

Gas Generators

*Generate High Purity Gas with
Reliability and Safety*

 **SUPELCO®**

Economical

Safe

Convenient

sigma-aldrich.com/lgc



SIGMA-ALDRICH

LABC0 L.L.C.

Gas Generators

Laboratory gas generators are a great alternative to gas cylinders. In addition to being a much more sensible source of gas from a cost standpoint, generators are safer, cosmetically better, take up less space, and do not require the labor needed to move bulky cylinders around the lab. Gas generators do not require switching systems or long runs of tubing to, or through, exterior walls. They just do their job – quietly, safely, year after year. Supelco offers gas generators from both Parker and domnick hunter. Additionally, high quality air compressors from JUN-AIR and critical particle and oil filters from Norgren are offered.

Economical

Some gas chromatographers are unsure whether there is an economic advantage to replacing gas cylinders with gas generators. It is simple to compare the costs of using gas cylinders to the cost of purchasing and operating gas generators. In many situations, the change to a gas generator will result in large savings over time.

To determine the costs of gas cylinders versus gas generators, estimate the total volume of gas needed for a year. For an accurate comparison, include other costs associated with gas cylinders, such as cylinder rental fees and direct labor for handling cylinders. Table 1 summarizes the time required to recover the purchase cost of a hydrogen generator (payback time). The savings result because gas generators operate for many years after the payback time, essentially generating free gas. To determine the number of months until payback, divide the monthly cost of using gas cylinders into the total cost of purchasing a gas generator. In most situations, the use of a gas generator often results in savings in the thousands after just a few years.

Table 1. Example Payback Time for Four GCs, Each with Dual FIDs

A total of 240 mL/min. of hydrogen is required (equates to 4,455 cubic feet of hydrogen per year)

Gas Cylinders/Year:	23 (each contains 196 cubic feet of gas)
Cost/Cylinder:	\$110 (includes rental fees)
Cost of Gas/Year:	\$2,530
Cost of Gas/Month:	\$211
Cost of Generator:	\$8,661 (Parker Model H2PEM-260)
Payback Time:	41 months (3.4 years)
Savings/Year After Payback:	\$2,530

Note: Gas cylinder price and rental fees are based on costs at Bellefonte, PA, USA and are used for illustrative purposes. Your costs will probably differ.

Because helium generators are not available, helium cylinders supplying carrier gas cannot simply be replaced with a gas generator. However, a switch from expensive helium to hydrogen as a carrier gas will allow the helium cylinders to be replaced with a hydrogen generator that will pay for itself in a very short time. In addition to the economy, hydrogen has a greater flow range over which efficiency is high and generally appears to be a better carrier gas for capillary GC.

Safe

Safety plays a major role in justifying hydrogen generators, but also plays a role in decisions concerning other gas generators. The explosive nature of hydrogen along with the many other safety issues associated with high-pressure gas cylinders should be considered.

- If a leak develops in a gas line, the entire contents of a gas cylinder will be emptied into the laboratory space. If the gas is hydrogen, it may result in an explosive mixture.
- Every time a gas cylinder valve is opened, a regulator can fail, releasing full pressure into the lines. Very few plumbing systems will withstand the 2000 to 3000 psi of pressure that would be instantly introduced into the system.
- Handling heavy gas cylinders may lead to back injuries. If a gas cylinder is dropped, it may crush a worker's hands or feet.

All of these scenarios lead to a dangerous situation for laboratory workers. The use of gas generators can help avoid these potential problems. The safety benefits that gas generators have over gas cylinders are:

- A minimal volume of gas is stored
- The gas that is stored is at a relatively low pressure
- The risk of injury from moving heavy cylinders is eliminated

Convenient

Gas generators are more convenient and reliable than gas cylinders. Their use eliminates shutting down operations during gas cylinder change-out, shuttling one gas cylinder into place while moving another out of the way, continuously handling orders and invoices, and delivery delays waiting for gas cylinders to arrive. Additionally, gas generators are more aesthetically pleasing than big, bulky gas cylinders.

