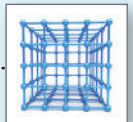


Water & Vapor Sorption



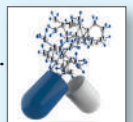
Material Science



Building Material



Pharmaceuticals



Food Processing



## Introduction

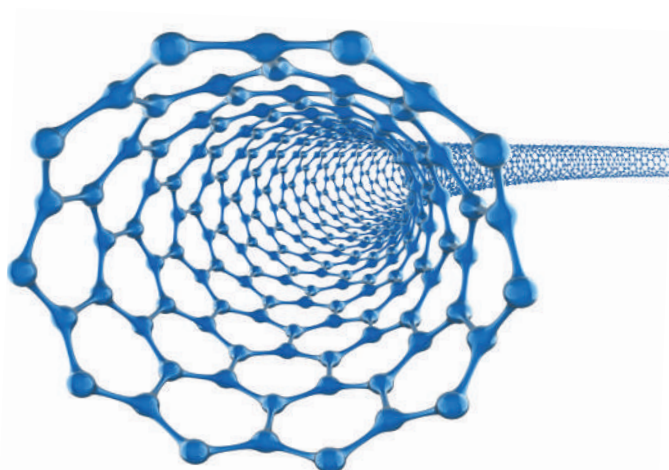
The **Vstar** is the star of the line of vapor sorption instruments offered by Quantachrome. The **VSTAR** vapor sorption analyzer goes beyond water sorption to provide vapor sorption analysis using a wide variety of organic vapors at a wide range of temperatures. Meticulous control of the manifold temperature from the vapor source to the sample eliminates the possibility of local condensation of the adsorptive and ensures the most accurate analysis possible.

## Features - Benefits

- **Wide Vapor Compatibility:**  
Organics (saturated, unsaturated, and aromatic), alcohols, amines, water, and more.
- **Homogeneous Temperature:**  
Single thermostatically controlled manifold and vapor source chamber.
- **Wide Range of Temperature:**  
Selectable manifold and vapor source temperature from 40°C to 110°C.
- **Flexible Modular Throughput:**  
Choose either 2 stations for routine work or 4 stations for high throughput labs.
- **Independent Sample Temperature:**  
Each sample station can be maintained at a different temperature (requires multiple circulator baths) or run at a common temperature (sharing a single circulator bath).
- **Wide Temperature Range:**  
Standard circulator controls the sample temperature from -20°C to 100°C with a stability of  $\pm 0.01^\circ\text{C}$  \*.
- **Small Thermal Gradients:**  
Small volume of sample jackets reduces thermal gradients, even when sharing a single circulator for four stations.
- **Reduced Void Volume with Simultaneous Equilibration :**  
Dedicated pressure transducers on each sample station reduce void volume and allow simultaneous equilibration of all stations.
- **Low Pressure Operation:**  
Optional pressure transducers for increased precision at low pressures are available. Optional turbomolecular pump to allow low-pressure measurements.
- **Space Saving Design:**  
Reduces clutter and saves valuable bench space.
- **Vacuum Pump Protection:**  
Integrated cold trap prevents vapors from entering the vacuum pump and reducing its efficiency.
- **Sensitive Sample Protection:**  
Optional isolation valves protect sensitive or hygroscopic samples when transferring them from the outgasser to the analysis station.
- **Flexible Software Interface:**  
Powerful Windows® based software provides a flexible interface for setting up experiments, controlling instrument functions, and displaying data. A full complement of classical and modern models for data reduction and display is included.
- **Easy Setup:**  
The system is supplied complete and ready for operation. Vacuum pump, circulator, tubing, samples cells, etc. are all included.

\* According to manufacturer's specifications at circulator without load, actual minimum sample temperature will be higher.

Visit [www.quantachrome.com](http://www.quantachrome.com) for more detailed instrument specifications and download brochures.



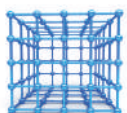
## Features



## Applications

The investigation of water vapor sorption on materials provides valuable information for material science, pharmaceutical, and food processing applications. The **VSTAR** provides a fast, accurate, and reliable means of obtaining water sorption isotherms on a wide variety of materials, but it doesn't stop there. The **VSTAR** also can measure adsorption isotherms of a variety of organic vapors, providing insight into the materials' resistance to organic vapors, viability as an adsorbent for these vapors in storage or sequestration applications, and information on the chemical properties of these materials.

