



# Analytical Gas Systems Products for Chromatography

Bulletin AGS-Chromatography-D

# 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	

### 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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# FID Gas Stations

**Parker Balston's FID-1000NA and FID-2500NA Gas Stations** provide both hydrogen gas and zero grade air to FID detectors on Gas Chromatographs. These systems are specifically designed to provide fuel gas and support air to 5-6 Flame Ionization Detectors, Flame Photometric Detectors or Total Hydrocarbon Analyzers.

Hydrogen gas is produced from deionized water using a Proton Exchange Membrane Cell. The hydrogen generator compartment utilizes the principle of electrolytic dissociation of water and hydrogen proton conduction through the membrane. The hydrogen supply produces up to 250 cc/min of 99.9995% pure hydrogen with pressures to 60 psig.

Zero air is produced by purifying on-site compressed air to a total hydrocarbon concentration of < 0.1 ppm (measured as methane). The zero air compartment produces up to 2500 cc/min of Zero Grade Air.

The FID Gas Stations are state-of-the-art systems with highly reliable components engineered for easy installation, operation, and long term performance.

The Parker Balston FID-1000NA and FID-2500NA eliminate all the inconveniences and cost of zero air and hydrogen cylinder gas supplies and dependence on outside vendors. Uncontrollable price increases, contract negotiations, long term commitments, and tank rentals are no longer a concern. With an FID Gas Station, you control your gas supply.

All Parker Balston gas generators exceed NFPA 50A and OSHA 1910.103 regulations which outline the storage of hydrogen.

Produced and supported by an ISO 9001 registered organization, Parker Balston's hydrogen generators are the first built to meet the toughest laboratory standards in the world: CSA, UL, CE and IEC 1010.



FID Gas Station, Models FID-1000NA and FID-2500NA



## Features and Benefits

- Ideal for up to 5-6 FIDs
- Produces UHP zero air from house compressed air (<0.1 ppm THC) and 99.9995% pure hydrogen in one enclosure
- Eliminates inconvenient and dangerous zero air and hydrogen cylinders from the laboratory
- Increases the accuracy of analysis
- Reduces the cleaning requirement for the detector
- Recommended and used by many GC and column manufacturers
- Typical payback period of less than one year
- Automatic water fill
- Silent operation and minimal operator attention required



# FID Gas Stations

## Principal Specifications

FID Makeup Gas Generators	FID-1000NA	FID-2500NA
Hydrogen Purity	99.9995%	99.9995%
Zero Air Purity	< 0.1 ppm (total hydrocarbon as methane)	< 0.1 ppm (total hydrocarbon as methane)
Maximum Hydrogen Flow Rate	90 cc/min	250 cc/min
Maximum Zero Air Flow Rate	1000 cc/min	2500 cc/min
Electrical Requirements <sup>(1)</sup>	120/230VAC, 60/50Hz, 4 Amps	120/230VAC, 60/50Hz, 4 Amps
Hydrogen Outlet Pressure	60 psig	60 psig
Zero Air Outlet Pressure	40-125 psig	40-125 psig
Certifications	IEC 1010-1; CSA 1010; UL 3101; CE Mark	IEC 1010-1; CSA 1010; UL 3101; CE Mark
Dimensions	10.5"w x 17"d x 16.5"h (27cm x 43cm x 42cm)	10.5"w x 17"d x 16.5"h (27cm x 43cm x 42cm)
Inlet Port	1/4" NPTF compressed air supply	1/4" NPTF compressed air supply
Outlet Ports	1/8" Compression	1/8" Compression
Shipping Weight	53 lbs / 24 kg	53 lbs / 24 kg

### NOTES

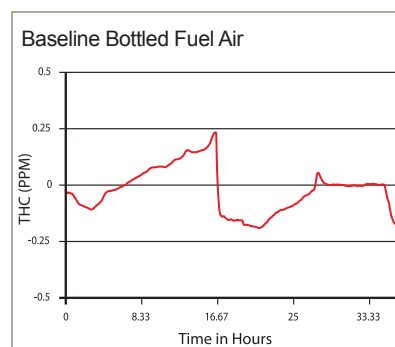
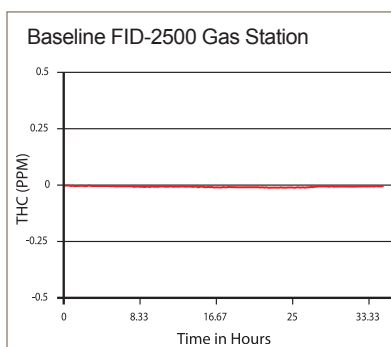
1 Refer to voltage appendix for electrical and plug configurations for outside North America.

## Ordering Information

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

Description	Model Number
FID Gas Station	FID-1000NA, FID-2500NA
Installation Service	FID-1000-INST, FID-2500-INST
Annual Maintenance Kit	MKFID1000
Preventive Maintenance Plan	FID-1000-PM, FID-2500-PM
Extended Support (24 Month Warranty)	FID-1000-DN2, FID-2500-DN2

The Chromatograms (at right) compare baselines produced by a Parker Balston Zero Air Generator and bottled fuel air. The baseline produced by the Parker Balston Generator is very flat, with no fluctuations or peaks, in comparison with the chromatogram of the bottled air fuel supply, which has many peaks ranging from .25 ppm to -.25 ppm.



# GC Gas Station

**Parker Balston's GC-4000NA GC Gas Station** provides both hydrogen gas and zero grade air to FID detectors on gas chromatographs. These systems are specifically designed to provide carrier, fuel gas and support air for Flame Ionization Detectors, and capillary columns.