TRADEMARKS

domnick-hunter, Nitrox - domnick hunter; JUN-AIR - Jun-Air A/S Corp.; Norgren - C.A. Norgren Co.; Parker - Parker Balston; Swagelok - Swagelok Co.

Hydrogen Generators

Parker® PEM and ChromGas Hydrogen Generators



Parker hydrogen generators are designed as hazard free alternatives to high pressure gas cylinders. These generators use a Proton Exchange Membrane to produce fuel grade hydrogen on demand. They can be used with any instrumentation requiring fuel grade hydrogen anywhere electrical supply is available. Deionized water is all that is required to generate hydrogen for weeks of continuous operation.

- Minimal maintenance required
- Produce fuel grade hydrogen on demand
- Ideal for carrier gas and fuel gas applications
- Use with any instrumentation requiring fuel grade purity hydrogen
- Only 100 mL of hydrogen is stored in the system at any time, and at low pressure
- Use a long-life solid polymer electrolyte, rather than a liquid electrolyte, eliminating the need for toxic liquids
- Exclusive water management system and control circuitry maximize uptime
- Unique display lighting changes color for easy status checks and water level indication
- Remote control and remote monitoring capable by adding USP options bay controller
- Compact and reliable, only one square foot of bench space required
- CE, CSA, and UL

Specifications for Parker PEM and ChromGas Hydrogen Generators

Hydrogen Purity:	>99.9995%
Hydrogen Purity:	>99.99997% (Model 9800)
Max. Output Flow:	90 mL/min. (Model 9090)
Max. Output Flow:	165 mL/min. (Model H2PEM-165)
Max. Output Flow:	260 mL/min. (Model H2PEM-260)
Max. Output Flow:	510 mL/min. (Model H2PEM-510)
Max. Output Flow:	1200 mL/min. (Model 9800)
Water Reservoir Capacity:	4 liters
Delivery Pressure:	100 psi max.
Outlet Fitting:	1/8 inch compression fitting
Dimensions (H x W x D):	17.1 x 13.5 x 18 in. / 43.5 x 34.2 x 45.6 cm
Dimensions (H x W x D):	15 x 13 x 17 in. / 37 x 33 x 44 cm (Model 9800)
Weight:	40 lbs. / 18 Kg
Electrical Requirements:	110-230 volt, self-switching
Electrical Requirements:	110 volt (Model 9090, 9800)

domnick hunter® NITROX® UHP Hydrogen Generators



Domnick hunter hydrogen generators are a safe and economic alternative to high pressure gas cylinders. They use a proprietary ion exchange membrane to produce ultra-high purity hydrogen from laboratory grade deionized water. These generators are suitable for use with any laboratory instrument requiring a supply of ultra-high purity hydrogen. Deionized water is all that is required to generate hydrogen for weeks of continuous operation.

- Minimal maintenance required
- Designed for total safety and highly reliable operation
- Produce fuel grade hydrogen on demand
- Ideal for carrier gas and fuel gas applications
- Use with any instrumentation requiring fuel grade purity hydrogen
- Minimal volume of hydrogen is stored within the system at any time, and at low pressure
- Uses a proprietary ion exchange membrane, totally eliminating the need for caustic solutions
- Unique digital display gives system status and diagnostic capabilities (not available on any other competitive hydrogen generator)
- Compact and reliable
- CE

Specifications for domnick hunter NITROX® UHP Hydrogen Generators

Hydrogen Purity:	>99.999%
Max. Output Flow:	160 mL/min. (Model 20H)
Max. Output Flow:	250 mL/min. (Model 40H)
Max. Output Flow:	500 mL/min. (Model 60H)
Water Reservoir Capacity:	5 liters
Input Water Quality:	deionized, >1 megohm per cm
Delivery Pressure:	100 psi max.
Outlet Fitting:	1/8 inch Swagelok® fitting
Dimensions (H x W x D):	34.2 x 45.6 x 43.7 cm
Weight:	53 lbs. / 24 Kg
Electrical Requirements:	110-230 volt, self-switching

technical service: 800-359-3041 (US and Canada only) / 814-359-3041

ordering: 800-247-6628 (US only) / 814-359-3441

Hydrogen
Generators

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Zero Air Generators

Parker ChromGas Zero Air Generators



Parker zero air generators produce a continuous flow of ultra-pure zero grade air from an existing compressed air supply. These zero air generators consist of three stages, a 0.5 µm coalescing inlet filter that removes particles, oil, and water; a heated catalyst that removes hydrocarbons; and a 0.01 µm cellulose fiber outlet filter that removes residual particulate material from the product air stream. These zero air generators eliminate the need to change-out gas cylinders and save time required to recalibrate your instrument after each cylinder change.

