



HT3

HEADSPACE

**AUTOMATED STATIC AND DYNAMIC
HEADSPACE VIAL SAMPLER**



The HT3 System

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. SCION INSTRUMENTS 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:



Sensitivity

Increased sensitivity from 50 to 100 times with the Dynamic Headspace option dependant on compound.



Accuracy

Accurate and precise results with electronically controlled flow and pressure.



Temperature

Up to 300 °C temperature throughout the sample pathway.



Scheduling

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 sample is then transferred through the transfer line to the GC for separation and detection.

In the Dynamic mode, upon completion of heating and mixing, the sample is continuously swept with an inert gas. The target compounds are swept onto an absorbent trap where they are concentrated. The trap is then heated, with the analytes being desorbed and backflushed to the GC, via the transferline for separation and detection.

Applications and Industries

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

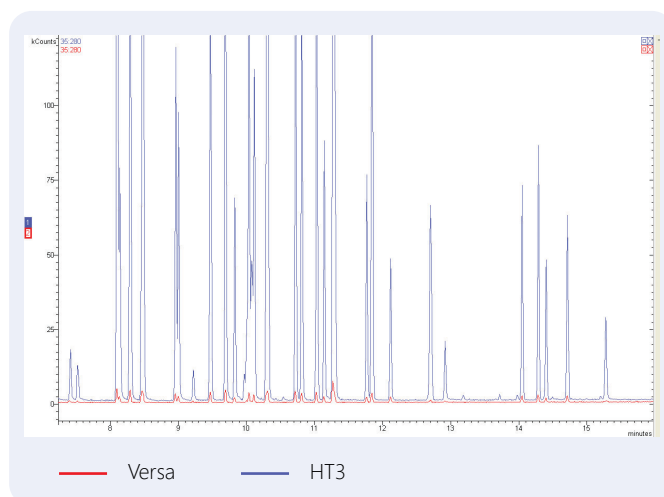
- Pharmaceutical
 - Residual Solvents
 - Impurities from drug substances
 - Impurities from container closure systems
- Flavour, Fragrance, and Packaging
- Petrochemical
- Blood Alcohol and Forensic Toxicology
- Polymers
- Environmental

Example Methods

- USP <467> (Residual Solvents)
- EPA Method 5021
- RSK-175

Static vs. Dynamic Headspace

Dynamic headspace analysis demonstrates improved sensitivity over static headspace as shown in the below illustration. This sensitivity is achieved due to the analytes being concentrated onto the sorbent trap.





A. Autosampler

The HT3 comes with a standard integrated, 60-position vial tray, 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. The vial tray is optimised for 22mL, 12mL and 9mL headspace vials. (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 250 µL to 5 mL may be used depending on application.

