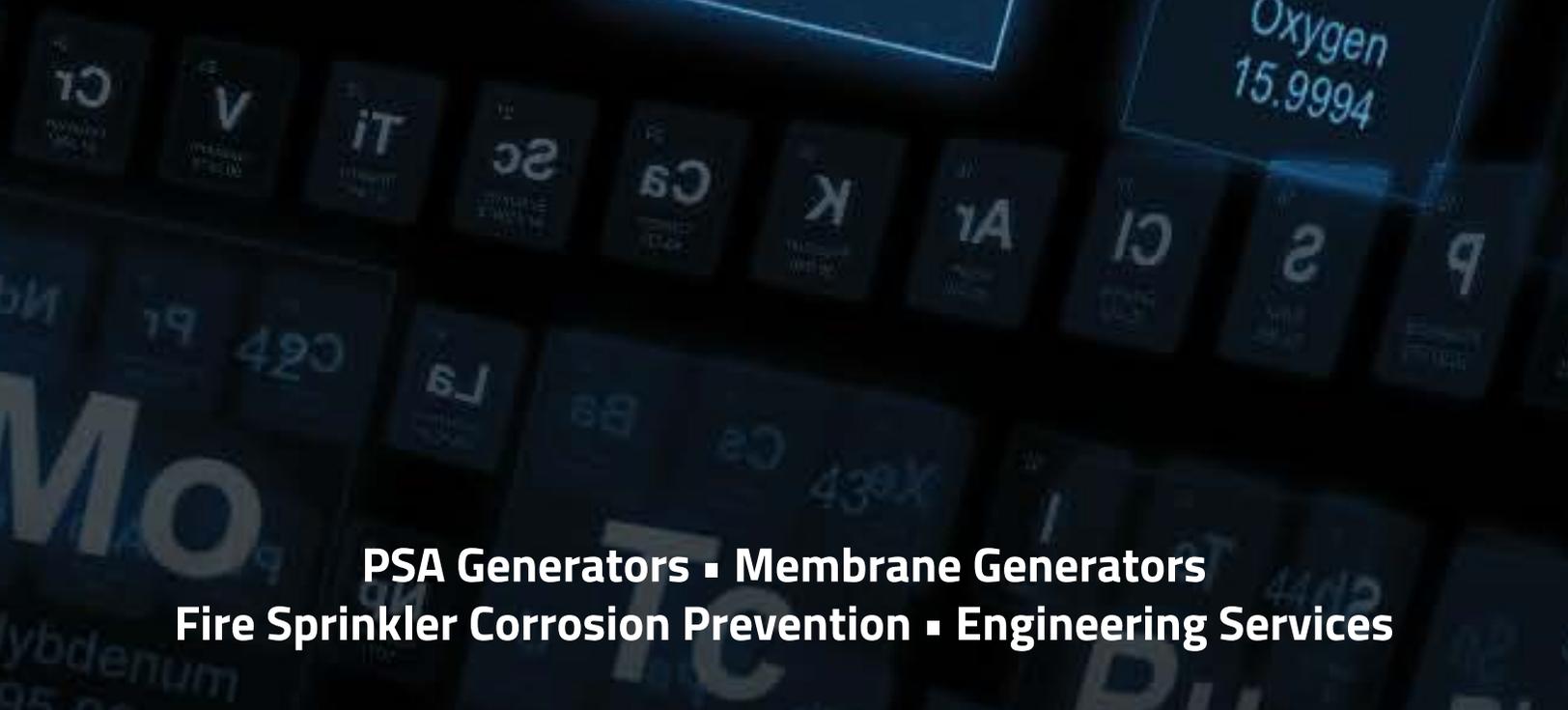


# Holtec Gas Systems



**Leadership & Innovation in  
Nitrogen Generation Systems**



**PSA Generators ■ Membrane Generators  
Fire Sprinkler Corrosion Prevention ■ Engineering Services**



# Welcome to Holtec Gas Systems



Holtec Gas Systems (Holtec) designs, manufactures, and services gaseous nitrogen generators. Our engineering and manufacturing headquarters is located in Chesterfield, Missouri, USA, but our products and services are marketed worldwide. Our designs include both Membrane Separator and Pressure-Swing Adsorption (PSA) technologies and can easily be modified to meet your specific needs. From smaller systems for laboratories or fire sprinkler corrosion prevention systems, to very large, multiple system industrial projects, Holtec has the design that is right for you!

