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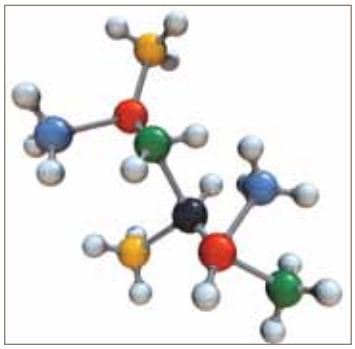
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# Analytical Gas Systems

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

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# Parker Balston
# Technology you can trust

Parker Balston is the leading provider of Gas Systems for the Analytical Instrument market. Generators are specifically designed to meet the stringent gas requirements for all the leading Analytical Instrument manufacturers including Agilent, ThermoFisher, Waters, Shimadzu, AB Sciex, Perkin Elmer and many others.

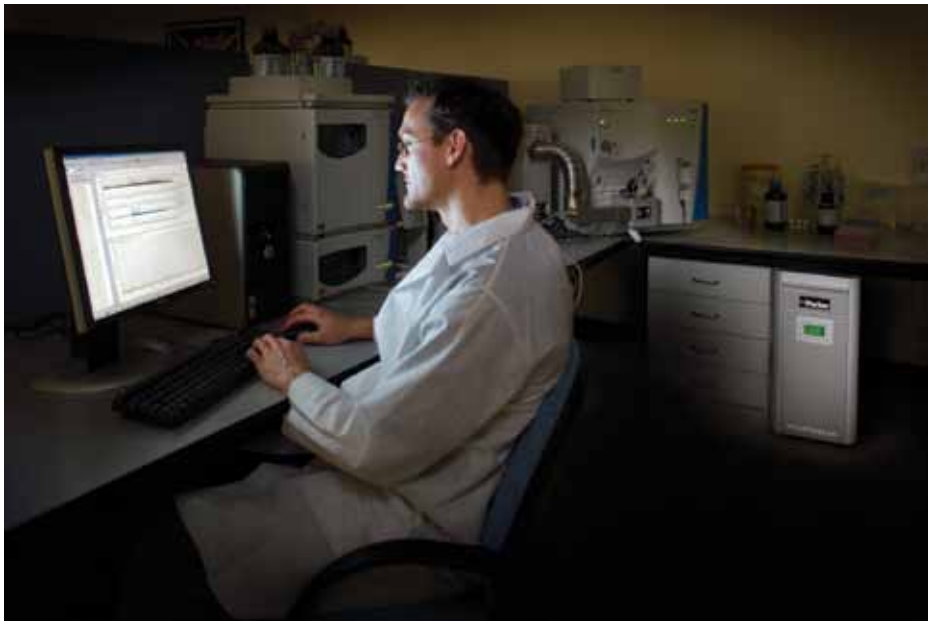
Utilising Parker's range of patented proprietary technologies, there are 1,000's of systems installed worldwide. These technologies offer some unique performance benefits, including guaranteed ultra high purity gas, silent operation, minimal moving parts and minimal operator attention. It is **technology you can trust.**

**Improved instrument performance**
Consistent gas quality and pressure improves stability and ensures greater reproducibility of results.

**Convenience**
No changing of gas cylinders or liquid dewars.
On-demand supply 24/7 - generate gas as and when required.

**Safety**
Eliminate high pressure gas cylinders and liquid dewars from your laboratory.
Eliminates manual handling, reducing Health and Safety risks.

**Cost**
Payback in less than 18 months. Minimal ongoing maintenance costs.
No more gas costs, delivery and rental charges.



# The End for High-Pressure Gas Cylinders?



High-pressure gas cylinders are a common sight in many laboratories: a default for supplying analytical instruments with their gas requirements, high-pressure gas cylinders are familiar and provide the gas that's required, so it could be said that the old adage, 'if it isn't broke, don't fix it', could well apply.

Despite this, increasing numbers of analytical instrument users are choosing to supply their GC FID, LC/MS and other types of instrument with gas via an analytical gas generator. Driving this decision will be a combination of factors broadly grouped into four areas; safety, cost, convenience and purity.

**Safety Concerns...**
High-pressure gas cylinders can provoke safety concerns in a number of different ways, some with potentially fatal consequences. The presence of high-pressure gas cylinders in the laboratory has been likened to sharing the laboratory with a potential missile. This stems from the behaviour of a cylinder that suddenly de-pressurises. There is enough force released with a European 'L' size cylinder to accelerate the cylinder to something like 66mph or 108km/h in around 1/10 seconds. Cylinders weigh in at 200lb (98kg), so there'll be enough momentum to cause some severe damage.

It's because of this potential 'missile scenario' that cylinders tend to be strapped down to something fixed. Even restrained, should a large cylinder suddenly vent its contents into the laboratory, then there are potentially fatal consequences. For example, if a high-pressure cylinder of nitrogen suddenly vented into the atmosphere of a laboratory, then more than 9,000 litres of un-breathable gas would be released. This would dramatically reduce the oxygen content of the air – presenting the possibility of asphyxiation. The risk of oxygen displacement from the atmosphere is also associated with liquefied gases whose volume will increase as much as 1,000 fold when in the gas phase. This means liquid nitrogen dewars can also be hazardous.

If the gas suddenly venting was a potentially explosive gas, as in the case of hydrogen, the result could be much more dramatic. Hydrogen will form an explosive mixture at just 4% volume in air.

These possibilities are the life threatening safety concerns associated with high-pressure gas cylinders. However, there is still the potential for other non-fatal injuries. The practice of rolling cylinders on their bottom edge comes with the risk of trapping toes or feet. With the 'smaller' cylinders there is also potential for heavy lifting injuries when being placed on a bench top.

**Costs Increase Whilst Convenience and Purity are Reduced...**
With high pressure cylinders the storage requirements are dictated by safety concerns, such as separating hydrogen cylinders and cylinders of oxidising gases. These often result in cylinders being some distance from where the gas is used and hence long gas lines. Whilst the longer gas lines result from the positioning of cylinders for safety concerns, the impact will be in the areas of cost, convenience and purity.

With any gas line there is the potential for leaks, and the longer the line the greater the potential. Hence the requirement to regularly leak-check the gas supply line – this both increases costs and decreases convenience - whilst leaks allow gas to escape and also allow impurities to enter the gas supply, which reduces purity and influences the accuracy of any analysis.

**A Smarter Choice...**
Analytical gas generators can remove the requirement for high-pressure cylinder gases for many analytical instrument users. Analytical gas generators are typically placed next to the instrument they're servicing. This removes any need for extended gas lines and with them associated problems impacting on purity, cost and convenience.

There are inherent features both in the design and the way in which generators operate which offer clear compelling reasons to switch from high-pressure gas cylinders. The latest gas generators utilise new technologies including membranes, adsorbents and catalysts to produce ultra high purity gases. Generators are designed to be used at the point of use, simplifying and minimising the amount of pipe work, and guaranteeing ultra high purity gas reaching the instrument.

The generators are designed to run continuously with minimal annual maintenance and therefore minimal disruption to the gas supply. This all but eliminates the introduction of impurities, which can be reduced further by the installation of in line purifiers.

**Increased Safety...**
High-pressure gas cylinders will contain gas which is at a pressure of 200 to 300 times atmospheric pressure, and gas which is released to atmospheric pressure would have a volume in the region of 9,000 litres. Analytical gas generators operate at a fraction of this pressure and have very low volumes of stored gas within them. One of Parker Balston's market leading hydrogen generators, for example, will have just 50 ml of stored gas, which will be at a maximum of around 4 times atmospheric pressure. Hence the missile concern is removed with a generator, and there's no large volume of gas to suddenly vent and make the atmosphere potentially explosive or deficient of life-supporting oxygen. Additional safety features are also incorporated in the design; for example, in Parker Balston hydrogen generators there are leak detection auto shut-off devices.

**Increased Convenience...**
High-pressure gas cylinders will require regular replacement. Gas cylinders running out part way through analysis will result in unplanned downtime, and a replacement cylinder has to be collected and the old one removed which brings manual handling and safety concerns. After the new cylinder has been connected restarting the instrument, and waiting for stable baseline and re-calibration, are required before samples can be run. Life is more convenient with



# *(continued)*





a gas generator as there's no unplanned downtime. Analytical gas generators only require simple quick maintenance which can be planned for – they don't unexpectedly run-out of gas halfway through analysis.

**Increased Purity...**
Analytical gas generators provide a constant source of gas. This removes the variations in purity between cylinders, helping to improve sensitive analysis. Purity is also preserved because there is no chance for impurities to enter the gas pipes, which may happen as cylinders are switched and regulators changed-over.

**Reduced Cost...**
High-pressure gas cylinders can also prove to be costly: typical payback periods on analytical gas generators are short – sometimes less than one year. The cost of using high pressure cylinders is not just the cost of the gas itself but other charges, some of which can be seen and others which are hidden. Cylinder rental and delivery charges are readily apparent, however there's also hidden costs. These must also be included to reveal the true cost.

Analytical gas generators do not have the hidden costs of cylinders. There are no recurring costs with generators for activities such as ordering replacement cylinders, there are no storage costs for the spare and empty cylinders, and there is no cost of lost productivity through the need to stop and replace cylinders.

**Innovative Technology...**
Parker Balston analytical gas generators are world renowned for their reliability, dependability and long life. Since commercializing their first laboratory scale analytical gas generator in the 1980s, Parker Balston now serve an installed customer base of over 40,000 gas generator users globally.

Part of the reason behind this is the unique innovative technology employed in Parker Balston's generators, from proprietary hollow fibre nitrogen generating membranes, to the use of palladium hydrogen purifiers.

**A Smarter Choice for LC/MS...**
Providing nitrogen for uses such as LC/MS, Parker Balston's hollow fibre membrane nitrogen generators represent state-of-the-art technology. The membrane simply and efficiently separates compressed air into nitrogen and an oxygen rich permeate stream – which contains other unwanted impurities such as water vapour. The membrane achieves this due to its selective permeation rates for different gases – oxygen and other unwanted constituents of the compressed air simply pass through the membrane at a much faster rate than nitrogen, resulting in a stream of very pure nitrogen.

These generators, when connected to an existing compressed air supply, will provide a constant supply of nitrogen with no moving parts inside the generator. This means that the generator is very quiet whilst operating and there are minimal replacement parts. The only consumable is a pre-filter which protects the membrane, and can be changed in 5 minutes every 6 months.

**A Smarter Choice for GC...**
Hydrogen offers advantages for GC users when used as a carrier gas. The Van Deemter curves illustrate the wide range over which high efficiency is obtained, making hydrogen the best carrier gas for samples containing compounds which elute over a wide temperature range. The risks associated with high-pressure gas cylinders have already been outlined – hence a gas generator is the smarter choice for hydrogen. The optimised design of Parker Balston hydrogen generators take deionised water and, through electrolysis, separate the hydrogen. This is then purified using desiccants, and on some generators a hydrogen purifier, manufactured from palladium. Palladium has a unique property which permits only hydrogen to diffuse: this ensures the highest possible purity of hydrogen.

**An End For Cylinders?**
With the improvements that gas generators offer in the areas of safety, purity, convenience and cost there's little reason to use high-pressure gas cylinders with instruments such as GC and LC/MS. The range of Parker Balston analytical gas generators also extends its technologically innovative approach to other techniques such as FT-IR, TOC, ICP, ELSD and Atomic Absorption.

# Gas Generators for GC and GC/MS

# Hydrogen Generators

for Gas Chromatography
PEM (Proton Exchange Membrane)



## Hydrogen on Demand, up to 510 ml/min

Ultra high purity hydrogen generators from Parker Balston are designed as hazard-free alternatives to high-pressure hydrogen cylinders. Deionised water and an electrical supply is all that is required to generate hydrogen for weeks of continuous operation.

Optional automatic water-feed is available for remote installations or where minimal operator attention is required. With an output capacity of up to 510 ml/min, one generator can supply 99.9995% pure fuel gas for up to 12 FID's or several GC's with carrier gas. The compact design allows the generators to be installed directly in the laboratory eliminating the requirement for long hydrogen lines.

Hydrogen generators are available with Remote Networking software. Remote Networking software allows up to 27 hydrogen to be activity controlled from one control PC, and facilitates true cascading capabilities.



## Contact Information:

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**Fax: +44 (0)191 482 6296**
**Email: balstonukinfo@parker.com**
**www.parker.com/dhFNS**

## Product Features:

- **Produces a continuous supply of 99.9995% pure hydrogen gas at up to 6.9 bar**
- **Designed to run 24 hours a day**
- **Compact, reliable and minimal maintenance**
- **Eliminate dangerous hydrogen cylinders from the laboratory**
- **2 years standard cell warranty**
- **Ideal for GC combustion gas requirements**

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### Certified Safety

Parker Balston hydrogen generators utilise an exclusive Proton Exchange Membrane to produce hydrogen on demand.

A built in sensing circuit shuts the generator down if a hydrogen leak is detected and an eightstage explosion protection system ensures the highest level of operator safety.

A sophisticated control system connected to a liquid crystal display, continuously monitors the vital operating parameters to ensure a safe and consistent performance.

That's why Parker Balston hydrogen generators meet the strict safety guidelines to be certified for CE, CSA and UL approval.

### Proven Technology

Parker Balston's exclusive Proton Exchange Membrane is proven in thousands of GC installations worldwide. Maintenance requires only a few moments per year – no inconvenient extended downtime.

Simply change the deioniser cartridge every 6 months and the desiccant cartridge as required.

If contaminated water or low water levels are detected, the system activates a warning light and shuts off the generator. A small pump and environmental filters also ensure that the electrolytic cell is supplied continuously with high quality water - avoiding damage to the electrolytic membrane. Parker Balston's hydrogen generators are the most reliable hydrogen generators on the market today.

## Principal Specification

| Model | H2PEM-100 | H2PEM-165 | H2PEM-260 | H2PEM-510 |
|---|---|---|---|---|
| Purity* | 99.9995% | 99.9995% | 99.9995% | 99.9995% |
| Flow Rates | 100 ml/min | 165 ml/min | 260 ml/min | 510 ml/min |
| Outlet Connection | 1/8" compression | 1/8" compression | 1/8" compression | 1/8" compression |
| Delivery Pressure (Adjustable) | 0.7 to 6.9 bar (+/- 0.07bar) | 0.7 to 6.9 bar (+/- 0.07bar) | 0.7 to 6.9 bar (+/- 0.07bar) | 0.7 to 6.9 bar (+/- 0.07bar) |
| Remote Monitoring | Yes | Yes | Yes | Yes |
| Auto Water Fill | Optional | Optional | Optional | Optional |
| Water Quality Required | > 5 Mohm | > 5 Mohm | > 5 Mohm | > 5 Mohm |
| Ambient Temperature | 10 to 35°C | 10 to 35°C | 10 to 35°C | 10 to 35°C |
| Electrical Requirements | 100-230v - 50/60Hz | 100-230v - 50/60Hz | 100-230v - 50/60Hz | 100-230v - 50/60Hz |
| Power Consumption | 90 Watts | 160 Watts | 250 Watts | 500 Watts |
| Dimensions (H x W x D) | 435 x 342 x 457 mm | 435 x 342 x 457 mm | 435 x 342 x 457 mm | 435 x 342 x 457 mm |
| Weight (Shipping) | 24 Kg (28) | 24 Kg (28) | 24 Kg (28) | 24 Kg (28) |

*with respect to Oxygen

## Ordering Information

| Description | Model Number |
|---|---|
| 100 ml/min Hydrogen Generator | H2PEM-100 |
| 165ml/min Hydrogen Generator | H2PEM-165 |
| 260 ml/min Hydrogen Generator | H2PEM-260 |
| 510 ml/min Hydrogen Generator | H2PEM-510 |
| Auto Water Fill Option | Add suffix AWF i.e. H2PEM-100-AWF |
| Installation Kit | IK7532 |
| Remote Networking Module | H2-REMOTE-NET-PB 604971531 |
| Remote Networking Expansion Module | H2-REMOTE-EXP-PB 604971541 |
| Remote Monitoring Module | H2-REMOTE-MON-PB 604971533 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Desiccant Cartridge | MKH2PEM-D | As Required |
| 6 Month Maintenance Kit | MKH2PEM-6M | 6 Months |
| 24 Month Maintenance Kit | MKH2PEM-24M | 24 Months |

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# Hydrogen Generators

For GC & GC/MS fuel and carrier gas applications



## Hydrogen on demand up to 1,300 ml/min



The Parker Balston ultra high purity hydrogen generators offer the optimum combination of safe operation, reliability, performance and low cost of ownership.