Hydrogen gas is produced from deionized water using a proton exchange membrane cell. The hydrogen generator compartment utilizes the principle of electrolytic dissociation of water and hydrogen proton conduction through the membrane. The hydrogen cell produces up to 500 cc/min of 99.99999+% pure hydrogen gas after passing through an (NM) no maintenance palladium membrane with pressures to 100 psig.

Zero air is produced by purifying on-site compressed air to a total hydrocarbon concentration of < 0.05 ppm (measured as methane). The zero air compartment produces up to 4000 cc/min of zero grade air.

The GC Gas Station is a state-of-the-art system with highly reliable components engineered for easy installation, operation, and long term performance.

The Parker Balston GC-4000NA will eliminate all the inconvenience and cost of helium, zero air, and hydrogen cylinder gas supplies and dependence on outside vendors. Uncontrollable price increases, contract negotiations, long term commitments, and tank rentals are no longer a concern. With a GC Gas Station, you control all your gas supplies.

All Parker Balston gas generators exceed NFPA 50A and OSHA 1910.103 regulations outlining the storage of hydrogen.

Produced and supported by an ISO 9001 registered organization, Parker Balston's gas generators are the first built to meet the toughest laboratory standards in the world: CSA, UL, CE and IEC 1010.



Model GC-4000NA GC Gas Station



## Features and Benefits

- Produce UHP zero air from house compressed air (<0.05 ppm THC) and 99.99999+% pure hydrogen in one enclosure
- Eliminates costly and dangerous helium, zero air and hydrogen cylinders from the laboratory
- Speeds up separation, increases sample thru-put and extends column life
- Recommended and used by many GC and column manufacturers
- Payback period of less than one year

# GC Gas Station

## Principal Specifications

GC Gas Station	GC-4000NA
Hydrogen Purity	99.99999+%
Zero Air Purity	< 0.05 ppm (total hydrocarbons as methane)
Maximum Hydrogen Flow Rate	500 cc/min
Maximum Zero Air Flow Rate	4000 cc/min
Electrical Requirements <sup>(1)</sup>	120/230VAC, 60/50Hz, 6.3 Amps
Hydrogen Outlet Pressure	100 psig
Zero Air Outlet Pressure	40-125 psig
Certifications	IEC 1010-1; CSA 1010; UL 3101; CE Mark
Dimensions	11"w x 27"d x 17"h (28cm x 69cm x 43cm)
Inlet Port	1/4" NPT (female tube) compressed air supply
Outlet Ports	1/8" Compression, Stainless
Shipping Weight	60 lbs/27 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

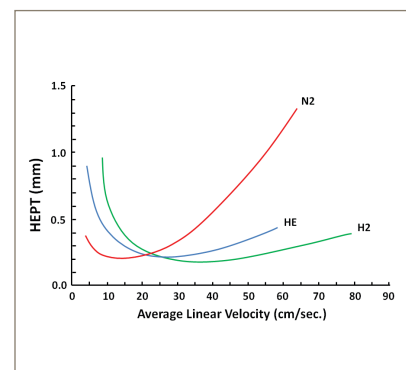
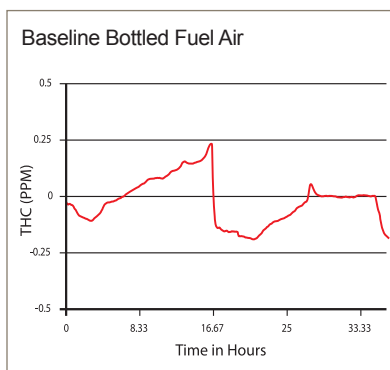
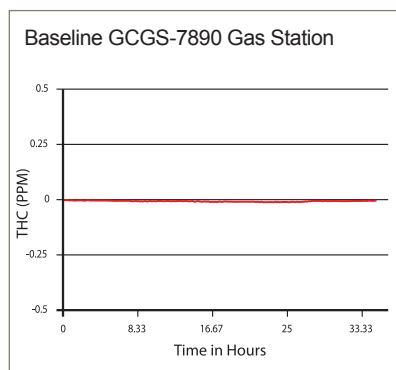
Description	Model Number
GC Gas Station	GC-4000NA
Installation Service	GC-4000-INST
Preventive Maintenance Plan	GC-4000-PM
Extended Support with 24 Month Warranty	GC-4000-DN2
Maintenance Kit @ 12 Months	MKGC-4000-12
Maintenance Kit @ 36 Months	MKGC-4000-36

The Chromatograms (below) compare baselines produced by a Parker Balston GC Gas Station and bottled fuel air. The baseline produced by the Parker Balston Generator is very flat, with no fluctuations or peaks, in comparison with

the chromatogram of the bottled air fuel supply, which has many peaks ranging from .25 ppm to -.25 ppm.

The Van Deemter Curves (below) show a comparison of nitrogen, helium and

hydrogen carrier gases. A Parker Balston Gas Station will also allow the user to exploit the benefits of using hydrogen carrier gas instead of helium. Increased flow velocity can shorten analysis time by 50%.



# Hydrogen Generators for Fuel Gas

**Parker Balston's fuel gas hydrogen generators utilize proton exchange membrane, which eliminates the use of liquid electrolytes with hydrogen generators.**

Proven in over 40,000 GC installations worldwide. Parker Balston's generators are the most reliable hydrogen generators on the market. Maintenance requires only a few moments per year—no inconvenient, extended downtime. Simply change the filters every six months and the desiccant cartridge whenever it turns dark brown.

