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Analytical Gas Systems
Products for LC-MS & Evaporation

Bulletin AGS-LCMS-D

Parker Balston

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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 technolgies 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 unmatchable 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

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Offer of Sale

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NitroVap Gas Generators

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

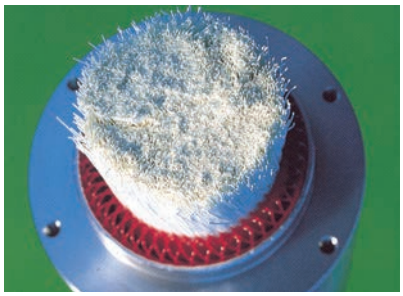
Nitrogen is produced by utilizing a combination of filtration and membrane separation technologies. A high efficiency prefiltration system pretreats the compressed air to remove all contaminants down to 0.01 micron. Hollow fiber membranes subsequently separate the clean air into a concentrated nitrogen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

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

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



NitroVap-1LV and NitroVap-2LV



This Technology Features Advanced HiFluxx Fiber

Features and Benefits

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

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NitroVap Gas Generators

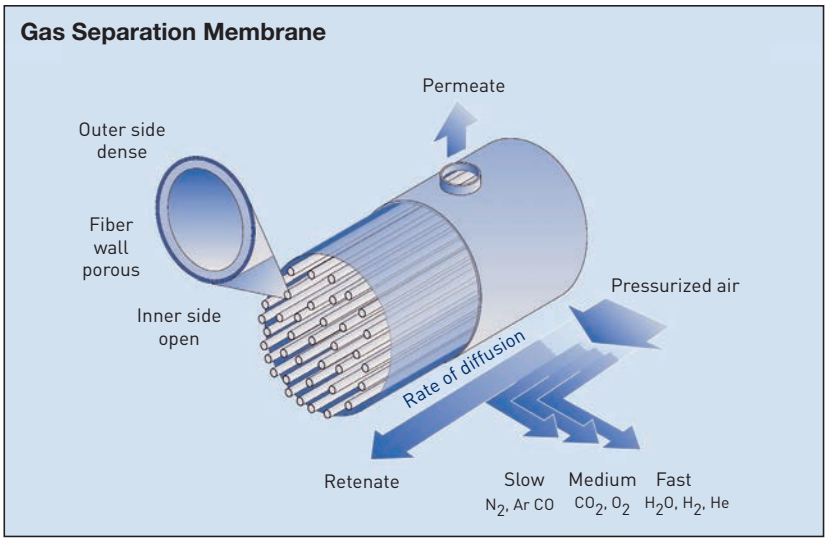
Principal Specifications

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

Ordering Information

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

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



Use with These and Other Blowdown Evaporators

TurboVap from Biotage
N-Evap from Organomation
RapidVap from LabConco
Reacti-Vap from Fisher Pierce
Duo-Vap from Jones Chromatography
DryVap from Horizon Technology
Evaporex from Apricot

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Self Contained Nitrogen Generators for LC-MS Flow Capacities up to 60 lpm

The Parker Balston® NitroFlow 60 is a self contained generator that produces up to 60 slpm of pure LC-MS grade nitrogen at pressures of up to 100 psig. Nitrogen is produced utilizing a combination of a scroll compressor and nitrogen membrane separation technologies. This combination of technologies yields the highest performing, most reliable and quietest integrated nitrogen generation system available.

The NitroFlow 60 is also available with an integrated membrane dryer for use with instruments that require dry air, including the chip cube interface from Agilent Technologies.

Typical applications include LC-MS, nebulizer gases for APCI and ESI, Jet Stream, I Funnel, ELSD, Turbo Vaps and chemical solvent evaporation.

The unique combination of a rotary scroll compressor and high efficiency membrane ensures that the NitroFlow 60 has many unique advantages over all other existing LC-MS nitrogen generators. Rotary scroll compressors operate at low temperatures, have less moving parts and are significantly quieter than piston compressors used by other Nitrogen Generator manufacturers.



Features and Benefits

- Complete “plug and play” system recommended for all major LC-MS instruments
- Phthalate-free, no organic vapors
- Produces a continuous supply of nitrogen for all LC-MS applications
- Eliminate dangerous nitrogen cylinders from the laboratory
- Nearly silent operation; operates at less than 49 dB(A)

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Nitrogen Generators for LC-MS
Flow Capacities up to 60 lpm

Principal Specifications

Model	NitroFlow 60	NitroFlow 60D
Nitrogen	Up to 60 slpm	Up to 60 slpm
Dry Air Flow	N/A	5 slpm
Dry Air Dewpoint	N/A	-40°F (-40°C)
Hydrocarbon Free	Yes	Yes
Phthalate Free	Yes	Yes
Maximum Outlet Pressure	100 psig	100 psig
Atmospheric Dewpoint	-58°F (-50°C)	-58°F (-50°C)
Outlet Port	Female 1/4" NPT	Female 1/4" NPT
Min/Max Ambient Temperature	60°F/90°F (16°C/32°C)	60°F/90°F (16°C/32°C)
Electrical Requirements	208-254 VAC, 60 Hz, 1 Phase, 16A* 230 VAC, 50 Hz, 1 Phase, 13A*	208-254 VAC, 60 Hz, 1 Phase, 16A* 230 VAC, 50 Hz, 1 Phase, 13A*
Dimensions	43"H x 21"W x 34"D (109cm H x 53cm W x 86cm D)	43"H x 21"W x 34"D (109cm H x 53cm W x 86cm D)
Shipping Weight	643 lbs. (292 kg)	643 lbs. (292 kg)

* During operation, 30A at startup

Ordering Information

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

Description	Model Number
Nitrogen Generator with Integrated Compressor	NitroFlow 60
Nitrogen Generator with Dryer Option and Integrated Compressor	NitroFlow 60D
NitroFlow 60-PM	PM service program
NitroFlow 60-PMPLUS	Plus service program
NitroFlow60-DN2	Depot extended warranty
NitroFlow60-EN2	Express extended warranty



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TriGas Generator for AB Sciex LC-MS Instruments

Flow Capacities up to 80 lpm

Three Gases "TriGas" On Demand

The Parker Balston NitroFlow TG2 is a self-contained gas generator that produces up to 80 lpm of pure LC-MS grade gases.

Designed for the AB Sciex 6500 series, zero air is produced at pressure above 110 psig for Gas1 and Gas2 needs. Nitrogen is produced at pressure above 80 psig for curtain cad gas and exhaust dry air is produced at pressure above 80 psig.

All gases are generated using a combination of a scroll compressor carefully engineered with nitrogen and gas dehydration membranes. The output gases are then purified using a proprietary series of unique purifiers, polishers and getter materials. This combination of Parker technologies yield the highest performing, most reliable and most quiet integrated TriGas generation system available.

Proven Technology

The unique combination of a rotary scroll compressor and Parker high efficiency membranes and purification systems ensure that the NitroFlow TG2 has many operational advantages over all other existing LC-MS gas generators. Rotary scroll compressors operate at low temperatures, have less moving parts, are vibration-free and are significantly quieter than piston compressors used by other gas generator manufacturers. The compressor in the NitroFlow TG2 comes with a 3-year limited or 10,000 hour compressor warranty.



