



# Nitrogen Generation Systems

Bulletin N2-N

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



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
<b>Filtration</b>	Sealing & Shielding
Fluid & Gas Handling	

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ENGINEERING YOUR SUCCESS.

# The Benefits of Producing Nitrogen on Location

Nitrogen is commonly used in industry because it is dry and inert. Traditionally, nitrogen has been obtained through a delivered supply in the form of bulk liquid N<sub>2</sub>, dewars, and high pressure compressed gas cylinders. Relying on outside vendors can pose several challenges including long term purchase commitments, inflexible delivery schedules, uncontrollable vendor price increases, contract negotiations, tank rental fees, HAZMAT fees, and a long procurement process which could result in delays.

With regard to cylinders and dewars, the gas supply is interrupted when changeouts are necessary. It is common to run out of supply due to a late or missed delivery.

## Product Features:

Membrane and PSA technologies available

Purities up to 99.999%

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 N<sub>2</sub> costs

Sustainable and good for the environment

Additionally, precautions must be taken when handling and storing high pressure compressed gas cylinders. A dangerous situation can be created if a cylinder is dropped and a valve is broken off, potentially causing the cylinder to become a projectile.

Parker Balston nitrogen generation systems continuously produce high purity nitrogen from compressed air and eliminate the inconvenience of a delivered nitrogen supply. A continuous supply of consistent purity is available within minutes of 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.

Nitrogen generation in house and on demand is good for the environment and represents a sustainable approach to the supply of nitrogen. Gas industry sources indicate that an air separation plant uses 1976 kJ of electricity per kilogram of nitrogen at 99.9%. Generation of 99.9% nitrogen in house using a PSA system is 1420 kJ. That means up to 28% fewer greenhouse gases are created by the generation of electricity with a typical nitrogen generator. At a purity of 98%, the energy required for in house nitrogen drops to 796 kJ/kg. That means that in house generation creates 62% fewer greenhouse gases from electrical power at that purity. Request our white paper entitled "A Sustainable Approach to the Supply of Nitrogen" for a more complete discussion.

An oxygen monitor to measure the oxygen concentration of the nitrogen stream is available as an option (standard on Models DB-30, DB-40, DB-50, and DB-80). Parker offers a range of oxygen monitors to meet your application. See Page 15 for details.



# Market Focus: Food and Beverage

## Modified Atmosphere Packaging

The benefits of using nitrogen for packaging in the food & beverage industry are well known. Residual oxygen within a package promotes bacterial growth and oxidation, 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.

The final stage sterile air filter is USDA/FSIS accepted for use in federally inspected meat and poultry plants and is in full compliance with FDA and GFSI requirements.



## 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 CO<sub>2</sub> 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.

## Other Applications

Coffee Packaging  
Meat Packaging  
Lettuce Packaging

# Market Focus: Chemical Processing

## Chemical Blanketing

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. The reduced oxygen level minimizes the chance of explosion. A nitrogen blanket can also be used to balance tank volumes and prevent collapse during unloading.

### 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.

### Other Applications

Edible Oils

De-ionized Water



# Market Focus: Metal Processing



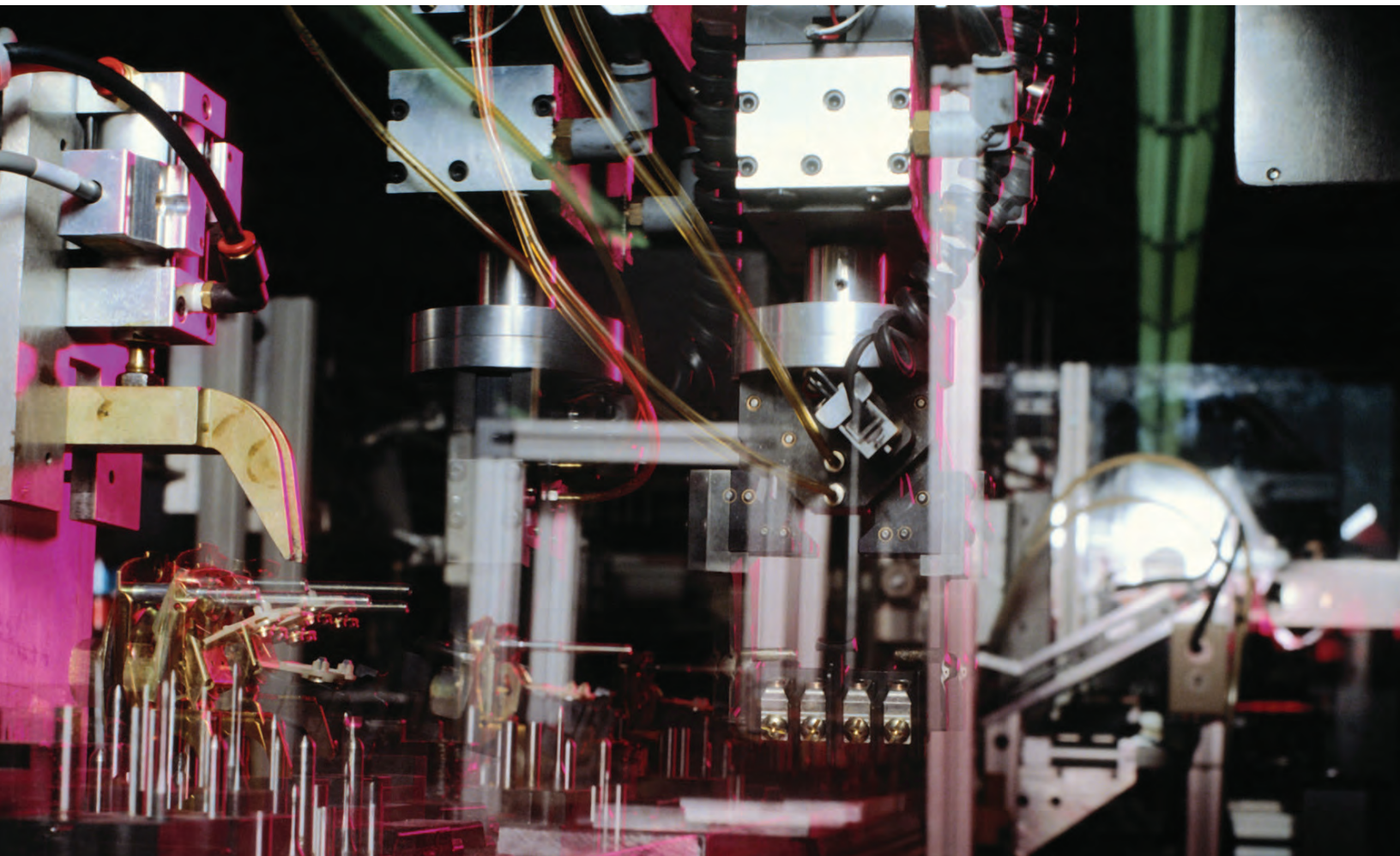
The use of nitrogen is widespread in the metal processing industry, including much of the support equipment such as lasers. Using nitrogen to minimize the contact with oxygen improves final product quality and minimizes rework.

