Restek GC Accessories

Gas Management

Supplies for GC Labs

- Gas Generators
- Pressure Regulators
- Tubing and Fittings
- Gas Purifiers

RESTEK Pure Chromatography www.restek.com

Gas Management for Your Lab

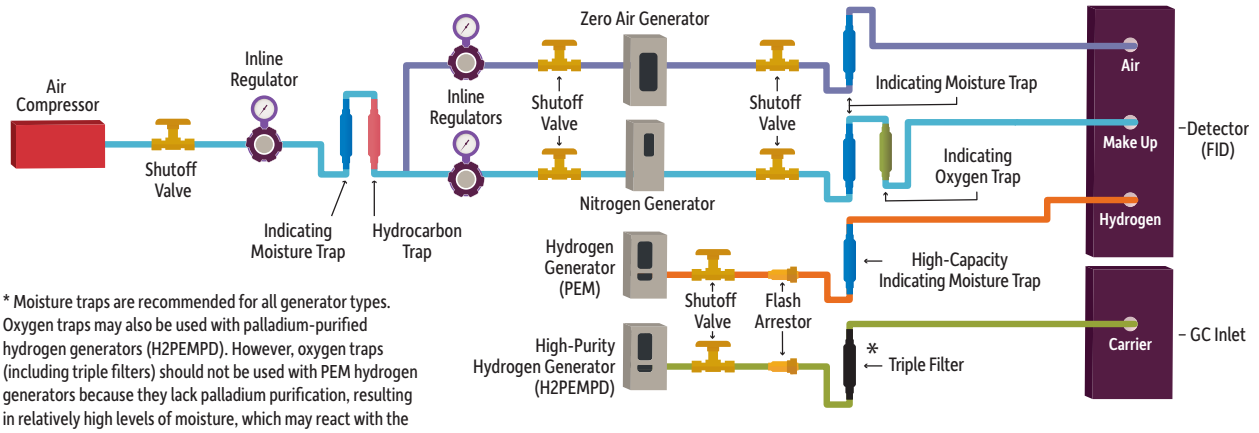
A clean gas stream is critical to the quality of your GC analysis and the reliability of your analytical results. Carrier gas must contain less than 1 ppm of oxygen, water vapor, and other trace contaminants for stable baselines on all detectors and to prevent column degradation, shortened column lifetime, and increased stationary phase bleed. Clean fuel gases and make-up gases are also essential for stable detector baselines. Your gas management system must deliver a high-purity gas stream from your source to your instrumentation without introducing contaminants. Restek offers the products you need to assure a clean, leak-free gas management system. If you need assistance in configuring your system, contact your Restek representative to discuss your application requirements.

Questions to Consider When Building Your Gas Management System:

1. **What gases do you require and at what purity?**
2. **What flow rates and/or pressures are required?**
3. **Are you using gas generators or high-pressure cylinders?**
4. **What type of tubing and fittings are needed to build your system?**
5. **What type of gas purifiers should you install in your system?**

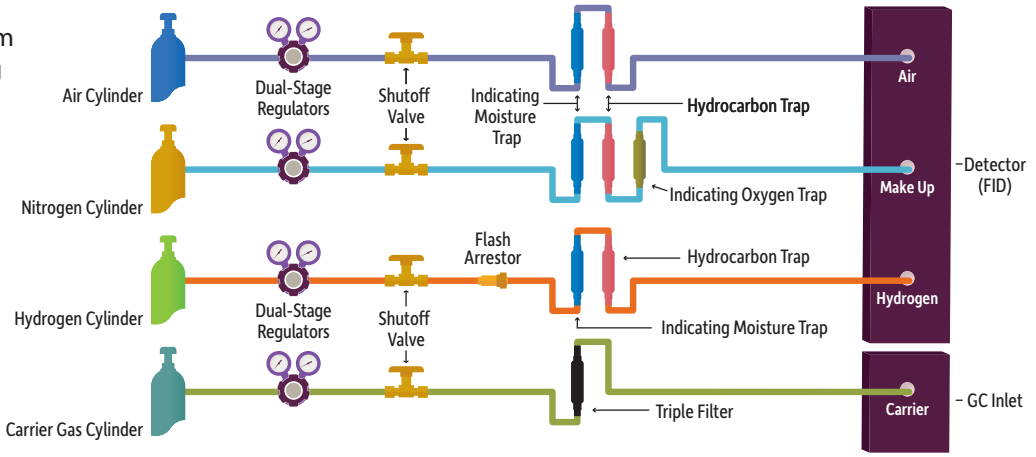
Once the components needed for your system are established, you will need to determine the most appropriate way to configure your gas management system. Figures 1 and 2 are typical configurations: Figure 1 illustrates a system that uses gas generators, and Figure 2 shows a system configured for use with high-pressure cylinders.

Figure 1: Gas Management System Configuration Using Gas Generators



* Moisture traps are recommended for all generator types. Oxygen traps may also be used with palladium-purified hydrogen generators (H2PEMPD). However, oxygen traps (including triple filters) should not be used with PEM hydrogen generators because they lack palladium purification, resulting in relatively high levels of moisture, which may react with the trapping and indicating media, damaging the filter.

Figure 2: Gas Management System Configuration Using Gas Cylinders



Gas Generators

Dependable gas supply • Consistent gas purity • Safe and economical

Gas generators eliminate the downtime, constant monitoring, and routine maintenance associated with using cylinders. Gas generators produce gas continuously and reliably without the interruptions that can be experienced during cylinder changes or delays in delivery when using gas cylinders.

A pure and consistent gas supply is needed for reproducible analytical results, but gas purity can vary from cylinder to cylinder in a way that is difficult to control. Dirty or rusted cylinders can also introduce contaminants and particulates into your gas stream. Gas generators eliminate these problems by continuously generating clean and pure gas.

Gas generators are a safe, compact, and virtually maintenance-free source of high-purity gas. Routine maintenance is minimal, and since generators don't store gas at high pressures, they are not as hazardous as gas cylinders. Gas generators can be placed in your lab in close proximity to your instruments, eliminating the need for a remote, isolated storage area. Depending on your specific analytical flow requirements, most gas generators can supply gas to multiple GCs in your lab.

Gas generators are typically less expensive than gas cylinders in the long term. Gas generators offer an unlimited source of high-purity gas that is available on demand. Cylinders appear to be less expensive initially but, if used continuously, have a significant replacement and resupply cost.

Hydrogen Gas Generators

Hydrogen gas generators produce hydrogen through the electrolysis of water. For operation, these generators require an electrical outlet and a source of deionized water. Restek offers a number of Parker Balston hydrogen generators that can produce flow rates from 100 mL/minute up to 1300 mL/minute at maximum pressures of 100 psig.

FID Gas Stations

FID gas stations combine a hydrogen generator and zero air generator into one unit. Parker Balston FID gas stations provide both ultra-high purity grade hydrogen gas and zero air for flame ionization detectors. Different models are available and can supply fuel gases for up to six FIDs.

Zero Air Gas Generators

High-purity air is essential as a fuel gas for flame ionization detectors (FID) in order to produce stable, low-level baselines. Zero air gas generators from Parker Balston can turn in-house compressed air into ultra-pure air with less than 0.1 ppm hydrocarbon levels. Varying models are available with flow rates from 1000 mL/minute up to 30,000 mL/minute at pressures ranging from 40 to 125 psig.

Nitrogen Gas Generators

Nitrogen gas generators produce pure nitrogen from compressed air. Parker Balston nitrogen gas generators produce ultra-pure nitrogen for use as GC carrier gases, make-up gases, and low-flow sample concentrators. Models are available to supply nitrogen at flows from one to 75 liters per minute.

Need help selecting a gas generator?

Visit **restek.com/contact-us** to connect with your local Restek representative or our Technical Service team.

Safer alternative to high-pressure gas cylinders!

HYDROGEN GAS GENERATORS

Parker PEM Hydrogen Generators

- Proton exchange membrane (PEM) cell eliminates the need for liquid electrolytes.
- Reliably generate 99.9995% pure hydrogen—for better chromatography.
- Eliminates high-pressure cylinders—greater convenience and improved lab safety.
- Compact unit requires only one square foot of bench space.
- Quick and easy to service and maintain; unique display lighting changes color for easy status checks and water level indication.
- Comes with a set of universal power adapters for U.S., European, and Asian plug types.
- Automatic safety feature shuts the generator down if a hydrogen leak is detected.
- Warranty: one year from date of purchase on system and two years from date of purchase on cell life.

Specifications for Parker PEM Hydrogen Generators

Purity:	99.9995% pure hydrogen
Delivery Pressure:	5-100 psig ± 0.5 psig (69-689 kPa ± 7 kPa)
Outlet Port:	1/8" compression
Electrical Requirements:	100-230 VAC/50-60 Hz
Physical Dimensions:	17.12" h x 13.46" w x 17.95" d (43.48 x 34.19 x 45.6 cm)
Shipping Weight:	70 lb (32 kg) dry

Description	Model #	Capacity	Certification/Compliance	qty.	cat.#
Hydrogen Generator	H2F-100NA	100 cc/min	CE,CSA,UKCA,UL	ea.	29278
	H2F-165NA	165 cc/min	CE,CSA,UKCA,UL	ea.	29279
	H2F-260NA	260 cc/min	CE,CSA,UKCA,UL	ea.	29280
	H2F-510NA	510 cc/min	CE,CSA,UKCA,UL	ea.	29281

Parker H2PEMPD Hydrogen Generators

- Proton exchange membrane (PEM) cell eliminates the need for liquid electrolytes.
- Maintenance-free palladium purifier removes oxygen to less than 0.01 ppm and moisture to 1 ppm.
- Produces continuous supply of 99.99999+% pure hydrogen gas.
- Does not require downstream gas filters.
- Maximum outlet pressure of 100 psig (690 kPa).
- Automatic safety feature shuts the generator down if a hydrogen leak is detected.
- Compact unit requires only one square foot of bench space.
- Warranty: one year from date of purchase on system and three years from date of purchase on cell life.

