TELEDYNE TEKMAR
Everywhereyoulook™

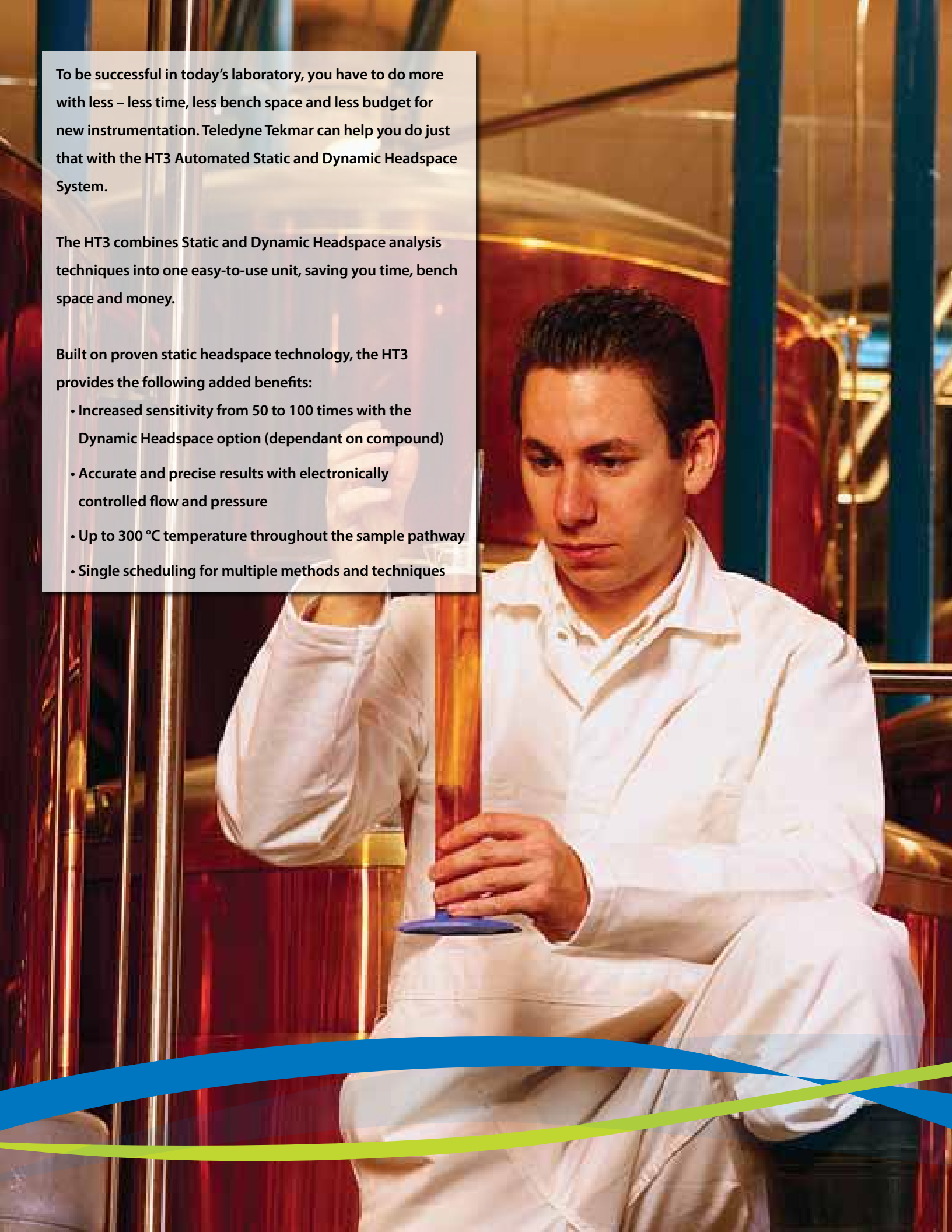
Sensitivity

Flexibility

Simplicity

HT3

Automated Static and Dynamic
Headspace Vial Sampler



To be successful in today's laboratory, you have to do more with less – less time, less bench space and less budget for new instrumentation. Teledyne Tekmar can help you do just that with the HT3 Automated Static and Dynamic Headspace System.

The HT3 combines Static and Dynamic Headspace analysis techniques into one easy-to-use unit, saving you time, bench space and money.