Utilising field proven PEM cell technology, hydrogen is produced on demand from deionized water and electricity. It then passes through a palladium purifier module to remove oxygen down to <0.01ppm. Innovative control software allows remote monitoring and the connection of several generators together (cascading) to supply applications with a large hydrogen demand.

With an output capacity of up to 1,300 ml/min at a purity of 99.99999+% and pressures up to 11.9 bar, the generator is ideal for all GC & GC/MS carrier gas (including fast GC) and combustion detector applications, and a more cost effective alternative to helium. To ensure continuous operation all generators include automatic water feed as standard.

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**Fax: +44 (0)191 482 6296**
**Email: balstonukinfo@parker.com**
**www.parker.com/dhFNS**

## Product Features:

- **Flow capacities up to 1,300 ml/min and pressures up to 11.9 bar**
- **Ultra high purity, 99.99999+%, an ideal alternative to helium for GC & GC/MS carrier gas applications**
- **3 year standard cell warranty**
- **Designed to run continuously with automatic water feed as standard**
- **Automatic shut-down in case of a hydrogen leak**
- **Minimal maintenance and operator attention**

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## Certified safety

Parker Balston hydrogen generators utilise an exclusive Proton Exchange Membrane and palladium catalyst to produce ultra high purity hydrogen on demand.

A built in sensing circuit shuts the generator down if a hydrogen leak is detected and an eight stage explosion protection systems ensures the highest level of operator safety.

A sophisticated control system connected to a liquid crystal display continuously monitors the vital operating parameters to ensure a safe and consistent performance.

That's why the Parker Balston hydrogen generators meet the strict safety guidelines to be certified for CE, CSA and UL approval.

## Proven technology

Parker Balston's exclusive Proton Exchange Membrane is proven in thousands of GC installations worldwide. Maintenance requires only a few moments per year, so no inconvenient extended downtime, simply change the deionizer cartridge and filter every 6 months.

High pressure for fast GC is achieved via an electrolytic cell utilising patented interlocking gaskets. The cell is protected by alarms that will detect low water quality and low water levels and a small internal pump ensures the cell is supplied with water at all times.

Parker Balston's hydrogen generators are the most reliable hydrogen generators on the market today.

## Principal Specification

| Model | H2PEMPD-510 | H2PEMPD-650 | H2PEMPD-850 | H2PEMPD-1100 | H2PEMPD-1300 |
|---|---|---|---|---|---|
| Purity | 99.99999+% | 99.99999+% | 99.99999+% | 99.99999+% | 99.99999+% |
| Flow Rates | 510 ml/min | 650 ml/min | 850 ml/min | 1,100 ml/min | 1,300 ml/min |
| Outlet Connection | 1/4" compression | 1/4" compression | 1/4" compression | 1/4" compression | 1/4" compression |
| Delivery Pressure (adjustable) | 6.8 or 11.9 bar options* | 6.8 or 11.9 bar options* | 6.8 or 11.9 bar options* | 6.8 or 11.9 bar options* | 6.8 or 11.9 bar options* |
| Remote Monitoring | Yes | Yes | Yes | Yes | Yes |
| Auto Water Fill | Included as standard | Included as standard | Included as standard | Included as standard | Included as standard |
| Water Quality Required | >5 Mohm | >5 Mohm | >5 Mohm | >5 Mohm | >5 Mohm |
| Ambient Temperature | 10 to 35°C | 10 to 35°C | 10 to 35°C | 10 to 35°C | 10 to 35°C |
| Electrical Requirements | 100-230V - 50/60Hz | 100-230V - 50/60Hz | 100-230V - 50/60Hz | 100-230V - 50/60Hz | 100-230V - 50/60Hz |
| Power Consumption | 270 Watts | 300 Watts | 340 Watts | 420 Watts | 450 Watts |
| Dimensions (H x W x D) | 435 x 342 x 533 mm | | | | |
| Weight (Shipping) | 25 kg (29) | 25 kg (29) | 25 kg (29) | 25 kg (29) | 25 kg (29) |

* for 6.8 bar option add suffix -100 and 11.9 bar option suffix -175 ie H2PEMPD-850-100 - see ordering details below.

## Ordering Information

| Description | Model Number |
|---|---|
| 510 ml/min Hydrogen Generator - 6.8 bar | H2PEMPD-510-100 |
| 650 ml/min Hydrogen Generator - 6.8 bar | H2PEMPD-650-100 |
| 850 ml/min Hydrogen Generator - 6.8 bar | H2PEMPD-850-100 |
| 1,100 ml/min Hydrogen Generator - 6.8 bar | H2PEMPD-1100-100 |
| 1,300 ml/min Hydrogen Generator - 6.8 bar | H2PEMPD-1300-100 |
| 510 ml/min Hydrogen Generator - 11.9 bar | H2PEMPD-510-175 |
| 650 ml/min Hydrogen Generator - 11.9 bar | H2PEMPD-650-100 |
| 850 ml/min Hydrogen Generator - 11.9 bar | H2PEMPD-850-175 |
| 1,100 ml/min Hydrogen Generator - 11.9 bar | H2PEMPD-1100-175 |
| 1,300 ml/min Hydrogen Generator - 11.9 bar | H2PEMPD-1300-175 |

| | |
|---|---|
| H2PEMPD - Remote Interface | B02-0795 |
| H2PEMPD - 8 Port Manifold | B02-0853 |
| H2PEMPD - H2 Load Balance Assy | B02-0851 |
| H2PEMPD - Kit, Hydrogen Purge | B02-0852 |
| H2PEMPD - 2 Port Manifold | B02-0861 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| 6 Month Maintenance Kit | MKH2PEMPD-6M | 6 Months |
| 24 Month Maintenance Kit | MKH2PEMPD-24M | 24 Months |

All H2PEMPD generators are fitted with auto water fill (AWF) as standard. When using the AWF the maximum water inlet pressure is 0.1 bar. The B02-0880 auto water feed regulator assemble is available if required. The B02-0880 is supplied as standard with the H2PEMPD-1100 and H2PEMPD-1300

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# Hydrogen Generators

for Gas Chromatography
Palladium



## Hydrogen on Demand, up to 300 ml/min

Ultra high purity hydrogen generators from Parker Balston are designed as hazard-free alternatives to high-pressure hydrogen cylinders. Deionised water and an electrical supply is all that is required to generate hydrogen for weeks of continuous operation.

Automatic water-feed is available as standard for remote installations or where minimal operator attention is required. With an output capacity of up to 300 ml/min, one generator can supply 99.99999% pure fuel gas for up to 7 FID's or several GC's with carrier gas or several GC/MS with carrier gas.



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**Email: balstonukinfo@parker.com**
**www.parker.com/dhFNS**

## Product Features:

- **Produces a continuous supply of 99.99999% pure hydrogen gas at up to 4.1 bar**
- **Designed to run 24 hours a day**
- **Ideal for carrier gas requirements for GC/MS**
- **Eliminate dangerous hydrogen cylinders from the laboratory**
- **Simple low cost annual maintenance**
- **Ideal for fuel and carrier gas requirements on GC-FID**

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### Certified Safety

Parker Balston hydrogen generators utilise an exclusive palladium membrane to produce hydrogen on demand. A built in pressure transducer monitors the down stream requirements. This ensures the hydrogen generator produces only enough gas for the application keeping internal storage to an absolute minimum.

A sophisticated control system connected to a liquid crystal display, continuously monitors the vital operating parameters to ensure a safe and consistent performance.

That's why Parker Balston hydrogen generators meet the strict safety guidelines to be certified for CE, CSA and UL approval.

### Proven Technology

Parker Balston's exclusive Palladium Membrane is proven in thousands of GC installations worldwide.

Maintenance requires only a few minutes per year - no inconvenient extended downtime. Simply change the electrolyte every 12 months.

Hydrogen gas is produced by electrolytic dissociation of water. The resultant hydrogen stream then passes through a palladium membrane to ensure ultra high purity.

Only hydrogen and its isotopes can penetrate the palladium membrane; therefore, the purity of the output gas is consistently 99.99999+%.

## Principal Specification

| Model | H2PD-150 | H2PD-300 |
|---|---|---|
| Purity | 99.99999+% | 99.99999+% |
| Flow Rates | 150 ml/min | 300 ml/min |
| Outlet Connection | 1/8" compression | 1/8" compression |
| Delivery Pressure (Adjustable) | 0.7 to 4.1 bar | 0.7 to 4.1 bar |
| Auto Water Fill | Yes | Yes |
| Water Quality Required | > 5 Mohm | > 5 Mohm |
| Ambient Temperature | 10 to 35°C | 10 to 35°C |
| Electrical Requirements | 230VAC - 50Hz | 230VAC - 50Hz |
| Power Consumption | 200 Watts | 200 Watts |
| Dimensions (H x W x D) | 580 x 300 x 300 mm | 580 x 300 x 300 mm |
| Weight (Shipping) | 23 Kg (26) | 23 Kg (26) |

## Ordering Information

| Description | Model Number |
|---|---|
| 150 ml/min Hydrogen Generator | H2PD-150EU OR H2PD-150UK |
| 300 ml/min Hydrogen Generator | H2PD-300EU OR H2PD-300UK |
| Installation Kit | IK7532 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Electrolyte Solution | REAG-920071 | 12 Months |

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# The Analysis of 16 EPA PAHs by GC/MS using Hydrogen Carrier Gas.

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Parker Hannifin Ltd

## AIM

The aim of this technical paper is to optimize and produce a robust and repeatable method for the analysis of 16 EPA PAHs by GC/MS using generated hydrogen carrier gas, over helium. This yields vastly improved analytical performance with shortened run times, whilst eliminating laboratory hazards associated with high pressure vessel usage, storage and handling.

## Introduction

Hydrogen is the choice of carrier gas for many applications, due to faster analysis times (compared with nitrogen and helium) with no reduction in resolution. In fact resolution is normally improved. However hydrogen's use as a GC/MS carrier gas has long been avoided. Reactions in the ion source, lack of pumping ability, and high background noise have all been cited as reasons not to use hydrogen as a carrier gas. Modern technology has to some extent allayed these concerns, but still helium continues to be used for many established methods. Generated hydrogen offers an analytically superior, cost effective and safe solution over and above cylinder fed helium.

One of the most common analytical studies performed in many environmental laboratories is the analysis of Polynuclear Aromatic Hydrocarbons (PAHs). PAHs are a group of compounds consisting of more than one benzene ring, found in fossil fuels, tar and various oils, as well as being formed by the incomplete combustion of carbon containing compounds, such as wood, coal and diesel, to name but a few.

The Environment Protection Agency (EPA) has designated 16 PAHs as primary pollutants. The detection and quantification of these compounds, especially in water and soils, is of paramount importance for human health and the environment, due to their toxic and carcinogenic nature.

Parker Balston manufacture a range of hydrogen generators providing ultra high purity hydrogen gas without the safety concerns associated with high pressure cylinders. These generators improve analytical performance, shorten run times and maximise productivity.

## Analytical considerations

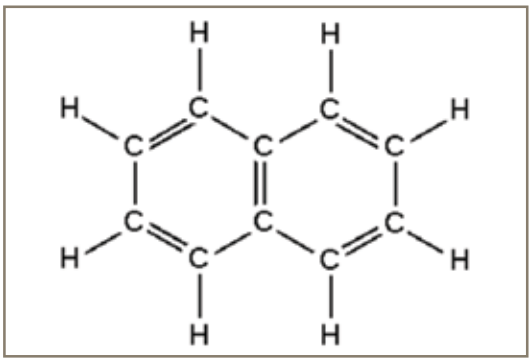
Analysis of the 16 EPA PAHs is normally carried out using GC-FID or GC/MS, with varying detection limits depending upon the medium in question and the analytical technique employed. GC/MS is favourable as it can eliminate non-required peaks, leaving only analytical information of interest, utilizing Single Ion Monitoring (SIM) mode. This is especially important in complex matrices, where peaks of similar composition may lead to false interpretation.

In any modern analytical laboratory, sample throughput and productivity are of utmost importance, where time is money.

Employing hydrogen as a carrier gas is very common in GC-FID workflows, yielding superior chromatography, as well as reduced run times. Whilst it's use within GC/MS workflows is less common, with the correct conditions, it has the potential to deliver superior performance benefits over and above helium, with the added incentive of enhanced safety and cost savings.

Typical GC/MS analyses uses helium which, as well as having vagaries in supply, often at elevated cost, also necessitates the use of cumbersome, heavy, high pressure cylinders (up to 200 bar g) which must be changed on a regular basis.

A Parker Balston hydrogen generator produces ultra high purity carrier gas at a constant pressure and flow rate, with minimal stored volume, eliminating laboratory hazards associated with high pressure storage vessels, such as cylinders.



Naphthalene

## Experimental

Analysis was performed on a Shimdazu QP2010s using SIM mode and splitless injection (www.shimadzu.com)

Hydrogen was supplied from a Parker Balston generator (www.parker.com/dhFNS))

Column supplied by Phenomenex - Zebron ZB5MS 0.25mm X 0.25$\mu$m (www.phenomemex.com)

Injector - 300°C

Interface - 320°C

Ion Source - 250°C

Flow rate - 3ml/min (H2)

Injection volume - 1$\mu$l

**Oven Programme:-**

40°C (hold 1minute)

100 °C @ 15 °C/min (hold 10 minutes)

225 °C @ 5 °C /min (hold 0 minutes)

320 °C @ 15 °C /minute (hold 2 minutes)

Total run time = 48.33 minutes

Sampling time - 1minute

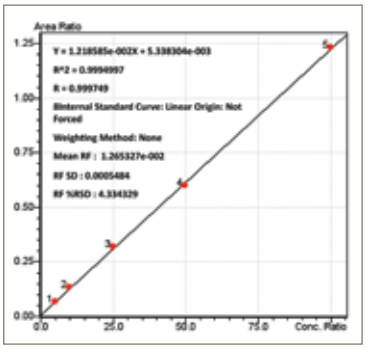
Control mode - Linear velocity

## Results

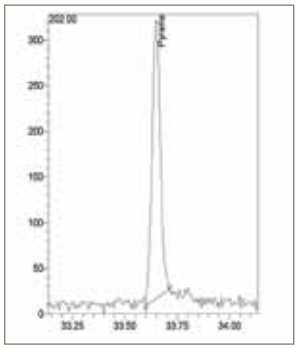
Detection limits of 1ppb were easily achieved, with excellent baseline resolution. 10 replicates were ran at this level, with typical RSD's of <0.1, and signal/noise (s/n) ratios varying between 5 and 20 (typically <10).

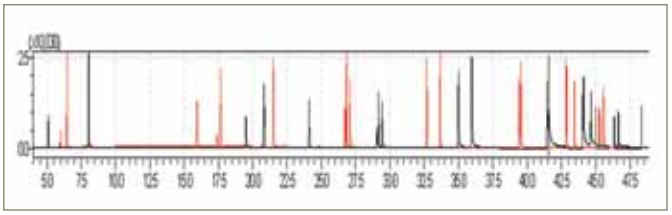
Standards were prepared in Dichloromethane over a range of 5 to 100ppb. Calibration over this range showed excellent linearity with all compounds being >0.995.