Specifications for Parker H2PEMPD Hydrogen Generators

Purity:	99.99999+% pure hydrogen
Outlet Port:	1/4" compression
Electrical Requirements:	100 to 230 VAC, 50/60Hz
Physical Dimensions:	17.1" h x 13.5" w x 21" d
Shipping Weight:	60 lb

Description	Model #	Capacity	Delivery Pressure	qty.	cat.#
Hydrogen Generator	H2PEMPD-510	510 cc/min	100 psig	ea.	22144
	H2PEMPD-650	650 cc/min	100 psig	ea.	22146
	H2PEMPD-850	850 cc/min	100 psig	ea.	22148
	H2PEMPD-1100	1100 cc/min	100 psig	ea.	22150
	H2PEMPD-1300	1300 cc/min	100 psig	ea.	22152

ZERO AIR GAS GENERATORS

Parker Zero Air Generators

- Turn in-house compressed air into ultra-pure air.
- Remove hydrocarbons to less than 0.1 ppm by catalytic oxidation.
- Operate at 40–125 psi (276–862 kPa).
- Typical payback is less than one year, based on cylinder costs.
- Installs easily and takes up little bench space.*
- Maintenance kits include a one-year supply of prefilters and final filter.

Specifications for Parker Balston Zero Air Generators

Maximum Zero Air Flow Rate:	75-83NA HPZA-3500 HPZA-7000 HPZA-18000 HPZA-30000	1.0 L/min 3.5 L/min 7.0 L/min 18 L/min 30 L/min
Outlet Hydrocarbon Concentration (as methane):	75-83NA HPZA-30000 Other Models	< 0.1 ppm < 0.1 ppm < 0.05 ppm
Minimum/Maximum Inlet Air Pressure:	40 psig/125 psig (276/862 kPa)	
Maximum Inlet Hydrocarbon Concentration (as methane):	100 ppm	
Pressure Drop at Maximum Flow Rate:	4 psi (28 kPa) differential	
Maximum Inlet Air Temperature:	78°F (25°C)	
Inlet/Outlet Ports:	1/4" NPT (female)	
Start-up Time to Specified Hydrocarbon Concentration:	45 minutes	
Electrical Requirements:	75-83NA HPZA-3500, HPZA-7000 HPZA-18000, HPZA-30000	120 VAC/60 Hz, 0.5 amps 120, 220, 230, 240 VAC/60 Hz, 2.0 amps 120, 220, 230, 240 VAC/60 Hz, 4.0 amps
Dimensions:	75-83NA Other Models	10" h x 12" w x 3" d (25 cm x 30 cm x 8 cm) 16" h x 11" w x 13" d (42 cm x 27 cm x 34 cm)
Shipping Weight:	75-83NA Other Models	7 lb (3 kg) 41 lb (19 kg)

Model	**Number of FIDs** (based on a 450 cc/min fuel air rate)
75-83NA	Up to 2
HPZA-3500	Up to 8
HPZA-7000	Up to 16
HPZA-18000	Up to 40
HPZA-30000	Up to 66

ordering notes

International power cords are available. Contact Customer Service to order.

Description	Model #	Capacity	Certification/Compliance	qty.	cat.#
Zero Air Generator	75-83NA	1000 cc/min	CE	ea.	20684
	HPZA-3500	3500 cc/min	CE	ea.	29282
	HPZA-7000	7000 cc/min	CE	ea.	29283
	HPZA-18000	18,000 cc/min	CE	ea.	29284
	HPZA-30000	30,000 cc/min	CE	ea.	29285

*Parker Model 75-83NA (Restek cat.# 20684) is a wall-mount model.

FID GAS STATIONS

Parker Model FID-1000 and FID-2500 Gas Stations

- Single unit produces UHP zero air from house compressed air and 99.9995% pure hydrogen from deionized water.
- Ideal for supplying up to 5-6 FIDs.
- Eliminates inconvenient and dangerous gas cylinders.
- Silent operation, minimal operator attention required.
- 12-month warranty from date of purchase.

Parker gas stations provide both UHP grade hydrogen gas and zero grade air for flame ionization detectors. The system is specifically designed to supply gas to FIDs and to support flame thermionic and flame photometric detectors. The units produce zero air by purifying compressed air to a total hydrocarbon concentration of 0.1 ppm or less (measured as methane). The hydrogen generators produce hydrogen gas from deionized water, using the principle of electrolytic dissociation of water and hydrogen proton conduction through a proton exchange membrane cell.

20177

Specifications for Parker Model FID-1000 and FID-2500 Gas Stations

Hydrogen Purity:	99.9995%
Zero Air Purity:	< 0.1 ppm total hydrocarbons as methane
Max. Hydrogen Flow Rate:	FID-1000: 90 cc/min, FID-2500: 250 cc/min
Max. Zero Air Flow Rate:	FID-1000: 1000 cc/min, FID-2500: 2500 cc/min
Power:	120 VAC/amp, 60 Hz, 480 watts
Hydrogen Outlet Pressure:	60 psig (414 kPa)
Zero Air Outlet Pressure:	40-125 psig* (276-862 kPa)
Inlet Connection:	1/4" NPT (female)
Outlet:	1/8" compression
Dimensions:	20" h x 13" w x 23" d (51 cm x 33 cm x 58 cm)
Weight:	53 lb (24 kg)

Description	Model #	Certification/Compliance	qty.	cat.#
Gas Station	Model FID-1000 (ideal for 1-2 FIDs)	CE	ea.	20177

*Zero air inlet requires minimum of 40 psig (276 kPa) compressed air pressure.

Built to International Standards

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

ordering notes

International power cords are available. Contact Customer Service to order.

NITROGEN GAS GENERATORS

20697

Parker Nitrogen Gas Generators

- Produces ultra-pure nitrogen (up to 99.9999%).
- Requires only a compressed air source and 120 volt AC power.
- Typical applications include GC carrier gas, make-up gas, and low-flow sample concentrators.
- Maintenance kits include replacement filters.
- 12-month warranty from date of purchase.

Specifications for Parker Balston Nitrogen Gas Generators

	Model UHPN2-1100
Maximum Nitrogen Flow Rate:	See Flow Table (below)
Nitrogen Purity:	99.9999%
Minimum/Maximum Inlet Pressure:	60 psig/125 psig (414/862 kPa)
Electrical Requirements[1]:	120 VAC/60 Hz
Dimensions:	35" h x 12" w x 16" d (89 cm x 30 cm x 41 cm)
Shipping Weight:	137 lb (62 kg)

Flow Table for Model UHPN2-1100

Inlet Air Pressure	**Maximum Outlet Flow (cc/min)**	**Maximum Outlet Pressure**
125 psig (862 kPa)	1100	85 psig (586 kPa)
110 psig (758 kPa)	1000	75 psig (517 kPa)
100 psig (689 kPa)	900	65 psig (448 kPa)
90 psig (621 kPa)	800	60 psig (414 kPa)
80 psig (552 kPa)	700	50 psig (345 kPa)
70 psig (483 kPa)	600	45 psig (310 kPa)
60 psig (414 kPa)	500	35 psig (241 kPa)

[1]Power consumption is:
Model UHPN2-1100 = 700 Watts

ordering notes

International power cords are available. Contact Customer Service to order.

Description	**Model #**	**Certification/Compliance**	**qty.**	**cat.#**
Nitrogen Generator	UHPN2-1100 (ultra-high purity zero grade)	CE	ea.	20697

Gas Cylinder Accessories

Handling Gas Cylinders

When using high-pressure gas cylinders, there are a number of accessories that should be used in order to safely handle and install cylinders in your gas management system. Dropped gas cylinders are very dangerous and can become flying projectiles if the cylinder valve is damaged. A cylinder holder will safely secure your cylinder to a wall in your lab, preventing it from accidentally toppling over and discharging its contents. Restek also offers protocol wall mounts for gas regulators, tools, and flame arrestors.

When using high-pressure gas cylinders, there are a number of accessories that should be used in order to safely handle and install cylinders in your gas management system.

Manifolds and Switchover Systems

High-purity automatic switchover systems provide a continuous supply of high-purity gas to your gas management system. Continuous gas supply is achieved by setting the two regulators at slightly different pressures and discharging one side of the system at a time. This allows for the replacement of a depleted gas cylinder without interrupting the gas supply.

Description	qty.	cat.#
Wall Mounted Cylinder Holders		
Cylinder Holder, Wall Mounted, Single	ea.	21333
Cylinder Holder, Wall Mounted, Double	ea.	23400
Cylinder Holder, Wall Mounted, Triple	ea.	23401
Cylinder Holder, Wall Mounted, Quadruple	ea.	23402
Tools		
Cylinder Valve Wrench	ea.	21321
Universal Cylinder Wrench	ea.	21322
Flexible Stainless Steel Hose, 1/4" Female NPT, 36"	ea.	21339
Flexible Stainless Steel Hose, 1/4" Female NPT, 18"	ea.	21340
Flash Arrestors		
Hydrogen Flashback Arrestor, Brass Body, 1/4" Female NPT	ea.	21334
Protocol Wall Mounts for Gas Regulators*		
Chrome-Plated Brass, CGA 580 (N_2, He, Ar)	ea.	21347
Chrome-Plated Brass, CGA 350 (H_2, P_5)	ea.	21348
Chrome-Plated Brass, CGA 590 (Air)	ea.	21349
Stainless Steel, CGA 580 (N_2, He, Ar)	ea.	21327

*Pressure regulator not included. Order separately.