The safe, convenient and cost effective method of providing high purity curtain, source and exhaust gases for your AB Sciex LC-MS

Features and Benefits

- Complete "plug and play" system recommended for AB Sciex LC-MS instruments
- Payback period of less than one year; low cost of ownership
- Whisper quiet operation; operates at less than 49 dB(A)
- Produces a continuous supply of nitrogen, zero air and exhaust gases for the instrument
- Easy installation and start-up
- Phthalate-free gases, no organic vapors
- Eliminates dangerous nitrogen and zero air cylinders from the laboratory, freeing up valuable laboratory floor space



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TriGas Generator for AB Sciex LC-MS Instruments

Flow Capacities up to 80 lpm

Principal Specifications

Model	NitroFlow TG2
Nitrogen, Curtain Cad	Up to 18 slpm @ 80 psig
Zero Air, Gas 1, Gas 2	Up to 26 slpm @ 110 psig
Dry Air, Source Exaust	Up to 25 slpm @ 80 psig
Hydrocarbon Free	Yes
Phthalate Free	Yes
Sound Level	<49 dB(A)
Atmospheric Dewpoint	Nitrogen -58°F (-50°C) Dry Air -40°F (-40°C)
Outlet Ports	1/4" gas tubing
Min/Max Ambient Temperature	60°F/85°F (16°C/29°C)
Electrical Requirements	208-230 VAC, 60 Hz, 1 Phase, 16A (1) (2) 230 VAC, 50 Hz, 1 Phase, 13A (1) (2)
Dimensions	43"H x 21"W x 34"D (109cm H x 53cm W x 86cm D)
Product Weight	427 lbs. (194 kgs)

NOTES

1 During operation, 30A at startup

2 Main supply voltage fluctuations not to exceed +10% / -15% of nominal voltage.

Ordering Information

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

Description	Model
TriGas Generator with Integrated Compressor	NitroFlow TG2NA (230 VAC, 60 Hz) NitroFlow TG2WD (230 VAC, 50 Hz) NitroFlow TG2JA200 (Japan)

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NitroFlow Lab Self Contained LC-MS Membrane Nitrogen Generator

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

Intake ambient air from the laboratory is filtered using an inlet suction breather filter to remove airborne organic and particulate impurities. This purified air is delivered to a long life low pressure air compressor which provides an air stream to hollow fiber membranes which subsequently separate the clean air into a concentrated nitrogen retentate and oxygen enriched permeate, which is then cycled through the system. Prior to exiting the system pure nitrogen retentate is delivered to a nitrogen amplification compressor to assure proper pressure, flow and purity to the LC-MS. The Parker Balston LC-MS NitroFlow Lab will deliver a continuous or on demand supply of pure nitrogen making it the smart alternative to cylinders. Superior engineering with carefully matched filtration, membrane separation and compression technologies have resulted in a system with the utmost reliability and longevity. Additional applications include: nebulizer gases, chemical and solvent evaporation, instrument supply and purge, evaporative light scattering equipment and sparging.



NitroFlow Lab

Features and Benefits

- Flow capacity to 32 LPM
- Includes 2 year compressor warranty
- Ideal for all derivatives of ESi and APCi modes
- Includes state-of-the-art, oil-less compressors
- Unlike PSA Hosmer technologies, membrane will not suppress corona needle discharge
- Special sound insulation design ensures quiet operation

Principal Specifications

Model	NitroFlowLab
Nitrogen	Phthalate free with flow to 32 lpm @ sea level
Maximum Outlet Pressure	116 psig (8 barg)
Hydrocarbon Content	< 2ppm (excluding methane)
Atmospheric Dewpoint	-58°F (-50°C)
Outlet Port	Female 1/4" NPT
Min/Max Ambient Temperature	50°F/95°F (10°C/35°C)
Electrical Requirements	120Vac/60Hz/16Amp / NEMA 5 - 20 Straight Blade
Dimensions	27.6"h x 12.2"w x 35.4"d (70.1cm x 31cm x 90cm)
Shipping Weight	204 lbs. (92.5 kg)

Here's what your colleagues say:

"We've used the Parker Balston Nitroflow® (combined compressor and nitrogen generator) on our LCMS for 3 years. In just over two years, it more than paid for itself in nitrogen savings, but the real advantages of the nitrogen generator are the continuous supply of high quality nitrogen and the tremendous amount of time saved from not having to check, order and switch high pressure liquid nitrogen tanks."

Karl J. Dria, PhD.
Assistant Research Scientist
Department of Chemistry and Chemical Biology
Indiana University-Purdue University Indianapolis

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SOURCE LC-MS TriGas Generator Series Model LCMS-5000NA

The Parker Balston SOURCE LCMS-5000NA TriGas Generator is a completely engineered system designed to deliver pure nitrogen for curtain gas, pure zero grade air as gas-1/gas-2 source gases and dry -40°F dew point air as source exhaust. The system is designed to produce gases which meet and exceed the requirements of any LC-MS requiring three independent gases.

The system consists of six functional technologies: Coalescing pre-filtration with timed solenoid drains, self regenerating compressed air dehydration membranes, a proprietary heated catalysis module, elegant self-regenerating nitrogen retentate membranes, high capacity - high sensitivity carbon absorption modules and carefully matched final filtration membrane media. These technologies are integrated to a reliable scroll compressor. 3 year compressor pump warranty included. Carries CE Marking and is compliant to WEEE standards.

The Parker Balston SOURCE LCMS-5000NA TriGas Generator will provide enough gas for a single LC-MS instrument on a continual basis and will completely eliminate dependence, expense and hassle with using high pressure nitrogen and zero air cylinders.

The generator can be located in the lab and features independent stainless steel output gas ports carefully matched to the instrument. Gas distribution, pressure and flow control are integral to each TriGas generator and therefore requirements for secondary gas pressure or gas management systems are eliminated.

There is no longer any need to use valuable laboratory floor space to store excess cylinder reserves to protect from running out of gas, late or missed cylinder deliveries, transportation interruptions or periods of tight supply. With a Parker Balston SOURCE LCMS-5000NA TriGas Generator, you control all your LC-MS gas supplies.



Model LCMS-5000NA

Features and Benefits

- Generates pure nitrogen, zero air and source exhaust air from compressed air, with 24/7 operation
- Eliminates costly and inconvenient nitrogen gas and zero air gas cylinders; mimimal annual maintenance
- Prevents running out of gases during LC-MS instrument operation
- Floor standing unit preserves valuable laboratory space and maximizes LC-MS instrument uptime
- Reliable scroll compressor, quiet 49 dB(A) operation at a safe, low pressure
- Gas purity to 99.999% and no phthalates
- Turnkey system that eliminates stainless steel regulators and gas distribution panels
- Produced and manufactured by an ISO 9001 registered organization

Here's what your colleagues say:

"Using the Parker Balston Tri-Gas system with our new ABI 5500 assures maximum uptime of the instrument while offering us the lowest cost to supply gas...The more samples we run lowers our costs and shortens our overall return on the instrument."

Ed Dabrea
Laboratory Director
Jupiter Environmental Laboratories

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SOURCE LC-MS TriGas Generator Series Model LCMS-5000NA

Principal Specifications

Model	LCMS-5000NA
Curtain gas (nitrogen)	to 10 lpm and 80 psi
Source gas (uhp zero grade air)	to 23 lpm and 110 psi
Exhaust gas (dry air)	to 8 lpm and 60 psi
Compressor included	Yes - Scroll
Atmospheric dewpoint	-40°F
Hydrocarbons	<0.1 ppm measured as methane
Particles > 0.01 micron	None
Phthalates	None
Suspended liquids	None
Outlets	1/4" tube - stainless steel - 3 each
Dimensions	34"D x 41"W x 43"H
Pressure gauges	3 each
Electrical requirements (1)	120vac, 60Hz, 3 amp and 220vac, 60Hz, 16 amp
Noise level	< 49 dB(A)
Weight	611 lbs. (277 kgs)

NOTES
1 Refer to voltage appendix for electrical and plug configurations for outside North America.

Ordering Information

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

Description	Model
Source LC-MS Trigas Generator	LCMS-5000NA
Installation Kit	IKLCMS-5000
Preventive Maintenance Plan	LCMS-5000NA-PM
Voltage Reducing Transformer	A03-0286
3/8" Clear PFA Tubing for Remote Compressor Use	11425-1 (specify length)
1/4" Clear PFA Tubing for Connections to LC-MS	11426-1 (specify length)

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SOURCE LC-MS TriGas Generator Series Model LCMS-5001NTNA

The Parker Balston SOURCE LCMS TriGas Generator is a completely engineered system designed to transform ordinary compressed air into pure nitrogen for curtain gas, pure zero grade air as gas-1/gas-2 source gases and dry -40°F dew point air as source exhaust. The system is designed to produce gases which meet and exceed the requirements of any LC-MS requiring three independent gases. The system consists of six functional technologies: Coalescing pre-filtration with timed solenoid drains, self regenerating compressed air dehydration membranes, a proprietary heated catalysis module, elegant self-regenerating nitrogen retentate membranes, high capacity - high sensitivity carbon absorption modules and carefully matched final filtration membrane media.

The Parker Balston SOURCE LCMS TriGas Generator will provide enough gas for a single LC-MS instrument on a continual basis and will completely eliminate dependence, expense and hassle with using high pressure nitrogen and zero air cylinders.