## Design, Implementation, Integration

## Why Generate Your Own Nitrogen?

Many industries are moving away from purchasing costly liquid nitrogen in favor of using self-generated nitrogen gas on demand. Several factors make this an ideal choice.

**Cost** – More and more industries are finding uses for nitrogen. This increased demand has caused a sharp increase in price for delivery of bulk liquid nitrogen and compressed gas cylinders. Producing your own nitrogen is less costly in nearly all circumstances. You can also say goodbye to delivery charges, tank rental fees, and usage contracts!

**Convenience** – You will no longer have to deal with delivery trucks or changing out packs of high-pressure cylinders. Nitrogen will be produced on-demand, as needed. This can be particularly attractive for companies located in inaccessible areas, or at significant distance from gas suppliers.

**Reduced Safety Concerns** – Self-generated nitrogen is generally produced and stored at 85-300 psig. You can forget about the safety concerns associated with liquid nitrogen and gas cylinders stored at 2000+ psig!

**Purity Control** – When you purchase liquid nitrogen, the purity is normally 99.999%  $N_2$  or better. You may not need this level of purity. When you generate your own nitrogen you can control the purity level produced with a great potential for savings.

**Consumption Rates** – With liquid nitrogen systems, some gas is always evaporating, which means you pay for nitrogen even when you are not using it. When producing your own nitrogen, your system is designed to produce at the rate of consumption, and you pay only for the gas you need.

For more information on how Holtec can solve your nitrogen generation needs, please contact us at: +1-636-532-6613 or email to: [sales@holtecllc.com](mailto:sales@holtecllc.com)



HMN-120  
Membrane Nitrogen Generator

With many options available in the market, Holtec stands above the rest with unmatched experience, reliability, efficiency, service, and support.

**Experience** – Our key employees have a combined 140+ years of experience in the field of gas separation. Additionally, Holtec has delivered many nitrogen generators for many different industries in all shapes and sizes: from very small generators which produce a few SCFM of nitrogen to very large systems producing several hundred SCFM of nitrogen.

**Reliability and Efficiency** – We take extra steps to ensure our nitrogen generators will function for many years with minimal unscheduled maintenance. Our strenuous research and development program results in nitrogen generator designs which maximize the value of every dollar spent while providing a very reliable product which uses the least possible amount of compressed air.

**Service and Support** – Holtec is proud to offer a line of standard, competitively priced nitrogen generators. But our role does not begin and end with selling an “off-the-shelf” nitrogen generator. Holtec can help you measure your consumption, select and commission a new system, and maintain the system after installation.

**Custom Systems** – Every nitrogen application is unique. Holtec is proud to offer a line of standard systems, and we can meet many different specifications. Because we are experienced with custom projects and have a standard design to start with, the additional cost of customizations is decreased. Whatever you need, chances are we have done something just like it or similar.

## Why Holtec is a better choice?



HPN-1050HEP  
PSA Nitrogen Generator



# Types of Nitrogen Generation Systems

Holtec Gas Systems manufactures nitrogen generators based on both PSA (Pressure-Swing Adsorption) and Membrane technology. But which technology is right for you? There are many factors in addition to cost which you should consider before choosing the best technology for your application.

## PSA Nitrogen Generators

PSA technology works on the concept of **adsorption** – the process by which a thin layer of molecules temporarily adheres to the surface of materials they are in contact with. A PSA nitrogen generator consists of two or more towers filled with adsorbent material called carbon molecular sieve (CMS). In our PSA nitrogen generators, air drawn from the atmosphere enters one adsorber tower. At higher pressures, the oxygen in the air gets “stuck” to the adsorbent material, allowing the remaining contents, mostly nitrogen, to pass through the system unhindered.