21333


21321


21334


21347

Pressure Regulators

The job of a pressure regulator is simple: it reduces the pressure of a gas source to a safe working pressure. However, there are many variables that need to be considered when choosing a pressure regulator. Does your application require a stainless-steel or brass regulator? Do you need a single- or dual-stage pressure regulator? What type of gas are you regulating, and what is the desired delivery pressure? Your choice in a pressure regulator will depend on your application and where the regulator will be placed in your gas management system.

Ultra-High Purity Regulators

Restek offers ultra-high purity (UHP) pressure regulators in chrome-plated brass and stainless-steel bodies. Both are ideal for applications requiring gas purities of 99.995% or greater, such as those used in carrier and fuel gas supplies. These pressure regulators are made from cold drawn bar stock, which results in smooth, reduced internal dead volumes, making them ideal for high-purity applications. In situations where corrosive gases are used or where the regulator is in a corrosive environment, stainless-steel bodies are required.

Dual-Stage Pressure Regulators

A dual-stage pressure regulator provides more precise pressure control by reducing the gas source pressure to the desired delivery pressure in two steps. They are recommended for supplying gas where constant delivery pressure is critical, especially if your gas source is a high-pressure cylinder. As the cylinder gas is used, the inlet pressure to the regulator from the cylinder decreases. A dual-stage regulator compensates for the decrease and maintains a constant delivery pressure whereas a single-stage regulator does not.

Single-Stage Pressure Regulators

A single-stage pressure regulator reduces the pressure of the gas source to the desired delivery pressure in one step. It does not provide the precise control of delivery pressure that can be achieved with a dual-stage pressure regulator. Single-stage pressure regulators should be used for applications where you can monitor and regulate the pressure downstream.

In-Line Regulators

In-Line regulators are single-stage pressure regulators that are used to provide point-of-use pressure monitoring and control. These pressure regulators are installed directly into gas lines, immediately before your instrumentation, to ensure the appropriate gas pressure is being delivered to your instrument. A dual-stage or single-stage pressure regulator should always be installed upstream of the in-line regulator to ensure adequate pressure control.

Pressure Regulator Connections

Restek ultra-high purity pressure regulators come with a variety of different connection fittings for attachment to different high-pressure gas cylinders. In the United States, Compressed Gas Association (CGA) fittings are used and designed for different gas service. In the European Union, German Institute for Standardization (DIN) fittings are used to make these connections, and in the United Kingdom, British Standard (BS) fittings are used. Table I indicates the appropriate fitting for each type of gas typically used in setting up your gas management system. We recommend you confirm the fitting needed with your gas cylinder provider prior to ordering fittings.

Table I: Choose fittings for your pressure regulator based on gas type.

	CGA	DIN 477	BS341
Helium	580	#6	#3
Hydrogen	350	#1	#4
Nitrogen	580	#10	#3
Air	590	#9	#3
Argon	580	#6	#3
P5 (Argon:Methane)	350	#1	#4

Need help selecting a pressure regulator?

Visit **restek.com/contact-us** to connect with your local Restek representative or our Technical Service team.

ULTRA-HIGH PURITY (UHP) BRASS BODY GAS REGULATORS

Ultra-High Purity (UHP) Brass Body Gas Regulators

Custom gas regulators, including regulators with an ⅛" tube fitting, are also available. Request yours today.

UHP brass regulators are suitable for use with high-purity carrier gas for sensitive GC applications using MS, PID, or ECD detection methods. They feature reduced internal dead volume relative to stainless-steel bodies. The 316 L stainless-steel diaphragm valve ensures leak-free shutoff. Oxidation-resistant chrome plating maintains a like-new appearance.

21667

All regulators are rated to 3000 psig (20,684 kPa) maximum inlet pressure.
Inlet gauge: 0 to 4000 psig (0–27,579 kPa)
Outlet assembly: 316 L stainless-steel diaphragm valve, 1/4" tube fitting

Dual-Stage Ultra-High Purity Chrome-Plated Brass Gas Regulators

with CGA Fittings

- Oxidation resistant, chrome plated.
- Most stable outlet pressure control.
- Secondary pressure regulation not needed.
- Most widely used regulator.
- Also available with international fittings.

Description	Type	Fittings	Material	Outlet Gauge	Outlet Pressure	qty.	cat.#
Ultra-High-Purity Regulator	Dual-Stage	CGA 580 (N_2, He, Ar)	Chrome-Plated Brass	30", 0 to 200 psig (0–1379 kPa)	0 to 150 psig (0–1034 kPa)	ea.	21667
	Dual-Stage	CGA 350 (H_2, P_5)	Chrome-Plated Brass	30", 0 to 200 psig (0–1379 kPa)	0 to 150 psig (0–1034 kPa)	ea.	21668
	Dual-Stage	CGA 590 (Air)	Chrome-Plated Brass	30", 0 to 200 psig (0–1379 kPa)	0 to 150 psig (0–1034 kPa)	ea.	21669

Dual-Stage Ultra-High Purity Chrome-Plated Brass Gas Regulators

with International Fittings

- Oxidation resistant, chrome plated.
- Most stable outlet pressure control.
- Secondary pressure regulation not needed.
- Most widely used regulator.
- Also available with CGA fittings.

BS 341 #3 Fitting

All regulators are rated to 3000 psig (20,684 kPa) maximum inlet pressure.
Inlet gauge: 0 to 4000 psig (0–27,579 kPa)
Outlet assembly: 316 L stainless-steel diaphragm valve, 1/4" tube fitting

Description	Type	Fittings	Material	Outlet Gauge	Outlet Pressure	qty.	cat.#
Ultra-High-Purity Regulator	Dual-Stage	DIN 477 #1 (H_2)	Chrome-Plated Brass	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22369
	Dual-Stage	DIN 477 #6 (He, Ar)	Chrome-Plated Brass	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22368
	Dual-Stage	DIN 477 #9 (Air)	Chrome-Plated Brass	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22370
	Dual-Stage	DIN 477 #10 (N_2)	Chrome-Plated Brass	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22371
	Dual-Stage	BS 341 #3 (He, Ar, Air, N_2)	Chrome-Plated Brass	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22136
	Dual-Stage	BS 341 #4 (H_2)	Chrome-Plated Brass	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22137

ULTRA-HIGH PURITY (UHP) BRASS BODY GAS REGULATORS

20646

All regulators are rated to 3000 psig (20,684 kPa) maximum inlet pressure.
Inlet gauge: 0 to 4000 psig (0–27,579 kPa)
Outlet assembly: 316 L stainless-steel diaphragm valve, 1/4" tube fitting

Ultra-High Purity (UHP) Brass Body Gas Regulators

Custom gas regulators, including regulators with an ⅛" tube fitting, are also available. Request yours today.

UHP brass regulators are suitable for use with high-purity carrier gas for sensitive GC applications using MS, PID, or ECD detection methods. They feature reduced internal dead volume relative to stainless-steel bodies. The 316 L stainless-steel diaphragm valve ensures leak-free shutoff. Oxidation-resistant chrome plating maintains a like-new appearance.

Single-Stage Ultra-High Purity Chrome-Plated Brass Gas Regulators
with CGA Fittings

- Oxidation resistant, chrome plated.
- Use when there is secondary pressure regulation downstream.
- Identical gas purity protection as with dual-stage gas regulators.
- Also available with international fittings.

Description	Type	Fittings	Material	Outlet Gauge	Outlet Pressure	qty.	cat.#
Ultra-High-Purity Regulator	Single-Stage	CGA 580 (N_2, He, Ar)	Chrome-Plated Brass	30", 0 to 200 psig (0–1379 kPa)	0 to 150 psig (0–1034 kPa)	ea.	20646
	Single-Stage	CGA 350 (H_2, P_5)	Chrome-Plated Brass	30", 0 to 200 psig (0–1379 kPa)	0 to 150 psig (0–1034 kPa)	ea.	20647
	Single-Stage	CGA 590 (Air)	Chrome-Plated Brass	30", 0 to 200 psig (0–1379 kPa)	0 to 150 psig (0–1034 kPa)	ea.	20648

BS 341 #3 Fitting

All regulators are rated to 3000 psig (20,684 kPa) maximum inlet pressure.
Inlet gauge: 0 to 4000 psig (0–27,579 kPa)
Outlet assembly: 316 L stainless-steel diaphragm valve, 1/4" tube fitting

Single-Stage Ultra-High Purity Chrome-Plated Brass Gas Regulators
with International Fittings

- Oxidation resistant, chrome plated.
- Use when there is secondary pressure regulation downstream.
- Identical gas purity protection as with dual-stage gas regulators.
- Also available with CGA fittings.

Description	Type	Fittings	Material	Outlet Gauge	Outlet Pressure	qty.	cat.#
Ultra-High-Purity Regulator	Single-Stage	DIN 477 #1 (H_2)	Chrome-Plated Brass	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22373
	Single-Stage	DIN 477 #6 (He, Ar)	Chrome-Plated Brass	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22372
	Single-Stage	DIN 477 #9 (Air)	Chrome-Plated Brass	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22374
	Single-Stage	DIN 477 #10 (N_2)	Chrome-Plated Brass	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22375
	Single-Stage	BS 341 #3 (He, Ar, Air, N_2)	Chrome-Plated Brass	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22138

PRESSURE REGULATOR CONNECTIONS

Automatic Switchover System for Noncorrosive Gases

High-purity automatic switchover systems provide a continuous supply of high-purity gas to the laboratory, process, or instrument to allow you to replace a depleted gas source without interruption in the gas supply. Continuous gas supply is achieved by setting the two regulators at slightly different pressures and discharging one side of the system at a time. These models include flexible, all-stainless-steel pigtails with armor casing. The CGA connection on each pigtail has a check valve in the gland to prevent contamination and minimize purging requirements.