## 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.

## Other Applications

Aluminum Degassing  
Laser Cutting



# 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.



## 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.



## Other Applications

Blanket Boiler Feedwater  
Transformer Blanketing



# Membrane Nitrogen Generators

## 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, water 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, pro-

viding 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 as -58°F/50°C.



Models HFX-7 through HFX-11

Model HFX-2

## Product Features

Complete package with prefilters, carbon filter, and membrane filter

No electrical line required, safe for all Class 1 environments.

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

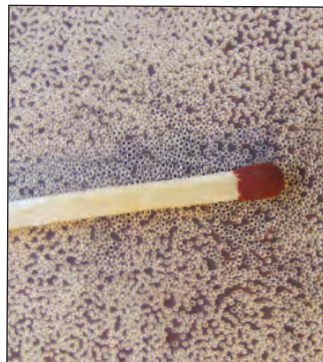
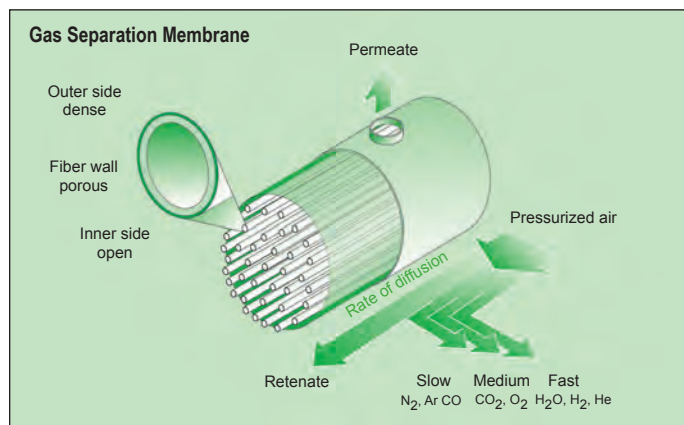
Dewpoints to -58°F (-50°C)

All models include a 0.01 micron membrane filter

Models available with oxygen monitors

Final stage sterile air filter is USDA/FSIS accepted for use in federally inspected meat and poultry plants

In full compliance with FDA and GFSI requirements



Relative Size of Hollow Fibers



High Performance Bundle





# Membrane Nitrogen Generators

## HFX Series

Flow Rates SCFH (Nm<sup>3</sup>/hr) @ 100 psig (7 barg) @ 68°F (20°C)

Pressure Correction Factors at Indicated Operating Pressure (PSIG)

Model	95	96	97	98	99	58	73	87	101	116	130	145
HFX-1	40 (1.1)	33 (0.9)	26 (0.7)	16 (0.5)	11 (0.3)	.52	.65	.86	1	1.15	1.35	1.44
HFX-3	148 (4.2)	120 (3.4)	95 (2.7)	70 (2.0)	42 (1.2)	.54	.68	.85	1	1.14	1.3	1.43
HFX-5	279 (7.9)	229 (6.5)	176 (5.0)	131 (3.7)	76 (2.2)	.52	.65	.85	1	1.14	1.34	1.43
HFX-7	452 (13)	360 (10)	283 (8.0)	209 (5.9)	120 (3.4)	.53	.66	.86	1	1.14	1.32	1.43
HFX-9	752 (21)	600 (17)	452 (13)	330 (9.3)	201 (5.7)	.44	.65	.85	1	1.1	1.3	1.4
HFX-11	1201 (34)	992 (28)	780 (22)	572 (16)	248 (7.0)	.44	.65	.85	1	1.2	1.4	1.6

### Principal Specifications - HFX Series

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.	60 psig/145 psig (4 barg/10 barg) (1)	60 psig/145 psig (4 barg/10 barg) (1)	60 psig/145 psig (4 barg/10 barg) (1)	60 psig/145 psig (4 barg/10 barg) (1)
Max. Press. Drop (at 95% N <sub>2</sub> , 125 psig)	10 psig (0.7 barg)	10 psig (0.7 barg)	10 psig (0.7 barg)	HFX-7, HFX0-7: 10 psig (0.7 barg) HFX-9, HFX0-9: 15 psig (1.03 barg) HFX-11, HFX0-11: 20 psig (1.4 barg)
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/110°F (4°C/43°C)	40°F/122°F (4°C/50°C)	40°F/122°F (4°C/50°C)	40°F/122°F (4°C/50°C)
Recommended Inlet Air Temperature	77°F (25°C)	77°F (25°C)	77°F (25°C)	77°F (25°C)
Inlet/Outlet Port Sizes	1/4" NPT	1/4" NPT	1/4" NPT	1/2" NPT
Electrical Requirements	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 oxygen analyzer.

### Ordering Information - HFX Series

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

Model	Maintenance Kit Components						
	Maintenance Kit	Maintenance Kit w/O2 Monitor	Replacement Filter Cartridges 1st stage	Replacement Filter Cartridges 2nd stage	Replacement Filter Cartridges 3rd stage	Final Membrane Filter	Activated Carbon Filter
HFX-1, HFX0-1	MK75005	N/A	100-12-DX	100-12-BX	---	9933-05-95	7700-L321
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)	MKHFX9	MKHFX09	100-18-DX	100-18-BX	100-25-BX	GS-100-25-95	75303
HFX-11, HFX0-11 (w/O2 monitor)	MKHFX11	MKHFX011	100-18-DX	100-18-BX	100-25-BX	GS-100-25-95	75303

# PSA Nitrogen Generators - Monobed

## How PSA Technology Works

Balston Monobed Nitrogen Generators produce up to 99.99% pure, compressed nitrogen at dewpoints to -58°F (-50°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 technology.