### Material Science



Novel materials are being developed in research labs at record rates. The screening and characterization of these materials is critical for identifying and developing these materials for their target applications. The hydrophobicity of the material as well as its affinity to other vapors can be quickly and accurately determined using the **VSTAR** vapor sorption analyzer. Unlike gravimetric systems, which are limited by the diffusion of the adsorptive through the carrier, the **VSTAR** achieves equilibrium in a fraction of the time, providing results in hours instead of days or weeks. This coupled with the ability to perform four simultaneous analyses provides the material scientist with an unparalleled throughput.

### Pharmaceuticals



The evaluation of pharmaceutical active ingredients and excipients under various relative humidities is routinely measured using gravimetric systems to simulate the actual conditions of storage and use. The measurements can be very time consuming due to the nature of gravimetric methods. Using a vacuum-volumetric system like the **VSTAR** can provide the same information in a fraction of the time.

### Food Development



Optimizing the recipe of processed foods can mean the difference between a successful product that tastes good and has a long shelf life, and an unsuccessful product that exhibits off-flavors and spoils quickly. Measurement of vapor sorption of the finished products and the raw ingredients can provide valuable insight in the effectiveness of various formulations.

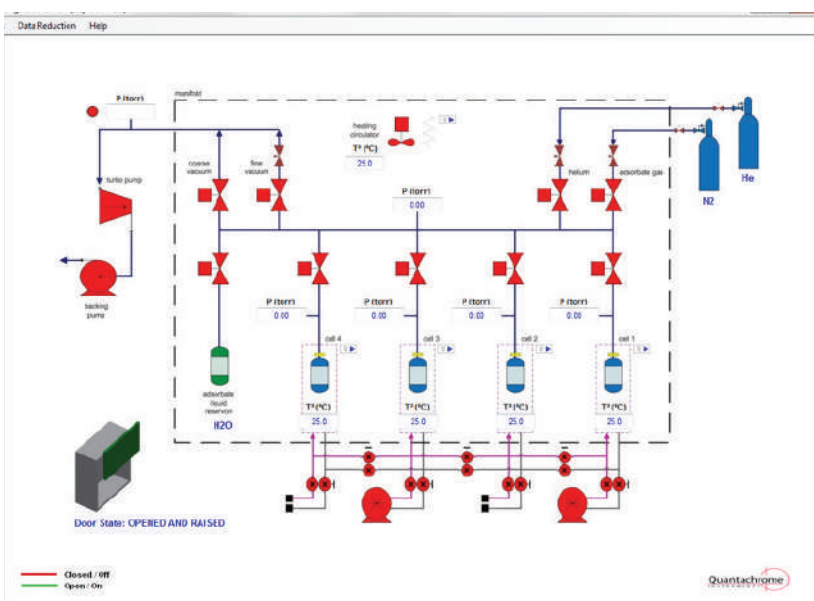
### Building Materials



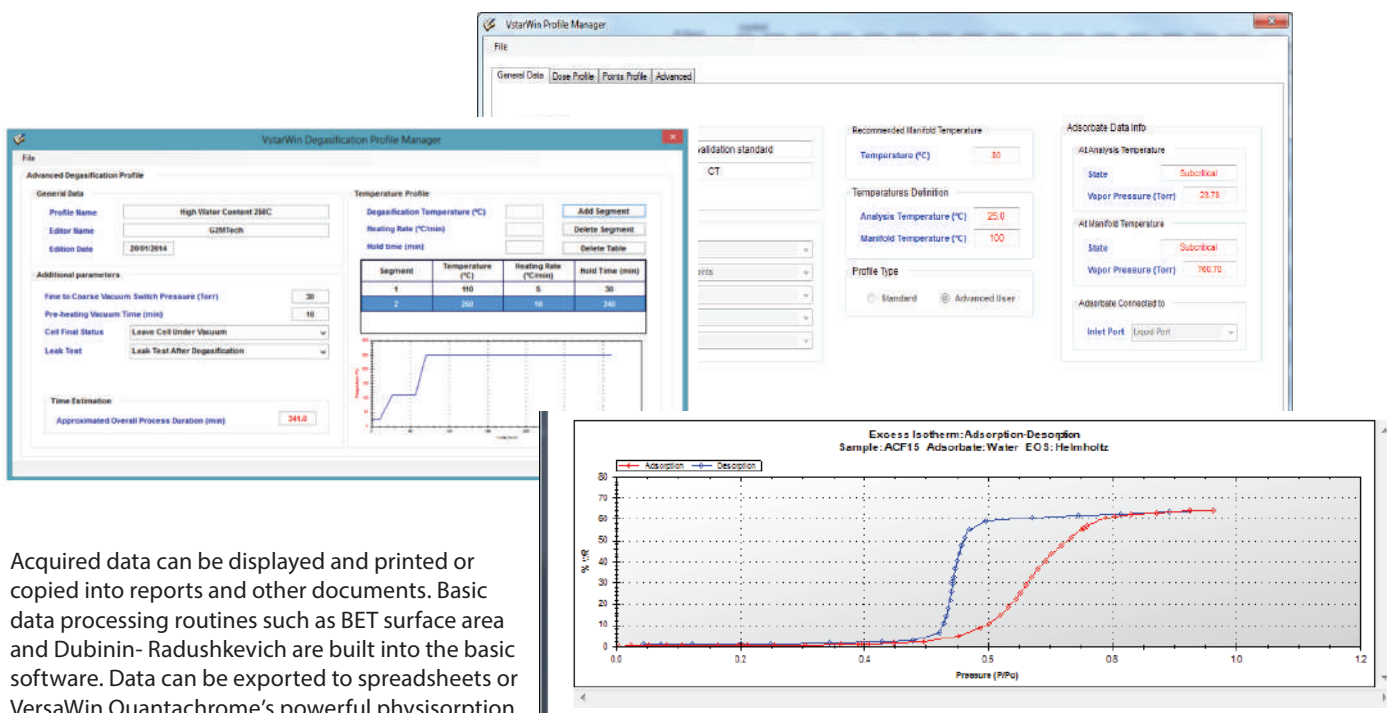
Building material development has gone well beyond simple trial and error with different clay or cement formulations. Modern building materials, whether masonry or composites, are developed and optimized for specific applications. The **VSTAR** can provide the information needed to evaluate various formulations for resistance to water and tolerance of solvents and other organic materials.

