

# nano



## ultra-high purity nitrogen generators

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# gen<sub>2</sub>

Leading edge technology and hundreds of years of **experience**... nano-purification solutions, your world-class manufacturer of state-of-the-art compressed air and gas solutions to industry.

Our commitment at nano is to work alongside our **customers** and provide unique solutions with the highest quality products to solve your specific challenges.

A wealth of experience and leading edge products are only part of the equation. nano recognise that world-class customer **service** is the most important component to any successful business.

Experience. Customer. Service... **nano**



## dry and pure

Nitrogen is a dry, inert gas which is used in a wide range of applications where oxygen may be harmful to the product or processes. Nitrogen generators use regular compressed air to deliver a continuous supply of high purity nitrogen, offering a cost effective and reliable alternative to the use of cylinder or liquid nitrogen across a wide range of applications.



## design

Our experienced team of design engineers are always looking for new and unique technologies and products to bring you the highest level of performance and lowest overall operating cost.



## research & development

Our R&D team endeavour to provide solutions that go beyond developing an existing product. They are continually researching new technologies which can provide unique advantages over competitive offerings.



## manufacture

The reliable and energy saving nano GEN<sub>2</sub> range of nitrogen generators are manufactured in our state of the art facility to the highest standards of build quality to ensure equipment reliability and high levels of performance.

## system performance

The technologically advanced nano GEN<sub>2</sub> nitrogen generator operates on the Pressure Swing Adsorption (PSA) principle to produce a continuous uninterrupted stream of nitrogen gas from clean dry compressed air.

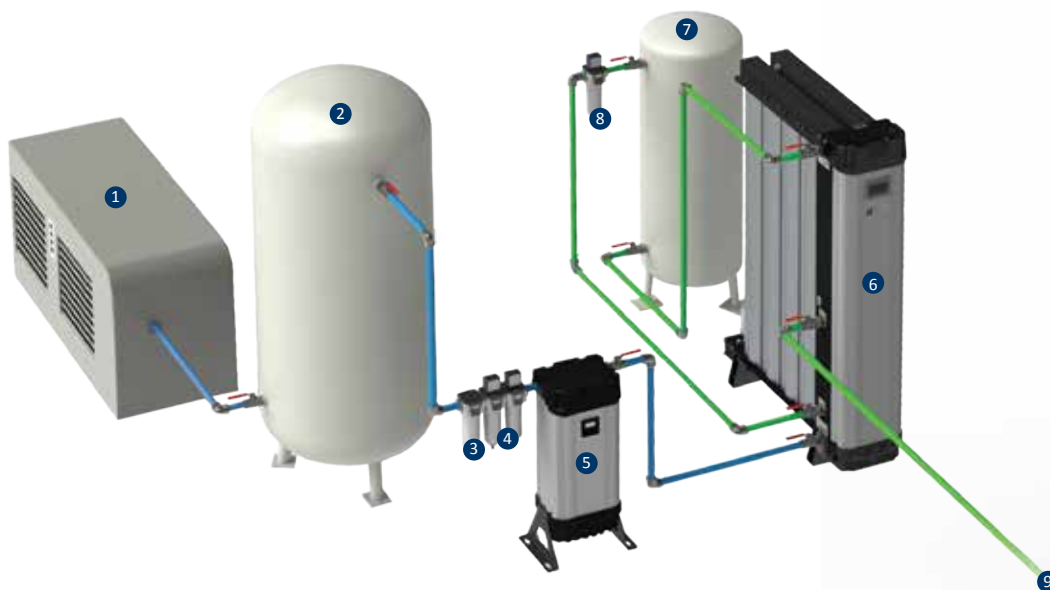
Pairs of dual chamber extruded aluminum columns are filled with Carbon Molecular Sieve (CMS). Joined via an upper and lower manifold, the high density filled columns produce a two bed system.

Clean, dry compressed air enters through the inlet manifold to the bottom of the 'online' bed and flows up through the CMS to separate the compressed air where oxygen and other trace gases are preferentially adsorbed. The nitrogen then passes through the supporting bed layer and outlet manifold to the buffer vessel and a nano F<sup>1</sup> buffer vessel filter before re-entering the GEN<sub>2</sub> nitrogen generator for purity monitoring.

After a pre-set time the control system automatically switches the beds. One bed is always online generating nitrogen while the other is being regenerated.

During regeneration, the oxygen that has been collected in the CMS stage is exhausted to atmosphere. A small portion of the outlet nitrogen gas is expanded into the bed to accelerate the regeneration process.

