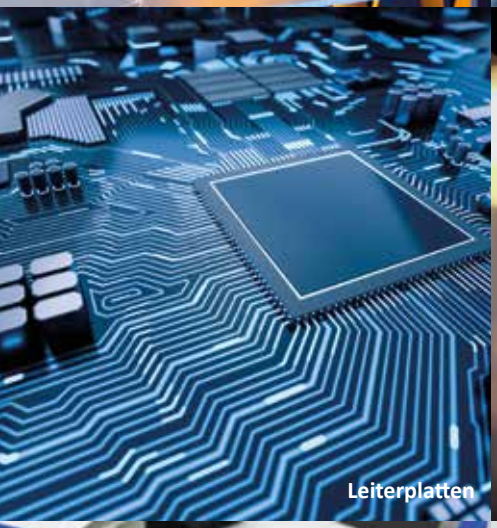
FST GmbH
Filtrations-Separations-Technik

Nitrogen Generators

Nitrogen Generator
APPLICATION


Laserschneiden


Chemie


Leiterplatten


Lebensmittel


Kunststoffe


Pharmazie

APPLICATION

Nitrogen and Nitrogen mixturers are used n various areas of industry to improve the quality or shelf lige of a product or to prevent a reaction with oxygen.

Nitrogen generated on site can be produced cost-effectively by using the already existing compressed air station. In this process nitrogen is available at all times and replaces the expensive supply through cylinder bundles or from tanks with liquid gas, which also require complex logistics and safety measures.

These problems can be avoided cost-effectively with a nitrogen generator. They operate if necessary 24 hours a day by pushing just one button. Annoying breakdowns due to a lack of nitrogen are things of the past.

By using the compressed air already available, our nitrogen generators can provide the required qualit quickly and safely. Independant of expensive cylinders ir storage tanks - anytime and anywhere.

Opposite to nitrogen from liquid tanks or bottles, nitrogen generators only supply the required purity. Unnecessary additional costs due to too high purity are avoided.

Nitorgen is used in many industrial applications.

Nitrogen Generators
COST FACTOR NITROGEN

ADVANTAGES OF OWN GENERATION

The conventional nitrogen supply from high-pressure cylinders or liquid gas tanks is expensive, time-consuming and requires a certain amount of advance planning and logistics. In-house production using nitrogen generators can reduce costs and in-house effort by a considerable amount and thus ofers great saving potentials, combined with an independent future of your gas supply.

COSTS OF DIFFERENT NITROGEN SOURCES

Source	price (€/m³)*1
Single cylinders	3,50 – 11,00
bundled cylinders	1,50 – 8,80
liquid nitrogen	0,17 – 1,20
own generation	0,10 – 0,30

*1 The values indicated in this table are average values at the time this brochure was launched. For an individual calculation of the total costs of ownership detailed costs, e.g. energy, logistic costs or rental cost, as well as gasoline and toll etc. needs to be considered.

YOUR INDIVIDUAL COST CALCULATION

Ask our experts to prepare your pesonal offer with a return of invest calculation. In most applications a return of investment can be achieved within 24 months.

Nitrogen Generators
NITROGEN PURITY

WHY PRODUCE NITROGEN ON SITE?

Nitrogen is an mayor component of our ambient air. It is therefore always available and free of charge. However, the available concentration is usually not sufficient for many applications. Oxygen, argon and other noble gases influence the quality of use.

Especially oxygen has a decisive influence on many applications, particularly with regards to oxidation and shelf life. Especially in the food industry, oxygen is an undesirable component during packaging, as the shelf life of the food is reduced accordingly.

In industrial processes, oxygen reduces the efficiency, e.g. in laser cutting. A corresponding reduction of the oxygen content is therefore desirable for many machines and processing operations.

But not all processes require the highest purity. The decisive factor for economic supply of nitrogen is that the required purity is avaialble in the right quantity at the required time. Not too much - not too little!

This can only be achieved by on site nitrogen generation.