Deionized water is all that is required to generate hydrogen for weeks of continuous operation.

Automatic water filling is available for all fuel gas hydrogen generators.

Simply connect your in-house supply of deionized water to the nitrogen generator for virtually hands-free operation.

With an output capacity of up to 510 cc/minute, one generator can supply 99.9995% pure hydrogen for up to several FID's. Based on cylinder gas savings alone, a Parker Balston hydrogen generator pays for itself in less than a year.

All Parker Balston hydrogen generators meet NFPA requirements and OSHA 1910.103 regulations governing the storage of hydrogen.

Produced and supported by an ISO 9001 registered organization, Parker Balston's hydrogen generators are the first built to meet the toughest laboratory standards in the world: CSA, UL, CE and IEC 1010.



H2PEM Hydrogen Generator



## Features and Benefits

- Ideal for fuel gas for up to 14 FID's
- Eliminates dangerous and expensive hydrogen gas cylinders from the laboratory
- Exclusive water management system and control circuitry maximize uptime
- Unique display lighting changes color for easy status checks and water level indication
- Remote control and remote monitoring capable by adding USB options bay controller
- Compact and reliable - only one square foot of bench space required
- Includes 2 year cell warranty
- No liquid caustics required



# Hydrogen Generators for Fuel Gas

## Principal Specifications

Description	H2PEM-100	H2PEM-165	H2PEM-260	H2PEM-510
Purity	99.9995%	99.9995%	99.9995%	99.9995%
Flow Rates	100 cc/min	165 cc/min	260 cc/min	510 cc/min
Outlet Port	1/8" compression	1/8" compression	1/8" compression	1/8" compression
Electrical <sup>(1)</sup>	100/230VAC, 60/50Hz	100/230VAC, 60/50Hz	100/230VAC, 60/50Hz	100/230VAC, 60/50Hz
Delivery Pressure	5-100 psig ± 0.5 psig	5-100 psig ± 0.5 psig	5-100 psig ± 0.5 psig	5-100 psig ± 0.5 psig
Shipping Weight	70 lb (32 kg) dry	70 lb (32 kg) dry	70 lb (32 kg) dry	70 lb (32 kg) dry
Dimensions	17"h x 13.4"w x 18"d (43cm x 34.2cm x 45cm)	17"h x 13.4"w x 18"d (43cm x 34.2cm x 45cm)	17"h x 13.4"w x 18"d (43cm x 34.2cm x 45cm)	17"h x 13.4"w x 18"d (43cm x 34.2cm x 45cm)

### 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
Desiccant Cartridge (1 each)	MKH2PEM-D
6 Month Service Kit	MKH2PEM-6M
24 Month Service Kit	MKH2PEM-24M
Preventive Maintenance Plan	H2PEM-100-PM H2PEM-165-PM H2PEM-260-PM H2PEM-510-PM
Installation Service	H2PEM-100-INST H2PEM-165-INST H2PEM-260-INST H2PEM-510-INST
USB Remote Control Accessory	604970894



# Hydrogen Generators for Fuel and Carrier Gas

**The Parker Balston Hydrogen Generator** is an excellent source of ultra pure, dry hydrogen for a wide range of laboratory uses. The generator is used extensively with Gas Chromatographs, as a fuel gas for Flame Ionization Detectors (FID), as a reaction gas for Hall Detectors, and as a carrier gas to ensure absolute repeatability of retention times. In high sensitivity Trace Hydrocarbon Analyzers and air pollution monitors, the hydrogen produced ensures the lowest possible background noise.

Other applications include using hydrogen for hydrogenation reactions and for FID's used in the analysis of engine gas emissions in the automobile industry.

In all applications the Parker Balston Hydrogen Generator sets the standard for safety, operational performance, and dependability. Parker Balston Hydrogen Generators eliminate the need for expensive, dangerous, high pressure cylinders of hydrogen in the laboratory. It is no longer necessary to interrupt important analysis to change cylinders.

Generator flow capacities of up to 300 cc/min. of ultra high purity hydrogen are available.

Parker Balston Hydrogen Generators are compact benchtop units designed for use in the laboratory or in the field.

Hydrogen gas is produced by electrolytic dissociation of water. The resultant hydrogen stream then passes through a palladium membrane to assure carrier grade purity.

Only hydrogen and its isotopes can penetrate the palladium membrane; therefore, the purity of the output gas is guaranteed to be 99.99999+% consistently. This technology produces hydrogen at a guaranteed purity two orders of magnitude greater than desiccant or silica gel technologies.

Parker Balston Hydrogen Generators offer many special features to ensure safe and convenient operation. These features include smart-display technology system status at a glance and automatic water fill for endless operation.



Model H2PD-300 Hydrogen Generator



## Features and Benefits

- Eliminates dangerous and expensive hydrogen gas cylinders from the laboratory
- Exceeds OSHA 1910.103 and NFPA 50A safety guidelines
- Safe - produces only as much gas as you need
- Produces a continuous supply of 99.99999+% pure hydrogen gas without snap on downstream purifiers
- Compact and reliable - only one square foot of bench space required and designed to run continuously 24 hours/day
- Unique (NM) no maintenance palladium membrane prevents baseline drift unlike auto-drying technologies
- Certified for laboratory use by CSA, UL, IEC 1010, and CE Mark

*"Our H2 generator has saved us time, space, and money over a traditional tank configuration. We realized a return on our investment in less than one year and no longer have to manage bulky and unsightly tanks in the lab."*

