

HPVA-4 Port Series

High Pressure Volumetric Analyzer

Features

- *Four analysis ports run simultaneously for high throughput applications*
- *Pressure ranges from high vacuum to 200 bars.*
- *Temperatures from cryogenic to 500 °C. Excellent control of sample temperature by means of a constant temperature bath, furnace or cryo-dewar*
- *Fully automated analysis and sample evacuation*
- *Excellent data reproducibility*
- *Handles typical adsorbates such as Nitrogen, Hydrogen, Methane, Argon, Oxygen, Carbon Monoxide, and Carbon Dioxide*
- *Comprehensive Data Analysis Package using Microsoft® Excel® macros for data processing and graphing*
- *Software includes NIST RefProp Database 23*
- *High-precision, solid-state pressure transducers provide a reading accuracy of $\pm 0.04\%$ full scale with a stability of $\pm 0.01\%$*
- *Internal pulse valves for excellent pressure precision*
- *Four port degas station also available for sample preparation*



HPVA 100-4 and HPVA 200-4

The HPVA Series of gas adsorption analyzers from Particulate Systems is designed to obtain high-pressure adsorption isotherms using gases such as hydrogen, methane, and carbon dioxide using the static volumetric method.

The volumetric technique consists of introducing (dosing) a known amount of gas (adsorptive) into

the chamber containing the sample to be analyzed. When the sample reaches equilibrium with the adsorbate gas, the final equilibrium pressure is recorded. These data are then used to calculate the quantity of gas adsorbed by the sample. This process is repeated at given pressure intervals until the maximum preselected pressure is

reached. Each of the resulting equilibrium points (volume adsorbed and equilibrium pressure) is then plotted to provide an isotherm. Excellent reproducibility and accuracy are obtained by using separate transducers for dosing the sample and for monitoring the pressure in the sample chamber.

Characterizations for:

- Catalysts
- Zeolites
- Activated Carbons
- Carbon Nanotubes
- Hydrides

Materials for:

- Hydrogen and NG Storage
- Fuel cells and batteries
- Stack gas scrubbers
- Hydrocarbon traps

HPVA High Pressure Volumetric Analyzer

Models HPVA 100-4 and HPVA 200-4

Manifold All the valves in the manifold are pneumatically operated high-pressure valves. All valve connections are made with heavy wall 316L stainless-steel, and are either welded or use VCR or VCO connections. All gas lines are fitted with 60 micron in-line filters.

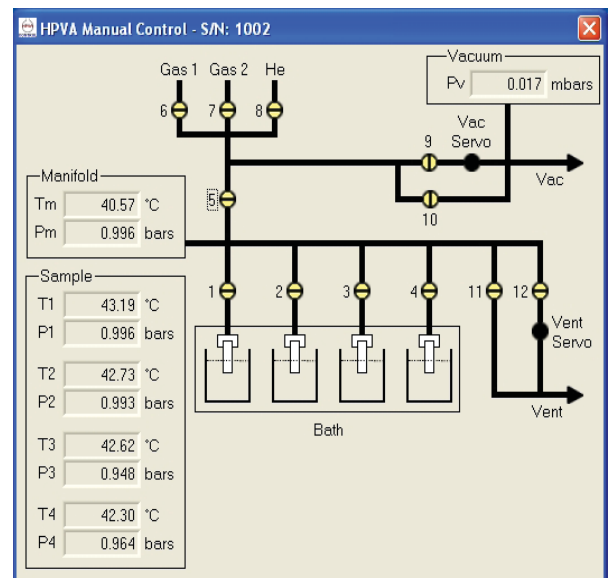
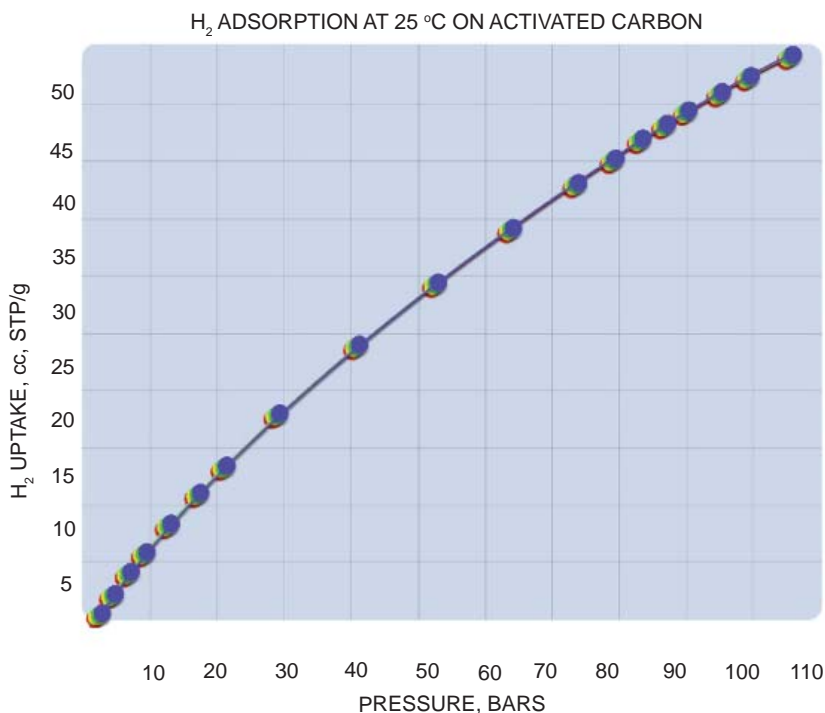
Pressure Transducer The pressure transducers are a high-precision, solid state design with a silicon strain gauge mounted to a hastalloy diaphragm. The advanced design is fully encapsulated thus ensuring the integrity of the element. Pressure reading accuracy is $\pm 0.04\%$ full scale with a stability of $\pm 0.1\%$.

Vacuum System Consists of a 5-CFM mechanical pump and an embedded vacuum gauge. A high vacuum turbo or molecular drag pump option is available.

Separate Degas Station A four port degas station and vacuum system is available for easy sample preparation. Four furnaces are used to independently control each sample temperature up to 500 °C.

Precision Pulse Valves The HPVA Analyzer includes two pulse valves that are used to reach exact gas dosing pressures. One pulse valve vents high pressure to atmosphere while the other is connected to the vacuum source. This allows for dosing precision above and below atmospheric pressure. Both pulse valves are driven with an algorithm embedded in the software.

Safety Features To protect the user, the HPVA includes a hydrogen gas sensor to detect excessive levels of H₂ gas should a leak in the system occur. If tripped, the safety circuit places the HPVA unit in a safe condition by removing power to the unit.



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