Benzo[ghi]perylene

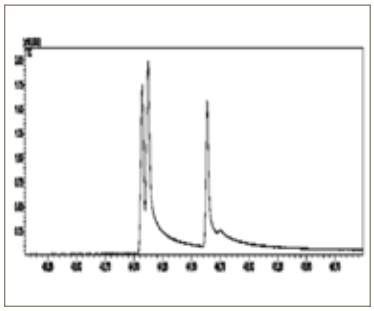



1 ppb Pyrene

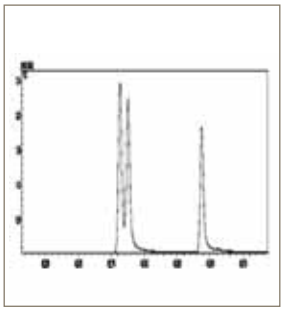


Late compound tailing - Helium



Elimination of peak tailing - Hydrogen



Typically, late eluting PAHs tend to tail, sometimes quite badly, making integration difficult, and peak asymmetry poor. In the above example, you can see clearly that the use of hydrogen carrier gas minimizes tailing, making integration easier to perform

As you can see from the comparison of the two chromatograms on the left hand side, hydrogen has many advantages over helium when it comes to chromatographic performance:-

- **Shorter run times, in this case, a saving of over 5 minutes**
- **Increase in sensitivity, which is important for trace level analysis**
- **Less peak tailing of later compounds, which is important for peak integration**
- **Near baseline resolution of later co-eluting peaks**

## Conclusion

In conclusion, hydrogen carrier gas, supplied by a Parker Balston generator, provides all the necessary requirements needed to perform the analysis of low level Polynuclear Aromatic Hydrocarbons by GC/MS, with many distinct advantages over helium carrier gas.

As well as the analytical benefits, safety issues are also addressed through the elimination of the containment and handling of heavy, high pressure storage vessels, not to mention the danger of running out of gas unexpectedly. Instrument downtime through loss of gas and further column damage and loss of vacuum within the GC/MS system are extremely undesirable outcomes. Moreover, the volume of stored gas in a hydrogen generator is very small, and has built in safety features in case of a leak, shutting down the flow of hydrogen, thus removing the danger of the lower explosive limit being reached.

With the price of helium ever increasing, and vagaries in supply, there is a compelling case for ultra high purity generated hydrogen as a GC/MS carrier gas. With maximized instrument uptime of prime importance to many analytical laboratories, the use of hydrogen is a viable and safe alternative over and above helium.

Throughout this paper we have displayed a robust, repeatable and reliable method utilizing hydrogen as a carrier gas to reduce peak tailing, lower limits of detection, provide superior baseline resolution of co-eluting compounds with excellent calibration coefficients, over much reduced analytical run times.

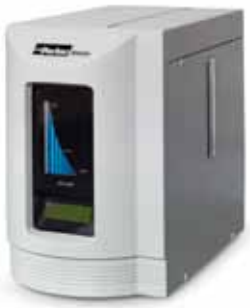
Acknowledgements
The author would like to thank Alan Northage/ Sarah Caldwell at Shimadzu UK (www.shimadzu.com) and Louise Earley at Phenomemex (www.phenomenex.com)

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# FID Gas Generators

for Gas Chromatography



## FID Gas on Demand, up to 250 ml/min $H_2$ and 2,500 ml/min Air

The Parker Balston FID Gas Station's combines two gas generators in one enclosure to supply all your FID gas requirements from one generator. The generators can produce up to 250 ml/min of high purity hydrogen and 2,500 ml/min of high purity, <0.05ppm THC, air. Each system is capable of supplying up to six FID's.



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## Product Features:

- **Produces a supply of 99.9995% pure hydrogen and 0.05ppm THC Air**
- **Eliminate dangerous hydrogen cylinders from the laboratory**
- **Supplies the gas requirements for up to six FID's**
- **Designed to run 24 hours a day**
- **Compact, reliable and minimal maintenance**
- **Simple annual maintenance**

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**Zero Air on demand, up to 2,500 ml/min**
Compressed air is pre filtered down to 0.01 micron and then purified using a state-of-art combined heated catalyst module.

The resultant air is free of total hydrocarbons (THC) to <0.05ppm making it ideal for all FID applications. The low levels guarantee a low signal to noise ratio, ensuring a flat constant base line with no peaks or fluctuations.

There are no moving parts and no noise making the generator extremely reliable and ideal to install in the laboratory. Simple and quick to install the Zero Air Generator requires maintenance just once per year.

**Hydrogen on demand, up to 250 ml/min**
Deionised water is all that is required to generate hydrogen for weeks of continuous operation. The generators utilises a proprietary Proton Exchange Membrane to produce hydrogen on demand.

A sophisticated control system, connected to a LCD continuously monitors the vital operating parameters to ensure a safe and consistent performance.

Parker Balston Proton Exchange Membrane is proven in 1,000's of GC installations worldwide. Maintenance requires only a few moments per year - no inconvenient extended downtime. Simply change the deioniser cartridge every 6 months and the desiccant as required.

## Principal Specification

| Model | FID-1000 | | FID-2500 | |
|---|---|---|---|---|
| Gas | Hydrogen | Zero Air | Hydrogen | Zero Air |
| Purity | 99.9995% | < 0.05ppm THC | 99.9995% | < 0.05ppm THC |
| Flow Rates | 90 ml/min | 1,000 ml/min | 250 ml/min | 2,500 ml/min |
| Outlet Connection | 1/8" compression | 1/8" compression | 1/8" compression | 1/8" compression |
| Delivery Pressure | 4.1 bar | 2.7 to 8.5 bar | 4.1 bar | 2.7 to 8.5 bar |
| Water Quality Required | > 5 Mohm | N/A | > 5 Mohm | N/A |
| Ambient Temperature | 10 to 35°C | | | |
| Electrical Requirements | 230VAC - 50Hz | | | |
| Power Consumption | 460 Watts | | | |
| Dimensions (H x W x D) | 502 x 324 x 575 mm | | | |
| Weight (Shipping) | 24 Kg (28) | | | |

## Ordering Information

| Description | Model Number |
|---|---|
| 90 ml/min Hydrogen / 1000 ml/min Zero Air | FID-1000EU OR FID-1000UK |
| 250 ml/min Hydrogen / 2500 ml/min Zero Air | FID-2500EU OR FID-2500UK |
| Installation Kit | IK7532 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Resin Bed Cartridge | B02-0323 | 6 Months |
| Desiccant Cartridge | 1647727 | As required |
| Maintenance Kit Zero Air | MK7583 | 12 Months |
| Maintenance Kit FID 1000 and 2500 (Includes 1647727, BO2-0323 and MK7583) | MKFID1000 | 12 Months / As required |

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Catalogue: S3.2.010c_EN 07/11

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# Zero Air Generators

for Gas Chromatography



## Zero Air on demand, up to 30,000 ml/min




The Parker Balston Zero Air Generator can produce up to 30,000 ml/min of high purity zero grade air. Compressed air is pre filtered down to 0.01 micron and then purified using a state-of-art combined heated catalyst module.

There are no moving parts and no noise, making the generator extremely reliable and ideal to install in the laboratory. Simple and quick to install, the Zero Air Generator requires minimal maintenance just once a year.

The resultant air is free of total hydrocarbons (THC) to < 0.05ppm making it ideal for all FID applications. The low levels guarantee a low signal to noise ratio, ensuring a flat constant base line with no peaks or fluctuations.

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## Product Features:

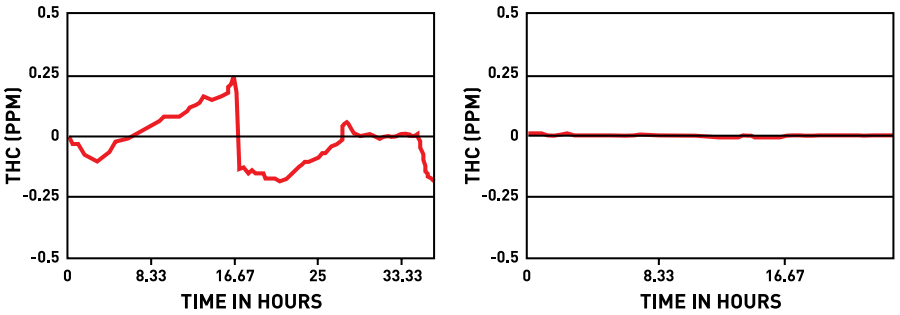
- **Ultra high purity air for GC FID applications**
- **Payback period typically less than one year**
- **Silent operation and minimal operator attention required**
- **Eliminate inconvenient and potentially dangerous air cylinders from the laboratory**
- **Models available to service up to 75 FID's**
- **Increases the accuracy and repeatability of analysis**

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The chromatograms compare baselines produced by a Parker Balston Zero Air Generator and cylinder air.

The baseline produced by the Parker Balston Generator is very flat, with no fluctuations or peaks, in comparison with the chromatogram of the cylinder air supply, which has many peaks ranging from 0.25 ppm to -0.25 ppm.




## Principal Specification

| Model | 75-83 | HPZA-3500 | HPZA-7000 | HPZA-18000 | HPZA-30000 |
|---|---|---|---|---|---|
| Purity | < 0.1ppm THC | < 0.05ppm THC | < 0.05ppm THC | < 0.05ppm THC | < 0.1ppm THC |
| Flow Rates | 1,000 ml/min | 3,500 ml/min | 7,000 ml/min | 18,000 ml/min | 30,000 ml/min |
| Number of FID's* | Up to 2 | Up to 8 | Up to 17 | Up to 45 | Up to 75 |
| Inlet Pressure | 2 to 8 bar | 2 to 8 bar | 2 to 8 bar | 2 to 8 bar | 2 to 8 bar |
| Drop-Clean Pressure | 0.6 bar | 0.6 bar | 0.6 bar | 0.6 bar | 0.6 bar |
| Inlet Connection | 1/4" NPT (Female) | 1/4" NPT (Female) | 1/4" NPT (Female) | 1/4" NPT (Female) | 1/4" NPT (Female) |
| Outlet Connection | 1/4" NPT (Female) | 1/4" NPT (Female) | 1/4" NPT (Female) | 1/4" NPT (Female) | 1/4" NPT (Female) |
| Ambient Temperature | 10 to 35°C | 10 to 35°C | 10 to 35°C | 10 to 35°C | 10 to 35°C |
| Electrical Requirements | 230VAC - 50Hz | 230VAC - 50Hz | 230VAC - 50Hz | 230VAC - 50Hz | 230VAC - 50Hz |
| Power Consumption | 150 Watts | 220 Watts | 220 Watts | 440 Watts | 440 Watts |
| Dimensions (H x W x D) | 250 x 300 x 80 mm | 420 x 270 x 340 mm | 420 x 270 x 340 mm | 420 x 270 x 340 mm | 420 x 270 x 340 mm |
| Weight (Shipping) | 2 Kg (3) | 16 Kg (19) | 16 Kg (19) | 16 Kg (19) | 16 Kg (19) |

*400 ml/min per FID

## Ordering Information

| Description | Model Number |
|---|---|
| 1,000 ml/min Zero Air Generator | 75-83EU or 75-83UK |
| 3,500 ml/min Zero Air Generator | HPZA-3500EU or HPZA-3500UK |
| 7,000 ml/min Zero Air Generator | HPZA-7000EU or HPZA-7000UK |
| 18,000 ml/min Zero Air Generator | HPZA-18000EU or HPZA-1800UK |
| 30,000 ml/min Zero Air Generator | HPZA-30000EU or HPZA-30000UK |
| Installation Kit | IK76803 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Maintenance Kit for Model 75-83 | MK7583 | 12 Months |
| Maintenance Kit for Models HPZA-3500, HPZA-7000, HPZA-18000, HPZA-30000 | MK7840 | 12 Months |

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# Explosion Proof Zero Air Generators

for Process GC-FID




## Zero Air on demand, up to 650 ml/min

The Parker Balston explosion proof zero air generators are a complete system with carefully matched components engineered for easy installation, operation and long term reliability. They are designed to transform standard compressed air into a safe supply of hydrocarbon free (< 0.1ppm) zero grade air.

The explosion proof zero air generators are an ideal alternative to high purity air cylinders used on process GC-FID's in explosive environments. Simply connect to the GC-FID to ensure a low baseline signal to noise ratio resulting in consistent, accurate and reliable analysis. Payback periods are typically less than one year.




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**Email: balstonukinfo@parker.com**
**www.parker.com/dhFNS**

## Product Features:

- **Produces a supply of high purity air for process GC-FIDS's in explosive environments**
- **Payback periods typically less than one year**
- **Compact design mounts directly to Unistrut® framing**
- **CENELEX Certification LCIE 03 ATEX 6232: Code EEX of 11B and $H_2$ T6, Category 112G**
- **CENELEX standard: EN 50014: 1997 +A1, A2, EN 50018: 2000**
- **Compact, reliable, no moving parts and minimal maintenance**

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The housing is a standard Crouse-Hinds explosion proof enclosure designed to operate in a Class 1, Division 1, groups B,C and D environments.

The intervals are all stainless steel to resist corrosion in the most hazardous environments.

The Parker Balston explosion proof zero air generators meet and exceed the CENELEX and ATEX requirements. Zero air is produced by utilising heated catalyst technology.

We recommend to pre filter instrument quality air with high efficiency coalescing filters to remove all contaminants down to 0.01 micron.

Compressed air flows across the heated catalyst to remove hydrocarbons to <0.1ppm. Finally the air passes through a combined filter / flame arrestor to ensure that the outlet air is particulate free.

Simply connect the Zero air generator to the process GC-FID for consistent reliable analysis.

## Principal Specification

| Model | 75-82EU-220 | 75-82EU |
|---|---|---|
| Purity | < 0.1 ppm Hydrocarbons | < 0.1 ppm Hydrocarbons |
| Flow Rates | 650 ml/min | 650 ml/min |
| Inlet Pressure | 2.8 to 8.6 bar | 2.8 to 8.6 bar |
| IP Rating | IP54 | IP54 |
| Internal Components | Stainless Steel | Stainless Steel |
| Outlet Flame Arrestor | Included | Included |
| Maximum Hydrocarbon at Inlet | 50 ppm | 50 ppm |
| Ambient Temperature | 4 to 38°C | 4 to 38°C |
| Electrical Requirements | 230VAC - 50Hz | 110VAC - 60Hz |
| Power Consumption | 60 Watts | 60 Watts |
| Dimensions (H x W x D) | 180 x 340 150 mm | 180 x 340 150 mm |
| Weight (Shipping) | 11 Kg (13) | 11 Kg (13) |

## Ordering Information

| Description | Model Number |
|---|---|
| Explosion Proof Zero Air Generator - 220V | 75-82EU-220 |
| Explosion Proof Zero Air Generator - 110V | 75-82EU |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Replacement Final Filter 75-82EU-220 and 75-82EU | 13299 | 12 Months |
| Replacement Catalyst Module for 75-82EU-220 | 75398-220 | 12 Months |
| Replacement Catalyst Module for 75-82EU | 75398 | 12 Months |

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# UHP Zero Nitrogen Generators

for GC carrier gas and make up applications



## Nitrogen on demand, up to 3,200 ml/min

The Parker Balston Ultra High Purity (UHP) Zero Nitrogen Generators are engineered to transform standard compressed air in to a safe regulated supply of 99.9995% pure nitrogen, with <0.1ppm of hydrocarbons

Typical applications include GC make up gas and carrier gas, including ECD (Electron Capture Detector), DSC (Differential Scanning Calorimeter) and virtually any analytical instrument that requires a small flow of ultra high purity zero nitrogen.

Innovative design features include integral compressors with economy mode as standard. This extends compressor life and reduces ongoing running costs.



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## Product Features:

- **Produces a continuous supply of ultra high purity organic free nitrogen at 99.9995% purity**
- **Ideal for make-up and carrier gas applications including ECD**
- **Eliminate dangerous nitrogen cylinders from the laboratory**
- **Integral oil free compressors with noise reduction technology**
- **Economy mode: increasing compressor life and reducing ongoing running costs**
- **Designed to run 24 hours a day**

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Nitrogen is produced by utilising a combination of filtration and pressure swing adsorption (PSA) technology. Standard compressed air is filtered by high efficiency coalescing filters to remove all contaminants down to 0.01 micron. For ultra sensitive applications such as ECD, units also include the addition of a heated catalyst module to ensure hydrocarbons are removed to < 0.1ppm.

The air then passes through two columns filled with carbon molecular sieve (CMS) which adsorb $O_2$, $CO_2$, moisture and hydrocarbons. These are desorbed to atmosphere during the pressure swing cycle leaving a supply of ultra pure nitrogen.

