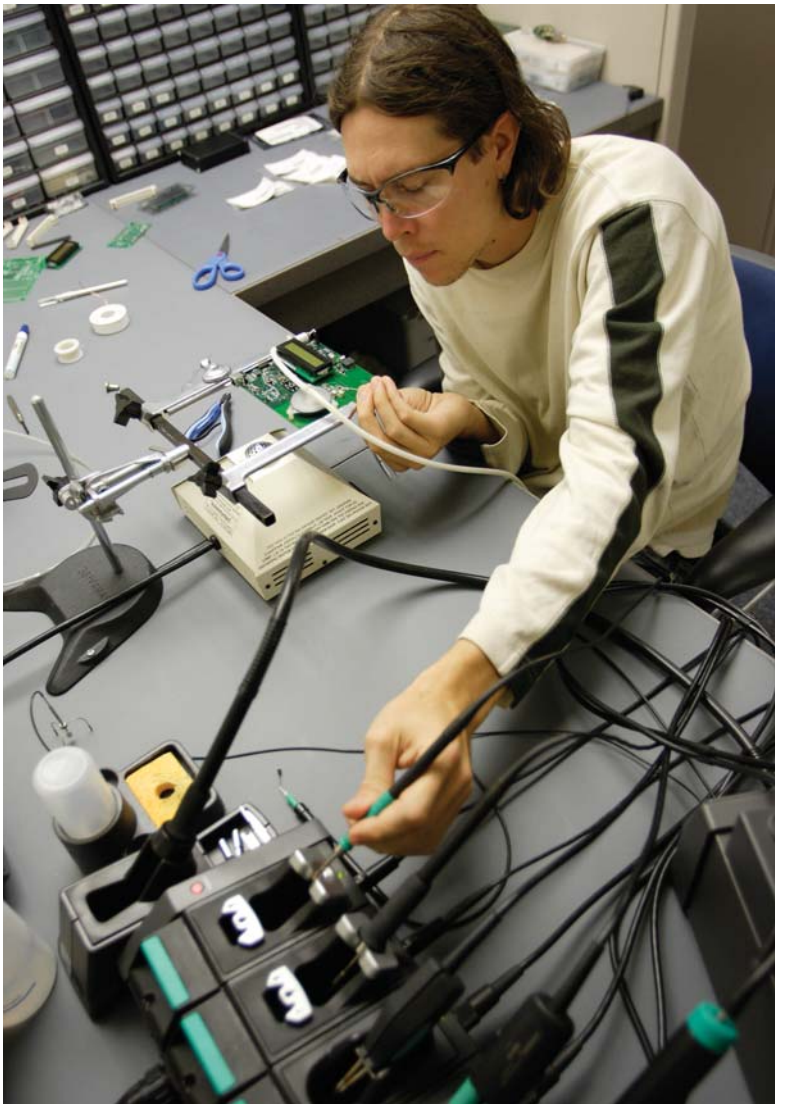
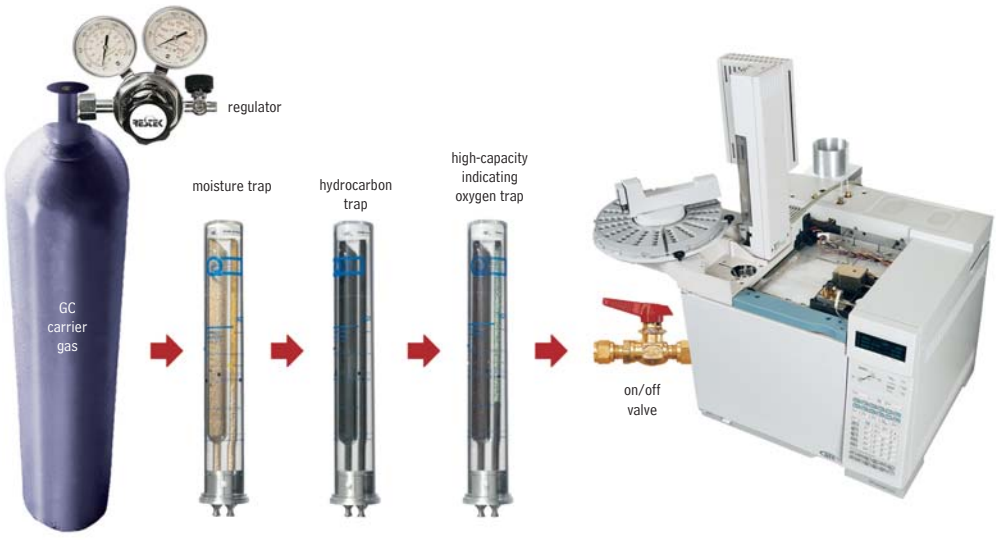
Purus Gas Systems



Top: Brandon Tarr, Product Development Engineer

Bottom: Steve Kozel, U.S. Sales & Distribution Manager



PURUS

for **more** info

Questions about which carrier gas purifier to use?
Call 800-356-1688 or 814-353-1300, ext. 4, or contact your Restek representative to discuss your application with our technical service chemists.

Why do I need to use traps and where should I install them?
Carrier gas must contain less than 1ppm 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 validity of analytical data. Make-up gas also should be contaminant-free, or baseline fluctuations and excessive detector noise can occur; detector gases should be free of water and hydrocarbons, or excessive baseline noise can result. Gas purifiers remove these contaminants from gas sources, thereby improving system performance.

Moisture Removal
Moisture in carrier gas lines will prematurely degrade oxygen and hydrocarbon traps and increase detector noise (particularly with ECDs). As a precaution, we highly recommend installing a moisture trap before the hydrocarbon and oxygen traps on all carrier gas lines. Our favorite trap is the Super-Clean™ Ultra-High Capacity Moisture Filter (cat.# 22028, pg. 234).

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. We recommend the Super-Clean™ Ultra-High Capacity Hydrocarbon Filter (cat.# 22030, pg. 234).

Oxygen Removal
Oxygen is a column killer. It is present even in UHP gases, as minute leaks at fittings allow oxygen to influx against the concentration gradient. There are many choices for oxygen removal—the Super-Clean™ Ultra-High Capacity Oxygen Filter (cat.# 22029, pg. 234) is popular with Restek chemists. 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.

tech tip

Carrier Gas Purity
Carrier gas should contain less than 1ppm of oxygen, moisture, or other trace contaminants, to prevent column degradation, increase column lifetime, and decrease stationary phase bleed.

The expense of using high-purity gases in combination with carrier gas line purifiers will be offset by longer column lifetime and less GC maintenance.

did you **know**?

Trap replacement made simple!
Try the Super-Clean™ Triple Filter Carrier Gas Cleaning Kit (cat.# 22019, pg. 234) —it removes moisture, hydrocarbons, and oxygen in one easy-to-change, economical cartridge.

GC ACCESSORIES | PURUS GAS SYSTEMS

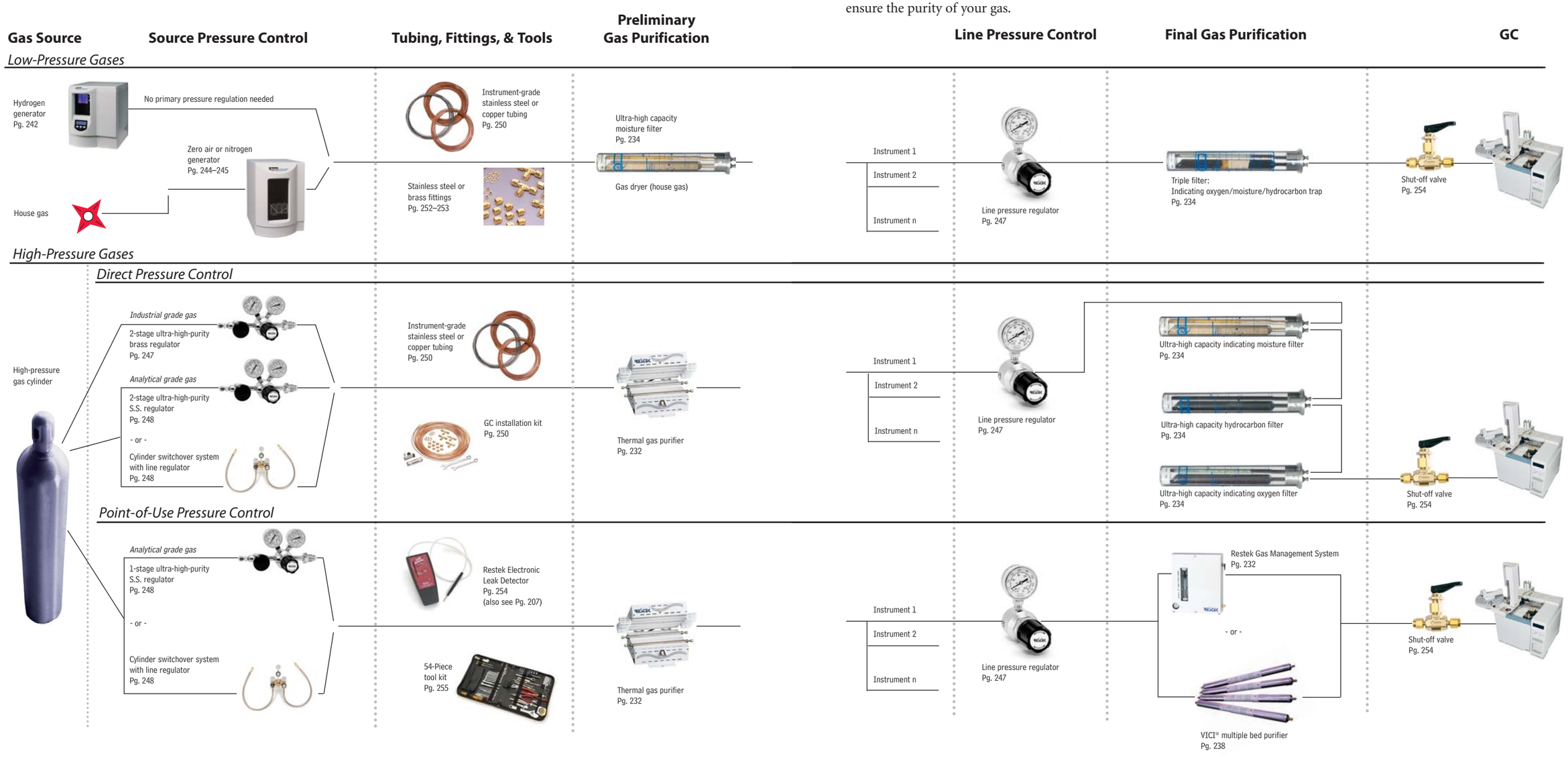
Purus Gas Systems

We know how important high-purity gas is to the success of your analysis. To provide you with the products and services you need to achieve a first-quality gas delivery system, Restek has created Purus Gas Systems. Purus Gas Systems are application-specific assemblies of the finest products and technical expertise for a systematic approach to gas handling. "Systematic" means that every product needed to deliver research purity gas is available from one source, at the level of quality you expect from Restek. We will not only supply products, we will work with you to design the best gas system for your application.

Restek provides the following total gas system solution:

- Restek gas purifiers provide cost-effective gas purity assurance.
- Restek stainless steel and copper tubing, precleaned and ready to use.
- Parker A-Lok® tube fittings consistently deliver high-quality performance.
- Extensive line of hand tools to make your work easier and faster, including Restek's Electronic Leak Detector.
- Gas generators for an uninterupted supply of gas.
- Gas regulators for optimum line pressure control of all your chromatography gases.