*John Ross  
Director Corporate Quality  
Ungerer & Company*

# Hydrogen Generators for Fuel and Carrier Gas

## Principal Specifications

Hydrogen Generators	H2PD-150	H2PD-300
Hydrogen Purity	99.99999+%	99.99999+%
Oxygen Content	< .01 ppm	< .01 ppm
Moisture Content	< 1.0 ppm	< 1.0 ppm
Max Hydrogen Flow Rate	150 cc/min	300 cc/min
Electrical Requirements <sup>(1)</sup>	120/230 VAC, 60/50 Hz, 3.5 Amps	120/230 VAC, 60/50 Hz, 3.5 Amps
Hydrogen Outlet Pressure	Adjustable, 0 to 60 psig	Adjustable, 0 to 60 psig
Certifications	IEC 1010-1; CSA; UL 3101; CE Mark	IEC 1010-1; CSA; UL 3101; CE Mark
Dimensions	12"w x 12"d x 22"h (30cm x 33cm x 58cm)	12"w x 12"d x 22"h (30cm x 33cm x 58cm)
Outlet Port	1/8" Compression	1/8" Compression
Shipping Weight	55 lbs (25 kg)	55 lbs (25 kg)

### NOTES

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

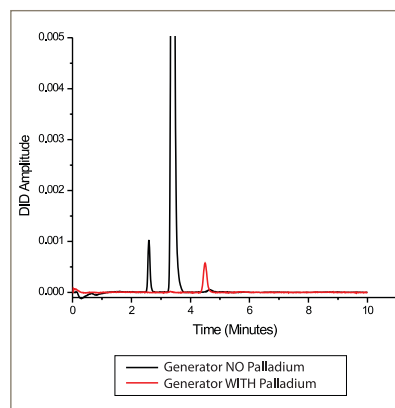
## Ordering Information

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

Description	Model Number
Hydrogen Gas Generator	H2PD-150, H2PD-300
Pressure Regulator	W-425-4032-000
Installation Kit	IK7532
Preventive Maintenance plan	H2PD-150-PM, H2PD-300-PM
Extended Support (24 Month Warranty)	H2PD-150-DN2, H2PD-300-DN2

**Simple Experimental:** The two merged baselines in the right chromatogram were created using a Gow-Mac Gas Chromatograph Series 590 equipped with a (DID) discharge ionization detector with hydrogen separator. In creating both baselines (black and red) the gas sample is hydrogen from a hydrogen generator. Both generators are the same - as hydrogen gas is produced from water via electrolytic disassociation, but differ slightly as one generator incorporates a desiccant drying tube as a final purifier while the second generator has a palladium membrane as the final purifier.

The large black peak represents a combined 12 ppm concentration of oxygen and nitrogen, suitable for hydrogen fuel gas while the corresponding point in the red baseline represents a combined 12 ppb concentration of oxygen and nitrogen, suitable for either fuel or carrier gas.



# Hydrogen Generators for Fuel and Carrier Gas

**The Parker Balston H2PEMPD Series of Hydrogen Generators** are an excellent source of ultra pure, dry hydrogen for a wide range of laboratory uses. The generator is used extensively with Gas Chromatographs, as a fuel gas for Flame Ionization Detectors (FID), as a reaction gas for Hall Detectors, and as a carrier gas to ensure absolute repeatability of retention times. In high sensitivity trace hydrocarbon analyzers and air pollution monitors, the hydrogen produced ensures the lowest possible background noise.

Other applications include using hydrogen for hydrogenation reactions and for FIDs used in the analysis of engine gas emissions in the automobile industry.

With an output capacity of up to 1,300 cc/minute, one generator can supply 99.99999+% pure carrier gas at up to 175 psig to multiple GCs, and fuel gas up to 45 FIDs. The Parker Balston H2PEMPD series of Hydrogen generators use a Proton Exchange Membrane (PEM) to produce hydrogen on demand. Each generator incorporates a maintenance free palladium purifier

module to remove oxygen down to <0.01 ppm and moisture down to <1.0 ppm. Only 100 mL of hydrogen gas is stored in the system at any time. Based on cylinder gas savings alone, a Parker Balston hydrogen generator pays for itself in less than one year.

The H2PEMPD series of hydrogen generators incorporate breakthrough software and microprocessor controls to provide many new features. Up to 32 hydrogen generators can be connected together using Parkers' cascading, load balancing software to supply gas to a large gas delivery system. Built in remote monitoring capability enables users to view system performance from a PC; multiple systems can be monitored at one time. Data logging of gas generator performance is incorporated into the H2PEMPD series for use in regulated environments where system validation may be required.

Parker Balston hydrogen generators meet the strict safety guidelines of the National Fire Protection Agency (NFPA) and the regulations of the Occupational Safety and Health



Model H2PEMPD Hydrogen Generator



Association (OSHA). Parker Balston hydrogen generators are certified for laboratory use by CSA, IEC 1010, and CE. Proven in over 40,000 GC installations worldwide, Parker Balston generators are the most reliable hydrogen generators on the market. Maintenance requires only a few moments per year - no inconvenient, extended downtime. Simply change the deionizer cartridge every six months. In all applications the Parker Balston Hydrogen Generator sets the standard for safety, operational performance and dependability.