Built on proven static headspace technology, the HT3 provides the following added benefits:

- **Increased sensitivity from 50 to 100 times with the Dynamic Headspace option (dependant on compound)**
- **Accurate and precise results with electronically controlled flow and pressure**
- **Up to 300 °C temperature throughout the sample pathway**
- **Single scheduling for multiple methods and techniques**

Advantages of the HT3

- Standard integrated 60-position autosampler with 10-position platen heater provides true walk away automation
- Increased sensitivity from 50 to 100 times with the Dynamic Headspace option (compound dependent)
- Removable sample path for trouble-free maintenance
- High temperature capability to 300 °C expands range of applications
- Inert sample pathway including transfer line, sample needle and loop provide superior analytical results by eliminating adsorption and reducing carryover
- Automated Leak Check and Benchmark for quick troubleshooting
- Automated method development using Method Optimization Mode (M.O.M.)
- 21 CFR Compliance
- Built-in Mass Flow Controller ensures consistent flow and pressure for all samples regardless of external conditions

Automated Productivity

How It Works

The HT3 incorporates traditional static headspace with the option to perform dynamic headspace. In the static set up, a sample is placed in a vial and then delivered to the autosampler. Once in the autosampler, the vial is loaded into a platen for heating. Upon reaching the final heat time it is then mixed for a set period of time. Using an electronic Mass Flow Controller the static vial pressure is recorded and the sample is pressurized to a user-defined set point. Next, the sample is passed through a fixed volume loop to another user-defined final pressure set point. The loop containing the sample is then placed in line with the GC column for separation and detection.

In the Dynamic mode, upon completion of heating and mixing, the headspace is continuously swept with an inert sample gas that is routed through a sorbent trap thus removing more of the analyte and concentrating it on the trap. The trap is then heated and back-flushed to the GC column for separation and detection.

Options

Dynamic Option - Improvements in sensitivity are achieved with the new dynamic analysis option. By continually sweeping and concentrating analytes onto an adsorbent trap, the HT3 provides all the benefits of static headspace with the low-level detection capabilities similar to Purge and Trap.

Applications and Industries

VOC sampling and analysis are used in a wide range of applications in the following industries:

- Pharmaceutical
  - Residual Solvents
  - Impurities from drug substances
  - Impurities from container closure systems
- Flavor, Fragrance, and Packaging
- Petrochemical
- Blood Alcohol and Forensic Toxicology
- Polymers
- Environmental

Methods

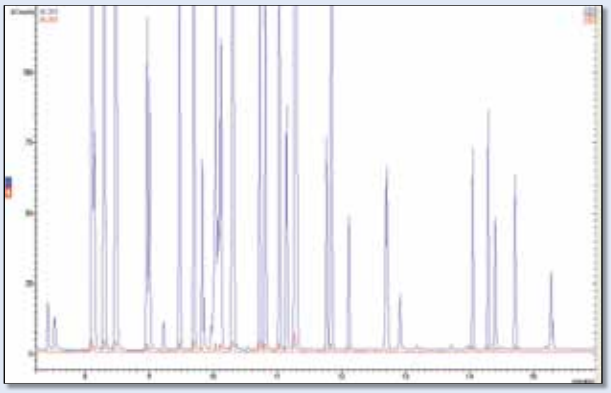
USP <467> (See applications above.)

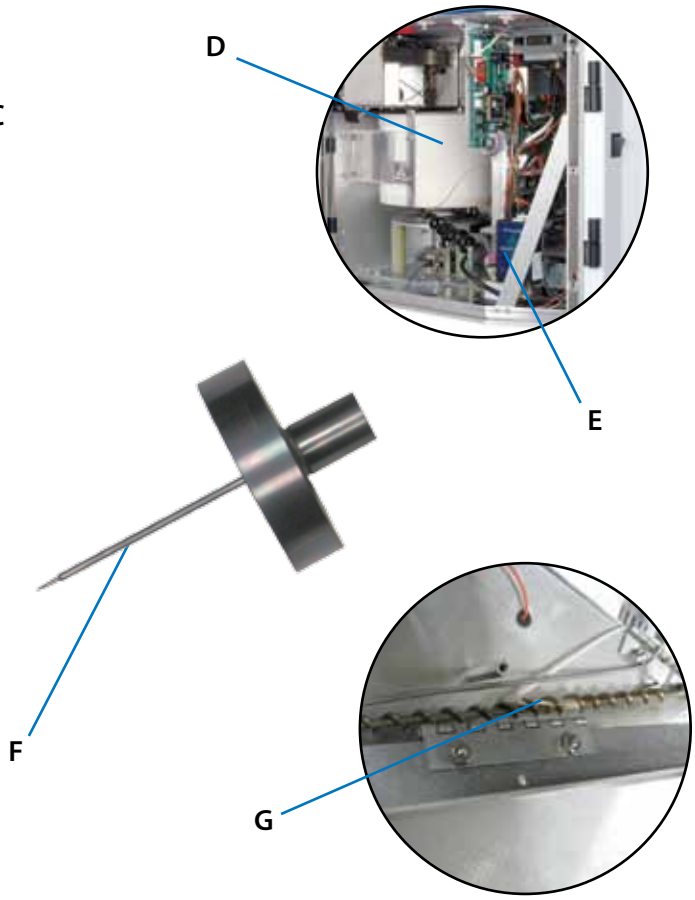
EPA Method 5021

RSK-175

Static vs. Dynamic Headspace

Dynamic headspace analysis demonstrates improved sensitivity over static headspace as shown in the illustration on the left. This sensitivity is achieved due to the sample being continually swept allowing the analytes to concentrate onto the sorbent trap.