The generator can connect easily to an existing compressed air supply line and features independent stainless steel output gas ports carefully matched to the instrument. Gas distribution, pressure and flow control are integral to each TriGas generator and therefore requirements for secondary gas pressure or gas management systems are eliminated.

There is no longer any need to use valuable laboratory floor space to store excess cylinder reserves to protect from running out of gas, late or missed cylinder deliveries, transportation interruptions or periods of tight supply. With a Parker Balston SOURCE LCMS TriGas Generator, you control all your LC-MS gas supplies.



Model LCMS-5001NTNA

Features and Benefits

- Generates pure nitrogen, zero air and source exhaust air from compressed air; continuously, 24/7
- Eliminates costly and inconvenient nitrogen gas and zero air gas cylinders
- Prevents running out of gases during LC-MS instrument operation
- Floor standing unit preserves valuable laboratory space and maximizes LC-MS instrument uptime
- Reliable, silent operation at a safe, low pressure; minimal annual maintenance
- Gas purity to 99.999% and no Phthalates
- Turnkey system that eliminates stainless steel regulators and gas distribution panels
- Produced and manufactured by an ISO 9001 registered organization
- Listed to U.S. & Canadian safety standards
- Carries CE Marking/compliant to WEEE standard



SOURCE LC-MS TriGas Generator Series Model LCMS-5001NTNA

Principal Specifications

Model	LCMS-5001NTNA
Curtain gas (nitrogen)	to 10 lpm and 80 psi
Source gas (uhp zero grade air)	to 23 lpm and 110 psi
Exhaust gas (dry air)	to 8 lpm and 60 psi
Air pressure required	85-145 psi (> 100 psi suggested)
Pressure dewpoint	-40°F
Hydrocarbons	<0.1 ppm measured as methane
Particles > 0.01 micron	None
Phthalates	None
Suspended Liquids	None
Inlet	3/8" tube (presto)
Outlets	1/4" tube - stainless steel - 3 each
Dimensions	21"D x 23"W x 41"H
Pressure gauges	3 each
Electrical requirements (1)	120vac, 60Hz, 3 amp
Noise	Silent operation
Weight	157 lbs. (71 kg)

NOTES
1 Refer to voltage appendix for electrical and plug configurations for outside North America.

Ordering Information

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

Description	Model
Source LC-MS Trigas Generator	LCMS-5001NTNA
Installation Kit	IKLCMS-5000
Preventive Maintenance Plan	LCMS-5001NTNA-PM
Extended Support with24 Month Warranty	LCMS-5001NT-DN2
1/4" Clear PFA Tubing for Connections to LC-MS	11426-1 (specify length)

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SOURCE LC-MS TriGas Generator Series Model LCMS-5001TNA

The Parker Balston SOURCE LCMS TriGas Generator is a completely engineered system designed to transform ordinary compressed air into pure nitrogen for curtain gas, pure zero grade air as gas-1/gas-2 source gases and dry -40°F dew point air as source exhaust. The system is designed to produce gases which meet and exceed the requirements of any LC-MS requiring three independent gases. The system consists of six functional technologies: Coalescing pre-filtration with timed solenoid drains, self regenerating compressed air dehydration membranes, a proprietary heated catalysis module, elegant self-regenerating nitrogen retentate membranes, high capacity - high sensitivity carbon absorption modules and carefully matched final filtration membrane media.

The Parker Balston SOURCE LCMS TriGas Generator will provide enough gas for a single LC-MS instrument on a continual basis and will completely eliminate dependence, expense and hassle with using high pressure nitrogen and zero air cylinders.

The generator can connect easily to an existing compressed air supply line and features independent stainless steel output gas ports carefully matched to the instrument. Gas distribution, pressure and flow control are integral to each TriGas generator and therefore requirements for secondary gas pressure or gas management systems are eliminated.

There is no longer any need to use valuable laboratory floor space to store excess cylinder reserves to protect from running out of gas, late or missed cylinder deliveries, transportation interruptions or periods of tight supply. With a Parker Balston SOURCE LCMS TriGas Generator, you control all your LC-MS gas supplies.



Model LCMS-5001NA



Features and Benefits

- Generates pure nitrogen, zero air and source exhaust air from compressed air continuously, 24/7
- Eliminates costly and inconvenient nitrogen gas and zero air gas cylinders
- Prevents running out of gases during LC-MS instrument operation
- Preserves valuable laboratory space and maximizes LC-MS instrument uptime
- Easy installation; reliable, silent operation at a safe, low pressure
- Gas purity to 99.999% and no Phthalates
- Turnkey system that eliminates stainless steel regulators and gas distribution panels
- Produced and manufactured by an ISO 9001 registered organization
- Floor standing, includes internal economizer air receiver system
- Listed to U.S. & Canadian safety standards
- Carries CE Marking/Compliant to WEEE standard

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SOURCE LC-MS TriGas Generator Series Model LCMS-5001TNA

Principal Specifications

Model	LCMS-5001TNA
Curtain gas (nitrogen)	to 10 lpm and 80 psi
Source gas (uhp zero grade air)	to 23 lpm and 110 psi
Exhaust gas (dry air)	to 8 lpm and 60 psi
Air pressure required	85-145 psi (>100 psi suggested)
Pressure dewpoint	-40°F
Hydrocarbons	<0.1 ppm measured as methane
Particles > 0.01 micron	None
Phthalates	None
Suspended Liquids	None
Inlet	3/8" tubing (presto)
Outlets	1/4" tube - stainless steel - 3 each
Dimensions	25"D x 20"W x 43"H
Pressure gauges	3 each
Electrical requirements (1)	120vac, 60Hz, 3 amp
Noise	Silent operation
Weight	271 lbs (123 kgs)

NOTES
1 Refer to voltage appendix for electrical and plug configurations for outside North America.

Ordering Information

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

Description	Model
Source Trigas Generator	LCMS-5001TNA
Installation Kit	IKLCMS-5000
Preventive Maintenance Plan	LCMS-5001TNA-PM
Extended Support with 24 Month Warranty	LCMS-5001T-DN2
1/4" Clear PFA Tubing for Connections to LC-MS	11426-1 (specify length)

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SOURCE LC-MS Super Flow TriGas Generator Series Model LCMS-SF5000NA

The Parker Balston SOURCE LCMS-SF5000NA Super Flow TriGas Generator is a completely engineered system designed to deliver pure nitrogen for curtain gas, pure zero grade air as gas-1/ gas-2 source gases and dry -40°F dew point air as source exhaust. The system is designed to produce gases which meet and exceed the requirements of any LC-MS requiring three independent gases. The system consists of six functional technologies: Coalescing pre-filtration with timed solenoid drains, self regenerating compressed air dehydration membranes, a proprietary heated catalysis module, elegant self-regenerating nitrogen retentate membranes, high capacity - high sensitivity carbon absorption modules and carefully matched final filtration membrane media. These technologies are integrated to a reliable scroll compressor.

The Parker Balston SOURCE LCMS-SF5000NA Super Flow TriGas Generator will provide enough gas for two LC-MS instruments on a continual basis and will completely eliminate dependence, expense and hassle with using high pressure nitrogen and zero air cylinders.

The generator can be located in the lab and features independent stainless steel output gas ports carefully matched to the instrument. Gas distribution, pressure and flow control are integral to each TriGas generator and therefore requirements for secondary gas pressure or gas management systems are eliminated.

There is no longer any need to use valuable laboratory floor space to store excess cylinder reserves to protect from running out of gas, late or missed cylinder deliveries, transportation interruptions or periods of tight supply. With a Parker Balston SOURCE LCMS-SF5000NA Super Flow TriGas Generator, you control all your LC-MS gas supplies.