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.

## Product Features

Monobed design

Complete package with prefiltration, and receiving tank

Safe and reliable

Produce 95 - 99.99% pure nitrogen

Dewpoints to -58°F (-50°C)

Final stage sterile air filter is USDA/FSIS accepted for use in federally inspected meat and poultry plants

In full compliance with FDA and GFSI requirements

PSA towers require no maintenance



### Nitrogen Purity Flow Chart - Monobed Nitrogen Generators Flow Rate, SCFH (Nm<sup>3</sup>/hr)

Purity (% N <sub>2</sub> )	MB-1	MB-3	MB-5
95	194 (5.5)	388 (11.0)	583 (16.5)
96	174 (4.9)	349 (9.9)	523 (14.8)
97	154 (4.4)	309 (8.7)	463 (13.1)
98	135 (3.8)	270 (7.6)	405 (11.5)
99	109 (3.1)	218 (6.2)	327 (9.3)
99.5	99 (2.8)	197 (5.6)	296 (8.4)
99.9	76 (2.2)	152 (4.3)	228 (6.5)
99.95	355 (1.6)	110 (3.1)	165 (4.7)
99.99	37 (1.1)	74 (2.1)	112 (3.2)



# PSA Nitrogen Generators

## Monobed Nitrogen Generators

### Principal Specifications

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 @ 99.99-99.5% 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 Nitrogen Tank Dimensions (all units)	29 3/8" w x 24 1/2" d x 78" h (74cm x 62cm x 198cm) 26" dia x 54" h (58cm x 58cm x 130cm)		
Max. Shipping Wt. (all units)	460 lbs. (209 kg)		

### Ordering Information

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

Model	MB-1	MB-3	MB-5	Maintenance Kits
Balston Monobed without Oxygen Analyzer	MB-1	MB-3	MB-5	MKMB1
Balston Monobed with the standard Oxygen Analyzer	MBO-1	MBO-3	MBO-5	MKMBO1
Balston Monobed with a Advanced Instruments % Oxygen Analyzer	MBOC-1	MBOC-3	MBOC-5	MKMBOC1
Balston Monobed with a Advanced Instruments Trace Oxygen Analyzer	MBOD-1	MBOD-3	MBOD-5	MKMBOD1



# PSA Nitrogen Generators - Dual Bed

## Dual Bed Nitrogen Generation Systems

### Product Features

- Fully enclosed (steel) with casters
- High efficiency coalescing and sterile air filters
- Oxygen analyzer available
- PLC controls
- High oxygen alarms and dry contacts available
- Stand by mode
- Purity easily adjusted between 95%-99.999% with flow control valve
- Outlet pressure regulator
- 60 gal. vertical nitrogen storage tank
- Energy efficient compared to delivered nitrogen
- Final stage sterile air filter is USDA/FSIS accepted for use in federally inspected meat and poultry plants
- In full compliance with FDA and GFSI requirements



### Nitrogen Flow SCFH (Nm<sup>3</sup>/hr), for Models DB-5 to DB-80

% Nitrogen (1)	DB-5	DB-10	DB-15	DB-20	DB-30	DB-40	DB-50	DB-80
99.999	94 (2.6)	189 (5.4)	283 (8.0)	377 (10.7)	552 (14.5)	656 (17.2)	864 (22.7)	1381 (36.3)
99.995	150(4.2)	300 (8.5)	450 (12.7)	600 (17.0)	715 (18.8)	847 (22.3)	1115 (29.3)	1783 (46.9)
99.99	194 (5.5)	388 (11.0)	583 (16.5)	777 (22.0)	1010 (26.6)	1198 (31.5)	1578 (41.5)	2525 (66.4)
99.95	314 (8.9)	629 (17.8)	943 (26.7)	1258 (35.6)	1365 (35.9)	1622 (42.6)	2135 (56.1)	3417 (89.8)
99.9	365 (10.3)	730 (20.7)	1095 (31.0)	1460 (41.3)	1530 (40.2)	1812 (47.6)	2390 (62.8)	3818 (100.4)
99.5	512 (14.5)	1024 (29.0)	1536 (43.5)	2048 (58.0)	2178 (57.3)	2585 (68.0)	3402 (89.4)	5445 (143.1)
99	618 (17.5)	1235 (35.0)	1853 (52.5)	2470 (70.0)	2270 (59.7)	2690 (70.7)	3545 (93.2)	5670 (149.1)
98	770 (21.8)	1541 (43.6)	2311 (65.4)	3081 (87.2)	2950 (77.5)	3505 (92.1)	4615 (121.3)	7385 (194.1)
97	892 (25.3)	1783 (50.5)	2675 (75.75)	3566 (101.0)	3190 (83.9)	3780 (99.4)	4980 (130.9)	7960 (209.3)
96	983 (27.8)	1966 (55.7)	2949 (83.5)	3931 (111.3)	3945 (103.7)	4680 (123.0)	6157 (161.9)	9845 (258.8)
95	1065 (30.2)	2130 (60.3)	3195 (90.5)	4260 (120.6)	4320 (113.6)	5140 (135.10)	6765 (177.8)	10815 (284.3)

