NitroVap Gas Generators

- Ideal for any combination of sample evaporators up to 100 nozzle positions
- Produces clean, dry (to -20°F) dewpoint evaporator grade nitrogen from any standard laboratory compressed air source
- Accelerates evaporation by decreasing the partial vapor pressure above the solvent liquid
- Eliminates inconvenient and dangerous LN2 boil-off dewars and nitrogen gas cylinders from the laboratory
- Recommended and used by many sample concentrator and sample evaporator manufacturers
- Payback period of typically less than one year
- Sleep economy mode
- Silent operation and minimal operator attention required

NitroVap-1LV and NitroVap-2LV

Proven Technology

Parker Balston's NitroVap-1LV and NitroVap-2LV Nitrogen Generators can provide clean, ultra-dry nitrogen to sample evaporators. These systems offer high nitrogen output flows in a miniature cabinet. The user can activate the manual SLEEP economy mode to eliminate compressed air consumption when the sample concentrator is not in use.

Nitrogen Technology

Nitrogen is produced by utilizing a combination of filtration and membrane separation technologies. A high efficiency prefiltration system pretreats the compressed air to remove all contaminants down to 0.01 micron. Hollow fiber membranes subsequently separate the clean air into a concentrated nitrogen output stream and an oxygen enriched permeate stream, which is vented from the system. The combination of these technologies produces a continuous on demand supply of pure nitrogen.

Gas Generator Benefits

The NitroVap generators are complete systems with state-of-the-art, highly reliable components engineered for easy installation, operation, and long term performance. The Parker Balston NitroVap-1LV and NitroVap-2LV eliminate all the inconveniences and cost of LN2 dewar and nitrogen cylinder gas supplies and dependence on outside vendors. Uncontrollable price increases, dewar ice and condensation, contract negotiations, long term commitments, and tank rentals are no longer a concern. With a NitroVap generator, you control your gas supply.

Ease of Use

Since NitroVap generators incorporate unique membrane separation technology, nitrogen delivery is immediate to the sample concentrator. "Lock-it-and-leave-it" operation of the sample concentrator is maintained without downtime and without "running out of gas" mid blow-down.

This Technology Features Advanced HiFluxx Fiber!

NitroVap Gas Generators

Principal Specifications - NitroVap Generators

Nitrogen Purity	Up to 90%
Nitrogen Dewpoint	Down to -20°F (-29°C) atmospheric
Maximum Nitrogen Flow Rate	NitroVap-1LV: up to 80 slpm @ 100 psig input up to 140 slpm @ 125 psig input
	NitroVap-2LV: up to 160 slpm @ 100 psig input up to 287 slpm @ 125 psig input
Electrical Requirements	None
Nitrogen Outlet Pressure	0-15 psig user controlled
Dimensions	10.63"w x 14.1"d x 16.5"h (26.92cm x 35.81cm x 41.91cm)
Inlet Port/Outlet Port	1/4" NPT (female)
Shipping Weight	53 lbs/24 kg

