Analytical Gas Systems
Products for Chromatography
Bulletin AGS-Chromatography-A
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.

Parker’s Motion and Control Technologies

<table>
<thead>
<tr>
<th>Aerospace</th>
<th>Hydraulics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate Control</td>
<td>Pneumatics</td>
</tr>
<tr>
<td>Electromechanical</td>
<td>Process Control</td>
</tr>
<tr>
<td><strong>Filtration</strong></td>
<td>Sealing &amp; Shielding</td>
</tr>
<tr>
<td>Fluid &amp; Gas Handling</td>
<td></td>
</tr>
</tbody>
</table>

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

The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated in the "Offer of Sale".

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Parker Balston's FID-1000NA, FID-2500NA, and FID-3500NA 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 10-11 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 500 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 3500 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, FID-2500NA, FID-3500NA 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.

**Features and Benefits**

- Ideal for up to 10-11 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

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.

<table>
<thead>
<tr>
<th>Description</th>
<th>FID-1000NA</th>
<th>FID-2500NA</th>
<th>FID-3500NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Number</td>
<td>FID-1000NA, FID-2500NA, FID-3500NA</td>
<td>FID-1000-INST, FID-2500-INST, FID-3500-INST</td>
<td>FID-1000-PM, FID-2500-PM, FID-3500-PM</td>
</tr>
<tr>
<td><strong>FID Makeup Gas Generators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrogen Purity</td>
<td>99.9995%</td>
<td>99.9995%</td>
<td>99.9995%</td>
</tr>
<tr>
<td>Zero Air Purity</td>
<td>&lt; 0.1 ppm</td>
<td>&lt; 0.1 ppm</td>
<td>&lt; 0.05 ppm</td>
</tr>
<tr>
<td>(total hydrocarbon as methane)</td>
<td>(total hydrocarbon as methane)</td>
<td>(total hydrocarbon as methane)</td>
<td></td>
</tr>
<tr>
<td>Maximum Hydrogen Flow Rate</td>
<td>90 cc/min</td>
<td>250 cc/min</td>
<td>500 cc/min</td>
</tr>
<tr>
<td>Maximum Zero Air Flow Rate</td>
<td>1000 cc/min</td>
<td>2500 cc/min</td>
<td>3500 cc/min</td>
</tr>
<tr>
<td>Electrical Requirements (1)</td>
<td>120VAC, 60Hz, 4 Amps</td>
<td>120VAC, 60Hz, 4 Amps</td>
<td>120VAC, 60Hz, 6.3 Amps</td>
</tr>
<tr>
<td>Hydrogen Outlet Pressure</td>
<td>60 psig</td>
<td>60 psig</td>
<td>60 psig</td>
</tr>
<tr>
<td>Zero Air Outlet Pressure</td>
<td>40-125 psig</td>
<td>40-125 psig</td>
<td>40-125 psig</td>
</tr>
<tr>
<td>Certifications</td>
<td>IEC 1010-1; CSA 1010; UL 3101; CE Mark</td>
<td>IEC 1010-1; CSA 1010; UL 3101; CE Mark</td>
<td>IEC 1010-1; CSA 1010; UL 3101; CE Mark</td>
</tr>
<tr>
<td>Dimensions</td>
<td>10.5&quot;w x 17&quot;d x 16.5&quot;h (27cm x 43cm x 42cm)</td>
<td>10.5&quot;w x 17&quot;d x 16.5&quot;h (27cm x 43cm x 42cm)</td>
<td>10.5&quot;w x 17&quot;d x 16.5&quot;h (27cm x 43cm x 42cm)</td>
</tr>
<tr>
<td>Inlet Port</td>
<td>1/4&quot; NPTF compressed air supply</td>
<td>1/4&quot; NPTF compressed air supply</td>
<td>1/4&quot; NPTF compressed air supply</td>
</tr>
<tr>
<td>Outlet Ports</td>
<td>1/8&quot; Compression</td>
<td>1/8&quot; Compression</td>
<td>1/8&quot; Compression</td>
</tr>
<tr>
<td>Shipping Weight</td>
<td>53 lbs / 24 kg</td>
<td>53 lbs / 24 kg</td>
<td>60 lbs / 27 kg</td>
</tr>
</tbody>
</table>

NOTES
1 Refer to voltage appendix to select correct part number and plug for Japan and 220VAC/50hz configurations.