**Notes**

1 Stand-by feature is unavailable for purities 99.995-99.999%



# PSA Nitrogen Generators

## Dualbed Nitrogen Generation Systems

### Principal Specifications - Models DB5, DB-10, DB-15, DB-20

Model Number	DB-5	DB-10	DB-15	DB-20
Feed Air Pressure (minimum)	110 psig	110 psig	110 psig	110 psig
Air Quality	Clean air without contaminants	Clean air without contaminants	Clean air without contaminants	Clean air without contaminants
Temperature	80°F	80°F	80°F	80°F
Electrical Requirements	120 VAC /lph / 60Hz	120 VAC /lph / 60Hz	120 VAC /lph / 60Hz	120 VAC /lph / 60Hz
Maximum Pressure	140 PSIG	140 PSIG	140 PSIG	140 PSIG
Temperature Range	60°F - 105°F	60°F - 105°F	60°F - 105°F	60°F - 105°F
Nitrogen Dewpoint	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)
Commercially Sterile	Yes	Yes	Yes	Yes
Filtration Efficiency	99.99% @ 0.01u	99.99% @ 0.01u	99.99% @ 0.01u	99.99% @ 0.01u
Suspended Liquids	None	None	None	None
Ambient Pressure	Atmospheric	Atmospheric	Atmospheric	Atmospheric
Dimensions	28.5"L x 32.25"D x 78"H	28.5"L x 32.25"D x 78"H	28.5"L x 51.5"D x 78"H	28.5"L x 51.5"D x 78"H
Weight (with tank)	625 lbs	835 lbs	1245 lbs	1455 lbs
Inlet	1/2" NPT	1/2" NPT	1" NPT	1" NPT
Outlet	1/2" NPT	1/2" NPT	3/4" NPT	3/4" NPT
Maintenance Kit	MKDB5	MKDB5	MKDB15	MKDB15

## Expansion System Options

As standard products, our DB-5 and DB-15 can be expanded to the flow capacity of a DB-10 and DB-20, respectively. The DB-5 and DB-10 Models can be incorporated into the

cabinet of a DB-20 so that they can be expanded to the flow capacity of a DB-20. To get the larger cabinet, order either the DB-5-EC or the DB-10-EC for future expansion to a

DB-20. The expansion is integrated into the cabinet so no extra floor space is needed. Expansion Kit P/N EXP-DB-01.

### Expansion Capabilities

DB-5	DB-10	DB-15	DB-20
DB-5 →		-	-
-	DB-10	-	-
-	-	DB-15 →	
DB-5-EC →			
-	DB-10-EC →		



# WineMaker Series™ Nitrogen Generators

**Creates a continuous supply of high purity nitrogen from compressed air**

Generating your own nitrogen eliminates the hassles of supplied cylinders, dewars or bulk nitrogen. A nitrogen generator dispels any concerns about lines icing up, running low, or running out of nitrogen. Costly downtime, tank rental fees, Haz Mat fees, delivery fuel surcharges, price increases, evaporation concerns, and multi-year lease agreements will all be eliminated. Producing your own nitrogen eliminates reliance on outside vendors, allowing your winery to be more self-sufficient. The WineMaker Series Nitrogen Generators typically have a 9-18 month payback, and an operating life of 15 years +.

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.

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.



## Wine Bottling

A nitrogen blanket reduces the oxygen concentration to less than 0.5% and 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 CO<sub>2</sub> 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.

## Product Features

Complete package with prefiltration, and receiving tank

Digital Oxygen analyzer and Digital gas flow meter

Plugs into 110 volt outlet

Portable and expandable

Lease to own options available

Services wineries producing from 5,000 to 1 million+ cases

Ensures minimal DO pickup



## Principal Specifications and Ordering Information

### Standard Package Includes:

Fully enclosed cabinet with casters	Stand by mode
High efficiency coalescing and sterile air filters	Purity easily adjusted between 98%-99.9% with flow control valve
Oxygen analyzer available	Outlet pressure regulator
PLC controls	60 gal. vertical nitrogen storage tank
High oxygen alarms and dry contacts available	

### Principal Specifications - Models DB5-W, DB-10-W, DB-15-W, DB-20-W

Model Number	DB-5-W	DB-10-W	DB-15-W	DB-20-W
Feed Air Pressure (minimum)	110 psig	110 psig	110 psig	110 psig
Air Quality	Clean air without contaminants	Clean air without contaminants	Clean air without contaminants	Clean air without contaminants
Temperature	80°F	80°F	80°F	80°F
Electrical Requirements	120 VAC /lph / 60Hz	120 VAC /lph / 60Hz	120 VAC /lph / 60Hz	120 VAC /lph / 60Hz
Maximum Pressure	140 PSIG	140 PSIG	140 PSIG	140 PSIG
Temperature Range	60°F - 105°F	60°F - 105°F		
Nitrogen Dewpoint	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)
Commercially Sterile	Yes	Yes	Yes	Yes
Filtration Efficiency	99.99% @ 0.01u	99.99% @ 0.01u	99.99% @ 0.01u	99.99% @ 0.01u
Suspended Liquids	None	None	None	None
Ambient Pressure	Atmospheric	Atmospheric	Atmospheric	Atmospheric
Dimensions	28.5"L x 32.25"D x 78"H	28.5"L x 32.25"D x 78"H	28.5"L x 51.5"D x 78"H	28.5"L x 51.5"D x 78"H
Weight (with tank)	625 lbs	835 lbs	1245 lbs	1455 lbs
Inlet	1/2" NPT	1/2" NPT	1" NPT	1" NPT
Outlet	1/2" NPT	1/2" NPT	3/4" NPT	3/4" NPT

### Ordering Information - Models DB5-W, DB-10-W, DB-15-W, DB-20-W

Dual Bed N2 Generator with O2 Analyzer	DB0-5-W	DB0-10-W	DB0-15-W	DB0-20-W
Dual Bed N2 Generator w/o O2 Analyzer	DB-5-W	DB-10-W	DB-15-W	DB-20-W
Maint. Kit for N2 Generator with O2 Analyzer	MKDB0-5	MKDB0-5	MKDB0-15	MKDB0-15
Maint. Kit for N2 Generator w/o O2 Analyzer	MKDB5	MKDB5	MKDB15	MKDB15
Oxygen Sensor	72695	72695	72695	72695

### Nitrogen Generator Flow Rates (SCFH)

% Nitrogen	DB-5-W	DB-10-W	DB-15-W	DB-20-W
99.9	365	730	1095	1460
99.5	512	1024	1536	2048
99	618	1235	1853	2470
98	770	1541	2311	3081

