

# GC Injectors

SRI offers a wide variety of GC injectors and injection systems. Up to five injectors may be mounted simultaneously on the Model 8610C or 8610D. The Model 310 will accommodate a single On-column, Heated Flash Vaporization, Heated Split/Splitless, or PTV injector. Injector types are selected by the user depending on the particular measurement application, detection limit, and regulatory requirements. The On-Column Injector is standard equipment on every 8610, 410 and 310 GC. Heated Flash Vaporization, Heated Split/Splitless, and PTV Injectors are all upgrades to the On-Column Injector. All injectors must be installed at the SRI factory.



1. On-Column Injector
2. On-Column PTV Injector
3. Heated Flash Vaporization Injector
4. Heated Split/Splitless Injector
5. PTV - Programmable Temperature Vaporization Injector
6. 10-Port Gas Sampling Valves & 22-port Selector Valves
7. Sample Preconcentration and Enrichment Options:
  - Heated Adsorbent Traps
  - DGA Permeation Loop Accessory
8. Heated Static Headspace Injector
9. Method TO-14 Air Concentrator (1 Trap or 2)
10. Thermal Desorber
11. Method 5030/5035 Compliant Purge & Trap
12. 10-Sample 5030 Purge & Trap Autosampler
13. 110 and 120 Vial Autosamplers
14. 28, 40 and 50 Vial Headspace Autosampler

## SAMPLE TYPES AND APPROPRIATE INJECTORS

SAMPLE TYPES AND APPROPRIATE INJECTORS	
<b>LIQUIDS</b>	<ul style="list-style-type: none"> <li>• On-column, Heated Split/Splitless, Heated Flash Vaporization, PTV, Heated Static Headspace, Purge &amp; Trap, Liquid Injection Valve, Liquid Autosamplers, or Headspace Autosampler</li> </ul>
<b>SOLIDS</b>	<ul style="list-style-type: none"> <li>• Thermal Desorber, Heated Static Headspace, PTV, or Headspace Autosampler</li> </ul>
<b>GASES</b>	<ul style="list-style-type: none"> <li>• On-column, Gas Sampling Valve, Method TO-14 Air Concentrator, or Heated Static Headspace</li> </ul>
<b>SPME FIBERS</b>	<ul style="list-style-type: none"> <li>• Heated Flash Vaporization with Low Volume SPME Liner, or Heated Split/Splitless</li> </ul>

# On-Column Injector

- Simple and Reproducible
- For Liquids and Gases with Low AND High Boiling Analytes
- For 0.53mm Capillary and 1/8" Packed Columns
- No Boiling Point Discrimination
- Low thermal mass

The On-Column Injector is supplied as standard equipment with the 8610, 410 and 310 GC mainframes.

For most applications, where a wide-bore 0.53mm capillary or 1/8" packed column is used, the On-column Injector will give the BEST results. In most cases the On-Column Injector is simpler and less expensive than heated injectors.

The On-Column Injector is perfect for liquids and gases with high and low boiling analytes. Even very high temperature analyses are easily performed using simple, reproducible on-column injection.



The On-Column Injector's low mass and small size ensure that the injector body temperature closely follows the column oven temperature.

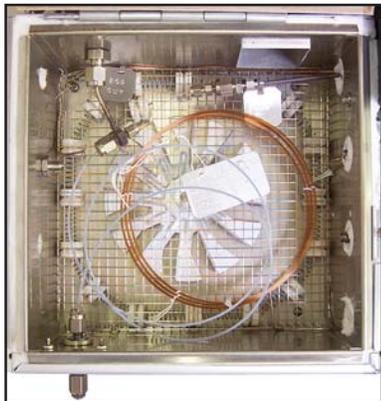


The injector's low thermal mass and small size ensure that the syringe needle deposits the liquid sample well inside the column oven, so that as the column temperature increases, even high boiling point samples are completely vaporized. The On-column technique of sample introduction puts the sample into the bore of the column itself, which is often more inert than a glass injection liner. Unlike split/splitless injection, on-column injection puts the entire sample volume into the column without the possibility of boiling point discrimination or other uncertainties, and the gradual volatilization of the sample starting from a liquid droplet yields sharper peaks than flash vaporization followed by recondensation.

The On-column Injector is supplied with carrier gas from the included Electronic Pressure Controller (EPC), and the carrier gas is conveniently filtered with an internally mounted Molecular Sieve filter which can be baked out simply by flipping a switch on the GC's front control panel. A second EPC is available for operating a column connected to a gas sampling valve (or for backflushing) without the injector fitting. Also available is a second injector fitting connected to the first EPC for applications where two columns are used in parallel, sharing the same carrier gas pressure.

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|-----------|---|
| 8690-0023 | On-Column Injector for 0.53mm capillary and 1/8" packed columns. Includes EPC carrier gas controller and molecular sieve filter |
| 8690-2022 | Second carrier gas EPC without injector port fitting  |
| 8690-2023 | Second injector port fitting without EPC  |

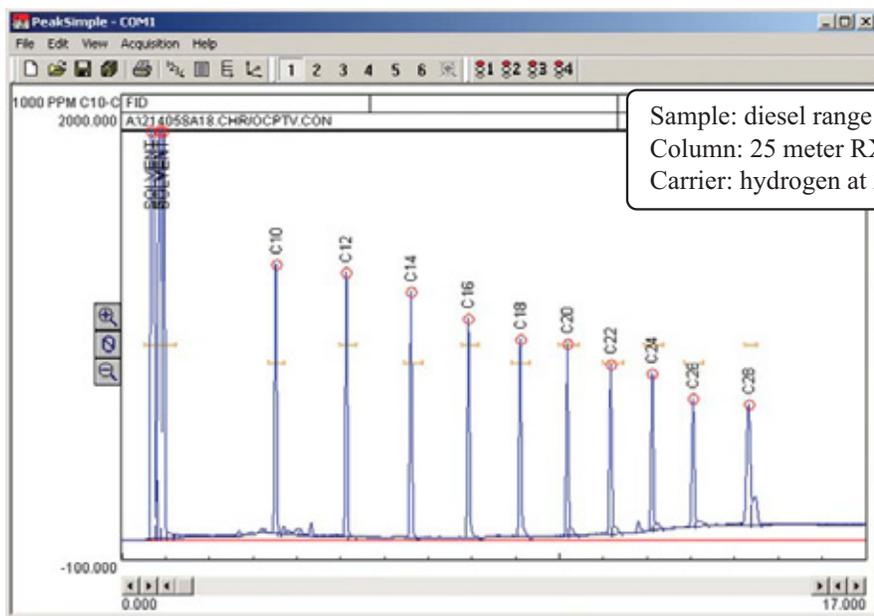
# On-Column PTV Injector



- Inject Larger Volumes onto Narrow Bore Columns
- Concentrate Sample and Focus Peaks
- Simpler than Split/Splitless Injectors
- Less Bulky than Conventional PTVs
- Great for Semivolatile Samples

The On-Column PTV is a resistively heated precolumn, which is connected to your narrow bore column with a special, electrically insulated split “T” inside the GC column oven. The 5 micron nonpolar phase in the OCPTV precolumn has a high capacity to absorb high boiling compounds, and is stable at high temperatures. Like in-tube SPME, the precolumn discriminates in favor of high boiling semivolatile analytes, concentrating them in the phase. Like the Split/Splitless injector, the OCPTV has a split vent and needle valve for venting solvent while concentrating sample. Unlike a normal Heated Split/Splitless injector, the OCPTV vents the solvent without expanding it to a gas. Therefore, the OCPTV is capable of larger liquid injections than a regular heated split/splitless injector.