Ordering Information

<table>
<thead>
<tr>
<th>Description</th>
<th>Model Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FID Gas Station</td>
<td></td>
</tr>
<tr>
<td>Installation Service</td>
<td></td>
</tr>
<tr>
<td>Annual Maintenance Kit</td>
<td>MKFID1000</td>
</tr>
<tr>
<td>Annual Maintenance Kit</td>
<td>MKFID3500</td>
</tr>
<tr>
<td>Preventive Maintenance Plan</td>
<td></td>
</tr>
<tr>
<td>Extended Support with 24 Month Warranty</td>
<td></td>
</tr>
</tbody>
</table>

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

1 800 343 4048
www.parker.com/fns/balstonlabgasgenerators
GC Gas Station

Parker Balston's GCGS-7890NA 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 3500 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 GCGS-7890NA 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.

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

<table>
<thead>
<tr>
<th>Description</th>
<th>Model Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC Gas Station</td>
<td>GCGS-7890 NA</td>
</tr>
<tr>
<td>Hydrogen Purity</td>
<td>99.99999+ %</td>
</tr>
<tr>
<td>Zero Air Purity</td>
<td>&lt; 0.05 ppm (total hydrocarbons as methane)</td>
</tr>
<tr>
<td>Maximum Hydrogen Flow Rate</td>
<td>500 cc/min</td>
</tr>
<tr>
<td>Maximum Zero Air Flow Rate</td>
<td>3500 cc/min</td>
</tr>
<tr>
<td>Electrical Requirements (1)</td>
<td>120 VAC, 60 Hz, 6.3 Amps</td>
</tr>
<tr>
<td>Hydrogen Outlet Pressure</td>
<td>100 psig</td>
</tr>
<tr>
<td>Zero Air Outlet Pressure</td>
<td>40-125 psig</td>
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<tr>
<td>Certifications</td>
<td>IEC 1010-1; CSA 1010; UL 3101; CE Mark</td>
</tr>
<tr>
<td>Dimensions</td>
<td>11&quot;w x 27&quot;d x 17&quot;h (28cm x 69cm x 43cm)</td>
</tr>
<tr>
<td>Inlet Port</td>
<td>1/4&quot; NPT (female tube) compressed air supply</td>
</tr>
<tr>
<td>Outlet Ports</td>
<td>1/8&quot; Compression, Stainless</td>
</tr>
<tr>
<td>Shipping Weight</td>
<td>60 lbs/27 kg</td>
</tr>
</tbody>
</table>

NOTES
1 Refer to voltage appendix to select correct part number and plug for Japan and 220VAC/50hz configurations.

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%.

Baseline GCGS-7890 Gas Station

Baseline Bottled Fuel Air

NOTES
1 Refer to voltage appendix to select correct part number and plug for Japan and 220VAC/50hz configurations.

Ordering Information

<table>
<thead>
<tr>
<th>Description</th>
<th>Model Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC Gas Station</td>
<td>GCGS-7890NA</td>
</tr>
<tr>
<td>Installation Service</td>
<td>GCGS-7890-INST</td>
</tr>
<tr>
<td>Preventive Maintenance Plan</td>
<td>GCGS-7890-DN2</td>
</tr>
<tr>
<td>Extended Support with 24 Month Warranty</td>
<td>GCGS-7890-DN2</td>
</tr>
<tr>
<td>Maintenance Kit @ 12 Months</td>
<td>MKCGGS-7890-12</td>
</tr>
<tr>
<td>Maintenance Kit @ 36 Months</td>
<td>MKCGGS-7890-36</td>
</tr>
</tbody>
</table>

for assistance, call 800-343-4048, 8 to 5 Eastern Time
Parker Balston’s MGG-400NA and MGG-2500NA, Makeup Gas Generators provide nitrogen gas and zero grade air to FID detectors on Gas Chromatographs. These systems are specifically designed to provide only nitrogen gas or both nitrogen and zero air to 5-6 Flame Ionization Detectors.

Zero grade nitrogen gas is produced by purifying on-site compressed air through the use of a heated catalyst technology mated with a hollow fiber membrane separator. The heated catalyst removes all heavy and light hydrocarbons while the hollow fiber membrane delivers nitrogen molecules to the generator’s output. The nitrogen from the system is 99.9999+% pure in respect to hydrocarbons (suitable for FID Makeup Gas) and is 99+% pure in trace in respect to oxygen and water vapor.