Use with These and Other Blowdown Evaporators

TurboVap from Calper-Zymark

N-Evap from Organomation

RapidVap from LabConco

Reacti-Vap from Fisher Pierce

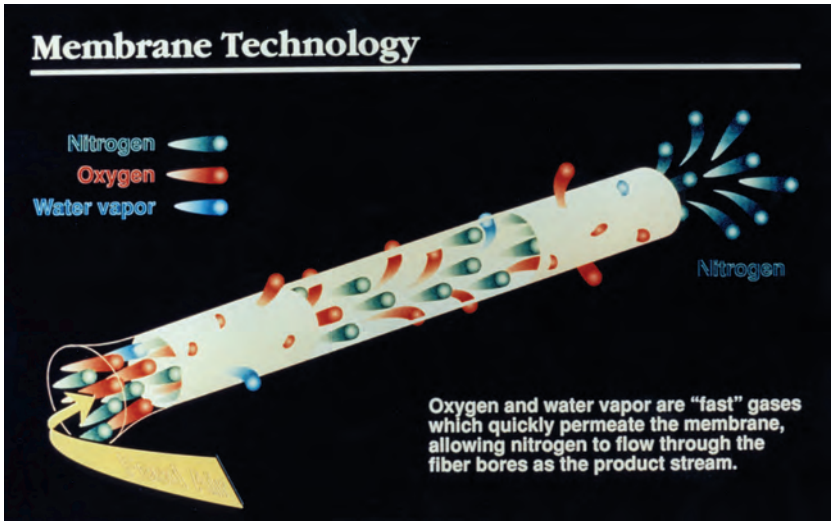
Duo-Vap from Jones Chromatography

DryVap from Horizon Technology

Evaporex from Apricot

Ordering Information for assistance, call 800-343-4048, 8 to 5 Eastern Time

Model	Description
NitroVap-1LV and NitroVap-2LV	NitroVap Nitrogen Generators
MKNITROVAP	Maintenance Kit (Includes 1 each filter cartridge, and 1 each membrane cartridge)
NITROVAP-1LV-PM, NITROVAP-2LV-PM	Preventive Maintenance Plan
NITROVAP-DN2	Extended Support with 24 Month Warranty



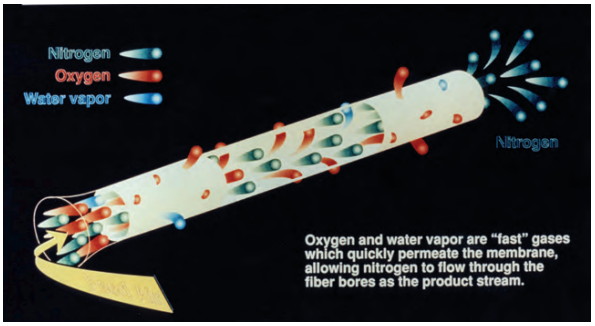
NitroFlow Lab Self Contained LC/MS Membrane Nitrogen Generator

- Flow capacity to 30 LPM
- Less expensive and more convenient than nitrogen cylinders and dewars
- Ideal for all derivatives of ESi and APCi modes
- Includes state-of-the-art, oil-less compressors
- Unlike PSA and Hosmer technologies, membrane will not suppress corona needle discharge
- Special sound insulation design ensures quiet operation

NitroFlowLab

The Parker Balston® LC/MS Nitro-Flow Lab is a self-contained membrane nitrogen generator that produces LC/MS grade nitrogen with output pressure to 116 psig. Nitrogen is produced by utilizing a combination of compressors, carefully matched with filtration, and membrane separation technology components.

Intake ambient air from the laboratory is filtered using an inlet suction breather filter to remove airborne organic and particulate impurities. This purified air is delivered to a long life low pressure air compressor which provides an air stream to hollow fiber membranes which subsequently separate the clean air into a concentrated nitrogen retentate and oxygen enriched permeate, which is then cycled through the system. Prior to exiting the system pure nitrogen retentate is delivered to a nitrogen amplification compressor to assure proper pressure, flow and purity to the LC/MS.



The Parker Balston LC/MS NitroFlow Lab will deliver a continuous or on demand supply of pure nitrogen making it the smart alternative to cylinders. Superior engineering with carefully matched filtration, membrane separation and compression technolies have resulted in a system with the utmost reliability and longevity. Additional applications include: nebulizer gases, chemical and solvent evaporation, instrument supply and purge, evaporative light scattering equipment and sparging.

Principal Specifications

Model	NitroFlowLab
Nitrogen	Phthalate free with flow to 30 lpm @ sea level
Maximum Outlet Pressure	116 psig (8 barg)
Hydrocarbon Content	< 2ppm (excluding methane)
Atmospheric Dewpoint	-58°F (-50°C)
Outlet Port	Female 1/4" NPT
Min/Max Ambient Temperature	50°F/95°F (10°C/35°C)
Electrical Requirements	120Vac/60Hz/20Amp / NEMA 5 - 20 Straight Blade
Dimensions	27.6"h x 12.2"w x 35.4"d (70.1cm x 31cm x 90cm)
Shipping Weight	204 lbs. (92.5 kg)