# DB Twin Tower Nitrogen Gas Generators

## Principal Specifications DB Twin Tower Nitrogen Generators

### Principal Specifications

	DB-30*	DB-40*	DB-50*	DB-80*
Atmospheric Dewpoint N2	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)
Particles >0.1 Micron	None	None	None	None
Suspended Liquids	None	None	None	None
Recommended Inlet Pressure	110 psig (7.6 bar)	110 psig (7.6 bar)	110 psig (7.6 bar)	110 psig (7.6 bar)
Outlet Pressure	80 psig (5.5 bar)	80 psig (5.5 bar)	80 psig (5.5 bar)	80 psig (5.5 bar)
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)	40°F/95°F (4°C/35°C)
Inlet Port Size	1.5" NPT Female	2" NPT Female	2" NPT Female	2" NPT Female
Outlet Port Size	1" NPT Female	1.5" NPT Female	1.5" NPT Female	1.5" NPT Female
Electrical Requirements	120VAC/60 HZ	120VAC/60 HZ	120VAC/60 HZ	120VAC/60 HZ
Dimensions	64"W x 64"D x 96"H (163cm x 163cm x 244cm)	64"W x 64"D x 96"H (163cm x 163cm x 244cm)	64"W x 64"D x 103"H (163cm x 163cm x 262cm)	64"W x 64"D x 127"H (163cm x 163cm x 323cm)
Shipping Weight	3800 lbs. (1723.7 kg)	4000 lbs. (1814.4 kg)	6000 lbs. (2721.6 kg)	8500 lbs. (3855.5 kg)
Tank Size	240 Gal. (908.5 L)	240 Gal. (908.5 L)	400 Gal. (1514.2 L)	660 Gal. (2498.4 L)

\* Canadian customers desiring CRN/CSA certified systems, please add suffix "-CRN" to the Model Part Number. E.g., DB-30-CRN

### Ordering Information - Maintenance Kit Options

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

	DB-30	DB-40	DB-50	DB-80
Basic Maintenance Kit (Units w/ Balston Analyzer) Oxygen Analyzer Fuel Cell P/N 72695	MKDB30-R01	MKDB40-R01	MKDB50-R01	MKDB80-R01
Advanced Instruments % Kit (Units w/ GPR-2900 Analyzer) Adv. instr. % Analyzer Fuel Cell P/N GPR-11-60-4	MKDBOC30-R01	MKDBOC40-R01	MKDBOC50-R01	MKDBOC80-R01
Advanced Instruments Trace Kit (Units w/ GPR-1900 Analyzer) Adv. Inst. Trace Analyzer Fuel Cell P/N GPR-12-333	MKDBOD30-R01	MKDBOD40-R01	MKDBOD50-R01	MKDBOD80-R01



1-800-343-4048



# PSA Nitrogen Generators

## High Flow Nitrogen Generators

Parker Balston Premium High Flow Nitrogen Generators offer a unique set of features not typically found in standard nitrogen generators.

### Product Features

Outdoor operation using the standard Nema 4 control panel

Freeze protection available for cold weather climates

Premium Allen-Bradley controller

Energy efficient control system

Ethernet (optional)

4-20 Milliamp output

ASME flanged tops allow for future expansion of 10% by raising the height of the towers

Pre-compressed bed prevents bed dusting assuring maximum bed life

Leak detection mode for easy troubleshooting



#### Nitrogen Flow SCFH (Nm<sup>3</sup>/hr), for Models DB-1200 to DB-4000

% Nitrogen (1)	DB-1200	DB-1600	DB-1900	DB-2500	DB-4000
99.999	186 (5.3)	248 (7.0)	295 (8.4)	389 (11)	622 (18)
99.995	522 (15)	696 (20)	826 (23)	1088 (31)	1741 (49)
99.99	630 (18)	840 (24)	997 (28)	1312 (37)	2100 (59)
99.95	951 (27)	1268 (36)	1505 (43)	1981 (56)	3170 (90)
99.9	1077 (30)	1435 (41)	1703 (48)	2243 (64)	3590 (102)
99.5	1635 (46)	2178 (62)	2585 (73)	3402 (96)	5445 (154)
99	1995 (56)	2652 (75)	3150 (89)	4150 (118)	6640 (188)
98	2445 (69)	3250 (92)	3860 (109)	5088 (144)	8138 (230)
97	2800 (79)	3732 (106)	4430 (125)	5836 (165)	9330 (264)
96	3050 (86)	4066 (115)	4540 (129)	5984 (169)	9574 (271)
95	3300 (93)	4400 (125)	5220 (148)	6880 (195)	11010 (312)

#### Notes

1 Stand-by feature is unavailable for purities 99.995-99.999%

# PSA Nitrogen Generators

## High Flow Nitrogen Generators

### Principal Specifications - Models DB-1200, DB-1600, DB-1900, DB-2500, DB-4000

Model	DB-1200	DB-1600	DB-1900	DB-2500	DB-4000
Atmospheric Dewpoint	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)
Particles > 0.01 micron	None	None	None	None	None
Suspended Liquids	None	None	None	None	None
Recommended Inlet Pressure	110 psig (7.6 barg)	110 psig (7.6 barg)	110 psig (7.6 barg)	110 psig (7.6 barg)	110 psig (7.6 barg)
Max Outlet Pressure	80 psig (5.5 barg)	80 psig (5.5 barg)	80 psig (5.5 barg)	80 psig (5.5 barg)	80 psig (5.5 barg)
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)	40°F/95°F (4°C/35°C)	40°F/95°F (4°C/35°C)
Inlet/Outlet Port Size (NPT female)	1-1/2"/1"	1-1/2"/1"	2"/1-1/2"	2"/1-1/2"	2"/1-1/2"
Electrical Requirements	120VAC/60 Hz	120VAC/60 Hz	120VAC/60 Hz	120VAC/60 Hz	120VAC/60 Hz
Dimensions (cm)	78"w x 48"d x 92"h (198 x 122 x 234)	78"w x 48"d x 92"h (198 x 122 x 234)	72"w x 54"d x 101"h (183 x 137 x 257)	72"w x 54"d x 125"h (183 x 137 x 318)	84"w x 72"d x 138"h (213 x 183 x 351)
Shipping Wt.	3,800 lbs. (1,724 kg)	3,800 lbs. (1,724 kg)	4300 lbs. (1,951 kg)	6500 lbs. (2948 kg)	7100 lbs. (3221 kg)