## Software VSTARWin

All aspects of the instrument control and data acquisition are controlled via a user-friendly software package. In normal operation the status of all valves, sensors, pumps, etc. can be viewed at a glance on the controlling PC. For diagnostic purposes a password protected manual mode allows control of all valves, pumps, and heaters with the click of a mouse button.



Intuitive dialogs allow programming flexible degas protocols and defining all acquisition parameters, from point selection to analysis temperature. Predefined protocols can be saved and used on a series of samples to ensure uniform analysis.



Acquired data can be displayed and printed or copied into reports and other documents. Basic data processing routines such as BET surface area and Dubinin- Radushkevich are built into the basic software. Data can be exported to spreadsheets or VersaWin Quantachrome's powerful physisorption data processing package for additional display and processing options.

## Specifications

Performance	2 Station	4 Station
Analysis Stations	2	4
Analysis Gas input	1	1
Analysis liquid input	1	1
Pressure transducers <sup>1</sup>	3	5
Maximum number of optional (low pressure) transducers <sup>2</sup>	2	4
Transducer accuracy <sup>3</sup>	<0.05% FS	
Vacuum pump	Standard external oil pump or optional internal turbomolecular pump	
Degas type	External, optional in-situ	
Sample Cells	Glass of various sizes	
Analysis temperature range <sup>4</sup>	-20°C to 100°C	
Thermostated manifold	yes (40°C to 110°C)	
P <sub>0</sub>	Calculated from temperature, measured on empty station, or user entered.	
Data reduction and reporting	Full complement of data reduction and display methods.	
Operating System Compatibility both 32- and 64-bit	Windows XP, Vista, Windows 7, and Windows 8	

### Environmental, Electrical, and Mechanical

Temperature Range	10°C – 38°C			
Max Relative Humidity	90% (non-condensing)			
Input Voltage (VAC)	100–120 or 200–240			
Frequency (Hz)	50/60			
Max Power (W)	270	340	410	480
Dimensions				
width:	85.8cm (33¾")			
depth:	52.5cm (20¾")			
height:	75.0cm (29½")			

<sup>1</sup> Standard version (optional low pressure transducers can be installed)

<sup>2</sup> 10 or 100 torr

<sup>3</sup> For standard 1000 mbar pressure transducer

<sup>4</sup> According to manufacturer's specifications at the circulating bath without load, actual minimum sample temperature will be higher.

In its standard configuration the VSTAR is a powerful tool for performing water and organic vapor sorption analyses for most applications, however, there are some applications where extra control or precision is necessary. For these applications we offer several options to extend the capabilities of the instrument.

## Temperature Control

Each VSTAR comes standard with a circulating bath, with all required tubing and sample jackets. This circulator is capable of controlling the sample temperature of one to four samples from  $-20^{\circ}\text{C}$  to  $100^{\circ}\text{C}$  with a thermal stability of  $\pm 0.01^{\circ}\text{C}^*$ . The 2-station Vstar comes with a 7 liter circulator and the 4-station model comes with a 15 liter circulator. Additional circulators can be added to allow completely independent temperature control of each sample in a multi-station system.