## Features and Benefits

- Flow capacity up to 1,300 cc/min
- Delivery pressure of up to 175 PSIG; ideal for high speed and fast GC applications
- Eliminates dangerous and expensive helium and hydrogen gas cylinders
- Safe - produces only as much gas as you need
- Produces a continuous supply of 99.99999+% pure hydrogen gas; palladium membrane prevents baseline drift unlike auto-drying technologies
- Compact and reliable - only one square foot of bench space required
- Standard automatic water feed for continuous operation, 24/7
- Optional cascading feature enables users to connect as many as 32 hydrogen generators together to supply a large number of instruments
- Remote PC monitoring features
- Advanced PEM electrochemical cell protection system with microprocessor controls
- Simple maintenance, without Snap-on downstream purifiers
- Certified for laboratory use by CSA, IEC 1010, and CE Mark

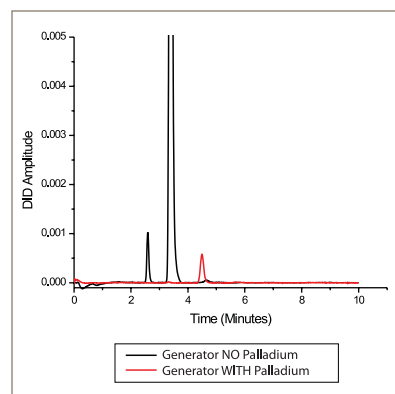
*"Our H2 generator has saved us time, space, and money over a traditional tank configuration. We realized a return on our investment in less than one year and no longer have to manage bulky and unsightly tanks in the lab."*

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# Hydrogen Generators for Fuel and Carrier Gas

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The large black peak represents a combined 12 ppm concentration of oxygen and nitrogen, suitable for hydrogen fuel gas while the corresponding point in the red baseline represents a combined 12 ppb concentration of oxygen and nitrogen, suitable for either fuel or carrier gas.



## Principal Specifications

	H2PEMPD-510	H2PEMPD-650	H2PEMPD-850	H2PEMPD-1100	H2PEMPD-1300
Hydrogen Purity	99.99999+%	99.99999+%	99.99999+%	99.99999+%	99.99999+%
Max Hydrogen Flow Rate	510 cc/min	650 cc/min	850 cc/min	1100 cc/min	1300 cc/min
Oxygen Content	< 0.01 ppm	< 0.01 ppm	< 0.01 ppm	< 0.01 ppm	< 0.01 ppm
Water Content	< 0.01 ppm	< 0.01 ppm	< 0.01 ppm	< 0.01 ppm	< 0.01 ppm
Max Outlet Pressure <sup>(1)</sup>	100 or 175 psig (6.8 or 11.9 Bar)	100 or 175 psig (6.8 or 11.9 Bar)	100 or 175 psig (6.8 or 11.9 Bar)	100 or 175 psig (6.8 or 11.9 Bar)	100 or 175 psig (6.8 or 11.9 Bar)
Electrical Requirements <sup>(2)</sup>	100 to 230 VAC, 50/60 Hz	100 to 230 VAC, 50/60 Hz	100 to 230 VAC, 50/60 Hz	100 to 230 VAC, 50/60 Hz	100 to 230 VAC, 50/60 Hz
Outlet Connection	1/4" Compression	1/4" Compression	1/4" Compression	1/4" Compression	1/4" Compression
Dimensions	17.1"h x 13.5"w x 21"d (43.5cm x 34cm x 53cm) for all models				
Shipping Weight	94 lb (42.6 kg) for all models				

### NOTES

- 1 H2PEMPD Hydrogen Generators are available with maximum pressure of either 100 or 175 PSIG. See Ordering Information for pressure selection
- 2 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

	H2PEMPD-510	H2PEMPD-650	H2PEMPD-850	H2PEMPD-1100	H2PEMPD-1300
Max Outlet Pressure to 100 PSIG (6.8 bar)	H2PEMPD-510-100	H2PEMPD-650-100	H2PEMPD-850-100	H2PEMPD-1100-100	H2PEMPD-1300-100
Max Outlet Pressure to 175 PSIG (11.9 bar)	H2PEMPD-510-175	H2PEMPD-650-175	H2PEMPD-850-175	H2PEMPD-1100-175	H2PEMPD-1300-175
Annual Preventive Maintenance	H2PEMPD-510-PM	H2PEMPD-650-PM	H2PEMPD-850-PM	H2PEMPD-1100-PM	H2PEMPD-1300-PM
Semi Annual Preventive Maintenance	H2PEMPD-510-PMPLUS	H2PEMPD-650-PMPLUS	H2PEMPD-850-PMPLUS	H2PEMPD-1100-PMPLUS	H2PEMPD-1300-PMPLUS



# Voltage Appendix

## 220vac / 50hz configuration for locations where final plug configuration is unknown

### Order Part Number

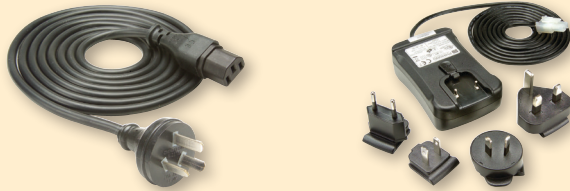


FID-1000-220, FID-2500-220, H2PD-150-220, H2PD-300-220, 75-83-220, HPZA-3500-220, HPZA-7000-220, HPZA-18000-220, HPZA-30000-220, UHPN2-1100-220, 76-97-220, 76-98-220, 74-5041-220, UDA-300-220, LCMS-5000-220, LCMS-5001T-220, LCMS-5001NT-220, N2-14A, N2-22A, N2-35A, N2-45A, N2-80A, N2-135A, MGG-400-220, 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

