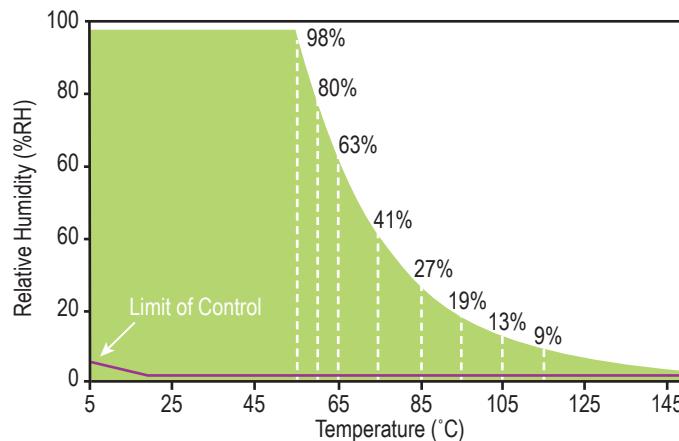


VTI-SA<sup>+</sup>  
**SPECIFICATIONS**



The VTI-SA<sup>+</sup> Vapor Sorption Analyzer is a continuous vapor flow sorption instrument for obtaining precision water and organic vapor isotherms at temperatures ranging from 5°C to 150°C at ambient pressure. The VTI-SA<sup>+</sup> combines the features of VTI's original SGA design with almost two decades of field-proven performance: the isothermal aluminum block construction, the three isolated thermal zones and chilled-mirror dew point analyzer for primary humidity measurements with the field-proven TA Instruments thermobalance technology... all to provide precise and accurate gravimetric measurements with excellent temperature and RH stability.

Maximum Sample Weight	750 mg / 5 g
Dynamic Range	100 mg / 500 mg
Weighing Accuracy	+/- 0.1%
Weighing Precision	+/- 0.01%
Sensitivity	0.1 µg / 0.5 µg
Signal Resolution	0.01 µg / 0.05 µg
Temperature Control	Peltier Elements, Resistance Heaters
Experimental Temperature Range	5 to 150°C
Isothermal Stability	+/- 0.1°C
Relative Humidity Control Range	See Figure Below
Accuracy	+/- 1% RH
Humidity Control	Closed Loop, Dew Point Analyzer
Organic Solvent Capability	Optional
Camera/2.5X Microscope Accessory	Optional
Raman Probe Accessory	Optional



\*Performance may vary slightly, depending on laboratory conditions

# VTI-SA<sup>+</sup> TECHNOLOGY

## Symmetrical Microbalance Design

The VTI-SA<sup>+</sup> Analyzer is a symmetrical vapor sorption instrument where both the sample and reference chambers are exposed to the same conditions of temperature and humidity. In this symmetrical design, any water or organic vapor sorption onto the hangdown wires and sample holder is differentially eliminated and the resultant data represents the uptake by the sample alone. This eliminates the need for background subtraction experiments and associated uncertainty typical in competitive, asymmetrical systems.

## Resolution and Stability of the Microbalance

The standard VTI-SA<sup>+</sup> boasts a microbalance designed and manufactured by TA Instruments with 0.1 microgram sensitivity optimized for pharmaceutical applications. A higher mass capacity version (5 g, 0.5 microgram sensitivity) is also available. To insure effective work in pharmaceutical studies, the design provides an enhanced stability by maintaining the balance compartment at a constant temperature, independent of the sample temperature. Because the balance is maintained at constant temperature, the user has the option of drying the sample at temperatures other than the experimental temperature or to run different temperature and RH profiles without removing the sample.





## Precision Humidity Measurements

As part of our standard design, the VTI-SA<sup>+</sup> employs a chilled mirror dew point analyzer (a NIST-traceable standard for humidity) to determine the absolute relative humidity at the sample. In applications where RH control is critical (as in most pharmaceutical studies), chilled-mirror dew point analyzers are the preferred method, because of the absence of drift and long term stability.

## Sorption Testing Using an Organic Vapor

The VTI-SA<sup>+</sup> can also be configured for organic vapor sorption. In the VTI-SA<sup>+</sup>, the concentration of the organic vapor in the gas stream reaching the sample is determined by the fraction of gas going through the organic solvent evaporator and the fraction of dry gas.

In competitive systems, assumptions are made that the evaporator is 100% efficient and that the temperature of the evaporator is constant from low to high concentrations. The VTI-SA<sup>+</sup> system measures the temperature of the organic solvent in the evaporator and uses this information together with the Wagner equation to control the organic vapor concentration in the gas phase. This method solves the issue of the adiabatic cooling of the solvent, a major source of error in competitive systems.

The solvent containers/evaporators are easily removed and exchanged so there is no need for decontamination or cleaning of the system when changing organic solvents or reverting to water adsorption experiments. For safety, the evaporator compartment is purged with dry nitrogen and fitted with a combustible gas sensor with an audible alarm, that when triggered, shuts down the power to the analyzer.

# VTI-SA<sup>+</sup> TECHNOLOGY

## Simultaneous Microscope Camera or Raman Measurement

The VTI-SA<sup>+</sup> is fully compatible with simultaneous optical measurements, including a high-resolution CCD camera/ 2.5X microscope or a dedicated Raman Probe\*. These optional accessories are field installable, providing the highest level of flexibility for your measurements.

## Sample Chamber Design

In the VTI-SA<sup>+</sup> Analyzer, the sample and reference chambers are located within an aluminum block maintained at constant temperature (within  $\pm 0.1^{\circ}\text{C}$ ) by precise Peltier control elements. Our unique aluminum block design has two distinct advantages. First, due to the high thermal conductivity of the aluminum, thermal gradients within the chambers are minimal. Secondly, because the chamber is a metal block, the issues of static electricity are eliminated. This feature is especially useful when analyzing finely divided powders, as is often the case with pharmaceuticals. The sample temperature is measured with a highly accurate, calibrated platinum resistance thermometer. When higher temperatures are required, the block can be heated to  $150^{\circ}\text{C}$  using installed resistance cartridge heaters.

\*Raman Spectrometer Required



