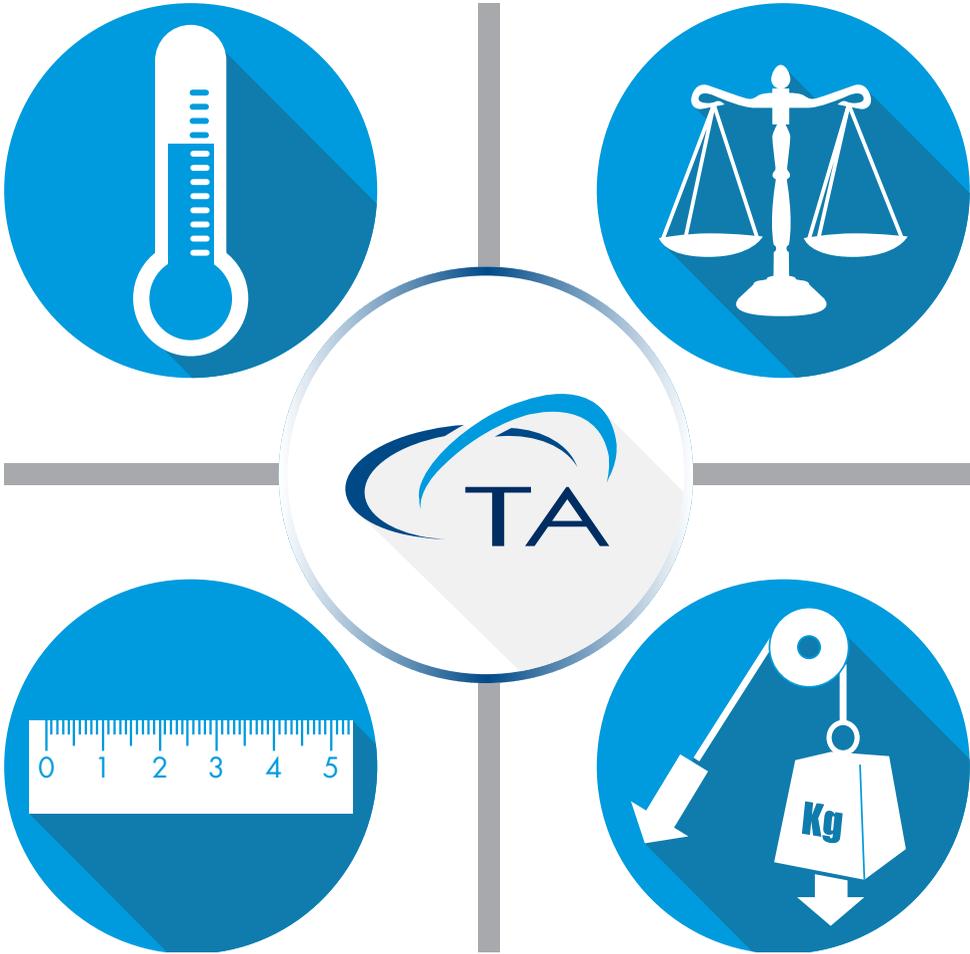


PRODUCT GUIDE



TA Instruments designs and manufactures the world's highest performing Thermal, Rheology, Microcalorimetry & Mechanical Test Systems by focusing on four fundamental measurements of **temperature**, **weight**, **displacement**, and **force**.



Performance, Quality & Support



THERMAL ANALYSIS

Thermal Analysis is important to a wide variety of industries, including polymers, composites, pharmaceuticals, foods, petroleum, inorganic and organic chemicals, and many others. Thermal analyzers typically measure heat flow, weight loss, dimension change, or mechanical properties as a function of temperature, time and atmosphere. Properties characterized include melting, crystallization, glass transitions, cross-linking, oxidation, decomposition, volatilization, coefficient of thermal expansion, and modulus. These experiments allow the user to examine end-use performance, composition, processing, stability, and molecular structure and mobility.



THERMAL CONDUCTIVITY

TA Instruments provides the most extensive and comprehensive range of instruments for the precise and accurate measurement of heat transfer properties of a wide range of material types and temperatures.

Thermal conductivity, thermal diffusivity and specific heat capacity define a material's ability to store and transfer heat. The precise and accurate measurement of these properties is critical for any process or material which experiences a large or fast temperature gradient, or for which the tolerance for temperature change is exacting.