Description	Fittings	Material	qty.	cat.#
Automatic Switchover System with Line Regulator	CGA 580 (N_2, He, Ar)	Brass	ea.	20668580
	CGA 580 (N_2, He, Ar)	Stainless Steel	ea.	21593580
	CGA 350 (H_2, P_5)	Brass	ea.	20668350
	CGA 590 (Air)	Brass	ea.	20668590

20668580

Switching pressure: 200 psig/170 psig (1379/1172 kPa)
Inlet connections: flexible SS pigtails (36")
Line regulator: 0 to 150 psig (0–1034 kPa)

ULTRA-HIGH PURITY (UHP) STAINLESS-STEEL BODY GAS REGULATORS

20662

All regulators are rated to 3000 psig (20,684 kPa) maximum inlet pressure.
Inlet gauge: 0 to 4000 psig (0–27,579 kPa)
Outlet assembly: 316 L stainless-steel diaphragm valve, 1/4" tube fitting

Ultra-High Purity (UHP) Stainless-Steel Body Gas Regulators

Custom gas regulators, including regulators with an ⅛" tube fitting, are also available. Request yours today.

UHP stainless-steel regulators are the standard for ultra-high-purity and corrosion-resistant pressure regulation. They are more easily purged of atmospheric components compared to brass gas regulators, making them ideal for the most demanding applications. Stainless steel is especially useful in atmospheres of dry corrosive gases, such as hydrogen.

Dual-Stage Ultra-High Purity Stainless-Steel Gas Regulators

with CGA Fittings

- Most stable outlet pressure control.
- Secondary pressure regulation not needed.
- Also available with international fittings.

Description	Type	Fittings	Material	Outlet Gauge	Outlet Pressure	qty.	cat.#
Ultra-High-Purity Regulator	Dual-Stage	CGA 580 (N_2, He, Ar)	Stainless Steel	30", 0 to 200 psig (0–1379 kPa)	0 to 150 psig (0–1034 kPa)	ea.	20662
	Dual-Stage	CGA 350 (H_2, P_5)	Stainless Steel	30", 0 to 200 psig (0–1379 kPa)	0 to 150 psig (0–1034 kPa)	ea.	20663
	Dual-Stage	CGA 590 (Air)	Stainless Steel	30", 0 to 200 psig (0–1379 kPa)	0 to 150 psig (0–1034 kPa)	ea.	20664

BS 341 #3 Fitting

All regulators are rated to 3000 psig (20,684 kPa) maximum inlet pressure.
Inlet gauge: 0 to 4000 psig (0–27,579 kPa)
Outlet assembly: 316 L stainless-steel diaphragm valve, 1/4" tube fitting

Dual-Stage Ultra-High Purity Stainless-Steel Gas Regulators

with International Fittings

- Most stable outlet pressure control.
- Secondary pressure regulation not needed.
- Also available with CGA fittings.

Description	Type	Fittings	Material	Outlet Gauge	Outlet Pressure	qty.	cat.#
Ultra-High-Purity Regulator	Dual-Stage	BS 341 #3 (He, Ar, Air, N_2)	Stainless Steel	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22140
	Dual-Stage	BS 341 #4 (H_2)	Stainless Steel	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22141

Single-Stage Ultra-High Purity Stainless-Steel Gas Regulators

with CGA Fittings

- Use when there is secondary pressure regulation downstream.
- Identical gas purity protection as with dual-stage gas regulators.
- Also available with international fittings.

Description	Type	Fittings	Material	Outlet Gauge	Outlet Pressure	qty.	cat.#
Ultra-High-Purity Regulator	Single-Stage	CGA 580 (N_2, He, Ar)	Stainless Steel	30", 0 to 200 psig (0–1379 kPa)	0 to 150 psig (0–1034 kPa)	ea.	20665
	Single-Stage	CGA 350 (H_2, P_5)	Stainless Steel	30", 0 to 200 psig (0–1379 kPa)	0 to 150 psig (0–1034 kPa)	ea.	20666
	Single-Stage	CGA 590 (Air)	Stainless Steel	30", 0 to 200 psig (0–1379 kPa)	0 to 150 psig (0–1034 kPa)	ea.	20667

20665

All regulators are rated to 3000 psig (20,684 kPa) maximum inlet pressure.
Inlet gauge: 0 to 4000 psig (0–27,579 kPa)
Outlet assembly: 316 L stainless-steel diaphragm valve, 1/4" tube fitting

Single-Stage Ultra-High Purity Stainless-Steel Gas Regulators

with International Fittings

- Use when there is secondary pressure regulation downstream.
- Identical gas purity protection as with dual-stage gas regulators.
- Also available with CGA fittings.

Description	Type	Fittings	Material	Outlet Gauge	Outlet Pressure	qty.	cat.#
Ultra-High-Purity Regulator	Single-Stage	BS 341 #3 (He, Ar, Air, N_2)	Stainless Steel	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22142
	Single-Stage	BS 341 #4 (H_2)	Stainless Steel	30", 0 to 14 bar (0–200 psig)	0 to 10 bar (0–150 psig)	ea.	22143

BS 341 #3 Fitting

All regulators are rated to 3000 psig (20,684 kPa) maximum inlet pressure.
Inlet gauge: 0 to 4000 psig (0–27,579 kPa)
Outlet assembly: 316 L stainless-steel diaphragm valve, 1/4" tube fitting

IN-LINE GAS REGULATORS

21666

Inlet connections: 1/4" FPT
Outlet assembly: 1/4" FPT port

Ultra-High Purity Chrome-Plated Brass Line Gas Regulator

- Oxidation-resistant, chrome plated.
- Use where you need to reduce the line pressure by 20 psig (138 kPa) or more.
- Same purity protection as high-pressure cylinder regulators.
- Rated to 3000 psig (20,684 kPa) maximum inlet pressure.

Custom gas regulators are also available. Request yours today.

Note: Inline regulators are not sold with end fittings. We recommend you order the appropriate NPT Male Connectors to connect the regulator to your gas line.

Description	Fittings	Material	Outlet Gauge	Outlet Pressure	qty.	cat.#
Ultra-High-Purity Line Gas Regulator	1/4" female NPT ports	Chrome-Plated Brass	30", 0 to 100 psig (0–689 kPa)	0 to 50 psig (0–345 kPa)	ea.	21666
	1/4" female NPT ports	Chrome-Plated Brass	30", 0 to 200 psig (0–1379 kPa)	0 to 150 psig (0–1034 kPa)	ea.	22452

Tubing and Fittings

Precleaned Tubing from Restek

The integrity of a gas management system can be compromised by using tubing that has not been precleaned. Residual dirt, machine oil, and polycyclic aromatic hydrocarbons (PAHs) from the manufacturing process often found in different types of tubing will lead to problems later on. Restek uses proprietary cleaning methods to preclean copper and stainless-steel tubing for plumbing your gas management system.

Tubing

Restek offers both stainless-steel and copper tubing precleaned and ready to use. The best choice for plumbing your gas management system is stainless-steel tubing, which should always be used for hydrogen gas lines. Type 304 stainless-steel tubing is the most commonly used variety. Copper tubing is also available and is the most economical choice for plumbing your gas management system.

Fittings

When assembling your gas management system, all of your connections should be metal-to-metal connections. This ensures a leak-free connection, which is important for preventing contaminants from entering the gas stream. O-rings, gaskets, and sealing reagents should be avoided when plumbing your system to avoid contamination of the tubing and gas chromatograph. Swagelok compression fittings are ideal for making your connections, and both stainless-steel and brass fittings are offered in ¼", ⅛", and 1/16" sizes.

Setting Gas Flows and Checking for Leaks

Once your gas management system is assembled, it should be checked for leaks. Leaks allow moisture, oxygen, and other airborne contaminants to enter your system as well as accelerating your gas supply consumption. Detecting leaks with soap-based liquids should be avoided as they can contaminate your gas stream and gas chromatograph. The Restek electronic leak detector is the ideal accessory for inspecting your gas management system for leaks. This electronic leak detector can be used to determine if your system is leaking helium, hydrogen, argon, nitrogen, and carbon dioxide.

Once you have determined that your system is leak free, you can set your gas flows with the Restek ProFLOW 6000 electronic flowmeter. This flowmeter measures flow from 0.5 mL/min up to 500 mL/min with an accuracy of ± 2% or ± 0.2 mL/min, whichever is greater. The ProFLOW 6000 flowmeter is even Ex rated so that it can be used to measure flow rates of flammable gases, such as hydrogen.

Need help selecting tubing and fittings?

Visit **restek.com/contact-us** to connect with your local Restek representative or our Technical Service team.

21512

ordering notes

Maximum continuous lengths are: 1500 ft (1⁄16" and 1⁄8") and 750 ft (1⁄4" OD).

The availability of long lengths is subject to inventory constraints. Lead times may vary depending on the continuous length needed. Please inquire before ordering.

Tube cutting and straightening is available upon request.

PRECLEANED TUBING FROM RESTEK

Rinsed and Cleaned 304 Stainless-Steel Tubing

- Use for providing carrier, fuel, make-up, or auxiliary gases to laboratory instruments.
- Proprietary cleaning process used to remove residual organics.

Note: While this tubing is ultra clean, it does not meet the requirements for oxygen service specifications (for example, CGA G – 4.1, ASTM G93-03, ASTM A380).