Restek's Technical Service Team, 800-356-1688 or 814-353-1300, ext. 4, or your Restek representative, can answer your questions and provide system-design advice. From the gas source to your point of use, we offer the products and services that ensure the purity of your gas.



www.restek.com

Thermal Gas Purifier

Single-Tube Model

Thermal Gas Purifier*

- Removes oxygen, water, carbon monoxide, carbon dioxide, hydrocarbons (except methane) to ppb levels—pure enough for MS.
- Packed with reactor-grade, pure getter material for maximum efficiency and no contamination.
- Welded end-fittings on getter tubes eliminate leaks.
- Each tube has 12L oxygen and 35L water vapor capacity.
- Maximum flow: 1 liter/minute.

Dual-Tube Model

The getter material in Restek's re-engineered line of thermal gas purifiers reacts chemically with impurities in the carrier gas stream. Because the reaction is nonreversible, there is no possibility of contaminants breaking through the thermal gas purifier.

Gas purification is very economical when you use a thermal gas purifier. Getter tubes normally require changing only once per year; heavy use or very impure feed gas may require more frequent getter tube replacement.

Restek Single-Tube Thermal Gas Purifier, 110 Volt (1 tube included)**	qty.	cat.#
1/8" Fittings	ea.	21496
1/4" Fittings	ea.	21497
Restek Dual-Tube Thermal Gas Purifier, 110 Volt (2 tubes included)**	**qty.**	**cat.#**
1/8" Fittings	ea.	21498
1/4" Fittings	ea.	21499
Replacement Getter Tube	**qty.**	**cat.#**
1/8" Fittings (Similar to Supelco part# 2-2396)	ea.	21661
1/4" Fittings (Similar to Supelco part# 2-2398)	ea.	21660

*Use with helium or nitrogen carrier gas only. Do not use with hydrogen, oxygen, or air—a violent reaction and/or fire will occur.
**Single-tube model dimensions: 15" x 7" x 6" (38 x 17.8 x 15.2 cm). Dual-tube model dimensions: 15" x 10" x 6" (38 x 25.4 x 15.2 cm).

Dimensions: 13" x 1/2"
(33 x 1.3 cm)

did you **know**?

Getter material is the physical material placed in a vacuuming tube that binds residual gases to the surface, maintaining or increasing the vacuum.

Always know the status of the Thermal Gas Purifier getter tube: change tube when pressure drops.

Gas Pressure Gauge Kit

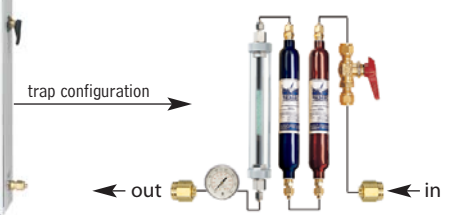
- Use an in-line pressure gauge to indicate when the Thermal Gas Purifier getter tube should be replaced.
- Includes 1/8" tee and 0–100 psi (0-689kPa) gauge.

Description	qty.	cat.#
In-line Gas Pressure Gauge Kit for Thermal Gas Purifiers	kit	21657

Restek Gas Management System

- Removes moisture, hydrocarbons, and oxygen from carrier gas, extending column lifetime.
- Produces high-purity carrier gas for most applications.
- Includes one each: moisture, hydrocarbon, and indicating oxygen trap.
- Replacing traps is safe and easy.
- Maximum flow: 1 liter/minute.

Dimensions: 12" x 14" x 3"
(30.5 x 35.6 x 7.6 cm)



did you **know**?

The Restek Gas Management System removes water vapor (to 10ppb), hydrocarbons (to 0.1ppm), and oxygen (to less than 0.1ppm) with three traps housed in one unit.

Description	qty.	cat.#
Restek Gas Management System (includes fittings for 1/8" and 1/4" gas line)	ea.	21999
Replacement Traps	**qty.**	**cat.#**
High-Capacity Moisture Trap, 1/8" Nickel-Plated Brass Fittings	ea.	21997
Capillary-Grade Hydrocarbon Trap, 1/8" Nickel-Plated Brass Fittings	ea.	21991
Indicating Oxygen Trap, 1/8" Nickel-Plated Brass Fittings	ea.	22010

Super-Clean™ Gas Filters

- High-purity output ensures 99.9999% pure gas (at max. flow of 2L/min.).
- "Quick connect" fittings for easy, leak-tight cartridge changes.
- Glass inside to prevent diffusion; polycarbonate housing outside for safety.

Designed for fast, simple cartridge changing

Cartridge systems make changing gas filters quick and easy, and Super-Clean™ gas filters are the latest in cartridge-style gas filtration. A base plate allows cartridges to be exchanged without introducing oxygen, moisture and hydrocarbons. Spring-loaded check valves seal when a filter is removed and open only when a new filter has been locked in place. There is no longer a need for loosening and tightening fittings every time a trap is changed, and your system will not become contaminated during the process.

With available 2- or 3-position base plates, you can purify all GC gas streams at one location. Figure 1 shows some possible filter cartridge combinations using these base plates. Any combination is possible because any Restek Super-Clean™ gas filter cartridge can be used with any Restek base plate.

High-purity output for improved sensitivity (Table I)

The Triple Gas Filter cartridge (cat.# 22020) is ideal for purifying carrier gas. This trap contains oxygen, moisture, and hydrocarbon scrubbers and indicators for oxygen and moisture in one cartridge. The purity of your carrier gas after flowing through the Triple Gas Filter is better than six-9s (99.9999% pure at max. flow of 2L/min.), which is ideal for sensitive mass spectrometry (MS) or ECD analyses, and for protecting your analytical columns against damage from contaminated carrier gas.

The Fuel Gas Filter cartridge (cat.# 22022) is perfect for purifying flame ionization detector (FID) fuel gases, removing both moisture and hydrocarbons. Using the Fuel Gas Filter for FID hydrogen and air will produce a stable baseline, improving overall reproducibility and sensitivity.

Figure 1 Filter cartridges can be configured for different applications.

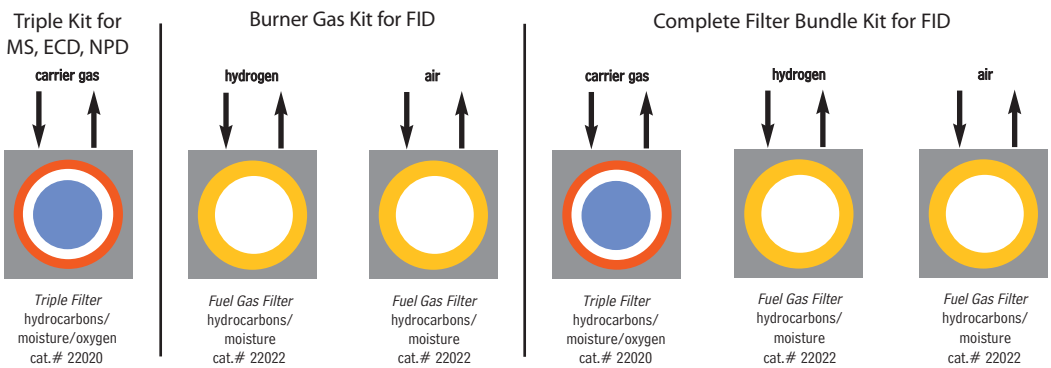


Table I Each Super-Clean™ gas filter provides high-purity outlet gas.

Type of Filter	Outlet Gas Quality (%)	Maximum Pressure/ Maximum Flow Rates	Use for:	Indicator Color Change	Capacity H_2O (g)	Capacity O_2 (mL)	Capacity Hydrocarbons (g)	Estimated Lifetime (years)
Moisture cat.# 22028	>99.9999	11 bar 159psi/ 7 L/min.	Inert carrier gas Air Hydrogen	Yellow/orange to clear	7.2	—	—	>2
Oxygen cat.# 22029	>99.9999	11 bar 159psi/ 7 L/min.	Inert carrier gas	Green to grey	NA	1000	—	>2
Hydrocarbons cat.# 22030	>99.9999	11 bar 159psi/ 7L/min.	Inert carrier gas Air Hydrogen	No indicator	NA	—	12[3]	>2
Fuel Gas[1] cat.# 22022	>99.9999	11 bar 159psi/ 7L/min.	Inert carrier gas Air Hydrogen	Yellow/orange to clear	3.5	—	24[3]	>1.5
Triple[2] cat.# 22020	>99.9999	11 bar 159psi/ 7L/min.	Inert carrier gas	Yellow/orange to clear Green to grey	1.8	500	4[3]	>1
Helium Specific[2] cat.# 21982	>99.9999	11 bar 159psi/ 7L/min.	Helium	Yellow/orange to clear Green to grey	1.8	500	—	>1

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

did you know?

All Super-Clean™ gas filter cartridges (except hydrocarbon filter cat.# 22030) feature easy-to-read indicators. The indicator code is shown on every trap so there is no confusion about when to replace it.

tech tip

Oxygen and Moisture Traps
Restek highly recommends oxygen and moisture traps for make-up gas when operating sensitive detectors such as electron capture detectors (ECD). The hydrogen reaction gas for sensitive electrolytic conductivity detectors (ELCD) also requires a hydrocarbon trap, to remove trace impurities.

Super-Clean™ gas filters are listed on pages 234 and 235.

Super-Clean™ Gas Filters and Base Plates

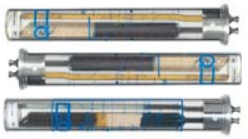
All traps measure:
10⅝" x 1¾" (27 x 4.4 cm)
Each base plate unit measures:
4" x 4" x 1⅞"
(10.2 x 10.2 x 4.8 cm)

Super-Clean™ Gas Filter and Base Plate Kits

Description	qty.	cat.#
Carrier Gas Cleaning Kit (includes mounting base plate, ⅛" inlet/outlet fittings, and oxygen/moisture/hydrocarbon Triple Gas Filter)	kit	22019
Fuel Gas Purification Kit (includes mounting base plate, ⅛" inlet/outlet fittings, and hydrocarbon/moisture Fuel Gas Filter)	kit	22021

Replacement Gas Filters

Description	qty.	cat.#
Replacement Triple Gas Filter (removes oxygen, moisture and hydrocarbons)	ea.	22020
Replacement Fuel Gas Filter (removes moisture and hydrocarbons)	ea.	22022



Gas Filter Bundle Kit

- Ideal for use in combination with 3-position base plate—purchase separately.

Description	qty.	cat.#
Gas Filter Bundle Kit	kit	22031

Super-Clean™ Ultra-High Capacity Gas Filters

Description	qty.	cat.#
Ultra-High Capacity Hydrocarbon Filter	ea.	22030
Ultra-High Capacity Moisture Filter	ea.	22028
Ultra-High Capacity Oxygen Filter	ea.	22029

Helium-Specific Super-Clean™ Gas Filter and Kit

- Specifically designed for purification of helium in GC/MS systems.
- Traps are packed and conditioned using helium.
- Uses standard single-position base plate.

Description	qty.	cat.#
Helium-Specific Carrier Gas Cleaning Kit (includes mounting base plate, ⅛" inlet/outlet fittings, and oxygen/moisture/hydrocarbon Helium-Specific Filter)	kit	21983
Replacement Helium-Specific Gas Filter (removes oxygen, moisture and hydrocarbons)	ea.	21982

Filter Base Plates

- Standard base plate fittings are ⅛". To adapt to ¼", order ⅛" to ¼" tube-end unions.
- Base plates fit all Super-Clean™ gas filters listed above.