1	compressor
2	wet air receiver
3	water separator
4	pre filters
5	dryer
6	generator
7	buffer vessel
8	buffer vessel filter
9	nitrogen outlet



## PLC controlled operation

Each GEN<sub>2</sub> nitrogen generator is operated by a reliable PLC control system with digital and analog (optional) outputs for remote monitoring and alarm capabilities. GEN<sub>2</sub> includes an easy-to-operate touch screen graphical interface which offers valuable features including 'power on', 'hours run', 'oxygen purity', 'pressure', 'online column' and 'service required' indicators. In addition, four pressure gauges provide the operator with continuous indication of column A, column B, air inlet and nitrogen outlet pressures.

## oxygen analyser

A built in oxygen analyser continuously monitors the oxygen concentration in the nitrogen stream. Our new remote mounted analyser utilises world leading sensor technology to give a more reliable measurement, faster response time and longer life compared to traditional analysers. Incorporated into the PLC controls, our oxygen analyser guarantees downstream purity levels are consistently achieved and maintained.

## ecomode energy saving control

This unique control feature utilises an outlet pressure monitor to reduce energy consumption during periods of low demand to ensure a continuous uninterrupted nitrogen supply while minimising power consumption.

## reliable high performance valves

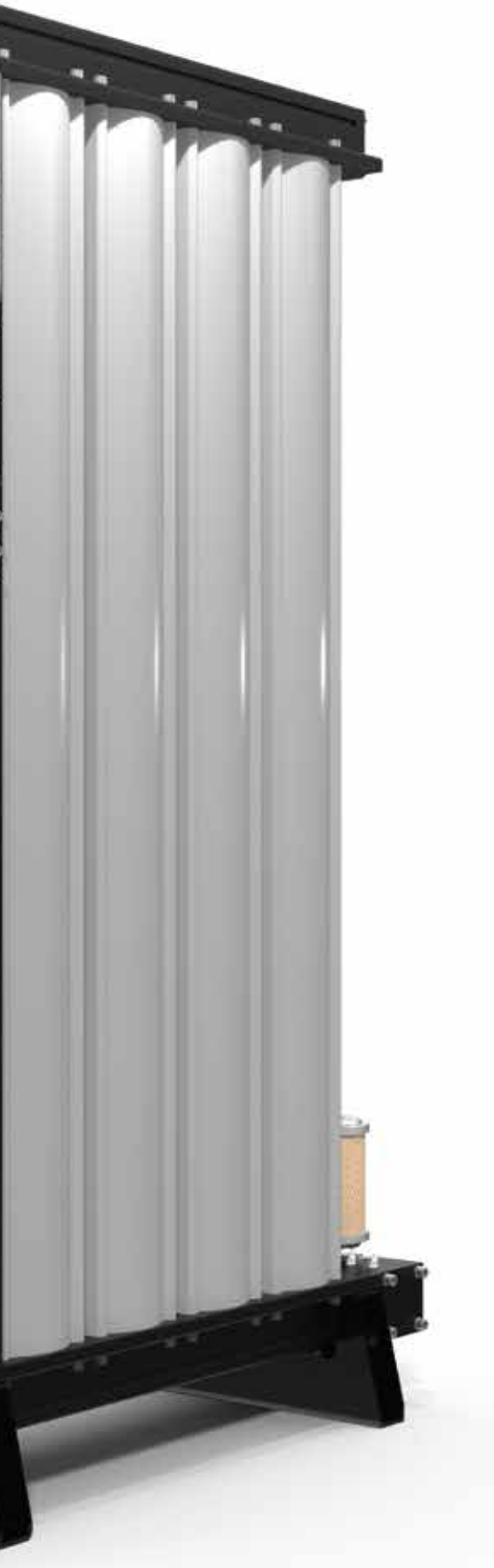
Inlet, outlet and exhaust valves are managed through unique integrated nano piston valves, which are designed for reliability, long service life and ease of maintenance. The generator also incorporates adjustable equalisation valves which smooth the column switch over, improve air/nitrogen ratios and extend CMS life. This highly durable valve system is backed by a comprehensive two year warranty.

## multi-bank design

The unique multi-bank design enables additional generators to be added in the future as demand increases. Your GEN<sub>2</sub> nitrogen generator can grow with your company.

## maximum corrosion protection

High tensile aluminum columns are first corrosion protected and then powder coated to provide maximum protection for all environments.