78 % nitrogen
20,9 % oxygen
0,9 % argon
0,1 % noble gases

THE PURITY CLASSES

Oxygen concentration	N2 purity (%)	purity class
0,001% (10 ppm)	99,999%	5.0
0,01% (100 ppm)	99,99%	4.0
0,1% (1000 ppm)	99,9%	3.0
0,5 %	99,5%	2.5
1%	99%	2.0
2%	98%	
3%	97%	

Nitrogen Generators
OUR PORTFOLIO

WHICH GENERATOR TYPES ARE AVAILABLE?

FST offers a wide portfolio of nitrogen generators. Depending on the volume and the required nitrogen purity so-called membrane systems or PSA system are available.

Membrane systems use the principle of selective permeation. Membrane generators are used with nitrogen purities of up to 99,5 % and can produce almost any amount of nitrogen.

PSA generators are the second type of nitrogen generators. The name is derived from their mode of operation in which the compressed air is fed through a vessel filled with CMS (desiccant). The CMS removes the oxygen from the compressed air and stores it in its structure until the desiccant is saturated with oxygen.

GNA2 - GNA15
95 % - 99,9995%
max. volume flow 97%
up to 88 m³/h
7,5 - 10 bar
1/2“ connection
110-240V / 50-60Hz

GNA20 - GNA150
95 % - 99,9995%
max. volume flow 97%
up to 886 m³/h
7,5 - 10 bar
1/2“ connection
110-240V / 50-60Hz

GNM0,1 - GNM22
95 % - 99,5%
max. volume flow 99,5%
up to 65,5 m³/h
7,5 - 10 bar
1/2“ - 1 1/2“ connection
240V / 50Hz

Higher volume flows upon request.

GNA
NITROGEN GENERATOR

Siemens S7 control with touch-screen display controls the necessary components. Data logger and modbus TCP comunication already included.

Stainless steel piping for durable, corrosion-free operation.

Switching between the vessels is done via individually controlled valves.

Oxygen sensor included for guaranteeed purity of nitrogen according to the design conditions.

Large cross flow sections reduce the differential pressure.

Free accessible valves and thus simplified maintenance.

GNA
NITROGEN GENERATOR

FUNCTION

Nitorgen generators of the GNA series operate according to the pressure swing adsorptin(PSA) principle. The incoming compressed air is fed into the first vessel. The oxygen is bound in the CMS desiccant so that only pure nitrogen leaves the generator. As soon as the desiccant is daturated, e.g. the oxygen content at the outlet increases, the system switches to the second vessel. The first vessel is expanded to atmospheric pressure and the bounded oxygen is discharged to the environment. For a continuus operation of a PSA system, two vessels are required.

The GNA is monitores and controlled by a Siemens S7 controller with touch screen. A Modbus TCP connection is already included o that the GNA can be connected to a central monitoring room and transmits the respective operating status. A data logger continuously records the operating status and can be read out to check the status if required.

The open construction permits free access to all valves and sensors. A fast and easy maintenance is ensured in this way.

All flow paths have above-average diameters and thus reduce the differental pressure. All pipings are made in stainless steel.

The GNA series has various features and ptions that ensure a continuous and reliable operation. For example, the GNA incorporates an oxygen sensor at the outlet and continuously measures the oxygen content. If the oxygen content exceeds a preset value, the system switches to the other, already regenerated vessel.

FST offers an extensive range of options to the GNA series. In addition to options directly used on the generator, e.g. flow meter or molsieve protection, we also offer extensice options for on-site installations, e.g. from nitrogen tanks to booster for cylinder bundles.

The range is completed by storage taks as well as corresponding highly effective filters and compressed air dryers to provide the required compressed air quality for the generator.

Options:

- molsieve protection
- flow sensor
- purity control
- filling station for cylinder bundles
- 7“ or 9“ or 11“ Display
- flow regulator (manual or automatic)
- energy saving system

Features:

The series of GNA nitrogen generators is characterised by:

- purities of 95 % to 99,9995%
- N2 volume flow up to 886 m^3/h
- high reliability
- small air factors
- multiple options and accessories upon request

GNM

NITROGEN GENERATOR

C5 control with touch screen to control and monitor all components.

