springfield
Micross
Sugar Foods
Criteria Labs
Matheson Trigas
Lacamas Labs
ADM
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