The GC operator injects sample via syringe through the on-column injection port with the split vent open to vent the solvent. After injection and solvent venting, the precolumn heats up while the carrier gas flows through it to sweep focused analytes from the precolumn to the analytical column. At this point, the precolumn is hotter than the column oven. The temperature difference between the hotter precolumn and cooler analytical column causes the analytes to focus on the analytical column, resulting in sharp peaks on the chromatogram.



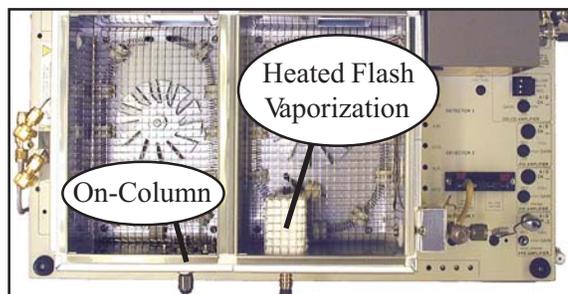
This chromatogram was generated by an SRI GC equipped with an OCPTV injector and an FID detector. A 25 meter narrow bore capillary column was used to separate 100ppm diesel range organics (DRO).

8690-0037

On-Column PTV Injector for GC

# Heated Flash Vaporization Injector

- Desorption of SPME Fibers
- Extremely Dirty Samples
- Adjustable from ambient to 300°C
- Includes On-Column Mode



This 8610D GC has a standard On-Column Injector on the first oven, and an optional Heated Flash Vaporization Injector on the second oven.

The SRI Heated Flash Vaporization Injector is useful for applications which require flash vaporization of the sample prior to the column, such as desorption of SPME fibers or injection of extremely dirty samples where the nonvolatile residue must be trapped in the injection liner.

The injector's heater block can be thermostatted up to 300°C, and includes as standard equipment two injector liners: an inert Silcosleeve™ liner, and an unbreakable stainless steel liner, which also allows for on-column mode.

The Heated Flash Vaporization Injector option is an upgrade to an existing On-column Injector. Two heated injectors may be installed on the Model 8610C GC, but only one on the smaller Model 310. Where no need for a heated injector exists, SRI recommends using the standard On-column Injector.

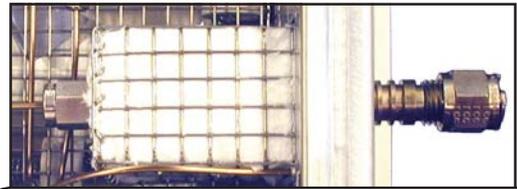
## Heated Injection vs. On-column Injection: PROS and CONS

In the early days of GC, the column oven insulation was typically several inches thick. It was not then possible to insert a syringe through the oven wall to deposit the sample on the column and be assured that the sample would completely vaporize unless the injector was heated. On today's SRI GC, the oven wall insulation is much thinner. This allows the syringe needle to penetrate well inside the column oven, thus depositing the sample into the bore of the column itself. As the temperature is programmed up, the sample is completely vaporized. Even high boiling analytes such as  $C_{44}$  hydrocarbons chromatograph well using on-column injection, since the area of the column where the sample is deposited follows the column temperature and ultimately heats to a point where the  $C_{44}$  begins to migrate down the column. There is no need to employ a heated injector unless the sample needs to be split, or if the sample needs to be desorbed from a SPME fiber. In fact, the heated injector has some distinct disadvantages. The internal surfaces of the injector liner are more chemically active than the very inert interior of the column, so undesired adsorption and tailing can result when the sample is violently expanded in the hot interior of the heated injector. Also, the heated injector transmits some heat into the column oven because of its close proximity, making it harder for the oven to cool down close to ambient temperature.

- |           |  |
|-----------|--|
| 8690-0025 | Heated Flash Vaporization Injector upgrade |
| 8670-0072 | Narrow bore SPME injector sleeve           |

# Heated Split/Splitless Injector

- Split, Splitless, or On-Column Modes
- Narrow or Wide Bore Capillary Columns
- Adjustable from Ambient to 300°C
- Adjustable Split Flow



The Split/Splitless Injector is insulated to help maintain its temperature independently of the column oven temperature.



The split flow is adjustable by a precision needle valve on the front of the GC valve oven. The GC pictured here is also equipped with a gas sampling valve, with the sample IN and OUT also on the front of the valve oven.

The Heated Split/Splitless Injector permits the use of narrow-bore capillary columns (0.32mm I.D. and smaller) in split or splitless modes. Capillary columns with 0.53mm I.D. and 1/8" packed columns can be used in split, splitless, or on-column modes. The injector temperature is adjustable from ambient to 300°C. The split flow is adjustable by means of a precision needle valve, and can be turned ON/OFF with a timed Event from the PeakSimple data system. One Silcosleeve liner and one unbreakable stainless steel liner are supplied as standard equipment with the injector.



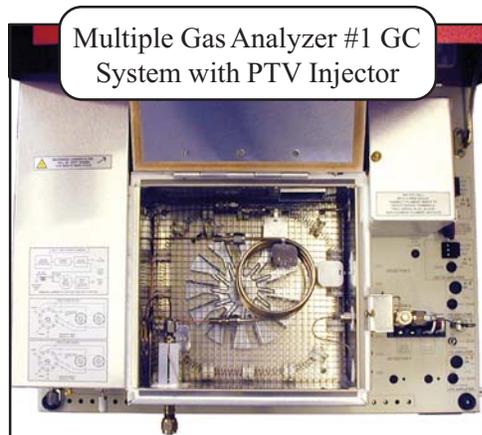
Stainless steel and Silcosleeve liners with megabore column adapter

The Split/Splitless Injector option is an upgrade to an existing On-column Injector, which is standard equipment on every SRI GC. When it is desired to add the Split/Splitless Injector as the second injector, an On-column Injector must be ordered as well (part number 8690-0023, page 54).

8690-0034

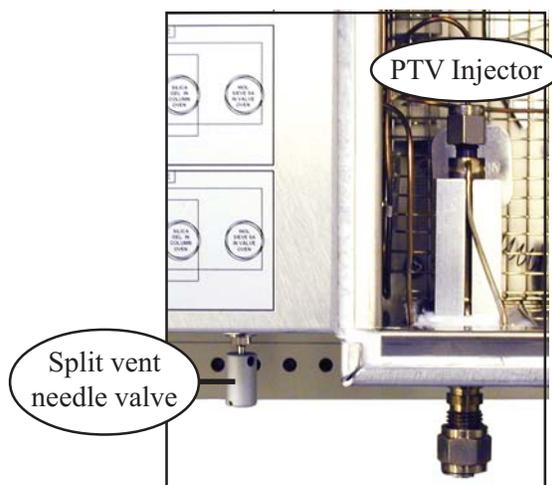
Heated Split/Splitless Injector upgrade

# PTV - Programmable Temperature Vaporization Injector



- **Ballistic Heating**
- **Ability to Stop carrier gas**
- **Large Volume Injections—to 1.0mL+**
- **Achieve Low Detection Limits without pre-concentration**
- **Split/Splitless & On-Column Modes**
- **Thermal Desorption Applications**
- **PeakSimple Control**

The Programmable Temperature Vaporization (PTV) option adds ballistic heating capability to the Heated Split/Splitless Injector to accommodate large volume injections or thermal desorption applications. In the PTV mode, the insulation is removed from the Split/Splitless Injector, so that the oven fan can cool the PTV Injector down between analyses.