### Ordering Information - Models DB-1200, DB-1600, DB-1900, DB-2500, DB-4000

Description	Model Number				
Dual Bed Nitrogen Generator	DB-1200	DB-1600	DB-1900	DB-2500	DB-4000

### Ordering Information - Maintenance Kit Options

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

	DB-1200	DB-1600	DB-1900	DB-2500
Advanced % O2 Analyzer	MKDBOC1200	MKDBOC1600	MKDBOC1900	MKDBOC2500
Trace O2 Analyzer	MKDBOD1200	MKDBOD1600	MKDBOD1900	MKDBOD2500



# PSA Nitrogen Generators

## Oxygen Analyzer Options

### Standard % O2 Analyzer - O

The standard oxygen analyzer has a High/Low contact alarm and audible alarm. This option is best for nitrogen purities  $\leq 99.5\%$ . Includes High/Low dry contact Replacement Oxygen Sensor P/N 72695.



Standard % O2 Analyzer - O

### Advanced O2 Analyzer - OC

The advanced oxygen analyzer with advanced galvanic sensor, capable of oxygen analysis from 0.05% to 100%, has a 1 year expected life. Standard features include auto-ranging capability, two-stage alarms, system diagnostic functions, zero and span calibration. Two sets of digital outputs and a 4-20mA output are available. This option is best for nitrogen purities  $\leq 99.95\%$  Replacement Oxygen Sensor P/N GPR-11-60-4.



Advanced O2 Analyzer - OC

### Trace O2 Analyzer - OD

The trace oxygen analyzer with advanced galvanic sensor, capable of oxygen analysis from 0-1000 ppm, has a 1 year expected life. Standard features include auto-ranging capability, two-stage alarms, system diagnostic functions, zero and span calibration. Two sets of digital alarm outputs and a 4-20mA output signal are available. This option is best for nitrogen purities  $>99.95\%$  Replacement Oxygen Sensor P/N GPR-12-333.



Trace O2 Analyzer - OD

### Ordering Information - O2 Analyzer Options

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

Model Numbers	Standard % O2 Analyzer	Advanced Analyzer	Trace O2 Analyzer
O2 Analyzer Manufacturer	Balston	Advanced Instruments	Advanced Instruments
Purity	Standard %	Upgraded %	High purity
Output	High/Low Contact Alarm	4-20 Milliamp	4-20 Milliamp
Most suitable for	Audible Warning $\leq 99.5\%$	99.5% - 99.95%	$>99.95\%$
Replacement Sensors	72695	GPR-11-60-4	GPR-12-333

### Ordering Information - Models with O2 Analyzer

	MBO-X	MBO-X-SB	DBO-X	DBO-X-EC	DB-30 thru 80	DB-1200 thru 4000
<b>Standard % O2 Analyzer;</b> best for purities $\leq 99.5\%$	MBO-1 thru MBO-5	MBO-1-SB thru MBO-5-SB	DBO-5 thru DBO-20	DBO-5-EC thru DBO-20-EC	DB-30 thru DB-80	--
<b>Advanced O2 Analyzer;</b> best for purities 99.5%-99.95%	MBOC-1 thru MBOC-5	MBOC-1-SB thru MBOC-5-SB	DBOC-5 thru DBOC-20	DBOC-5-EC thru DBOC-20-EC	DBOC-30 thru DBOC-80	DB-1200 thru DB-4000
<b>Trace O2 Analyzer;</b> best for purities $>99.95\%$	MBOD-1 thru MBOD-5	MBOD-1-SB thru MBOD-5-SB	DBOD-5 thru DBOD-20	DBOD-5-EC thru DBOD-20-EC	DBOD-30 thru DBOD-80	DB-1200-OD thru DB-4000-OD



# PRD Series Non-Cycling Refrigerated Air Dryers

## for use with Balston Nitrogen Generators

The importance of compressed air as a provider of energy for modern industrial processes is widely known. What is often overlooked however is the need to provide quality treatment for this air.

In fact, the air entering the system contains moisture which, when cooled, will turn into liquid water, causing extensive damage not only to the compressed air network, but also to the finished product.

These costly contamination problems can be avoided by installing a PRD Series non-cycling refrigerated dryer package complete with Parker Balston high efficiency filtration.

Parker's revolutionary 3-in-1 heat exchanger (PRD10 - PRD175) features a 3-in-1 aluminum design with integral air connections. All models include an air-to-air

freecooler, while the unique "slowflow" demister ensures perfect dewpoints whatever the operating conditions.

Compressed air purification equipment must deliver uncompromising performance and reliability while providing the right balance of air quality with the lowest cost of operation. Many manufacturers offer products for the filtration and purification of contaminated compressed air, which are often selected only upon their initial purchase cost, with little or no regard for the air quality they provide, the cost of operation throughout their life or their environmental impact. When purchasing purification equipment, delivered air quality, the overall cost of ownership and the equipment's environmental impact must always be considered.



## Benefits of Models PRD10 - PRD175

"Plug and Play" design for easy installation

Robust timed solenoid drain equals improved reliability (PRD15 - PRD175)

Unique 3-in-1 heat exchanger

Oversized demister separator resulting in excellent liquid removal over all operating conditions

Oversized condenser to operate in ambients to 122°F (50°C)

Fan cycling ensures stable operation

All models incorporate a dewpoint indicator

Extremely compact footprint

Low pressure differential across dryer (1.45 psi average)