## Principal Specification

| Model | UHPZN2-1100 | UHPZN2-1100C | UHPZN2-3200 | UHPZN2-3200C |
|---|---|---|---|---|
| Purity | 99.9995% | 99.9995% | 99.9995% | 99.9995% |
| Hydrocarbon concentration | <0.1ppm | <0.1ppm | <0.1ppm | <0.1ppm |
| CO Concentration | <1ppm | <1ppm | <1ppm | <1ppm |
| CO2 Concentration | <1ppm | <1ppm | <1ppm | <1ppm |
| H2O Concentration | <1ppm | <1ppm | <1ppm | <1ppm |
| Flow rates | 1100ml/min | 1100ml/min | 3200ml/min | 3200ml/min |
| Inlet pressure | 9 to 9.9 bar | N/A | 9 to 9.9 bar | N/A |
| Integral compressor | No | Yes | No | Yes |
| Outlet pressure | 5 bar | 5 bar | 5 bar | 5 bar |
| Inlet connection | 1/4" | N/A | 1/4" | N/A |
| Outlet connection | 1/8" BSPP | 1/8" BSPP | 1/4" BSPP | 1/4" BSPP |
| Ambient temperature | 15 to 25°C | 15 to 25°C | 15 to 25°C | 15 to 25°C |
| Electrical requirements | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz |
| Power Consumption | 720 Watts | 1250 Watts | 720 Watts | 1250 Watts |
| Dimensions (HxWxD) | 869x345x667mm | 869x345x667mm | 869x345x667mm | 869x345x667mm |
| Weight | 86 | 96 | 86 | 96 |

## Ordering Information

| Description | Model Number |
|---|---|
| 1,100 ml/min Zero UHP Nitrogen Generator | UHPZN2-1100 |
| 1,100 ml/min Zero UHP Nitrogen Generator with integral compressor | UHPZN2-1100C |
| 3,200 ml/min Zero UHP Nitrogen Generator | UHPZN2-3200 |
| 3,200 ml/min Zero UHP Nitrogen Generator with integral compressor | UHPZN2-3200C |
| Installation Kit | IK7694 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Filter Kit - all non compressor models | MKUHPZN2-FK | 12 months |
| Filter Kit - All compressor models | MKUHPZN2CL-FK | 12 months |
| Compressor Kit 230V - All models | MKN2-CK230L | 4,000 hours or 12 months (which ever comes sooner) |

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# Ultra High Purity Nitrogen Generators

for GC and other analytical applications



## Nitrogen on demand, up to 3,200 ml/min

The Parker Balston Ultra High Purity (UHP) Nitrogen Generators are engineered to transform standard compressed air in to a safe regulated supply of 99.9995% pure nitrogen.

Typical applications include GC make up gas, solvent evaporation, DSC (Differential Scanning Calorimeter) and virtually any analytical instrument that requires a small flow of ultra high puirty nitrogen.

Innovative design features include integral compressors with economy mode as standard. This extends compressor life and reduces ongoing running costs.



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**www.parker.com/dhFNS**

## Product Features:

- **Produces a continuous supply of high purity nitrogen 99.9995% for analytical applications**
- **Compact, reliable with minimal operator attention and maintenance**
- **Eliminate dangerous nitrogen cylinders from the laboratory**
- **Integral oil free compressors with noise reduction technology**
- **Economy mode: increasing compressor life and reducing ongoing running costs**
- **Designed to run 24 hours a day**

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Nitrogen is produced by utilising a combination of filtration and pressure swing adsorption (PSA) technology. Standard compressed air is filtered by high efficiency coalescing filters to remove all contaminants down to 0.01 micron.

The air then passes through two columns filled with carbon molecular sieve (CMS) which adsorb $O_2$, $CO_2$ , moisture and hydrocarbons. These are desorbed to atmosphere during the pressure swing cycle leaving a supply of ultra pure nitrogen.

## Principal Specification

| Model | UHPN2-600 | UHPN2-600C | UHPN2-800 | UHPN2-800C | UHPN2-1600 | UHPN2-1600C | UHPN2-3200 | UHPN2-3200C |
|---|---|---|---|---|---|---|---|---|
| Purity | 99.9995% | 99.9995% | 99.9995% | 99.9995% | 99.9995% | 99.9995% | 99.9995% | 99.9995% |
| Hydrocarbon concentration | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| CO Concentration | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm |
| CO2 Concentration | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm |
| H2O Concentration | <<1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm |
| Flow rates | 600ml/min | 600ml/min | 800ml/min | 800ml/min | 1600ml/min | 1600ml/min | 3200ml/min | 3200ml/min |
| Inlet pressure | 8-9.9 bar | N/A | 8-9.9 bar | N/A | 8-9.9 bar | N/A | 8-9.9 bar | N/A |
| Integral compressor | No | Yes | No | Yes | No | Yes | No | Yes |
| Outlet pressure | 5 bar | 5 bar | 5 bar | 5 bar | 5 bar | 5 bar | 5 bar | 5 bar |
| Inlet connection | 1/4” | N/A | 1/4” | N/A | 1/4” | N/A | 1/4” | N/A |
| Outlet connection | 1/8” BSPP | 1/8” BSPP | 1/8” BSPP | 1/8” BSPP | 1/4” BSPP | 1/4” BSPP | 1/4” BSPP | 1/4” BSPP |
| Ambient temperature | 15 to 25°C | 15 to 25°C | 15 to 25°C | 15 to 25°C | 15 to 25°C | 15 to 25°C | 15 to 25°C | 15 to 25°C |
| Electrical requirements | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz |
| Power consumption | 85 Watts | 606 Watts | 85 Watts | 606 Watts | 88 Watts | 698 Watts | 88 Watts | 698 Watts |
| Dimensions (HxWxD) | 869x345x417mm | 869x345x417mm | 869x345x417mm | 869x345x417mm | 869x345x667mm | 869x345x667mm | 869x345x667mm | 869x345x667mm |
| Weight | 44Kg | 50Kg | 44Kg | 50Kg | 84Kg | 93Kg | 84Kg | 93Kg |

## Ordering Information

| Description | Model Number |
|---|---|
| 600 ml/min UHP Nitrogen Generator | UHPN2-600 |
| 600 ml/min UHP Nitrogen Generator with integral compressor | UHPN2-600C |
| 800ml/min UHP Nitrogen Generator | UHPN2-800 |
| 800ml/min UHP Nitrogen Generator with integral compressor | UHPN2-800C |
| 1600ml/min UHP Nitrogen Generator | UHPN2-1600 |
| 1600ml/min UHP Nitrogen Generator with integral compressor | UHPN2-1600C |
| 3,200 ml/min UHP Nitrogen Generator | UHPN2-3200 |
| 3,200ml/min UHP Nitrogen Generator with integral compressor | UHPN2-3200C |
| Installation Kit | IK7694 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Filter Kit - all non compressor models | MKUHPN2-FK | 12 months |
| Filter Kit - UHPN2-600C/800C models | MKUHPN2C-FK | 12 months |
| Filter Kit UHPN2-1600C / 3200C models | MKUHPN2CL-FK | 12 months |
| Compressor Kit 230V - UHPN2-600C/800C models | MKN2CK230S | 8,000 hours or 24 months (which ever comes first) |
| Compressor Kit 230V UHPN2-1600C/3200C models | MKN2-CK230L | 8,000 hours or 24 months (which ever comes first) |

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# Nitrogen Generators

for Gas Chromatography
FID Make Up Gas



## Make up Gas on Demand, up to 400 ml/min Zero Grade $N_2$ and 2,500 ml/min Zero Air

The Parker Balston Make up Gas Generator is available in two options, Zero Grade Nitrogen or Zero Grade Nitrogen with Zero Grade Air combined in the same enclosure. With flow rates up to 400 ml/min of Zero Nitrogen and 2,500 ml/min of Zero Air each unit can supply up to 6 GC-FID's.

The typical application is make up gas and fuel air for FID and other detectors on GC's. Make up gas efficiently sweeps the sample to the detector which results in improved peak shape and maximum sensitivity. The majority of GC manufactures instruments have the option to add make up gas to the sample flow prior to the detector.



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**www.parker.com/dhFNS**

## Product Features:

- **Produces make up grade nitrogen with < 0.05ppm THC**
- **Improves flame shape within the FID detector and maximises sensitivity**
- **Eliminates dangerous and costly helium or nitrogen cylinders**
- **Can supply up to 6 GC-FID with FID fuel air and make up nitrogen**
- **Silent in operation and minimal operator attention required**
- **Space saving wall mount version available**

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**Zero Grade Air**
Zero Air is produced by utilising a combination of filtration and catalyst technologies. Compressed air is pre filtered down to 0.01 micron and then purified using a state-of-art combined heated catalyst module.

The resultant air is free from hydrocarbons (THC) to < 0.05ppm making it ideal for all FID applications.

The low levels guarantee a low signal to noise ratio, ensuring a flat consistent base line.

**Zero Grade Nitrogen**
A proportion of the Zero Grade Air is further purified by utilising membrane separation technology. The unique proprietary hollow fibre membranes separate the air into a concentrated Zero Nitrogen stream.

At 99.9999% pure with respect to hydrocarbons and 99+% in respect to oxygen, the zero grade nitrogen is ideal as a make up gas.

There are no moving parts and no noise, making the generator extremely reliable and ideal to install in the laboratory. Simple and quick to install, the make up gas generator requires minimal maintenance just once per year.

## Principal Specification

| Model | MGG-400 | MGG-2500 | |
|---|---|---|---|
| Gas | Zero Nitrogen | Zero Nitrogen | Zero Air |
| Purity | 99.9999% THC & 99+% $O_2$ | 99.9999% THC & 99+% $O_2$ | <0.05 ppm THC |
| Flow Rates | 400 ml/min | 400 ml/min | 2,500 ml/min |
| Inlet Pressure | 4.1 to 8.2 bar | | |
| Outlet Pressure | 4.1 to 8.2 bar | | |
| Inlet Connection | 1/4" NPT (female) | | |
| Outlet Connetion | 1/4" NPT (female) | | |
| Ambient Temperature | 10 to 35°C | | |
| Electrical Requirements | 230VAC - 50Hz | | |
| Power Consumption | 580 Watts | | |
| Dimensions (H x W x D) | 420 x 180 x 660 mm | | |
| Weight (Shipping) | 27 Kg (30) | | |

## Ordering Information

| Description | Model Number |
|---|---|
| Make up Gas Generator - Zero N2 only | MGG-400EU OR MGG-400UK |
| Make up Gas Generator - Zero N2 & Zero Air | MGG-2500EU OR MGG-2500UK |
| Wall mount versions | Add the suffix 'W' i.e. MGGW-400 |
| Installation Kit | IK76803 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| 12 Month Maintenance Kit - MGG-400 | MKMGG400-12 | 12 Months |
| 12 Month Maintenance Kit - MGG-2500 | MKMGG2500-12 | 12 Months |

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# HydroGen Mate

for Hydrogen Generators



## Deionised water on demand, up to 1 lpm

The Parker Balston HydroGen Mate is a complete system designed with carefully matched components engineered for easy installation, operation and long term reliability. They are engineered to transform standard tap water into a safe regulated supply of deionised water (> 5 megohms/cm), with minimal operator attention.

With flow rates up to 1 lpm they make an ideal solution as a point of use supply, for all Parker Balston hydrogen generators users who do not have access to a suitable deionised water supply.



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## Product Features:

- **Produces a continuous supply of high purity water for hydrogen generators**
- **Visual indication for cartridge change**
- **Compact, reliable and minimal maintenance**
- **Removal of organics, phosphates, chlorine, and all ionisable constituent**
- **Quick and easy installation, no electrical requirements**
- **Easy fill dispensing gun**

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The system is supplied ready to install complete with pre-filtration, two DI resin exchange cartridges, a final filter and dispensing gun.

Simply change the resin exchange cartridges as required for a continuous supply of ultra pure deionised water. Change times will depend on the quality of inlet water and usage.

## Principal Specification

| | |
|---|---|
| **Model** | **72-230 and 72-231** |
| **Purity** | >5 Megohm/cm - Final Filter 20 micron |
| **Flow Rates** | 1 lpm |
| **Maximum Water Inlet Pressure** | 3.4 bar |
| **Maximum Water Supply Temperature** | 27°C |
| **Inlet Connection** | 1/4" OD Tubing (Press Fitting) |
| **Outlet Connection** | Dispensing Gun |
| **Ambient Temperature** | 10 to 35°C |
| **Electrical Requirements** | Not Required |
| **Power Consumption** | N/A |
| **Dimensions (H x W x D)** | 460 x 310 x 70 mm |
| **Weight (Shipping)** | 4.5 Kg (5.5) |

## Ordering Information

| | |
|---|---|
| **Description** | **Model Number** |
| **Complete DI Water System** | 72-230 or 72-231** |

| | | |
|---|---|---|
| **Maintenance Items** | **Model Number** | **Change Frequency** |
| **Maintenance Kit*** | 72236 | 12 Months |

* Includes 2 each resin exchange cartridges, 1 each prefilter and 1 each final filter.
** Model 72-231 does not include dispensing gun and connects directly to generator automatic water feed port.

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# Gas Generators for LC/MS

# NitroFlow Lab

for LC/MS



## Nitrogen on demand, up to 32 lpm

The Parker Balston NitroFlow Lab is a self contained generator that produces up to 32 lpm of pure LC/MS grade nitrogen at pressures up to 8 bar. Nitrogen is produced by utilising a combination of compressor and membrane separation technologies. High and low pressure compressors are carefully matched to the hollow fibre membranes to ensure quiet and reliable operation. Oil free compressed air is passed through the unique proprietary hollow fibre membranes which separate the air into a concentrated nitrogen stream.

Typical applications include LC/MS, LC/MS/MS, nebuliser gases for APCI and ESI, ELSD, Turbo Vaps and chemical solvent evaporation. The NitroFlow Lab has been tried and tested by all the major LC/MS manufacturers.



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## Product Features:

- **Complete “Plug and Play” system recommended by all major LC/MS manufacturers**
- **Produces a continuous supply of nitrogen for all LC/MS applications**
- **Phthalate-free, no organic vapours**
- **Eliminate dangerous nitrogen cylinders from the laboratory**
- **8,000 hours compressor warranty**
- **Internal acoustic dampening ensures quiet operation**

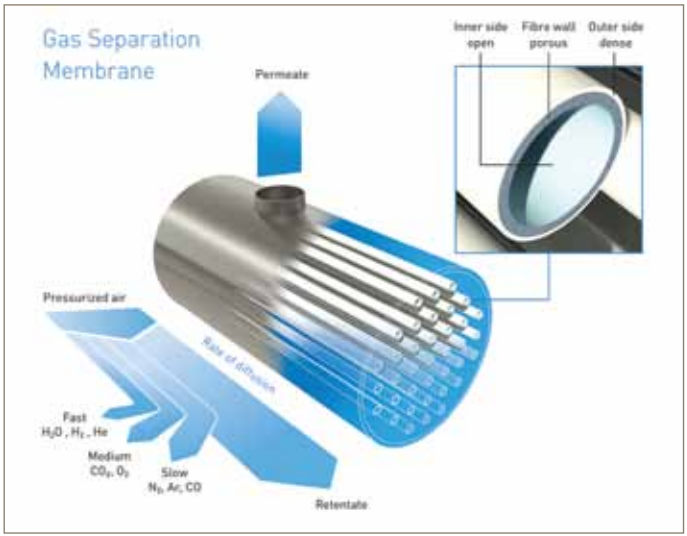
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The unique combination of the dual compressor technology ensures that the NitroFlow® Lab has several unique technical advantages over all other existing LC/MS Nitrogen Generators.

Nitrogen is produced at low pressure and then compressed to 8 bar. This ensures minimal maintenance of the system with no compressed air filter replacements or waste condensate. The compressor life is guaranteed under the Parker Balston warranty for 8,000 continuous running hours, the longest currently available on the market.