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 2500 cc/min of zero grade air.

The Makeup Gas Generators are manufactured with state-of-the-art, highly reliable components engineered for easy installation, operation and long term performance.

The Parker Balston® MGG-400NA and MGG-2500NA eliminate all the inconveniences and of 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 Parker Balston Makeup Gas Generator, you control your gas supply.

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.

**Features and Benefits**

- Ideal for up to 5-6 FIDs
- Produces makeup grade nitrogen with less than 0.05 ppm THC (measured as methane)
- Eliminates dangerous and costly helium or nitrogen cylinders from the laboratory
- Improves flame shape within the FID detector and maximizes sensitivity
- Recommended and used by many GC and column manufacturers
- Typical payback period of less than one year
- Silent operation and minimal operator attention required

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This Technology Features

Advanced HiFluxx Fiber
The Chromatograms (right) compare baselines produced by a Parker Balston Makeup Gas 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 fuel supply, which has many peaks ranging from .25 ppm to -.25 ppm.

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGG-400NA, MGG-2500NA</td>
<td>Makeup Gas Generator</td>
</tr>
<tr>
<td>MGGW-400NA, MGGW-2500NA</td>
<td>Makeup Gas Generator (wall mount)</td>
</tr>
<tr>
<td>MGG-400-INST, MGG-2500-INST</td>
<td>Installation service</td>
</tr>
<tr>
<td>MGGW-400-INST, MGGW-2500-INST</td>
<td>Annual Maintenance Kit</td>
</tr>
<tr>
<td>MKMGG2500-12</td>
<td>Preventive Maintenance Plan</td>
</tr>
<tr>
<td>MGG-400-DN2, MGG-2500-DN2,</td>
<td>Extended Support with 24 Month Warranty</td>
</tr>
<tr>
<td>MGGW-400-DN2, MGGW-2500-DN2</td>
<td></td>
</tr>
</tbody>
</table>

NOTES
1 Refer to voltage appendix to select correct part number and plug for Japan and 220VAC/50hz configurations.
## Voltage Appendix

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

<table>
<thead>
<tr>
<th>Order Part Number</th>
</tr>
</thead>
</table>

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

### 220vac / 50hz plug configuration for Australia

<table>
<thead>
<tr>
<th>Order Part Number</th>
</tr>
</thead>
</table>

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

### 220vac / 50hz plug configuration for Europe

<table>
<thead>
<tr>
<th>Order Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
</tr>
</tbody>
</table>

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

### 100vac / 60hz plug configuration for Japan

<table>
<thead>
<tr>
<th>Order Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FID-1000JA-100, FID-2500JA-100, FID-3500JA-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, 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</td>
</tr>
</tbody>
</table>

* 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)

