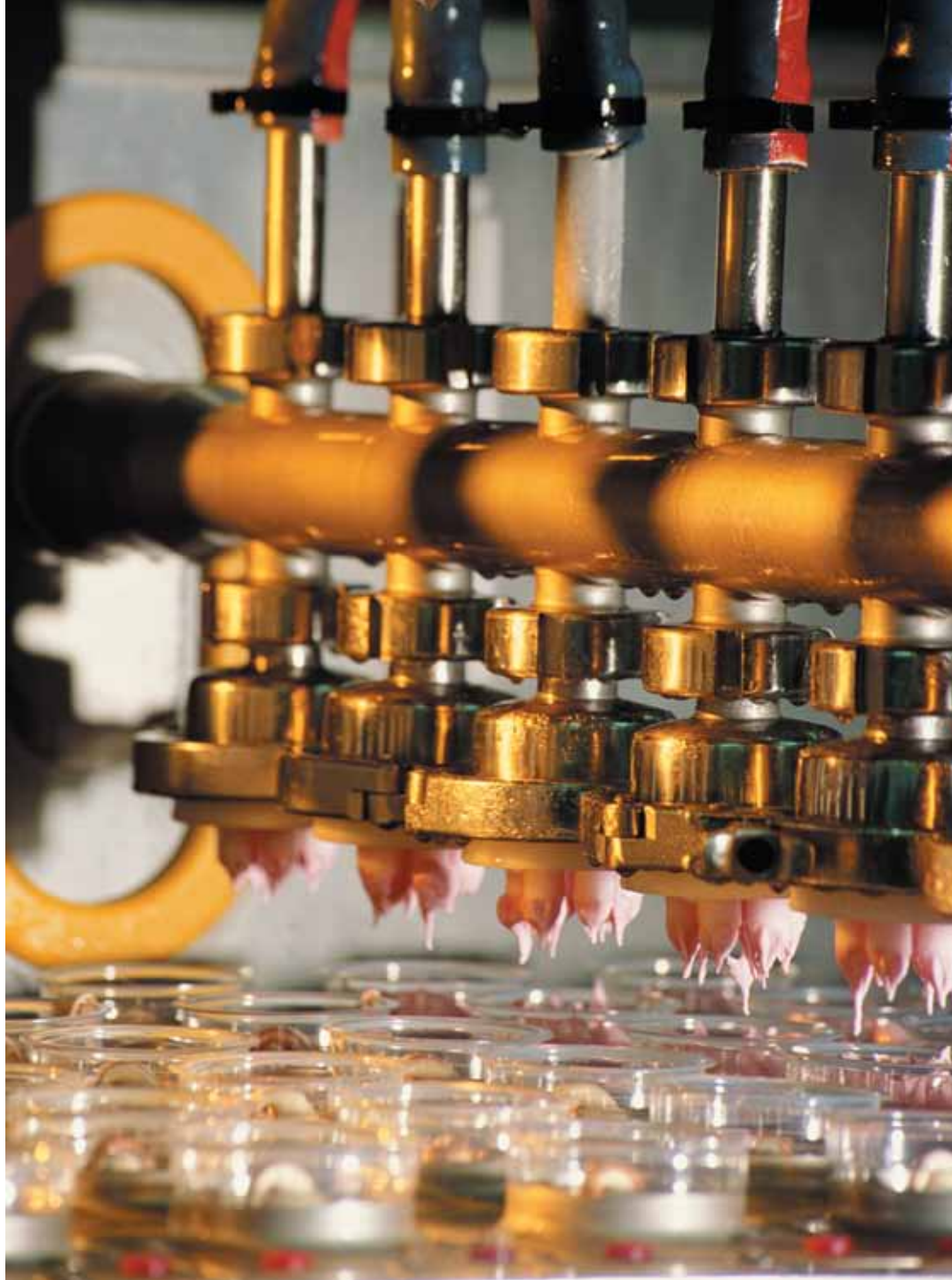




aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



Balston Nitrogen Generation Systems

Bulletin N2-H



ENGINEERING YOUR SUCCESS.

Parker Hannifin Corporation

The Global Leader in Motion and Control Technologies

We engineer success of our customers around the world, drawing upon nine core motion and control technologies. These technologies enable virtually every machine and process to operate accurately, efficiently and dependably.

As the global leader in motion and control, we partner with our distributors to increase our customers' productivity and profitability by delivering an unmatched breadth of engineered components and value-added services.