ID	OD	Min Qty	qty.	cat.#
0.01"	1/16"	1	6-ft Roll	29000
	1/16"	1	10-ft Roll	29001
	1/16"	1	25-ft Roll	21500
	1/16"	1	50-ft Roll	29004
	1/16"	1	100-ft Roll	29005
	1/16"	101	>100 ft/price per ft	21502
0.02"	1/16"	1	6-ft Roll	29006
	1/16"	1	25-ft Roll	21503
	1/16"	1	50-ft Roll	29010
	1/16"	1	100-ft Roll	29011
	1/16"	101	>100 ft/price per ft	21505
0.03"	1/16"	1	6-ft Roll	29012
	1/16"	1	10-ft Roll	29013
	1/16"	1	25-ft Roll	21506
	1/16"	1	50-ft Roll	29017
	1/16"	1	100-ft Roll	29018
	1/16"	101	>100 ft/price per ft	21508
0.04"	1/16"	1	6-ft Roll	29019
	1/16"	1	10-ft Roll	29020
	1/16"	1	20-ft Roll	29022
	1/16"	1	25-ft Roll	21509
	1/16"	1	50-ft Roll	29023
	1/16"	1	100-ft Roll	29024
	1/16"	101	>100 ft/price per ft	21511
0.085"	1/8"	1	6-ft Roll	29025
	1/8"	1	10-ft Roll	29026
	1/8"	1	15-ft Roll	29027
	1/8"	1	20-ft Roll	29028
	1/8"	1	25-ft Roll	21512
	1/8"	1	50-ft Roll	29029
	1/8"	1	100-ft Roll	29030
	1/8"	101	>100 ft/price per ft	21514
0.21"	1/4"	1	20-ft Roll	29034
	1/4"	1	25-ft Roll	21515
	1/4"	1	50-ft Roll	29035
	1/4"	1	100-ft Roll	29036
	1/4"	101	>100 ft/price per ft	21517

Cleaned Copper Tubing

- Use for plumbing GC systems.
- Proprietary cleaning process used to remove residual organics.

Note: While this tubing is ultra clean, it does not meet the requirements for oxygen service specifications (for example, CGA G – 4.1, ASTM G93-03, ASTM A380).

ID	OD	Max Pressure	Wall Thickness	Min Qty	qty.	cat.#
0.065"	1/8"	2800 psig	0.030"	1	50 ft	22628
0.190"	1/4"	1000 psig	0.030"	1	50 ft	22629

22629

FITTINGS

Swagelok Tee (Brass, Stainless Steel & Treated)

Description	Size	Material	Vendor cat.#	qty.	Similar to Part #	cat.#
Tee	1/16"	Brass	B-100-3	2-pk.	Parker 1ET1-B; Supelco/Millipore Sigma 22132-U	23121
	1/16"	Stainless Steel	SS-100-3	ea.	Supelco/Millipore Sigma 22133-U	23171
	1/16"	Siltek/Sulfinert-Treated	SS-100-3	ea.	PerkinElmer NR410341	22543
	1/4"	Brass	B-400-3	2-pk.	Supelco/Millipore Sigma 22010-U	23123
	1/4"	Stainless Steel	SS-400-3	ea.	Supelco/Millipore Sigma 22036	23173
	1/4"	Siltek/Sulfinert-Treated	SS-400-3	ea.		22545
	1/4"	Silcosteel-CR Treated	SS-400-3	ea.		22580
	1/8"	Brass	B-200-3	2-pk.	Supelco/Millipore Sigma 22020-U	23122
	1/8"	Stainless Steel	SS-200-3	ea.	Supelco/Millipore Sigma 22046	23172
	1/8"	Siltek/Sulfinert-Treated	SS-200-3	ea.		22544
	1/8"	Silcosteel-CR Treated	SS-200-3	ea.		22579
	3/8"	Siltek/Sulfinert-Treated	SS-600-3	ea.		22910

Swagelok Union (Brass, Stainless Steel & Treated)

Description	Size	Material	Vendor cat.#	qty.	Similar to Part #	cat.#
Union	1/16"	Brass	B-100-6	3-pk.	Agilent 0100-1316; Parker 1SC1-B; Supelco/Millipore Sigma 22025	23115
	1/16"	Stainless Steel	SS-100-6	ea.	Supelco/Millipore Sigma 22051-U	23165
	1/16"	Siltek/Sulfinert-Treated	SS-100-6	ea.	PerkinElmer NR410342	22540
	1/4"	Brass	B-400-6	5-pk.	Supelco/Millipore Sigma 22004	23117
	1/4"	Stainless Steel	SS-400-6	2-pk.	Supelco/Millipore Sigma 22030-U	23167
	1/4"	Siltek/Sulfinert-Treated	SS-400-6	ea.		22542
	1/4"	Silcosteel-CR Treated	SS-400-6	ea.		22577
	1/8"	Brass	B-200-6	5-pk.	Supelco/Millipore Sigma 22015	23116
	1/8"	Stainless Steel	SS-200-6	2-pk.	Supelco/Millipore Sigma 22041	23166
	1/8"	Siltek/Sulfinert-Treated	SS-200-6	ea.		22541
	3/8"	Siltek/Sulfinert-Treated	SS-600-6	ea.		22909

23159

Swagelok Fittings

Restek is pleased to offer one of the premier lines of fittings available for chromatographers in the market today. We can supply the entire line of Swagelok fittings. Fittings are available in several materials and treatments. If you don't see the exact product you're looking for, please call us for a quote.

Swagelok Nut & Ferrule Set (Brass & Stainless Steel)

Description	Size	Material	Vendor cat.#	qty.	Similar to Part #	cat.#
Nut & Ferrule Set	1/16"	Brass	B-102-1 (nut) + B-100-SET (ferrule set)	10-pk.	Supelco/Millipore Sigma 22024	23109
	1/16"	Stainless Steel	SS-100-NFSET (nut and ferrule set)	2-pk.	Supelco/Millipore Sigma 22050	23159
	1/4"	Brass	B-400-NFSET (nut and ferrule set)	20-pk.	Supelco/Millipore Sigma 22003	23111
	1/4"	Stainless Steel	SS-400-NFSET (nut and ferrule set)	5-pk.	Supelco/Millipore Sigma 22029	23161
	1/8"	Brass	B-202-1 (nut) + B-200-SET (ferrule set)	20-pk.	Supelco/Millipore Sigma 22014	23110
	1/8"	Stainless Steel	SS-200-NFSET (nut and ferrule set)	5-pk.	Supelco/Millipore Sigma 22040-U	23160

Note: Nuts and ferrules are not treated unless requested (custom parts). Nuts and ferrules normally are not in contact with sample pathway and thus do not require coating.

Swagelok Toggle Valve

Shutoff Gas Valve

Note: Restek strongly recommends using a filter between these valves and the instrument. The filter will capture any potential volatile components released from the lubricant used in the valve.

Description	Size	Material	Vendor cat.#	qty.	Similar to Part #	cat.#
Toggle Valve	1/8"	Brass	B-OGS2	ea.	Parker 2A-V4LQ-BP	23142
	1/8"	Stainless Steel	SS-OGS2	ea.	Parker 2A-V4LQ-SSP	23198
	1/4"	Brass	B-1GS4	ea.	Parker 4A-V4LQ-BP	23143
	1/4"	Stainless Steel	SS-1GS4	ea.	Parker 4A-V4LQ-SSP	23199

Swagelok Ball Valve

Shutoff Gas Valve

Note: Restek strongly recommends using a filter between these valves and the instrument. The filter will capture any potential volatile components released from the lubricant used in the valve.

Description	Size	Material	Vendor cat.#	qty.	Similar to Part #	cat.#
Ball Valve	1/8"	Brass	B-41S2	ea.	Parker 2A-B2LJ2-BP	23144
	1/8"	Stainless Steel	SS-41GS2	ea.	Parker 2A-B2LJ2-SSP	23200
	1/4"	Brass	B-42S4	ea.	Parker 4A-B2LJ2-BP	23145
	1/4"	Stainless Steel	SS-42GS4	ea.	Parker 4A-B2LJ2-SSP	23201

Swagelok 3-Way Ball Valve

Note: Restek strongly recommends using a filter between these valves and the instrument. The filter will capture any potential volatile components released from the lubricant used in the valve.

Description	Size	Material	Vendor cat.#	qty.	Similar to Part #	cat.#
Ball Valve, 3-Way	1/8"	Brass	B-41XS2	ea.	Parker 2A-MB2XPFA-BP	23219
	1/8"	Stainless Steel	SS-41GXS2	ea.	Parker 2A-MB2XPFA-SSP	23217
	1/4"	Brass	B-42XS4	ea.	Parker 4A-MB4XPFA-BP	23220
	1/4"	Stainless Steel	SS-42GXS4	ea.	Parker 4A-MB4XPFA-SSP	23218

Swagelok Plug Valve

Shutoff Gas Valve

Note: Restek strongly recommends using a filter between these valves and the instrument. The filter will capture any potential volatile components released from the lubricant used in the valve.