C. Removable Sample Path

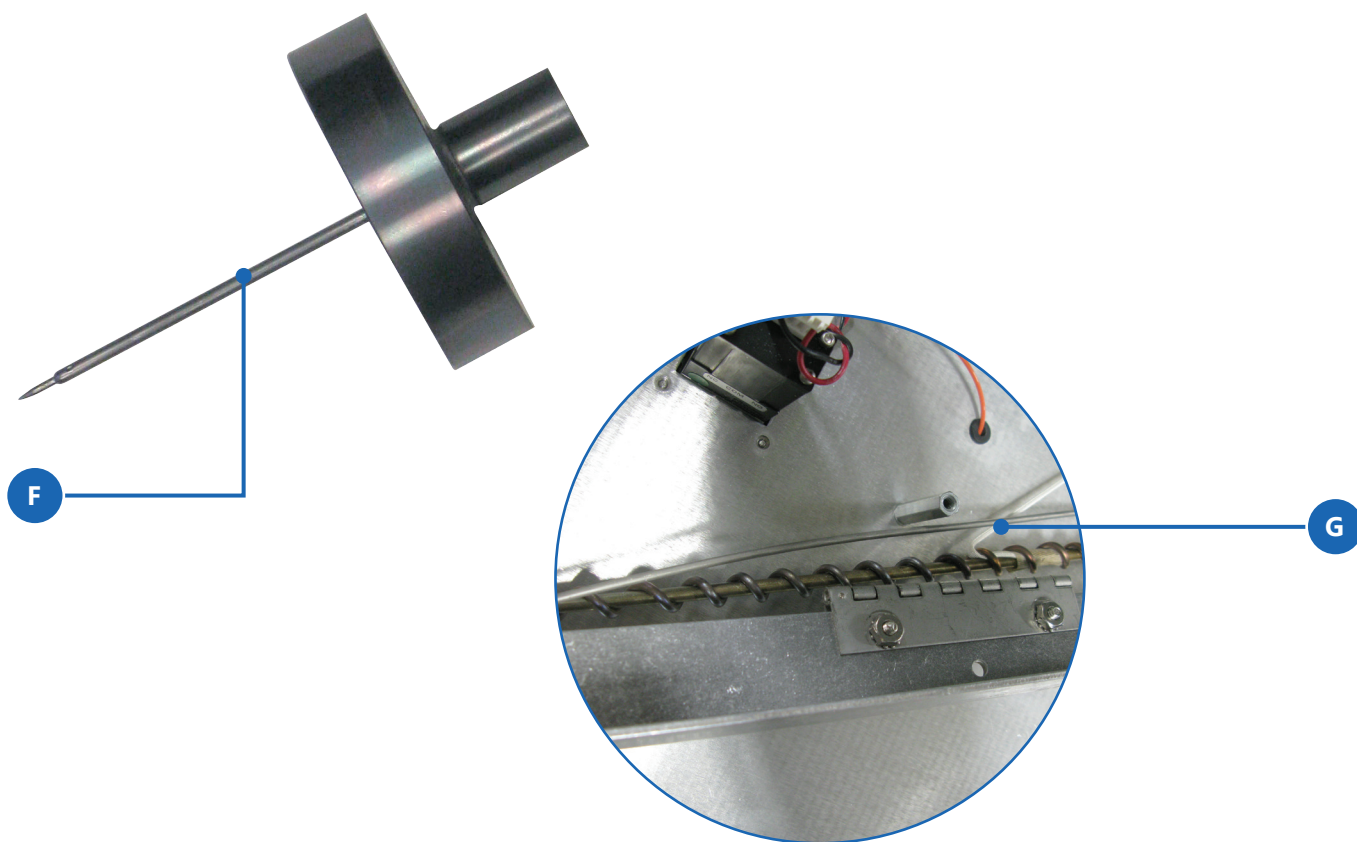
Easy access to sample path allows for trouble-free removal, maintenance and safety.

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 MFC has the ability to control pressure and flow, assuring 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. The dynamic HT3 is supplied with a VOCARB 4000 trap as standard.

Additional Features

Dynamic Option

This dynamic headspace sampling option concentrates the headspace sample and thereby increases your sensitivity compared to that of the conventional static mode. Dynamic HT3 allows for flexibility by allowing the user to set up a schedule utilising both static and dynamic modes interchangeably.

Variable Fill Pressure Control

Utilizes 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.



VOC TekLink™

Fully Optimized User Interface

HT3 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.

HT3 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. HT3 TekLink™ provides pre-developed methods, allowing startup with little or no modifications and also contains optional 21 CFR Part 11 tools.

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 9 mL, 12 mL and standard 22 mL vials to be varied within the sequence as well.

- 1 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 by simply clicking on the method or schedule name.
- 2 The Zone section monitors actual values compared to method driven set points.