Model LCMS-SF5000NA

Features and Benefits

- Generates pure nitrogen, zero air and source exhaust air from compressed air with continuous 24/7 operation for two LC-MS instruments
- 3 year compressor pump warranty
- Prevents running out of gases during LC-MS instrument operation
- Floor standing unit preserves valuable laboratory space and maximizes LC-MS instrument uptime
- Reliable scroll compressor, quiet 49 dB(A) operation at a safe, low pressure
- Gas purity to 99.999% and no phthalates
- Turnkey system that eliminates stainless steel regulators and gas distribution panels; easy installation and minimal maintenance
- Produced and manufactured by an ISO 9001 registered organization
- Carries CE Marking/compliant to WEEE standard

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SOURCE LC-MS Super Flow TriGas Generator Series Model LCMS-SF5000NA

Principal Specifications

Model	LCMS-SF5000NA
Curtain gas (nitrogen)	to 20 lpm and 80 psi
Source gas (uhp zero grade air)	to 46 lpm and 110 psi
Exhaust gas (dry air)	to 16 lpm and 60 psi
Compressor included	Yes - Scroll
Atmospheric dewpoint	-40°F
Hydrocarbons	<0.1 ppm measured as methane
Particles > 0.01 micron	None
Phthalates	None
Suspended liquids	None
Outlets	1/4" tube - stainless steel - 6 each
Dimensions	34"D x 61"W x 43"H
Pressure gauges	6 each
Electrical requirements (1)	120vac, 60Hz, 3 amp (two outlets) and 220vac, 60Hz, 16 amp
Noise level	< 49 dB(A)
Weight	788 lbs. (357 kg)

NOTES
1 Refer to voltage appendix for electrical and plug configurations for outside North America.

Ordering Information

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

Description	Model
Source LC-MS Trigas Generator	LCMS-SF5000NA
Installation Kit	IKLCMS-5000
Preventive Maintenance Plan	LCMS-SF5000NA-PM
Voltage Reducing Transformer	A03-0286
3/8" Clear PFA for Remote Compressor Use	11425-1 (specify length)
1/4" Clear PFA Tubing for Connections to LC-MS	11426-1 (specify length)

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Low Flow Nitrogen Generators

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

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

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

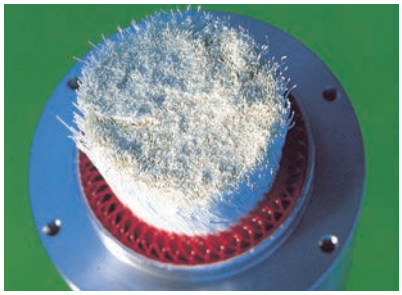
Typical applications include: LC-MS, nebulizer gas, chemical and solvent evaporation, instrument purge and supply, evaporative light scattering detector use (ELSD), and sparging.



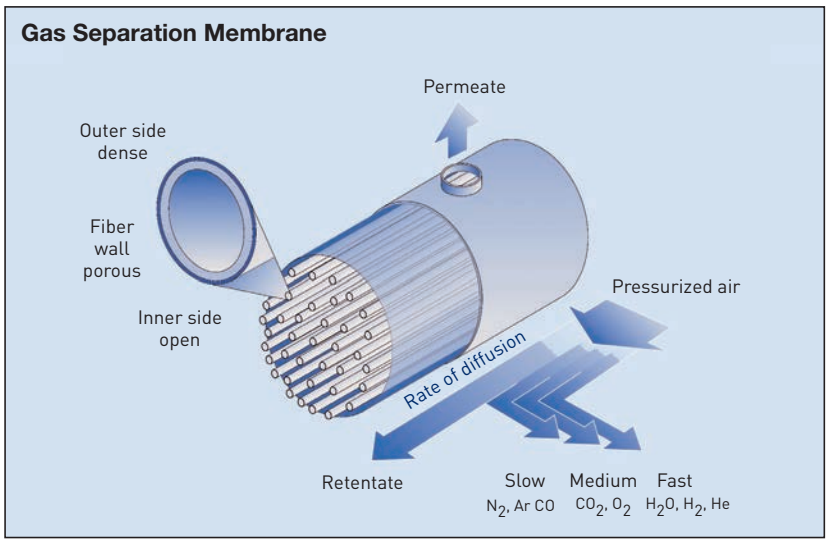
Model N2-22 Mid Flow
Membrane Nitrogen Generator

Features and Benefits

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



This Technology Features
Advanced HiFluxx Fiber



Nitrogen Purity / Flow Chart

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

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

Nitrogen Purity / Flow Chart

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

	145		125		110		100		90		80		70		60	
99.5	19	29	16	25	14	22	13	20	12	18	10	16	9	13	17	11
99	29	44	25	37	22	33	20	30	18	27	15	23	13	20	11	17
98	44	66	38	57	34	51	30	46	27	41	24	36	20	30	17	26
97	59	83	50	74	45	65	40	57	36	52	31	46	26	40	23	35
96	73	109	63	94	56	84	50	75	45	67	39	59	32	50	27	42
95	88	131	77	114	69	102	61	90	55	81	48	71	41	60	35	52

Principal Specifications

Models		N2-04, N2-14, N2-14ANA, N2-22, N2-22ANA, N2-35 and N2-35ANA
Nitrogen Purity		95.0% - 99.5%
Atmospheric Dewpoint		-58°F (-50°C)
Suspended Liquids		None
Particles > 0.01µm		None
Commercially Sterile		Yes
Phthalate-free		Yes
Hydrocarbon-free		Yes
Min./Max. Operating Pressure		60/145 psig
Max. Press. Drop @ 99% N_2 Purity, 125 psig		10 psig
Recommended Ambient Operating Temperature		68°F (20°C)
Max. Inlet Air Temperature		110°F (43°C)
Inlet/Outlet Ports		1/4" NPT
Electrical Requirements	N2-04, N2-14, N2-22, N2-35 N2-14ANA, N2-22ANA, N2-35ANA	None 120V/60Hz/100mA, 230V/50Hz/50mA
Shipping Weight	N2-04 N2-14 N2-14ANA, N2-22, N2-22ANA N2-35, N2-35ANA	42.5 lbs (19 kg) 75 lbs (34 kg) 80 lbs (36 kg) 90 lbs (41 kg)
Oxygen Analyzer		Included with Model N2-14ANA, N2-22ANA, N2-35ANA
Dimensions, N2-04		16.1"h x 10.7"w x 13.4"d (40.9cm x 27.2cm x 34cm)
Dimensions, N2-14, N2-14ANA, N2-22, N2-22ANA, N2-35, N2-35ANA		51.5"h x 18"w x 16.2"d (130.8cm x 45.7cm x 41.1cm)

NOTES

1 Refer to voltage appendix for electrical and plug configurations for outside North America.

Ordering Information

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

Description	Galvanic Cell	Annual Maintenance Kit	Installation Kit	Preventive Maintenance Plan	Extended Support with 24 Month Warranty
N2-04	N/A	MK7840	IK7572	N2-04 -PM	N2-04-DN2
N2-14	N/A	MK7572C	IK7572	N2-14-PM	N2-14-DN2
N2-14ANA	72695A	MK7572C	IK7572	N2-14A-PM	N2-14A-DN2
N2-22, N2-35	N/A	MK7572C	IK7572	N2-22-PM, N2-35-PM	N2-22-DN2, N2-35-DN2
N2-22ANA, N2-35ANA	72695A	MK7572C	IK7572	N2-22A-PM, N2-35A-PM	N2-22A-DN2, N2-35A-DN2

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Mid Flow Nitrogen Generators

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

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

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

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



Model N2-135 High Flow Membrane Nitrogen Generator

Features and Benefits

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



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Nitrogen Purity / Flow Chart

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

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

Principal Specifications

Model	N2-45, N2-80, N2-135, N2-45ANA, N2-80ANA, and N2-135ANA
Nitrogen Purity	95.0% - 99.5%
Atmospheric Dewpoint	-58°F (-50°C)
Suspended Liquids	None
Particles > 0.01µm	None
Commercially Sterile	Yes
Phthalate-free	Yes
Hydrocarbon-free	Yes
Min./Max. Operating Pressure	60/145 psig
Max. Press. Drop @ 99% N_2 Purity, 125 psig	10 psig
Recommended Ambient Operating Temperature	72°F (22°C)
Max. Inlet Air Temperature	110°F (43°C)
Inlet/Outlet Ports	1/2" NPT
Electrical Requirements N2-45, N2-80, N2-135 N2-45ANA, N2-80ANA, N2-135ANA	None 120V/60Hz/100mA, 230V/50Hz/50mA
Shipping Weight N2-45, N2-80, N2-135 N2-45ANA, N2-80ANA, N2-135ANA	250 lbs (114 kg) 250 lbs (114 kg)
Oxygen Analyzer	Included with Model N2-45ANA, N2-80ANA, N2-135ANA
Dimensions	67"h x 24"w x 20"d (140cm x 61cm x 50cm)

NOTES
1 Refer to voltage appendix for electrical and plug configurations for outside North America.