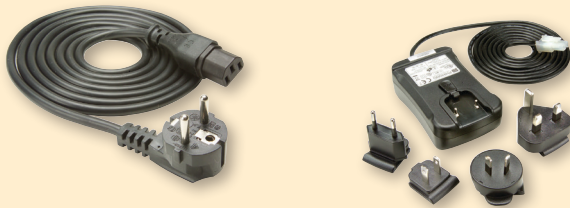


FID-1000AU, FID-2500AU, H2PD-150AU, H2PD-300AU, 75-83AU, HPZA-3500AU, HPZA-7000AU, HPZA-18000AU, HPZA-30000AU, UHPN2-1100AU, 76-97AU, 76-98AU, 74-5041AU, UDA-300AU, LCMS-5000AU, LCMS-5001TAU, LCMS-5001NTAU, N2-14AAU, N2-22AAU, N2-35AAU, N2-45AAU, N2-80AAU, N2-135AAU, MGG-400AU, MGG-2500AU, TOC-625AU, TOC-1250AU

\* Models Spectra-15, Spectra-30 and 75-62AU will include universal fit plug and transformer kit.

## 220vac / 50hz plug configuration for Europe

### Order Part Number

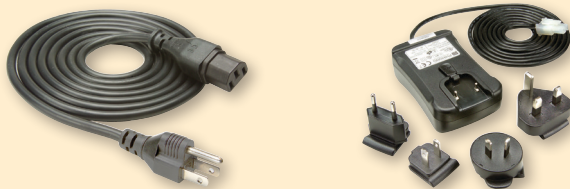


FID-1000EU, FID-2500EU, H2PD-150EU, H2PD-300EU, 75-83EU, HPZA-3500EU, HPZA-7000EU, HPZA-18000EU, HPZA-30000EU, UHPN2-1100EU, 76-97EU, 76-98EU, 74-5041EU, UDA-300EU, LCMS-5000EU, LCMS-5001TEU, LCMS-5001NTEU, N2-14AEU, N2-22AEU, N2-35AEU, N2-45AEU, N2-80AEU, N2-135AEU, MGG-400EU, MGG-2500EU, TOC-625EU, TOC-1250EU

\* Models Spectra-15, Spectra-30 and 75-62EU will include universal fit plug and transformer kit.

## 100vac / 60hz plug configuration for Japan

### Order Part Number



FID-1000JA-100, GCGS-7890JA-100, H2PD-150JA-100, H2PD-300JA-100, 75-83JA-100, HPZA-3500JA-100, HPZA-7000JA-100, HPZA-18000JA-100, HPZA-30000JA-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 Spectra-15, Spectra-30 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, H2PD-150UK, H2PD-300UK, 75-83UK, HPZA-3500UK, HPZA-7000UK, HPZA-18000UK, HPZA-30000UK, 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 Spectra-15, Spectra-30 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	<b>AA Gas Purifier</b> (Model 73-100)
Atomic Thermal Desorber	Zero Air	Clean, Dry, Hydrocarbon-free	Up to 1600 ml/min.	<b>Zero Air or TOC Gas Generator</b> (HPZA-3500 or TOC-1250)
	Hydrogen for FID Fuel	Clean, Dry, High Purity	Up to 40 ml/min. per FID	<b>Hydrogen Generator</b> (H2PEM-100, H2PEM-165) (H2PEM-260, H2PEM-510)
Atmospheric Pressure Ionization (API-MS)	Air for Nebulizer Gas	Clean, Dry, Hydrocarbon-free	< 30 LPM	<b>Zero Air Generator</b> (HPZA-30000)
	Nitrogen for Curtain, Sheath, and Shield gas	99% or higher	< 20 LPM	<b>Nitrogen Generator</b> (N2-14, N2-22, N2-35, NitroFlowLab)
Autosamplers for Various Instruments	Air for Pneumatic Controls	Clean, Dry	< 1 SCFM	<b>Membrane Air Dryer</b> (64-02)
	Nitrogen for Sample Injector	Ultra High Purity	< 550 cc/min	<b>UHP Nitrogen Generator</b> (UHPN2-1100)
CO <sub>2</sub> Analyzers	Calibration Air	CO <sub>2</sub> -free	0.5-1.0 SLPM	<b>FT-IR Purge Gas Generator</b> (Spectra-30)
Continuous Emissions Monitoring (CEM)	Calibration Air Dilution Air	Dry, CO <sub>2</sub> , SO <sub>2</sub> , NO <sub>x</sub> , Hydrocarbon-free	10-15 SLPM	<b>CEM Zero Air Generator</b> (75-45-M744)
Emissions Analyzers	Zero Air	Hydrocarbon-free	2-15 SLPM	<b>Zero Air Generator</b> (HPZA-18000)
Fourier Transform Infrared Spectrometer (FT-IR)	Air for Sample Compartment, Optics, and/or Air-Bearing Components	Clean, Dry, CO <sub>2</sub> -free	0.5-3 SCFM	<b>FT-IR Purge Gas Generator</b> (75-62, Spectra-30) <b>Lab Gas Generator</b> (74-5041NA)
Gas Chromatograph (GC) GC-FID	Zero Air as Flame Support Air	Clean, Hydrocarbon-free	150-600 cc/min.	<b>Zero Air Generator</b> (HPZA-3500)
	Hydrogen as Flame Fuel Gas	Ultra High Purity	30-40 cc/min.	<b>Hydrogen Generator</b> (H2PEM-260)
	Hydrogen as Capillary Carrier Gas	Ultra High Purity	Varies	<b>Hydrogen Generator</b> (H2PD-300)
	Nitrogen as Packed Carrier Gas	Ultra High Purity, Zero Grade	Varies	<b>UHP Nitrogen Generator</b> (UHPN2-1100)
	Nitrogen as Make up Gas	Ultra High Purity, Zero Grade	<100 cc/min	<b>UHP Nitrogen Generator</b> (UHPN2-1100)
GC-FPD	Zero Air as Flame Support Air	Clean, Hydrocarbon-free	<200 cc/min	<b>Zero Air Generator</b> (HPZA-3500)
	Hydrogen as Flame Fuel Gas	Ultra High Purity	50-70 cc/min	<b>Hydrogen Generator</b> (H2PEM-260)
	Hydrogen as Capillary Carrier Gas	Ultra High Purity	Varies	<b>Hydrogen Generator</b> (H2PEMPD-1300)
	Nitrogen as Packed Carrier Gas	Ultra High Purity	Varies	<b>UHP Nitrogen Generator</b> (UHPN2-1100)
GC-NPD	Zero Air to Rubidium/Thermonic Bead	Dry, Clean, Hydrocarbon-Free	60-200 cc/min.	<b>Zero Air Generator</b> (HPZA-3500)
	Hydrogen as Detector Support Gas	Ultra High Purity	<10 cc/min	<b>Hydrogen Generator</b> (H2PEM-100)
	Hydrogen as Capillary Carrier Gas	Ultra High Purity	Varies	<b>Hydrogen Generator (Palladium)</b> (H2PD-300)
	Nitrogen as Packed Carrier Gas	Ultra High Purity	Varies	<b>UHP Nitrogen Generator</b> (UHPN2-1100)
GC-ECD	Nitrogen as Carrier Gas	Ultra High Purity, Zero Grade	Varies	<b>UHP Nitrogen Generator</b> (UHPN2-1100)
	Nitrogen as Make up Gas	Ultra High Purity, Zero Grade	<100 cc/min	<b>UHP Nitrogen Generator</b> (UHPN2-1100)
GC-ELCD, HALL	Hydrogen as Reaction Gas	Ultra High Purity	70-200 cc/min	<b>Hydrogen Generator</b> (H2PD-300)