A small amount of adsorbent material, like Tenax, is packed inside the PTV injector sleeve. The initial column oven temperature, which maintains the injector cool-down temperature, should be set slightly higher than the boiling point of the solvent. As a large volume of sample is injected, the solvent vaporizes and passes through the adsorbent material and out the split vent. The split vent and carrier gas are under PeakSimple control. The carrier gas can be turned OFF during the PTV ballistic heating, in order to preheat the adsorbed analytes prior to desorbing onto the column.

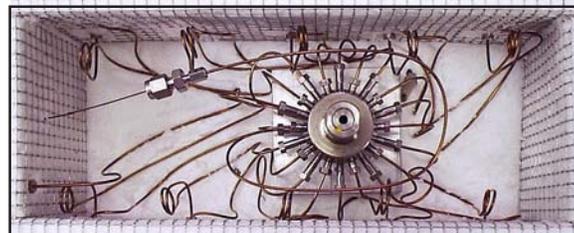
The Silcosleeve™ liner can be packed with adsorbents like Tenax, loaded with sample offline, then inserted into the PTV for desorption.

8690-7034

PTV & Split/Splitless Injector upgrade

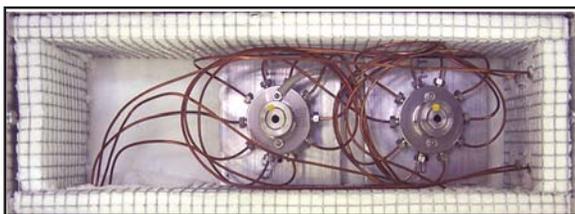
## 10-Port Gas Sampling Valves and 22-Port Selector Valves

- Heated, Thermostatted Valve Oven
- Standard & Custom Plumbing Configurations
- Electronically Actuated with PeakSimple Control or Manually Actuated
- 1, 2, or 3 Valve Capability



22-port stream selector valve on our 10 position Method 5030 Purge & Trap Autosampler

SRI uses 10-port gas sampling valves because they provide more analytical flexibility for the same cost as 4 or 6 port valves. 10-port gas sampling valves can easily be plumbed to replicate the function of the simpler valves, while offering many other possible configurations. SRI offers standard plumbing configurations, including: Inject Only, Inject and Backflush, Precolumn Backflush to Vent, Column Sequence Reversal, Alternate Loop Inject, and Dual Loop-Dual Column. Many more plumbing configurations are possible, especially when multiple valves are plumbed together.



Dual 10-port gas sampling valves in the heated valve oven of a customized dual TO-14 injector

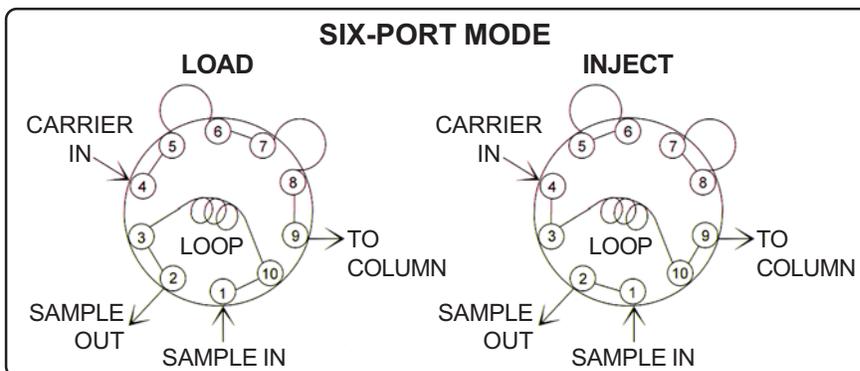
The optional valve oven, mounted on the 8610C GC, can accommodate two electrically operated plus one manually operated valve, and can be adjusted from ambient to 175°C (up to 300°C for the manual valve). Because the valve oven is immediately next to the column oven, tubing runs are short with no cold spots, which results in sharper peaks.

Each valve includes 1/8" stainless steel bulkhead fittings on the front of the optional valve oven for sample in/out connections. A single heated (375°C max) fast-cooling adsorbent trap plumbed as the loop of the gas sampling valve is also available for applications where sample concentration is desired. The trap cools to a user-controlled setpoint, not just to ambient temperature, so the adsorbent characteristics (water rejection, etc.) can be manipulated.

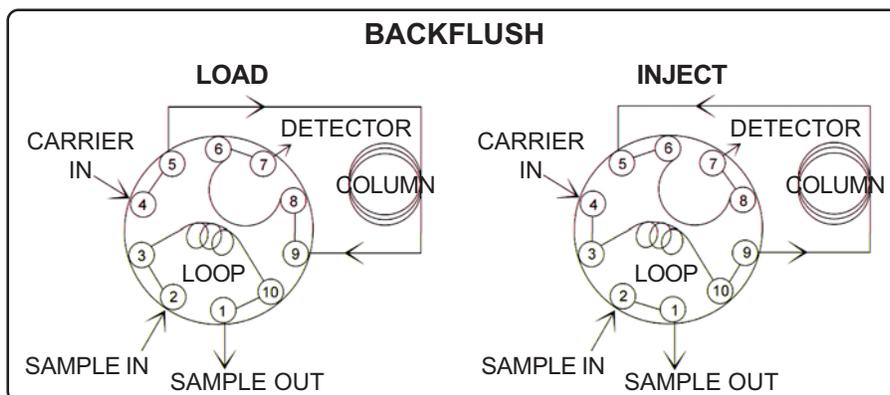
8690-0063	10-Port Manually Actuated valve, plumbed & tested
8690-0065	10-Port Electrically Actuated valve, plumbed & tested
8690-0077	Automated 22-port, 10-Stream Selection valve, plumbed & tested
8690-0088	Heated, thermostatted valve oven mounted on an 8610C GC

# 10-Port Gas Sampling Valve Plumbing Option Examples

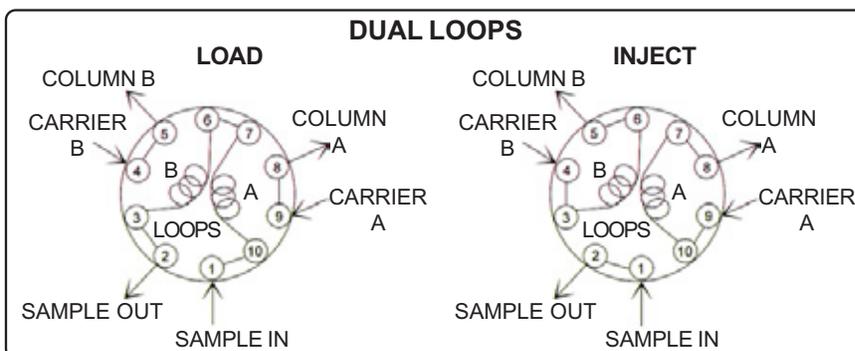
The valve plumbing configuration shown at right is the standard 6-port configuration. The sample loop connected between ports 3 and 10 is inserted into the carrier gas stream when the valve is rotated to the INJECT position.