We continue to grow with our customers by creating application-focused products and system solutions. A key to our global expansion has been to follow our customers and establish operations, sales and service wherever they are needed. No single competitor matches Parker's global presence.

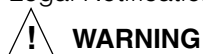


Corporate Headquarters
in Cleveland, Ohio.

Parker's Motion and Control Technologies

Aerospace	Hydraulics
Climate Control	Pneumatics
Electromechanical	Process Control
Filtration	Sealing & Shielding
Fluid & Gas Handling	

Legal Notifications



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Nitrogen Generation Systems

Continuously transform compressed air into nitrogen

Parker Balston nitrogen generation systems continuously produce high purity nitrogen from compressed air and eliminate the inconvenience and high costs of nitrogen cylinders, dewars and bulk delivery. The hassles of changing dangerous high pressure cylinders and interruption of gas supply are completely removed. A nitrogen generator offers long term price stability eliminating uncontrollable vendor price increases, long term commitments, contract negotiations and tank rental fees. A continuous supply of consistent purity is available within minutes from startup.

Installation is simple: pipe in compressed air and pipe out nitrogen. Just connect a standard compressed air line to the inlet of the generator, connect the outlet to your nitrogen line and the unit is ready for trouble free operation. The system is designed to operate 24 hours/day, 7 days/week.

Parker Balston nitrogen generators are free standing, housed in an attractive cabinet or skid mounted, depending on the application. Standard features include high efficiency coalescing prefilters with automatic drains, activated carbon adsorption (when required), nitrogen storage tank and a 0.01 micron final membrane filter.

There is no complicated operating procedure or labor intensive monitoring involved. Simply select the purity your process requires and set the flow and within minutes, high purity, dry nitrogen is available. Once the Parker Balston nitrogen generator is installed, the system requires very little maintenance.

The only regular maintenance require changing filtration cartridges regularly.

An oxygen monitor to measure the oxygen concentration of the nitrogen stream is available as an option. An audible alarm signals high or low oxygen concentrations (determined by the application). The oxygen analyzer is supplied 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 for protection of downstream equipment or processes.

Product Features:

- **Membrane and PSA technologies available**
- **Purities up to 99.9995%**
- **Lower cost...eliminates the need for expensive gas cylinders**
- **Operate continuously with no unexpected shutdowns**
- **Hassle-free, easy to install and operate**
- **Compact, frees up valuable floor space**
- **Safe and reliable**
- **Provide stable long term N2 costs**



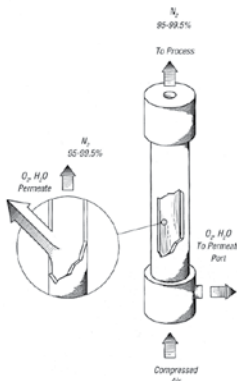
Membrane Nitrogen Generators

Smaller flows and lower purities

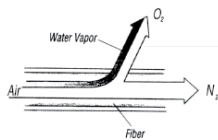
How Membrane Technology Works

Parker Balston nitrogen generators utilize proprietary membrane separation technology. The membrane separates compressed air into two streams: one is 95%-99% pure nitrogen, and the other is oxygen enriched with carbon dioxide and other gases.

The generator separates air into component gases by passing inexpensive compressed air through semi permeable membranes, consisting of bundles of individual hollow fibers. 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 into the center of the fibers at one end of the module and contacts the membrane as it flows through the fiber bores. Oxygen, water vapor and other trace gases easily permeate the membrane fiber and are discharged through a permeate port while the nitrogen is contained within the membrane and flows through the outlet port. Since water vapor permeates through the membrane as well, the nitrogen gas stream is very dry, with dewpoints as low -58°F.



Market Focus: Food & Beverage Packaging

The benefits of using nitrogen for packaging in the food & beverage industry are well known. Residual oxygen within a package promotes bacterial growth, which can compromise product quality and shelf life. Using nitrogen minimizes the levels of oxygen present, preserving quality and significantly improving shelf life. A nitrogen generator, which separates nitrogen and oxygen from a compressed air supply, can often be the most effective way to supply this nitrogen.



Application: Wine Bottling

A nitrogen blanket, reducing the oxygen concentration to less than 0.5% minimizes contact between oxygen and the wine surface during storage (both pre and post bottling). This will prevent the growth of bacteria and other microbes. Nitrogen can also be used to purge air from pipes and hoses prior to bottling and to ensure oxygen is not introduced during transport. Finally, sparging with nitrogen will remove any oxygen or CO₂ introduced during handling helping to preserve wine integrity. A Parker nitrogen generator supplies a continuous stream of nitrogen to displace residual oxygen and fill the voids within the package, preserving taste and freshness and extending shelf life.