# 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	<b>Hydrogen Generator</b> (H2PD-300)
LC/MS	Nitrogen as a Curtain Gas	LC/MS Grade	3-30 lpm	<b>Nitrogen Generator</b> (N2-14, N2-14ANA, NitroFlowLab) (NitroFlow60, N2-35, N2-35ANA)
ICP Spectrometer	Nitrogen as Optic/Camera Purge	Ultra High Purity	<1-5 lpm	<b>Nitrogen Generator</b> (HPN2-5200)
Nuclear Magnetic Resonance (NMR)	Air for Lifting, Spinning	Clean, Dry	<10 SCFM	<b>Air Dryer</b> (UDA-300NA) <b>Lab Gas Generator</b> (74-5041NA)
Ozone Generator	Supply Air	Clean, Dry	.3-20 SCFM	<b>Air Dryer</b> (64-01, 64-02, 64-10, UDA-300NA)
Protein Analyzer	Dry Air, Nitrogen	Clean, Dry	10-40 SLPM	<b>Nitrogen Generator</b> (N2-14, N2-22, NitroFlowLab, N2-35)
Solvent Evaporators (Sample Concentrators)	Nitrogen	Clean, Dry Nitrogen	Up to 5 SCFM	<b>Nitrogen Generator</b> (Nitrovap-1LV, Nitrovap-2LV)
Stack Gas Sampler	Dilution Air	Clean, Dry	<1.0 SCFM	<b>CEM Zero Air Generator</b> (75-45-M744)
Total Oxygen Demand (TOD)	Nitrogen Carrier Gas	Ultra High Purity	300 cc/min	<b>Nitrogen Generator</b> (UHPN2-1100)
Thermal Gravimetric Analyzer (TGA)	Nitrogen as Furnace Purge	Clean, Dry, Inert	<100 cc/min	<b>Nitrogen Generator</b> (UHPN2-1100)
Differential Scanning Calorimeter (DSC)	Air for Air Shield	Clean, Dry	<100 cc/min	<b>Dry Air Generator</b> (64-01, UDA-300)
Total Hydrocarbon Analyzer (THA)	Zero Air for FID	Clean, Hydrocarbon-Free	50-500 cc/min	<b>Zero Air Generator</b> (75-82S, 75-83NA)
	Hydrogen as Flame Fuel Gas	Ultra High Purity	5-50 cc/min	<b>Hydrogen Generator</b> (H2PEM-100)
Total Organic Carbon Analyzer (TOC)	Dry Air or Nitrogen for Carrier Gas or Combustion Gas	Clean, Dry, Hydrocarbon-Free	100-500 SLPM	<b>TOC Gas Generator</b> (TOC-625, TOC-1250)
		CO <sub>2</sub> -Free Ultra High Purity	50-700 cc/min	<b>UHP Nitrogen Generator</b> (UHPN2-1100)

# 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 gases from one unit
- Highest purities available from any supplier



## Products for Spectroscopy

(Request Bulletin AGS-Spectroscopy)

- Remove water and CO<sub>2</sub> 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

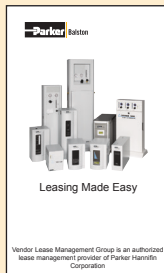
# Gas Generator Services



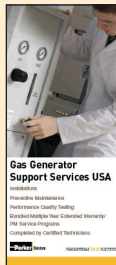
**Parker Balston Extended Support Services** extend the warranty term of gas generators to 24-months. There are two choices available for level of service: Depot and Express. All parts and labor are included, with “next business morning” delivery available.