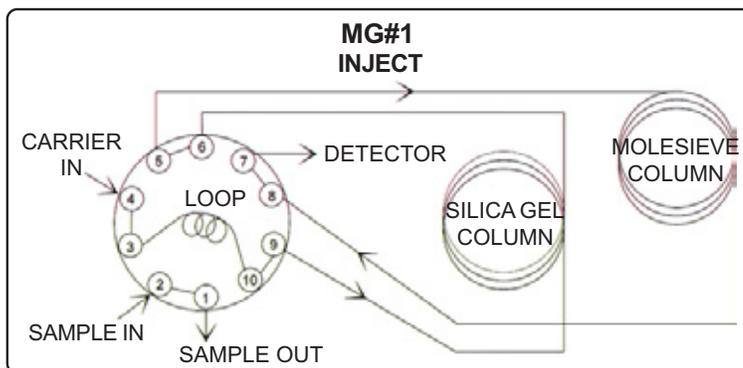
The same 10-port valve can also be configured to backflush the column when the valve is rotated. Backflushing can often shorten the analysis by eliminating the need to program the column temperature up to elute high boiling analytes.



A single 10-port valve can be plumbed to inject the same sample onto two separate columns using two separate loops. This is especially useful where two different carrier gas types are used, or where the detectors employed have very different sensitivities and need different sample sizes injected.



The 10-port valve configuration shown at right is our Multiple Gas Analyzer #1 (MG#1) valve. In the LOAD position, the sample loop is filled with new sample gas, and the Silica Gel column is downstream of the MoleSieve column. In the INJECT position (shown), the contents of the loop are flushed into the Silica Gel column, which is now upstream. The lightest analytes blow through onto the MoleSieve for separation. The valve is then rotated back to the LOAD position, just prior to the elution of ethane for the separation of C<sub>2</sub>-C<sub>6</sub>.

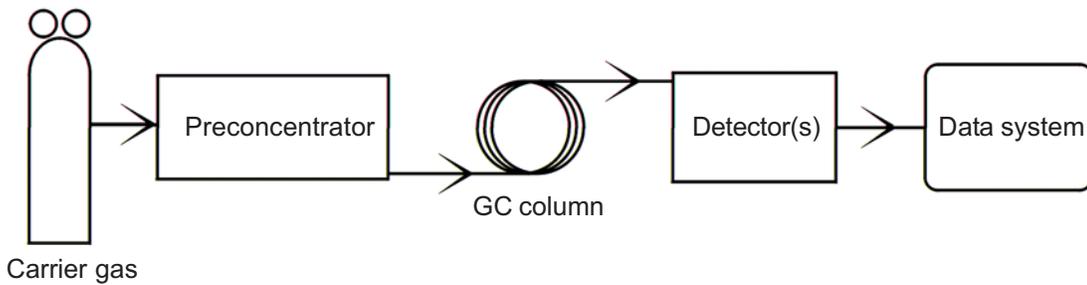


# Sample Preconcentration and Enrichment Options

SRI offers a variety of trapping options for preconcentrating or enriching samples for GC analysis.

- **Traditional Heated Adsorbent Trap** for preconcentrating molecules between  $C_3$  and  $C_{15}$
- **Permeation Trap** for gases dissolved in liquid samples`
- **Enrichment Coil** for thermal modulation of gas streams

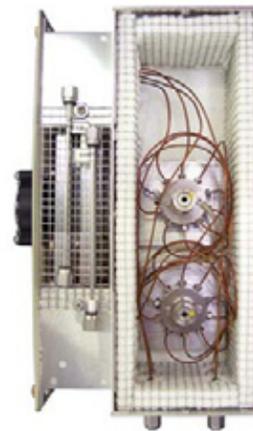
In terms of flow, the preconcentrator is always upstream of the GC column oven. Trap and valve ovens are mounted on the left-hand side of the GC.



Most of these options employ the versatile 10-port gas sampling valve described on the previous pages. Each valve in turn requires a heated valve oven. The only exception featured here is the Enrichment Coil option, designed for use on the Model 110 detector chassis or in the GC column oven.



Permeation trap with DGA accessory



Dual TO-14 Concentrator (four traps, two valves)

# Heated Adsorbent Traps

- Dual setpoints for adsorption & desorption temperatures
- Preconcentrates molecules between C<sub>3</sub> and C<sub>15</sub>
- Single (1/8") or Dual (1/4") Independently Heated Traps
- Requires a 10-port Valve & Valve oven
- Adsorbent packing of your choice
- PeakSimple Control

ADSORBENTS	
Carbosieve II	MoleSieve 13X
Carbopack B	Silica Gel
HayeSep-D	Tenax-GR

Heated adsorbent traps are a simple and economical way to preconcentrate samples for the GC. A heated trap consists of a stainless steel tube packed with adsorbent. While sample is drawn through the tube, analytes of interest are trapped on the adsorbent bed. Then, the trap is heated and the valve rotated to desorb the analytes into the carrier gas stream, which deposits them in the analytical column for separation prior to reaching the detector.

Each SRI trap is plumbed as a sample loop of a 10-port gas sampling valve. A valve and heated valve oven must be ordered along with a heated trap. SRI heated traps are installed in the ducts of the valve oven on the left-hand side of an SRI 8610 GC.



Top view of an SRI heated trap



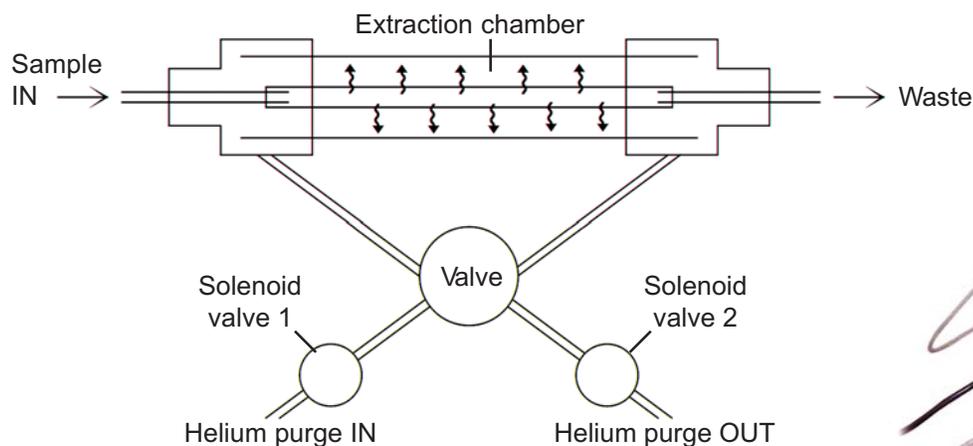
Choose one or two independently heated traps packed with your choice of adsorbent. Rather than using multiple adsorbents with different affinities and desorption temperatures in one trap, SRI uses a unique dual trap system for simultaneous trapping and desorption of dissimilar analytes. Dual heated traps are an integral part of the SRI Purge and Trap and the TO-14 Air Concentrator. For most applications, dual heated traps still require just one 10-port gas sampling valve.