- Minimal maintenance required
- Reduce the total hydrocarbon content to less than 0.1 ppm (measured as methane)
- Produce lower, more stable baselines than gas cylinders
- Use with FIDs to stabilize baselines and improve detection
- Significantly enhance the sensitivity of GC-FID analyses
- Easy to use, only require an electrical outlet and a compressed air source
- CE, CSA, IEC 1010, and UL

Specifications for Parker ChromGas Zero Air Generators

Air Purity:	<0.1 ppm total hydrocarbons (as methane)
Max. Output Flow:	1000 mL/min. (Models 1000, 1001)
Max. Output Flow:	3500 mL/min. (Model 3500, 3501)
Inlet Air Pressure:	2-125 psi
Delivery Pressure:	125 psi max.
Outlet Fitting:	1/8 inch compression fitting
Dimensions (H x W x D):	9.75 x 5.75 x 12 in. / 25 x 14.7 x 30.8 cm (Models 1000, 1001)
Dimensions (H x W x D):	12 x 6.75 x 15 in. / 29.2 x 17.8 x 39.4 cm (Models 3500, 3501)
Weight:	11 lbs. / 5 Kg (Models 1000, 1001)
Weight:	20 lbs. / 9.1 Kg (Models 3500, 3501)
Electrical Requirements:	110 volt (Models 1000, 3500)
Electrical Requirements:	230 volt (Models 1001, 3501)

domnick hunter NITROX Zero Air Generators



Domnick hunter zero air generators employ a catalytic oxidation system to produce a continuous supply of air that is virtually free of hydrocarbons, including methane. After incoming compressed air is filtered to remove oil, water, and particles, it is passed over a heated platinum catalyst that converts methane and oxygen in the air to carbon dioxide and water. A high efficiency 0.01 µm filter downstream of the catalyst ensures further removal of particles from the product stream.

- Minimal maintenance required
- Low power usage
- Easy to wall mount
- Reduce the total hydrocarbon content to less than 0.1 ppm (measured as methane)
- Produce lower, more stable baselines than gas cylinders
- Use with FIDs to stabilize baselines and improve detection
- Significantly enhance the sensitivity of GC-FID analyses
- Easy to use, only require an electrical outlet and a compressed air source
- CE

Specifications for domnick hunter NITROX Zero Air Generators

Air Purity:	<0.1 ppm total hydrocarbons (as methane); <0.01 µm particles
Max. Output Flow:	1000 mL/min. (Model 10)
Max. Output Flow:	3500 mL/min. (Model 35)
Inlet Air Quality:	<10 ppm total hydrocarbons (as methane)
Inlet Air Pressure:	20-125 psi / 1.5-8.5 bar
Delivery Pressure:	125 psi max.
Outlet Fitting:	1/4 inch Swagelok fitting
Dimensions (H x W x D):	12 x 9 x 17 in. / 31 x 23 x 43 cm
Weight:	19 lbs. / 8.5 Kg
Electrical Requirements:	110 volt or 230 volt (catalog number specific)

Nitrogen Generators



All domnick hunter NITROX nitrogen generators employ pressure swing technology to produce a continuous supply of nitrogen. Most models include an integral oil-free air compressor, which delivers filtered compressed air (101 psi / 7 bar) to a bed of carbon molecular sieve, which removes oxygen, water vapor, carbon dioxide, and hydrocarbons. Two beds alternate between purification and regeneration modes, ensuring a continuous supply of nitrogen at the specified purity levels.

domnick hunter NITROX Hydrocarbon-free Nitrogen Generators

Downstream of the carbon molecular sieve bed, a heated catalyst reduces the hydrocarbons in the nitrogen stream to less than 0.1 ppm (as methane).