The screenshot displays the HT3 TekLink software interface. The main window is titled "HT3 TekLink [Instrument Name: My Instrument Name] - [New Schedule]". It features a menu bar (File, View, Commands, Schedule, Tools, Window, Help) and a toolbar with icons for Trap, Loop, Schedule, Start, Step, Hold, Abort, Bake, Leakcheck, History, and Help. Below the toolbar is a "Schedule Builder" tab with a "Make Active" button. The main area shows a table with columns: Status, Vial, Method, and Type. The table lists 27 rows of scheduled steps, including various methods like loop300PST25.mol, loop300PST35.mol, loop300PST45.mol, loop300PST55.mol, loop300PST65.mol, Loop-VOC_400min.mhl, fastloop.mhl, trap300.mhs, fasttrap.mhs, test.mhl, and fasttrap.mhs. To the right, a "Unit Status" window is open, showing the current mode (Mixer Equilibration), time (0.05 → 0.10), and the active schedule line (17 of 60). Below this, a "Messages" section indicates that the mixer is turned off and the sample vial is being held idle. At the bottom, the "HT3 Zones" section displays a table of actual vs. set point values for various parameters.

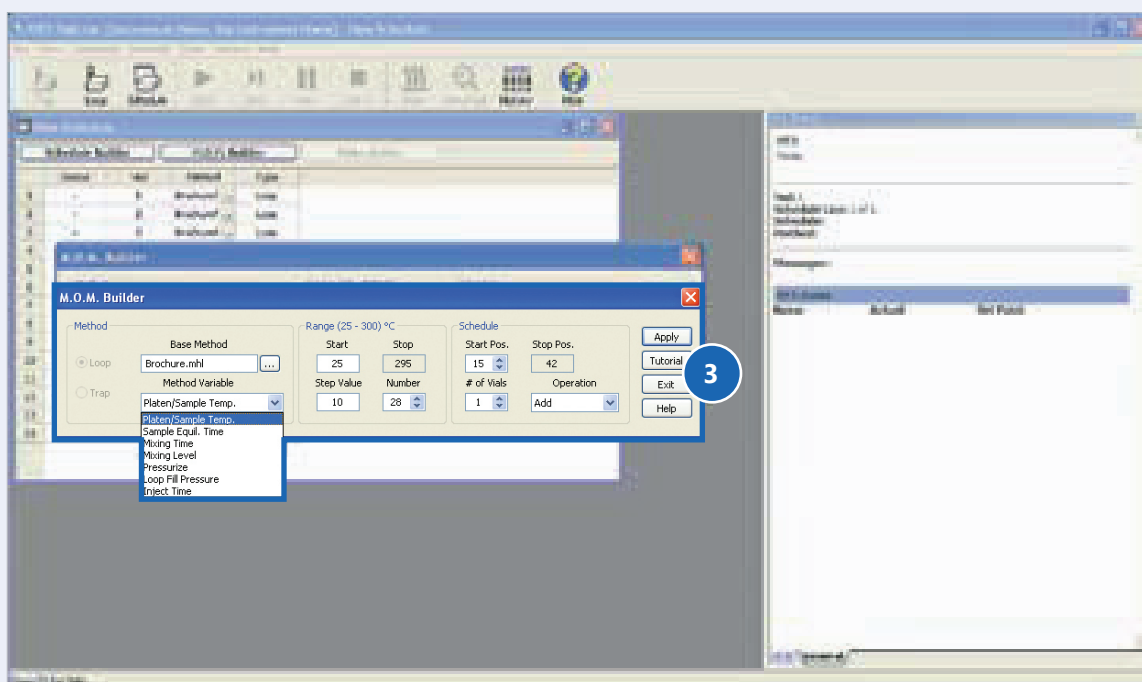
| Name | Actual | Set Point |
|----------|----------|-----------|
| Pressure | 0.1 psig | 0.0 psig |
| Transfer | 100°C | 100°C |
| Oven | 100°C | 100°C |
| Platen | 40°C | 40°C |

Schedule Screen

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.

3 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 Optimisation Mode



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 |
| Trap Heater | Controlled temperature range up to 300°C (Trapping Module only) |
| Trap Size | 12 in (30.5 cm) x 1/8 in (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® 2010 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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