8690-0084	Heated/fast cooling adsorbent trap and plumbing for existing gas sampling valve 1/8"
8690-1084	Heated/fast cooling adsorbent trap and plumbing for existing gas sampling valve 1/4"
8690-0065	10-Port electrically actuated valve, plumbed & tested
8690-0088	Thermostatted valve oven mounted on an 8610C GC

# DGA Permeation Loop Accessory

- For Extracting and Preconcentrating Dissolved Gases in liquid samples
- Built-in Standards Preparation Module—Make Your Own Standards
- Requires a Valve Oven & one or two 10-port Valves

The Permeation Loop consists of permeation membrane tubing encapsulated in a trap-heated glass tube. When sample liquid is pumped through the permeation tubing, the dissolved gases therein selectively permeate through the heated membrane into the surrounding extraction chamber, which is plumbed as the loop of a 10-port gas sampling valve.

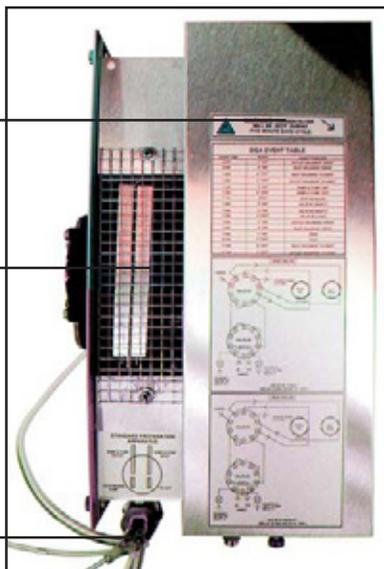


## Top view of the DGA-TOGA Permeation Trap Accessory

Heated valve oven with 10-port valve inside

Permeation Trap

Standards preparation sparge head



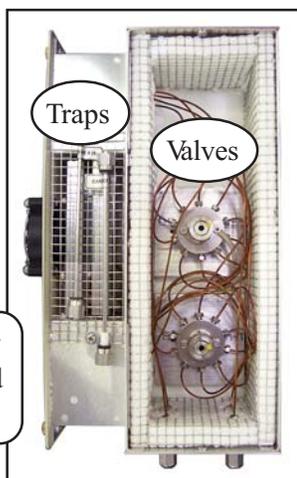
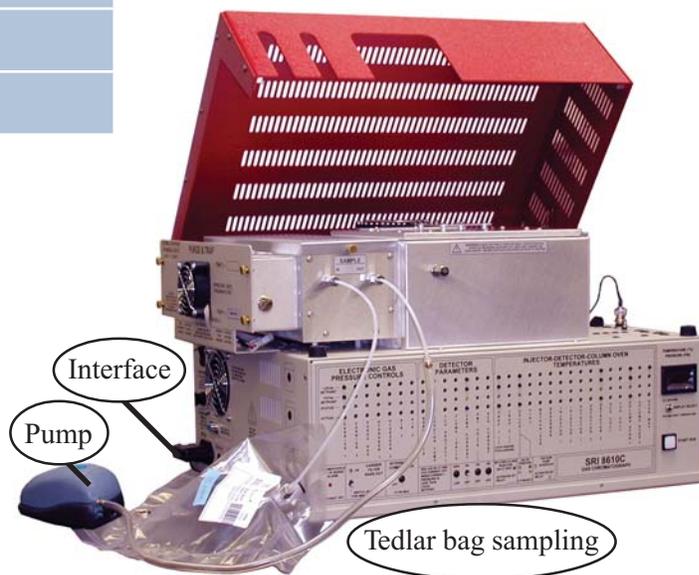
The Permeation Loop Accessory includes the permeation trap, two peristaltic pumps, two solenoid valves, and a standards preparation sparge head. By reconnecting a few tubing lines, the DGA-TOGA Permeation Loop Accessory can be configured to prepare dissolved gas standards. A Tedlar bag, or other container, filled with gas standard is connected to the standard pump. The standards preparation vessel is filled with sample liquid, such as water. The standard pump bubbles gas standard into the standards preparation vessel, equilibrating the liquid over time to a known concentration.

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|-----------|---|
| 8690-0087 | DGA Permeation Trap accessory                         |
| 8690-0065 | 10-Port electrically actuated valve, plumbed & tested |
| 8690-0088 | Thermostatted valve oven mounted on an 8610C GC       |

## Method TO-14 Air Concentrator (1 Trap or 2)

- Sample from Source, Tedlar Bags, Canisters, or Ambient Air
- Vacuum Pump and Data System controlled Interface
- Independently Heated Dual Trap Design (optional)
- 10-port Electrically Actuated Valve
- PeakSimple Control

The SRI Method TO-14 Air Concentrator is equipped with a vacuum pump and interface, a 10-port gas sampling valve, and one or two independently heated adsorbent traps. The included external vacuum pump may be attached to the downstream side of the traps to load a gas sample automatically, under control of the PeakSimple data system.



Shown here is a dual TO-14 Air Concentrator with four traps and two gas sampling valves.

The gas sample may be contained in Tedlar bags or canisters, or may be sampled directly from the source. The vacuum pump is operated for several minutes or more to pass 100-200mL/minute of gas through the traps, where the organics are retained. Several liters or more may be concentrated, depending on the detection limit required. Once the analytes are trapped, they are desorbed and directed to the column for separation.

The TO-14 Air Concentrator comes with single or dual traps. The single trap option is good for most analyses. If vinyl chloride is a target analyte, order the dual trap option. Please see the Purge & Trap pages for an explanation of the benefits of our unique dual trap design.

8690-1051

Method TO-14 Air Concentrator with 1 trap

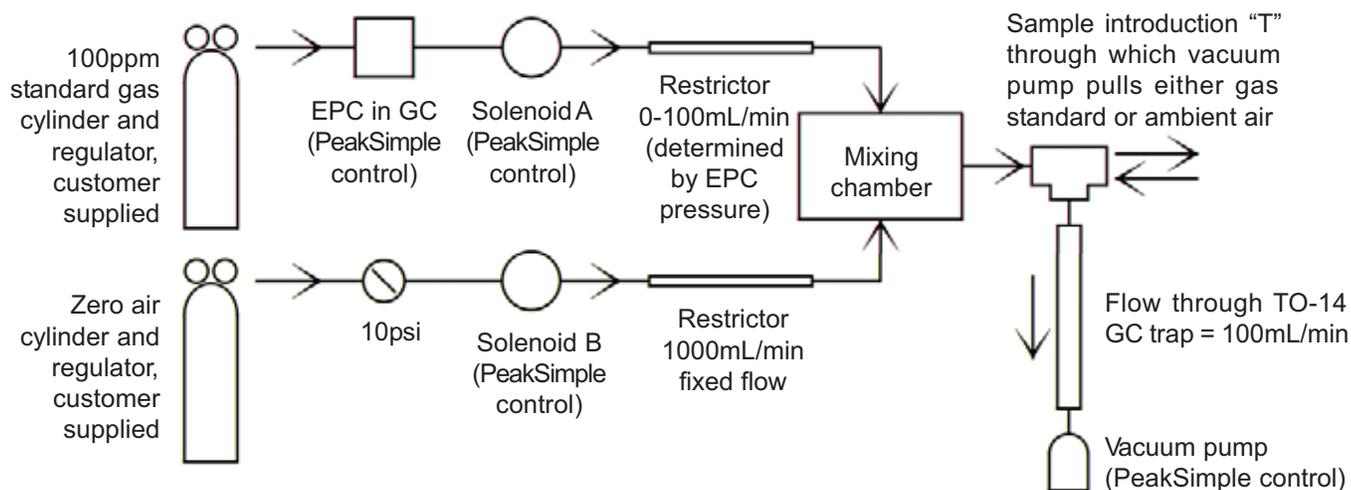
8690-1055

Method TO-14 Air Concentrator with 2 traps

# Automated Calibration System (ACS)

## For the SRI TO-14 Air Monitoring GC

The SRI Automatic Calibration System (ACS) allows for automatic, unattended recalibration when using an SRI GC equipped with the TO-14 Air Concentrator for ambient air analysis.