Membrane Nitrogen Generators

Complete systems with carefully matched components

Product Features:

Complete package with prefilters, carbon filter, and membrane filter

No electrical line required

Product 95 - 99% pure, commercially sterile nitrogen from a compressed air supply

Dewpoints to -58°F (-50°C)

All models include a 0.01 membrane filter

Models available with oxygen monitors



HFX Series
High Flow Nitrogen
Membrane Generator

Market Focus: Chemicals

Many industries use a wide variety of dangerous chemicals in the manufacture of products. Blanketing with an inert gas, such as nitrogen, is often used to ensure the chemical integrity and maximize safety. Nitrogen tank blanketing controls the oxygen concentration and humidity within the vessel, protecting the product from contamination, degradation, and chemical change thus minimizing chance of explosion. A nitrogen blanket can also be used to balance tank volumes and prevent collapse during unloading.



Application: Isocyanate Blanketing

Isocyanates are highly reactive acids that change physical properties when combined with oxygen and moisture, and are potential explosion hazards in the presence of oxygen. Minimizing the concentration of oxygen (below 5%) and water vapor in the void volume can eliminate these issues. A Parker nitrogen generator supplies a continuous stream of dry (-58° dewpoint) nitrogen, creating an inert headspace that ensures chemical integrity and decreases the fire hazard.

Membrane Nitrogen Generators

HFX Series Principal Specifications

Flow Rates (SCFH) @ 100 psig @ 68°F							Pressure Correction Factors (at Indicated Operating Pressure (PSIG))									
Model	95	96	97	98	99	99.5	58	73	87	101	116	130	145	160	174	190
HFX Series Nitrogen Generators																
HFX-1	40	33	26	16	11	---	.52	.65	.86	1	1.15	1.35	1.44	---	---	---
HFX-3	148	120	95	70	42	---	.54	.68	.85	1	1.14	1.3	1.43	---	---	---
HFX-5	279	229	176	131	76	---	.52	.65	.85	1	1.14	1.34	1.43	---	---	---
HFX-7	452	360	283	209	120	---	.53	.66	.86	1	1.14	1.32	1.43	---	---	---
HFX-9	752	600	452	330	201	---	.44	.65	.85	1	1.1	1.3	1.4	---	---	---
HFX-11	1201	992	780	572	248	---	.44	.65	.85	1	1.2	1.4	1.6	---	---	---

Principal Specifications - HFX Series Membrane Nitrogen Generators

Model Number	HFX-1, HFX0-1	HFX-3, HFX0-3	HFX-5, HFX0-5	HFX-7, HFX0-7, HFX-9, HFX0-9, HFX-11, HFX0-11
Atmospheric Dewpoint	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)
Commercially Sterile	Yes	Yes	Yes	Yes
Particles > 0.01 micron	None	None	None	None
Suspended Liquids	None	None	None	None
Min/Max Operating Press.(1)	60 psig/145 psig	60 psig/145 psig	60 psig/145 psig	60 psig/145 psig
Max. Press. Drop (at 95% N ₂ , 125 psig)	10 psig	10 psig	10 psig	10 psig
Recommended Ambient Operating Temperature	77°F (25°C)	77°F (25°C)	77°F (25°C)	77°F (25°C)
Min/Max Inlet Air Temp.	40°F/122°F (2°C/50°C)	40°F/122°F (2°C/50°C)	40°F/122°F (2°C/50°C)	40°F/122°F (2°C/50°C)
Recommended Inlet Air Temperature	77°F (25°C)	77°F (25°C)	77°F (25°C)	77°F (25°C)
Electrical Requirements (2)	None (2)	None (2)	None (2)	None (2)
Dimensions	12.8" w x 7.5" d x 16.3" h (32cm x 19.1cm x 41cm)	16" w x 16" d x 50" h (41cm x 25cm x 91cm)	16" w x 16" d x 50" h (41cm x 25cm x 91cm)	24" w x 20" d x 69" h (61cm x 51cm x 175cm)
Shipping Wt.	38 lbs. (17.3 kg)	75 lbs. (34 kg)	106 lbs. (114 kg)	250 lbs. (114 kg)

Notes:

1 Maximum operating pressure in Europe is 8 barg.

2 No electrical power required unless used with an electrical accessory, e.g., an oxygen analyzer.

Ordering Information - HFX Series Membrane Nitrogen Generators

For assistance, call toll-free at 1-800-343-4048 8AM to 5PM Eastern Time

Model	Maintenance Kit	Maintenance Kit w/O2 Monitor	Maintenance Kit Components			Final Membrane Filter	Activated Carbon Filter
			Replacement Filter Cartridges 1st stage	Replacement Filter Cartridges 2nd stage	Replacement Filter Cartridges 3rd stage		
HFX-1, HFX0-1 (w/O2 monitor)	MK75005	MK750050	100-12-DX	100-12-BX	---	9933-05-95	1/7825-08-000
HFX-3, HFX0-3 (w/O2 monitor)	MK7579C	MK75790C	100-12-DX	100-12-BX	---	GS-100-12-95	75620
HFX-5, HFX0-5 (w/O2 monitor)	MK7579C	MK75790C	100-12-DX	100-12-BX	---	GS-100-12-95	75620
HFX-7, HFX0-7 (w/O2 monitor)	MK7576	MK76760	100-18-DX	100-18-BX	100-25-BX	GS-100-25-95	75303
HFX-9, HFX0-9 (w/O2 monitor)	MK7576	MK75760	100-18-DX	100-18-BX	100-25-BX	GS-100-25-95	75303
HFX-11, HFX0-11 (w/O2 monitor)	MK7576	MK76760	100-18-DX	100-18-BX	100-25-BX	GS-100-25-95	75303

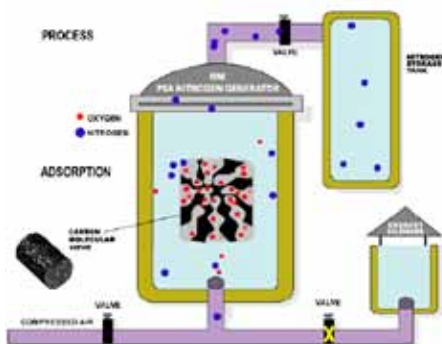
PSA Nitrogen Generators

Larger Flows and Higher Purities

How PSA Technology Works

Balston Monobed and Dual Bed Nitrogen Generators produce up to 99.9995% pure, compressed nitrogen at dewpoints to -70°F (-57°C) from nearly any compressed air supply. The generators are designed to continually transform standard compressed air into nitrogen at safe, regulated pressures without operator attention.

Balston PSA Nitrogen Generators utilize a combination of filtration and pressure swing adsorption technologies. High efficiency prefiltration pretreats the compressed air to remove all contaminants down to 0.1 micron. Air entering the generator consists of 21% oxygen and 78% nitrogen. The gas separation process preferentially adsorbs oxygen over nitrogen using carbon molecular sieve (CMS). At high pressures the CMS has a greater affinity for oxygen, carbon dioxide, and water vapor than it does at low pressures. By raising and lowering the pressure within the CMS bed, all contaminants are captured and released, leaving the CMS unchanged. This process allows the nitrogen to pass through as a product gas at pressure. The depressurization phase of the CMS releases the absorbed oxygen and other contaminant gases to the atmosphere.



Market Focus: Metal Processing

The use of nitrogen is widespread in the metal processing industry, including much of the support equipment such as lasers. Using nitrogen to minimize the contact with oxygen improves final product quality and minimizes rework.



Application: Aluminum Extrusion

High temperatures often cause aluminum oxide to form on the surface of the dies, causing imperfections in the newly formed piece. This damage can cause increased tooling costs, higher maintenance costs and requirements, extended downtime and lost productivity. This damage can also leave the final part useless, due to weakness within the material or non-compliance to the original design specification. Using nitrogen to degas the aluminum during the extrusion process removes oxygen and assists die cooling, which improves consistency, yields less scrap, and produces high quality finished products. A Parker nitrogen generator is often the most cost efficient way to supply this continuous stream of nitrogen.

PSA Nitrogen Generators

Monobed and Dual Bed Designs

Product Features:

Monobed and Dualbed designs

Complete package with pre-filtration, and receiving tank

Safe and reliable

Produce 95 - 99.999% pure nitrogen

Dewpoints to -70°F (-21°C)

PSA towers require no maintenance



MB Series Nitrogen Generator



DB5-10 Series PSA Nitrogen Generator

Market Focus: Power Generation

Nitrogen is used throughout the energy cycle from production in oil and gas wells to transmission at power plant. The severe combustibility of the product often makes it a requirement, from gas lift in the production well to blanketing the seals on a natural gas compressor during electrical generation. The remoteness of many of these locations, coupled with the volumes required, typically make a nitrogen generator a great fit.