		Brass	new! Stainless Steel	
Description	qty.	cat.#	qty.	cat.#
Single-Position Filter Base Plate	ea.	22025	ea.	22344
2-Position Filter Base Plate	ea.	22026	ea.	22345
3-Position Filter Base Plate	ea.	22027	ea.	22346

Wall Mounting Bracket

- Base plates can be mounted by using screws and the mounting holes on the base plate, or by using this optional wall mounting bracket.

Description	qty.	cat.#
Wall Mounting Bracket for Super-Clean™ Base Plates	ea.	21984

Replacement O-Rings for Cartridge Base Plates

- Pack includes 10 large O-rings and 10 small O-rings.

Description	qty.	cat.#
Replacement O-Rings for Cartridge Base Plates	20-pk.	22023

⅛-Inch to ¼-Inch Tube-End Unions

- To adapt ⅛" Super-Clean™ base plate fittings to ¼", use ⅛" to ¼" tube-end unions.

		Brass		Stainless Steel
Description	qty.	cat.#	qty.	cat.#
⅛" to ¼" Tube-End Unions	5-pk.	21833	2-pk.	21933

Super-Clean™ Gas Trapping System for LC/MS

Quick-change cartridge system for removing hydrocarbon impurities from nitrogen

- Changing filters is quick and easy.
- Up to 20L of hydrocarbon-free nitrogen per minute.

The Super-Clean™ Gas Trapping System is the latest technology in cartridge-style gas filtration for purifying nitrogen, and is ideal for use in LC/MS systems. The two-position base plate (installed in the gas line) allows cartridges to be exchanged without introducing oxygen into the system. Spring-loaded check valves seal when a cartridge is removed and open only when a new cartridge has been locked in place. There is no need for loosening and tightening fittings every time you change cartridges, and your system cannot become contaminated during the changing process.

To meet the high flow needs of the LC/MS system, the activated charcoal-filled cartridges are positioned and connected in parallel. The incoming gas stream is split equally between the cartridges, and the two streams are rejoined after purification but before the gas exits the base plate. This approach allows longer contact between the nitrogen and the adsorbent, ensuring higher gas purity and eliminating a potential source of contaminants to your analyses.

A handy date wheel, included with the system, indicates the cartridge installation date and the recommended replacement date. A special particle filter is included with the high flow base plate to be installed at the gas outlet. This exchangeable particle cup filter has a nominal pore size of 0.5µm and is recommended to be used to help remove potential dust from the charcoal, which could enter into the nebulizer gas stream and possibly damage the LC/MS system.

Table I Super-Clean™ Gas Filters provide high-purity outlet gas

Type of filter	Max. Flow	Outlet Gas Quality %	Maximum Pressure	Estimated Lifetime
Hydrocarbon (charcoal)	20L/min.	99.9999%	11 bar/159psi	3 to 6 months

20L of purified nitrogen per minute!

Super-Clean™ Gas Trapping System for LC/MS

Description	qty.	cat.#
Super-Clean™ Gas-Trapping System (2-position base plate, 2 charcoal filters)	ea.	22062
2-Position Base Plate (1/4" Fittings) for use with hydrocarbon filters (cat.# 22061)	ea.	22060
Replacement Hydrocarbon (Charcoal) Filters	2-pk.	22061

Stephanie Sunner & Tim Herring

a **plus 1** story

"West Coast companies often have to deal with East Coast companies closing by 2:00 pm Pacific time and grumpy people itching to leave. Not so with Restek! When I called at 2:55 pm (Pacific) on a Friday, Stephanie was kind enough to not only answer my questions, but forward me immediately to Tim at technical service so that I could catch him before he left - and then stayed late to help me set up an account. Tim deserves kudos, too, for not only being extremely friendly, but also being able to identify a part with no serial number and a label from a different company! Awesome service!"

Tim S., Research Scientist, a West Coast pharmaceutical company

also **available**

Looking for a nitrogen generator for your LC/MS? Restek offers a full line of Parker LC/MS generators. See **page 245**.

Super-Clean™ Click-On Purification Gas Traps

Click-On Inline Super-Clean™ Purification Gas Traps

- High-purity output ensures 99.9999% pure gas.
- Click-On fittings for easy, leak-tight cartridge changes; brass or stainless steel, 1/4" or 1/8".
- Helium-Specific Triple Gas Trap is ideal for GC/MS.

Using the same features and benefits as the Super-Clean™ base-plates and filters (page 234), Click-On adaptor connectors allow cartridges to be exchanged without introducing oxygen, moisture, and hydrocarbons. Spring-loaded check valves seal when a filter is removed and open only when a new filter has been locked in place. There is no need for loosening and tightening fittings every time a gas trap is changed, and your system will not become contaminated during the process.

The Triple Gas Trap is ideal for purifying carrier gas—it contains oxygen, moisture, and hydrocarbon scrubbers in one cartridge.

The Fuel Gas Trap is ideal for purifying flame ionization detector (FID) fuel gases, removing both moisture and hydrocarbons.

The Helium-Specific Triple Trap is ideal for purifying helium in GC/MS systems. This gas trap is packed and purged under helium and contains oxygen, moisture, and hydrocarbon scrubbers in one cartridge.

Click-On Traps measure: 8 1/2" x 1 1/4" (21.6 x 3.2cm)

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.

Filter Type	Gas Quality at Outlet	Maximum Pressure	Maximum Flow (L/min.)	Use For	H_2O (g)	Capacity O_2 (mL)	Hydrocarbons[3] (g)	Estimated Lifetime (years)
Moisture cat.#22467	>99.9999	11 bar 160psi	25	Inert carrier gas, helium, air, H_2	15	NA	NA	>3
Oxygen cat.#22468	>99.9999	11 bar 160psi	25	Inert carrier gas	NA	2000	NA	>3
Hydrocarbon cat.#22466	>99.9999	11 bar 160psi	25	Inert carrier gas, helium, air, H_2	NA	NA	24	>3
Fuel Gas[1] cat.#22465	>99.9999	11 bar 160psi	25	Inert carrier gas, helium, air, H_2	7	NA	12	>2
Triple[2] cat.#22464	>99.9999	11 bar 160psi	25	Inert carrier gas	4	1000	8	>2

[1]Removes hydrocarbons, moisture.
[2]Removes hydrocarbons, moisture, oxygen.
[3]As *n*-butane.

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%.

Click-On Inline Super-Clean™ Gas Traps and Connector Kits

Description	qty.	cat.#
Carrier Gas Purification Kit, 1/8" Stainless Steel Includes (2) 1/8" SS connectors and (1) oxygen/moisture/hydrocarbon triple trap	kit	22456
Carrier Gas Purification Kit, 1/8" Brass Includes (2) 1/8" brass connectors and (1) oxygen/moisture/hydrocarbon triple trap	kit	22457
Carrier Gas Purification Kit, 1/4" Stainless Steel Includes (2) 1/4" SS connectors and (1) oxygen/moisture/hydrocarbon triple trap	kit	22458
Carrier Gas Purification Kit, 1/4" Brass Includes (2) 1/4" brass connectors and (1) oxygen/moisture/hydrocarbon triple trap	kit	22459
Fuel Gas Purification Kit, 1/8" Stainless Steel Includes (4) 1/8" SS connectors and (2) hydrocarbon/moisture traps	kit	22460
Fuel Gas Purification Kit, 1/8" Brass Includes (4) 1/8" brass connectors and (2) hydrocarbon/moisture traps	kit	22461
Fuel Gas Purification Kit, 1/4" Stainless Steel Includes (4) 1/4" SS connectors and (2) hydrocarbon/moisture traps	kit	22462
Fuel Gas Purification Kit, 1/4" Brass Includes (4) 1/4" brass connectors and (2) hydrocarbon/moisture traps	kit	22463

Super-Clean™ Click-On Purification Gas Traps

Click-On Inline Super-Clean™ Replacement Gas Traps

Description	qty.	cat.#
Click-On Super-Clean™ Replacement Triple Trap (removes oxygen, moisture and hydrocarbons)	ea.	22464
Click-On Super-Clean™ Replacement Fuel Gas Trap (removes moisture and hydrocarbons)	ea.	22465

Click-On Inline Super-Clean™ Ultra-High Capacity Gas Traps

Description	qty.	cat.#
Ultra-High Capacity Hydrocarbon Trap	ea.	22466
Ultra-High Capacity Moisture Trap	ea.	22467
Ultra-High Capacity Oxygen Trap	ea.	22468

Helium-Specific Click-On Inline Super-Clean™ Gas Trap and Connector Kits

Description	qty.	cat.#
Kits		
Helium-Specific Carrier Gas Cleaning Kit, 1/8" Stainless Steel Includes (2) 1/8" SS connectors and (1) oxygen/moisture/hydrocarbon helium-specific triple trap	kit	22469
Helium-Specific Carrier Gas Cleaning Kit, 1/8" Brass Includes (2) 1/8" brass connectors and (1) oxygen/moisture/hydrocarbon helium-specific triple trap	kit	22470
Helium-Specific Carrier Gas Cleaning Kit, 1/4" Stainless Steel Includes (2) 1/4" SS connectors and (1) oxygen/moisture/hydrocarbon helium-specific triple trap	kit	22471
Helium-Specific Carrier Gas Cleaning Kit, 1/4" Brass Includes (2) 1/4" brass connectors and (1) oxygen/moisture/hydrocarbon helium-specific triple trap	kit	22472
Replacement Trap		
Helium-Specific Replacement Triple Trap (removes oxygen, moisture and hydrocarbons)	ea.	22473

did you know?

Helium-Specific Click-On Inline Super-Clean™ Gas Trap and Kits are designed specifically for purification of helium in GC/MS systems!

tech tip

Install an indicator after the Click-On inline gas filter so there is no confusion about when to replace the traps.

Click-On Inline Super-Clean™ Indicator

- Oxygen: Green to Grey
- Moisture: Beige to Clear

Description	qty.	cat.#
Click-On Inline Super-Clean™ Indicator (oxygen, moisture)	ea.	22474

Click-On Inline Super-Clean™ Connectors

- Click-On connectors allow you to change traps quickly, without introducing oxygen into your system.

Description	qty.	cat.#
1/8" Brass Click-On Inline Super-Clean™ Connectors	2-pk.	22475
1/8" Stainless Steel Click-On Inline Super-Clean™ Connectors	2-pk.	22476
1/4" Brass Click-On Inline Super-Clean™ Connectors	2-pk.	22477
1/4" Stainless Steel Click-On Inline Super-Clean™ Connectors	2-pk.	22478

Each connector is 2 3/8" (6cm) in length.

Click-On Inline Super-Clean™ Double Connector

- Connects any Click-On trap to a Click-On indicator.

Description	qty.	cat.#
Click-On Inline Super-Clean™ Double Connector, stainless steel	ea.	22479

Each double connector is 3" (8cm) in length.

Wall-Mounting Clamps for Click-On Inline Super-Clean™ Gas Traps

Description	qty.	cat.#
Wall-Mounting Clamps for Click-On Inline Super-Clean™ Gas Traps	4-pk.	22480

Replacement O-Rings for Click-On Inline Super-Clean™ Connectors

- Pack includes 10 large O-rings and 10 small O-rings.