There’s just one problem. Eventually, oxygen molecules will completely cover all the available surface area on the CMS, and you can no longer make nitrogen. However, at ambient pressure, the adsorbent bonds are broken, and all that oxygen (and some N<sub>2</sub>) can be released back into the atmosphere as waste gas, thus regenerating the adsorber tower for use in another cycle. This is why PSA systems have two or more towers. While the first adsorber is regenerating, the second adsorber is actively separating nitrogen. Then the first adsorber comes back on line, and the second adsorber regenerates – and so on.

### A Small Sample of PSA Nitrogen Generators

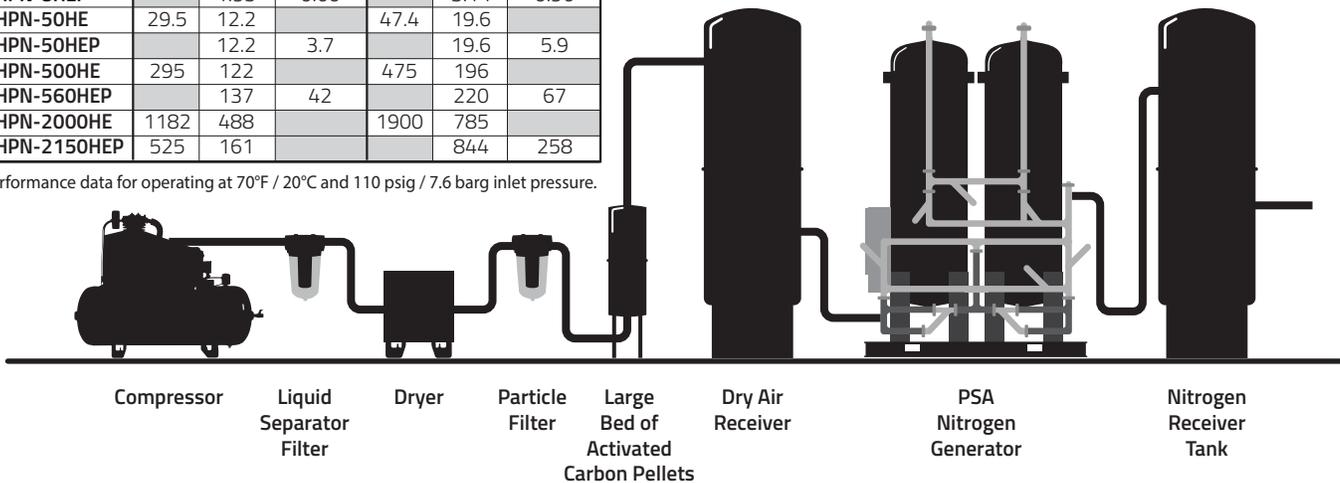
Please contact Holtec to determine the best system for your needs

MODEL	SCFM			Nm <sup>3</sup> /h		
	95%	99.5%	99.999%	95%	99.5%	99.999%
HPN-5HE	2.95	1.22		4.74	1.96	
HPN-8HEP		1.95	0.60		3.14	0.96
HPN-50HE	29.5	12.2		47.4	19.6	
HPN-50HEP		12.2	3.7		19.6	5.9
HPN-500HE	295	122		475	196	
HPN-560HEP		137	42		220	67
HPN-2000HE	1182	488		1900	785	
HPN-2150HEP		525	161		844	258

\*Performance data for operating at 70°F / 20°C and 110 psig / 7.6 barg inlet pressure.