Plug-and-play. Simply connect and start-up.

Silent operation mode.

Easy maintenance.

Filter and flow regulator included.

Pure nitrogen without interruption.

GNM
NITROGEN GENERATOR

FUNCTION

The various components contained in the air, e.g. oxygen, carbon dioxide, water vapour, nitrogen and other noble gases, are fed into the membrane. Due to their different molecular structure, they diffuse through the hollow fibres membrane at different speeds. Nitrogen has a low diffusion rate and accumulates within the membrane. The purity of the gas is dtermined by the flow rate. The required nitrogen purity can be adjusted by varying the pressure and flow.

Nitrogen membranes can achieve a purity of between 95% to 99,5% depending on the adjustment.

The GNM from FST has one or more membranes, depending on the version. The C5 microprocessor control monitors the generator and regulates the valves. An oxygen sensor at the outlet determines the respective concentration.

If the nitrogen concentration is sufficient, or if less nitrogen is used, the control system switches off e.g. a membrane. In opposite way, the control regulates the flow rate and pressure in order to continuously provide the required amount and purity of nitrogen. In this operation mode, the C5 control contributes significantly to reducing the operating costs.

As a very compact unit, the GNM is suitable for the on-site production of small and medium nitrogen volumes at purities up to 99,5%. Since the system also operates very quietly, it can be used close to the application without any problems.

Options

The performance of a GNM nitrogen generator can be improved by several options, e.g.

- flow regulator
- membrane protection
- energy saving module
- purity control
- full protection

Features:

- continuous high purity
- air treatment included
- reliable availability
- low operating costs

GNA
NITROGEN GENERATOR

BASIC DATA

Type	Volume	95 %	98,0 %	99,0 %	99,5 %	99,9 %	99,99 %	99,999 %	99,9995 %
GNA2	kg/h	15,3	10,8	8,5	7,5	5,6	3,7	2,0	1,5
	m^3/h^{*1}	13,2	9,3	7,3	6,5	4,8	3,2	1,7	1,3
GNA4	kg/h	30,6	21,6	17,1	15,1	11,1	7,4	3,8	2,9
	m^3/h^{*1}	26,4	18,6	14,7	13,0	9,6	6,4	3,3	2,5
GNA6	kg/h	45,9	32,4	25,5	22,5	16,7	11,0	5,8	4,4
	m^3/h^{*1}	39,6	27,9	22,0	19,4	14,4	9,5	5,0	3,8
GNA9	kg/h	68,9	48,6	38,3	33,9	25,1	16,6	8,7	6,5
	m^3/h^{*1}	59,4	41,9	33,0	29,2	21,6	14,3	7,5	5,6
GNA12	kg/h	91,8	64,8	51,0	45,1	33,5	22,2	11,6	8,7
	m^3/h^{*1}	79,1	55,9	44,0	38,9	28,9	19,1	10,0	7,5
GNA15	kg/h	114,7	81,0	63,8	56,4	41,9	27,7	14,5	10,9
	m^3/h^{*1}	98,9	69,8	55,0	48,6	36,1	23,9	12,5	9,4
GNA20	kg/h	153,0	108,0	85,0	75,2	55,8	36,9	19,4	14,5
	m^3/h^{*1}	131,9	93,1	73,3	64,8	48,1	31,8	16,7	12,5
GNA27	kg/h	206,6	145,8	114,8	101,5	75,3	49,8	26,1	19,6
	m^3/h^{*1}	178,1	125,7	99,0	87,5	64,9	42,9	22,5	16,9
GNA35	kg/h	267,1	189,0	148,8	131,5	97,7	64,6	33,9	25,4
	m^3/h^{*1}	230,8	162,9	128,3	113,4	84,2	55,7	29,2	21,9
GNA50	kg/h	382,5	270,0	212,6	187,9	139,5	92,2	48,4	36,3
	m^3/h^{*1}	329,7	232,8	183,3	162,0	120,3	79,5	41,7	31,3
GNA65	kg/h	495,0	349,0	275,0	243,0	180,0	119,0	63,0	47,0
	m^3/h^{*1}	429,0	302,0	238,0	210,0	156,0	103,0	54,0	40,0
GNA80	kg/h	609,0	430,0	339,0	299,0	222,0	146,0	77,0	58,0
	m^3/h^{*1}	528,0	372,0	294,0	259,0	192,0	126,0	66,0	50,0
GNA100	kg/h	761,0	537,0	423,0	374,0	277,0	183,0	96,0	72,0
	m^3/h^{*1}	660,0	465,0	366,0	324,0	240,0	158,0	83,0	62,0
GNA125	kg/h	951,0	672,0	529,0	467,0	346,0	229,0	120,0	90,0
	m^3/h^{*1}	824,0	582,0	458,0	405,0	300,0	198,0	104,0	78,0
GNA150	kg/h	1141,0	806,0	635,0	560,0	416,0	475,0	144,0	108,0
	m^3/h^{*1}	989,0	699,0	550,0	485,0	360,0	411,0	124,0	93,0