RHEOLOGY

Rheology is the study of flow and deformation of materials. Deformation and flow are referred to as strain or strain rate, respectively, and indicate the distance over which a body moves under the influence of an external force, or stress. For this reason, rheology is also considered to be the study of stress-strain relationships in materials.

A rheometer is a precision instrument that contains the material of interest in a geometric configuration, controls the environment around it, and applies and measures wide ranges of stress, strain, and strain rate.

TA Instruments has the world's most versatile platform for rheological measurements. A full range of environmental systems and measurement accessories are available powered by SmartSwap™ Technology, for fast exchange & automatic configuration.



RUBBER TESTING

TA Instruments offers a complete line of instruments for the measurement of rheological and physical properties of polymers, rubber and rubber compounds at all stages of manufacture. The new rubber testing instruments include a Rubber Process Analyzer, Moving Die Rheometer, Mooney Viscometer, Automated Density Tester and Automated Hardness Tester.



MICROCALORIMETRY

TA Instruments Isothermal Titration Calorimetry (ITC), Differential Scanning Calorimetry (DSC), and Isothermal Calorimetry systems are powerful analytical techniques for in-depth characterization of molecular binding events and structural stability. Thermodynamic binding signatures not only reveal the strength of a binding event, but the specific or non-specific driving forces involved. Structural stability profiles from DSC reveal strengths and weaknesses in higher order structure and define the behavior of individual domains and their interactions. The TA Instruments Affinity ITC, Nano ITC and Nano DSC provide the performance, reliability and ease-of-use required for the most demanding applications in drug discovery, protein-protein interactions, structure-function characterization and more.



DILATOMETRY

TA Instruments Dilatometers are high-precision systems designed to measure dimensional changes of a specimen brought about by changes in its thermal environment.

Linear thermal expansion coefficient, annealing characteristics and other physical or chemical changes manifesting themselves as a change of dimensions can be precisely determined. Optimization of processing parameters as reflected by dimensional changes of the material can be studied in great detail through duplication of thermal cycles and rates used in the actual process. Due to the flexible programming of thermal cycles, complex processes can be easily simulated.



ELECTROFORCE MECHANICAL TEST INSTRUMENTS

TA ElectroForce® has been committed to electromagnetic technology and testing since its founding more than 20 years ago. This ongoing effort has resulted in the development of patented high-performance linear motors that feature essentially zero-friction moving-magnet designs. TA ElectroForce has established itself as an industry leader in mechanical testing. Explore for yourself the unique TA ElectroForce technologies that provide demonstrable benefits for your testing needs that range from traditional test frames to specialized medical device and tissue engineering solutions.



SERVICE

TA Instruments leadership position results from the fact that we offer the best overall product in terms of technology, performance, quality, and customer support. While each is important, our demonstrated commitment to after-sales support is a primary reason for the continued loyalty of our customers. To provide this level of support, TA Instruments has assembled the largest worldwide team of field technical and service professionals in the industry. Others promise good service. Talk to our customers and learn how TA Instruments consistently delivers on our promise to provide exceptional service.

NEWEST Products



Discovery DSC Differential Scanning Calorimeters

TA Instruments introduces the Discovery DSC 2500, DSC 250 and DSC 25. Discover the result of advanced engineering and attention to detail that provides enhancements in every aspect of DSC technology. The Discovery DSC delivers unrivaled performance in baseline flatness, sensitivity, resolution, and reproducibility. Accurately determine heat capacity, heats of reactions/enthalpy and transition temperatures with the Discovery DSC.

From the most cost-effective DSC with industry-leading performance, to the most advanced DSC available, there is a TA Instruments DSC to meet your needs and exceed your expectations.

[More information on page 16](#)



Discovery TGA Thermogravimetric Analyzers

Discover the world's finest line of Thermogravimetric Analyzers, the Discovery TGA 5500, TGA 550 and TGA 55. Every new Discovery TGA is equipped with the proprietary Tru-Mass™ Balance. The Tru-Mass Balance system is thermally isolated for high sensitivity, delivers the highest resolution to separate components of the most challenging samples, and has the flattest baseline for accurate determination of weight change in a single run. Unlike competitive designs, the Discovery TGA delivers optimum performance without requiring baseline subtractions and other post-test manipulation required by competitors. The result is an innovative new TGA with unrivaled performance.