Description	Size	Material	Vendor cat.#	qty.	Similar to Part #	cat.#
Plug Valve	1/8"	Brass	B-2P4T	ea.	Parker 2A-PR4-VT-B	23146
	1/8"	Stainless Steel	SS-2P4T	ea.	Parker 2A-PR4-VT-SS	23202
	1/4"	Brass	B-4P4T	ea.	Parker 4A-PR4-VT-B	23147
	1/4"	Stainless Steel	SS-4P4T	ea.	Parker 4A-PR4-VT-SS	23203

28500

Leak Detector Specifications
Detectable Gases: Helium, nitrogen, argon, carbon dioxide, hydrogen*
Battery: Rechargeable nickel-metal hydride (NiMH) internal battery pack (12 hours normal operation)
Ambient Temperature: 50–98.6 °F (10–37 °C)
Humidity Range: 0–97%
Warranty: One year
Certification/Compliance: CE (EU, Korea, Japan, Australia); CSA/UL tested, not listed; WEEE; CEC; China RoHS 2; UKCA
Indoor Use Only

Limits of Detection
These gases can be detected with the Restek electronic leak detector at the following leak rates:
Minimum Detectable Gas Limits and Indicating LED Color:
Helium, 1.0 x 10^{-5}, red LED
Hydrogen*, 1.0 x 10^{-5}, red LED
Nitrogen, 1.4 x 10^{-3}, yellow LED
Argon, 1.0 x 10^{-4}, yellow LED
Carbon dioxide, 1.0 x 10^{-4}, yellow LED

Gas detection limits measured in atm cc/sec.

Avoid using liquid leak detectors on a GC! Liquids can be drawn into the system and/or into the leak detector.

*Caution: The Restek electronic leak detector should only be used to detect trace amounts of hydrogen in a noncombustible environment. It is NOT designed for determining leaks in a combustible environment. A combustible gas detector should be used for determining combustible gas leaks under any condition. When using it to detect hydrogen, the Restek electronic leak detector may only be used for determining trace amounts in a GC environment.

CHECKING FOR LEAKS

Restek Electronic Leak Detector

Prevent small leaks from causing big problems with a Restek leak detector.

- Detects a broad range of gases and indicates leak severity with both an LED display and audible tone.
- No more waiting for a full charge—can be operated during charging or used up to 12 hours between charges.
- Charging kit includes both universal AC power adaptor and USB charging cable, so you can charge anywhere, anytime.
- Pinpoint very small gas leaks quickly and accurately before they cause damage and downtime.
- Compact, handheld unit is easy to operate and convenient to use anywhere you need to check for leaks.

Features & benefits include:

- Detects a broad range of gases.
- Audible tone and LED display indicate the severity of a leak.
- Can be operated during charging or used up to 12 hours between charges.
- Ergonomic, handheld design.
- Rugged side grips for added durability.
- Handy probe storage for cleanliness and convenience.
- Automatic shutoff.
- A convenient carrying and storage case.
- Easy-to-clean probe assembly.
- A universal AC power adaptor (U.S., UK, Europe, Australia, Japan).
- USB charging cable.

Backed by a one-year warranty, the Restek leak detector is the industry standard for performance and affordability in handheld leak detectors.

Description	Includes	qty.	cat.#
Restek Electronic Leak Detector	carrying case, universal AC power adaptor [U.S., UK, Europe, Australia, Japan], 6-ft USB charging cable	ea.	28500
Small Probe Adaptor for Leak Detector		ea.	22658
Dynamic Duo Combo Pack (Restek Leak Detector and ProFLOW 6000 Flowmeter)	Restek Electronic Leak Detector (cat.# 28500) & ProFLOW 6000 Flowmeter (cat.# 22656)	kit	22654
Soft-Sided Storage Case for Restek Leak Detector or ProFLOW 6000 Flowmeter		ea.	22657

SETTING GAS FLOWS

Restek ProFLOW 6000 Electronic Flowmeter

State-of-the-art features include:

- Measures volumetric flow for gases across a range of 0.5–500 mL/min.
- NIST traceable calibration.
- Ex rating (electrical apparatus for explosive gas atmospheres) for hydrogen and related gas types.
- Accuracy of ± 2.00% of flow reading or ± 0.200 mL/min, whichever is greater.
- Over-range warning indicator.
- Auto shutoff feature.
- Use as a benchtop or handheld unit.
- Ergonomic design and side grips for comfort.
- Measures most gas types.*
- Convenient carrying/storage case included.
- Uses two AA batteries (included).
- Data output via USB port.
- One-year warranty (excludes recalibration).
- Recalibration service available.

*The flowmeter is designed to measure clean, dry, noncorrosive gases.

Description	qty.	cat.#
Restek ProFLOW 6000 Electronic Flowmeter with Hard-Sided Carrying Case	ea.	22656

Patented

22656

Flowmeter Specifications
Type of Flowmeter: Volumetric
Battery: 2-AA
Operating Temp. Range: 32–120 °F (0–48 °C)
Warranty: One-year warranty (excludes recalibration)
Certification/Compliance: CE, Ex, Canadian ICES-003, WEEE, RoHS 2, China RoHS 2, UKC

Gas Purifiers

Gas purification is essential in your gas management system. Carrier gases must contain less than 1 ppm of oxygen, water vapor, or any other trace contaminant to prevent column degradation, shortened column lifetime, and increased stationary phase bleed. Contaminants cause ghost peaks to appear during temperature programming and degrade the quality of analytical data. The expense of using high-purity gases in combination with carrier gas purifiers will be offset by longer column lifetime and less instrument maintenance along with better instrument sensitivity. Gas purifiers are available for specific types of contamination (moisture, hydrocarbon, or oxygen) or as a combination of filters that provides broader protection. These purifiers can be installed in-line or using a quick-install baseplate system.

Moisture Removal

Moisture in carrier gas lines will prematurely degrade oxygen and hydrocarbon traps and increase detector noise (particularly with ECDs). As a precaution, you should install a moisture trap before the hydrocarbon and oxygen traps on all carrier gas lines. Moisture traps should also be installed on fuel gas lines, especially if using a gas generator.

Hydrocarbon Removal

Use a hydrocarbon trap if your gas has a potential source of hydrocarbon contaminants (e.g., an oil pump in an air compressor) or if you suspect you are observing carrier gas ghost peaks. Install the hydrocarbon trap after the moisture trap to prevent moisture from degrading the hydrocarbon-trapping ability of the activated carbon in the hydrocarbon trap.

Oxygen Removal

Oxygen is a GC column killer, and it can enter the system at any connection that is leaking. Because oxygen can enter a gas line at any fitting, the oxygen trap should be the last connection before the gas line enters the chromatograph. Oxygen traps should only be used to clean fuel and carrier gas streams with very low moisture content because water can react with the oxygen trapping and indicating media. They are recommended for use with high-purity gas cylinders and palladium-purified hydrogen generators (H2PEMPD). Palladium purification lowers oxygen and moisture concentrations in the hydrogen gas to levels compatible with oxygen traps. Oxygen traps should not be used with PEM hydrogen generators because they lack palladium purification and, thus, the hydrogen gas they produce through the electrolysis of water can contain a high concentration (percent levels) of water. Oxygen traps (including triple filters) are not suitable for gas streams with moisture concentrations greater than part-per-million levels, and damage can result if they are used under high moisture conditions. In addition, oxygen traps should never be used on air gas lines.

Leak Checking

To prevent column degradation, increase column lifetime, and decrease stationary phase bleed, carrier gas supply lines need to be leak free to prevent the introduction of oxygen. This can be monitored by frequently leak checking all carrier gas system connections using the Restek electronic leak detector.

Rely on Restek for Gas Management

An effective gas management system is essential to obtaining accurate, reliable GC results. Restek offers the products and expertise to help you set up and maintain the right system for your lab. Whether you use gas generators or freestanding cylinders, we have the equipment you need to ensure a reliable, high-purity gas stream to your GC instruments.

Need help selecting a gas purifier?

Visit **restek.com/contact-us** to connect with your local Restek representative or our Technical Service team.

SUPER-CLEAN BASEPLATE GAS FILTERS

Restek Super Clean Gas Filter Kits

- High-purity output ensures 99.9999% pure gas (at max. flow of 2 L/min).
- Designed for easy, hassle-free cartridge changes.
- Glass inside to prevent diffusion, polycarbonate housing outside for safety.
- The indicator code is shown on every trap so there is no confusion determining when a trap needs to be replaced.

Description	Includes	Fittings	Used with	qty.	Similar to Part #	cat.#
Carrier Gas Cleaning Kit	Mounting Baseplate; 1/8" Inlet/Outlet Fittings; and Oxygen/Moisture/Hydrocarbon Triple Gas Filter	1/8" Brass		kit	Agilent 5182-9704	22019
Fuel Gas Purification Kit	Mounting Baseplate, 1/8" Inlet/Outlet Fittings, and Hydrocarbon/Moisture Fuel Gas Filter	1/8" Brass		kit		22021
Gas Filter Bundle Kit	Triple Gas Filter (1), (cat.# 22020); and Fuel Gas Filters (2), (cat.# 22022)			kit	Agilent 5183-4769	22031
Helium-Specific Carrier Gas Cleaning Kit	Mounting Baseplate; 1/8" Inlet/Outlet Fittings; and Oxygen/Moisture/Hydrocarbon Helium-Specific Filter	1/8" Brass		kit	Agilent 5188-6475	21983
Super Clean Combi (CO_2, Sulfur, Moisture) Filter Kit	Replacement CO_2, Sulfur, Moisture Filter, Baseplate with 1/4" Brass Fittings	1/4" Brass	Ideal for TOC analyzers and zero air generators.	kit		23844
	Replacement CO_2, Sulfur, Moisture Filter, Baseplate with 1/8" Brass Fittings	1/8" Brass	Ideal for TOC analyzers and zero air generators.	kit		23845
	Replacement CO_2, Sulfur, Moisture Filter, Baseplate with 1/4" Stainless Steel Fittings	1/4" Stainless Steel	Ideal for TOC analyzers and zero air generators.	kit		23846
	Replacement CO_2, Sulfur, Moisture Filter, Baseplate with 1/8" Stainless Steel Fittings	1/8" Stainless Steel	Ideal for TOC analyzers and zero air generators.	kit		23847

22021

Each baseplate unit measures: 4" x 4" x 1 7/8" (10.2 x 10.2 x 4.8 cm).