Ordering Information

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

Description	Galvanic Cell	Carbon Tower	Maintenance Kit	Installation Kit	Preventive Maintenance Plan	Extended Support with 24 Month Warranty
N2-45	N/A	75344	75478	IK75880	N2-45-PM	N2-45-DN2
N2-45ANA	72695A	75344	75478	IK75880	N2-45A-PM	N2-45A-DN2
N2-80	N/A	75344	75478	IK75880	N2-80-PM	N2-80-DN2
N2-80ANA	72695A	75344	75478	IK75880	N2-80A-PM	N2-80A-DN2
N2-135	N/A	75344	75478	IK75880	N2-135-PM	N2-135-DN2
N2-135ANA	72695A	75344	75478	IK75880	N2-135A-PM	N2-135A-DN2

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High Flow Nitrogen Generator

The Parker Balston N2-200 Nitrogen Generator is a completely engineered system which will convert a compressed air supply into a 96% to 99.5% purity compressed nitrogen gas. The system is based on state-of-the-art membrane separation technology. Hollow fiber membranes are used to separate air into a concentrated nitrogen output stream and an oxygen enriched permeate stream. Figure 1 shows an overview of the system. Table 2 shows the specifications for the Nitrogen Generator. Parker also offers an optional Oxygen Analyzer to monitor the oxygen concentration in the nitrogen stream.

Parker Balston Nitrogen Generators are complete systems engineered to transform standard compressed air into nitrogen at safe, regulated pressures, on demand, without the need for operator attention. The systems eliminate the need for costly, dangerous dewars and cylinders in the laboratory.

Nitrogen is produced by utilizing a combination of filtration and membrane separation technologies. A high efficiency prefiltration system pretreats the compressed air to remove all contaminants down to 0.01 micron. Hollow fiber membranes subsequently separate the clean air into a concentrated nitrogen output stream and an oxygen enriched permeate stream, which is vented from the system. The combination of these technologies produces a continuous on demand supply of pure nitrogen. Typical applications include: LC-MS, nebulizer gas, chemical and solvent evaporation, instrument purge and supply, evaporative light scattering detector use (ELSD), and sparging.

The Parker Balston N2-200 Nitrogen Generator is certified to IEC, UL and CSA Standards.

The generator includes the CSA safety marking on the product label.



Model N2-200 High Flow Nitrogen Generator

Features and Benefits

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



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Nitrogen Purity / Flow Chart

Purity (%N2)	80 psig (5.5 bar) Flow Rate	90 psig (6.2 bar) Flow Rate	100 psig (6.9 bar) Flow Rate	110 psig (7.6 bar) Flow Rate	120 psig (8.3 bar) Flow Rate
99.5	100 slpm	120 slpm	140 slpm	157 slpm	170 slpm
99.0	155 slpm	185 slpm	210 slpm	235 slpm	260 slpm
98.0	240 slpm	280 slpm	320 slpm	355 slpm	390 slpm
97.0	320 slpm	375 slpm	415 slpm	455 slpm	
96.0	395 slpm	455 slpm			

Technical Specifications

	N2-200
Purity Range (% Nitrogen)	96.0 - 99.5
CSA Certification Standard	CAN/CSA 22.2 No. 61010-1-12
IEC Standard	IEC 61010-1:2010
IEC 61010 Installation Category	Category II
IEC 61010 Pollution Degree	Degree 2
Impact Code	IK08
Dewpoint	40°F (5°C)
Particles > 0.01µm	None
Suspended Liquids	None
Commercially Sterile	Yes
Min./Max. Operating Pressures	80 psig/120 psig (5.5 barg/8.3 barg)
Max. Pressure Drop	20 psig
Min./Max. Ambient Operating Temperature	60°F/105°F (16°C/41°C)
Reccommended Ambient Operating Temperature	68°F (20°C)
Max. Relative Humidity	80%
Altitude	2000 m Max.
Min./Max. Inlet Air Temperature	60°F/95°F (16°C/35°C)
Dimensions	24" w x 20" d x 67" h (61 cm x 51 cm x 170 cm)
Shipping Weight	239 lbs

Ordering Information

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

Part Number	N2-200
Description	Nitrogen Generator
Optional Oxygen Monitor Kit	B04-0605
6 Month Maintenance Kit	MKN2-200
Installation Service	N2-200PM-INST
Preventative Maintenance Service	N2-200PM
Extended Warranty (Second Year)	N2-200EN2

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High Flow Nitrogen Generators

Parker Balston® Monobed Nitrogen Generators produce up to 99.95% pure, compressed nitrogen at dewpoints to -70°F (-21°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.

Parker 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.

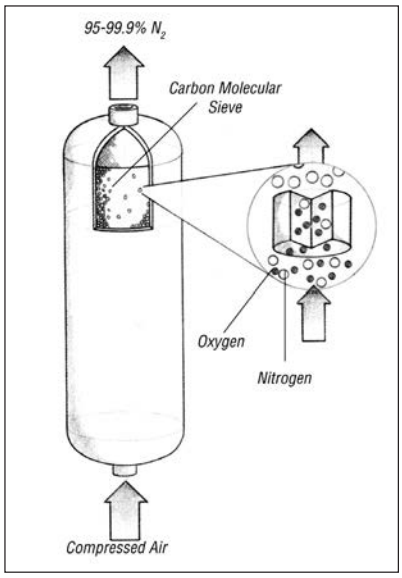
The Parker Balston PSA Nitrogen Generators completely eliminate the inconvenience and the high costs of nitrogen Dewars and cylinders. There is no need to depend on outside vendors for your nitrogen gas supplies. The hassles of changing dangerous, high pressure cylinders, and interruption of gas supplies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



Parker Balston
Dual Bed Nitrogen Generators

Features and Benefits

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



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High Flow Nitrogen Generators

Parker Balston® Monobed Nitrogen Generators produce up to 99.95% pure, compressed nitrogen at dewpoints to -70°F (-21°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.

Parker 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.

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

Installation consists of simply connecting a standard compressed air line to the inlet and connecting the outlet to a nitrogen line. Plug the electrical cord into a wall outlet, and the unit is ready for trouble-free operation. This system is designed to operate 24 hours per day, 7 days per week.

Once the system is operating, it requires little monitoring. The only maintenance involves changing the coalescing prefilter cartridges and final sterile air filter periodically. The PSA towers do not require any maintenance.

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.

Principal Specifications

Model		AGS200, AGS400
Nominal Conditions		
Feed Pressure		140 psig
Temperature		80°F
Ambient Pressure		1 Atm.
Compressed Air Specifications		
Maximum Pressure		140 psig
Temperature Range		60°F - 105°F
Dewpoint		40°F pressure dewpoint or better
Residual Oil Content		Trace
Particles		<.01 micron
Ambient Conditions		
Temperature		45°F-90°F
Ambient Pressure		Atmospheric
Air Quality		Clean air without contaminants
Dimensions		28.5"L x 32.25"D x 76.25"H
Weight	AGS200 AGS400	520 lbs (236 kg) 738 lbs (335 kg)
Inlet		1/2" NPT
Outlet		1/2" NPT

Nitrogen Purity Flow Chart

	Flow Rate (SCFH)	Flow Rate (SCFH)
Model	99.9%, 140 psig	99.99%, 140 psig
AGS200	235	47
AGS400	470	94

Parker Balston

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High Flow Nitrogen Generators

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

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

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

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

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



Parker Balston N2-300
Nitrosource Nitrogen Generators

Features and Benefits

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

Applications

High thru-put LC-MS contract labs

Sample concentrators

Nitrogen supply to analytical lab

Custom Systems Available

Flow rates to 2,265 lpm

Delivery pressures to customer’s specifications

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

High Flow Nitrogen Generators

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

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

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

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

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

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

Principal Specifications - Nitrosource Series

Model	N2-300	N2-460	N2-600
Atmospheric Dewpoint	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)
Commercially Sterile	Yes	Yes	Yes
Particles >0.01 micron	None	None	None
Suspended Liquids	None	None	None
Min/Max Operating Pressure	60 psig/145 psig	60 psig/145 psig	60 psig/145 psig
Max Pressure Drop (at 95% N2, 125 psig)	15 psig	15 psig	15 psig
Operating Temperature	70°F (21°C)	70°F (21°C)	70°F (21°C)
Min/Max Inlet Air Temp.	50°F /104°F (10°F /40°F)	50°F /104°F (10°F /40°F)	50°F /104°F (10°F /40°F)
Recommended Inlet Air Temp.	70°F (21°C)	70°F (21°C)	70°F (21°C)
Electrical Requirements	90-250 VAC 50-60 Hz	90-250 VAC 50-60 Hz	90-250 VAC 50-60 Hz
Dimensions	29"W x 31"D x 76"H (74cm x 51cm x 193cm)	29"W x 42"D x 76"H (74cm x 79cm x 193cm)	29"W x 53"D x 76"H (74cm x 107cm x 193cm)
Shipping Weight	660 lbs. (300 kg)	870 lbs. (395 kg)	1,290 lbs. (586 kg)