ETL listed complete unit

Ideal for Nitrogen Generator Air Preparation



# Technical Information

## Product Selection

Dryer Model	Air Connections	Nominal Capacity (scfm)*	Dimensions ins (mm)			Weight		Primary Voltages	Recommended Pre-Filter Model**
			H	W	D	lbs	kg		
PRD10	1/2" NPT-F	10	16.9 (430)	8.3 (210)	17.7 (450)	42	19	115V/1Ph/60Hz	2104N-1B1-DX
PRD15	1/2" NPT-F	15	16.9 (430)	8.3 (210)	17.7 (450)	42	19	115V/1Ph/60Hz	2104N-1B1-DX
PRD25	1/2" NPT-F	25	19.9 (505)	8.3 (210)	19.7 (500)	52	24	115V/1Ph/60Hz	2104N-1B1-DX
PRD35	1/2" NPT-F	35	19.9 (505)	8.3 (210)	19.7 (500)	52	24	115V/1Ph/60Hz	2104N-1B1-DX
PRD50	3/4" NPT-F	50	22.2 (565)	8.9 (225)	20.5 (520)	58	27	115V/1Ph/60Hz	2206N-1B1-DX
PRD75	3/4" NPT-F	75	22.2 (565)	8.9 (225)	20.5 (520)	68	31	115V/1Ph/60Hz	2206N-1B1-DX
PRD100	3/4" NPT-F	100	22.2 (565)	8.9 (225)	20.5 (520)	77	35	115V/1Ph/60Hz	2206N-1B1-DX
PRD150	1 1/2" NPT-F	150	23.4 (604)	16.7 (425)	21.9 (555)	128	58	115V/1Ph/60Hz & 230V/1Ph/60Hz	2312N-1B1-DX
PRD175	1 1/2" NPT-F	175	23.4 (604)	16.7 (425)	21.9 (555)	132	60	230V/1Ph/60Hz	2312N-1B1-DX

## Recommended Dryer and Air Surge Tank Model for Nitrogen Generators

Nitrogen Generator	Recommended Dryer Model	Air Surge Tank Size (Gallons) ***	Air Surge Tank Model
MB-1	PRD10	60	72-060AST
MB-3 *	PRD15	60	72-060AST
MB-3 **	PRD25	60	72-060AST
MB-5	PRD25	60	72-060AST
DB-5 *	PRD25	60	72-060AST
DB-5 **	PRD50	60	72-060AST
DB-10 *	PRD50	120	72-120AST
DB-10 **	PRD75	120	72-120AST
DB-15 *	PRD75	120	72-120AST
DB-15 **	PRD150	120	72-120AST
DB-20 *	PRD100	120	72-120AST
DB-20 **	PRD150	200	72-200AST
DB-30	PRD150	240	72-240AST
DB-40	PRD175	240	72-240AST
DB1200	PRD150	200	72-200AST
DB1600	PRD150	240	72-240AST
HFX-1	PRD10	n/r	-
HFX-3	PRD10	n/r	-
HFX-5	PRD25	n/r	-
HFX-7	PRD35	n/r	-
HFX-9	PRD50	n/r	-
HFX-11	PRD100	n/r	-

\* Before Serial Number 6274

\*\* Beginning with Serial Number 6274

\*\*\* An Air Surge Tank installed between the dryer and the nitrogen generator assures consistent air pretreatment.

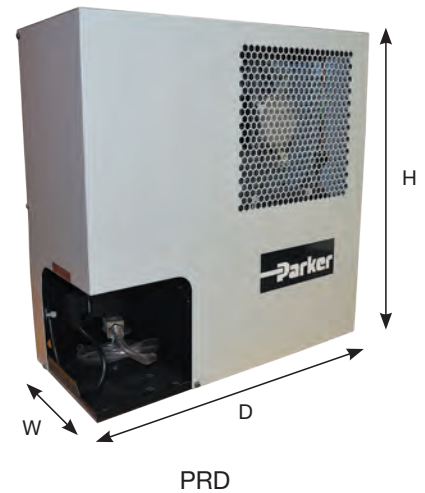
### Dryer and Pre-Filter Ordering Information

PRD10-A11516016FLU	2104N-1B1-DX
PRD15-A11516016TXU	2104N-1B1-DX
PRD25-A11516016TXU	2104N-1B1-DX
PRD35-A11516016TXU	2104N-1B1-DX
PRD50-A11516016TXU	2206N-1B1-DX
PRD75-A11516016TXU	2206N-1B1-DX
PRD125-A11516016TXU	2206N-1B1-DX
PRD125-A23016016TXU	2312N-1B1-DX
PRD150-A11516016TX	2312N-1B1-DX
PRD150-A23016016TX	2312N-1B1-DX
PRD175-A23016016TX	2312N-1B1-DX

\*Flowrates at the following climatic conditions - Ambient Temperature: 100°F (38°C), Inlet Temperature: 100°F (38°C), Inlet Pressure: 100 psi g (7 bar g).

\*\*Parker Balston recommends Grade DX pre-filter.

\*\*\*For final sizing, refer to the temperature correction factors below and nitrogen generator air consumption at desired nitrogen purity from the product's installation, operation and maintenance manual.



### Technical Data

Models	Max Ambient Temperature	Max Inlet Temperature	Min Ambient Temperature	Max Inlet Pressure	Refrigerant
PRD10 - PRD175	122°F (50°C)	149°F (65°C)	41°F (5°C)	232 psi g (16 bar g)	R134a

### Correction Factors for Models PRD10 - PRD175

To obtain dryer capacity at new conditions, multiply nominal capacity x C1 x C2 x C3.

Ambient Temperature (C1)	°F	60	70	80	90	100	110	120	
	°C	16	21	27	32	38	43	49	
	CF	1.34	1.26	1.17	1.09	1.00	0.91	0.82	
Inlet Temperature (C2)	°F	90	100	110	120	140	149		
	°C	32	38	43	49	60	65		
	CF	1.24	1.00	0.81	0.67	0.45	0.43		
Working Pressure (C3)	psi g	60	80	100	125	150	175	200	230
	bar g	4	6	7	9	10	12	14	16
	CFP	0.83	0.93	1.00	1.07	1.12	1.16	1.19	1.22

#### Notes:

- Standard equipment includes:
  - Models PRD10 - PRD175 have electromechanical control
  - 6' power cord (115V models) on Models PRD10 - PRD125 only
  - on/off switch
  - R134a environmentally friendly refrigerant
  - power on light
  - built-in demister for high efficient removal of condensed liquid
  - removable cabinet for easy access to internal components
  - moisture dewpoint indicator
  - automatic condensate drain on Model PRD10
  - timed solenoid condensate drain on Models PRD15 - PRD175
- For reliable operation and to meet warranty conditions, a pre-filter must be installed