Under control of the PeakSimple software included with the GC, the ACS can make dilutions of the customer-supplied standard gas and Zero Air at ratios of 10,000 to 1. For example, if the standard EPC on the TO-14 GC is set to 50psi, a 100ppm standard gas flows through the restrictor at a rate of 100 milliliters per minute; the Zero Air flows at a rate of 1,000 milliliters per minute. This produces a 10ppm diluted gas, which is sampled into the TO-14 Air Concentrator by the vacuum pump (supplied with the TO-14 Air Concentrator).

By manipulating both the EPC pressure and time, the 100ppm standard can be diluted over a 10,000 to 1 concentration. For example, let's say you've decided to use 300 seconds as the length of time the vacuum pump is sampling the standard gas. If the standard EPC pressure is reduced to 10psi, the standard gas flow rate is reduced to 10 milliliters per minute, and the resulting diluted concentration is 1ppm. If solenoid A is open for 30 seconds (10% of the total 300 second time period during which the vacuum pump is pulling sample through the TO-14 trap), the resulting time-averaged concentration is 100ppb. Because PeakSimple controls the dilution ratio, a multi-point calibration curve can be automatically constructed as part of the Autosampler Queue feature. The Autosampler Queue permits PeakSimple to periodically recalibrate without operator intervention.

# Thermal Desorber

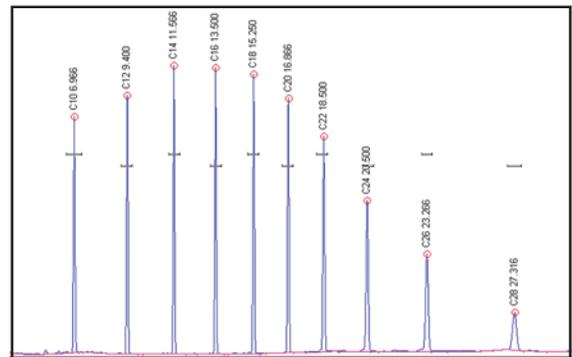


- Volatile & Semivolatile compounds in Solid Matrices
- Mounts in the Valve Oven on the 8610C GC
- High Temperature & High Sensitivity
- Manually Actuated 10-port Valve
- No solvent extraction required
- Simple to Use

The SRI Thermal Desorber accessory permits volatile and semivolatile compounds in soil, or other solid matrices, to be injected and analyzed with little or no sample preparation, and with very high sensitivity.

With the Thermal Desorber, no solvent extraction is required. This is a major convenience for field operations, and helps save on costs. Little operator skill is needed, and 4-10 analyses can be run per hour, depending on specific requirements.

Up to one gram of soil is loaded into a reusable glass tube, and secured in place with plugs of glass wool. The tube is then inserted into the hot (275 °C) thermal desorber fitting, which is mounted in the heated valve oven compartment of the 8610C GC.

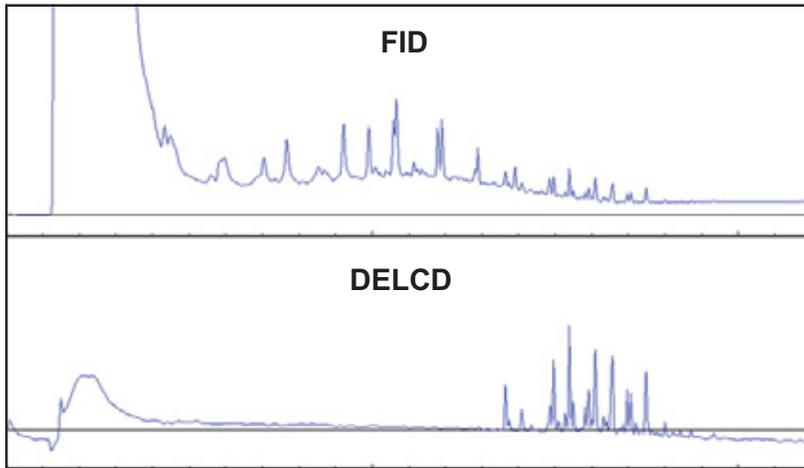


This chromatogram is from a GC with a Thermal Desorber and an FID detector. Synthetic diesel range samples like this are used to verify complete desorption. Sample: 2000ng synthetic diesel range organics desorbed from soil.

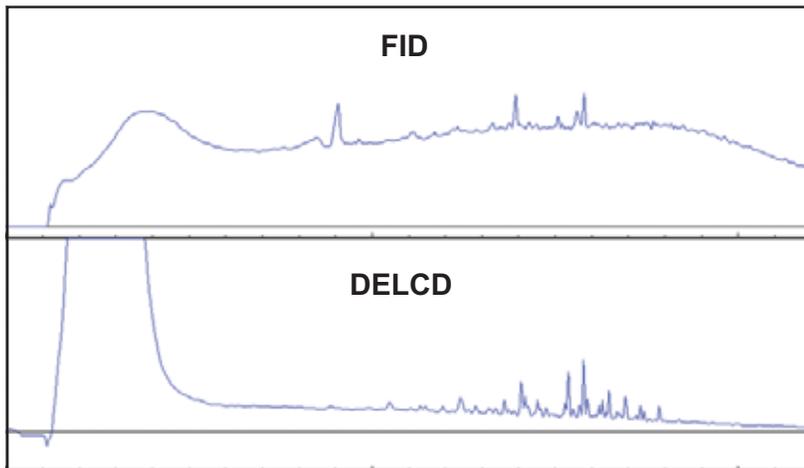
Because of the large sample size—up to 1 gram, an analyte present in the soil at 1ppm desorbs 1000 nanograms onto the GC column. This results in detection limits in the ppb range for most compounds. Sandy soil can typically be desorbed with no sample preparation at all. Clay soil is first mixed with sodium sulfate granules to break the clay into a fine powder coating the granules, then the clay and sodium sulfate mix is desorbed.

# Thermal Desorber

Soil samples can typically contain 20-50% water. FID or FID/DELCD detectors are commonly used with the Thermal Desorber, because the SRI FID automatically relights the flame after the large water peak. The Thermal Desorber + FID/DELCD configuration is perfect for detecting PCBs, pesticides, PAHs, JP-4, kerosene, and diesel in soil. Due to the extreme selectivity of the DELCD, PCBs can be discriminated even in the presence of massive hydrocarbon contamination.



The top two chromatograms show the analysis of PCB 1254 standard in diesel oil with our PCB GC System, which is equipped with a Thermal Desorber and FID/DELCD detectors in combination. The FID shows the diesel hydrocarbons and the PCBs, but the PCB peaks are obscured by the diesel peaks. In contrast, the DELCD shows the PCBs only, revealing what was essentially hidden in the FID chromatogram.



The bottom set of chromatograms show the analysis of a real-world standard: 0.3 grams of soil from a contaminated site. This real-world standard is NIST certified to contain 1.34ppm PCBs. The FID shows a large hydrocarbon matrix which is precombusted in the FID flame prior to reaching the DELCD, which shows a clean PCB 1254 chromatogram. Precombustion of the sample by the FID protects the DELCD from hydrocarbon contamination.