^{*1} – related to 1,013 bar (a) and 20 °C at 7 bar operating pressure, conversion factor 0,8 m^3/kg
Higher nitrogen flows upon request.

AIR FACTOR

Type	95 %	98,0 %	99,0 %	99,5 %	99,9 %	99,99 %	99,999 %	99,9995 %
GNA2 – GNA150	1,8	2,1	2,3	2,5	3,2	4,3	5,2	6,2

GNM
NITROGEN GENERATOR

BASIC DATA

Type	Volume	95 %	96,0 %	97,0 %	98,0%	99,0 %	99,5 %	99,6 %
GNM0,1	kg/h	1,6	1,4	1,1	0,9	0,6	0,4	0,4
	m^3/h^{*1}	1,3	1,1	0,9	0,7	0,5	0,3	0,3
GNM0,2	kg/h	3,3	2,8	2,3	1,8	1,3	0,8	0,8
	m^3/h^{*1}	2,6	2,2	1,8	1,4	1,0	0,6	0,6
GNM0,3	kg/h	4,9	4,1	3,4	2,6	1,9	1,1	1,1
	m^3/h^{*1}	3,9	3,3	2,7	2,1	1,5	0,9	0,9
GNM0,5	kg/h	6,5	5,5	4,5	3,5	2,5	1,5	1,5
	m^3/h^{*1}	5,2	4,4	3,6	2,8	2,0	1,2	1,2
GNM1,1	kg/h	14,1	11,9	9,8	7,8	5,4	4,0	3,5
	m^3/h^{*1}	11,3	9,5	7,8	6,2	4,3	3,2	2,8
GNM2.0	kg/h	25,8	21,6	17,8	14,0	9,8	7,1	6,4
	m^3/h^{*1}	20,6	17,3	14,2	11,2	7,8	5,7	5,1
GNM2.5	kg/h	28,3	23,8	19,5	15,5	10,8	8,0	7,0
	m^3/h^{*1}	22,6	19,0	15,6	12,4	8,6	6,4	5,6
GNM3	kg/h	42,4	35,6	29,3	23,3	16,1	12,0	10,5
	m^3/h^{*1}	33,9	28,5	23,4	18,6	12,9	9,6	8,4
GNM4	kg/h	51,5	43,3	35,5	28,0	19,5	14,3	12,8
	m^3/h^{*1}	41,2	34,6	28,4	22,4	15,6	11,4	10,2
GNM5	kg/h	77,3	64,9	53,3	42,0	29,3	21,4	19,1
	m^3/h^{*1}	61,8	51,9	42,6	33,6	23,4	17,1	15,3
GNM6	kg/h	81,9	68,9	56,4	44,5	31,1	22,8	20,3
	m^3/h^{*1}	65,5	55,1	45,1	35,6	24,9	18,2	16,2
GNM7	kg/h	90,0	75,8	62	48,9	34,1	25,0	22,3
	m^3/h^{*1}	72,0	60,6	49,6	39,1	27,3	20,0	17,8
GNM13	kg/h	163,8	137,8	112,8	89,0	62,3	45,5	40,5
	m^3/h^{*1}	131,0	110,2	90,2	71,2	49,8	36,4	32,4
GNM14	kg/h	180,0	151,5	124,0	97,8	68,3	50,0	44,5
	m^3/h^{*1}	144,0	121,2	99,2	78,2	54,6	40,0	35,6
GNM20	kg/h	245,6	206,6	169,1	133,5	93,4	68,3	60,8
	m^3/h^{*1}	196,5	165,3	135,3	106,8	74,7	54,6	48,6
GNM22	kg/h	270,0	227,3	186,0	146,6	102,4	75,0	66,8
	m^3/h^{*1}	216,0	181,8	148,8	117,3	81,9	60,0	53,4