Standard baseplate inlet/outlet fittings accept 1/8" tubing. To adapt to 1/4" tubing, order 1/8" to 1/4" tube end reducers.

Specifications for Super Clean Gas Filters

Restek Super Clean Traps measure: 10 5/8" x 1 3/4" (27 x 4.4 cm).

					-----Capacity------				
Type of Filter	**Outlet Gas Quality (%)**	**Maximum Pressure/ Maximum Flow Rates**	**Use for:**	**Indicator Color Change**	**H_2O (g)**	**O_2 (mL)**	**Hydrocarbons (g) (as *n*-butane)**	**Carbon Dioxide (g)**	**Estimated Lifetime (years)**
Moisture cat.# 22028	>99.9999	15 bar 217 psi/ 7 L/min.	Inert carrier gas Air Hydrogen	Yellow/orange to clear	7.2	—	—	—	>2.0
Oxygen cat.# 22029	>99.9999	15 bar 217 psi/ 7 L/min.	Inert carrier gas Hydrogen	Green to grey	NA	150	—	—	>2.0
Hydrocarbons cat.# 22030	>99.9999	15 bar 217 psi/ 7 L/min.	Inert carrier gas Air Hydrogen	No indicator	NA	—	12	—	>2.0
Fuel Gas[1] cat.# 22022	>99.9999	15 bar 217 psi/ 7 L/min.	Inert carrier gas Air Hydrogen	Yellow/orange to clear	3.5	—	6	—	>1.5
Triple[2] cat.# 22020	>99.9999	15 bar 217 psi/ 7 L/min.	Inert carrier gas Hydrogen	Yellow/orange to clear Green to grey	1.8	75	4	—	>1.0
Helium Specific[2] cat.# 21982	>99.9999	15 bar 217 psi/ 7 L/min.	Helium	Yellow/orange to clear Green to grey	1.8	75	4	—	>1.0
CO_2, Sulfur, Moisture cat.# 23843	>99.9999	15 bar 217 psi/ 7 L/min.	Inert carrier gas Air Hydrogen	Yellow/orange to clear Grey to white	3.5	—	—	6	>2.0

[1] Removes hydrocarbons, moisture.
[2] Removes hydrocarbons, moisture, oxygen.

Note:
Restek replacement filters fit all cartridge filter baseplates regardless of manufacturer. However, if the baseplate was manufactured by Agilent or Varian, the retaining nut that came with the original filter will not work and will require a universal ring nut. Please contact customer service to receive a complimentary universal ring nut.

22030

Restek Super Clean Ultra-High Capacity Hydrocarbon Filter

- Glass inside to prevent diffusion, polycarbonate housing outside for safety.

Description	qty.	Similar to Part #	cat.#
Ultra-High Capacity Hydrocarbon Filter	ea.	Agilent 5182-0820, CP17972; Scion/Bruker/Varian BRS0103	22030

22028

Restek Super Clean Ultra-High Capacity Moisture Filter

- Restek Super Clean ultra-high capacity moisture filter cartridges feature easy-to-read indicators.
- Glass inside to prevent diffusion, polycarbonate housing outside for safety.
- The indicator code is shown on every trap so there is no confusion determining when a trap needs to be replaced.

Description	qty.	Similar to Part #	cat.#
Ultra-High Capacity Moisture Filter	ea.	Agilent 5182-0817, CP17971; Scion/Bruker/Varian BRS0101	22028

22029

Restek Super Clean Ultra-High Capacity Oxygen Filter

- Restek Super Clean ultra-high capacity oxygen filter cartridges feature easy-to-read indicators.
- Glass inside to prevent diffusion, polycarbonate housing outside for safety.
- The indicator code is shown on every trap so there is no confusion determining when a trap needs to be replaced.

Description	qty.	Similar to Part #	cat.#
Ultra-High Capacity Oxygen Filter	ea.	Agilent 5182-0818, CP17970; Scion/Bruker/Varian BRS0102	22029

Replacement Gas Filters for Restek Super Clean Gas Filter Kits

- High-purity output ensures 99.9999% pure gas (at max. flow of 2 L/min).
- Designed for easy, hassle-free cartridge changes.
- Glass inside to prevent diffusion, polycarbonate housing outside for safety.
- The indicator code is shown on every trap so there is no confusion determining when a trap needs to be replaced.

Description	Used with	qty.	Similar to Part #	cat.#
Replacement CO_2, Sulfur, Moisture Filter	Ideal for TOC analyzers and zero air generators.	ea.		23843
Replacement Fuel Gas Filter (removes moisture and hydrocarbons)		ea.	Agilent 5183-4771	22022
Replacement Helium-Specific Gas Filter (removes oxygen, moisture, and hydrocarbons)		ea.	Agilent 5188-6474, CP17973	21982
Replacement Triple Gas Filter (removes oxygen, moisture, and hydrocarbons)		ea.	Agilent 5182-9705, CP17973	22020

Restek Filter Baseplates

- End fittings available in brass or stainless steel.
- Baseplates fit all stand-alone Super Clean gas filters offered.

Description	Material	Dimensions	Type	qty.	Similar to Part #	cat.#
Filter Baseplate	Brass	4" x 4" x 1 7/8" (10.2 x 10.2 x 4.8 cm)	Single-Position	ea.	Agilent CP7988	22025
	Stainless Steel	4" x 4" x 1 7/8" (10.2 x 10.2 x 4.8 cm)	Single-Position	ea.	Agilent 5182-0815	22344
	Brass	8" x 4" x 1 7/8" (20.3 x 10.2 x 4.8 cm)	2-Position	ea.	Agilent CP738407	22026
	Stainless Steel	8" x 4" x 1 7/8" (20.3 x 10.2 x 4.8 cm)	2-Position	ea.	Agilent 5182-9706	22345
	Brass	12" x 4" x 1 7/8" (30.5 x 10.2 x 4.8 cm)	3-Position	ea.		22027
	Stainless Steel	12" x 4" x 1 7/8" (30.5 x 10.2 x 4.8 cm)	3-Position	ea.	Agilent 5182-9707	22346

Standard baseplate inlet/outlet fittings accept 1/8" tubing. To adapt to 1/4" tubing, order 1/8" to 1/4" tube end reducers.

IN-LINE SUPER CLEAN PURIFICATION GAS TRAPS

Restek Click-On In-Line Super Clean Gas Traps and Connector Kits

- High-purity output ensures 99.9999% pure gas.
- Click-On fittings for easy, leak-tight cartridge changes; brass or stainless steel, ¼" or ⅛".
- Triple gas trap is ideal for purifying carrier gas—it contains oxygen, moisture, and hydrocarbon scrubbers in one cartridge.
- Fuel gas trap is ideal for purifying flame ionization detector (FID) fuel gases, removing both moisture and hydrocarbons.
- Helium-specific triple gas trap is ideal for GC-MS—it contains oxygen, moisture, and hydrocarbon scrubbers in one cartridge.

Description	Includes	Fittings	qty.	cat.#
Carrier Gas Purification Kit	1/8" SS connectors (2) and oxygen/moisture/hydrocarbon triple trap (1)	1/8" Stainless Steel	kit	22456
	1/8" brass connectors (2) and oxygen/moisture/hydrocarbon triple trap (1)	1/8" Brass	kit	22457
	1/4" SS connectors (2) and oxygen/moisture/hydrocarbon triple trap (1)	1/4" Stainless Steel	kit	22458
	1/4" brass connectors (2) and oxygen/moisture/hydrocarbon triple trap (1)	1/4" Brass	kit	22459
Fuel Gas Purification Kit	1/8" SS connectors (4) and hydrocarbon/moisture traps (2)	1/8" Stainless Steel	kit	22460
	1/8" brass connectors (4) and hydrocarbon/moisture traps (2)	1/8" Brass	kit	22461
	1/4" SS connectors (4) and hydrocarbon/moisture traps (2)	1/4" Stainless Steel	kit	22462
	1/4" brass connectors (4) and hydrocarbon/moisture traps (2)	1/4" Brass	kit	22463
Helium-Specific Carrier Gas Cleaning Kit	1/8" SS connectors (2) and oxygen/moisture/hydrocarbon helium-specific triple trap (1)	1/8" Stainless Steel	kit	22469
	1/8" brass connectors (2) and oxygen/moisture/hydrocarbon helium-specific triple trap (1)	1/8" Brass	kit	22470
	1/4" SS connectors (2) and oxygen/moisture/hydrocarbon helium-specific triple trap (1)	1/4" Stainless Steel	kit	22471
	1/4" brass connectors (2) and oxygen/moisture/hydrocarbon helium-specific triple trap (1)	1/4" Brass	kit	22472

Did you know?

Trap replacement depends on the quality of the incoming gas. Use the double connector and install an indicating cartridge after a trap to indicate when the trap should be replaced.

To prevent settling of desiccant, mount vertically, not horizontally.

Specifications for Click-On Inline Super-Clean Purification Gas Traps
Click-On Traps measure: 8 1/2" x 1 1/4" (21.6 x 3.2 cm)

					-----Capacity------			
Type of Filter	**Gas Quality at Outlet**	**Maximum Pressure**	**Maximum Flow (L/min.)**	**Use for:**	**H_2O (g)**	**O_2 (mL)**	**Hydrocarbons (g) (as *n*-butane)**	**Estimated Lifetime (years)**
Moisture cat.# 22467	>99.9999	11 bar 160 psi	25	Inert carrier gas Helium Air Hydrogen	15	NA	NA	>3
Oxygen cat.# 22468	>99.9999	11 bar 160 psi	25	Inert carrier gas Hydrogen	NA	2000	NA	>3
Hydrocarbon cat.# 22466	>99.9999	11 bar 160 psi	25	Inert carrier gas Helium Air Hydrogen	NA	NA	24	>3
Fuel Gas[1] cat.# 22465	>99.9999	11 bar 160 psi	25	Inert carrier gas Helium Air Hydrogen	7	NA	12	>2
Triple[2] cat.# 22464	>99.9999	11 bar 160 psi	25	Inert carrier gas Hydrogen	4	1000	8	>2
Helium-Specific Triple[2] cat.# 22473	>99.9999	11 bar 160 psi	25	Helium	4	1000	8	>2

[1] Removes hydrocarbons, moisture.
[2] Removes hydrocarbons, moisture, oxygen.