8690-1088

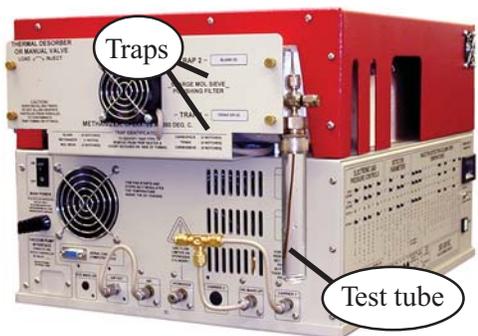
**Thermal Desorber on 8610C GC**

Includes 10 reusable glass desorber tubes

8690-1087

**10-pack reusable ground glass desorber tubes**

## For the SRI TO-14 Air Monitoring GC



- Built into the GC for lower dead volume and better peak shape—no transfer line!
- Two Independently heated Adsorbent Traps
- EPA Methods Compliant
- PeakSimple Control

The Method 5030 Compliant Purge & Trap uses disposable test tubes at ambient temperature.

Built-in to the Model 8610C GC, the SRI Method 5030/5035 Compliant Purge & Trap concentrates the volatile organic compounds (VOCs) in a gas, water, or soil sample onto two adsorbent traps, from which they are automatically desorbed onto the GC column. The Method 5030/5035 Compliant Purge & Trap is equipped with interchangeable purge heads. The 5035 purge head is a thermostatted (typically 40°C) sleeve which accepts standard 40mL VOA vials. The entire sleeve is mechanically agitated while purging to comply with the requirements of EPA Method 5035. The 5030 purge head uses low-cost, disposable 16mm test tubes which are purged at ambient temperature. For higher level soil samples or soil/methanol extractions, the test tube is more convenient and less expensive than VOA vials.



The Method 5030/5035 Compliant Purge & Trap has interchangeable purge heads, and a syringe port for adding internal standard or water. The 5035 purge head is heated and mechanically agitated under PeakSimple data system control.

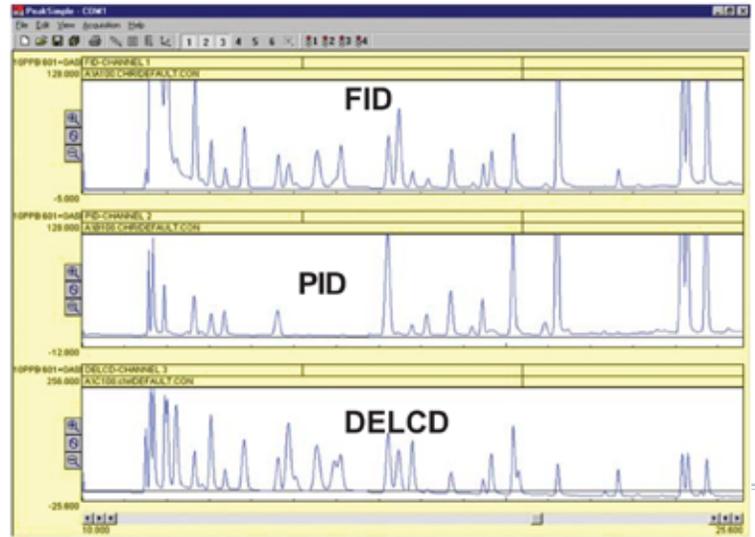


Operation of the Purge & Trap is completely automated by the PeakSimple data system that is built into the GC. Run parameters such as purge time, desorb preheat, bake-out, vial temperature, and mechanical agitation are adjusted in a PeakSimple Event table.

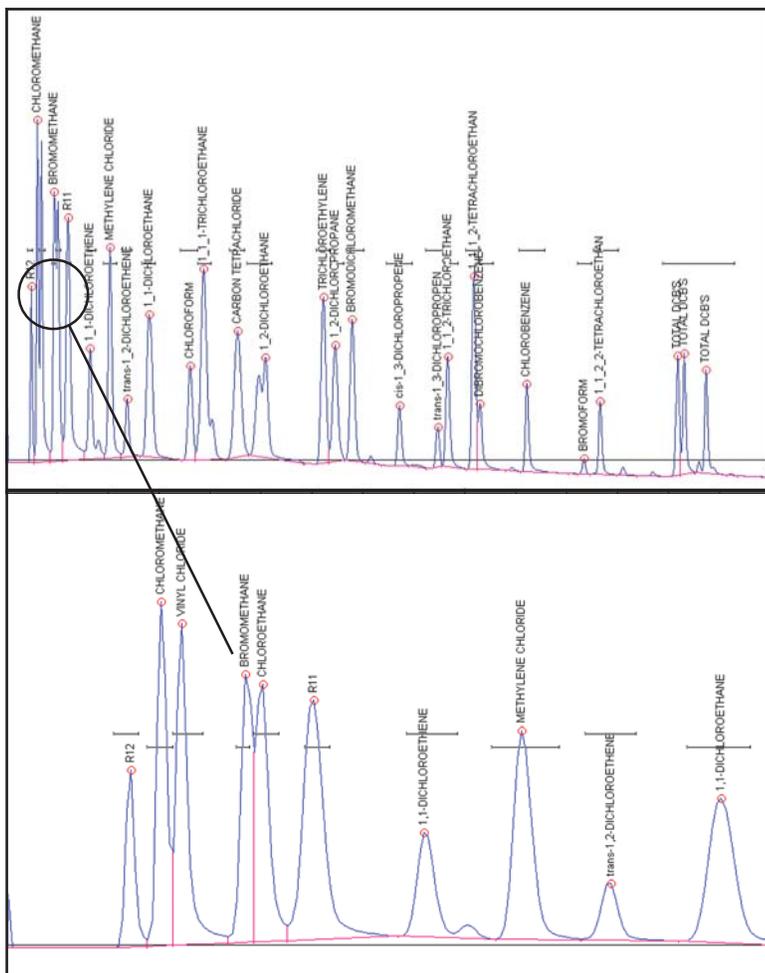
The SRI Purge & Trap is unique because it is equipped with two traps rather than one, and each trap can be heated independently at the adsorption temperature (typically 35-70°C), the desorption temperature (200°C), and the bake-out temperature (250°C). For most VOC applications, the first trap is Tenax-GR, and the second trap is Carbon Molecular Sieve. By setting the adsorption temperature of the Carbon MoleSieve to 50-60°C and the Tenax-GR to 35°C, water retention is dramatically reduced. By staggering desorption times, early eluting peaks from the hot Carbon MoleSieve trap are refocused on the temporarily cold Tenax-GR trap, resulting in much sharper peaks than otherwise possible (see the chromatograms on the following page).

# Purge & Trap

By comparing the relative response, the three detectors make peak identification and confirmation easy. The FID responds to all hydrocarbons, the PID responds to some hydrocarbons and all aromatics, and the DELCD responds to halogens only.



GC Injectors



The DELCD chromatogram is shown at left in more detail, and with the peaks labeled for identification. The DELCD is completely selective for compounds containing chlorine and/or bromine. Other analytes do not respond at all, even at very high levels. The DELCD actually operates on the FID's exhaust gases; therefore, all contaminants are precombusted by the FID to CO<sub>2</sub> and H<sub>2</sub>O.