\*According to manufacturer's specification of circulating bath without load. Actual sample temperature limits will differ depending on manifold temperature.

## Low Pressure Operation

The standard VSTAR has one 1000-mbar transducer for each station and one for the manifold. In most applications this is all that is needed to precisely measure the pressure changes due to adsorption. If the optional turbomolecular pump is ordered lower pressures can be achieved. When operating at these lower pressures or with high vapor pressure liquids, optional low-pressure transducers are available to measure the small changes in pressure due to adsorption or desorption.

Description	Specification
High vacuum option	Turbo pump to $<10^{-8}$ mbar ( $7.5 \times 10^{-9}$ Torr)
Low pressure Option 1	10 torr transducer, Minimum pressure reading: 0.005 torr, Accuracy $<0.5\%$ of reading
Low pressure Option 2	100 torr transducer, Minimum pressure reading: 0.05torr, Accuracy $<0.5\%$ of reading

## In-Situ Outgassing

For quick outgassing of samples, which do not contain large amounts of volatile material, an In-Situ outgas option is available. It consists of a furnace and controller, which can be programmed to heat the sample at a user-defined rate and hold under vacuum for a selectable period of time. Multiple ramp and hold cycles can be programmed for each sample.

Description	Thermal stability ( $^{\circ}\text{C}$ )	Temp range ( $^{\circ}\text{C}$ )
In-situ Outgas Option	$\pm 0.1$	Ambient to 400

## Sample Preparation: Degassers

Consistent and reliable results depend upon proper sample preparation procedures and the limitation in analysis throughput is often sample preparation, since complete degassing of samples can often require several hours.

Quantachrome manufactures several models of degassers to fulfill your sample preparation needs. These degassers provide a virtually continuous supply of properly prepared samples for the **VSTAR**.

### XeriPrep Degasser



The gold-standard in sample preparation for physisorption analyzers. It provides PC control of all heating zones with individual heating ramps and times. The built-in cold trap enable efficient removal of condensables at low degassing temperatures and for a clean vacuum. Turbo- pumped version available for rapid high-vacuum degassing.

Vacuum pump included.

### MasterPrep Degasser



Fully featured preparation unit. Individually heated stations with programmable heating profiles for R&D, commercial labs and multi-user laboratories. Dual modes (vacuum or flow) for further flexibility and optimization. Temperature control and logging via PC software (included). Integral cooling stations provide additional convenience.

Vacuum pump not included.

### FloVac Degasser



The FloVac provides cost effective vacuum degassing. Complete with single-zone heater (to 400°C), digital temperature controller and built-in digital vacuum gauge. Each sample station has its own adjustable evacuation / back-fill rate control. Flow degassing is also possible and can be advantageous in removing large quantities of moisture prior to vacuum degassing. Individual cooling stations. PC Temperature Control Software included.

Vacuum pump not included.



Renowned innovator for today's porous materials community. The quality of Quantachrome's after sales service support is the reason we are proud to maintain life time relationships with our customers.

## Field Service

Our global service staff assure you that Quantachrome Instruments will continue to be the reliable engines of material characterization laboratories. We offer you the flexibility of choosing from service contracts tailored to provide you with the response time, service package, and spare parts discounts that best fit your needs.

## Spare Parts

Quantachrome spare parts are certified to work with our instruments. We provide rapid response spare parts orders, and keep large inventories of replacement parts and hardware available.

## Application Lab

Our fully equipped, state-of-the-art powder characterization laboratory (email: [application.qt@anton-paar.com](mailto:application.qt@anton-paar.com)), provides the option of contracting for expert testing services. Laboratory services are also available to validate the applicability of our products prior to your purchase using your actual samples.

## Lifetime Application Support

We view the field support of our instruments as an essential component of our business strategy. Our expert scientists are always available to answer questions on applications, or the use of our instruments. We do this as a standard service regardless of whether you have a service contract with us or not.

## Partners in Science

Quantachrome has a scientific research department consisting of world renowned experts in material characterization. Our staff, led by team conducts collaborative research projects with leading material research labs around the world. They regularly publish articles in leading peer reviewed journals, and speak at technical symposiums around the world.

For almost half a century Quantachrome's scientists and engineers have revolutionized measurement techniques and designed instrumentation to enable the accurate, precise, and reliable characterization of powdered and porous materials. We have an unwavering commitment to providing state of the art technology, along with superior and unparalleled customer service and support.

Our commitment to customers is to support you before, during, and after the sale throughout the lifetime of our instruments. This is a big commitment because our products are so robust and reliable that we regularly find many still in use for decades.

## Corporate Headquarters-USA Quantachrome Instruments

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