A. Autosampler - The HT3 comes with a standard integrated, 60-position autosampler, providing true walk away automation. Vials are automatically queued into the platen heater ensuring reproducible dwell times. Vials may also be added during a run to increase productivity. (Optional 9 or 12 mL vial inserts sold separately.)

B. Valve/Loop System - The valve and loop sample method has proven to be the industry's most reliable technique for headspace sampling. The entire sample path is SilcoNert® 1000 and can be heated up to 300 °C thus minimizing analyte carryover. Different loop sizes ranging from 100 µL to 5 mL may be used depending on application.

C. Removable Sample Path - Easy access to sample path allows for trouble-free removal, maintenance and safety.

D. Platen Heater - The platen heater offers a 10-position, highly regulated heating chamber. Temperatures are controlled up to 300 °C in increments of 1 °C. A strict control of the platen heater chamber allows for superior reproducibility in sample preparation achieving greater sample accuracy.

E. Electronic Mass Flow Controller (MFC) - The patented MFC has the ability to control pressure and flow assures consistent volume control regardless of external conditions for all samples.

F. Two-Stage Needle - This unique design allows for the continuous sweeping so critical to dynamic headspace analysis.

G. Trap - Sorbent traps allow for dynamic compound concentration and are available in a variety of sorbent packing materials. Some typical sorbents are listed below:

- Tenax - General purpose trapping agent
- Silica Gel - Choice for polar compounds
- Carbopacks™ - Variety of types for extended range compound trapping capabilities
- Carbo Sieve III - Extremely strong sorbent for extremely volatile compounds

Additional Features

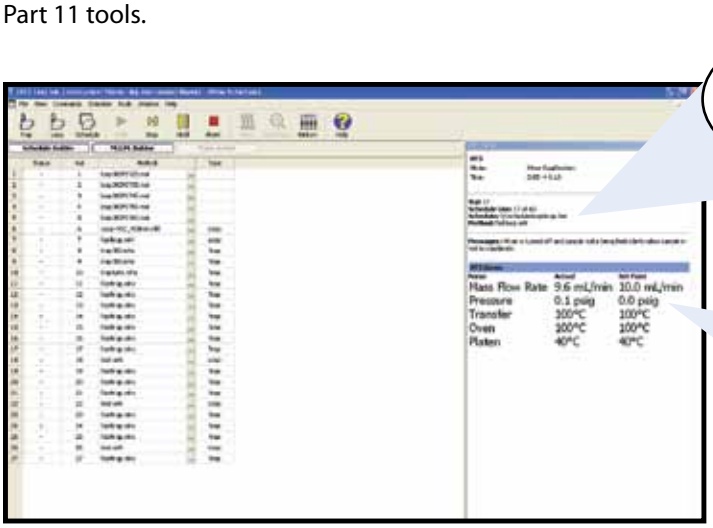
Dynamic Option – This dynamic headspace sampling option concentrates the headspace sample and thereby increases your sensitivity requirements compared to that of the conventional static mode. Dynamic headspace allows for flexibility by allowing the user to set up a schedule utilizing both static and dynamic modes interchangeably.

Variable Fill Pressure Control – (patent pending) Utilization of a Mass Flow Controller, which reads and controls both pressure and flow in order to meet user-defined requirements for pressurization loop filling and static pressure assuring sample volumes are consistent from one sample injection to another.

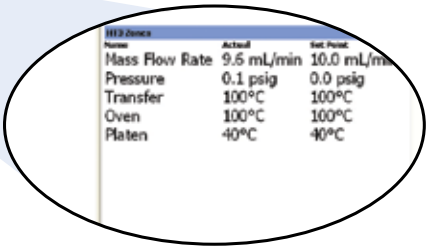
VOC TekLink™

Fully Optimized User Interface

VOC TekLink™ software allows the user to enter all analysis parameters and once activated, it will continuously monitor the system ensuring operating limits are not exceeded. VOC TekLink™ software is capable of performing useful diagnostics such as leak and benchmark tests for instrument validation. All instrument parameters, method scheduling and editing can be programmed. VOC TekLink™ provides pre-developed methods, allowing startup with little or no modifications and also contains optional 21 CFR Part 11 tools.

