

# Thermo Scientific Surfer Gas Adsorption Porosimeter



*Setting a new standard for surface area  
and pore size analysis*



Ceramic materials



Powder metal oxides



Activated carbons and adsorbents



Catalysts



Pharmaceuticals



Cements and concrete



Pigments

# Thermo Scientific Surfer

## Introducing the Thermo Scientific Surfer, a new reference standard for surface analysis

The Thermo Scientific Surfer applies the principle of static volumetric gas adsorption under controlled temperature and pressure conditions to determine the micro structural properties of solids and powders. Surfer determines rapidly and precisely the following properties of porous materials:

- Specific surface area (including krypton BET)
- Ultra micro, micro and mesopore size distribution
- Specific pore volume
- Exposed active sites concentration on catalysts

Surfer is composed of two separate modules that can be used either independently or connected together, the analyzer and the sample preparation degasser. Prior to the experiment, porous samples need to be dried and degassed. Often the sample preparation is a time-consuming operation as it is dependent on the material nature and pore dimensions. The Thermo Scientific Surfer features a degasser module with three independent vacuum ports, so that up to three samples can be prepared at once, shortening the total experiment time.

## The Flexible configuration of Surfer satisfies the most demanding analytical needs

Customization and modularity are important benefits of the Thermo Scientific Surfer, enabling the analyst to obtain the best results in terms of surface area and pore size for any kind of material, from extremely low surface areas (non-porous) to very high surface areas and large pore volumes (e.g. the case of micro and mesopore samples). Surfer can be configured and customized easily on demand also according to the available budget, choosing from a wide range of vacuum pumps, pressure gauges, valve types, etc. The system can be easily upgraded at any time.

**OPTIMIZED TO MINIMUM  
SAMPLE SIZES  
FOR FASTER ANALYSIS AT  
HIGHER ACCURACY**



### EVERYTHING LOOKS BETTER!

- ✓ Modules for analysis and sample preparation can be used independently providing a more flexible laboratory design
- ✓ Fully configurable to match any analytical demand and budget availability
- ✓ Full set of gauges is available to cover the complete pressure range with maximum resolution
- ✓ Pressure reading zone mounted in closest vicinity of sample minimizes dead volumes thus improving sensitivity
- ✓ Specifically designed A/D converter (8 channels at 24 bit plus 4 channels at 12 bit) guarantees the best resolution in pressure and temperature readings
- ✓ Computer communication through a LAN port allows the remote control on a network
- ✓ A PID (proportional-integrative-derivative) temperature-controlled cabinet isolates the manifold and all pressure sensors from external temperature effects for unrivalled stability
- ✓ New and high-precision coolant level control gives excellent stability of saturation pressure region
- ✓ Three vacuum independent degassing stations with two temperature zones up to 450 °C with temperature rate controlled by a PID device

## What makes Thermo Scientific Surfer the specialist's choice of gas adsorption analyzer?

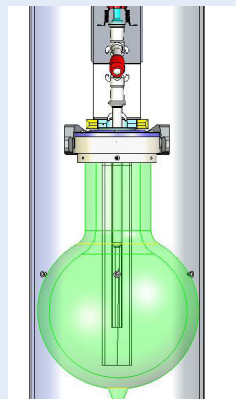
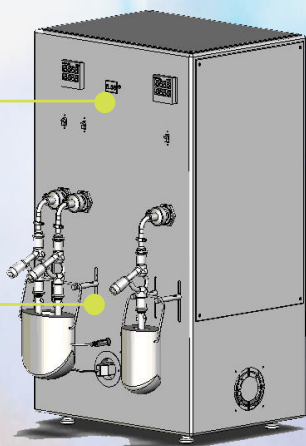
The precision and reliability of surface area and pore size determination is related to several independent but interconnected factors. The amount of gas adsorbed by a porous material is directly related to the pore volume and the exposed surface area while the pressure at which the gas is adsorbed is linked to the pore dimension.

The volume of adsorbed gas is determined by the difference between the adsorbate introduced in the sample cell less the amount of adsorbate staying in the gaseous phase. Therefore the sensitivity in measuring surface area is directly related to the minimized free space over the sample and to the precision in determining the dosed quantity of gas.

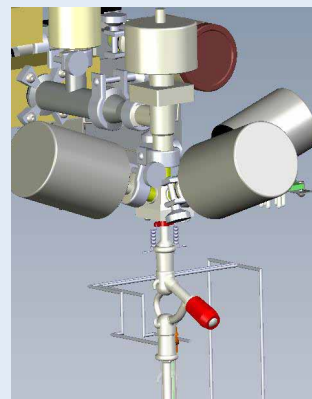
- Surfer minimizes the dead volume allowing for the use of less sample and therefore less run time for the experiment
- The gas dose is measured by a separate transducer in a reference calibrated stainless steel chamber where the gas temperature is measured with 0.01 °C resolution
- PID temperature control (+/- 0.1 °C stability) of the cabinet containing the manifold, all the tubing in contact with the measuring gas and the pressure transducers ensures excellent stability of the system independent from environmental temperature changes
- Unrivalled stability of gas pressure in the cold space zone is assured by Surfer thanks to its unique and specifically designed device for liquid coolant level control (within 100 microns!!)
- Surfer manifold geometry has been designed to minimize the distance between the transducers and the sample, reducing in most cases the cryogenic temperature effect on the pressure reading.