## Principal Specification

| Model | NitroFlow Lab |
|---|---|
| Purity | Up to 99.5% |
| Phthalate-free | Yes |
| Hydrocarbon-free | Yes |
| Flow Rates | Up to 32 lpm |
| Delivery Pressure | 8 bar |
| Outlet Connection | 1/4" G (optional 6 and 8mm push fit connectors included.) |
| Ambient Temperature | 10 to 35°C |
| Electrical Requirements | 230VAC- 50Hz |
| Power Consumption | 1400 Watts |
| Noise Level | <58 dB (A) |
| Dimensions (H x W x D) | 700 x 310 x 900 mm |
| Weight (Shipping) | 93 Kg (110) |

## Ordering Information

| Description | Model Number |
|---|---|
| NitroFlow Lab - EU plug* | 159.003848 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Maintenance Kit | 159.003754 | 12 Months |

* EU & UK Cord set provided

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# NitroFlow 60

for LC/MS




## Nitrogen On Demand, Up to 60 lpm

The Parker Balston NitroFlow 60 is a self contained generator that produces up to 60 slpm of pure LC/MS grade nitrogen at pressures of up to 7 bar. Nitrogen is produced utilizing a combination of a scroll compressor and nitrogen membrane separation technologies. This combination of technologies yields the highest performing, most reliable and quietest integrated nitrogen generation system available.

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

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




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## Product Features:

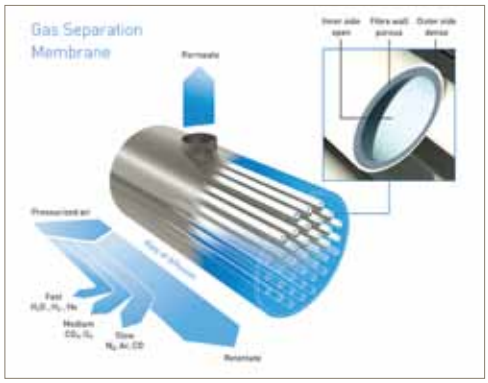
- **Ideal for Agilents 6490 iFunnel Triple Quadrapole LC/MS and iFunnel Q-TOF LC/MS**
- **Safe, convenient and cost effective method of providing high purity nitrogen for your LC/MS**
- **Complete “plug and play” system recommended for all major LC/MS instruments**
- **Phthalate-free, no organic vapors**
- **Available with an optional integrated membrane dryer to supply clean air for the Agilent LC/MS Chip Cube interface**
- **Scroll compressor technology offers near silent operation; less than 49 dB(A)**

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## Proven Technology

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




## Principal Specifications and ordering information

| Model | NitroFlow 60 | NitroFlow 60D |
|---|---|---|
| Nitrogen | Up to 60 lpm | Up to 60 lpm |
| Dry Air Flow | N/A | 5 lpm |
| Dry Air Dewpoint | N/A | -40°C |
| Hydrocarbon Free | Yes | Yes |
| Phthalate Free | Yes | Yes |
| Maximum Outlet Pressure | 7 bar | 7 bar |
| Atmospheric Dewpoint | -50°C | -50°C |
| Outlet Port | Female 1/4" NPT | Female 1/4" NPT |
| Min/Max Ambient Temperature | 10°C / 35°C | 10°C / 35°C) |
| Electrical Requirements | 230 VAC, 50 Hz, 1 Phase, 13A PCE socket and 20 ampere circuit breaker required | |
| Dimensions | 109cm H x 53cm W x 86cm D | 109cm H x 53cm W x 86cm D |
| Shipping Weight | 292 kg | 292 kg |

## Ordering Information

| Description | Model Number |
|---|---|
| Nitrogen Generator with Integrated Compressor | NitroFlow 60WD |
| Nitrogen Generator with Dryer Option and Integrated Compressor | NitroFlow 60DWD |
| European / UK cordset | A03-0344 |

## Maintenance Items

| Description | Model Number | Frequency |
|---|---|---|
| Gas Generator module annual maintenance kit | MKNITROFLOW60-5 | 12 months |
| Compressor annual maintenance kit | MKNITROFLOW60-1 | 12 months |
| Replacement drain solenoid valves | MKNITROFLOW60-2 | 24 months |
| Compressor 36 month maintenance kit | MKNITROFLOW60-3 | 36 months |

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# Nitrogen Generators

for LC/MS



## Nitrogen on demand, up to 228 lpm

The Parker Balston membrane nitrogen generators can produce up to 228 lpm of pure LC/MS grade nitrogen at pressures up to 8 bar. Generators are complete systems engineered to transform standard compressed air into a safe regulated nitrogen supply with minimal operator attention.

Typical applications include LC/MS, LC/MS/MS, nebuliser gases for APCI and ESI, ELSD, Turbo Vaps and chemical solvent evaporation. The membrane nitrogen generators have been tried and tested by all the major LC/MS manufactures.



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## Product Features:

- **Recomended and used by all major LC/MS manufacturers**
- **No electrical requirement, no noise, no moving parts**
- **Can supply up to 6 LC/MS from one generator**
- **Eliminates inconvenient nitrogen dewars from the laboratory**
- **Phthalate-free, no organic vapours**
- **Utilises Parker's proprietary membrane technology**

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Nitrogen is produced by utilising a combination of filtration and membrane separation technologies.

A house supply of compressed air is filtered by high efficiency coalescing filters to remove all contaminants down to 0.01 micron.

Unique proprietary hollow fibre membranes then separate the air into a concentrated nitrogen stream.

Membrane technology offers some unique performance benefits for LC/MS users including phthalate-free nitrogen, silent operation, no moving parts and no electrical requirements. 10,000's of systems are installed worldwide.

## Principal Specification

| Model | N2-14 | N2-22 | N2-35 | N2-45 | N2-80 | N2-135 |
|---|---|---|---|---|---|---|
| Purity | Up to 99.5 % | Up to 99.5 % | Up to 99.5 % | Up to 99.5 % | Up to 99.5 % | Up to 99.5 % |
| Phthalate-free | Yes | Yes | Yes | Yes | Yes | Yes |
| Hydrocarbon-free | Yes | Yes | Yes | Yes | Yes | Yes |
| Flow Rates | Up to 34 lpm | Up to 50 lpm | Up to 75 lpm | Up to 117 lpm | Up to 175 lpm | Up to 233 lpm |
| Inlet Pressure | 7 to 10 bar | 7 to 10 bar | 7 to 10 bar | 7 to 10 bar | 7 to 10 bar | 7 to 10 bar |
| Ambient Temperature | 10 to 35°C | 10 to 35°C | 10 to 35°C | 10 to 35 °C | 10 to 35°C | 10 to 35°C |
| Inlet Connection | 1/4" NPT | 1/4" NPT | 1/4" NPT | 1/2" NPT | 1/2" NPT | 1/2" NPT |
| Outlet Connection | 1/4" NPT | 1/4" NPT | 1/4" NPT | 1/2" NPT | 1/2" NPT | 1/2" NPT |
| Electrical Requirements | None | None | None | None | None | None |
| Number of LC/MS* | Up to 1 | Up to 2 | Up to 3 | Up to 4 | Up to 7 | Up to 9 |
| Dimensions (H x W x D) | 1270 x 400 x 400 mm | 1270 x 400 x 400 mm | 1270 x 400 x 400 mm | 1700 x 610 x 510 mm | 1700 x 610 x 510 mm | 1700 x 610 x 510 mm |
| Weight (Shipping) | 30 Kg (34) | 42 Kg (46) | 48 Kg (52) | 104 Kg (114) | 104 Kg (114) | 104 Kg (114) |

*Based on 25 lpm at 7 bar per LC/MS

## Ordering Information

| Description | Model Number |
|---|---|
| Nitrogen Generator for up to 1 LC/MS | N2-14 |
| Nitrogen Generator for up to 2 LC/MS | N2-22 |
| Nitrogen Generator for up to 3 LC/MS | N2-35 |
| Nitrogen Generator for up to 4 LC/MS | N2-45 |
| Nitrogen Generator for up to 5 LC/MS | N2-80 |
| Nitrogen Generator for up to 6 LC/MS | N2-135 |
| Installation Kit for N2-14, N2-22, N2-35 | IK7572 |
| Installation Kit for N2-45, N2-80, N2-135 | IK75880 |

For versions with oxygen analysers add AEU or AUK ie N2-14AEU

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Maintenance Kit for N2-14, N2-22, N2-35 | MK7572C* | 6 Months (Kit contains 1 year supply) |
| Maintenance Kit for N2-45, N2-80, N2-135 | 75478 | 6 Months (Kit contains 1 year supply) |
| Carbon Tower for N2-45, N2-80, N2-135 | 75344 | 6 Months |

*Includes Carbon Filters

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Catalogue: S3.2.019e_EN 07/11

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# TriGas Generators

for Applied Biosystems LC/MS/MS



## Gas on Demand, up to 10 lpm $N_2$, 23 lpm Zero Air and 8 lpm Dry Air

The Parker Balston TriGas Generators are complete engineered systems designed to purify compressed air into pure nitrogen, zero grade air (0.1ppm THC) and dry (-40˚C dewpoint) air. The gases exceed the purity, flow and pressure requirements for the curtain, source and exhaust gases on all Applied Biosystems LC/MS/MS instruments.

The TriGas Generators can easily be connected to an existing compressed air supply. Alternatively complete 'plug and play' systems including ultra quiet reliable scroll compressors are available.



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## Product Features:

- **Specifically designed to supply curtain, source and exhaust gas for LC/MS/MS**
- **Purity up to 99.999% for organics**
- **10,000 hour/3 year compressor warranty**
- **Special design ensures ultra quiet operation**
- **Phthalate-free nitrogen**
- **Complete 'Plug and Play' system approved by AB Sciex**

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Gas distribution is via independent stainless steel outlets carefully matched to the instrument. Integral flow and pressure control on each outlet eliminate the requirement for additional gas management systems.

The systems consist of 3 main functional technologies: proprietary nitrogen membranes, proprietary air membranes and heated catalyst module. Compressed air is pre-filtered by high efficiency coalescing and carbon filters to remove all contaminants down to 0.01 micron.

Nitrogen membranes separate the air into a concentrated nitrogen steam, air membranes separate the moisture from the air and the heated catalyst module removes the hydrocarbons. Final absolute membrane filtration ensure optimum gas quality.

## Principal Specification

| Model | LCMS-5000 | LCMS-5001T | LCMS-5001NT |
|---|---|---|---|
| **Purity** | | | |
| **Curtain-Gas (Nitrogen)** | 99.9 % | 99.9 % | 99.9 % |
| **Source Gas (UHP Zero Grade Air)** | <0.1ppm Total Hydrocarbons | <0.1ppm Total Hydrocarbons | <0.1ppm Total Hydrocarbons |
| **Exhaust Gas (Dry Air)** | -40°C Dew Point | -40°C Dew Point | -40°C Dew Point |
| **Flow Rates** | | | |
| **Curtain-Gas (Nitrogen)** | Up to 10 lpm | Up to 10 lpm | Up to 10 lpm |
| **Source Gas (UHP Zero Grade Air)** | Up to 23 lpm | Up to 23 lpm | Up to 23 lpm |
| **Exhaust Gas (Dry Air)** | Up to 8 lpm | Up to 8 lpm | Up to 8 lpm |
| **Includes Compressor** | Yes | No | No |
| **Delivery Pressure** | | | |
| **Curtain-Gas (Nitrogen)** | 5.5 bar | 5.5 bar | 5.5 bar |
| **Source Gas (UHP Zero Grade Air)** | 7.6 bar | 7.6 bar | 7.6 bar |
| **Exhaust Gas (Dry Air)** | 4.1 bar | 4.1 bar | 4.1 bar |
| **Inlet Connection** | Includes Compressor | 3/8” Compression Fitting | 3/8” Compression Fitting |
| **Outlet Connection** | 1/4” SS Compression (3 off) | 1/4” SS Compression (3 off) | 1/4” SS Compression (3 off) |
| **Ambient Temperature** | 10 to 35°C | 10 to 35°C | 10 to 35°C |
| **Electrical Requirements** | 230VAC - 50Hz - 13 amp PCE socket and 20 amperes circuit breaker required | | |
| **Power Consumption** | 3000 Watts | 360 Watts | 360 Watts |
| **Dimensions (H x W x D)** | 1090 x 1140 x 640 mm | 1090 x 510 x 640 mm | 1040 x 580 x 410 mm |
| **Weight (Shipping)** | 256 Kg (350) | 102 Kg (150) | 50 Kg (94) |

## Ordering Information

| Description | Model Number |
|---|---|
| **Complete Source LC/MS TriGas Generator including compressor** | LCMS-5000EU OR LCMS-5000UK |
| **Source LC/MS TriGas Generator including reciever tank** | LCMS-5001TEU OR LCMS-5001TUK |
| **Source LC/MS TriGas Generator** | LCMS-5001NTEU OR LCMS-54001NTUK |
| **Installation Kit** | IKLCMS-5000 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| **Maintenance Kit for LCMS 5000 and 5001T** | MK5028 | 12 Months |
| **Maintenance Kit for LCMS 5001NT** | MK5029 | 12 Months |

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# TriGas Generator for Sciex LC/MS Instruments




## Flow Capacities up to 69 lpm

The Parker Balston NitroFlow TG2 is a self contained gas generator that produces up to 69 lpm of pure LC/MS grade gases.

Designed for the Sciex 6500 series, zero air is produced at pressure above 7.6 bar for Gas1 and Gas2 needs. Nitrogen is produced at pressure above 5.5 bar for curtain gas and exhaust dry air is produced at pressure above 5.5 bar.

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

## Proven Technology

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



## Product Features:

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

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

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# Principal Specifications and Ordering Information

## Flow Capacities Up to 69 slpm

### Principal Specifications

| | |
|---|---|
| **Model** | NitroFlow TG2 |
| **Curtain Gas - Nitrogen** | Up to 18 slpm @ 5.5 bar |
| **Source Gas 1 & 2 - Zero Air** | Up to 26 slpm @ 7.6 bar |
| **Exhaust gas - dry air** | Up to 25 slpm @ 5.5 bar |
| **Hydrocarbon Free** | Yes |
| **Phthalate Free** | Yes |
| **Sound Level** | <49 dB(A) |
| **Atmospheric Dewpoint** | -50°C |
| **Outlet Ports** | 1/4” gas tubing |
| **Min/Max Ambient Temperature** | 10°C / 35°C |
| **Electrical Requirements** | 230VAC, 50 Hz, 1 Phase, 13A<br>(PCE socket and 20 ampere circuit breaker required) |
| **Dimensions** | 1090mm (H) x 530mm (W) x 860mm (D) |
| **Product Weight (Shipping)** | 194 Kg (289 Kg) |

### Ordering Information

| Description | Model Number |
|---|---|
| **TriGas Generator with Integrated Compressor** | NitroFlow TG2WD (230VAC, 50Hz) |

### Maintenance Items

| | |
|---|---|
| **5,000 hour maintenance kit (50 Hz)** | MKNITROFLOWTG2-1 |
| **10,000 hour maintenance kit** | MKNITROFLOWTG2-3 |
| **30,000 hour maintenance kit (50 Hz)** | MKNITROFLOWTG2-4 |

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Catalogue: 174004555_00_EN 04/15

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# NitroSource Lab

for LC/MS




## Nitrogen on demand, up to 500 lpm

The Parker Balston NitroSource Lab nitrogen generator can produce up to 500 lpm of pure LC/MS grade nitrogen at pressures up to 10 bar. The generator is engineered to transform standard compressed air into a safe regulated supply of nitrogen with minimal operator attention. Pressure flow rates and purities are specifically designed to match the stringent requirements of all the latest LC/MS instruments.

Typical applications include LC/MS, LC/MS/MS, nebuliser gases for APCI and ESI, ELSD, Turbo Vaps and chemical solvent evaporation. The Nitrosource Lab technology has been tried and tested by all the major LC/MS manufactures.




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**www.parker.com/dhFNS**

## Product Features:

- **Recommended and used by all major LC/MS manufacturers**
- **No noise, no moving parts**
- **Can supply up to 20 LC/MS from one generator**
- **Eliminate dangerous nitrogen cylinders or dewars from the laboratory**
- **Phthalate-Free, no organic vapours**
- **Utilises Parker's proprietary membrane technology**

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Nitrogen is produced by utilising a combination of filtration and membrane separation technologies. A supply of compressed air is filtered by high efficiency coalescing filters to remove all contaminants down to 0.01 micron.

Patented proprietary hollow fibre membranes then separate the air into a concentrated pure nitrogen stream. Membrane technology offers some unique performance benefits for LC/MS users including phthalate free nitrogen, silent operation, no moving parts. There are 10,000's systems installed worldwide.