Description	qty.	cat.#
Replacement O-Rings for Click-On Inline Super-Clean™ Connectors	20-pk.	22481

Gas-Specific Purifier Modules

Dimensions: 21" x 1½"
(53.3 x 3.8 cm)

VICI® Mat/Sen® Gas-Specific Purifier Modules

- Replace separate oxygen, moisture, and hydrocarbon traps with one multiple-bed purifier, specific for purifying helium, hydrogen, nitrogen, or air.
- Reduce gas impurities from ppm to low ppb levels.
- Decrease baseline noise and increase GC/MS sensitivity.
- Prepurged with the specified gas, to shorten downtime.

These gas-specific purifier modules offer dramatic reductions in contaminant levels—from ppm to levels that are below the limit of standard analytical detection. Performance is optimized by incorporating a multiple-bed format that progressively lowers concentrations of contaminants at each successive bed. VICI® Mat/Sen® purifiers are guaranteed to produce gases that are purer than 99.9999%, when supplied with gas of 99.995% purity, and are prepurged with the specified gas to speed conditioning. Purifier capacity is approximately four tanks of gas at 99.995% (50ppm) purity, and correspondingly longer for purer gases.

Specifications:	
Length	21" (52.3cm)
Diameter	1.5" (3.8cm)
Maximum Inlet Pressure	1000psi (6895kPa)
Maximum Recommended Flow	500mL/min.
Pressure Drop from 120psi (827 kPa) inlet at at 0-500mL/min.:	<0.20psi (1.4kPa)
End Fittings	compression, 1/8" or 1/4", stainless steel
Shipping Weight	3.04 lb. (1300 g)

Please Note: We recommend using an indicating oxygen trap (e.g., cat.# 22029, pg. 234) downstream from a VICI® Mat/Sen® purifier to continually ensure gas purity and indicate absolute change-out time.

it's a **fact**

The nitrogen module is excellent for LC/MS systems.

Gas-Specific Purifier Module	Max Pressure	Compression Tube Fittings ¼-inch qty.	¼-inch cat.#	⅛-inch qty.	⅛-inch cat.#
Helium Purifier Module	1000psi, 6895kPa	ea.	22600	ea.	22601
Hydrogen Purifier Module	1000psi, 6895kPa	ea.	22602	ea.	22603
Nitrogen Purifier Module*	1000psi, 6895kPa	ea.	22604	ea.	22605
Air Purifier Module	1000psi, 6895kPa	ea.	22606	ea.	22607

*Warning: Do not use with nitrogen containing more than 500ppm of oxygen. If the oxygen level in the stream exceeds 500ppm, use an air purifier.

a **plus 1** story

"We enjoy doing business with Restek. Their technical knowledge and willingness to back their products help us to maximize the performance of our chromatography instruments."

Jean-François Vergelin, Département de Seine et Marne, Direction de l'Eau et de l'Environnement, Laboratoire Départemental d'Analyse des eaux (Melun, France)

High-Capacity Indicating Oxygen Trap

- Indicator changes color from dark blue to black as oxygen & water are trapped.
- Lasts longer than three smaller traps.
- Use with all carrier gases.
- Ambient operating temperature, 100psi (689kPa) operating pressure.
- Built-in frit traps microparticles.
- Outlet gas purity: $O_2 <$ 0.1ppm when inlet does not exceed 15ppm.
  $H_2O <$ 0.5ppm when inlet does not exceed 10ppm.
- Includes cartridge housing and one cartridge.
- Maximum operating pressure: 150psi (1034kPa).
- Maximum flow: 16.5L/min.

Dimensions: 9¼" x 2"
(23.5 x 5.1 cm)

Description	qty.	cat.#
High-Capacity Indicating Oxygen Trap, 1/8" Compression Tube Brass Fittings	ea.	20624
High-Capacity Indicating Oxygen Trap, 1/4" Compression Tube Brass Fittings	ea.	20623
Replacement Cartridge (fits 1/4" or 1/8" housing)	ea.	20625
Replacement O-Rings (5 small O-rings and 5 large O-rings)	kit	22081

Indicating Oxygen Trap

- Indicator changes color from light green to grey as oxygen is trapped.
- Heavy-walled glass body prevents oxygen & water infusion.
- Prepurged for fast stabilization.
- 100psi (689kPa) maximum operating pressure.
- Reduces oxygen to 0.1ppm.

Dimensions: 10" x 1¼"
(25.4 x 3.2 cm)

Description	qty.	cat.#
Indicating Oxygen Trap, 1/8" Nickel-Plated Brass Fittings	ea.	22010
Indicating Oxygen Trap, 1/4" Nickel-Plated Brass Fittings	ea.	22011

High-Capacity Oxygen Trap

- Removes up to 600mg of oxygen or 2g of water.
- Long life—typically purifies more than five 200ft³ cylinders.
- Reduces oxygen to 15ppb.
- Maximum operating pressure: 250psi (1724kPa).
- Flow: 3L/min. @ 32psi (221kPa).

Dimensions: 11" x 1½"
(27.9 x 3.8 cm)

Description	qty.	cat.#
High-Capacity Oxygen Trap, 1/8" Nickel-Plated Brass Fittings	ea.	20601
High-Capacity Oxygen Trap, 1/4" Nickel-Plated Brass Fittings	ea.	20600

Rechargeable Molecular Sieve S-Trap

- Traps water vapor; increases column and oxygen trap lifetime.
- Reduces baseline noise from sensitive detectors such as ECDs and mass spectrometers.
- Activated and ready to use.
- Reduces water to less than 1ppm.
- Fits in GC oven for easy thermal recharging.
- Maximum flow: 1L/min.

Dimensions: 6¾" x 5⅝"
(17.1 x 14.3 cm)

Description	qty.	cat.#
Rechargeable Molecular Sieve S-Trap, 1/8" Brass Fittings	ea.	20686
Rechargeable Molecular Sieve S-Trap, 1/4" Brass Fittings	ea.	20685

tech tip

Carrier Gas Purity

Carrier gas should contain less than 1ppm of oxygen, moisture, or other trace contaminants, to prevent column degradation, increase column lifetime, and decrease stationary phase bleed.

The expense of using high-purity gases in combination with carrier gas line purifiers will be offset by longer column lifetime and less GC maintenance.

High-Capacity Moisture Trap

Dimensions: 11" x 1½"
(27.9 x 3.8 cm)

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

Description	qty.	cat.#
High-Capacity Moisture Trap, ⅛" Nickel-Plated Brass Fittings	ea.	21997
High-Capacity Moisture Trap, ¼" Nickel-Plated Brass Fittings	ea.	20638

Indicating Moisture Trap

Dimensions: 13" x 2"
(33 x 5.1 cm)

- Reduces water to less than 10ppb; indicator changes color from blue to pink at 5% relative humidity.
- Prepurged for fast stabilization.
- Reduces noise from high-sensitivity detectors.
- Heavy-walled glass body prevents oxygen & water infusion.
- 40µm frit prevents microparticulate damage to needle valves and flow controllers.
- Maximum operating pressure: 100psi (689kPa).

Description	qty.	cat.#
Indicating Moisture Trap, ⅛" Nickel-Plated Brass Fittings	ea.	22014
Indicating Moisture Trap, ¼" Nickel-Plated Brass Fittings	ea.	22015

Capillary-Grade Hydrocarbon Trap

Dimensions: 11" x 1½"
(27.9 x 3.8 cm)

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

Description	qty.	cat.#
Capillary-Grade Hydrocarbon Trap, ⅛" Nickel-Plated Brass Fittings	ea.	21991
Capillary-Grade Hydrocarbon Trap, ¼" Nickel-Plated Brass Fittings	ea.	21992

Refillable Hydrocarbon Trap

Dimensions: 9¼" x 2¼"
(23.5 x 5.7 cm)

- Removes trace impurities from carrier gas: reduces organics to 0.1ppm (assuming 100ppm input).
- 20µm frit prevents gas contamination by purifier particles.
- Stops carrier gas contaminants from interfering with purge & trap systems.
- Refillable and rechargeable.
- Maximum operating pressure: 250psi (1724kPa).
- Maximum flow: 1.25L/min.

Description	qty.	cat.#
Refillable Hydrocarbon Trap, ⅛" Nickel-Plated Brass Fittings	ea.	22012
Refillable Hydrocarbon Trap, ¼" Nickel-Plated Brass Fittings	ea.	22013
Carbon Refill (two recharges)	pint	20626

Hydrocarbon S-Trap

Dimensions: 6¾" x 5⅝"
(17.1 x 14.3 cm)

- Removes hydrocarbons and other contaminants from the gas stream.
- Reduces organics to 0.1ppm (assuming 100ppm input).
- Each trap individually activated to ensure maximum efficiency.
- Fits in GC oven for easy thermal recharging.
- Maximum operating pressure: 60psi (414kPa).

Description	qty.	cat.#
Hydrocarbon S-Trap, ⅛" Brass Fittings	ea.	22016

Indicating Hydrocarbon Trap for Air Compressors

Dimensions: 6" x 1¾"
(15.2 x 4.4 cm)

- Pass compressed air from an oil-filled air compressor through this trap, to remove oil vapors and mist.
- Indicator changes from pale pink to deep pink.

Description	qty.	cat.#
Indicating Hydrocarbon Trap for Air Compressors, ⅛" Brass Fittings	ea.	20637
Indicating Hydrocarbon Trap for Air Compressors, ¼" Brass Fittings	ea.	20636

High-Capacity Split Vent Trap

- Reduces the release of hazardous materials from the capillary split vent into the lab.
- Lasts approximately one month or 1,500 injections.
- Includes connecting lines and mounting kit.

Description	qty.	cat.#
High-Capacity Split Vent Trap	ea.	20698
High-Capacity Split Vent Trap	5-pk.	20699

Dimensions: 6" x 1"
(15.2 x 2.5 cm)

ECD Vent Trap

- Reduces the release of hazardous materials from the ECD vent into the lab.
- Includes connecting lines and mounting kit.

Description	qty.	cat.#
ECD Vent Trap	ea.	22017

Dimensions: 6" x 1"
(15.2 x 2.5 cm)

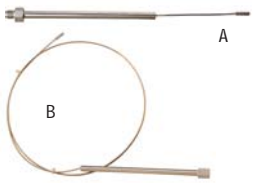
Replacement Chemical Traps for Agilent GCs

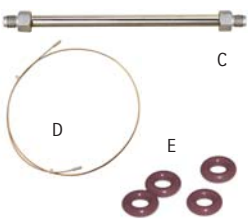
- Easy to install.
- Attach to same fittings as original equipment.
- Built-in frits retain fine particles; adsorbents remove both moiture and hydrocarbons.

tech tip

Eliminate ghost peaks—change your chemical trap often!

Description	Similar to Agilent part #	qty.	cat.#
A) Replacement Split Vent Trap for Agilent 6890/6850 GCs	G1544-80550	ea.	22820
B) Replacement Chemical Trap for Agilent 5890 GCs	05890-61260	ea.	21610
C) Replacement Chemical Trap for Agilent 5880 GCs	19362-60500	ea.	21158
D) Split Vent Line for Agilent GCs (32-inch) (Includes all installation hardware.)	19251-80525 G1544-20620	2-pk.	22800
E) O-rings for Agilent Trap Fittings	5180-4181	25-pk.	22064
F) Optional Split Vent Trap Assembly for Agilent 6890/6850 GCs	G1544-60610	kit	23031
G) Replacement Traps (2) and O-rings (4)	G1544-80530	kit	23032





Restek Electronic Leak Detector

- Reliable thermal conductivity leak detector.
- Responds to leaks in less than 2 seconds.
- Audible alarm plus LED readout.
- Auto zeros with the touch of a button.
- Built-in rechargeable 7.2-volt battery.