### Typical PSA Process Flow Diagram\*

*\*(Depending on your existing compressed air supply, you may not require compressor, filters, dryer, and /or tanks)*



Standard Two-Bed PSA System



High-Spec Four-Bed PSA System for Power Plant

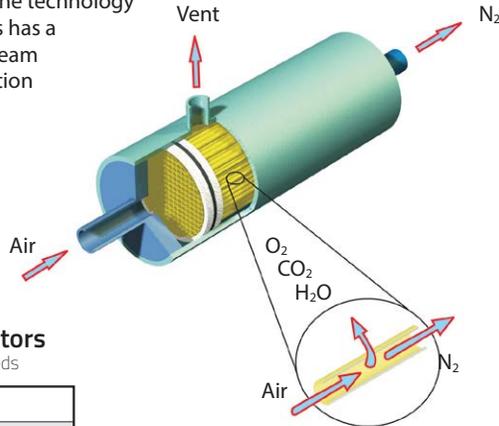


Small Six-Bed PSA System

## Membrane Nitrogen Generators

Membrane nitrogen generators separate nitrogen from the atmosphere by passing compressed air through a permeable membrane. The technology relies on the principle of selective gas permeation. Each gas has a different permeation rate, so as the compressed feed air stream passes across the membrane, the gases with faster permeation rates (such as O<sub>2</sub> and CO<sub>2</sub>) are released back into the air at atmospheric pressure as waste gas (along with some N<sub>2</sub>).

The product nitrogen, now stripped of most of its oxygen and carbon dioxide, passes out the other end of the membrane at a slightly lower pressure for collection or direct use in your application.



### A Small Sample of Membrane Nitrogen Generators

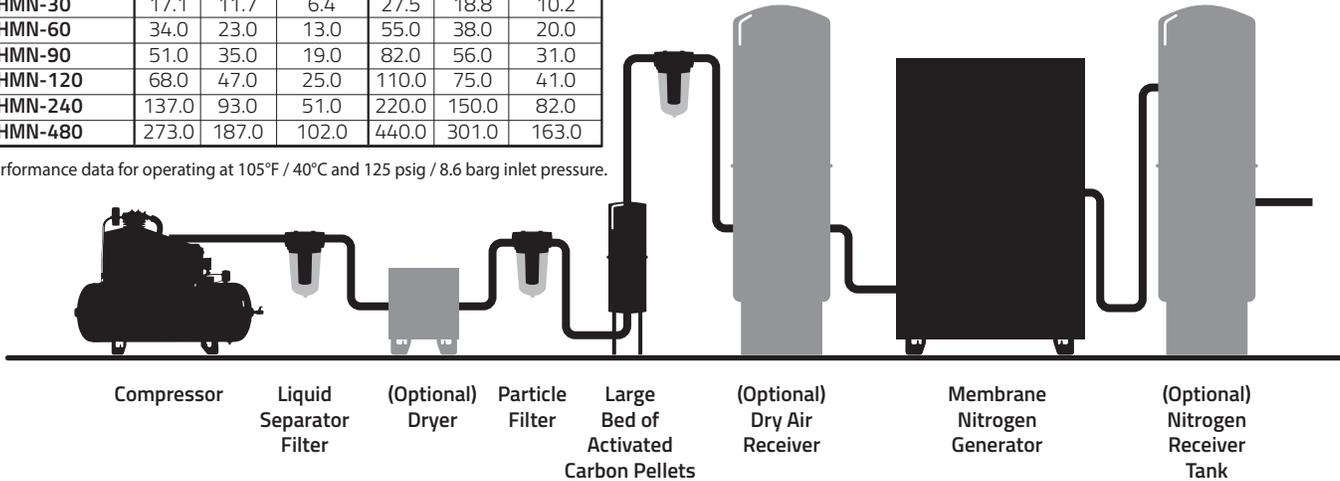
Please contact Holtec to determine the best system for your needs

MODEL	SCFM			Nm <sup>3</sup> /h		
	95%	97%	99%	95%	97%	99%
HMN-7	4.2	2.9	1.6	6.73	4.58	2.50
HMN-12	6.8	4.7	2.5	10.9	7.5	4.1a
HMN-30	17.1	11.7	6.4	27.5	18.8	10.2
HMN-60	34.0	23.0	13.0	55.0	38.0	20.0
HMN-90	51.0	35.0	19.0	82.0	56.0	31.0
HMN-120	68.0	47.0	25.0	110.0	75.0	41.0
HMN-240	137.0	93.0	51.0	220.0	150.0	82.0
HMN-480	273.0	187.0	102.0	440.0	301.0	163.0

### Typical Membrane Process Flow Diagram\*

\*(Depending on your existing compressed air supply, some items may be optional)

\*Performance data for operating at 105°F / 40°C and 125 psig / 8.6 barg inlet pressure.