- Includes an integral oil-free air compressor
- CE

Specifications for domnick hunter NITROX Hydrocarbon-free Nitrogen Generators

Nitrogen Purity:	<10 ppm oxygen; <0.1 ppm total hydrocarbons (as methane)
Max. Output Flow:	1000 mL/min.
Delivery Pressure:	73 psi / 5 bar
Outlet Fitting:	1/4 inch NPT fitting
Dimensions (H x W x D):	33 x 14 x 18 in. / 84 x 36 x 46 cm
Weight:	101 lbs. / 46 Kg
Electrical Requirements:	110 volt or 230 volt (catalog number specific)

domnick hunter NITROX High-Purity Nitrogen Generators

A storage reservoir ensures a continuous supply of nitrogen.

- Includes an integral oil-free air compressor

Specifications for domnick hunter NITROX High-Purity Nitrogen Generators

Nitrogen Purity	<10 ppm oxygen
Max. Output Flow	750 mL/min. (Model 0751)
Max. Output Flow	1500 mL/min. (Model 1501)
Max. Output Flow	3000 mL/min. (Model 3001)
Delivery Pressure	73 psi / 5 bar
Outlet Fitting	1/8 inch Swagelok® fitting (Model 0751)
Outlet Fitting	1/4 inch Swagelok fitting (Models 1501, 3001)
Dimensions (H x W x D)	33 x 14 x 14.25 in. / 84 x 36 x 36 cm (Model 0751)
Dimensions (H x W x D)	33 x 14 x 26 in. / 84 x 36 x 66 cm (Models 1501, 3001)
Weight	79 lbs. / 36 Kg (Model 0751)
Weight	176 lbs. / 80 Kg (Models 1501, 3001)
Electrical Requirements	110 volt or 230 volt (catalog number specific)

domnick hunter NITROX LC-MS Nitrogen Generators

Specially designed to meet the gas flow, purity, and pressure requirements of LC-MS units.

- Model 12 includes an integral oil-free air compressor
- Model 18 must be used with an external supply of oil-free compressed air
- Compatible with atmospheric pressure chemical ionization (APCI) and electrospray ionization (ESI) interfaces
- CE

Specifications for domnick hunter NITROX LC-MS Nitrogen Generator

Nitrogen Purity:	<0.5% oxygen
Max. Output Flow:	12 L/min. (Model 12)
Max. Output Flow:	18 L/min. (Model 18)
Inlet Air Pressure:	125 psi / 8.5 bar (Model 18)
Delivery Pressure:	100 psi / 7 bar
Outlet Fitting:	1/4 inch Swagelok fitting
Dimensions (H x W x D):	33 x 14 x 27 in. / 84 x 36 x 69 cm (Model 12)
Dimensions (H x W x D):	33 x 14 x 18 in. / 84 x 36 x 46 cm (Model 18)
Weight:	190 lbs. / 86 Kg (Model 12)
Weight:	165 lbs. / 75 Kg (Model 18)
Electrical Requirements:	110 volt or 230 volt (catalog number specific)

ordering: 800-247-6628 (us only) / 814-359-3441 technical service: 800-359-3041 (us and Canada only) / 814-359-3041

Nitrogen
Generators

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JUN-AIR® Oilless Air Compressors



Model OF301-4B



Model OF302-25MD2



Model 2000-40MD

More than 45 years of experience and product development keep JUN-AIR the leader in air compressor technology. These quiet, reliable compressors produce GC-quality compressed air. Highly efficient cooling enables these units to run continuously. Models OF302-25MD2 and 2000-40MD are housed in sound-reducing cabinets and incorporate an effluent filter/dryer to reduce water vapor.