Note:
Super-Clean Gas Filters are recommended for purifying noncorrosive gases with low concentrations of contaminants. The maximum concentration of oxygen in the incoming gas stream for oxygen purifiers is 0.5%.

IN-LINE GAS TRAPS

Specifications for In-Line Filters

Indicating Oxygen Trap

- Removes oxygen to low ppb levels from He, Ar, N_2, or methane.
- Indicator changes from green to gray when adsorption capacity is depleted.
- Can be used with nonoxidizing gases such as He, Ar, N_2, H_2, or CH_4.
- Heavy-walled inner glass tube is protected by a sealed outer plastic tube to prevent oxygen and water infusion.
- Pre-purged for fast stabilization.
- 160 psi (1103 kPa) maximum operating pressure.
- Reduces oxygen to 100 ppb.
- 10 µm frits at inlet and outlet.
- Optimal flow rate: < 150 mL/min.

Oxygen Indicator

Description	Fittings	Dimensions	qty.	Similar to Part #	cat.#
Indicating Oxygen Trap	1/8" Brass	10" x 1 1/4" (25.4 x 3.2 cm)	ea.		22010
	1/4" Brass	10" x 1 1/4" (25.4 x 3.2 cm)	ea.		22011
	1/8" Stainless Steel	13" x 1.5" (33 x 3.8 cm)	ea.	Agilent 5182-9202	23804
	1/4" Stainless Steel	13" x 1.5" (33 x 3.8 cm)	ea.	Agilent 5182-9402	23805

Specifications for In-Line Filters

					-----Capacity------				
Type of Filter	**Maximum Pressure**	**Maximum Flow Rates**	**Use for:**	**Indicator Color Change**	**H_2O (g)**	**O_2 (mL)**	**Hydrocarbons (g) (as *n*-butane)**	**Carbon Dioxide (g)**	**Estimated Lifetime (years)**
Oxygen cat.# 22010, 22011, 23804, 23805	11 bar/160 psi	2 SLPM	Inert carrier gas, He, N_2, H_2, Ar	Green to Grey	—	45	NA	NA	>1
Moisture cat.# 22014, 22015, 23806, 23807	11 bar/160 psi	2 SLPM	Inert carrier gas, He, N_2, H_2, Ar, Air	Yellowish Green to Blue	6.0	—	—	—	>1
Carrier Gas cat.# 23808, 23809, 23810, 23811	11 bar/160 psi	400 mL/min	Inert carrier gas, He, N_2, H_2, Ar	2 indicators: Blue to Brown (moisture); Green to Gray (oxygen)	1.4	80	1	—	>1
Detector Gas cat.# 23812, 23813, 23814, 23815	11 bar/160 psi	2 SLPM	Inert carrier gas, He, N_2, H_2, Ar, Air	Yellowish Green to Blue	3.0	—	2	—	>1
CO_2 cat.# 23816, 23817, 23818, 23819	68.9 bar/1000 psi	1300 cc/min	He, N_2, H_2, Ar, Air	NA	—	—	—	19	>1

Indicating Moisture Trap

- Reduces water to less than 10 ppb. Indicator changes from yellowish green to blue at 5% relative humidity (suitable for general use).
- Pre-purged for fast stabilization.
- Reduces noise from high-sensitivity detectors.
- Heavy-walled glass body prevents oxygen and water infusion.
- 10 µm frit prevents microparticulate damage to needle valves and flow controllers.
- Maximum operating pressure: 160 psi (1103 kPa).

Moisture capacity: 6 g of water
Maximum flow: 1 L/min

Description	Fittings	Dimensions	qty.	cat.#
Indicating Moisture Trap	1/8" Brass	13" x 2" (33 x 5.1 cm)	ea.	22014
	1/4" Brass	13" x 2" (33 x 5.1 cm)	ea.	22015
	1/8" Stainless Steel	13" x 1.5" (33 x 3.8 cm)	ea.	23806
	1/4" Stainless Steel	13" x 1.5" (33 x 3.8 cm)	ea.	23807

Oxygen Indicator

Indicating Carrier Gas Purifier

- Removes multiple impurities such as O_2, H_2O, CO_2, CO, halogenated compounds, siloxanes, hydrocarbons (heavier than butane), sulfur-containing molecules, and ammonia from inert gases (He, Ar, N_2, and H_2).
- Can be used with other filters to provide endpoint detection.
- Contains highly sensitive visual indicators for oxygen and water contamination. The oxygen indicator signals breakthrough when the adsorbent changes from green to grey, and the moisture indicator signals breakthrough by changing from blue to brown.
- Heavy-walled inner glass tube is protected by a sealed, outer plastic tube to further protect against leaks.

Description	Fittings	Dimensions	qty.	cat.#
Indicating Carrier Gas Purifier	1/8" Brass	13" x 1.5" (33 x 3.8 cm)	ea.	23809
	1/4" Brass	13" x 1.5" (33 x 3.8 cm)	ea.	23808
	1/8" Stainless Steel	13" x 1.5" (33 x 3.8 cm)	ea.	23811
	1/4" Stainless Steel	13" x 1.5" (33 x 3.8 cm)	ea.	23810

Indicating Detector Gas Purifier

- Removes moisture and hydrocarbons (C5 and heavier) from dry air or inert gases.
- Indicator signals breakthrough by changing from yellowish green to blue at low relative humidity to warn of leaks in the gas stream.
- The inner glass tube contains activated carbon, moisture indicator, and molecular sieve.
- 10 µm frits at both ends of the filter.
- Heavy-walled inner glass tube is protected by a sealed outer plastic tube to further protect against leaks.

Description	Fittings	Dimensions	qty.	cat.#
Indicating Detector Gas Purifier	1/8" Brass	13" x 1.5" (33 x 3.8 cm)	ea.	23813
	1/4" Brass	13" x 1.5" (33 x 3.8 cm)	ea.	23812
	1/8" Stainless Steel	13" x 1.5" (33 x 3.8 cm)	ea.	23815
	1/4" Stainless Steel	13" x 1.5" (33 x 3.8 cm)	ea.	23814

Carbon Dioxide Trap

- Removes carbon dioxide from inert gases He, Ar, N_2, H_2, and clean dry air (CDA) to low ppb levels.
- Functions by consuming carbon dioxide in a reaction with highly dispersed NaOH on a silicate support (reaction produces water that remains adsorbed in the purifier).
- In highly critical applications, consider using an additional moisture trap after the CO_2 trap as a safety measure.

Description	Fittings	Dimensions	qty.	cat.#
Carbon Dioxide Trap	1/8" Brass	13" x 1.5" (33 x 3.8 cm)	ea.	23816
	1/4" Brass	13" x 1.5" (33 x 3.8 cm)	ea.	23817
	1/8" Stainless Steel	13" x 1.5" (33 x 3.8 cm)	ea.	23818
	1/4" Stainless Steel	13" x 1.5" (33 x 3.8 cm)	ea.	23819

20600

High-Capacity Oxygen Trap

- Removes up to 135 ml of oxygen or 2 g of water.
- Long life—typically purifies more than 480 cu ft of inert gas.
- Reduces oxygen to 15 ppb.
- Maximum operating pressure: 250 psi (1724 kPa).
- Flow: 3 L/min @ 32 psi (221 kPa).

Description	Fittings	Dimensions	qty.	cat.#
High-Capacity Oxygen Trap	1/8" Nickel-Plated Brass	11" x 1 1/2" (27.9 x 3.8 cm)	ea.	20601
	1/4" Nickel-Plated Brass	11" x 1 1/2" (27.9 x 3.8 cm)	ea.	20600

21997

Moisture capacity: 16 g of water

High-Capacity Moisture Trap

- Purged with ultra-high-purity helium; ready to use with any carrier gas, including hydrogen.
- Reduces water to less than 15 ppb.
- Maximum operating pressure: 250 psi (1724 kPa).
- Maximum flow: 1.25 L/min.

Description	Fittings	Dimensions	qty.	Similar to Part #	cat.#
High-Capacity Moisture Trap	1/8" Nickel-Plated Brass	11" x 1 1/2" (27.9 x 3.8 cm)	ea.		21997
	1/4" Nickel-Plated Brass	11" x 1 1/2" (27.9 x 3.8 cm)	ea.	Agilent MT200-4	20638

21991

Capillary-Grade Hydrocarbon Trap

- Packed with an extremely high surface area, baked coconut shell–based activated carbon.
- Purged with ultra-high-purity helium; ready to use with any carrier gas, including hydrogen.
- Reduces organics to 0.1 ppm (assuming 100 ppm input).
- Maximum operating pressure: 250 psi (1724 kPa).

Description	Fittings	Dimensions	qty.	cat.#
Capillary-Grade Hydrocarbon Trap	1/8" Nickel-Plated Brass	11" x 1 1/2" (27.9 x 3.8 cm)	ea.	21991
	1/4" Nickel-Plated Brass	11" x 1 1/2" (27.9 x 3.8 cm)	ea.	21992

RESTEK

www.restek.com

Lit. Cat.# GNSS1758F-UNV