Containerized Systems for Oil & Gas Company



Small-Footprint Membrane Nitrogen Generator for Power Company



Standard Cabinet-Mounted Membrane Nitrogen Generator

## Fire Sprinkler Corrosion Prevention Systems

### Corrosion in fire sprinkler systems is widespread, costly and disruptive.

Now thanks to Holtec's pioneering work, the cost and operational downtime associated with replacing corroded sprinkler piping can be avoided. With patented and patents-pending innovations, we are at the frontlines in the field of corrosion prevention in fire sprinkler systems. Using a Holtec nitrogen system can virtually eliminate corrosion in both wet, dry, and pre-action sprinkler systems, allowing the use of less costly materials during construction. Self-generated nitrogen gas is the effective and environmentally friendly way of treating this costly problem, and available leasing allows for rapid implementation of the technology.

### The Problem: Leaks Resulting from Corrosion

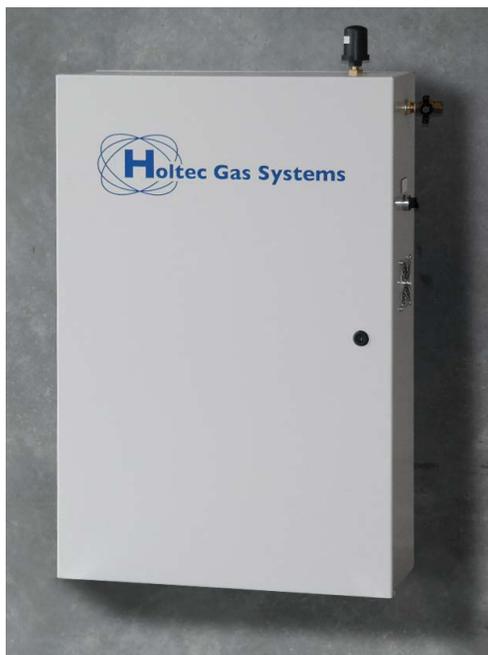
#### Corrosion in Dry Systems

The oxygen content of moist compressed air is by far the main cause of internal corrosion in steel and galvanized steel forming dry/pre-action sprinkler piping. Microbial Induced Corrosion (MIC) is relatively of minor importance.

#### Corrosion in Wet Systems

A wet pipe fire sprinkler system is essentially a number of connected long and narrow vessels mostly filled with stagnant water and periodically drained and re-filled at which time air is trapped under pressure in the higher locations. The result of draining and filling activity is that the oxygen in the trapped air results in corrosion. This leads to production of insoluble corrosion products, focusing corrosion activity which then leads to localized pitting under the debris. There are three main areas/stages of corrosion activity:

- Piping has been drained and exposed to air: Wet metal surfaces have direct access to dissolved oxygen from the 21% that is contained in air, resulting in rapid corrosion.
- In partially filled sections of pipe, at the interface between trapped air and water, corrosion is more severe.
- Under deposits of corrosion products: Localized severe corrosion can occur leading to pitting.



All-in-One, Wall-mounted Nitrogen Generator for Small Sprinkler Systems



All-in-One, Skidded Nitrogen Generator for Larger Sprinkler Systems

### The Solution: Holtec's Nitrogen Inerting Technology

Using dry, inert, and non-corrosive nitrogen gas produced from one of our family of compact nitrogen generators in place of compressed air virtually arrests corrosion. Holtec supplied the first nitrogen generator in the US for protecting pre-action (dry) sprinkler piping from corrosion in mid-2006. Since that time Holtec developed and perfected the use of nitrogen generators specifically tailored to supply inert gas corrosion protection to dry and pre-action fire sprinkler systems. More than 250 Holtec nitrogen generators have been installed in the U.S., Canada, and Europe; protecting more than 50,000 feet of piping and more than 5 million square feet of floor area. Holtec's expertise in the generation and use of nitrogen gas is the accepted standard for solving this problem. Our generators produce nitrogen with only 1% of damaging residual oxygen compared to double that amount (2%), in the nitrogen from competitors generators.