Flow Rates (lpm) @ 100 psig, 68°F

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

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Voltage Appendix

120vac / 60hz plug configuration for North America	Order Part Number
 	FID-1000NA-100, FID-2500NA-100, FID-3500NA-100, GCGS-7890NA-100, H2PD-150NA-100, H2PD-300NA-100, 75-83NA-100, HPZA-3500NA-100, HPZA7000NA-100, HPZA-18000NA-100, HPZA-30000NA-100, HPN2-1100NA-100, HPN2-2000NA-100, UHPN2-1100NA-100, 76-97NA-100, 76-98NA-100, 74-5041NA-100, UDA-300NA-100, LCMS-5000NA-100, LCMS-5001TNA, 100,LCMS-5001NTNA-100, N2-14ANA-100, N2-22ANA-100, N2-35ANA-100, N2-45ANA-100, N2-80ANA-100, N2-135ANA-100, MGG-400NA-100, MGG-2500NA-100, TOC-625NA-100, TOC-1250NA-100

* Models 75-45NA-100, 75-52NA-100 and 75-62NA-100 will include universal fit plug and transformer kit.

220vac / 50hz configuration for locations where final plug configuration is unknown	Order Part Number
	FID-1000-220, FID-2500-220, FID-3500-220, GCGS-7890-220, H2PD-150-220, HPD-300-220, 75-83-220, HPZA-3500-220, HPZA-7000-220, HPZA18000-220, HPZA30000-220, HPN2-1100-220, HPN2-2000-220, UHPN2-1100-220, 76-97-220, 76-98-220, 74-5041-220, UDA-300-220, LCMS-5000-220, LCMS-5001T-220, LCMS-5001NT-220, N2-14A, N2-22A, N2-35A, N2-45A, N2-80A, N2-135A, MGG-400-220, MGG-2500-220, TOC-625-220, TOC-1250-220

* Units will be supplied only with IEC connector as depicted, power cord to be customer supplied

220vac / 50hz plug configuration for Australia	Order Part Number
 	FID-1000AU, FID-2500AU, FID-3500AU, GCGS-7890AU, H2PD-150AU, H2PD-300AU, 75-83AU, HPZA-3500AU, HPZA-7000AU, HPZA-18000AU, HPZA-30000AU, HPN2-1100AU, HPN2-2000AU, UHPN2-1100AU, 76-97AU, 76-98AU, 74-5041AU, UDA-300AU, LCMS-5000AU, LCMS-5001TAU, LCMS-5001NTAU, N2-14AAU, N2-22AAU, N2-35AAU, N2-45AAU, N2-80AAU, N2-135AAU, MGG-400AU, MGG-2500AU,TOC-625AU, TOC-1250AU

* Models 75-45AU, 75-52AU and 75-62AU will include universal fit plug and transformer kit.

220vac / 50hz plug configuration for Europe	Order Part Number
 	FID-1000EU, FID-2500EU, FID-3500EU, GCGS-7890EU, H2PD-150EU, H2PD-300EU, 75-83EU, HPZA-3500EU, HPZA-7000EU, HPZA-18000EU, HPZA-30000EU, HPN2-1100EU, HPN2-2000EU, UHPN2-1100EU, 76-97EU, 76-98EU, 74-5041EU, UDA-300EU, LCMS-5000EU, LCMS-5001TEU, LCMS-5001NTEU, N2-14AEU, N2-22AEU, N2-35AEU, N2-45AEU, N2-80AEU, N2-135AEU, MGG-400EU, MGG-2500EU, TOC-625EU, TOC-1250EU

* Models 75-45EU, 75-52EU and 75-62EU will include universal fit plug and transformer kit.

100vac / 60hz plug configuration for Japan	Order Part Number
 	FID-1000JA-100, FID-2500JA-100, FID-3500JA-100, GCGS-7890JA-100, H2PD-150JA-100, H2PD-300JA-100, 75-83JA-100, HPZA-3500JA-100, HPZA7000JA-100, HPZA-18000JA-100, HPZA-30000JA-100, HPN2-1100JA-100, HPN2-2000JA-100, UHPN2-1100JA-100, 76-97JA-100, 76-98JA-100, 74-5041JA-100, UDA-300JA-100, LCMS-5000JA-100, LCMS-5001TJA, 100,LCMS-5001NTJA-100, N2-14AJA-100, N2-22AJA-100, N2-35AJA-100, N2-45AJA-100, N2-80AJA-100, N2-135AJA-100, MGG-400JA-100, MGG-2500JA-100, TOC-625JA-100, TOC-1250JA-100

* Models 75-45JA-100, 75-52JA-100 and 75-62JA-100 will include universal fit plug and transformer kit.

220vac / 50hz plug configuration for United Kingdom (some Asia)	Order Part Number
 	FID-1000UK, FID-2500UK, FID-3500UK, GCGS-7890UK, H2PD-150UK, H2PD-300UK, 75-83UK, HPZA-3500UK, HPZA-7000UK, HPZA-18000UK, HPZA-30000UK, HPN2-1100UK, HPN2-2000UK, UHPN2-1100UK, 76-97UK, 76-98UK, 74-5041UK, UDA-300UK, LCMS-5000UK, LCMS-5001TUK, LCMS-5001NTUK, N2-14AUK, N2-22AUK, N2-35AUK, N2-45AUK, N2-80AUK, N2-135AUK, MGG-400UK, MGG-2500UK, TOC-625UK, TOC-1250UK

* Models 75-45UK, 75-52UK and 75-62UK will include universal fit plug and transformer kit.