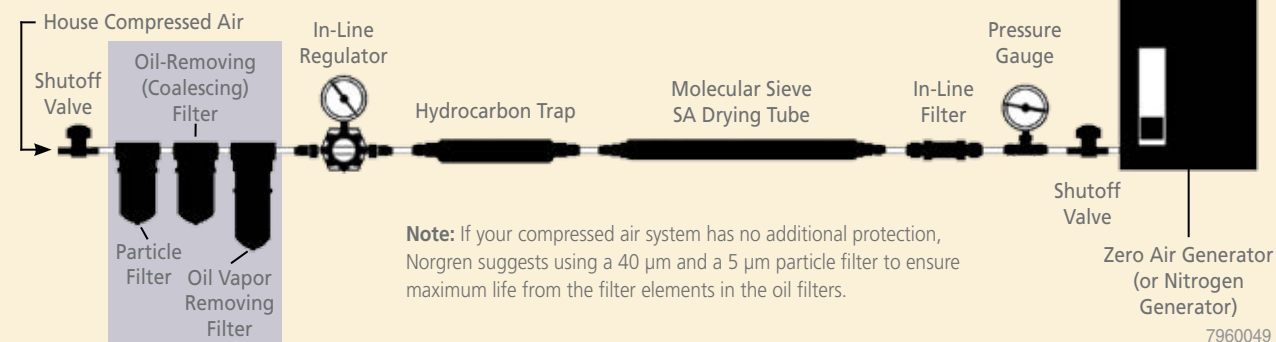
- Oilless air compressors
- Produce dry, clean, GC-quality compressed air
- No potential source of contamination
- Quiet and vibrationless
- Models OF302-25MD2 and 2000-40MD are housed in sound-reducing cabinets
- CE, CSA, IEC 1010, and UL

Air Compressor Specifications

	Model OF301-4B	Model OF302-25MD2	Model 2000-40MD
Maximum Pressure:	120 psi / 8 bar	120 psi / 8 bar	120 psi / 8 bar
Max. Output Flow at 4 bar:	32 L/min.	50 L/min.	105 L/min.
Noise at 8 bar:	61 dB	48 dB	53 dB
Dimensions (H x W x D):	13.1 x 11.8 x 15 in.	33.9 x 17.4 x 26.1 in.	31 x 25 x 22.5 in.
Dimensions (H x W x D):	33.4 x 30 x 38.2 cm	86.1 x 44 x 66.5 cm	79 x 63 x 57 cm
Weight:	42 lbs. / 19 Kg	183 lbs. / 83 Kg	254 lbs. / 115 Kg
Electrical Requirements (all):		110 volt or 230 volt (catalog number specific)	

Norgren® Particle and Oil Filters

Ensure High Quality Incoming Air for a Zero Air or Nitrogen Generator



Airborne dust can be drawn into the intake of an air compressor. These dust particles as well as any oils released from an air compressor can damage any downstream gas generator. Norgren filters are designed to remove solid and liquid particles in addition to oil aerosols. The oil-removing and oil vapor-removing filters must be protected with a particle filter upstream.

- Install between air compressors and gas generators
- Designed to be used together as a three- or four-filter system
- Elements are easily replaced

Specifications for Norgren Particle and Oil Filters

40 µm Particle Filter:	Removes particulates >40 µm
5 µm Particle Filter:	Removes particulates >5 µm
Oil-Removing Filter:	Removes particulates >0.01 µm (input <5 µm); Reduces oil to 0.01 ppm (input <8 ppm)
Oil Vapor-Removing Filter:	Reduces oil to 0.003 ppm (input <0.01 ppm)