*The sample preparation device can be connected to the Surfer or used independently providing best versatility in laboratory design*

*The degassing unit, with three positions, improves sample throughput*



*New exclusive coolant level device assures a stability of the cryogenic liquid within 100 microns!!*



*Specially designed manifold minimizes the dead volume for the most accurate pressure reading in the sample zone*

**All tubing, manifold in contact with the adsorbate and the four inlet ports fit in the temperature-controlled zone (stability: +/- 0.1 °C)**

**Communication ports (LAN/COM) are easily accessible from the rear**

**Reference manifold temperature is monitored in real time with 0.01 °C resolution**

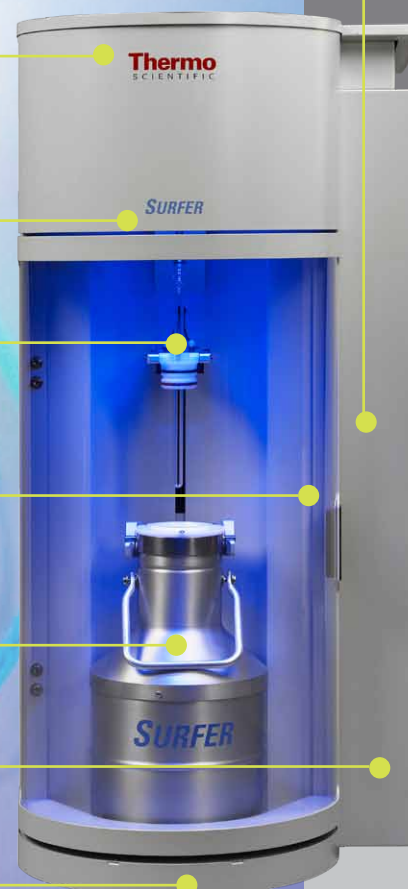
**Unique design coolant level control assures unmatched stability**

**Safety door for operator protection prevents any coolant operation if opened**

**Long lasting liquid coolant container raised up automatically**

**Vacuum pumps (up to two) fit in the lower section of the cabinet**

**Small footprint**



In addition to these offices, Thermo Fisher Scientific maintains a network of representative organizations throughout the world.

## Instrument control, data acquisition and reprocessing

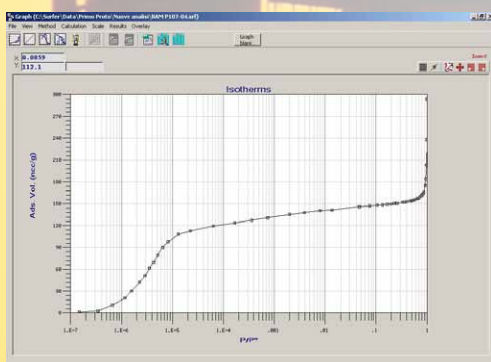
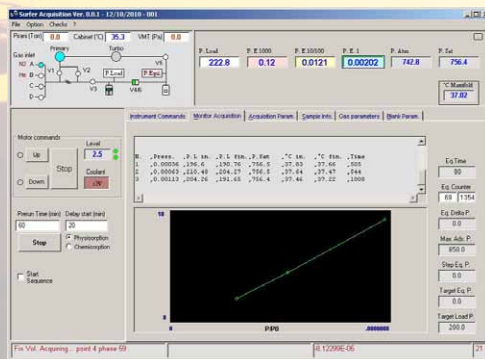
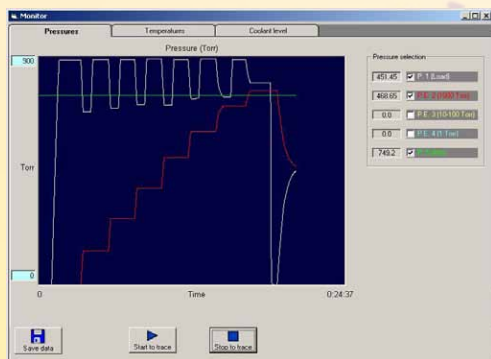
Surfer is computer-controlled through a LAN port allowing for operation in a network. The control software has been designed for easy operation and full monitoring of all the instrument parameters, pumps control, analytical procedures, configuration set up, etc.

Data acquisition features the on-line display of the isotherm (volume versus pressure) and the graphic display of all parameters versus time (pressure values, temperatures and coolant level). These data can then be saved in a separate text file and imported in any spreadsheet software.

A new innovative analytical method to collect the experimental points allows the measurement of the equilibrium pressures where needed on the isotherm, enhancing the precision in the region of interest. Unprecedented isotherm resolution is now achievable by Surfer.

- Mode "Zone": the user can select up to 10 + 10 (adsorption and desorption) pressure regions, choosing for each region the pressure steps and the equilibration conditions
- Mode "NPT" (Next Point Triangulation method): an automatic mode suitable for non-porous, macro and mesoporous materials. Surfer automatically determines the pressure steps at which equilibrium pressures must be collected with a degree of resolution decided on by the user
- Mode "NPLT" (Next Point Logarithmic Triangulation method): specially designed for micro and ultra-microporous materials (works also if mesopores are present), when the equilibrium pressure falls at extremely low values
- Acquisition parameters and experimental conditions can either be imported from a previously collected experiment or from a standard method prepared in advance

Data reprocessing software includes all the latest updates of calculation models, e.g. BET 2 and 3 parameters, Langmuir, NLDFT, ESW, BJH, Horvath-Kawazoe, Saito-Foley and many more.



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