Recommended Gas Generators for Analytical Instruments

Instrument	Gas Requirements	Gas Purity Requirements	Flow Rates	Generator Recommendation/Model
Atomic Absorption (AA) with Flame	Air for Oxidant Gas	Clean, Dry	1-7 SCFM	**AA Gas Purifier** (Model 73-100)
Atomic Thermal Desorber	Zero Air	Clean, Dry, Hydrocarbon-free	Up to 1600 ml/min.	Zero Air or TOC Gas Generator (HPZA-3500 or TOC-1250)
	Hydrogen for FID Fuel	Clean, Dry,High Purity	Up to 40 ml/min. per FID	Hydrogen Generator (H2PEM-100, H2PEM-165) (H2PEM-260, H2PEM-510)
Atmospheric Pressure Ionization (API-MS)	Air for Nebulizer Gas	Clean, Dry, Hydrocarbon-free	< 30 LPM	Zero Air Generator (HPZA-30000)
	Nitrogen for Curtain, Sheath, and Shield gas	99% or higher	< 20 LPM	Nitrogen Generator (N2-14, N2-22, N2-35, NitroFlowLab)
Autosamplers for Various Instruments	Air for Pneumatic Controls	Clean, Dry	< 1 SCFM	Membrane Air Dryer (64-02)
	Nitrogen for Sample Injector	Ultra High Purity	< 550 cc/min	UHP Nitrogen Generator (HPN2-1100) (UHPN2-1100)
CO_2 Analyzers	Calibration Air	CO_2-free	0.5-1.0 SLPM	FT-IR Purge Gas Generator (75-45, 75-52)
Continuous Emissions Monitoring (CEM)	Calibration Air Dilution Air	Dry, CO_2, SO_2, NO_X, Hydrocarbon-free	10-15 SLPM	CEM Zero Air Generator (75-45-M744)
Emissions Analyzers	Zero Air	Hydrocarbon-free	2-15 SLPM	Zero Air Generator (HPZA-18000)
Fourier Transform Infrared Spectrometer (FT-IR)	Air for Sample Compartment, Optics, and/or Air-Bearing Components	Clean, Dry, CO_2-free	0.5-3 SCFM	FT-IR Purge Gas Generator (75-62, 75-52, 75-45) Lab Gas Generator (74-5041NA)
Gas Chromatograph (GC)				
GC-FID	Zero Air as Flame Support Air	Clean, Hydrocarbon-free	150-600 cc/min.	Zero Air Generator (HPZA-3500)
	Hydrogen as Flame Fuel Gas	Ultra High Purity	30-40 cc/min.	Hydrogen Generator (H2PEM-260)
	Hydrogen as Capillary Carrier Gas	Ultra High Purity	Varies	Hydrogen Generator (H2PD-300)
	Nitrogen as Packed Carrier Gas	Ultra High Purity, Zero Grade	Varies	UHP Nitrogen Generator (UHPN2-1100)
	Nitrogen as Make up Gas	Ultra High Purity, Zero Grade	<100 cc/min	UHP Nitrogen Generator (UHPN2-1100)
GC-FPD	Zero Air as Flame Support Air	Clean, Hydrocarbon-free	<200 cc/min	Zero Air Generator (HPZA-3500)
	Hydrogen as Flame Fuel Gas	Ultra High Purity	50-70 cc/min	Hydrogen Generator (H2PEM-260)
	Hydrogen as Capillary Carrier Gas	Ultra High Purity	Varies	Hydrogen Generator (H2-1200)
	Nitrogen as Packed Carrier Gas	Ultra High Purity	Varies	UHP Nitrogen Generator (UHPN2-1100)
GC-NPD	Zero Air to Rubidium/Thermonic Bead	Dry, Clean, Hydrocarbon-Free	60-200 cc/min.	Zero Air Generator (HPZA-3500)
	Hydrogen as Detector Support Gas	Ultra High Purity	<10 cc/min	Hydrogen Generator (H2PEM-100)
	Hydrogen as Capillary Carrier Gas	Ultra High Purity	Varies	Hydrogen Generator (Palladium) (H2PD-300)
	Nitrogen as Packed Carrier Gas	Ultra High Purity	Varies	UHP Nitrogen Generator (UHPN2-1100)
GC-ECD	Nitrogen as Carrier Gas	Ultra High Purity, Zero Grade	Varies	UHP Nitrogen Generator (UHPN2-1100)
	Nitrogen as Make up Gas	Ultra High Purity, Zero Grade	<100 cc/min	UHP Nitrogen Generator (UHPN2-1100)
GC-ELCD, HALL	Hydrogen as Reaction Gas	Ultra High Purity	70-200 cc/min	Hydrogen Generator (H2PD-300)

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Recommended Gas Generators for Analytical Instruments

Instrument	Gas Requirements	Gas Purity Requirements	Flow Rates	Generator Recommendation/Model
GC-TCD	Hydrogen as Carrier & Reference Gas	Ultra High Purity	Varies	Hydrogen Generator (H2PD-300)
LC-MS	Nitrogen as a Curtain Gas	LC-MS Grade	3-30 lpm	Nitrogen Generator (N2-14, N2-14ANA, NitroFlowLab) (NitroFlow60, N2-35, N2-35ANA)
ICP Spectrometer	Nitrogen as Optic/Camera Purge	Ultra High Purity	<1-5 lpm	Nitrogen Generator (76-97NA, 76-98NA)
Nuclear Magnetic Resonance (NMR)	Air for Lifting, Spinning	Clean, Dry	<10 SCFM	Air Dryer (UDA-300NA) Lab Gas Generator (74-5041NA)
Ozone Generator	Supply Air	Clean, Dry	.3-20 SCFM	Air Dryer (64-01, 64-02, 64-10, UDA-300NA)
Protein Analyzer	Dry Air, Nitrogen	Clean, Dry	40 psig	Nitrogen Generator (N2-14, N2-22, NitroFlowLab, N2-35)
Solvent Evaporators (Sample Concentrators)	Nitrogen	Clean, Dry Nitrogen	Up to 5 SCFM	Nitrogen Generator (Nitrovap-1LV, Nitrovap-2LV)
Stack Gas Sampler	Dilution Air	Clean, Dry	<1.0 SCFM	CEM Zero Air Generator (75-45-M744)
Total Oxygen Demand (TOD)	Nitrogen Carrier Gas	Ultra High Purity	300 cc/min	Nitrogen Generator (UHPN2-1100)
Thermal Gravametric Analyzer (TGA)	Nitrogen as Furnace Purge	Clean, Dry, Inert	<100 cc/min	Nitrogen Generator (UHPN2-1100)
Differential Scanning Calorimeter (DSC)	Air for Air Shield	Clean, Dry	<100 cc/min	Dry Air Generator (64-01, UDA-300)
Total Hydrocarbon Analyzer (THA)	Zero Air for FID Hydrogen as Flame Fuel Gas	Clean, Hydrocarbon-Free Ultra High Purity	50-500 cc/min 5-50 cc/min	Zero Air Generator (75-82S, 75-83NA) Hydrogen Generator (H2PEM-100)
Total Organic Carbon Analyzer (TOC)	Dry Air or Nitrogen for Carrier Gas or Combustion Gas	Clean, Dry, Hydrocarbon-Free CO2-Free Ultra High Purity	100-500 SLPM 50-700 cc/min	TOC Gas Generator (TOC-625, TOC-1250) UHP Nitrogen Generator (UHPN2-1100)

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Parker Balston also offers Gas Generators for these Applications



Products for LC-MS & Evaporation
(Request Bulletin AGS-LCMS)

- High purity nitrogen for LCMS instruments and solvent evaporation
- Tri-gas units available for instruments that require nitrogen, dry air and zero grade air
- Produce a continuous supply of high purity nitrogen from an existing compressed air supply
- Integrated compressor systems eliminate the need for house air
- Systems available to support one or dozens



Products for Chromatography
(Request Bulletin AGS-Chromatography)

- Hydrogen, Zero Air and UHP Nitrogen Generators for Gas Chromatography
- Combination systems available to provide multiple gasses from one unit
- Highest purities available from any supplier



Products for Spectroscopy
(Request Bulletin AGS-Spectroscopy)

- Remove water and CO_2 from compressed air
- Protect expensive optics from damage from water vapor
- Increase Signal to Noise Ratio and maximize instrument sensitivity
- Ultra dry air for NMR injecting, spinning and ejecting samples



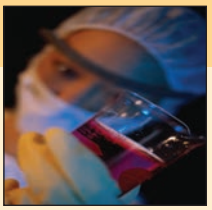
Products for TOC Analysis
(Request Bulletin AGS-TOC)

- Generate gasses for all combustion, UV persulfate and wet oxidation techniques
- Ensures consistent, reliable, instrument operation and reduces instrument service and maintenance costs



Products for Ultra Dry Air
(Request Bulletin AGS-UDA)

- Gas generators for dilution and calibration of Emissions Analyzers
- Exceed instrument manufacturer specifications
- Nitrogen and specialty blend gasses available



Analytical Gas Supplies
(Request Bulletin AGS SUPCAT)

- Installation kits, compressors, purifiers, flow-meters, regulators and all the materials needed to equip your lab
- High quality components, designed specifically for use with Parker gas generators, to deliver high purity gas to your instruments

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Gas Generator Services



Parker Balston Extended Support Services extend the warranty term of gas generators to 24-months. There are two choices available for level of service: Depot and Express. All parts and labor are included, with “next business morning” delivery available.



Parker Balston “Balston Bucks” Loyalty Programs are offered to every customer who purchases gas generators. Services include special discounts and incentives on gas generator spare parts and consumables as well as special deals on buying your next gas generator. Customers can easily “opt-in” and opt-out” of our special e-mail alerts system which features newsletters, new product announcements and product reminders.



Parker Balston Leasing and Rental Services can provide simple cost effective ways to acquire your next gas generator. Our competitive rates typically provide a monthly payment less than current monthly cylinder gas expenditures. Leasing and rental programs help the customer avoid the need to use capital budget money.



Parker Balston Preventive Maintenance Agreements provide convenient direct in-lab maintenance service for your gas generator. A factory trained technician will service your gas generator, in your lab, with original Parker parts. Preventative maintenance saves time, money and will reduce the total cost of ownership of your gas generator.

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Offer of Sale

1. Definitions. As used herein, the following terms have the meanings indicated.

Buyer: means any customer receiving a Quote for Products from Seller.

