

GREAT LAKES AIR

NITROGEN
GENERATORS



BEER & WINE

LASER CUTTING

PROCESSING

INJECTION MOLD-

PROCESSING

HEAT TREATING

LASER CUTTING

PHARMACEUTICAL

GN2 Series PSA Nitrogen Generators

Common Applications



Beer & Wine Manufacturing & Storage

Breweries and wineries take great care to prevent oxidation during all processing steps and packaging to enhance product quality. Nitrogen can also provide an inert atmosphere during the mashing and lautering operations. Increasing the nitrogen levels in the finished product to enhance foam characteristics is also common

Chemical Processing

Nitrogen is used to create an oxygen-deficient environment for use with oxygen-sensitive chemicals reducing safety hazards. It is used to propel liquids through pipelines; and in the manufacture of ammonia.

Electronics

Nitrogen prevents oxidation while manufacturing semiconductors and printed circuit processes such as wave soldering. It is also used to enhance solvent recovery systems by eliminating the use of chlorofluorocarbons for cleanup.

Food Processing & Packaging

Nitrogen extends shelf-life in packaged foods by preventing spoilage due to oxidation, mold growth, moisture migration and insect infestation.

Injection Molding

In the gas injection molding process (GIM), nitrogen is injected under high pressure into the melted polymer and displaces the core of the molded part. This creates a void and reduces the amount of material used.

Metal Production

Nitrogen is used to protect metals such as steel, copper and aluminum during annealing, carburizing and sintering operations.

Metal Fabrication

Nitrogen is utilized as a purge gas with stainless steel tube welding. It is also used to support plasma and laser cutting systems. By using high purity (99.9% to 99.99%) nitrogen, it is possible to eliminate oxide edges and the need for additional handling labor.

Petroleum Refining

Nitrogen is used to maintain pressure in oil and gas reservoirs; to blanket storage tanks and product loading/unloading; to purge pipelines; and to strip volatile organic compounds (VOCs) from waste streams. Controlling VOC emissions helps refiners comply with U.S. Clean Air Act requirements.

Pharmaceuticals

Nitrogen is commonly used for blanketing and purging to protect volatile chemicals from oxygen and high purity gases, which are a required component of many analytical instruments.

Rubber Manufacturing

In the vulcanizing process, nitrogen is used to prevent surface deteriorations due to oxidation.



Why do you need a GN2 System

75% to 92% Cost Savings

Generating your own nitrogen can substantially reduce the cost of nitrogen consumption, and is the primary reason for the purchase of most GN2 systems.

The price of purchasing nitrogen in a gaseous or liquid form can vary from \$2.88 to \$0.35 per 100 ft³. The price range can be a result of volume consumption, type of product, location, or vendor. This cost is strictly for the gas or liquid delivered and does not factor additional supply costs such as:

- Delivery Costs
- Monthly Cylinder / Tank Rental Fees
- Bulk Evaporative Loss
- Handling and Purchasing Labor Costs
- Additional Site Liability Insurance

A GN2 system will produce gaseous nitrogen at costs that ranges from \$0.061 to \$0.217 per 100 ft³. The price range is a result of local power costs, compressor efficiencies, and required nitrogen purity.

An average GN2 system has an (ROI) return on investment of 6 to 18 months. This rapid return enhances the financially attractive position of a GN2 system above and beyond the 75% to 92% base reduction in nitrogen cost.



Experience

Great Lakes Air has over 25 years of experience manufacturing various types of standard and custom PSA (Pressure Swing Adsorption) systems for many industries such as:

Petrochemical	Aerospace
Automotive	Electronics
Mining	Food & Beverage
Defense	Steel Production
Pharmaceutical	Medical Industry

The GN2 Nitrogen generator is a PSA system that separates the oxygen from a compressed air supply generating a continuous source of gaseous nitrogen.

Reliability



GN2 systems operate automatically and supply nitrogen on demand 24 hours a day. A missed nitrogen delivery due to bad weather or clerical oversight can dramatically impact production costs.

Nitrogen Purity

GN2 systems can produce nitrogen purities from 95.0% to 99.99%. If your application can operate at lower purities the cost of production is reduced and can add to your overall reduction in nitrogen costs.