^{*1} – related to 1,013 bar (a) and 20 °C at 7 bar operating pressure, conversion factor 0,8 m^3/kg
Higher nitrogen flows upon request.

AIR FACTOR

Type	95 %	96,0 %	97,0 %	98,0 %	99,0 %	99,5 %	99,6 %
GNM0,1 – GNM22	2,3	2,6	3,0	3,8	4,8	5,2	5,7

GNA
NITROGEN GENERATOR

DIMENSIONS, CONNECTIONS AND WEIGHTS

Type	inlet	outlet	height	width	depth	weight
GNA2	1/2“	1/2“	1700 mm	550 mm	700 mm	165 kg
GNA4	1/2“	1/2“	1930 mm	780 mm	820 mm	320 kg
GNA6	1/2“	1/2“	1950 mm	620 mm	750 mm	200 kg
GNA9	1/2“	1/2“	1950 mm	650 mm	800 mm	250 kg
GNA12	3/4“	1/2“	2100 mm	1050 mm	950 mm	750 kg
GNA15	3/4“	1/2“	2120 mm	820 mm	820 mm	450 kg
GNA20	1“	¾“	2130 mm	870 mm	830 mm	550 kg
GNA27	1“	¾“	2200 mm	1250 mm	950 mm	1100 kg
GNA35	1 1/2“	1“	2250 mm	1810 mm	1130 mm	2300 kg
GNA50	1 1/2“	1“	2250 mm	1920 mm	1250 mm	2800 kg
GNA65	1 1/2“	1“	2260 mm	1150 mm	900 mm	1000 kg
GNA80	1 1/2“	1“	2300 mm	1550 mm	1300 mm	1850 kg
GNA100	2“	1 1/2“	2650 mm	2050 mm	1400 mm	3000 kg
GNA125	2“	1 1/2“	3000 mm	2050 mm	1400 mm	3300 kg
GNA150	2“	1 1/2“	3500 mm	2050 mm	1400 mm	4000 kg

REQUIRED STORAGE VOLUME FOR BUFFER VESSEL

Type	Volume	95 %	98,0 %	99,0 %	99,5 %	99,9 %	99,99 %	99,999 %	99,9995 %
GNA2	liter	250	250	250	250	250	250	250	250
GNA4	liter	250	250	250	250	250	250	250	250
GNA6	liter	250	250	250	250	250	250	250	250
GNA9	liter	250	250	250	250	250	250	250	250
GNA12	liter	500	500	250	250	250	250	250	250
GNA15	liter	500	500	500	500	250	250	250	250
GNA20	liter	750	750	500	500	500	250	250	250
GNA27	liter	1000	1000	750	750	500	250	250	250
GNA35	liter	1500	1500	750	750	750	500	500	500
GNA50	liter	1500	1500	1000	1000	1000	500	500	500
GNA65	liter	2000	2000	1500	1500	1500	725	725	725
GNA80	liter	3000	3000	2000	2000	2000	900	900	900
GNA100	liter	3000	3000	2000	2000	2000	1000	1000	1000
GNA125	liter	4000	4000	3000	3000	3000	1500	1500	1500
GNA150	liter	5000	5000	3000	3000	3000	1500	1500	1500