Description	qty.	cat.#
Leak Detector with 110Volt Battery Charger	ea.	22451
Leak Detector with 220Volt European Battery Charger	ea.	22451-EUR
Leak Detector with 220Volt UK Battery Charger	ea.	22451-UK

Small, compact unit—easy to hold and operate.

Leak Detector Accessory Kit

The kit includes an adaptor fitting to detect leaks in hard-to-reach locations, and a mounting bracket that can be affixed to the wall or GC.

Verify hard-to-reach leaks with the adaptor fitting.

Leak Detector Accessory Kit

Description	qty.	cat.#
Leak Detector Accessory Kit (adaptor fitting for probe, mounting bracket)	kit	22453

Leak Detector is easily accessed when stored in the mounting bracket.

Hydrogen Gas Generators

Parker Balston® 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, requiring 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 US, European, and Asian plug types.

Fuel-grade high purity hydrogen generators are safer alternatives to high-pressure gas cylinders. The new Proton Exchange Membrane (PEM) cell eliminates the use of liquid electrolytes with hydrogen generators. Deionized water is all that is required to generate hydrogen for weeks of continuous operation. With an output capacity of up to 510cc/minute, one generator can supply 99.9995% pure hydrogen for up to several FIDs. Based on cylinder gas savings alone, a hydrogen generator pays for itself in one or two years.

new and improved!

Hydrogen PEM generators now come with a set of universal power adapters for US, European, and Asian plug types.

CE

Produced and supported by an ISO 9001 registered organization, Parker Balston® hydrogen generators are the first built to meet the toughest laboratory standards in the world: CSA, UL, IEC 1010, and CE Mark. A great safety feature is the built-in sensing circuit, which shuts the generator down if a hydrogen leak is detected.

Specifications

Purity:	99.9995% pure hydrogen
Delivery Pressure:	10-100psig ± 1psig (69-689kPa ± 7kPa)
Outlet Port:	1/8" compression
Electrical Requirements:	100-230VAC/50-60Hz
Physical Dimensions:	17.12"h x 13.46"w x 17.95"d (43.48 x 34.19 x 45.6cm)
Shipping Weight:	40 lbs. (18kg) dry

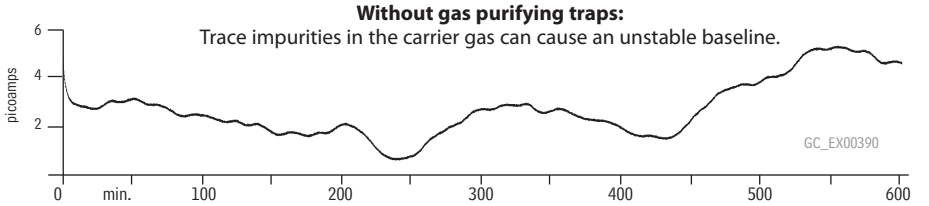
Description	Capacity	qty.	cat.#
Hydrogen Generator H2PEM-100	100cc/min.	ea.	23065
Hydrogen Generator H2PEM-165	165cc/min.	ea.	23066
Hydrogen Generator H2PEM-260	260cc/min.	ea.	23067
Hydrogen Generator H2PEM-510	510cc/min.	ea.	23068
Replacement and Maintenance Components for Hydrogen Generators (for all models listed above)			
Replacement Desiccant Cartridge for H2PEM Generators		ea.	23069
6-Month Maintenance Kit for H2PEM Generators (Includes: 1 deionizer cartridge, 1 water filter, 3 environmental filters)		kit	23070
24-Month Maintenance Kit for H2PEM Generators (Includes: 1 deionizer cartridge, 1 water filter, 3 environmental filters, 1 water level sensor, 1 water pump, and 1 desiccant cartridge)		kit	23071

tech tip

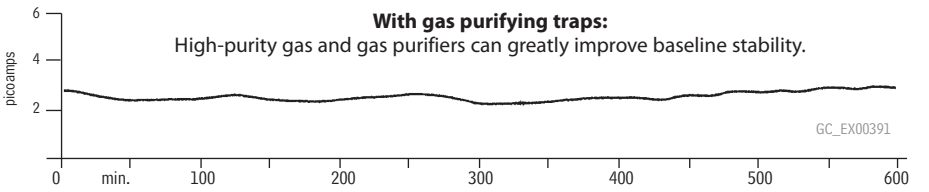
Gas generators are an economical source of pure gases, and eliminate the inconvenience and danger of high-pressure cylinders.

The combination of high-purity gas and gas purifying traps can save analytical time in the long run.

Without gas purifying traps:
Trace impurities in the carrier gas can cause an unstable baseline.



With gas purifying traps:
High-purity gas and gas purifiers can greatly improve baseline stability.



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Parker Balston® Hydrogen Generators

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Fast Facts
lit. cat.# 580053A

Parker Balston® 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.

Parker Balston® 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 0.1ppm 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.

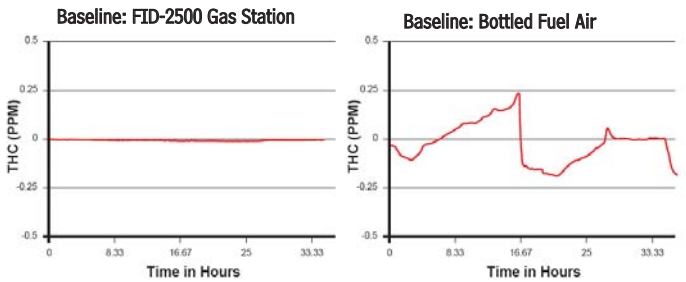
Specifications

Hydrogen Purity:	99.9995%
Zero Air Purity:	FID-1000:
	< 0.1ppm total hydrocarbons as methane
	FID-2500:
	< 0.05ppm total hydrocarbons as methane
Max. Hydrogen Flow Rate:	FID-1000: 90cc/min.
	FID-2500: 250cc/min.
Max. Zero Air Flow Rate:	FID-1000: 1000cc/min.
	FID-2500: 2500cc/min.
Power:	120VAC/amp, 60Hz, 400 watts
Hydrogen Outlet Pressure:	60 psig (414kPa)
Zero Air Outlet Pressure:	40-125 psig* (276-862kPa)
Inlet Connection:	1/4" NPT (female)
Outlet:	1/8" compression
Dimensions:	16.5"h x 10.5"w x 17"d
	(42cm x 27cm x 43cm)
Weight:	53 lbs. (24kg)

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

Produce zero air and pure hydrogen from one unit!

Compare baselines produced by a Parker Balston® FID Gas Station and bottled fuel air. The baseline produced by the Parker Balston® Generator is flat, with no fluctuations or peaks; the chromatogram from the bottled air fuel supply has many peaks ranging from 0.25 ppm to -0.25 ppm total hydrocarbons.



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FID Gas Stations

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Fast Facts
lit. cat.# 580051

Description	qty.	cat. #
Model FID-1000 Gas Station (ideal for 1-2 FIDs)	ea.	20177
Model FID-2500 Gas Station (ideal for 5-6 FIDs)	ea.	24913
Replacement Components for FID Gas Stations		
Resin Bed Cartridge for Hydrogen Generators in FID-1000 and FID-2500 Gas Stations	ea.	24914
Replacement Desiccant Cartridge	ea.	21671
FID Gas Station Maintenance Kit Includes 1 desiccant cartridge, 1 resin bed cartridge, 1 filter cartridge)	ea.	24915

ordering note

For **international orders**, please add the appropriate power cord suffix from the table below.

International Power Cord Sets

Just add the proper suffix to the catalog number for the gas generator you are ordering.

Location	qty.	cat.# suffix
United Kingdom (230VAC, 50/50Hz)	ea.	-550
European (230VAC, 50/60Hz)	ea.	-551
IEC Connector Only (230VAC, 50/60Hz)	ea.	-552
Japanese (200VAC, 50/60Hz)	ea.	-556
Japanese for Zero Air (100VAC, 50/60Hz)	ea.	-553
Japanese for Hydrogen (100VAC, 50/60Hz)	ea.	-554
Japanese for Nitrogen (100VAC, 50/60Hz)	ea.	-555

Zero Air Generators

Parker Filtration

Parker Balston® Zero Air Generators

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

Specifications

Maximum Zero Air Flow Rate:	75-83NA	1 lpm
	HPZA-3500	3.5 lpm
	HPZA-7000	7 lpm
	HPZA-18000	18 lpm
	HPZA-30000	30 lpm
Outlet Hydrocarbon Concentration (as methane):	75-83NA	< 0.1 ppm
	HPZA-30000	< 0.1 ppm
	Other Models	< .05 ppm
Minimum/Maximum Inlet Air Pressure:	40 psig/125 psig (276/862kPa)	
Maximum Inlet Hydrocarbon Concentration (as methane):	100 ppm	
Pressure Drop at Maximum Flow Rate:	4 psi (28kPa) 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	120 VAC/60 Hz, 0.5 amps
	Other Models	120 VAC/60 Hz, 3.5 amps
Dimensions:	75-83NA	12"h x 10"w x 3"d (30cm x 25cm x 8cm)
	Other Models	16"h x 11"w x 13"d (42cm x 27cm x 34cm)
Shipping Weight:	75-83NA	7 lbs. (3 kg)
	Other Models	41 lbs. (19 kg)

Model	Number of FIDs*
75-83NA	Up to 3
HPZA-3500	Up to 11
HPZA-7000	Up to 23
HPZA-18000	Up to 60
HPZA-30000	Up to 100

*based on a 300 cc/min. fuel air rate

Zero Air Generator	Capacity	qty.	cat. #
Zero Air Generator Model 75-83NA	1000cc/min.	ea.	20684
Zero Air Generator Model 75-83NA with United Kingdom Power Cord	1000cc/min.	ea.	20684-550
Zero Air Generator Model HPZA-3500	3500cc/min.	ea.	20680
Zero Air Generator Model HPZA-3500 with European Power Cord	3500cc/min.	ea.	20680-551
Zero Air Generator Model HPZA-7000	7000cc/min.	ea.	20681
Zero Air Generator Model HPZA-18000	18,000cc/min.	ea.	20682
Zero Air Generator Model HPZA-30000	30,000cc/min.	ea.	20683
Maintenance Kits (includes a one-year supply of prefilters and final filter)		**qty.**	**cat. #**
Maintenance Kit for Model 75-83NA		kit	21646
Maintenance Kit for Models HPZA-3500, HPZA-7000, HPZA-18000, HPZA-30000		kit	21647
Replacement Catalyst Towers	**Capacity**	**qty.**	**cat. #**
Replacement Catalyst Tower for Model 75-83NA	1000cc/min.	ea.	22005
Replacement Catalyst Tower for Model HPZA-3500	3500cc/min.	ea.	22004
Replacement Catalyst Tower for Model HPZA-7000	7000cc/min.	ea.	22006
Replacement Catalyst Tower for Model HPZA-18000	18,000cc/min.	ea.	22007
Replacement Catalyst Tower for Model HPZA-30000	30,000cc/min.	ea.	22008

ordering **note**

For **international orders**, please add the appropriate power cord suffix from the table below.

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Zero Air Generators

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Fast Facts
lit. cat.# 580050

International Power Cord Sets

Just add the proper suffix to the catalog number for the gas generator you are ordering.