Application: Boiler Layup

Boiler cycling (i.e. startup and shutdown) is more common in today's challenging business environment, primarily due to instability of natural gas prices and volatile energy demand. Proper layup of the Heat Recovery Steam Generator (HRSG) is critical. Problems associated with improper boiler layup include corrosion and pitting on both the gas & water sides of the HRSG, maintenance issues, startup delays and water chemistry delays. Nitrogen is an essential tool in helping to alleviate these issues, and has become the preferred technology since it doesn't introduce foreign chemicals to the boiler. A Parker nitrogen generator improves operating costs, eliminates corrosion and pitting and ensures a quick, trouble free startup.



PSA Nitrogen Generators

Principal Specifications - Monobed Systems

Principal Specifications - Monobed Nitrogen Generators

Model Number	MB-1	MB-3	MB-5
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
Recommended Inlet Pressure	110 psig (7.6 barg)	110 psig (7.6 barg)	110 psig (7.6 barg)
Max Inlet Pressure	140 psig (9.7 barg)	140 psig (9.7 barg)	140 psig (9.7 barg)
Max Outlet Pressure at Corresponding Purity (Based on nominal conditions & standard 60 gallon nitrogen tank)	80 psig @ 99.99 - 95% 75 psig @ 95.0%	80 psig @ 99.99 - 96.0% 75 psig @ 99.0%	80 psig @ 99.99-95.0% 70 psig @ 98.0-95.0%
Min/Max Ambient Temperature	40°F/95°F (4°C/35°C)	40°F/95°F (4°C/35°C)	40°F/95°F (4°C/35°C)
Inlet Port Size	1/2" NPT (female)	1/2" NPT (female)	1/2" NPT (female)
Outlet Port Size	1/2" NPT (female)	1/2" NPT (female)	1/2" NPT (female)
Electrical Requirements	120VAC/60 Hz., .18 kw	120VAC/60 Hz., .18 kw	120VAC/60 Hz., .18 kw
MB Dimensions	29 3/8" w x 24 1/2" d x 78" h (74cm x 62cm x 198cm)		
Nitrogen Tank Dimensions (all units)	26" dia x 54" h (58cm x 130cm)		
Max. Shipping Wt. (all units)	460 lbs. (209 kg)		

Ordering Information - Monobed Nitrogen Generators

For assistance, call toll-free at 1-800-343-4048 8AM to 5PM Eastern Time

Model	MB-1	MB-3	MB-5
Balston Monobed without Oxygen Analyzer	MB-1	MB-3	MB-5
Balston Monobed with a Parker Oxygen Analyzer	MBO-1	MBO-3	MBO-5
Balston Monobed with a Teledyne 3300 PB Analyzer	MBOA-1	MBOA-3	MBOA-5
Balston Monobed with a Teledyne 3300 TB Analyzer	MBOB-1	MBOB-3	MBOB-5
Monobed Nitrogen Generator Replacement Parts	Part Number		
Prefilter (box of 5)	5/100-18-BX		
Final Filter (box of 5)	5/100-12-BX		
Final Sterile Air Filter (box of 10)	100-18-SA		
Replacement Oxygen Monitor Fuel Cells (Optional)			
Parker 72-730	72-695		
Teledyne 3300PB (High Purity Applications)	I22		
Teledyne 3300TB (High Purity Trace Applications)	B2C		
Maintenance Kits			
Maintenance Kit w/out O2 Sensor	MKMB1		
Maintenance Kit w/O2 Sensor (72695)	MKMBO1		
Maintenance Kit W/O2 Sensor (I22)	MKMBOA1		
Maintenance Kit W/O2 Sensor (B2C)	MKMBOB1		

Nitrogen Purity Flow Chart - Monobed Nitrogen Generators

Flow Rate (SCFH)			
Purity (%N2)	MB-1	MB-3	MB-5
95	130	260	390
96	115	230	345
97	103	207	310
98	90	180	270
99	72	143	215
99.5	60	120	180
99.9	43	87	130
99.95	38	77	115
99.99	14	27	41

Notes

1 The 72-460 is an optional accessory which will maintain a constant pressure drop across the flow control valve, thereby providing a constant nitrogen purity.