GNM
NITROGEN GENERATOR

DIMENSIONS, CONNECTIONS AND WEIGHTS

Type	inlet	outlet	height	width	depth	weight
GNM0,1	1/2“	1/2“	1200 mm	600 mm	400 mm	91 kg
GNM0,2	1/2“	1/2“	1200 mm	600 mm	400 mm	102 kg
GNM0,3	1/2“	1/2“	1200 mm	600 mm	400 mm	110 kg
GNM0,5	1/2“	1/2“	1200 mm	600 mm	400 mm	118 kg
GNM1,1	1/2“	1/2“	1200 mm	600 mm	400 mm	102 kg
GNM2.0	1/2“	1/2“	1200 mm	600 mm	400 mm	105 kg
GNM2.5	1“	1“	1200 mm	600 mm	400 mm	118 kg
GNM3	3/4“	3/4“	1200 mm	600 mm	400 mm	134 kg
GNM4	3/4“	3/4“	2000 mm	600 mm	400 mm	124 kg
GNM5	1 1/2“	1 1/2“	2000 mm	600 mm	400 mm	143 kg
GNM6	1 1/2“	1 1/2“	2000 mm	600 mm	400 mm	147 kg
GNM7	1 1/2“	1 1/2“	2000 mm	600 mm	400 mm	154 kg
GNM13	1 1/2“	1 1/2“	2000 mm	600 mm	400 mm	189 kg
GNM14	1 1/2“	1 1/2“	2000 mm	600 mm	400 mm	203 kg
GNM20	1 1/2“	1 1/2“	2000 mm	600 mm	400 mm	231 kg
GNM22	1 1/2“	1 1/2“	2000 mm	600 mm	400 mm	252 kg

REMAKRS TO THE COMPRESSED AIR QUALITY

The compressed air should always be trreated with refrigeration dryers, appropriate filtration and oil vapour adsorbers. For highly sensitve applications and nitrogen purities above 99,9%, we recommend the optional use of adsorption dryer with a pressure dewpoint of -20°C or even -40°C.

REQUIRED PURITY CLASSES ACC. TO ISO 8573.1 FOR THE COMPRESSED AIR SUPPLY

Type	GNA series	GNM series
particles *1	class 3	class 1
humidity *1*2	class 2 - 4	class 2 - 4
oil content *1	class 1	class 1

*1 – typical result under the assumption of correspondingly suitable inlet concentrations as well as operating framework conditions.
*2 – up from 99,9 % purity, class 2 is recommended.

QUESTIONAIRE NITROGEN GENERATION

Customer:		Date:
Contact:		
Address:		
Phone:		
E-Mail:		

Anwendung:	

required purity	min. in %	max. in %

Required operating pressure:		Demand N2/Tag:	

hours per day:		days per week:	

Is there a temporary, higher demand (peak) of nitrogen?	
Volume:	
Length of peak min.:	
time between peaks:	

current nitrogen supply (with demand):			
cylinder bundles:	day:	week:	month:
liquid gas:	day:	week:	month:

Current compressed air supply:		
operating pressure:	min:	max:
compressed air temperature:	min:	max.:
ambient temperature:	min.:	max.:

Available compressed air quality (ISO 8573.1):					
particle:	class 1: ☐	class 2: ☐	class 3: ☐	class 4: ☐	class 5: ☐
humidty:	class 1: ☐	class 2: ☐	class 3: ☐	class 4: ☐	class 5: ☐
oil content:	class 1: ☐	class 2: ☐	class 3: ☐	class 4: ☐	class 5: ☐

Does your compressed air system offer reserves? Which quantity?	
volume flow m³/min.	

Is the application sensitive to dust?	yes: ☐	no: ☐

This questionaire is also availalbale for download on our website: www.fstweb.de.

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