Location	qty.	cat.# suffix
United Kingdom (230VAC, 50/50Hz)	ea.	-550
European (230VAC, 50/60Hz)	ea.	-551
IEC Connector Only (230VAC, 50/60Hz)	ea.	-552
Japanese (200VAC, 50/60Hz)	ea.	-556
Japanese for Zero Air (100VAC, 50/60Hz)	ea.	-553
Japanese for Hydrogen (100VAC, 50/60Hz)	ea.	-554
Japanese for Nitrogen (100VAC, 50/60Hz)	ea.	-555

Parker Balston® Nitrogen Gas Generators

- Turn compressed air into ultra-pure nitrogen (up to 99.9995%).
- Flows from 1 to 75+ lpm.
- Require only a compressed air source and 110 volt AC power.
- Safe, reliable, low maintenance.
- Maintenance kits include replacement filters.
- N2-14 and N2-14A can be used for LC/MS.

Model: N2-14

Specifications

	Model HPN2-1100 or UHPN2-1100	Model HPN2-2000	Model N2-14 or N2-14A
Maximum Nitrogen Flow Rate:	See Flow Table	2 lpm	78scfh** at 95% purity
Nitrogen Purity:	99.9999%	99.99%	95.0%–99.5%
Maximum Nitrogen Outlet Pressure:	See Flow Table	90 psig	
CO Concentration:	< 1.0 ppm	NA	
CO_2 Concentration:	< 1 ppm	< 1 ppm	
O_2 Concentration:	< 1 ppm	< 100 ppm	
H_2O Concentration:	≤ 2 ppm	≤ 2 ppm	
Hydrocarbon Concentration[1]:	< 0.1 ppm	NA	
Argon Concentration[2]:	0.9%	0.9%	
Atmospheric Dewpoint:			-58°F (-50°C)
Suspended Liquids:			None
Particles > 0.01μm:			None
Oxygen Analyzer:			Included with Model 75-720NA
Commercially Sterile:			Yes
Minimum/Maximum Inlet Pressure:	60 psig/125 psig (414/862kPa)	75 psig/120 psig (517/827kPa)	60 psig/145 psig (414/1,000kPa)
Maximum Pressure Drop (99% N_2 Purity, 125 psig):			10 psig (69kPa)
Recommended Inlet Temperature:	≤ 78°F (25°C)	≤ 78°F (25°C)	≤ 68°F (25°C) (Max.)
Ambient Operating Temperature:	60°F–100°F (16°C–38°C)	40°F–100°F (4°C–38°C)	110°F (43°C) (Max.)
Maximum Air Consumption:	42 lpm (1.5 scfm)*	42 lpm (1.5 scfm)*	
Inlet Connection:	1/4" NPT (female)	1/4" NPT (female)	1/4" NPT
Outlet Connection:	1/4" compression	1/8" NPT compression	1/8" NPT
Electrical Requirements[3]:	120 VAC/60 Hz	120 VAC/60 Hz	N2-14: None N2-14A: 120 VAC/60 Hz/25 Watts
Dimensions:	35"h x 12"w x 16"d (89cm x 30cm x 41cm)	35"h x 12"w x 16"d (89cm x 30cm x 41cm)	50"h x 16"w x 16"d (127cm x 41cm x 41cm)
Shipping Weight:	115 lbs. (52 kg)	115 lbs. (52 kg)	N2-14: 75 lbs. (34 kg) N2-14A: 80 lbs. (36 kg)

[1]Models HPN2-1100 and HPN2-2000 do not remove hydrocarbons.
[2]Purity specification for nitrogen does not include argon concentration.
[3]Power consumption is:
Model HPN2-1100 = 25 Watts
Model UHPN2-1100 = 700 Watts
Model HPN2-2000 = 25 Watts

Flow Table for Models HPN2-2000, HPN2-1100, and UHPN2-1100

Inlet Air Pressure	Maximum Outlet Flow (cc/min.)	Maximum Outlet Pressure
	Models HPN2-1100 and UHPN2-1100	
125 psig (862kPa)	1100	85 psig (586kPa)
110 psig (758kPa)	1000	75 psig (517kPa)
100 psig (689kPa)	900	65 psig (448kPa)
90 psig (621kPa)	800	60 psig (414kPa)
80 psig (552kPa)	700	50 psig (345kPa)
70 psig (483kPa)	600	45 psig (310kPa)
60 psig (414kPa)	500	35 psig (241kPa)
	Model HPN2-2000	
75-120 psig (517-827kPa)	2000	90 psig (621kPa)

Nitrogen Generators for LC/MS or General Purpose	qty.	cat.#
Nitrogen Generator N2-14 (general purpose) 78 scfh** max. flow at 95% purity	ea.	20677
Nitrogen Generator N2-14 with European Power Cord	ea.	20677-551
Nitrogen Generator N2-14A (general purpose w/oxygen analyzer) 78 scfh** max. flow at 95% purity	ea.	21652

Nitrogen Generators	qty.	cat.#
Nitrogen Generator HPN2-2000 (high purity—99.99%) 2.0 lpm max. flow	ea.	21654
Nitrogen Generator HPN2-1100 (ultra-high purity—99.9995%) 1.1 lpm max. flow	ea.	21653
Nitrogen Generator UHPN2-1100 (ultra-high purity—99.9995%); [HC<0.1ppm] 1.1 lpm max. flow	ea.	20697

Maintenance Kits	qty.	cat.#
Maintenance Kit for Models N2-14, N2-14A, 75-72, 75-720NA	kit	21648
Maintenance Kit for Models HPN2-1100, HPN2-2000, 76-96, 76-92	kit	21649
Maintenance Kit for Models UHPN2-1100, 76-94	kit	21655

*Standard cubic feet per minute.

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Nitrogen Generators

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Fast Facts
lit. cat.# 580052

ordering note

For **international orders**, please add the appropriate power cord suffix from the table on the previous page.

Gas Pressure Regulators: Introduction

Introduction to Gas Pressure Regulators

Mike Zezzo
Mid-Atlantic States
Sales Representative
9+ years of service!

General Purpose or Analytical?
General-purpose gas regulators usually are best suited for applications involving gases that are less than 99.995% pure: pneumatically-actuated valves and autosamplers, blanketing, inert atmospheres, and any other application not directly integrated with analytical data production. General purpose gas regulators have nylon-reinforced neoprene diaphragms that provide very good pressure control but are prone to air and moisture diffusion and hydrocarbon off-gassing.

Analytical regulators are recommended for applications in which maintaining the purity of a gas or mixture is the overriding concern, i.e., for applications requiring gases that are greater than 99.995% pure. They are commonly used in analytical labs. Analytical regulators have stainless steel diaphragms for pressure control. Stainless steel is not subject to the diffusion and off-gassing associated with neoprene diaphragms, and is easily purged of atmospheric contaminants when put into service.

Dual- or Single-Stage?
Dual-stage gas regulators reduce the source pressure to outlet pressure in two steps. The first stage reduces the inlet pressure to about three times the maximum working pressure. Outlet pressure gas regulation is controlled by the second stage and is set through the use of an adjusting knob. This two-step gas regulation is highly recommended for services requiring a near constant delivery pressure as the source pressure decays, including chromatographic analyses.

Single-stage gas regulators perform the same function as dual-stage gas regulators, but in a single step-down from source pressure to outlet pressure. For this reason, the outlet pressure cannot be as accurately maintained as the source pressure decays. We highly recommend that single-stage gas regulators be used only in circumstances in which the operator can monitor and adjust the regulator as needed, when the regulator is supplied with a nearly constant source pressure, or when additional pressure regulation is supplied downstream.

Brass or Stainless Steel?
Analytical gas regulators made from brass bar stock provide optimum performance for most analytical applications. Brass provides excellent strength and cleanliness and the machined bar stock design has less dead volume than forged-body gas regulators, making purging of atmospheric contaminants faster and more assured.

Gas regulators with stainless steel bodies were designed for delivering corrosive gases that would be incompatible with brass. With the advent of semiconductor manufacturing and high sensitivity analytical techniques, stainless steel also has proven to be a better surface for removing "sticky" atmospheric contaminants that interfere with detectors downstream. Unless these gas regulators are used in an all-stainless-steel system that incorporates welded tubing and special fittings, and in which rigorous cleaning and proper gas management are practiced, the extra expense relative to brass is not justified.

Overview of Restek's Chrome-Plated Brass and Stainless Steel Body Ultra-High-Purity Gas Regulators

These regulators feature metal-to-metal seals throughout for long-term leak-tightness, and a metal diaphragm outlet valve ensures gas purity. Each regulator is helium leak-test-certifiable to $1x10^{-8}$scc/sec. and is fully assembled and tested for your convenience. 100psig maximum delivery pressure supports EPC operation. Maximum inlet pressure is 3000psig. Chrome-plated brass bar stock construction minimizes dead volume. Stainless steel construction is more easily purged of atmospheric contaminants, and is more resistant to attack from dry corrosive gases.

Ultra-High-Purity Brass Body Gas Regulators

These regulators are the best choice when using ultra-high-purity carrier gas for sensitive GC applications using MS, PID, HID, or ECD detection methods. They feature reduced internal dead-volume, relative to stainless steel bodies. The stainless steel gas regulator diaphragm minimizes nonmetal parts, to help ensure ultra-high gas purity, and the metal valve diaphragm ensures leak-free shut-off. Oxidation-resistant chrome plating maintains a like-new appearance.

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

- Oxidation-resistant, chrome-plated.
- Most stable outlet pressure control throughout the life of a high-pressure gas cylinder.
- Secondary pressure regulation not needed.
- Most widely used regulator.
- Less internal volume than stainless steel gas regulators.

Outlet pressure: 0 to 100psig (0-689kPa)
Outlet gauge: 30" – 0 to 200psig (0-1379kPa)
Inlet gauge: 0 to 4000psig (0-27,579kPa)
Outlet assembly: diaphragm valve, 1/4" tube fitting

Fitting	qty.	cat.#
CGA 580 (N_2 He, Ar)	ea.	21667
CGA 350 (H_2, P_5)	ea.	21668
CGA 590 (Air)	ea.	21669

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

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

Outlet pressure: 0 to 100psig (0-689kPa)
Outlet gauge: 30" – 0 to 200psig (0-1379kPa)
Inlet gauge: 0 to 4000psig (0-27,579kPa)
Outlet assembly: diaphragm valve, 1/4" tube fitting

Fitting	qty.	cat.#
CGA 580 (N_2, He, Ar)	ea.	20646
CGA 350 (H_2, P_5)	ea.	20647
CGA 590 (Air)	ea.	20648

Ultra-High-Purity Chrome-Plated Brass Line Gas Regulator

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

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

Fitting	Outlet Gauge	Outlet Pressure	qty.	cat.#
1/4" female NPT ports*	30" - 0 to 100psig (0-689kPa)	0-50psig (0-345kPa)	ea.	21666
1/4" female NPT ports*	30" - 0 to 200psig (0-1379kPa)	0-100psig (0-689kPa)	ea.	22452

*Order appropriate male connector, pipe-to-tube fittings.

Male Connector, Pipe-to-Tube Fittings


male connector


tube end reducer

Fitting Type	Size (inches)	Parker #	Similar to Swagelok®	Brass qty.	Brass cat.#	Stainless Steel qty.	Stainless Steel cat.#
Male Connector	1/4" to 1/4" NPT	4 MSC 4N	400-1-4	10-pk.	21842	2-pk.	21942
Male Connector	1/8" to 1/4" NPT	2 MSC 4N	200-1-4	10-pk.	21844	2-pk.	21944
Tube End Reducer	1/4" tube to 1/8"	4 TUR 2	200-R-4	5-pk.	21834	2-pk.	21934

Ultra-High-Purity Stainless Steel Body Gas Regulators

These 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. Gas regulation performance is equal to our brass body gas regulators. For use in all-stainless steel systems where welded tubing and special fittings are used, and rigorous cleaning and proper gas management are practiced.