PSA Nitrogen Generators

Principal Specifications - Dualbed Systems

Principal Specifications - Models DB-5, DB-10, DB-15, DB-20		
Model Number	DB-5, DB-10	DB-15, DB-20
Nominal Conditions		
Feed Pressure (minimum)	110 psig	110 psig
Temperature	80°F	80°F
Ambient Pressure	1 Atm.	1 Atm.
Compressed Air Specifications		
Maximum Pressure	140 PSIG	140 PSIG
Temperature Range	60°F - 105°F	60°F - 105°F
Dewpoint	40°F atmospheric dewpoint or better	40°F atmospheric dewpoint or better
Residual Oil Content	Trace	Trace
Particles	<.01 micron	<.01 micron
Atmospheric Dewpoint		
Atmospheric Dewpoint	-58°F (-50°C)	-58°F (-50°C)
Commercially Sterile	Yes	Yes
Particles > .1 micron	None	None
Suspended Liquids	None	None
Recommended Inlet Pressure (Min.)	110 psig (7.6 barg)	110 psig (7.6 barg)
Max Inlet Pressure	140 psig (9.7 barg)	140 psig (9.7 barg)
Max Outlet Pressure (Based on nominal conditions and standard 60 gallon nitrogen tank)	80psig	DB-15: 80 psig @ 95-99.99% Purity DB-20: 80 psig @ 98-99.99% Purity 70 psig @ 95-94% Purity 75 psig @ 95-96% Purity
Min. / Max. Ambient Temperature	40°F/95°F (4°C/35°C)	40°F/95°F (4°C/35°C)
Ambient Conditions		
Temperature	45°F - 95°F	45°F - 95°F
Min/Max Ambient Temperature	40°F - 95°F	40°F - 95°F
Ambient Pressure	Atmospheric	Atmospheric
Air Quality	Clean air without contaminants	Clean air without contaminants
Dimensions, Weight and Connections		
Dimensions	28.5"L x 32.25"D x 78"H	28.5"L x 50"D x 78"H
Weight (with tank)	620 lbs (DB-5), 830 lbs (DB-10)	1240 lbs (DB-15), 1450 lbs (DB-20)
Inlet	1/2" NPT	1" NPT
Outlet	1/2" NPT	3/4" NPT
Electrical Requirement	120VAC/60Hz, 1.5 Amp	120VAC/60Hz, 1.5 Amp

Ordering Information - Models DB5, DB-10, DB-15, DB-20 For assistance, call toll free at 800-343-4048, 8AM to 5PM EST

Balston Dual Bed Nitrogen Generator with Oxygen Analyzer	DB0-5	DB0-10	DB0-15	DB0-20
Balston Dual Bed Nitrogen Generator without Oxygen Analyzer	DB-5	DB-10	DB-15	DB-20
Maintenance Kit for Nitrogen Generator with Oxygen Analyzer	MKDB0-5	MKDB0-5	MKDB0-15	MKDB0-15
Maintenance Kit for Nitrogen Generator without Oxygen Analyzer	MKDB5	MKDB5	MKDB15	MKDB15
Oxygen Sensor	72695	72695	72695	72695

Performance Data - Nitrogen Flow (SCFH), for Models DB5 to DB-20

% Nitrogen	DB-5	DB-10	DB-15	DB-20
99.999	33	66	99	132
99.995	74	148	222	296
99.99	141	281	421	561
99.95	204	409	613	817
99.9	240	480	720	960
99.5	345	689	1034	1378
99	416	831	1247	1663
98	499	998	1496	1995
97	570	1140	1710	2280
96	630	1259	1889	2518
95	694	1387	2081	2774

PSA Nitrogen Generators

Principal Specifications - Dualbed Systems

Principal Specifications - Dual Bed Nitrogen Generators

Model	DB-1200	DB-1600	DB-1900
Atmospheric Dewpoint	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)
Particles > .1 micron	None	None	None
Suspended Liquids	None	None	None
Recommended Inlet Pressure	110 psig (7.6 barg)	110 psig (7.6 barg)	110 psig (7.6 barg)
Max Outlet Pressure	80 psig	80 psig	80 psig
Min/Max Ambient Temperature	40°F/95°F (4°C/35°C)	40°F/95°F (4°C/35°C)	40°F/95°F (4°C/35°C)
Inlet Port Size	1-1/2" NPT (female)	1-1/2" NPT (female)	2" NPT (female)
Outlet Port Size	1" NPT (female)	1" NPT (female)	1-1/2" NPT (female)
Electrical Requirements	120VAC/60 Hz	120VAC/60 Hz	120VAC/60 Hz
Dimensions	78" w x 48" d x 98" h (198cm x 122cm x 245cm)	78" w x 48" d x 92" h (198cm x 122cm x 234cm)	72" w x 54" d x 101" h (183cm x 137cm x 257cm)
Shipping Wt.	3,800 lbs. (1,724 kg)	3,800 lbs. (1,724 kg)	4300 lbs. (1,951 kg)