Safety

GN2 systems operate with no more liability than a standard compressed air system. With a GN2 system you yield the liability of handling 2,200 PSI cylinders or storing -320°F (-196°C) liquid nitrogen.



System Operation

The earth's atmosphere is comprised of approximately 78% nitrogen and 21% oxygen. Once atmospheric air is compressed, its pressure is increased while proportions of nitrogen and oxygen remain unchanged. Once the air is compressed it must be filtered and dried prior to its introduction to the GN2 system.

Step 1.

Inlet valves direct the compressed air flow into one of the two adsorption chambers (Right) where the CMS (Carbon Molecular Sieve) adsorbs the oxygen content while allowing the nitrogen to pass creating a high purity nitrogen stream that then exits the adsorption chamber and is stored in the nitrogen storage/buffer tank. The other adsorption chamber (Left) is depressurized to atmosphere through the exhaust valve enabling the CMS to release and expel any previously adsorbed oxygen to atmosphere.

Step 2.

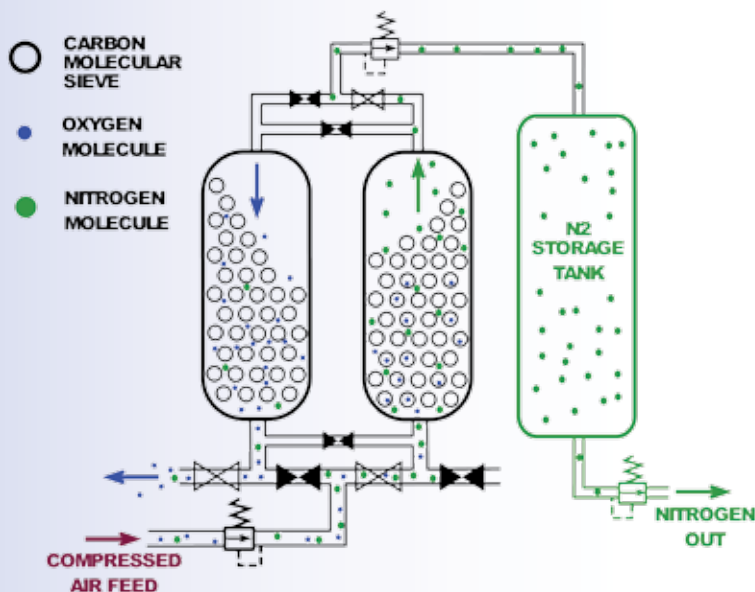
Just prior to the end of the (Right) adsorption cycle the exhaust valve on (Left) is closed and balance valves are opened to equalize pressure in the two adsorption tanks.

Step 3

The inlet valves are then inverted bringing the regenerated (Left) tower online to adsorb oxygen leaving a high purity nitrogen gas stream. The other adsorption chamber (Right) which was previously online adsorbing oxygen is depressurized so the CMS will release and exhaust any previously adsorbed oxygen to atmosphere.

Step 4

This cyclic action continues allowing the GN2 to produce a steady stream of high purity nitrogen gas. This process is commonly known as Pressure Swing Adsorption (PSA).



Flow diagram represents status for operational steps 1 & 2 only.