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

- Most stable outlet pressure control throughout the life of a high-pressure gas cylinder.
- Secondary pressure regulation not needed.

Outlet pressure: 0 to 100psig (0-689kPa)
Outlet gauge: 30" – 0 to 200psig (0-1379kPa)
Inlet gauge: 0 to 4000psig (0-27,579kPa)
Outlet assembly: diaphragm valve, 1/4" tube fitting

Fitting	qty.	cat.#
CGA 580 (N_2, He, Ar)	ea.	20662
CGA 350 (H_2, P_5)	ea.	20663
CGA 590 (Air)	ea.	20664

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

- Use when there is secondary pressure requirement downstream.
- Identical gas purity protection as with our dual-stage gas regulators.

Outlet pressure: 0 to 100psig (0-689kPa)
Outlet gauge: 30" – 0 to 200psig (0-1379kPa)
Inlet gauge: 0 to 4000psig (0-27,579kPa)
Outlet assembly: diaphragm valve, 1/4" tube fitting

Fitting	qty.	cat.#
CGA 580 (N_2, He, Ar)	ea.	20665
CGA 350 (H_2, P_5)	ea.	20666
CGA 590 (Air)	ea.	20667

Critical Purity Automatic Switchover System for Noncorrosive Service

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 supply of gas. Continuous supply is achieved by setting the two regulators at slightly different pressures, to discharge 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.

Switching pressure:
200psig/170psig
(1379/1172kPa)
Inlet connections:
flexible SS pigtails (36")
Line regulator:
0 to 100psig (0-689kPa)

Brass Automatic Switchover System with Line Regulator	qty.	cat.#
CGA 580 (N_2, He, Ar)	ea.	20668580
CGA 350 (H_2, P_5)	ea.	20668350
CGA 590 (Air)	ea.	20668590
Stainless Steel Automatic Switchover System with Line Regulator	**qty.**	**cat.#**
CGA 580 (N_2, He, Ar)	ea.	21593580
CGA 350 (H_2, P_5)	ea.	21593350
CGA 590 (Air)	ea.	21593590

Protocol Station

The protocol station is designed for convenient wall mounting of high-purity gas regulators. Wall mounting provides ease of use, prevents gas regulator damage, and improves safety. Either chrome-plated brass or 316 stainless steel option is complete with a 3-foot, flexible, all-stainless-steel pigtail with armor casing. The CGA connection on the pigtail has an integral check valve in the gland to prevent contamination during cylinder changeout.

Chrome-Plated Brass Protocol Station*	qty.	cat.#
CGA 580 (N_2, He, Ar)	ea.	21347
CGA 350 (H_2, P_5)	ea.	21348
CGA 590 (Air)	ea.	21349
Stainless Steel Protocol Station*	**qty.**	**cat.#**
CGA 580 (N_2, He, Ar)	ea.	21327
CGA 350 (H_2, P_5)	ea.	21328
CGA 590 (Air)	ea.	21329

*Pressure regulator not included. Order separately.

CGA Fittings

CGA-specified nuts and nipples with internal frit, 1/4-inch NPT nickel-plated brass.

Description	qty.	cat.#
CGA 580 Fitting, (N_2, He, Ar)	ea.	21336
CGA 350 Fitting, (H_2, P_5)	ea.	21337
CGA 590 Fitting, (Air)	ea.	21338

Flexible Stainless Steel Hoses

Description	qty.	cat. #
Flexible Stainless Steel Hose, 36", 1/4" Female NPT Fittings	ea.	21339
Flexible Stainless Steel Hose, 18", 1/4" Female NPT Fittings	ea.	21340
Flexible SS Hose, 36", with Stainless Steel CGA 580	ea.	21344
Flexible SS Hose, 36", with Stainless Steel CGA 350	ea.	21345
Flexible SS Hose, 36", with Stainless Steel CGA 590	ea.	21346

Flammable Gas Flash Arrestor—Factory Mutual Approved*

- Gas flow shuts off in the event of a flashback.
- Flame extinguished—flame front prevented from reaching the gas supply.
- No gas flow restriction under normal operating conditions.

Description	qty.	cat.#
Flammable Gas Flash Arrestor, Brass Body	ea.	21334

*Approved for brass body servicing hydrogen, acetylene, propane, or natural gas only.

Backpressure Gas Regulator

Capillary GC inlet systems have backpressure regulators to maintain a constant upstream pressure and rapidly respond to catastrophic leaks. The 0–60psig (0-414kPa) operating range is sufficient to operate a 105m, 0.25mm ID column at its optimum flow rate.

Description	qty.	cat.#
Backpressure Gas Regulator	ea.	20635

MINICYL Regulator

This compact general purpose regulator has many laboratory applications including air-drying glassware, sparging or evaporating solutions, and controlling pneumatic valves. It is constructed of lightweight aluminum with an elastomer diaphragm. Includes a 0–60psig (0-414kPa) gauge and either 1/8- or 1/4-inch tube fittings.

Description	qty.	cat.#
MINICYL Regulator, 1/8" Fittings	ea.	20610
MINICYL Regulator, 1/4" Fittings	ea.	20611

Cylinder Valve Wrench

This specially-designed wrench enables easy opening of cylinder valves that are fitted with a hand wheel. It is also suitable for removing difficult cylinder caps.

Description	qty.	cat.#
Cylinder Valve Wrench	ea.	21321

Universal Cylinder Wrench

Use this versatile wrench for tightening gauges and gas regulator CGA fittings to cylinder outlets and pipe thread connections.

Description	qty.	cat.#
Universal Cylinder Wrench	ea.	21322

Wall-Mount Gas Cylinder Holder

Prevent serious injuries! This holder is designed to prevent free-standing gas cylinders from tipping over and injuring personnel. The cast aluminum holder can be secured to a wall or the side of a work bench. The mount will secure a cylinder from 4–15 inches in diameter.

Description	qty.	cat.#
Wall-Mount Gas Cylinder Holder	ea.	21333

Instrument-Grade Tubing

ordering note

Required length in meters x 3.2808 = length in feet.

Instrument-Grade Welded and Drawn 304 Grade Stainless Steel Tubing

Clean tubing is critical to ensure the delivery of pure gas to your instrument. Restek's stainless steel tubing is specially cleaned for inertness by using the procedure for processing our Silcosteel® and Siltek®-treated products, because scrupulously clean parts are a prerequisite for a quality coating.

Tubing Dimensions		Length (per-foot pricing on 26 feet or more)		
		25 Feet	26–100 Feet	>100 Feet*
ID (in.)	OD (in.)	cat.#	cat.#	cat.#
0.01" ID	1/16" OD	21500	21501	21502
0.02" ID	1/16" OD	21503	21504	21505
0.03" ID	1/16" OD	21506	21507	21508
0.04" ID	1/16" OD	21509	21510	21511
0.085" ID	1/8" OD	21512	21513	21514
0.21" ID	1/4" OD	21515	21516	21517

*The availability of long lengths (continuous lengths up to 500 feet) is subject to inventory constraints. Please inquire before ordering.

ordering note

An extra charge is applied for cutting and/or straightening stainless steel and/or copper tubing, calculated from the total number of pieces produced for each line item

precleaned

All tubing is precleaned and ready to use.

Cleaned Copper Tubing

- Adheres to ASTM B-280.
- Precleaned and ready to use.
- Use for plumbing GC systems.

ID	OD	Wall	qty.	cat.#
0.065"	1/8"	0.030"	50 ft.	21590
0.190"	1/4"	0.030"	50 ft.	21592

GC Installation Kit

This kit contains the tubing and fittings needed to add an additional GC to your lab bench. Also included are four 1/8-inch tees, so carrier, fuel, and other GC gases can be routed to the new inlet or detector from existing gas lines. Order additional parts, such as gas purifiers or regulators, separately to customize the GC installation to your specifications. Kit includes: one tubing cutter, one 1/8-inch x 1/4-inch reamer, one 7/16-inch wrench, one 1/2-inch wrench, four 1/8-inch brass tees, ten 1/8-inch brass nuts, ten brass front and back ferrules, and 50 feet (15.2 meters) of our instrument-grade cleaned 1/8-inch copper tubing.

Description	qty.	cat.#
GC Installation Kit	kit	21325

tech tip

Plumbing a GC

It is essential to use clean chromatographic-grade tubing to plumb a GC. Standard-grade tubing contains residual hydrocarbon contaminants from the drawing process. These contaminants migrate into the carrier gas stream, elevating background noise and causing down time.

1/16-Inch Tubing Cutter

- Produces square, smooth cuts in 1/16-inch tubing.
- Eliminates tubing distortion.
- Replaceable cutting wheel.

Description	qty.	cat.#
1/16" Tubing Cutter	ea.	20192
Replacement Cutting Wheels	3-pk.	20185

Ridgid® Tubing Cutter

- Excellent for cutting 1/8- or 1/4-inch metal tubing.
- Compact size is ideal for tight spaces.
- Replaceable cutting wheel.

Description	qty.	cat.#
Ridgid® Tubing Cutter for 1/8" or 1/4" metal tubing	ea.	23011
Replacement Cutting Wheels	2-pk.	23012

Tubing Reamer

- Removes burrs from stainless steel tubing.
- For 1/4- or 1/8-inch tubing.
- Nonslip safety design.

Description	qty.	cat.#
Tubing Reamer	ea.	20134

SSI TC-20 Tube Cutting Machine

- Cuts 1/16", 1/8", or 1/4" tubing with inside diameter as small as 0.008".
- Electrically operated bench-top model.
- Handy dressing tool on the swing arm removes burrs and reams tubing.
- Voltage selectable 110–120/220–240 volts, 50–60Hz.*

Description	qty.	cat.#
SSI Tubing Cutter Machine	ea.	23029
SSI Replacement Cutting Wheels	3-pk.	23030

*Unit shipped set for 110–120 operating voltage. Switch to 220–240 volts by using alternate fuse and power cord (included).

8" x 6 1/4" x 4 1/4"
(20.3 x 15.9 x 10.8 cm)
Weight: 11 lbs. (5.0 kg)

Tubing Dressing Tool

Same tool as included with the SSI tube cutting machine.

Description	qty.	cat.#
1/16" Tubing Dressing Tool	ea.	20188
Replacement Insert for 1/16" Tubing Dressing Tool	ea.	20189
1/8" Tubing Dressing Tool	ea.	20190
Replacement Insert for 1/8" Tubing Dressing Tool	ea.	20191

Tubing Bender

- Bends 1/8-inch, 3/16-inch, or 1/4-inch tubing.
- Accurate left-hand, right-hand, or offset bends.

Description	qty.	cat.#
Tubing Bender	ea.	23009

1/16-Inch Tubing Cutting Pliers

- Ideal for cutting 1/16-inch tubing.
- Cuts quickly, reducing distortion.
- Cuts clean, eliminating need for deburring.

Description	qty.	cat.#
1/16" Tubing Cutting Pliers	ea.	20193

Tube & Pipe Fittings

also available

For Siltek®/Sulfinert® and Silcosteel®-CR-treated fittings, see **pages 392-393.**

Tube & Pipe Fittings

The Instrumentation Group of Parker Balston® Corporation designs and manufactures a top-quality line of components and systems for use in process instrumentation, semiconductor manufacturing, and analytical instrumentation. Parker's product quality and delivery have made them a world-wide leader—and this is the level of quality and service Restek wants to deliver to you.