**PARKER-HANNIFIN CORPORATION – FILTRATION AND SEPARATION DIVISION**  
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- 3. Shipment; Delivery; Title and Risk of Loss.** All delivery dates are approximate. Seller is not responsible for damages resulting from any delay. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the shipment carrier at Seller's facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyer's request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.
- 4. Warranty.** Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of twelve (12) months from the date of shipment and covers in-factory repair and parts only. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**
- 5. Claims; Commencement of Actions.** Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to the Seller within ten (10) days of delivery. No other claims against Seller will be allowed unless asserted in writing within thirty (30) days after delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the defect is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery. **If product is returned for a refund, a 20% restock fee may apply.**
- 6. LIMITATION OF LIABILITY.** IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE WITHIN A REASONABLE PERIOD OF TIME. **IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.**
- 7. User Responsibility.** The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.
- 8. Loss to 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, will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the items 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. Special Tooling.** A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. 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 Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.
- 10. Buyer's Obligation; Rights of Seller.** To secure payment of all sums due or otherwise, Seller retains a security interest in all Products delivered to Buyer and this agreement is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.
- 11. Improper Use and Indemnity.** Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, application, design, specification or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Products; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.
- 12. Cancellations and Changes.** Buyer may not cancel or modify or cancel any order for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change Product features, specifications, designs and availability. **Order cancellation fee of 15% may apply.**
- 13. Limitation on Assignment.** Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.
- 14. Force Majeure.** Seller does not assume the risk and is not liable for delay or failure to perform any of Seller's obligations by reason of events or circumstances beyond its reasonable control (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.
- 15. Waiver and Severability.** Failure to enforce any provision of this agreement will not invalidate that provision; nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.
- 16. Termination.** Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate this agreement, in writing, if Buyer: (a) breaches any provision of this agreement (b) appoints a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or one if filed by a third party (d) makes an assignment for the benefit of creditors; or (e) dissolves its business or liquidates all or a majority of its assets.
- 17. Governing Law.** This agreement and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.
- 18. Indemnity for Infringement of Intellectual Property Rights.** Seller is not liable for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("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 a Product sold pursuant to this agreement 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 a Product 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 the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and refund the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller is not liable for claims of infringement based on information provided by Buyer, or directed to Products 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 Product sold hereunder. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.
- 19. Entire Agreement.** This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged. The terms contained herein may not be modified unless in writing and signed by an authorized representative of Seller.
- 20. Compliance with Laws.** Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards of care, including those of the United Kingdom, the United States of America, and the country or countries in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act") and the U.S. Food Drug and Cosmetic Act ("FDCA"), each as currently amended, and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that it is familiar with the provisions of the U. K. Bribery Act, the FCPA, the FDA, and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller.



# Worldwide Filtration Manufacturing Locations

## North America

**Compressed Air Treatment  
Filtration & Separation/Balston**  
Haverhill, MA  
978 858 0505  
[www.parker.com/balston](http://www.parker.com/balston)

**Finite Airtek Filtration  
Airtek/domnick hunter/Zander**  
Lancaster, NY  
716 686 6400  
[www.parker.com/faf](http://www.parker.com/faf)

**Finite Airtek Filtration/Finite**  
Oxford, MI  
248 628 6400  
[www.parker.com/finitefilter](http://www.parker.com/finitefilter)

**Engine Filtration &  
Water Purification  
Racor**  
Modesto, CA  
209 521 7860  
[www.parker.com/racor](http://www.parker.com/racor)

Holly Springs, MS  
662 252 2656  
[www.parker.com/racor](http://www.parker.com/racor)

Beaufort, SC  
843 846 3200  
[www.parker.com/racor](http://www.parker.com/racor)

**Village Marine, Sea Recovery,  
Horizon Reverse Osmosis**  
Carson, CA  
310 637 3400  
[www.parker.com/watermakers](http://www.parker.com/watermakers)

**Hydraulic Filtration  
Hydraulic Filter**  
Metamora, OH  
419 644 4311  
[www.parker.com/hydraulicfilter](http://www.parker.com/hydraulicfilter)

Laval, QC Canada  
450 629 9594  
[www.parkerfarr.com](http://www.parkerfarr.com)

**Process Filtration  
domnick hunter Process Filtration**  
Oxnard, CA  
805 604 3400  
[www.parker.com/processfiltration](http://www.parker.com/processfiltration)

Madison, WI  
608 824 0500  
[www.scilog.com](http://www.scilog.com)

Phoenixville, PA  
610 933 1600  
[www.parker.com/processfiltration](http://www.parker.com/processfiltration)

**Aerospace Filtration  
Velcon Filtration**  
Colorado Springs, CO  
719 531 5855  
[www.velcon.com](http://www.velcon.com)

## Europe

**Compressed Air Treatment  
domnick hunter Filtration & Separation**  
Gateshead, England  
+44 (0) 191 402 9000  
[www.parker.com/dhfns](http://www.parker.com/dhfns)

**Parker Gas Separations**  
Etten-Leur, Netherlands  
+31 76 508 5300  
[www.parker.com/dhfns](http://www.parker.com/dhfns)

**Hiross Zander**  
Padova Business Unit  
Padova, Italy  
+39 049 9712 111  
[www.parker.com/hzd](http://www.parker.com/hzd)

**Hiross Zander**  
Essen Business Unit  
Essen, Germany  
+49 2054 9340  
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**Engine Filtration &  
Water Purification  
Racor**  
Dewsbury, England  
+44 (0) 1924 487 000  
[www.parker.com/rfde](http://www.parker.com/rfde)

**Racor Research & Development**  
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[www.kittiwake.com](http://www.kittiwake.com)

**Process Filtration  
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+44 (0) 191 410 5121  
[www.parker.com/processfiltration](http://www.parker.com/processfiltration)

**Parker Twin Filter BV**  
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+31(0)75 655 50 00  
[www.twinfilter.com](http://www.twinfilter.com)

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[www.parker.com/japan](http://www.parker.com/japan)

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+81 66 340 1600  
[www.techno.taiyo-ltd.co.jp](http://www.techno.taiyo-ltd.co.jp)

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+66 2186 7000  
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+55 12 4009 3500  
[www.parker.com/br](http://www.parker.com/br)

**Pan American Division**  
Miami, FL  
305 470 8800  
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