## Principal Specification

| Model | NitroSource Lab |
|---|---|
| Purity | Up to 99% |
| Phthalate-Free | Yes |
| Hydrocarbon-Free | Yes |
| Flow Rates | Up to 500 lpm |
| Inlet Pressure | 4 to 10 bar |
| Inlet Connection | G1 - 1 1/2" BSPP (G) |
| Outlet Connection | G1 - 1" BSPP (G) |
| Ambient Temperature | 10 to 35°C |
| Electrical Requirements | 90-250VAC / 50-60 Hz |
| Power Consumption | 35 Watts |
| Dimensions (H x W x D) | 1928 x 725 x 490 mm |
| Weight (Shipping) | 165 Kg (180) |

## Ordering Information

| Description | Model Number |
|---|---|
| NitroSource Lab for up to 16 LC/MS | 159.003847 |
| Installation Kit | IK7572 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Maintenance Kit | 159.003569 | 12 Months |

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# Nitrogen Generators

for ELSD



## Nitrogen on demand, up to 8 lpm

The Parker Balston ELSD (Evaporative Light Scattering Detector) nitrogen generator can produce up to 8 lpm of nitrogen at pressures up to 8 bar. The generator is engineered to transform standard compressed into a safe, regulated supply of nitrogen with minimal operator attention.

Pressure flow rates and purities are speciifacally designed to match the stringent requirements of all the ELSD instruments. The ELSD Nitrogen Generators has been tried and tested by all the major ELSD manufactures.



## Contact Information:

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## Product Features:

- **Produces a continuous supply of high purity nitrogen as a nebulising gas for ELSD**
- **No noise, no moving parts, no electrical requirements**
- **Utilises Parker's proprietary membrane technology**
- **Eliminate dangerous nitrogen cylinders from the laboratory**
- **Phthalate-Free, no organic vapours**
- **Compact design, minimal maintenance**

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Nitrogen us produced by utilising a combination of filtration and membrane separation technologies. A supply of compressed air is filtered by high efficiency coalescing filters to remove all contaminants down to 0.01 micron.

Patented proprietary hollow fibre membranes then separate the air into a concentrated nitrogen stream. Membrane technology offers some unique performance benefits for ELSD users including phthalate free nitrogen, silent operation, no moving parts and no electrical requirements. There are 10,000's of systems using Parker Balston membrane technology installed worldwide.

## Principal Specification

| | |
|---|---|
| **Model** | **N2-04** |
| **Purity** | **99%** |
| **Flow Rates** | **Up to 8 lpm** |
| **Inlet/Outlet Connection** | **1/4" NPT** |
| **Inlet Pressure** | **4.1 to 10 bar** |
| **Ambient Temperature** | **10 to 35°C** |
| **Electrical Requirements** | **Not Required** |
| **Power Consumption** | **N/A** |
| **Dimensions (H x W x D)** | **410 x 270 x 340 mm** |
| **Weight (Shipping)** | **17 Kg (19)** |

## Ordering Information

| **Description** | **Model Number** |
|---|---|
| **Nitrogen Generator for up to 2 ELSD** | N2-04 |
| **Installation Kit** | IK7572 |

| **Maintenance Items** | **Model Number** | **Change Frequency** |
|---|---|---|
| **Maintenance Kit** | MK7840 | 12 Months |

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Catalogue: S3.2.018c_EN 07/11

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# Gas Generators for Spectroscopy, TOC and evaporation

# FT-IR Purge Gas Generators

for Fourier Transform-Infrared



## FT-IR Purge Gas on demand, up to 85 lpm

The Parker Balston FT-IR purge gas generator is engineered to transform standard compressed air into a clean supply of dry (-73°C), $CO_2$ free (<1 ppm) purge gas. The FT-IR gas generators are an ideal alternative to nitrogen, producing cleaner background spectra in a shorter time.

Payback periods are typically less than one year. By removing $CO_2$ and water vapour the signal to noise ratio allows more accurate analysis, particularly from 1,200-2,000, 2,400 and 3,600-4,000 wave numbers.



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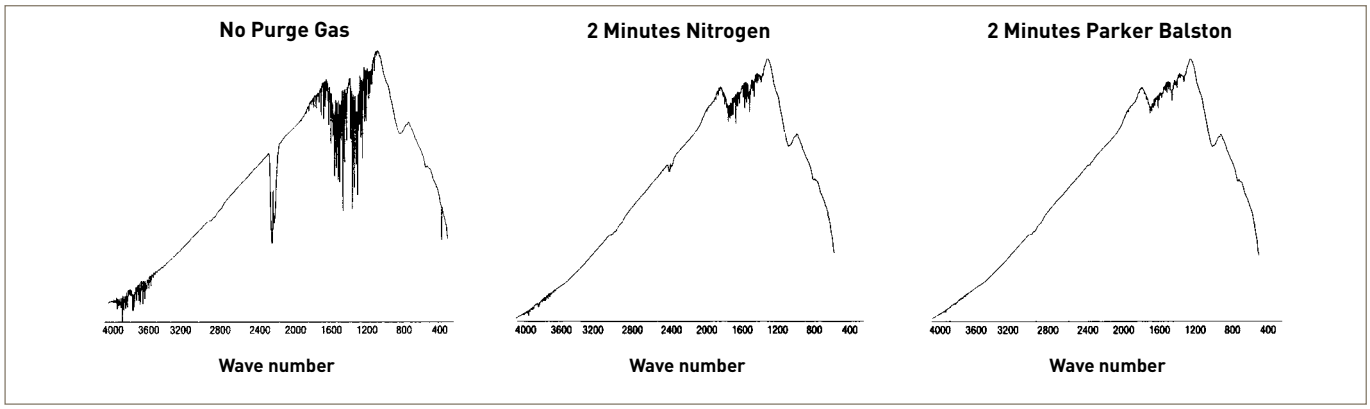
## Product Features:

- **Produces a continuous supply of purge gas for FT-IR's at a fraction of the cost of nitrogen**
- **Can supply FTIR with microscopes and other accessories**
- **Eliminate costly nitrogen cylinders in the laboratory**
- **Recommended and used by all leading FT-IR manufacturers**
- **Improve signal-to-noise ratio even on non-purge systems - cleaner spectra in a shorter time**
- **Simple, low cost annual maintenance**

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FT- IR purge gas is produced by utilising a combination of filtration and pressure swing adsorption (PSA) technology. An external supply of compressed air is filtered by high efficiency coalescing filters to remove all contaminants down to 0.01 micron. The air then passes through two columns filled with molecular sieve which adsorb moisture and $CO_2$. These are desorbed to atmosphere during the pressure swing cycle leaving a supply of ultra pure dry air.




## Principal Specification

| Model | 75-45 | 75-52 | 75-62 |
|---|---|---|---|
| Dewpoint | -73°C | -73°C | -73°C |
| Carbon Dioxide Concentration | < 1.0 ppm | < 1.0 ppm | < 1.0 ppm |
| Flow Rates (at 6.9 bar) | 14 lpm | 28 lpm | 85 lpm |
| Inlet/Outlet Pressure | 4.1 to 8.6 bar | 4.1 to 8.6 bar | 4.1 to 8.6 bar |
| Inlet Connection | 1/4" NPT (Female) | 1/4" NPT (Female) | 1/4" NPT (Female) |
| Outlet Connection | 1/4" NPT (Female) | 1/4" NPT (Female) | 1/4" NPT (Female) |
| Ambient Temperature | 10 to 35°C | 10 to 35°C | 10 to 35°C |
| Electrical Requirements | 230 VAC - 50Hz - 12VDC | 230 VAC - 50Hz - 12VDC | 230 VAC - 50Hz - 12VDC |
| Power Consumption | 100 Watts | 100 Watts | 100 Watts |
| Dimensions (H x W x D) | 330 x 320 x 180 mm | 710 x 320 x 220 mm | 1120 x 320 x 220 mm |
| Weight (Shipping) | 10 Kg (12) | 24 Kg (27) | 36 Kg (40) |

## Ordering Information

| Description | Model Number |
|---|---|
| 14 lpm FT-IR Purge Gas Generator | 75-45 |
| 28 lpm FT-IR Purge Gas Generator | 75-52 |
| 85 lpm FT-IR Purge Gas Generator | 75-62 |
| Installation Kit | IK7572 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Maintenance Kit for 75-45 | MK7505 | 12 Months |
| Maintenance Kit for 75-52 | MK7552 | 12 Months |
| Maintenance Kit for 75-62 | MK7520 | 12 Months |

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# FT-IR Purge Gas Generators

for Fourier Transform-Infrared




## FT-IR Purge Gas on Demand, up to 28 lpm

The Parker Balston 'plug and play' FT-IR purge gas generator is engineered to transform standard compressed air from an integral state of the art oil-free compressor, into a safe regulated supply of dry (-73°C), $CO_2$ free (< 1 ppm) purge gas.

The FT-IR gas generators are an ideal alternative to nitrogen producing cleaner background spectra in a shorter time. Payback periods are typically less than one year. By removing $CO_2$ and water vapour the signal to noise ratio allows more accurate analysis, particularly from 1,200-2,000, 2,400 and 3,600-4,000 wave numbers.



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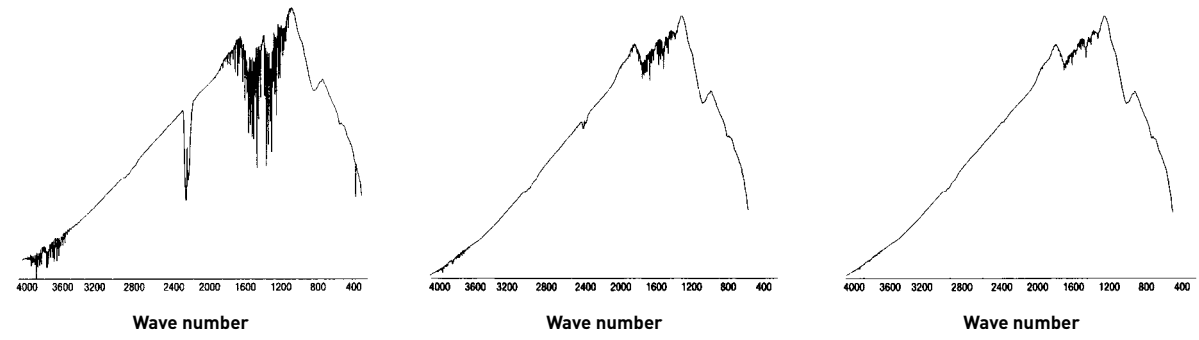
## Product Features:

- **Produces a continuous supply of purge gas for FT-IR's at a fraction of the cost of nitrogen**
- **Complete 'Plug and Play' generator**
- **Improve signal-to-noise ratio even on non-purge systems - cleaner spectra in a shorter time**
- **Recommended and used by all leading FT-IR manufacturers**
- **Eliminate costly nitrogen cylinders from the laboratory**
- **Internal acoustic dampening ensures quiet operation**

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FT- IR purge gas is produced by utilising a combination of compressor, filtration and pressure swing adsorption (PSA) technology. Compressed air is produced from an oil free compressor and then filtered by high efficiency coalescing filters to remove all contaminants down to 0.01 micron. The air then passes through two columns filled with molecular sieve which adsorb $CO_2$, moisture and hydrocarbons.
These are desorbed to atmosphere during the pressure swing cycle leaving a supply of ultra pure air. Simply connect to the instrument for a continuous supply of FT-IR purge gas.




## Principal Specification

| Model | 74-5041 |
|---|---|
| Dewpoint | -73°C |
| Carbon Dioxide Concentration | < 1.0 ppm |
| Delivery Pressure | 5.5 bar |
| Ambient Temperature | 10 to 35°C |
| Electrical Requirements | 230VAC- 50Hz |
| Power Consumption | 1.8 kW |
| Dimensions (H x W x D) | 700 x 310 x 900 mm |
| Weight (Shipping) | 93 Kg (114) |

## Ordering Information

| Description | Model Number |
|---|---|
| 28 lpm FT-IR Purge Gas Generator | 74-5041EU or 74-5041UK |
| Installation Kit | IK7572 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Maintenance Kit | 74065 | 12 Months |
| Replacement Compressor 220V | 74155 | 18 Months |

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# High Purity Nitrogen Generators

for Analytical Instruments including ICP Spectrometers



## Nitrogen on demand, up to 14 lpm

The Parker Balston Ultra High Purity (UHP) Nitrogen Generators are engineered to transform standard compressed air in to a safe supply of 99.999% pure nitrogen.

Innovative design features include integral compressors with economy mode as standard. This extends compressor life and reduces ongoing running costs.

Typical applications include optical purge for ICP-OES (Inductive Coupled Plasma - Optical Emissions) high flow GC make up gas, solvents evaporation, DSC (Differential Scanning Calorimeter) and virtually any analytical instrument that requires a small to medium flow of ultra high purity nitrogen.



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## Product Features:

- **Produces a continuous supply of high purity nitrogen 99.999% for ICP-OES**
- **Ideal for Optical Purge, extends analysis into the far UV range below 170 nm**
- **Designed to run 24 hours a day**
- **Eliminate dangerous nitrogen cylinders or dewars from the laboratory**
- **Integral oil free compressors with noise reduction technology**
- **Economy mode, increasing compressor life and reducing ongoing running costs**

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Nitrogen is produced by utilising a combination of filtration and pressure swing adsorption (PSA) technology. Standard compressed air is filtered by high efficiency coalescing filters to remove all contaminants down to 0.01 micron.

The air then passes through two columns filled with carbon molecular sieve (CMS) which adsorb $O_2$, $CO_2$, moisture and hydrocarbons. These are desorbed to atmosphere during the pressure swing cycle leaving a supply of ultra pure nitrogen.

## Principal Specification

| | HPN2-5200 | HPN2-5200C | HPN2-8000 | HPN2-8000C | HPN2-10500 | HPN2-10500C | HPN2-14000 | HPN2-14000C |
|---|---|---|---|---|---|---|---|---|
| **Purity** | 99.999% | 99.999% | 99.9% | 99.9% | 99.8% | 99.8% | 99.5% | 99.5% |
| **Hydrocarbon concentration** | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| **CO concentration** | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm |
| **CO2 concentration** | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm |
| **H2O concentration** | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm | <1ppm |
| **Flow rates** | 5,200ml/min | 5,200ml/min | 8,000ml/min | 8,000ml/min | 10,500ml/min | 10,500ml/min | 14,000ml/min | 14,500ml/min |
| **Inlet pressure** | 8 to 9.9 bar | N/A | 8 to 9.9 bar | N/A | 8 to 9.9 bar | N/A | 9 to 9.9 bar | N/A |
| **Integral compressor** | No | Yes | No | Yes | No | Yes | No | Yes |
| **Outlet pressure** | 5 bar | 5 bar | 5 bar | 5 bar | 5 bar | 5 bar | 5 bar | 5 bar |
| **Inlet connection** | 1/4" BSPP | N/A | 1/4" | N/A | 1/4" | N/A | 1/4" | N/A |
| **Outlet connection** | 1/4" BSPP | 1/4" BSPP | 1/4" BSPP | 1/4" BSPP | 1/4" BSPP | 1/4" BSPP | 1/4" BSPP | 1/4" BSPP |
| **Ambient temperature** | 15 to 25°C | 15 to 25°C | 15 to 25°C | 15 to 25°C | 15 to 25°C | 15 to 25°C | 15 to 25°C | 15 to 25°C |
| **Electrical requirements** | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz | 230VAC-50Hz |
| **Power consumption** | 89 Watts | 580 Watts | 89 Watts | 580 Watts | 89 Watts | 580 Watts | 89 Watts | 580 Watts |
| **Dimensions (HxWxD)** | 869x345x667mm | 869x345x667mm | 869x345x667mm | 869x345x667mm | 869x345x667mm | 869x345x667mm | 869x345x667mm | 869x345x667mm |
| **Weight (shipping)** | 86Kg | 95Kg | 86Kg | 95Kg | 86Kg | 95Kg | 86Kg | 95Kg |

## Ordering Information

| Description | Model Number |
|---|---|
| **5,200ml/min HP Nitrogen Generator** | HPN2-5200 |
| **5,200ml/min HP Nitrogen Generator with integral compressor** | HPN2-5200C |
| **8,000ml/min HP Nitrogen Generator** | HPN2-8000 |
| **8,000ml/min HP Nitrogen Generator with integral compressor** | HPN2-8000C |
| **10,500ml/min HP Nitrogen Generator** | HPN2-10500 |
| **10,500ml/min HP Nitrogen Generator with integral compressor** | HPN2-10500C |
| **14,000ml/min HP Nitrogen Generator** | HPN2-14000 |
| **14,000ml/min HP Nitrogen Generator with integral compressor** | HPN2-14000C |
| **Installation Kit** | IK7694 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| **Filter Kit - non compressor models** | MKHPN2-FK | 12 months |
| **Filter Kit - compressor models** | MKHPN2CL-FK | 12 months |
| **Compressor Kit 230V all models** | MKN2-CK230L | 8,000 hours or 24 months (which ever comes first) |

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Catalogue: S3.2.027e_EN 09/13

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# Dry Air Generators

for Nuclear Magnetic Resonance




## NMR Gas on demand, up to 340 lpm

The Parker Balston NMR (Nuclear Magnetic Resonance) gas generators are a complete system with carefully matched components engineered for easy installation, operation and long term reliability. They are designed to transform standard compressed air into a safe supply of dry (-73°C) gas ideal for ejecting, spinning and lifting on NMR instruments.