**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 Contracts** 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. Preventive maintenance saves time, money and will reduce the total cost of ownership of your gas generator.



# Application Notes

# Offer of Sale

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, FNS Division, its subsidiaries and its authorized distributors ("Seller") are hereby offered for sale at prices to be established by Seller. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods, services or work described will be referred to as "Products".

**1. Terms and Conditions.** Seller's willingness to offer Products, or accept an order for Products, to or from Buyer is subject to these Terms and Conditions or any newer version of the terms and conditions found on-line at [www.parker.com/saleterms/](http://www.parker.com/saleterms/). Seller objects to any contrary or additional terms or conditions of Buyer's order or any other document issued by Buyer.

**2. Price Adjustments; Payments.** Prices stated on Seller's quote or other documentation offered by Seller are valid for 30 days, and do not include any sales, use, or other taxes unless specifically stated. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). Payment is subject to credit approval and is due 30 days from the date of invoice or such other term as required by Seller's Credit Department, after which Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.

**3. Delivery Dates; Title and Risk; Shipment.** All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the manner of shipment, title to any products and risk of loss or damage shall 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 Buyers' 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 12 months from the date of shipment and covers in-factory repair and parts only. Warranty does not include on site labor, travel expenses, or other expense associated with field repair. Purchaser shall notify Seller of any breach of warranty within 30 days. Upon notification, Seller will, at its option, repair or replace the defective product, or refund its purchase price. Any action for breach of warranty or for failure to deliver must be commenced within 13 months of its accrual. **DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

**5. Claims; Commencement of Actions.** Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 30 days after delivery. Buyer shall notify Seller of any alleged breach of warranty within 30 days after the date the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for an amount due on any invoice) must be commenced within 12 months from the date of the breach without regard to the date breach is discovered. **If product is returned for refund, a 20% restock fee may apply.**

**6. LIMITATION OF LIABILITY, UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER 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, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER 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, 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 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 shall have 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 shall retain a security interest in the goods delivered and this agreement shall be deemed 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 claim, liability, damages, lawsuits, and costs (including attorney fees),

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, improper application 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 Product; 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.** Orders shall not be subject to cancellation or change by Buyer 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 with notice to Buyer. 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 shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, 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 waive 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 written notice of termination. Seller may immediately terminate this agreement, in writing, if Buyer: (a) commits a breach of 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 by a third party (d) makes an assignment for the benefit of creditors, or (e) dissolves or liquidates all or a majority of its assets.

**17. Governing Law.** This agreement and the sale and delivery of all Products hereunder shall be 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 shall have no liability 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 return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to 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 shall 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.

**20. Compliance with Law, U. K. Bribery Act and U.S. Foreign Corrupt Practices Act.** Buyer agrees to comply with all applicable laws and regulations, including both those of the United Kingdom and the United States of America, and of the country or countries of the Territory in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA") and the U.S. Anti-Kickback Act (the "Anti-Kickback Act"), 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 they are familiar with the provisions of the U. K. Bribery Act, the FCPA and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer shall 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

#### Gas Separation & Filtration Division

Lancaster, NY  
716 686 6400  
[www.parker.com/gsf](http://www.parker.com/gsf)

Haverhill, MA  
978 858 0505  
[www.parker.com/gsf](http://www.parker.com/gsf)

### Engine Filtration

#### 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)

### Hydraulic Filtration

#### Hydraulic & Fuel Filtration

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)

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

### Process Filtration

#### domnick hunter Process Filtration SciLog

Oxnard, CA  
805 604 3400  
[www.parker.com/processfiltration](http://www.parker.com/processfiltration)

### Water Purification

#### Village Marine, Sea Recovery, Horizon Reverse Osmosis

Carson, CA  
310 637 3400  
[www.parker.com/watermakers](http://www.parker.com/watermakers)

## Europe

### Compressed Air Treatment

#### Gas Separation & Filtration Division EMEA

Gas Generation/Compressed Air and Gas Treatment  
Gateshead, England  
+44 (0) 191 402 9000  
[www.parker.com/gsf](http://www.parker.com/gsf)

Membrane and Modules  
Etten-Leur, Netherlands  
+31 76 508 5300  
[www.parker.com/gsf](http://www.parker.com/gsf)

Hiross Zander  
Essen, Germany  
+49 2054 9340  
[www.parker.com/gsf](http://www.parker.com/gsf)

Padova, Italy  
+39 049 9712 111  
[www.parker.com/gsf](http://www.parker.com/gsf)

### Engine Filtration & Water Purification

#### Racor

Dewsbury, England  
+44 (0) 1924 487 000  
[www.parker.com/rfde](http://www.parker.com/rfde)

#### Racor Research & Development

Stuttgart, Germany  
+49 (0)711 7071 290-10

### Hydraulic Filtration

#### Hydraulic Filter

Arnhem, Holland  
+31 26 3760376  
[www.parker.com/hfde](http://www.parker.com/hfde)

Ujala, Finland  
+358 20 753 2500

#### Condition Monitoring Parker Kittiwake

West Sussex, England  
+44 (0) 1903 731 470  
[www.kittiwake.com](http://www.kittiwake.com)

### Process Filtration

#### domnick hunter Process Filtration Parker Twin Filter BV

Birtley, England  
+44 (0) 191 410 5121  
[www.parker.com/processfiltration](http://www.parker.com/processfiltration)

## Asia Pacific

### Australia

Castle Hill, Australia  
+61 2 9634 7777  
[www.parker.com/australia](http://www.parker.com/australia)

### China

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