Ordering Information

Description	Max. Output	Cat. No.
Hydrogen Generators		
<i>Parker PEM and ChromGas Hydrogen Generators</i>		
Model 9090, 110 volt	90 mL/min.; 100 psi	27773-U
Model H2PEM-165, 110-230 volt	165 mL/min.; 100 psi	27620-U
Model H2PEM-260, 110-230 volt	250 mL/min.; 100 psi	22751
Model H2PEM-510, 110-230 volt	510 mL/min.; 100 psi	22801
Model 9800, 110 volt	1200 mL/min.; 100 psi	22835
<i>Replacement Parts for Parker Hydrogen Generators</i>		
Desiccant Cartridge (for Model H2PEM)		Custom
Deionizer Pack, 2 ea (for Models 9090 and 9800)		22963
Indicating Drying Cartridge (for Models 9090 and 9800)		22837
<i>domnick hunter NITROX UHP Hydrogen Generators</i>		
Model 20H, 110-230 volt	160 mL/min.; 100 psi	27748-U
Model 40H, 110-230 volt	250 mL/min.; 100 psi	27749-U
Model 60H, 110-230 volt	500 mL/min.; 100 psi	27750-U
<i>Replacement Parts for domnick hunter Hydrogen Generators</i>		
Deionizer Bag, 2 ea		27768-U
Indicating Drying Cartridge		27769-U
Zero Air Generators		
<i>Parker ChromGas Zero Air Generators</i>		
Model 1000, 110 volt	1000 mL/min.; 125 psi	22824
Model 3500, 110 volt	3500 mL/min.; 125 psi	27625-U
Model 1001, 230 volt	1000 mL/min.; 125 psi	22830-U
Model 3501, 230 volt	3500 mL/min.; 125 psi	27626-U
<i>domnick hunter NITROX Zero Air Generators</i>		
Model 10, 110 volt	1000 mL/min.; 125 psi	27758-U
Model 35, 110 volt	3500 mL/min.; 125 psi	27759-U
Model 10, 230 volt	1000 mL/min.; 125 psi	28358-U
Model 35, 230 volt	3500 mL/min.; 125 psi	28359-U
Nitrogen Generators		
<i>domnick hunter NITROX Hydrocarbon-free Nitrogen Generators</i>		
Model 1001, 110 volt	1000 mL/min.; 73 psi	27765-U
Model 1001, 230 volt	1000 mL/min.; 73 psi	28366-U
<i>domnick hunter NITROX High-Purity Nitrogen Generators</i>		
Model 0751, 110 volt	750 mL/min.; 73 psi	27760-U
Model 1501, 110 volt	1500 mL/min.; 73 psi	27761-U
Model 3001, 110 volt	3000 mL/min.; 73 psi	27762-U
Model 0751, 230 volt	750 mL/min.; 73 psi	28360-U
Model 1501, 230 volt	1500 mL/min.; 73 psi	28361-U
Model 3001, 230 volt	3000 mL/min.; 73 psi	28362-U
<i>domnick hunter NITROX LC-MS Nitrogen Generators</i>		
Model 12, 110 volt	12 L/min.; 100 psi	27766-U
Model 18, 110 volt	18 L/min.; 100 psi	27767-U
Model 12, 230 volt	12 L/min.; 100 psi	28367-U
Model 18, 230 volt	18 L/min.; 100 psi	28368-U
Air Compressors		
<i>JUN-AIR Oilless Air Compressors</i>		
Model OF301-4B, 110 volt	32 L/min.; 4 bar	503746
Model OF302-25MD2, 110 volt	50 L/min.; 4 bar	503762
Model 2000-40MD, 110 volt	105 L/min.; 4 bar	27675-U
Model OF301-4B, 230 volt	32 L/min.; 4 bar	503754
Model 2000-40MD, 230 volt	105 L/min.; 4 bar	22825
<i>Replacement Parts for JUN-AIR Oilless Air Compressors</i>		
Intake filter for Model OF302-25MD2		503797
Intake filter for Model 2000-40MD		23153
Norgren Filters		
<i>Filters</i>		
Particle filter, 40 µm element, 1/4 inch female NPT fittings		24990-U
Particle filter, 5 µm element, 1/4 inch female NPT fittings		24992
Oil-removing filter, 1/4 inch female NPT fittings		24994
Oil vapor-removing filter, 3/8 inch female NPT fittings		24996
<i>Replacement Elements for Norgren Filters</i>		
40 µm element		24991
Oil-removing element		24995
Oil vapor-removing element		24997

Custom Products

Because of long-term relationships with vendors, we offer many other products they manufacture, even if not listed in this brochure. Please contact Supelco Technical Service at 800-359-3041 (US and Canada only), 814-359-3041, or techservice@sial.com to request a quotation.

- For information concerning Parker gas generators, visit www.parker.com/ags
- For information concerning domnick hunter gas generators, visit www.domnickhunter.com
- For information concerning JUN-AIR air compressors, visit www.jun-air.com
- For information concerning Norgren filters, visit www.norgren.com

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