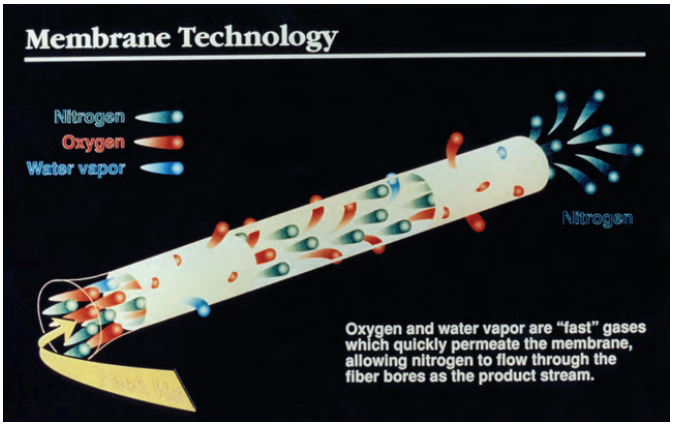
Low and Mid Flow Nitrogen Generators

- Recommended and used by all major LC/MS manufacturers
- Eliminates the need for costly, dangerous, inconvenient nitrogen cylinders in the laboratory
- Models N2-04, N2-14, N2-22, N2-35 require no electricity
- Compact design frees up valuable laboratory floor space
- Phthalate-free, no organic vapors
- Unlike PSA technology, membrane will not suppress corona needle discharge.

Model N2-22 Mid Flow
Membrane Nitrogen Generator

Parker Balston® Low Flow Nitrogen Generators include models N2-04, N2-14, N2-14A that produce up to 61 SLPM of compressed nitrogen, on-site. The Parker Balston® Mid-Flow Nitrogen Generators include models N2-22, N2-22ANA, N2-35, and N2-35ANA that produce 132 SLPM of compressed nitrogen, on-site. The purity level of the nitrogen stream is defined by the user, for the application, and may range from 95% to 99.5%.

Low Flow Model N2-14ANA and Mid Flow Models N2-22ANA and N2-35ANA Nitrogen Generators include an oxygen analyzer which monitors the oxygen concentration of the nitrogen stream. An audible alarm signals high or low oxygen concentrations. Parker Balston Nitrogen Generators are complete systems engineered to transform standard compressed air into nitrogen at safe, regulated pressures, on demand, without the need for operator attention. The systems eliminate the need for costly, dangerous dewars and cylinders in the laboratory.



Nitrogen is produced by utilizing a combination of filtration and membrane separation technologies. A high efficiency prefiltration system pretreats the compressed air to remove all contaminants down to 0.01 micron. Hollow fiber membranes subsequently separate the clean air into a concentrated nitrogen output stream and an oxygen enriched permeate stream, which is vented from the system. The combination of these technologies produces a continuous on demand supply of pure nitrogen.

This Technology Features Advanced HiFluxx Fiber!

Typical applications include: LC/MS, nebulizer gas, chemical and solvent evaporation, instrument purge and supply, evaporative light scattering detector use (ELSD), and sparging.

Nitrogen Purity / Flow Chart

Flow measured in SLPM at indicated Operating Pressure, psig. Flows for Model N2-04 printed in black, flows for Models N2-14 and N2-14A in red.

	145		125		110		100		90		80		70		60	
99.5	–	11	–	10	–	9	–	8	–	7	–	6	–	5	–	4
99	6	18	5	16	5	15	4	13	4	11	3	10	3	8	2	7
98	11	29	10	25	9	25	8	20	7	18	6	16	5	13	4	11
97	15	40	13	34	13	33	10	27	9	25	8	21	7	18	6	15
96	20	50	17	43	16	42	13	34	12	31	10	26	9	22	7	19
95	24	60	21	52	20	51	17	42	15	37	13	32	11	28	9	24

Nitrogen Purity / Flow Chart

Flow measured in SLPM at indicated Operating Pressure, psig. Flows for Model N2-22, N2-22A printed in black, flows for Models N2-35, N2-35A in red.