Fitting Type	Parker #	Similar to Swagelok® #	Size	Brass qty.	Brass cat.#	316 Grade Stainless Steel qty.	316 Grade Stainless Steel cat.#
nut 	1 Nu 1	102-1	1/16"	20-pk.	21800	5-pk.	21900
	2 Nu 2	202-1	1/8"	40-pk.	21801	10-pk.	21901
	4 Nu 4	402-1	1/4"	40-pk.	21802	10-pk.	21902
front ferrule 	1 FF 1	103-1	1/16"	20-pk.	21803	10-pk.	21903
	2 FF 2	203-1	1/8"	40-pk.	21804	20-pk.	21904
	4 FF 4	403-1	1/4"	40-pk.	21805	20-pk.	21905
back ferrule 	1 BF 1	104-1	1/16"	20-pk.	21806	10-pk.	21906
	2 BF 2	204-1	1/8"	40-pk.	21807	20-pk.	21907
	4 BF 4	404-1	1/4"	40-pk.	21808	20-pk.	21908
nut & ferrule set 	—	—	1/16"	10-pk.	21809	2-pk.	21909
	—	—	1/8"	20-pk.	21810	5-pk.	21910
	—	—	1/4"	20-pk.	21811	5-pk.	21911
plug 	1 BLP 1	100-P	1/16"	5-pk.	21815	2-pk.	21915
	2 BLP 2	200-P	1/8"	10-pk.	21816	4-pk.	21916
	4 BLP 4	400-P	1/4"	10-pk.	21817	4-pk.	21917
union 	1 SC 1	100-6	1/16"	3-pk.	21818	ea.	21918
	2 SC 2	200-6	1/8"	5-pk.	21819	2-pk.	21919
	4 SC 4	400-6	1/4"	5-pk.	21820	2-pk.	21920
reducing union 	2 RU 1	200-6-1	1/8" to 1/16"	5-pk.	21823	ea.	21923
	4 RU 1	400-6-1	1/4" to 1/16"	5-pk.	21824	2-pk.	21924
	4 RU 2	400-6-2	1/4" to 1/8"	5-pk.	21825	2-pk.	21925

Parker's (A-Lok) two-piece ferrules and NPT fittings are ideal for installing new equipment, modifying existing instrumentation, or replacing worn connections.

Size	Parker #	Similar to Swagelok®	Brass qty.	Brass cat.#	316 Grade Stainless Steel qty.	316 Grade Stainless Steel cat.#	Fitting Type
1/16"	1 ET 1	100-3	2-pk.	21826	ea.	21926	 tee
1/8"	2 ET 2	200-3	2-pk.	21827	ea.	21927	
1/4"	4 ET 4	400-3	2-pk.	21828	ea.	21928	
1/8"	2 ECR 2	200-4	2-pk.	21829	ea.	21929	 cross
1/4"	4 ECR 4	400-4	2-pk.	21830	ea.	21930	
A B 1/8" tube to 1/16"	2 TUR 1	100-R-2	5-pk.	21831	2-pk.	21931	A B  tube end reducer
1/4" tube to 1/16"	4 TUR 1	100-R-4	5-pk.	21832	2-pk.	21932	
1/8" tube to 1/4"	2 TUR 4	400-R-2	5-pk.	21833	2-pk.	21933	
1/4" tube to 1/8"	4 TUR 2	200-R-4	5-pk.	21834	2-pk.	21934	
1/8"	2 PC 2	201-PC	5-pk.	21835	2-pk.	21935	 port connector
1/4"	4 PC 4	401-PC	10-pk.	21836	2-pk.	21936	
1/8" tube to 1/4"	2 PC 4	401-PC-2	5-pk.	21837	2-pk.	21937	
A B 1/8" to 1/8" NPT	2 MSC 2N	200-1-2	10-pk.	21841	2-pk.	21941	A B  male connector
1/4" to 1/4" NPT	4 MSC 4N	400-1-4	10-pk.	21842	2-pk.	21942	
1/16" to 1/8" NPT	1 MSC 2N	100-1-2	5-pk.	21843	2-pk.	21943	
1/8" to 1/4" NPT	2 MSC 4N	200-1-4	10-pk.	21844	2-pk.	21944	
1/4" to 1/8" NPT	4 MSC 2N	400-1-2	10-pk.	21845	2-pk.	21945	
A B 1/8" to 1/8" NPT	2 FSC 2N	200-7-2	5-pk.	21846	2-pk.	21946	A B  female connector
1/4" to 1/4" NPT	4 FSC 4N	400-7-4	5-pk.	21847	2-pk.	21947	
1/4" to 1/8" NPT	4 FSC 2N	400-7-2	5-pk.	21848	2-pk.	21948	
1/8" male*	2A-Q4VN	QC4D-200	—	—	ea.	21957	 male & female quick couplings
1/8" male	2A-Q4P	QC4S-200	—	—	ea.	21958	
1/8" female*	2A-Q4CN	QC4B-200	—	—	ea.	21959	
1/4" male*	4A-Q4VN	QC4D-400	—	—	ea.	21960	
1/4" male	4A-Q4P	QC4S-400	—	—	ea.	21961	
1/4" female*	4A-Q4CN	QC4B-400	—	—	ea.	21962	

*Includes self-sealing shut-off valve.

Gas Valves, Leak Detector, GC Installation Kit

Toggle-valve—instant on/off control

Ball valve—leak-free bidirectional sealing

Plug valve—leak-free at wide temperature swings

cat.# 22202

cat.# 22200

cat.# 22209 Optional knob for accurate control of low flow

Parker Balston® Shut-Off Gas Valves

Parker toggle gas valves are ideal for applications in which instant on/off gas control is necessary. They are rated to 200psig at 21°C and have a maximum operating temperature of 148°C. Ball valves have a floating ball to assist sealing and to reduce operating torque, and dual seats to provide leak-tight bidirectional sealing. They are rated to 1500psig at 21°C and have a maximum operating temperature of 177°C. Perfect for instrument supply lines, plug valves work well in any application requiring throttling or on/off operations. Parker plug valves remain leak-free even when subjected to wide temperature swings. They are rated to 3000psig at 21°C and have a maximum operating temperature of 205°C.

	1/8" Brass		1/4" Brass		1/8" Stainless Steel		1/4" Stainless Steel	
Valve Type	cat.#	ea.	cat.#	ea.	cat.#	ea.	cat.#	ea.
Toggle	22188		22189		22190		22191	
Ball	22192		22193		22194		22195	
Plug	22196		22197		22198		22199	

Parker Balston® Precision Metering Gas Valves

Precision metering gas valves provide accurate, stable control of low gas and liquid flow rates. The valve stem threads do not contact the fluid stream, making these valves ideal for high-purity applications. The O-ring seal and stem threads are coated with a low vapor pressure, silicone lubricant for optimum performance. An optional vernier turn-counter knob allows repeatable flow settings for standardized operating processes.

	1/8" Nickel-Plated Brass		1/4" Nickel-Plated Brass		1/8" Stainless Steel		1/4" Stainless Steel	
Valve Type	cat.#	ea.	cat.#	ea.	cat.#	ea.	cat.#	ea.
Metering, straight	22200		22201		22204		22205	
Metering, right angle	22202		22203		22206		22207	
Vernier Knob for Metering Valve: cat.# 22209 (ea.)								

Restek Electronic Leak Detector

- Reliable thermal conductivity leak detector.
- Responds to leaks in less than 2 seconds.
- Audible alarm plus LED readout.
- Auto zeros with the touch of a button.
- Built-in rechargeable 7.2-volt battery.

Easy-to-clean probe assembly.

Description	qty.	cat.#
Leak Detector with 110Volt Battery Charger	ea.	22451
Leak Detector with 220Volt European Battery Charger	ea.	22451-EUR
Leak Detector with 220Volt UK Battery Charger	ea.	22451-UK

Caution: The Restek Electronic Leak Detector is NOT designed for determining leaks of combustible gases. A combustible gas detector should be used for determining combustible gas leaks under any condition. The Restek Electronic Leak Detector may be used for determining trace amounts of hydrogen in a GC environment only.

Leak Detector Accessory Kit

The kit includes an adaptor fitting to detect leaks in hard-to-reach locations, and a mounting bracket that can be affixed to the wall or GC.

Description	qty.	cat.#
Leak Detector Accessory Kit (adaptor fitting for probe, mounting bracket)	kit	22453

GC Installation Kit

This kit contains the tubing and fittings needed to add an additional GC to your lab bench. Also included are four 1/8-inch tees, so carrier, fuel, and other GC gases can be routed to the new inlet or detector from existing gas lines. Order additional parts, such as purifiers or regulators, separately to customize the GC installation to your specifications. Kit includes: one tubing cutter, one 1/8-inch x 1/4-inch reamer, one 7/16-inch wrench, one 1/2-inch wrench, four 1/8-inch brass tees, ten 1/8-inch brass nuts, ten brass front and back ferrules, and 50 feet (15.2 meters) of our instrument-grade cleaned 1/8-inch copper tubing.

Description	qty.	cat.#
GC Installation Kit	kit	21325

54-Piece Tool Kit

A must-have for every lab—all the tools you need in one place! Set comes with screwdrivers, pliers, wrenches, sockets, scissors, clamps, and more. Durable, zippered, notebook-style carrying case for easy transport.

Description	qty.	cat.#
54-Piece Tool Kit	kit	23004

Plier Set

Includes 6-inch nose/side cutter, 6-inch wire cutter, and 6-inch adjusting pliers.

Description	qty.	cat.#
Plier Set	set	23033

Metric 9 Piece Ball-Point Hex Key Set

Includes 9 metric hex keys (Allen wrenches): 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10mm.

Description	qty.	cat.#
Metric 9 Piece Ball-Point Hex Key Set	set	22999

12 Piece Ball-Point Hex Key Set

Includes 12 hex keys (Allen wrenches): .050", $^{1}/_{16}$", $^{5}/_{64}$", $^{3}/_{32}$", $^{7}/_{64}$", $^{1}/_{8}$", $^{9}/_{64}$", $^{5}/_{32}$", $^{3}/_{16}$", $^{7}/_{32}$", $^{1}/_{4}$", and $^{5}/_{16}$".

Description	qty.	cat.#
12 Piece Ball-Point Hex Key Set	set	22998

Tubing Bender

- Bends $^{1}/_{8}$-inch, $^{3}/_{16}$-inch, or $^{1}/_{4}$-inch tubing.
- Accurate left-hand, right-hand, or offset bends.

Description	qty.	cat.#
Tubing Bender	ea.	23009

Torx® Screwdriver Set

- Set includes TR-10, TR-15, and TR-20.
- Ideal for performing routine maintenance on Agilent 6890 GCs.

Description	qty.	cat.#
Torx® Screwdriver Set	set	23034

5-in-1 Magnetic Screwdriver

Magnetic power tip holds bits and screws securely.

Description	qty.	cat.#
5-in-1 Magnetic Screwdriver	set	23002

Ratchet Wrenches

Easier to use in confined spaces, compared to adjustable wrenches.

Description	qty.	cat.#
$^{3}/_{8}$" Ratchet Wrench	ea.	23005
$^{1}/_{2}$" Ratchet Wrench	ea.	23006
$^{7}/_{16}$" Ratchet Wrench	ea.	23007
$^{9}/_{16}$" Ratchet Wrench	ea.	23008

Wrench Set

Includes 4-inch, 6-inch, and 8-inch adjustable wrenches.

Description	qty.	cat.#
Wrench Set	set	23001