<table>
<thead>
<tr>
<th>Order Part Number</th>
</tr>
</thead>
</table>

* Models 75-45UK, 75-52UK and 75-62UK will include universal fit plug and transformer kit.
# Recommended Gas Generators for Analytical Instruments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Gas Requirements</th>
<th>Gas Purity Requirements</th>
<th>Flow Rates</th>
<th>Generator Recommendation/Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atomic Absorption (AA) with Flame</td>
<td>Air for Oxidant Gas</td>
<td>Clean, Dry</td>
<td>1-7 SCFM</td>
<td>AA Gas Purifier (Model 73-100)</td>
</tr>
<tr>
<td>Atomic Thermal Desorber</td>
<td>Zero Air</td>
<td>Clean, Dry, Hydrocarbon-free</td>
<td>Up to 1600 ml/min.</td>
<td>Zero or TOC Gas Generator (HPZA-3500 or TOC-1250) Hydrogen Generator (H2PEM-100, H2PEM-165) (H2PEM-260, H2PEM-510)</td>
</tr>
<tr>
<td></td>
<td>Hydrogen for FID Fuel</td>
<td>Clean, Dry, High Purity</td>
<td>Up to 40 ml/min. per FID</td>
<td></td>
</tr>
<tr>
<td>Atmospheric Pressure Ionization (API-MS)</td>
<td>Air for Nebulizer Gas</td>
<td>Clean, Dry, Hydrocarbon-free</td>
<td>&lt; 30 LPM</td>
<td>Zero Air Generator (HPZA-30000) Nitrogen Generator (N2-14, N2-22, N2-35, NitroFlowLab)</td>
</tr>
<tr>
<td></td>
<td>Nitrogen for Curtain, Sheath, and Shield gas</td>
<td>99% or higher</td>
<td>&lt; 20 LPM</td>
<td></td>
</tr>
<tr>
<td>Autosamplers for Various Instruments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Air for Pneumatic Controls</td>
<td>Clean, Dry</td>
<td>&lt; 1 SCFM</td>
<td>Membrane Air Dryer (64-02) UHP Nitrogen Generator (HPN2-1100) (UHPN2-1100)</td>
</tr>
<tr>
<td></td>
<td>Nitrogen for Sample Injector</td>
<td>Ultra High Purity</td>
<td>&lt; 550 cc/min</td>
<td></td>
</tr>
<tr>
<td>CO₂ Analyzers</td>
<td>Calibration Air</td>
<td>CO₂-free</td>
<td>0.5-1.0 SLPM</td>
<td>FT-IR Purge Gas Generator (75-45, 75-52)</td>
</tr>
<tr>
<td>Continuous Emissions Monitoring (CEM)</td>
<td>Calibration Air</td>
<td>Dry, CO₂, SO₂, NOₓ, Hydrocarbon-free</td>
<td>10-15 SLPM</td>
<td>CEM Zero Air Generator (75-45-M744)</td>
</tr>
<tr>
<td>Emissions Analyzers</td>
<td>Zero Air</td>
<td>Hydrocarbon-free</td>
<td>2-15 SLPM</td>
<td>Zero Air Generator (HPZA-1800)</td>
</tr>
<tr>
<td>Fourier Transform Infrared Spectrometer (FT-IR)</td>
<td>Air for Sample Compartment, Optics, and/or Air-Bearing Components</td>
<td>Clean, Dry, CO₂-free</td>
<td>0.5-3 SCFM</td>
<td>FT-IR Purge Gas Generator (75-62, 75-52, 75-45) Lab Gas Generator (74-5041NA)</td>
</tr>
<tr>
<td>GC-ECD</td>
<td>Nitrogen as Carrier Gas</td>
<td>Clean, Hydrocarbon-Free Ultra High Purity, Zero Grade</td>
<td>Varies</td>
<td>UHP Nitrogen Generator (UHPN2-1100) UHP Nitrogen Generator (UHPN2-1100)</td>
</tr>
<tr>
<td></td>
<td>Nitrogen as Make up Gas</td>
<td>Clean, Hydrocarbon-Free Ultra High Purity, Zero Grade</td>
<td>&lt;100 cc/min</td>
<td></td>
</tr>
<tr>
<td>GC-ELCD, HALL</td>
<td>Hydrogen as Reaction Gas</td>
<td>Clean, Hydrocarbon-Free Ultra High Purity</td>
<td>70-200 cc/min</td>
<td>Hydrogen Generator (H2PD-300)</td>
</tr>
</tbody>
</table>
# Recommended Gas Generators for Analytical Instruments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Gas Requirements</th>
<th>Gas Purity Requirements</th>
<th>Flow Rates</th>
<th>Generator Recommendation/Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC-TCD</td>
<td>Hydrogen as Carrier &amp; Reference Gas</td>
<td>Ultra High Purity</td>
<td>Varies</td>
<td>Hydrogen Generator (H2PD-300)</td>
</tr>
<tr>
<td>LC/MS</td>
<td>Nitrogen as a Curtain Gas</td>
<td>LC/MS Grade</td>
<td>3-30 lpm</td>
<td>Nitrogen Generator (N2-14, N2-14ANA, NitroFlowLab)</td>
</tr>
<tr>
<td>ICP Spectrometer</td>
<td>Nitrogen as Optic/Camera Purge</td>
<td>Ultra High Purity</td>
<td>&lt;1-5 lpm</td>
<td>Nitrogen Generator (N2-14, N2-35, N2-35ANA)</td>
</tr>
<tr>
<td>Nuclear Magnetic Resonance (NMR)</td>
<td>Air for Lifting, Spinning</td>
<td>Clean, Dry</td>
<td>&lt;10 SCFM</td>
<td>Air Dryer (UDA-300NA), Lab Gas Generator (74-5041NA)</td>
</tr>
<tr>
<td>Ozone Generator</td>
<td>Supply Air</td>
<td>Clean, Dry</td>
<td>3-20 SCFM</td>
<td>Air Dryer (64-01, 64-02, 64-10, UDA-300NA)</td>
</tr>
<tr>
<td>Protein Analyzer</td>
<td>Dry Air, Nitrogen</td>
<td>Clean, Dry</td>
<td>40 psig</td>
<td>Nitrogen Generator (N2-14, N2-22, NitroFlowLab, N2-35)</td>
</tr>
<tr>
<td>Solvent Evaporators (Sample Concentrators)</td>
<td>Nitrogen</td>
<td>Clean, Dry Nitrogen</td>
<td>Up to 5 SCFM</td>
<td>Nitrogen Generator (Nitrovap-1LV, Nitrovap-2LV)</td>
</tr>
<tr>
<td>Stack Gas Sampler</td>
<td>Dilution Air</td>
<td>Clean, Dry</td>
<td>&lt;1.0 SCFM</td>
<td>CEM Zero Air Generator (75-45-M744)</td>
</tr>
<tr>
<td>Total Oxygen Demand (TOD)</td>
<td>Nitrogen Carrier Gas</td>
<td>Ultra High Purity</td>
<td>300 cc/min</td>
<td>Nitrogen Generator (UHPN2-1100)</td>
</tr>
<tr>
<td>Thermal Gravimetric Analyzer (TGA)</td>
<td>Nitrogen as Furnace Purge</td>
<td>Clean, Dry, Inert</td>
<td>&lt;100 cc/min</td>
<td>Nitrogen Generator (UHPN2-1100)</td>
</tr>
<tr>
<td>Differential Scanning Calorimeter (DSC)</td>
<td>Air for Air Shield</td>
<td>Clean, Dry</td>
<td>&lt;100 cc/min</td>
<td>Dry Air Generator (64-01, UDA-300)</td>
</tr>
<tr>
<td>Total Hydrocarbon Analyzer (THA)</td>
<td>Zero Air for FID</td>
<td>Clean, Hydrocarbon-Free</td>
<td>50-500 cc/min</td>
<td>Zero Air Generator (75-825, 75-83NA)</td>
</tr>
<tr>
<td></td>
<td>Hydrogen as Flame Fuel Gas</td>
<td>Ultra High Purity</td>
<td>5-50 cc/min</td>
<td>Hydrogen Generator (H2PEM-100)</td>
</tr>
<tr>
<td>Total Organic Carbon Analyzer (TOC)</td>
<td>Dry Air or Nitrogen for Carrier Gas or Combustion Gas</td>
<td>Clean, Dry, Hydrocarbon-Free CO2-Free Ultra High Purity</td>
<td>100-500 SLPM</td>
<td>TOC Gas Generator (TOC-625, TOC-1250)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50-700 cc/min</td>
<td>UHP Nitrogen Generator (UHPN2-1100)</td>
</tr>
</tbody>
</table>
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 CO₂ 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
Offer of Sale