	145		125		110		100		90		80		70		60	
99.5	19	29	16	25	14	22	13	20	12	18	10	16	9	13	17	11
99	29	44	25	37	22	33	20	30	18	27	15	23	13	20	11	17
98	44	66	38	57	34	51	30	46	27	41	24	36	20	30	17	26
97	59	83	50	74	45	65	40	57	36	52	31	46	26	40	23	35
96	73	109	63	94	56	84	50	75	45	67	39	59	32	50	27	42
95	88	131	177	114	69	102	61	90	55	81	48	71	41	60	35	52

Principal Specifications

Models		**N2-04, N2-14, N2-14ANA, N2-22, N2-22ANA, N2-35 and N2-35ANA**
Nitrogen Purity		95.0% - 99.5%
Atmospheric Dewpoint		-58°F (-50°C)
Suspended Liquids		None
Particles > 0.01µm		None
Commercially Sterile		Yes
Phthalate-free		Yes
Hydrocarbon-free		Yes
Min./Max. Operating Pressure		60/145 psig
Max. Press. Drop @ 99% N_2 Purity, 125 psig		10 psig
Recommended Ambient Operating Temperature		68°F (20°C)
Max. Inlet Air Temperature	110°F (43°C)	
Inlet/Outlet Ports		1/4" NPT
Electrical Requirements	N2-04, N2-14, N2-22, N2-35	None
	N2-14ANA, N2-22ANA, N2-35ANA	120 VAC/60 Hz/25 Watts
Shipping Weight	N2-04	42.5 lbs (19 kg)
	N2-14	75 lbs (34 kg)
	N2-14ANA, N2-22, N2-22ANA	80 lbs (36 kg)
	N2-35, N2-35ANA	90 lbs (41 kg)
Oxygen Analyzer		Included with Model N2-14ANA, N2-22ANA, N2-35ANA
Dimensions, N2-04		16.1"h x 10.7"w x 13.4"d (40.9cm x 27.2cm x 34cm)
Dimensions, N2-14, N2-14ANA, N2-22, N2-22ANA, N2-35, N2-35ANA		51.5"h x 18"w x 16.2"d (130.8cm x 45.7cm x 41.1cm)

High Flow Nitrogen Generators

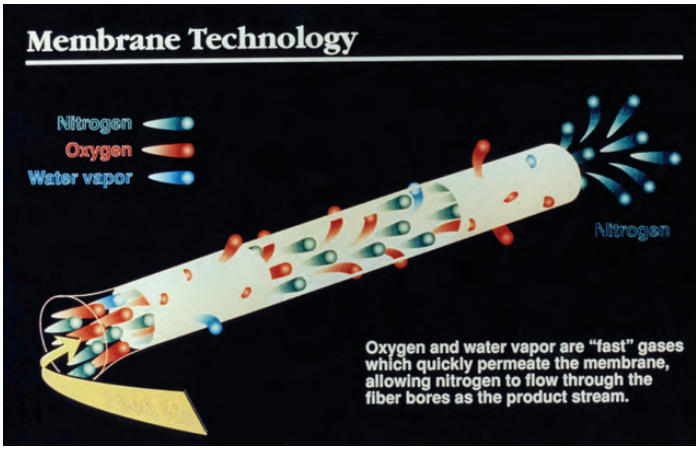
- Recommended and used by all major LC/MS manufacturers
- Eliminates the need for costly, dangerous, inconvenient nitrogen cylinders in the laboratory
- Models N2-45, N2-80, and N2-135 require no electricity
- Compact design frees up valuable laboratory floor space
- Phthalate-free, no organic vapors
- Unlike PSA technology, membrane will not suppress corona needle discharge.

Model N2-135 High Flow
Membrane Nitrogen Generator

Parker Balston® High Flow Nitrogen Generators include models N2-45, N2-80, N2-135 that produce up to 467 SLPM of compressed nitrogen, on-site. The purity level of the nitrogen stream is defined by the user, for the application, and may range from 95% to 99.5%.

High Flow Model N2-45ANA, N2-80ANA, and N2 135ANA Nitrogen Generators include an oxygen analyzer which monitors the oxygen concentration of the nitrogen stream. An audible alarm signals high or low oxygen concentrations. Parker Balston Nitrogen Generators are complete systems engineered to transform standard compressed air into nitrogen at safe, regulated pressures, on demand, without the need for operator attention. The systems eliminate the need for costly, dangerous dewars and cylinders in the laboratory.