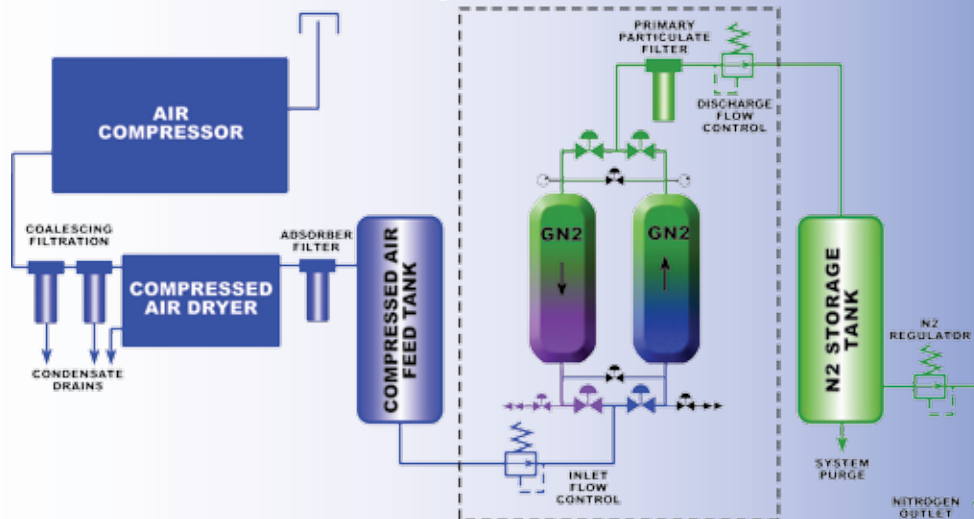
(CMS) Carbon Molecular Sieve

The adsorption component CMS is a non-polarity based adsorbent that uses a unique pore structure to preferentially adsorb oxygen molecules over nitrogen molecules. By adsorbing the oxygen from the process stream (Compressed Air) what remains can be virtually pure nitrogen. Because the product is a non-polarity based adsorbent, it's hypothetical life is indefinite but realistically it has an industrial service life in excess of 10 years with proper maintenance.

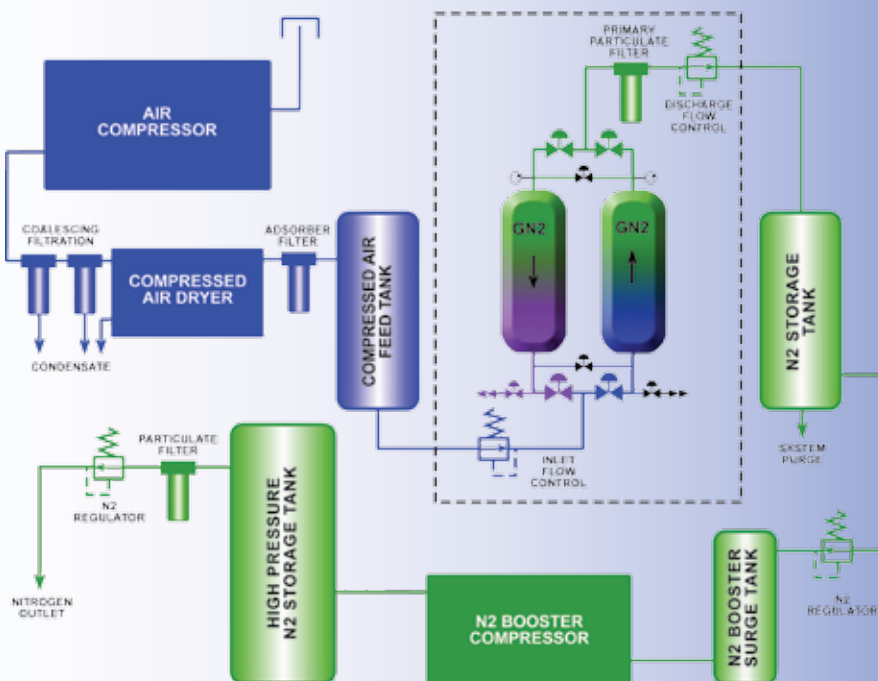


Carbon molecular sieve is also widely applied in petrochemical industry, heat treatment industry, and electronic manufacturing as well as the food preservation.

Standard System Installation



High Pressure System Installation



Features & Options

Description	Standard	Optional	Description	Standard	Optional
Inlet Flow Controller	✓		Removable Stainless Steel Screens	✓	
Outlet Flow Controller	✓		ASME/CRN (GN2-75 and larger)	✓	
Automatic Operation & PLC Control	✓		Manifold Type Solenoid Valves	✓	
NEMA 12 Electrical	✓		Skid Mounted Component Packages		✓
NEMA 4 Electrical		✓	Booster Compressor Packages		✓
Touch Screen Operator Interface		✓	Process Oxygen Sensor with Alarms		✓
Tower Pressure Gauges	✓		Energy Saving Sleep Mode	✓	
Non-Lubricated High Cycle Valves	✓		Automatic Purity Proof System		✓