Model	DB-2500	DB-4000
Atmospheric Dewpoint	-58°F (-50°C)	-58°F (-50°C)
Particles > .1 micron	None	None
Suspended Liquids	None	None
Recommended Inlet Pressure	110 psig (7.6 barg)	110 psig (7.6 barg)
Max Outlet Pressure	80 psig	80 psig
Min/Max Ambient Temperature	40°F/95°F (4°C/35°C)	40°F/95°F (4°C/35°C)
Inlet Port Size	2" NPT (female)	2" NPT (female)
Outlet Port Size	1-1/2" NPT (female)	1-1/2" NPT (female)
Electrical Requirements	120VAC/60 Hz	120VAC/60 Hz
Dimensions	72" w x 54" d x 125" h (183cm x 137cm x 318cm)	84" w x 72" d x 138" h (215cm x 183cm x 351cm)
Shipping Wt.	6500 lbs. (2948 kg)	7100 lbs. (3221 kg)

How To Order

For assistance, call toll-free at 1-800-343-4048 8AM to 5PM Eastern Time

	DB-1200	DB-1600	DB-1900	DB-2500	DB-4000
Dual Bed Nitrogen Generator	DB-1200	DB-1600	DB-1900	DB-2500	DB-4000
Prefilter Cartridges, 1st Stage	200-35-DX	200-35-DX	200-80-DX	200-80-DX	200-80-DX
Prefilter Cartridges, 2nd Stage	200-35-BX	200-35-BX	200-80-BX	200-80-BX	200-80-BX
Additional Prefilter Cartridges	200-35-DX	200-35-DX	200-80-DX	200-80-DX	200-80-DX
Final Air Filter	100-18-DX	150-19-DX	150-19-DX	200-35-DX	200-35-DX
Oxygen Monitor					
Standard	72-730	72-730	72-730	72-730	72-730
High Purity (Optional)	3290	3290	3290	3290	3290

Flow Rate (SCFH)

Purity %N2	DB-1200	DB-1600	DB-1900	DB-2500	DB-4000
95	3300	4400	5220	6880	11010
96	3050	4066	4540	5984	9574
97	2800	3732	4430	5836	9330
98	2445	3250	3860	5088	8138
99	1995	2652	3150	4150	6640
99.5	1635	2178	2585	3402	5445
99.9	1077	1435	1703	2243	3590
99.95	951	1268	1505	1981	3170
99.99	630	840	997	1312	2100
99.995	522	696	826	1088	1741
99.999	186	248	295	389	622

Notes

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Offer of Sale

The items described in this document are hereby offered for sale at prices to be established by Parker Hannifin Corporation, its subsidiaries and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Parker Hannifin Corporation, its subsidiary or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

1. Terms and Conditions of Sale: All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance or an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

2. Payment: Payment shall be made by Buyer within 30 days from the date of shipment. Amounts not timely paid shall bear interest at the Maximum rate permitted by law for each month or portion thereof that the Buyer is late making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment to Buyer. THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.

NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.

5. Limitation of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's Control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

North America

Engine Filtration

Parker Hannifin Corporation
Racor Division
3400 Finch Road
P.O. Box 3208
Modesto, CA 95354
phone 209 521 7860
fax 209 529 3278
www.parker.com/racor

Parker Hannifin Corporation
Racor Division
P.O. Box 6030
Holly Springs, MS 38635
phone 662 252 2656
fax 662 274 2118
www.parker.com/racor

Parker Hannifin Corporation
Racor Division
302 Parker Drive
Beaufort, SC 29906
phone 843 846 3200
fax 843 846 3230
www.parker.com/racor

Compressed Air Treatment

Parker Hannifin Corporation
Filtration and Separation Division
Balston Operation
242 Neck Road
Haverhill, MA 01835
phone 978 858 0505
fax 978 556 7501
www.balstonfilters.com

Parker Hannifin Corporation
Filtration and Separation
Finite Filter Operation
500 Glaspie Street
P.O. Box 599
Oxford, MI 48371-5132
phone 248 628 6400
fax 248 628 1850
www.parker.com/finitefilter