The NMR gas generators are an ideal alternative to nitrogen cylinders or dewars. Payback periods are typically less than one year.



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## Product Features:

- **Produces a continuous supply of ultra dry (-73ºC) air for NMR spectrometers and other analytical instruments**
- **Low cost alternative to nitrogen - pay back periods typically less than one year**
- **Ideal gas supply for ejecting, spinning and lifting operations**
- **Eliminate dangerous nitrogen cylinders or dewars from the laboratory**
- **Compact, reliable and minimal maintenance**
- **Designed to run 24 hours a day**

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NMR gas is produced by utilising a combination of filtration and pressure swing adsorption (PSA) technologies. Standard compressed air is filtered by high efficiency coalescing filters to remove all contaminants down to 0.01 micron. The air then passes through two columns filled with molecular sieve which adsorbs moisture. This is desorbed to atmosphere during the pressure swing cycle leaving a supply of ultra dry NMR grade air. The PSA columns require no operator attention or maintenance. Simply connect the generator to the NMR instrument for consistent reliable analysis.

## Principal Specification

| Model | UDA-300 |
|---|---|
| Dew Point | -73°C |
| Flow Rates | Up to 340 lpm |
| Inlet Pressure | 4.1 to 8.6 bar |
| Inlet Connection | 1/4" NPT (Female) |
| Outlet Connection | 1/4" NPT (Female) |
| Ambient Temperature | 10 to 35°C |
| Electrical Requirements | 230VAC- 50Hz - 12VDC (to the UDA-300) |
| Power Consumption | 10 Watts |
| Dimensions (H x W x D) | 700 x 310 x 900 mm |
| Weight (Shipping) | 23 Kg (26) |

## Ordering Information

| Description | Model Number |
|---|---|
| NMR Gas Generator | UDA-300 |
| Installation Kit | IK7572 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Maintenance Kit | MK7525 | 12 Months |

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# Gas Purifier

for AA Spectrophotometers



## AA Gas Purifier

The Parker Balston AA (Atomic Absorption) purifiers are a complete wall mount system with carefully matched components engineered for easy installation, operation and long term reliability. They are engineered to purify standard compressed air (oxidant) into a safe supply of clean dry air. They also remove liquid acetone from the acetylene which increases in quantity as the cylinder volume is reduced during use.

Ideal for all AA installations the purifier protects the microcomputer gas controls and AA burner assembly from contamination and corrosion.




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## Product Features:

- **Designed specifically for AA Instrumentation**
- **Protects microcomputer gas controls**
- **Ensures a clean, contaminant-free flame**
- **Ensures a consistent quality of compressed air (oxidant) and fuel gas**
- **Convenient wall mountable system with flash back arrestor**
- **Minimal maintenance**

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The purifier consists of two independent filtration systems. The first is designed to purify the compressed air with two stages of high efficiency coalescing filters to remove all contaminants to < 0.01ppm.

The second system then purifies the acetylene by removing liquid acetone and solids from the gas. Finally the gas passes through an integral flash back arrestor to enhance the safe operation of the Atomic Absorption.

## Principal Specification

| Model | 73-100 | |
|---|---|---|
| | Compressed Air | Acetylene |
| Purity | < 0.01 µm | < 0.01 µm |
| Inlet Pressure | 1 to 17 bar | 0.5 to 1 bar |
| Inlet Connection | 1/4" (Female) | 3/4 -24 LH (A Size) |
| Outlet Connection | 1/4" (Female) | 9/16 -18 LH (B Size) |
| Ambient Temperature | 10 to 35°C | |
| Electrical Requirements | Not Required | |
| Power Consumption | N/A | |
| Dimensions (H x W x D) | 250 x 270 x 200 mm | |
| Weight (Shipping) | 4 Kg (5) | |

## Ordering Information

| Description | Model Number |
|---|---|
| Atomic Absorption Gas Purifier | 73-100 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Maintenance Kit | 73065 | 12 Months |
| Acetylene Hose Assembly (1.8m in length) | 19257 (connection thread: POL/CGA 501) | As required |

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# Membrane Air Dryers

for Analytical Instruments




## Dry Air on demand, up to 1,203 lpm

The Parker Balston membrane air dryers are a complete system with carefully matched components engineered for easy installation, operation and long term reliability. They are engineered to transform standard compressed air into a safe supply of dry (up to -40°C) air with minimal operator attention.

With flow rates up to 1,203 lpm and pressure up to 9.6 bar, they make an ideal alternative to cylinders for any analytical instruments or laboratory house supply.

With no electrical requirements and no moving parts they are also designed for installation in explosive environments and for process analysers.



Water vapour quickly permeates the membrane and is released harmlessly to atmosphere. Air flows along the membrane fibre as a separate product stream.



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## Product Features:

- **Produces a continuous supply of ultra dry -40°C dewpoint instrument air**
- **Designed to run 24 hours a day**
- **Compact, reliable and minimal maintenance**
- **Instrinsically safe for hazardous explosive environments**
- **No noise, no moving parts, no electrical requirements**
- **No refrigerants on Freons - environmentally friendly**

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Dry air is produced by utilising a combination of filtration and membrane separation technologies.

A supply of compressed air is filtered by high efficiency coalescing filters to remove all contaminants down to 0.01 micron.

Patented proprietary hollow fibre membranes then separate the moisture to leave ultra dry air.

Membrane technology offers some unique performance benefits including silent operation, no moving parts and no electrical requirements.

There are 1000's systems using Parker Balston membrane technology installed worldwide.

## Principal Specification

| Model | 64-01 | 64-02 | 64-10 |
|---|---|---|---|
| Dew Point | Up to -40°C | Up to -40°C | Up to -40°C |
| Flow Rates | See Table | See Table | See Table |
| Inlet Pressure | 4.1 to 10.3 bar | 4.1 to 10.3 bar | 4.1 to 10.3 bar |
| Inlet/Outlet Connection | 1/4" NPT (Female) | 1/4" NPT (Female) | 1/2" NPT (Female) |
| Ambient Temperature | 10 to 35°C | 10 to 35°C | 10 to 35°C |
| Electrical Requirements | Not Required | Not Required | Not Required |
| Power Consumption | N/A | N/A | N/A |
| Dimensions (H x W x D) | 570 x 150 x 130 mm | 570 x 150 x 130 mm | 930 x 150 x 130 mm |
| Weight (Shipping) | 3 Kg (4) | 4 Kg (5) | 7 Kg (9) |

## Flow Rates lpm

| Pressure | 4 bar | | 5.5 bar | | 7 bar | | 8.3 bar | | 9.6 bar | |
|---|---|---|---|---|---|---|---|---|---|---|
| Dewpoint | -40°C | 0°C | -40°C | 0°C | -40°C | 0°C | -40°C | 0°C | -40°C | 0°C |
| Model 64-01 | 9 | 24 | 16 | 35 | 28 | 71 | 35 | 83 | 47 | 113 |
| Model 64-02 | 13 | 52 | 30 | 80 | 57 | 142 | 80 | 193 | 125 | 307 |
| Model 64-10 | 54 | 321 | 142 | 425 | 283 | 708 | 403 | 1014 | 517 | 1203 |

## Ordering Information

| Description | Model Number |
|---|---|
| Membrane Air Dryer up to 113 lpm | 64-01 |
| Membrane Air Dryer up to 307 lpm | 64-02 |
| Membrane Air Dryer up to 1,203 lpm | 64-10 |
| Installation Kit for 64-01 and 64-02 | IK7572 |
| Installation Kit for 64-10 | IK75880 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Annual Maintenance Kit for 64-01 and 64-02 | MK7601 | 12 Months |
| Annual Maintenance Kit for 64-10 | MK7610 | 12 Months |

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# NitroVap Generator

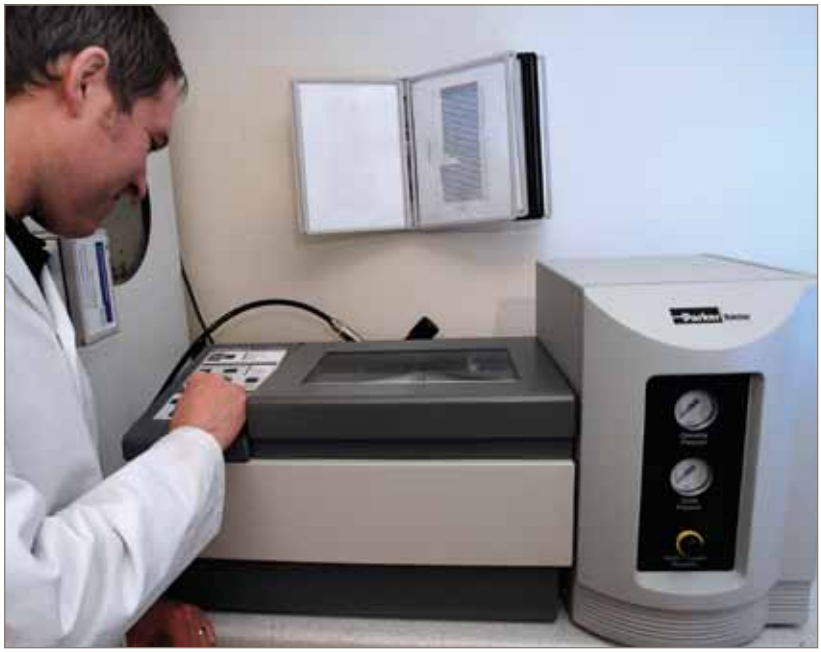
for Turbo Vaps



## Nitrogen on demand, up to 350 lpm

The Parker Balston NitroVap nitrogen generator can produce up to 350 lpm of pure nitrogen at pressures up to 8 bar. The generator is engineered to transform standard compressed air into a safe supply of nitrogen with minimal operator attention.

With a 'sleep' economy mode, high volumes of nitrogen are available as required making this an ideal generator for Turbo Vaps, sample concentrators and solvent evaporator applications.



## Contact Information:

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## Product Features:

- **Pay back periods typically less than one year**
- **Designed to run 24 hours a day**
- **Flow rates up to 350 lpm**
- **Requires minimal installation and operator attention**
- **Sleep economy mode**
- **Compact design**

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Nitrogen is produced by utilising a combination of filtration and membrane separation technologies. A supply of compressed air is filtered by high efficiency coalescing filters to remove all contaminants down to 0.01 micron.

Patented proprietary hollow fibre membranes then separate the air into a concentrated pure nitrogen stream. Membrane technology offers some unique performance benefits including phthalate free nitrogen, silent operation, no moving parts and no electrical requirements. There are 10,000's of systems using Parker Balston membrane technology installed worldwide.

## Principal Specification

| Model | NitroVap-1LV | NitroVap-2LV |
|---|---|---|
| Purity | Up to 95% | Up to 95% |
| Flow Rates | 200 lpm | 350 lpm |
| Inlet Pressure | 4.1 bar to 10 bar (7 bar recommended) | 4.1 bar to 10 bar (7 bar recommended) |
| Inlet Connection | 1/4" NPT (Female) | 1/4" NPT (Female) |
| Outlet Connection | 1/4" NPT (Female) | 1/4" NPT (Female) |
| Ambient Temperature | 10 to 35°C | 10 to 35°C |
| Electrical Requirements | Not Required | Not Required |
| Power Consumption | N/A | N/A |
| Dimensions (H x W x D) | 410 x 270 x 340 mm | 410 x 270 x 340 mm |
| Weight (Shipping) | 22 Kg (24) | 22 Kg (24) |

## Ordering Information

| Description | Model Number |
|---|---|
| 200 lpm NitroVap Nitrogen Generators | NitroVap-1LV |
| 350 lpm NitroVap Nitrogen Generators | NitroVap-2LV |
| Installation Kit | IK76803 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Maintenance Kit 1LV and 2LV | MKNITROVAP | 12 Months |

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# TOC Gas Generators

for Total Organic Carbon Analysers



## TOC carrier gas on demand, up to 1,250 ml/min

The Parker Balston TOC (Total Organic Carbon) gas generators are a complete system with carefully matched components engineered for easy installation, operation and long term reliability.

They are designed to transform standard compressed air into safe supply of hydrocarbon free (<0.05ppm), dry (-73°C), $CO_2$ free (<1ppm) carrier gas. The TOC gas generators are an ideal alternative as a carrier / combustion gas to nitrogen, oxygen and air cylinders. Payback periods are typically less than one year.




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## Product Features:

- **Produces a continuous supply of gas for TOC's**
- **Designed to run continuously 24 hours/day**
- **Purity meets or exceeds all TOC manufacturer's gas purity requirements**
- **Compact design and minimal maintenance**
- **Ensures consistent, reliable TOC analysis**
- **Eliminate dangerous high pressure oxygen and nitrogen gas cylinders from the laboratory**

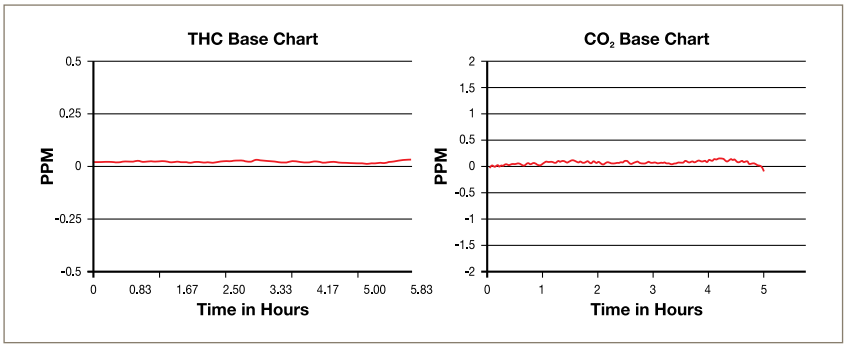
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TOC carrier gas is produced by utilising a combination of filtration, heated catalyst and pressure swing adsorption (PSA) technologies. Standard compressed air is filtered by high efficiency coalescing filters to remove all contaminants down to 0.01 micron.

The air is then purified using a state-of-art combined heated catalyst module to remove hydrocarbons. Finally the air then passes through two columns filled with molecular sieve which adsorb $CO_2$ and moisture.

These are desorbed to atmosphere during the pressure swing cycle leaving a supply of ultra pure TOC grade air. Simply connect to the TOC instrument for consistent reliable analysis.