# GEN<sub>2</sub> nitrogen generators

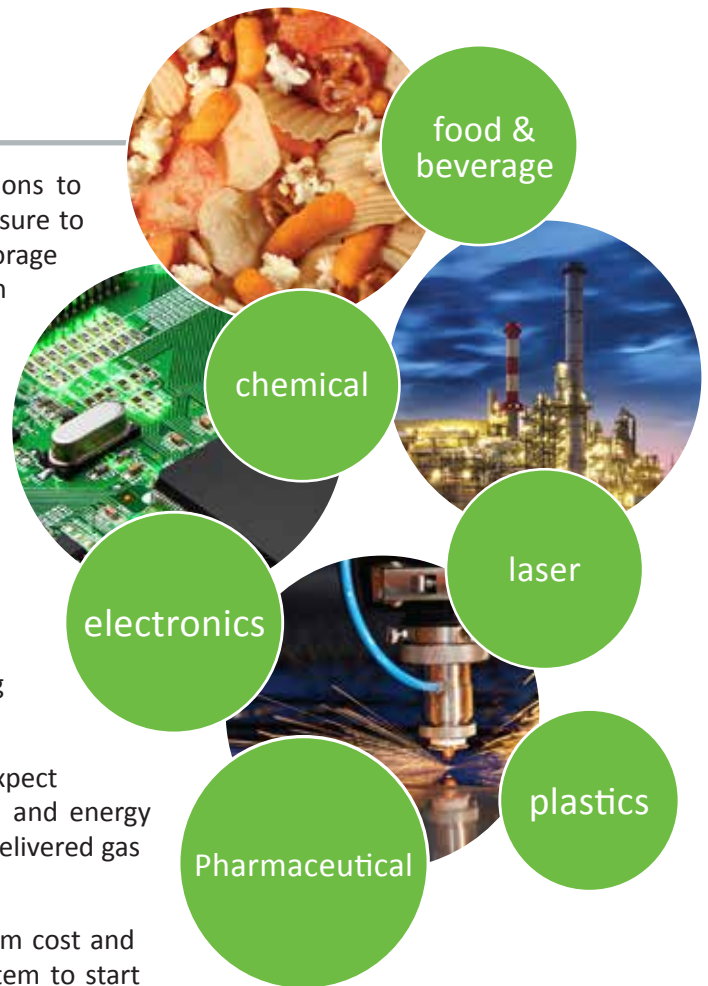
Nitrogen is used in many commercial and industrial applications to improve the quality of a product or process or as a safety measure to prevent combustion. Liquid or bottled nitrogen delivery and storage can be expensive, unreliable and a safety concern. Nitrogen generators allow users to produce nitrogen in-house simply and inexpensively using an existing compressed air system.

Nano recognises the importance of having a safe, reliable and cost effective supply of high purity nitrogen. We have developed the GEN<sub>2</sub> nitrogen generator to meet the increasing demand for high quality, complete packaged solutions which save energy and time while fulfilling the needs of their intended application.

With traditional methods of gas supply, users are liable for hidden costs such as rental, refill and delivery, order processing charges as well as an environmental levy charges.

When you switch to a nano GEN<sub>2</sub> nitrogen generator you can expect payback typically between 6 to 24 months. It's unique design and energy saving function offers a number of significant advantages over delivered gas options, as well as traditional generator designs.

The compact system can be installed easily and with a minimum cost and disruption and requires only a pre-treated compressed air system to start production. An on-site generator enables users to produce their demand for nitrogen gas on their premises, under their complete control. As a result, companies can generate as much or as little nitrogen as needed at a fraction of the cost of having the gas delivered by an external supplier.



## benefits

### guaranteed performance

- reliable performance based on decades of experience with pressure swing adsorption technology
- 100% function and performance tested at our factory
- 2 year warranty

### rapid return on investment

- significant cost savings over cylinder or liquid supply provides a typical return on investment of less than 24 months

### easy to install

- the compact design allows installation in spaces too small for twin tower generator systems

### safe & reliable

- eliminates the safety hazards of transporting and storing pressurised gas cylinders or liquid nitrogen

### environmentally friendly

- lower air consumption and refined controls provide greater energy efficiency
- reduces carbon footprint by eliminating gas delivery to your facility

### easy to maintain

- advanced PLC with HMI touchscreen controls simplify operation and require minimal training
- innovative piston valves significantly reduce maintenance schedules and minimise downtime

### fits any application

- maximum design operating pressure of 10 barg (16 barg optional)
- available in a wide range of flow rates and purities from 95% - 99.999%
- can handle any power supply from 110 - 240 VAC in 50 - 60 Hz, 24VDC optional

### design quality

- mass flow controller - ensuring correct set pressure and flow
- integral oxygen analyser - constantly measuring gas purity
- purity guarantee valve - automatically vents off out of specification gas
- remote monitoring - enabling connection to proprietary remote management and generator control systems

