

# FEATURES SHEET

## TEOM<sup>®</sup> SERIES 1500 REACTION KINETICS ANALYZER

The TEOM Series 1500 PMA is a micro reactor with a high resolution micro balance that measures, in real-time and in-situ, changes in mass during gas-solid interactions. It incorporates a tapered element oscillating micro balance that constrains the sample in the test bed at its lower end, and also determines the mass change of the test material in real time.

The TEOM Series 1500 PMA is controlled by an object oriented software written in LabVIEW for Windows. Numerous valves, flow controllers, external equipment and gas analyzers can be integrated and controlled by the system software.

The system's overall design provides the following features:

- 0.1 second response time provides ability to study kinetics of fast transient changes.
- TEOM Series 1500 PMA provides for a well-defined gas phase and far better control of gas-solid contact than in TGA or gravimetric balance systems. This improves the mass and heat transfer for the materials and also results in a fast response to gas-phase changes.
- Design outline and 100% contact of flow through packed sample test bed, reduces long equilibration periods.
- High mass resolution at both temperature ( to 900 °C ) and pressure ( to 50 Atm ) operation. Robust operation across the entire range with use of realistic space velocities and flow conditions relevant to full scale operating conditions.
- Reactive gases are fed into the system in either a continuous or pulsed mode. A pulsed sample feed can be used to isolate the elemental components of the catalysis cycle ( diffusion, adsorption, reaction, desorption, residue level ) and facilitate quantitative analysis.
- Immediate capture of effluent with capillary probe option reduces diffusion and post reaction of product.
- A heat-traced inlet and outlet line are offered, as well as two ( 2 ) thermocouples in each zone for high reliability. Three ( 3 ) analog and two ( 2 ) digital interfaces are standard with the system. Additional interfaces can be added.
- All components of the sample carrier exposed to the reaction and product gases are composed of corrosion-resistant material.
- Different exchangeable sample carriers ( test bed size 0.05, 0.1 or 0.2 cc ), can be used with a single sensor unit. A sample carrier holder is used to stabilize and firmly secure the position of the sample carrier, while the operator loads material into the sample test bed.
- User selected data storage intervals ( seconds, minutes ) assist in capturing events in a time frame appropriate for the specific study.
- The operating software is designed to give the user a means of controlling the internal conditions of the hardware and external sample preparation and post-gas analysis devices. The main software screen is customized by Thermo for each customer to show the instrument's flow diagram, accessories, control parameters, and data displays in numeric and graphic format.
- Flexible Software Using LabView<sup>®</sup> for Windows<sup>®</sup>:
  - Numeric and Graphic Displays for Mass, Temperatures, Flows and Customer Added Equipment
  - Menu Pages for Configuring Experimental Setup
  - Control of Complete Reactor System Including Gas Preparation and Analysis Equipment
- R&D and Quality Control Applications:
  - Deactivation due to coke formation, coking rate, kinetics of deactivation
  - Effect of coke formation on adsorption, diffusion, coke location, selectivities
  - Regeneration of catalysts
  - Characterization of catalysts
  - Oxidation and reduction
  - Transient kinetics
  - Adsorption, reaction, desorption rates
  - Fuel cell material studies
  - Catalyst acidity testing
  - Carbon formation at elevated pressures
  - Combined diffusion, adsorption, and catalysis studies



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