## Principal Specification

| Model | TOC-625 | TOC-1250 |
|---|---|---|
| Hydrocarbon Concentration | < 0.05 ppm | < 0.05 ppm |
| Carbon Dioxide Concentration | <1.0 ppm | < 1.0 ppm |
| Dew Point | -73°C | -73°C |
| Flow Rates | 625 ml/min | 1250 ml/min |
| Inlet Pressure | 4.5 bar to 8.6 bar | 4.5 bar to 8.6 bar |
| Ambient Temperature | 10 to 35°C | 10 to 35°C |
| Electrical Requirements | 230VAC - 50Hz | 230VAC - 50Hz |
| Power Consumption | 80 Watts | 170 Watts |
| Dimensions (H x W x D) | 318 x 229 x 406 mm | 430 x 280 x 430 mm |
| Weight (Shipping) | 13 Kg (15) | 20 Kg (22) |

## Ordering Information

| Description | Model Number |
|---|---|
| 625 ml/min TOC Gas Generator | TOC-625EU OR TOC-625UK |
| 1,250 ml/min TOC Gas Generator | TOC-1250EU OR TOC-1250UK |
| Reciever Tank - 3 litres at atmospheric pressure | 72-007 (required to prevent pressure fluctuations) |
| Installation Kit | IK76803 |

| Maintenance Items | Model Number | Change Frequency |
|---|---|---|
| Maintenance Kit for TOC-1250 | MK7840 | 12 Months |
| Replacement catalyst module | 76810 - 220 | 36 Months |
| Maintenance Kit for TOC-625 | MKTOC625-12 | 12 Months |
| Maintenance Kit for TOC-625 | MKTOC625-36* | 36 Months |

* Includes catalyst module

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# Applications by Market

Application found in this market

X Application in this market is a major target area

| Applications | Pharmaceutical | Biotechnology | Chemical | Oil & Gas | Governmental | Academia | Food & Beverage | Environmental | Semiconductor |
|---|---|---|---|---|---|---|---|---|---|
| **Products for Gas Chromatography** | | | | | | | | | |
| GC - Flame Ionisation Detector (FID) | X | | X | X | | | | X | |
| GC - Flame Photometric Detector (FPD) | | | | | | | | | |
| GC - Nitrogen Phosphorous Detector (NPD) | | | | | | | | | |
| GC - Electron Capture Detector (ECD) | | | | | | | | | |
| GC - Thermal Conductivity Detector (TCD) | | | | | | | | | |
| GC - Automatic Thermal Desorption (ATD) | | | | | | | | | |
| GC - Atomic Emission Detector (AED) | | | | | | | | | |
| GC - Electrolytic Conductivity Detector (ELCD & Hall ELCD) | | | | | | | | | |
| GC/MS - Carrier Gas | | | | | | | | | |
| **Products for LC/MS Instruments** | | | | | | | | | |
| LC/MS - Nebulization Gas (Nitrogen) | X | X | | | X | X | | | |
| LC/MS - Source Gas | | | | | | | | | |
| LC/MS - Exhaust Gas | | | | | | | | | |
| LC/MS - Sheath Gas | | | | | | | | | |
| LC/MS - Collision Cell Gas/Drift Gas | | | | | | | | | |
| LC/MS - Matrix Assisted Laser Desorption Ionisation | | | | | | | | | |
| LC/MS - Multiple Instrument Supply | | | | | | | | | |
| FT/MS - Fourier Transform Mass Spectrometry | | | | | | | | | |
| **Products for Spectroscopy** | | | | | | | | | |
| Fourier-Transform Infra Red Spectrometer, FT-IR | X | X | X | | | X | | | |
| Nuclear Magnetic Resonance, NMR | | | | | | X | | | |
| Inductively Coupled Plasma - Mass Spectrometry (ICP-MS) | | | | | | | | | |
| Induct Optical Emission Spectrometers (ICP-OES) | | | | | | | | | |
| Atomic Adsorption (AA - Flame) | | | | | | | | | |
| Particle Sizing | | | | | | | | | |
| **Products for Analysers** | | | | | | | | | |
| Total Organic Carbon Analyser (TOC) | X | | X | | | | | X | |
| Total Hydrocarbon Analyser (THA) | | | | | | | | | |
| Differential Scanning Calorimetry (DSC) | | | | | | | | | |
| Thermal Gravimetric Analyser (TGA) | | | | | | | | | |
| C02 Analyser | | | | | | | | | |
| Chemisorption/Physisorption | | | | | | | | | |
| **Other Laboratory Applications** | | | | | | | | | |
| Sample Preparation/Solvent Evaporators | X | X | X | | | X | | | |
| Circular Dichroism (CD) | | | | | | | | | |
| Evaporative Light Scattering Detector (ELSD) | X | X | | | | X | | | |
| Corona Charged Aerosol Detector (CAD) | | | | | | | | | |
| Condensation Nucleation Light Scattering Detector (CNLSD) | | | | | | | | | |
| C02 Incubators (IVF, Stem Cell & Regenerative Medicine) | | | | | | | | | |
| Chemical Vapour Deposition Instrumentation (CVD) | | | | | | | | | |
| Plasma Cleaning Instrumentation (UCP) | | | | | | | | | |
| Digital Radiography (Edge, General Electric, Varian Medical) | | | | | | | | | |
| Hydrogenation (Organic Chemistry) | | | | | | | | | |

# Applications Guide

**Key**
**UHP = Ultra High Purity, >99.99 - >99.9999% with respect to oxygen**
**Zero Grade = Free from residual hydrocarbons**
**HP = High Purity, >98 >99.9% with respect to oxygen**
**CDA = Clean Dry Air**

| Instrument | Gas Requirement | Purity | Flow rate | Generator | Technology |
|---|---|---|---|---|---|
| **Product for Gas Chromatography (GC)** | | | | | |
| **GC - Flame Ionisation Detector (FID)** | H2 as fuel gas | UHP | 30-50 ml/min | Hydrogen 'H2PEM/PD' or 'H2PD' | PEM + Palladium or Palladium Cell (PD) |
| | H2 as carrier gas (displacing Helium) | UHP | up to 200 ml/min | Hydrogen, 'H2PD' or H2PEMPD | Palladium Cell (PD) |
| | Zero Air as flame support gas | Zero Grade | 300-500 ml/min | Zero Air HP-ZA | Catalytic Module |
| | N2 for packed carrier gas | Zero Grade | 20-50 ml/min | Zero Nitrogen, UHPZN2-1100 | N2 PSA + Catalytic Module |
| | N2 as detector make-up gas | Zero Grade | 30-50 ml/min | Zero Nitrogen, UHPZN2-1100 | N2 PSA + Catalytic Module |
| **GC - Flame Photometric Detector (FPD)** | Hydrogen as fuel gas | UHP | 60-90 ml/min | Hydrogen, 'H2PEM' or 'H2PD' | PEM + Desiccant or Palladium Cell (PD) |
| | Zero Air as flame support gas | Zero Grade | 90-120 ml/min | Zero Air HP-ZA | Catalytic Module |
| **GC - Nitrogen Phosphorous Detector (NPD)** | Hydrogen as carrier gas (displacing Helium) | UHP | up to 50 ml/min | Hydrogen 'H2PEMPD' or 'H2PD' | PEM + Desiccant or Palladium Cell (PD) |
| | Nitrogen as detector make-up gas | Zero Grade | up to 30 ml/min | Zero Nitrogen, UHPZN2-1100 | N2 PSA + Catalytic Module |
| **GC - Electron Capture Detector (ECD)** | Nitrogen as carrier gas | Zero Grade | up to 60 ml/min | Zero Nitrogen, UHPZN2-1100 | N2 PSA + Catalytic Module |
| | Nitrogen as detector make-up gas | Zero Grade | up to 100 ml/min | Zero Nitrogen, UHPZN2-1100 | N2 PSA + Catalytic Module |
| **GC - Thermal Conductivity Detector (TCD)** | Hydrogen as carrier gas | UHP | up to 50 ml/min | Hydrogen 'H2PEMPD' or 'H2PD' | PEM + Desiccant or Palladium Cell (PD) |
| **GC - Automatic Thermal Desorption (ATD)** | Nitrogen as purge gas | UHP | up to 150 ml/min | UHP Nitrogen, UHPN2-1100 | N2 PSA |
| **GC - Atomic Emission Detector (AED)** | Nitrogen as carrier gas | Zero Grade | up to 1 ml/min | Zero Nitrogen, UHPZN2-1100 | N2 PSA + Catalytic Module |
| **GC - Electrolytic Conductivity Detector (ELCD & Hall ELCD)** | Hydrogen as reaction gas | UHP | 70 to 200 ml/min | Hydrogen, 'H2PEM' or 'H2PD' | PEM + Desiccant or Palladium Cell (PD) |
| **GC/MS - Carrier Gas** | Hydrogen as carrier gas (displacing Helium) | UHP | up to 50 ml/min | Hydrogen, 'H2PD' or H2PEMPD | Palladium Cell (PD) |
| **Products for LC/MS Instruments** | | | | | |
| **LC/MS - Nebulisation Gas** | Nitrogen used to nebulise liquid into aerosol | HP | up to 32 L/min | Nitrogen, NitroFlow Lab | N2 Membrane |
| | | | 34 - 228 L/min | Nitrogen, N2-14 to 135 | N2 Membrane |
| | | | up to 567 L/min | Nitrogen, NitroSource | N2 Membrane |
| **LC/MS - Source Gas** | Nitrogen used as a source gas | HP | up to 17 L/min | TriGas, LCMS-5000 series | N2 Membrane |
| | Zero Air as source gas to remove hydro-carbons | Zero Grade | up to 17 L/min | TriGas, LCMS-5000 series | Catalytic Module |
| | | Zero Grade | up to 17 L/min | Zero Air HP-ZA | Catalytic Module |
| **LC/MS - Exhaust Gas** | Nitrogen for exhaust gas purge | HP | up to 8 L/min | TriGas, LCMS-5000 series | N2 Membrane |
| | Clean Dry Air for exhaust gas purge | CDA | up to 8 L/min | TriGas, LCMS-5000 series | CDA Membrane |
| **LC/MS - Sheath Gas** | Nitrogen used as inerting/blanket gas | HP | up to 32 L/min | Nitrogen, NitroFlow Lab | N2 Membrane |
| | | | 34 - 228 L/min | Nitrogen, N2-14 to 135 | N2 Membrane |
| | | | up to 567 L/min | Nitrogen, NitroSource | N2 Membrane |
| **LC/MS - Collision Cell Gas** | Nitrogen used as collision gas | UHP | up to 25 ml/min | Nitrogen, UHPN2 | N2 PSA |
| **LC/MS - Matrix Assisted Laser Desorption Ionisation** | Nitrogen as laser purge guide | UHP | up to 5 L/min | Nitrogen, N2-04 | N2 Membrane |
| **LC/MS - Multiple Instrument Supply** | Nitrogen as nebulisation/sheath/exhaust gas | HP | Various | Nitrogen, N2-14 to 135 | N2 Membrane |
| | | | | Nitrogen, NitroSource | N2 Membrane |
| **FT/MS - Fourier Transform Mass Spectrometry** | Nitrogen as laser flush/purge gas | HP | up to 100 L/min | Nitrogen, N2-14 to 135 | N2 Membrane |
| | | | | Nitrogen, NitroSource | N2 Membrane |

| Instrument | Gas Requirement | Purity | Flow rate | Generator | Technology |
|---|---|---|---|---|---|
| **Products for Spectroscopy** | | | | | |
| **Fourier-Transform Infra Red Spectrometer (FT-IR)** | C02 free air for sample compartment, optics air bearing and microscope purge gas | C02 free air | up to 28 L/min | C02 free air, 75-5041 75-45/75-52/75-62 | C02 RP PSA - Desiccant |
| **Nuclear Magnetic Resonance (NMR)** | Air for lifting, spinning & ejecting, <400MHz | CDA | 60-100 L/min | CDA, UDA-300 | CDA PSA - Desiccant |
| | Nitrogen for lifting, spinning & ejecting, >400MHz | HP | | Nitrogen, N2-14 to 135 | N2 Membrane |
| | | | | Nitrogen, NitroSource | N2 Membrane |
| **Inductively Coupled Plasma - Mass Spectrometry (ICP-MS)** | Hydrogen as collision cell reaction gas | UHP | up to 250 ml/min | Hydrogen, 'H2PD' | Palladium Cell (PD) |
| **Inductively Coupled Plasma Optical Emission Spectrometers (ICP-OES)** | Nitrogen as purge gas for plasma torch | UHP | up to 9 L/min | Nitrogen HPN2 | N2 PSA |
| **Atomic Emission Spectrometers (AA - Flame)** | Air for flame support gas | CDA | 28-200 L/min | CDA, 73-100 | Filtration |
| **Particle Sizing Instruments** | Air to purge and drying gas | CDA | up to 100 L/min | CDA, 64-01/64-02/64-10 | CDA Membrane |
| **Products for Analysers** | | | | | |
| **Total Organic Carbon Analyser (TOC)** | C02 free & Zero Grade air for carrier gas | C02 free air | 100-500 ml/min | C02 Free Air Zero Grade | PSA - Desiccant & Catalytic Module |
| | | Zero Grade | | TOC-625 / 1250 | |
| | Nitrogen for carrier gas | UHP | 50-700 ml/min | Nitrogen, UHPZN2-1100 | N2 PSA + Catalytic Module |
| **Total Hydrocarbon Analyser (THA)** | Hydrogen as fuel gas | UHP | 5-50 ml/min | Hydrogen, 'H2PEM' or 'H2PD' | PEM + Desiccant or Palladium Cell (PD) |
| | Zero Air as flame support gas | Zero Grade | 50-500 ml/min | Zero Air, HP-ZA | Catalytic Module |
| **Differential Scanning Calorimetry (DSC)** | Nitrogen as shield/sheath gas | UHP | 100 ml/min | Nitrogen, UHPN2 | N2 PSA |
| **Thermal Gravimetric Analyser (TGA)** | Nitrogen as inerting/blanket furnace gas | UHP | 300 ml/min | Nitrogen, UHPN2 | N2 PSA |
| **C02 Analyser** | C02 free air as calibration gas | C02 free air | 550-1000 ml/min | C02 free air, 75-5041 | C02 RP PSA - Desiccant |
| | | | | 75-45/75-52/75-62 | |
| **Chemisorption/Physisorption** | Hydrogen as measurement gas | UHP | up to 250 ml/min | Hydrogen, 'H2PD' | Palladium Cell (PD) |
| | Nitrogen as measurement gas | UHP | up to 250 ml/min | Nitrogen, UHPN2 | N2 PSA |
| **Other Laboratory Applications** | | | | | |
| **Sample Preparation/Solvent Evaporators (TurboVap)** | Nitrogen as inert evaporation gas | HP | 6-50 L/min | Nitrogen, NitroVap-1LV | N2 Membrane |
| | | | | NitroVap-2LV | |
| **Circular Dichroism (CD)** | Nitrogen as source and optics purge | UHP | up to 10 L/min | Nitrogen HPN2 | N2 PSA |
| **Evaporative Light Scattering Detector (ELSD)** | Nitrogen as nebulisation gas | HP | up to 8 L/min | Nitrogen, N2-04 | N2 Membrane |
| **Corona Charged Aerosol Detector (CAD)** | Nitrogen as nebulisation gas | HP | up to 8 L/min | Nitrogen, N2-04 | N2 Membrane |
| **Condensation Nucleation Light Scattering Detector (CNLSD)** | Nitrogen as nebulisation gas | HP | up to 8 L/min | Nitrogen, N2-04 | N2 Membrane |
| **C02 Incubators (IVF, Stem Cell & Regenerative Medicine)** | Nitrogen to create oxygen deficient atmosphere | HP | up to 12 L/min | Nitrogen, NitroFlow Lab | N2 Membrane |
| **Chemical Vapour Deposition Instrumentation (CVD)** | Hydrogen to aid deposition process | UHP | up to 1L/min | Hydrogen, 'H2PD' | Palladium Cell (PD) |
| | Nitrogen to aid deposition process | UHP | up to 1L/min | Nitrogen, UHPN2 | N2 PSA |
| **Plasma Cleaning Instrumentation (UCP)** | Hydrogen as a high efficiency process gas | UHP | up to 1000 ml/min | Hydrogen, 'H2PD' | Palladium Cell (PD) |
| **Digital Radiography (Edge, General Electric, Varian Medical)** | Nitrogen to inert/purge diode array | UHP | up to 550 ml/min | Nitrogen, UHPN2 | N2 PSA |
| **Hydrogenation (Organic Chemistry)** | Hydrogen as reaction gas | UHP | up to 250 ml/min | Hydrogen, 'H2PEM' | PEM + Desiccant |

# Notes

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