# sizing & specifications

GEN <sub>2</sub> generator model	rated outlet flow <sup>(1)</sup>	nitrogen purity at the outlet (maximum oxygen content)												dimensions (mm)			approx. weight
		99.999% (10 ppm)	99.995% (50 ppm)	99.99% (100 ppm)	99.975% (250 ppm)	99.95% (500 ppm)	99.9% (0.10%)	99.5% (0.50%)	99% (1%)	98% (2%)	97% (3%)	96% (4%)	95% (5%)	A	B	C	kg
1110	Nm <sup>3</sup> /h	0.9	1.7	2.0	2.5	3.0	3.6	5.2	5.8	9.3	8.3	9.5	10.3	1214	399	584	170
2110	Nm <sup>3</sup> /h	1.8	3.4	4.0	5.0	6.0	7.2	10.4	11.6	14.5	16.7	19.0	20.6	1214	399	752	198
3110	Nm <sup>3</sup> /h	2.7	5.1	6.0	7.5	9.0	10.8	15.6	17.3	21.8	25.0	28.5	30.9	1214	399	919	254
2130	Nm <sup>3</sup> /h	5.1	7.2	8.9	10.0	11.4	13.2	18.9	21.0	26.4	30.3	34.5	37.5	1811	399	752	267
3130	Nm <sup>3</sup> /h	7.7	10.8	12.6	15.0	17.1	19.8	28.4	31.5	39.6	45.5	51.8	56.3	1811	399	919	354
4130	Nm <sup>3</sup> /h	10.2	14.4	16.8	20.0	22.8	26.4	37.8	42.0	52.8	60.6	69.0	75.0	1811	399	1087	441
6130	Nm <sup>3</sup> /h	15.3	21.6	25.2	30.0	34.2	39.6	56.7	63.0	79.2	90.9	103.5	112.5	1811	399	1420	615
8130	Nm <sup>3</sup> /h	20.4	28.8	33.6	40.0	45.6	52.8	75.6	84.0	105.6	121.2	138.0	150.0	1811	399	1760	789
10130	Nm <sup>3</sup> /h	23.5	33.1	38.6	46.0	52.4	60.7	86.9	96.6	121.4	139.4	158.7	172.5	1811	399	2096	963
12130	Nm <sup>3</sup> /h	27.2	38.4	44.9	53.3	60.9	70.5	100.9	112.1	141.0	161.8	184.2	200.3	1811	399	2428	1137
air factor		6.8	5.1	4.6	3.6	3.5	3.4	2.8	2.7	2.4	2.2	2.1	2.0				

## specifications

maximum inlet particulate	0.1 micron
maximum inlet oil content <sup>(4)</sup>	0.01 ppm
minimum operating pressure	6 barg
maximum operating pressure <sup>(2)</sup>	10 barg
recommended inlet dewpoint <sup>(3)</sup>	-40°C pdp
recommended operating temperature range	5 to 40°C
design operating temperature range	5 to 50°C
power supply requirements	110 - 240V AC / 50 - 60 Hz

## options & accessories

needle valve	-
galvanic ppm sensor	> 99.9%
zirconia oxygen sensor	-
additional mass flow controller	> 60 Nm <sup>3</sup> /hr
large mass flow controller	> 120 Nm <sup>3</sup> /hr
24V DC control	-
high pressure option	Up to 16 barg
4-20 mA re-transmission	-

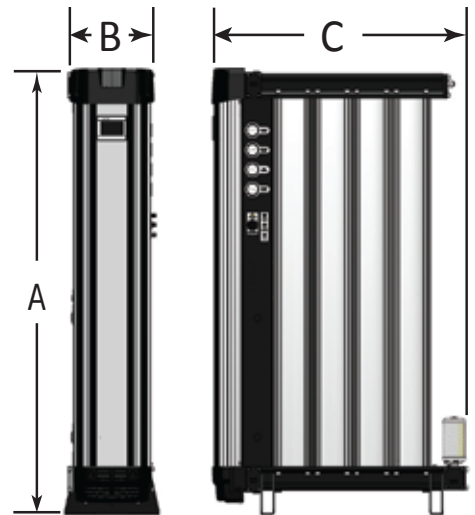
## temperature correction factors <sup>(5)</sup>

inlet air temperature (°C)	5	10	15	20	25	30	35	40	45	50
correction factor	0.80	0.90	0.94	1.00	1.00	0.98	0.95	0.90	0.85	0.72

## pressure correction factors <sup>(5)</sup>

inlet air pressure (barg)	6	7	8	9	10 - 16
correction factor	0.88	1.00	1.10	1.20	1.20

- (1) at 7 barg inlet pressure and 20 to 25°C inlet temperature. For outlet flow at all other conditions, refer to the correction factors above or contact enquiries@n-psi.co.uk
- (2) for pressures above 10 barg, contact enquiries@n-psi.co.uk
- (3) requires an upstream dryer. Contact n-psi for assistance selecting the optimum dryer for your application
- (4) including oil vapour
- (5) to be used as an approximate guide only. All applications should be confirmed by n-psi. Contact us for sizing assistance
- (6) includes mass flow controller and galvanic oxygen sensor.



## connections

air inlet	1"
to buffer vessel	1"
from buffer vessel	½"
nitrogen outlet	½"

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