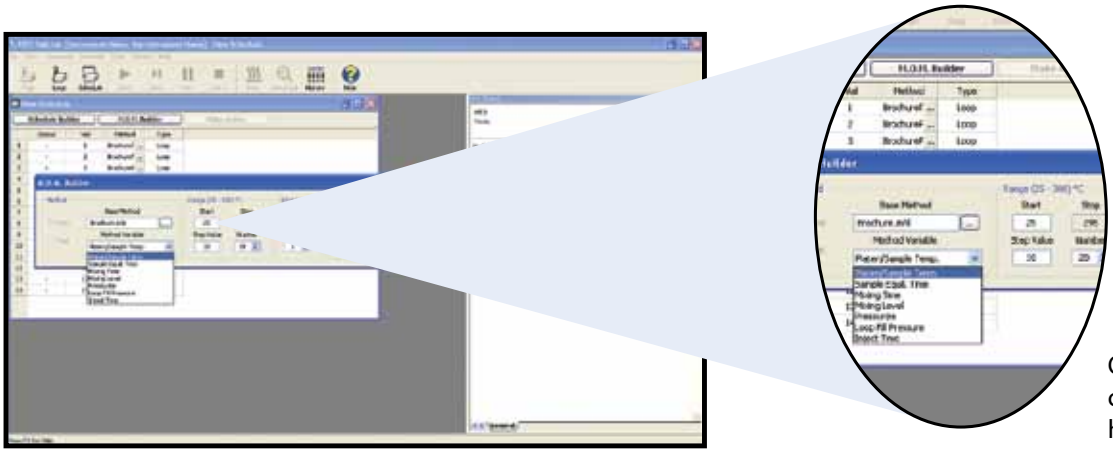


Current conditions of the unit including individual temperature zone status, pressure readings, and elapsed time of the current mode. In addition the active method and schedule are shown with the ability to modify parameters or schedule lines "on the fly" by simply clicking on the method or schedule name.



Schedule Screen - The autosampler scheduling screen allows for multiple method and technique types within one schedule. This feature allows the user to run both static and dynamic methods as well as M.O.M. methods all in the same sequence without having to change any hardware. In addition the use of vial inserts allows for 9mL, 12mL and standard 22mL vials to be varied within the sequence as well.

The Zone section monitors actual values compared to method driven set points.



Other parameters that are common to all methods are seen here and are user selectable with recommended default values and an intuitive prompt that indicates min and max allowable values as well as the variable description.

Method Optimization Mode (M.O.M.) - This unique software feature allows for unattended method development. This is achieved by allowing the user to access selective method variables and the ability to program changes in values and replicates for either dynamic or static processes. The built-in autosampler is then automatically programmed within the schedule and each individual change is executed and recorded as a new method as well as in the sample history log for easy chromatographic comparison.

HT3 Specifications

Autosampler Capacity	60-positions
Platen Heater	Up to 10 vials simultaneously heated up to 300 °C via resistance heater settable in 1 °C increments with a +/- 0.1 °C uniformity
Vial Size	9, 12, 22 mL vials accepted (9 mL and 12 mL vials require inserts)
Sample Loop	Ships with a 1 mL SilcoNert® 1000 coated loop. Other optional loop sizes include 100, 250, 300, and 500 µL as well as 2, 3, and 5 mL
Sample Mixing	Optimix system allows variable power settings from 1 to 10
Display	Electronic status panel on the front of the unit
Trap Heater	Controlled temperature range up to 300 °C (Trapping Module only)
Trap Size	12in (30.5 cm) x 1/8in (0.32 cm) O.D.
Sample Pathway	SilcoNert® 1000 Tubing. Entire sample pathway temperature controlled up to 300 °C
Software	21 CFR Tools Available
GC Interface	Interface to virtually all commercially available GC instruments. Supplies or accepts GC and Data System start/ready signals via software selectable GC I/O configuration
Valving	24 VDC motor actuated 8-port valve with removable rotor. Temperature controlled from ambient to 300 °C
Data Input	Input via RS 232 or Ethernet TCP/IP using a PC with the HT3 Headspace TekLink™ software running on Microsoft® Windows® 2000 or greater
VOC TekLink™ Control of Gas Flow and Pressure	Gas flow controlled via Electronic Mass Flow Controller capable of flow rates from 5 to 500 mL/min. +/- 2% of full scale
Voltage Requirements	100/115 VAC +/- 5%, 50/60 Hz 10 amps 220/240 VAC +/- 5%, 50/60 Hz, 5 amps
Gas Requirements	99.999% Helium or Nitrogen at 65-100 psi
Unit Dimensions	21 5/8 in (54.9 cm) H x 19 in (48.3 cm) W x 25 in (63.5 cm) D
Weight	86 lbs. (39 kg)
Environmental Conditions	This system is capable of operating in laboratory temperatures between 10-30 °C and a humidity range from 10 and 90%
Corrosion Resistance	Front cover is resistant to aqueous samples with pH range of 1-10

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