Capacities & Requirements

Model Number	(A) 99.99% Purity		(B) 99.9% Purity		(C) 99.5% Purity		(D) 99.0% Purity		(E) 98.0% Purity		(F) 95.0% Purity	
	<i>Feed</i>	<i>Output</i>	<i>Feed</i>	<i>Output</i>	<i>Feed</i>	<i>Output</i>	<i>Feed</i>	<i>Output</i>	<i>Feed</i>	<i>Output</i>	<i>Feed</i>	<i>Output</i>
	SCFM @ 90 PSIG	SCFH @ 70 PSIG	SCFM @ 90 PSIG	SCFH @ 70 PSIG	SCFM @ 90 PSIG	SCFH @ 69 PSIG	SCFM @ 90 PSIG	SCFH @ 68 PSIG	SCFM @ 90 PSIG	SCFH @ 65 PSIG	SCFM @ 90 PSIG	SCFH @ 57 PSIG
GN2-2500-000	3	26	3	42	3	50	3	63	4	78	4	101
GN2-3500-000	5	40	5	64	5	76	5	95	6	117	6	151
GN2-5000-000	7	59	7	95	7	113	8	142	8	175	9	227
GN2-7500-000	11	86	10	138	10	164	11	205	12	253	14	328
GN2-10000-000	14	112	14	180	13	214	15	268	16	331	18	429
GN2-12500-000	17	139	17	223	16	265	18	331	20	409	22	530
GN2-17500-000	22	178	22	286	20	340	23	426	25	526	28	681
GN2-25000-000	37	297	36	477	34	567	39	709	42	877	47	1135
GN2-35000-000	51	416	50	668	48	794	55	993	59	1228	66	1589
GN2-50000-000	66	535	65	859	61	1021	70	1277	76	1578	85	2043
GN2-65000-000	88	713	86	1145	82	1362	94	1702	102	2104	113	2724
GN2-80000-000	110	891	108	1431	102	1702	117	2128	127	2630	142	3404
GN2-100000-000	132	1069	129	1717	123	2043	140	2553	153	3157	170	4085
GN2-125000-000	168	1366	165	2194	157	2610	179	3263	195	4033	218	5220
GN2-140000-000	190	1544	186	2480	177	2951	203	3668	220	4559	246	5901
GN2-160000-000	219	1782	215	2862	204	3404	234	4255	254	5261	284	6809
GN2-180000-000	241	1960	237	3148	225	3745	257	4681	280	5787	312	7490
GN2-200000-000	270	2198	265	3530	252	4199	289	5248	314	6489	350	8398
GN2-225000-000	307	2495	301	4007	286	4766	328	5958	356	7365	397	9532

Model Number	(A) 99.99% Purity		(B) 99.9% Purity		(C) 99.5% Purity		(D) 99.0% Purity		(E) 98.0% Purity		(F) 95.0% Purity	
	<i>Feed</i>	<i>Output</i>	<i>Feed</i>	<i>Output</i>	<i>Feed</i>	<i>Output</i>	<i>Feed</i>	<i>Output</i>	<i>Feed</i>	<i>Output</i>	<i>Feed</i>	<i>Output</i>
	SCFM @ 110 PSIG	SCFH @ 90 PSIG	SCFM @ 110 PSIG	SCFH @ 90 PSIG	SCFM @ 110 PSIG	SCFH @ 88 PSIG	SCFM @ 110 PSIG	SCFH @ 86 PSIG	SCFM @ 110 PSIG	SCFH @ 80 PSIG	SCFM @ 110 PSIG	SCFH @ 75 PSIG
GN2-2500-000	4	30	4	48	4	57	4	72	4	89	5	115
GN2-3500-000	6	45	5	72	5	86	6	107	6	133	7	172
GN2-5000-000	8	68	8	108	8	129	9	161	10	199	11	258
GN2-7500-000	12	98	11	157	11	186	13	233	14	288	16	373
GN2-10000-000	16	128	15	205	15	244	17	304	18	376	20	487
GN2-12500-000	19	158	19	253	18	301	21	376	22	465	25	602
GN2-17500-000	25	203	24	325	23	387	27	484	29	598	32	774
GN2-25000-000	42	338	40	542	39	645	44	806	48	996	54	1289
GN2-35000-000	58	473	56	759	54	903	62	1128	67	1395	75	1805
GN2-50000-000	75	608	72	976	70	1161	80	1451	87	1794	97	2321
GN2-65000-000	100	810	95	1301	93	1547	106	1934	116	2392	129	3095
GN2-80000-000	125	1013	119	1627	116	1934	133	2418	144	2989	161	3868
GN2-100000-000	149	1215	143	1952	139	2321	160	2902	173	3587	193	4642
GN2-125000-000	191	1553	183	2494	178	2966	204	3708	222	4584	247	5932
GN2-140000-000	216	1755	207	2820	201	3353	231	4191	250	5182	279	6705
GN2-160000-000	249	2025	239	3254	232	3869	266	4836	289	5979	322	7737
GN2-180000-000	274	2228	262	3579	255	4256	293	5320	318	6577	355	8511
GN2-200000-000	307	2498	294	4013	286	4771	328	5965	356	7374	398	9542
GN2-225000-000	349	2835	334	4555	325	5416	372	6771	405	8370	451	10832