Goods: means any tangible part, system or component to be supplied by the Seller.

Products: means the Goods, Services and/or Software as described in a Quote provided by the Seller.

Quote: means the offer or proposal made by Seller to Buyer for the supply of Products.

Seller: means Parker-Hannifin Corporation, including all divisions and businesses thereof.

Services: means any services to be supplied by the Seller.

Software: means any software related to the Products, whether embedded or separately downloaded.

Terms: means the terms and conditions of this Offer of Sale or any newer version of the same as published by Seller electronically at www.parker.com/saleterms.

2. Terms. All sales of Products by Seller are contingent upon, and will be governed by, these Terms and, these Terms are incorporated into any Quote provided by Seller to any Buyer. Buyer's order for any Products whether communicated to Seller verbally, in writing, by electronic date interface or other electronic commerce, shall constitute acceptance of these Terms. Seller objects to any contrary or additional terms or conditions of Buyer. Reference in Seller's order acknowledgement to Buyer's purchase order or purchase order number shall in no way constitute an acceptance of any of Buyer's terms of purchase. No modification to these Terms will be binding on Seller unless agreed to in writing and signed by an authorized representative of Seller.

3. Price; Payment. The Products set forth in Seller's Quote are offered for sale at the prices indicated in Seller's Quote. Unless otherwise specifically stated in Seller's Quote, prices are valid for thirty (30) days and do not include any sales, use, or other taxes or duties. Seller reserves the right to modify prices at any time to adjust for any raw material price fluctuations. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). All sales are contingent upon credit approval and payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified in the Quote). Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month or the maximum allowable rate under applicable law.

4. 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 agreed, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective indicated shipping date 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.

5. Warranty. The warranty related to the Products is as follows: (i) Goods are warranted against defects in material or workmanship for a period of twelve (12) months from the date of shipment; (ii) Services shall be performed in accordance with generally accepted practices and using the degree of care and skill that is ordinarily exercised and customary in the field to which the Services pertain and are warranted for a period of six (6) months from the completion of the Services by Seller; and (iii) Software is only warranted to perform in accordance with applicable specifications provided by Seller to Buyer for ninety (90) days from the date of delivery or, when downloaded by a Buyer or end-user, from the date of the initial download. 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. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE SOFTWARE IS ERROR-FREE OR FAULT-TOLERANT, OR THAT BUYER'S USE THEREOF WILL BE SECURE OR UNINTERRUPTED. BUYER AGREES AND ACKNOWLEDGES THAT UNLESS OTHERWISE AUTHORIZED IN WRITING BY SELLER THE SOFTWARE SHALL NOT BE USED IN CONNECTION WITH HAZARDOUS OR HIGH RISK ACTIVITIES OR ENVIRONMENTS. EXCEPT AS EXPRESSLY STATED HEREIN, ALL PRODUCTS ARE PROVIDED "AS IS".

6. 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. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the non-conformance 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 30% restock fee may apply.*

7. LIMITATION OF LIABILITY. IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE THE NON-CONFORMING PRODUCT, RE-PERFORM THE SERVICES, OR REFUND THE PURCHASE PRICE PAID 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, NON-COMPLETION OF SERVICES, USE, LOSS OF USE OF, OR INABILITY TO USE THE PRODUCTS OR ANY PART THEREOF, LOSS OF DATA, IDENTITY, PRIVACY, OR CONFIDENTIALITY, 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 PAID FOR THE PRODUCTS.**

8. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which are or 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 Products 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. Special Tooling includes but is not limited to tooling, jigs, fixtures and associated manufacturing equipment acquired or necessary to manufacture Products. A tooling charge may be imposed for any Special Tooling. 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 Special Tooling belonging to Seller that is utilized in the manufacture of the Products, even if such Special Tooling 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. Security Interest. To secure payment of all sums due, Seller retains a security interest in all Products delivered to Buyer and, Buyer's acceptance of these Terms 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. User Responsibility. The Buyer through its own analysis and testing, is solely responsible for making the final selection of the Products and assuring that all performance, endurance, maintenance, safety and warning requirements of the application of the Products are met. The Buyer must analyze all aspects of the application and follow applicable industry standards, specifications, and other technical information provided with the Product. If Seller provides Product options based upon data or specifications provided by the Buyer, the Buyer is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products. In the event the Buyer is not the end-user, Buyer will ensure such end-user complies with this paragraph.

12. Use of Products, Indemnity by Buyer. Buyer shall comply with all instructions, guides and specifications provided by Seller with the Products. Unauthorized Uses. If Buyer uses or resells the Products for any uses prohibited in Seller's instructions, guides or specifications, or Buyer otherwise fails to comply with Seller's instructions, guides and specifications,

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Offer of Sale (cont'd)

Buyer acknowledges that any such use, resale, or non-compliance is at Buyer's sole risk. 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, intellectual property 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 provided by Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, tooling, equipment, plans, drawings, designs or specifications or other information or things furnished by Buyer; (d) damage to the Products from an external cause, repair or attempted repair by anyone other than Seller, failure to follow instructions, guides and specifications provided by Seller, use with goods not provided by Seller, or opening, modifying, deconstructing or tampering with the Products for any reason; or (e) Buyer's failure to comply with these Terms. Seller shall not indemnify Buyer under any circumstance except as otherwise provided in these Terms.

13. Cancellations and Changes. Buyer may not cancel or modify 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, at any time, may change Product features, specifications, designs and availability. *Order cancelation fee of 15% may apply.*

14. Limitation on Assignment. Buyer may not assign its rights or obligations without the prior written consent of Seller.

15. 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 ("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.

16. Waiver and Severability. Failure to enforce any provision of these Terms 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 these Terms by legislation or other rule of law shall not invalidate any other provision herein and, the remaining provisions will remain in full force and effect.

17. Termination. Seller may terminate any agreement governed by or arising from these Terms for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate, in writing, if Buyer: (a) breaches any provision of these Terms (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.

18. Ownership of Software. Seller retains ownership of all Software supplied to Buyer hereunder. In no event shall Buyer obtain any greater right in and to the Software than a right in the nature of a license limited to the use thereof and subject to compliance with any other terms provided with the Software.

19. 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 ("Intellectual Property Rights") except as provided in this Section. 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 a third party claim that one or more of the Products sold hereunder infringes the Intellectual Property Rights of a third party in the country of delivery of the Products by the Seller to the Buyer. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of any such claim, and Seller having sole control over the defense of the claim including all negotiations for settlement or compromise. If one or more Products sold hereunder is subject to such a claim, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Products, replace or modify the Products so as to render them non-infringing, or offer to accept return of the Products and refund the purchase price less a reasonable allowance for depreciation. Seller has no obligation or liability for any claim of infringement: (i) arising from information provided by Buyer; or (ii) directed to any Products provided hereunder for which the designs are specified in whole or part by Buyer; or (iii) resulting from the modification, combination or use in a system of any Products provided hereunder. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for such claims of infringement of Intellectual Property Rights.

20. Governing Law. These Terms 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 the sale and delivery of the Products.

21. Entire Agreement. These Terms, along with the terms set forth in the main body of any Quote, forms the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. In the event of a conflict between any term set forth in the main body of a Quote and these Terms, the terms set forth in the main body of the Quote shall prevail. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter shall have no effect. These Terms may not be modified unless in writing and signed by an authorized representative of Seller.

22. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards, including those of the United States of America, and the country or countries in which Buyer may operate, including without limitation the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act"), U.S. and E.U. export control and sanctions laws ("Export Laws"), the U.S. Food Drug and Cosmetic Act ("FDCA"), and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), each as currently amended. Buyer agrees to indemnify, defend, and hold harmless Seller from the consequences of any violation of such laws, regulations and standards by Buyer, its employees or agents. Buyer acknowledges that it is familiar with all applicable provisions of the FCPA, the Anti-Kickback Act, Export Laws, the FDCA and the FDA and certifies that Buyer will adhere to the requirements thereof and not take any action that would make Seller violate such requirements. Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly, to any governmental official, foreign political party or official thereof, candidate for foreign political office, or commercial entity or person, for any improper purpose, including the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller. Buyer further represents and agrees that it will not receive, use, service, transfer or ship any Product from Seller in a manner or for a purpose that violates Export Laws or would cause Seller to be in violation of Export Laws.

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