Nitrogen is produced by utilizing a combination of filtration and membrane separation technologies. A high efficiency prefiltration system pretreats the compressed air to remove all contaminants down to 0.01 micron. Hollow fiber membranes subsequently separate the clean air into a concentrated nitrogen



output stream and an oxygen enriched permeate stream, which is vented from the system. The combination of these technologies produces a continuous on demand supply of pure nitrogen.

Typical applications include: LC/MS, nebulizer gas, chemical and solvent evaporation, instrument purge and supply, evaporative light scattering detector use (ELSD), and sparging.

High Flow Nitrogen Generators

Nitrogen Purity / Flow Chart

Flow LPM (liters per minute), at 68°F (25°C) inlet air temperature and operating pressure, PSIG.
Flows printed in black are for Models N2-45 and N2-45A
Flows printed in red are for Models N2-80 and N2-80A
Flows printed in green are for Models N2-135 and N2-135A

	145			125			110			100			90			80		
99.5	67	100	133	55	83	110	47	71	94	39	59	78	33	50	66	27	41	54
99	92	138	183	74	112	149	63	95	127	53	79	106	44	66	89	35	53	71
98	129	194	258	106	159	212	89	134	179	73	110	147	62	93	124	50	75	101
97	163	244	325	132	198	264	113	169	226	94	141	187	79	119	159	65	97	130
96	200	300	400	160	240	320	137	205	274	114	171	228	97	145	194	80	119	159
95	233	350	467	187	281	374	160	241	321	134	201	268	111	167	222	90	135	180

Principal Specifications

Model		**N2-45, N2-80, N2-135, N2-45ANA, N2-80ANA, and N2-135ANA**
Nitrogen Purity		95.0% - 99.5%
Atmospheric Dewpoint		-58°F (-50°C)
Suspended Liquids		None
Particles > 0.01µm		None
Commercially Sterile		Yes
Phthalate-free		Yes
Hydrocarbon-free		Yes
Min./Max. Operating Pressure		60/145 psig
Max. Press. Drop @ 99% N_2 Purity, 125 psig		10 psig
Recommended Ambient Operating Temperature		72°F (22°C)
Max. Inlet Air Temperature	110°F (43°C)	
Inlet/Outlet Ports		1/2" NPT
Electrical Requirements	N2-45, N2-80, N2-135	None
	N2-45ANA, N2-80ANA, N2-135ANA	120 VAC/60 Hz/25 Watts
Shipping Weight	N2-45, N2-80, N2-135	250 lbs (114 kg)
	N2-45ANA, N2-80ANA, N2-135ANA	250 lbs (114 kg)
Oxygen Analyzer		Included with Model N2-45ANA, N2-80ANA, N2-135ANA
Dimensions		67"h x 24"w x 20"d (140cm x 61cm x 50cm)

High Flow Nitrogen Generators

- Lower cost...eliminates the need for costly gas cylinders
- Complete package with prefilters, carbon filter, and membrane filter
- Compact - frees up valuable floor space
- Eliminates unexpected shutdowns due to a “bad” or empty cylinder
- Hassle-free, easy to install, easy to operate
- Safe and reliable
- Expandable modular design

Parker Balston N2-300
Nitrosource Nitrogen Generator

Parker Balston® High Flow Nitrosource Nitrogen Generators produce up to 99.5% pure, commercially sterile nitrogen at dewpoints to -58°F (-50°C) from a compressed air supply. All Membrane Nitrogen Generators include a 0.01 micron membrane filter which ensures the nitrogen is completely free of suspended impurities.

Parker Balston High Flow Nitrosource Nitrogen Generators are one of the most effecient membrane systems available with higher recovery rates and lower operating costs than many other membrane systems.

The generators utilize proprietary membrane separation technology. The membrane divides the air into two separate streams: one is 95%-99.5% pure nitrogen, and the other is oxygen rich with carbon dioxide and other trace gases.