Custom designed, larger capacity or non standard purity systems are available upon request

Specifications & Dimensions

Model Number	Minimum Storage Capacity / Gallons		Voltage	Inlet Ports	Outlet Ports	Max. Inlet Pressure	Dimensions Inches			Shipping Weight
	Air	N ₂					H	W	D	
	GN2-2500-0000	10					10	100-1-50 115/120-1-60	1/2"	
GN2-3500-0000	15	15	1/2"	1/2"	40	31	15		226	
GN2-5000-0000	15	15	1/2"	1/2"	49	41	15		353	
GN2-7500-0000	20	20	3/4"	1/2"	65	48	24		510	
GN2-10000-0000	20	20	3/4"	1/2"	65	48	24		540	
GN2-12500-0000	20	20	3/4"	1/2"	65	48	24		565	
GN2-17500-0000	30	30	3/4"	1/2"	69	52	28		675	
GN2-25000-0000	60	60	1"	1/2"	69	52	28		730	
GN2-35000-0000	60	60	1"	1/2"	75	52	33		1200	
GN2-50000-0000	80	80	1-1/2"	3/4"	80	68	33		1286	
GN2-65000-0000	120	120	1-1/2"	3/4"	85	68	33		1500	
GN2-80000-0000	120	120	1-1/2"	3/4"	90	77	33		2425	
GN2-100000-0000	200	200	1-1/2"	3/4"	90	86	45		2590	
GN2-125000-0000	240	240	2"	1"	90	86	45		2975	
GN2-140000-0000	240	240	2"	1"	90	90	45		3375	
GN2-160000-0000	240	240	2"	1"	90	99	45		3975	
GN2-180000-0000	300	300	2"	1"	90	104	45		4635	
GN2-200000-0000	400	400	2"	1"	104	110	45		4950	
GN2-225000-0000	400	400	2"	1"	104	112	62		5620	

- Notes:
1. Capacity reflects a maximum 90°F inlet temperature and 90°F ambient
 2. Feed compressed air pressure dewpoint must not exceed 39°F.
 3. Inlet/Outlet connections are NPT unless otherwise specified
 4. Dimensions are in inches. Complete drawing packages available upon request
 5. Shipping weight is in pounds
 6. Dimensions and specifications are subject to change without notice

Made With Pride in the U.S.A.

Great Lakes Air is proud to manufacture all of its compressed air and gas equipment in Michigan. We offer our customers a steady stream of reasonably priced high quality industrial products with a proven history of performance. Readily available replacement components and maintenance items are locally available through the Great Lakes Air distribution system. Consider the quality and durability of American made products when choosing a manufacturer.

GN2 Series Model Decoder

Model	Purity %	Feed Pressure	Voltage/Package
GN2-XXX	X	X	XXX
25	A 99.99	7 70 PSIG	116 120-1-60
35	B 99.90	9 90 PSIG	SP1 Package #1
↑ ↓	C 99.50	11 110 PSIG	SP2 Package #2
	D 99.00	14 145 PSIG	
	E 98.00		
2000	F 95.00		
2250			

Note: Feed voltages for packages match air dryer feed voltages.

Example Model # GN2-500B9-116

This is a GN2-500 setup for specified nitrogen output at 99.9% purity and a 90 PSIG compressed air feed.

Other Products from Great Lakes Air



**GRF Series Non Cycling
Type Air Dryer**



**GTX Series Cycling
Type Air Dryer**



**Regenerative Type
Desiccant Air Dryers**



**Compressed Air
Filtration**



**Condensate
Drain Systems**

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