The first few peaks in the 8021 standard, including vinyl chloride, are of special interest to many analysts. The chromatogram to the left shows the expanded detail of the first few peaks in the analysis (the VOC gases). Note the exceptionally good resolution and peak shape delivered by the SRI system with its dual trap technology.

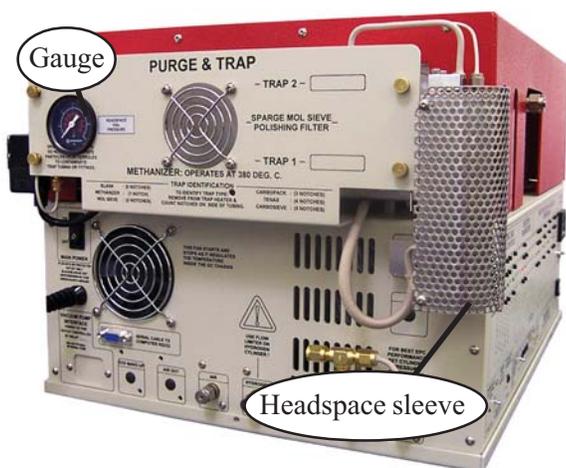
8690-0052

**Method 5030/5035 Compliant Purge & Trap**  
(with interchangeable purge heads)

8690-0051

**Method 5030 Compliant Purge & Trap**

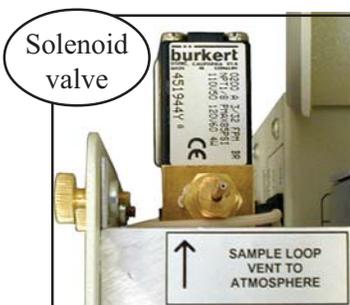
# Heated Static Headspace Injector



- Uses standard 40mL VOA vials
- VOA Vial Sleeve thermostatted from Ambient to 90°C
- Gas Sampling Valve with fixed volume Loop
- Gauge displays Actual Vial Pressure
- Liquid, Solid, or Powder samples
- Complete PeakSimple Control

The Heated Static Headspace Injector is useful for the analysis of volatiles, especially where the sample matrix is dirty. A 10-port gas sampling valve and fixed sample loop are used for maximum precision.

The thermostatted headspace sleeve accepts standard 40mL VOA vials with 10-20 mLs of sample.



As the vial is inserted into the headspace sleeve, two needles puncture the septum top of the vial. Purge gas enters through one needle to pressurize the vial, and the other needle carries headspace vapors to the loop of the gas sampling valve. A solenoid valve located at the loop exit is opened under PeakSimple data system control to allow headspace vapors to purge through the loop just prior to injecting the loop contents onto the column. The entire headspace sleeve is mechanically agitated under control of the data system.

The headspace sleeve is thermostatted from ambient to 90°C under PeakSimple data system control, and can be cooled down before removing the VOA vial.

8690-0045

Heated Static Headspace Injector

# HTA 40-Vial Headspace Autosampler

- Interfaces with SRI and other GCs
- Holds 40 Standard 20mL Headspace Vials
- Injects Directly into the GC—No transfer lines
- 6 Position Incubator with Orbital Shaking
- Progressive Sample Transfer



The Headspace Autosampler is designed to meet the requirements of static headspace injection for GC analysis. The swivel head design simulates the movements of manual direct injection and eliminates the need for transfer lines.

The injection tower smoothly transports vials to the 6 position incubator, where they are orbitally agitated at the user-programmed temperature. The heated syringe then samples the headspace and injects directly into the GC. The 2.5 or 5mL syringe is purged with inert gas after injection. The incubator oven and the heated syringe have the same programmable temperature range of 40° to 150°C. The rotating design leaves the injection port available for manual injections at any time. The autosampler processes samples so that headspace injections start immediately after previous run is completed.

## OPERATING SPECIFICATIONS

### Sample conditioning

Oven temperature	40°C - 150°C
Incubation time	0:00 - 24:00 hr
Progressive heating time	0:00 - 9:59 hr
Oven shaking time	variable

### Sample withdrawal

Syringe temperature	40°C - 150°C
Sample volume	steps of 0.01mL
Flushing flow rate	0.1 - 99.9mL/min
Sample homogenization	up to 15 strokes
Syringe size	2.5 or 5mL

### Injection

Injection speed	0.1 - 99mL/min
Pre/post injection swell time	0 - 99 sec
Post injection syringe flush time	0 - 9.9 min

Up to 10 analytical methods, including all the user-selected options listed in the OPERATING SPECIFICATIONS table, may be stored in the autosampler's memory.

8690-4000

HTA 40-Vial Headspace Autosampler

# HTA 110-Vial Liquid Autosampler



- Holds 110 2mL or 2.5mL vials
- Interfaces with SRI and other GCs
- 15-Step Automatic Injection Sequence
- Direct Injection, No Transfer Lines

The 110-Vial Liquid Autosampler is made to meet the high throughput liquid injection needs of your GC analysis. Like the Headspace Autosampler, the swivel head design simulates the movements of manual direct injection and eliminates the need for transfer lines, as well as leaving the injection port free for manual injections. Up to 10 analytical methods, including function speeds, may be stored in the autosampler's memory.

The automatic injection sequence may have up to 15 steps, which may be programmed to include:

- First sample of group
- Last sample of group
- Analytical method
- Number of injections for each sample
- Pre and Post washing solvent position
- Internal Standard position (if used)

The sampling system eliminates air bubbles, and the variable fill speed allows for a wide range of sample viscosities. The syringe may be washed with solvent or sample.

## OPERATING SPECIFICATIONS

### Sampling

Sample volume	steps of 0.1 $\mu$ L
Air volume	steps of 0.1 $\mu$ L
Aspirating speed	0.1 $\mu$ L - 100 $\mu$ L/sec
Needle washing	up to 15
Air bubble removal	up to 15 strokes
Viscosity time	1-60 sec
Syringe sizes	1, 10, 25, 50, 100 $\mu$ L 1000 $\mu$ L large vol. version

### Injection

Injection speed	0.1 $\mu$ L - 100 $\mu$ L/sec
Waiting time before and after inject	1-60 sec
Injection depth	variable

### Internal Standard Technique

IS volume	steps of 0.1 $\mu$ L
Air gap volume	steps of 0.1 $\mu$ L
Mode	1 or 2 air gaps

8690-3000

HTA 110-Vial Liquid Autosampler

## Online Sampler for Purge & Trap

- For use with SRI Method 5030 Purge & Trap
- Automatically fills and empties the Purge Vessel
- Valve and 5mL loop for precise sampling
- Data System Control



The Online Sampler for Purge & Trap is designed for applications where a single water stream needs to be measured automatically and repeatedly by purge & trap. The Online Sampler automatically fills and empties the test tube purge vessel of the SRI Method 5030 Purge & Trap with a precisely metered 5mL volume of water. This is useful when monitoring a single stream of contaminated groundwater, or a wastewater stream. A valve with a 5mL loop, special plumbing, and a custom purge head make up the Online Sampler. The stream to be monitored is plumbed to the Online Sampler and a 10-100mL/minute flow is established to continuously flush the 5mL loop with fresh sample.

When used with an SRI Purge & Trap GC, the PeakSimple data system controls the sampler to transfer the 5mL loop contents into the purge vessel of the purge & trap. When the purge is complete, the purge vessel is emptied to waste.

The valve may be optionally configured with a second loop so that an internal standard can be injected along with the water sample.