Parker Hannifin Corporation
Airtek Division
4087 Walden Avenue
Lancaster, NY 14086
phone 716 685 4040
fax 716 685 1010
www.airtek.com

Hydraulic Filtration

Parker Hannifin Corporation
Hydraulic Filter Division
16810 Fulton County Road #2
Metamora, OH 43540-9714
phone 419 644 4311
fax 419 644 6205
www.parker.com/hydraulicfilter

Process Filtration

Parker Hannifin Corporation
Process Advanced Filtration
2340 Eastman Avenue
Oxnard, CA 93030
phone 805 604 3400
fax 805 604 3401
www.parker.com/processfiltration

Europe

Engine Filtration

Parker Hannifin Corporation
Filter Division Europe
Shaw Cross Business Park
Churwell Vale
Dewsbury, WF12 7RD England
phone +44 (0) 1924 487000
fax +44 (0) 1924 487038
www.parker.com/rfde

Compressed Air Treatment

Parker Hannifin Corporation
domnick hunter industrial operations
Dukesway, Team Valley Trading Estate
Gateshead, Tyne & Wear
England NE11 0PZ
phone +44 (0) 191 402 9000
fax +44 (0) 191 482 6296
www.domnickhunter.com

Parker Hannifin Corporation
Parker Hiross S.p.A.
Strada Zona Industriale, 4
35020, S. Angelo di Piove(PD), Italy
phone +39 049 9712 111
fax +39 049 7001 111
www.dh-hiross.com

Parker Hannifin Corporation
ZANDER Aufbereitungstechnik GmbH
Stammhaus Essen/Headquarter
Germany, Essen
Im Teelbruch 118
45219 Essen
phone +49 (0) 20 54 93 40
fax +49 (0) 20 54 93 41 64
www.zander.de

Hydraulic Filtration

Parker Hannifin Corporation
Hydraulic Filtration Division Europe
Stieltjesweg 8, 6827 BV Arnhem
P.O. Box 5008 6802 EA, Arnhem
Arnhem, Holland
phone +31 26 3760376
fax +31 26 3643620
www.parker.com/hfde

Parker Hannifin Corporation
Finn Filter Operation
Salmentie 260
FI-31700 Urjala as Finland
phone +358 20 753 2500
fax +358 20 753 2501
www.parker.com/hfde

Parker Hannifin Corporation
CMC Operation
Brunel Way
Thetford, Norfolk IP 24 1HP England
phone +44 1842 763299
fax +44 1842 756300
www.parker.com/hfde

Process Filtration

Parker Hannifin Corporation
domnick hunter process division
Durham Road, Birtley
Co. Durham, DH3 2SF England
phone +44 (0) 191 410 5121
fax +44 (0) 191 410 5312
www.domnickhunter.com

Asia Pacific

Parker Hannifin Corporation
Shanghai Co. Ltd.
280 YunQiao Road
JinQiao Export Processing Zone
Shanghai 101206 China
phone +86 21 5031 2525
fax +86 21 5834 3714
www.parker.com/china

Parker Hannifin Corporation
Singapore Pte Ltd.
No 11 Fourth Chin Bee Road
Jurong Town
Singapore 619702
phone +65 68876300
fax +65 6265 5125
www.parker.com/malaysia

Parker Hannifin Corporation
Thailand Co. Ltd.
1023 3rd Floor, TPS Building
Pattanakam Road
Suanluang, Bangkok 10250 Thailand
phone +66 2717 8140
fax +66 2717 8148
www.parker.com/thailand

Parker Hannifin Corporation
Korea Ltd.
777 Jung-Ri
Dongtan-Myeon, Hwaseong-City
Kyunggi-Do, 445-813 Korea
phone +82 31 379 2200
fax +82 31 377 9710
www.parker.com/korea

Latin America

Parker Hannifin Corporation
Comercio Ltda. Filtration Division
Estrada Municipal Joel de Paula, 900
Eugenio de Melo, Sao Jose dos Campos
CEP 12225-390 SP Brazil
phone +55 (12) 4009 3500
fax +55 (12) 4009 3529
www.parker.com/br

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February 2010

Bulletin N2-H

Parker Hannifin Corporation
Filtration and Separation Division
242 Neck Road
Haverhill, MA 01835
1-978-858-0505
1-978-556-7501 fax
1-800-343-4048 (US & Canada)
www.balstonfilters.com