The generator separates air into its component gases by passing inexpensive, conventional compressed air through bundles of individual hollow fiber, semi-permeable membranes. Each fiber has a perfectly circular cross section and a uniform bore through its center. Because the fibers are so small, a great many can be packed into a limited space, providing an extremely large membrane surface area that can produce a relatively high volume product stream.

Compressed air is introduced to the center of the fibers at one end of the module and contacts the membrane as it flows through the fiber bores. While oxygen, water vapor and other trace gases permeate the membrane fiber and are discharged through a permeate port, the nitrogen is contained within the hollow fiber membrane, and flows through the outlet port of the module.

Water vapor also permeates through the membrane; therefore, the nitrogen product gas is very dry.

Applications

High thru-put LC/MS contract labs

Sample concentrators

Nitrogen supply to analytical lab

Custom Systems Available

Flow rates to 2,265 lpm

Delivery presssures to customer’s specifications

Skid mounted systems with compressor, receiving tank and controls are available

High Flow Nitrogen Generators

The Parker Balston Nitrosource Nitrogen Generators completely eliminate and inconvenient and the high costs of nitrogen Dewars and cylinders. There is no need to depend on outside vendors for nitrogen gas supplies. The hassles of changing dangerous, high pressure cylinders and interruption of gas supplies are completely eliminated. The Balston Systems offer long term cost stability by eliminating uncontrollable vendor price increases, contract negotiation, long term commitments and tank rentals. Once the generator is installed, a continuous nitrogen supply of consistent purity is available within minutes from start-up.

The Parker Balston Nitrosource Nitrogen Generators are complete systems ready to operate as delivered with carefully matched components engineered for easy installation, operation and long term reliability.

The generators are free-standing and housed in an attractive cabinet. Standard features include: high efficiency coalescing prefilters with automatic drains, an activated carbon filter, and a 0.01 micron membrane final filter. Installation consists of simply connecting a standard compressed air line to the inlet and connecting the outlet to a nitrogen line.

There is no complicated operating procedure to learn or labor intensive monitoring involved. Simply select the purity your process requires, set the flow and pressure, and within minutes high purity, dry nitrogen is available
for use!

Once the system is operating, it requires little monitoring. The only maintenance involves changing the coalescing filter cartridges and activated carbon filter periodically. This is a simple ten minute procedure.

All models also include an oxygen monitor which offers LCD readouts and remote alarm or chart recorder capabilities. An audible alarm signals high or low oxygen concentrations (determined by the application). The oxygen monitor is supplies with alarm relay outputs which may be used to signal a remote alarm, open a backup supply or the process stream, or close the process flow.

Flow Rates (lpm) @ 100 psig, 68°F

Model	99.5%	99%	98%	97%	96%	95%
N2-300	200	311	538	736	935	1133
N2-460	297	467	807	1104	1402	1699
N2-600	396	623	1076	1473	1869	2266

Principal Specifications - Nitrosource Series

Model	N2-300	N2-460	N2-600
Atmospheric Dewpoint	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)
Commercially Sterile	Yes	Yes	Yes
Particles >0.01 micron	None	None	None
Suspended Liquids	None	None	None
Min/Max Operating Pressure	60 psig/145 psig	60 psig/145 psig	60 psig/145 psig
Max Pressure Drop (at 95% N2, 125 psig)	15 psig	15 psig	15 psig
Operating Temperature	70°F (21°C)	70°F (21°C)	70°F (21°C)
Min/Max Inlet Air Temp.	50°F /104°F (10°F /40°F)	50°F /104°F (10°F /40°F)	50°F /104°F (10°F /40°F)
Recommended Inlet Air Temp.	70°F (21°C)	70°F (21°C)	70°F (21°C)
Electrical Requirements	90-250 VAC 50-60 Hz	90-250 VAC 50-60 Hz	90-250 VAC 50-60 Hz
Dimensions	29"W x 31"D x 76"H (74cm x 51cm x 193cm)	29"W x 42"D x 76"H (74cm x 79cm x 193cm)	29"W x 53"D x 76"H (74cm x 107cm x 193cm)
Shipping Weight	660 lbs.	870 lbs.	1,290 lbs.