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, 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 this document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods, services or work described herein are referred to as "Products.

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3. Delivery Dates; Title and Risk. 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 shipper at Seller’s facility. Unless otherwise stated, Buyer may exercise its judgment in choosing the carrier and means of delivery. No delivery 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 due to Buyer’s acts or omissions.

4. Warranty. Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of twelve months from the date of delivery to Buyer or 2,000 hours of normal use, whichever occurs first. The prices charged for Seller’s products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRIS THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING DESIGN, 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 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.

6. LIMITATION OF LIABILITY. UPON NOTIFICATION, SELLER WILL, AT IT'S 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 NEGLECTFUL, WHETHER IN CONTRACT OR TORT OR UNDER ANY OTHER LEGAL THEORIES. NO CLAIMS AGAINST SELLER 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 applicable laws and reasonably foreseeable uses of the Products or systems.

8. Loss to Buyer's Property. Any designs, tools, patterns, drawings, confidential information or equipment furnished by Buyer or any other item 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 any 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 designed for 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 Products until such time as 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, or otherwise, by reason of any act, omission or occurrence which is not, or which is the result of Buyer’s, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller’s use of Products; (d) any drawn design 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. Seller reserves the right to modify or change this written contract which will indemnify, defend and hold Seller harmless against all loss and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

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 but not be limited to: 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 in connection with 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 subject to Buyer not, acting on its own behalf or on behalf of its Affiliates, making, using or licensing the Product in violation of any Intellectual Property Rights. Buyer 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.

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 Seller harmless from the consequences of any violation of provisions of the Seller’s 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 government 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 Seller of any kind.
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