#### Cost-Effective:

- Eliminates damage caused by leakage onto critical facilities and equipment.
- Eliminates costly disruptions and downtime by extending the useful life of sprinkler systems about 20 fold.
- Saves at least 20% of piping costs in new construction by allowing the use of thin-walled black steel piping instead of galvanized steel.
- The option of leasing the equipment from Holtec means peace of mind is within easy reach.
- Eliminates the need for costly and unreliable corrosion monitoring devices and services.

#### Versatile:

- Holtec has a complete range of standard equipment models and the technology to serve the huge range in size variation in dry and pre-action systems.
- Three optional methods of purging to remove residual air are available.
- Nitrogen generators using membrane separation technology are the best choice for most applications. However, Holtec can also use Pressure-Swing Adsorption (PSA) technology where larger or more efficient solutions are desired. (Using less power)
- Holtec's corrosion control systems can also be custom designed for any application and our engineers are happy to consider new or unusual applications.

#### Convenient:

- Most of Holtec's generators are supplied as a single skid for fast, low cost installation.
- Holtec utilizes proprietary design tools to quickly specify and size systems for a "perfect fit" for any application.
- Leasing the equipment from Holtec provides the fastest way to overcome capital budgeting limitations.

#### Clean:

- Holtec nitrogen generator inerting systems use no chemical additives.

Visit our website at [www.holtecllc.com](http://www.holtecllc.com) for more information and a complete data sheet on all models.

### Fire Sprinkler Corrosion Prevention Systems



HCV-M Purging Option for Each Zone



Real Word Results!



SMART Manifold Purging Option for Multiple Zones

2014 **Global Growth Award**

### **Global Needs, Global Reach**

With a few exceptions due to US regulation, Holtec is happy to deliver nitrogen generators to countries all over the world. Our systems are currently in use in over 39 countries (and counting), and on every continent except Antarctica!

Export has always been a significant portion of our business. In 2014, export amounted to more than 50% of the total business. In recognition of this achievement, Holtec was honored by the World Trade Center in St. Louis for its contribution to the global economy with the 2014 Global Growth Award, alongside other honorees Rawlings Sporting Goods and the Danforth Plant Science Center.

Export for 2015 is projected to be similar, and will continue to play a large role at Holtec in years to come.



*"My system has been in service for 5 ½ years. It's one of the best pieces of equipment I've ever purchased."*

Plant Engineer for Toyal America.

*"I would be more than happy to speak in general about the performance of the Holtec nitrogen generator itself as well as the tremendous start-up support that we received from Dale."*

Project Engineer for EPIC Systems, Inc.

*"Our system is working so good, it is invisible. We changed the carbon in the canister on schedule and have not had one second's problem. We have run it at the setting you provided and have had no reason to change."*

US Tool Manufacturing Company

## What Else **Can Holtec Do?**

Holtec has extensive experience designing nitrogen generators for oil & gas applications both on-shore and off-shore.

Offshore Oil & Gas

Holtec has experience repairing customer's existing nitrogen generators, regardless of the brand. Repairs made by Holtec will often make the system even more productive than it was when it was built!

Service, Repair & Refurbish

We sometimes trade in or purchase used nitrogen generators which are no longer wanted. We therefore occasionally have used nitrogen generators for sale. These systems can often be tailored to meet the customer's needs.

Used Systems

If your existing nitrogen generator requires service or if a new system is needed, Holtec will work with you to provide the best solution. We have factory trained technicians for different types of air and booster compressors as well.

Consultation & Needs Assesment



**Filtro Pte Ltd**  
**7 Kallang Place**  
**#04-08 Singapore 339153**  
**Tel: +65-6392 2552 Ext:23**  
**Fax: +65-6392 4456**  
**Website: [www.filtro.com.sg](http://www.filtro.com.sg)**