[More information on page 18](#)



Discovery SDT Simultaneous DSC/TGA

The Discovery SDT 650 provides a true simultaneous measurement of weight change (TGA) and true differential heat flow (DSC) on the same sample from ambient to 1500 °C. The Discovery SDT 650 now features standard advanced technologies such as Dual Sample TGA, Modulated DSC, Modulated and Hi-Res TGA. Available with or without an autosampler, the Discovery SDT is sure to meet your needs and exceed your expectations.

[More information on page 20](#)



Affinity ITC Isothermal Titration Calorimeters

The Affinity ITC instruments are the newest technological advance in ITC for measuring molecular interactions. Data generated from this type of assays helps users to determine specific or non-specific binding determinations, all without labeling or immobilization. Our new Affinity ITC provides both inexperienced and advanced users the highest confidence generating superior data.

New innovative features include the FlexSpin™ stirring technology, AccuShot™ injection technology and Intelligent Hardware Positioning. The separation of the stirring mechanism from the injection system results in data quality unsurpassed by any ITC available today. The AccuShot™ injection system delivers high-precision injection volumes at the top of the stirring paddle. The new patent-pending FlexSpin™ paddle shape ensures fast, efficient mixing at 10X slower speeds which in turn keeps the integrity of the sample intact.

[More information on page 38](#)

NEWEST Products



DIL 830 Horizontal Dilatometry Series

The DIL 830 features an impressive array of unique technologies and capabilities that make it the ideal tool in any R&D laboratory for the characterization of mechanical and dimensional properties. These include: TA Instruments exclusive True Differential™ technology, the 1 nm resolution optical encoder, a family of new dynamic furnaces, and the new linear sample load motor. The result is the best performing horizontal push-rod dilatometer available on the market, regardless of the application or the material to be tested.

[More information on page 44](#)



DIL 820 Vertical Dilatometry Series

The 820 Series operate in a vertical orientation, making it uniquely set up for the analysis of sintering, studies in Rate Controlled Sintering (RCS) mode and the determination of dilatometric parameters of samples otherwise difficult to be analyzed on classic dilatometers with horizontal design.

Available in two different models (DIL 821 and DIL 822), both units feature our new optical encoder with 1 nm resolution. Combined with the True Differential design of the DIL 822, this results in the best possible sensitivity and CTE accuracy on the market.

[More information on page 44](#)



ODP 860 Optical Dilatometry Series

The result of over twenty years of R&D in optical instruments for the study of the thermomechanical behavior of materials, the ODP 868 and HM 867 make possible the analysis of samples beyond the limits of classical heating microscopy. Its versatility makes it the most innovative tool for R&D and QA/QC laboratories for the optimization of industrial processes that involve thermal cycles.

[More information on page 46](#)



DLF 1600 Discovery Laser Flash

The Discovery Laser Flash DLF 1600's source module is a freestanding unit employing a custom Class 1 35 J Nd:Glass laser pulse source. It provides a collimated, monochromatic energy pulse to specimens heated up to 1600 °C. The laser radiation is delivered via a proprietary fiber optic delivery wand which ensures a 99% homogenized laser pulse. This leads to more accurate measurements than any competitive direct firing laser pulse instrument.

[More information on page 50](#)

NEWEST Products



DuraPulse™ Stent/Graft Test (SGT) Instrument

The NEW DuraPulse™ Stent/Graft test (SGT) instrument extends the performance and reliability that ElectroForce SGTs have become known for over the past 20 years. Utilizing patented high-bandwidth, low-distortion ElectroForce actuator technology to provide best-in-class performance, the DuraPulse SGT incorporates a modular design that allows the user to easily change out manifold and tube sets to optimize sample throughput for various stented device sizes. An enhanced software user interface is easier to use and includes inner diameter (ID) and outer diameter (OD) radial strain calculations, improved strain control modes, and simplified data acquisition.

[More information on page 68](#)



ElectroForce 3310 Test Instrument

The ElectroForce 3310 is the newest addition to the TA Instruments load frame family, delivering 1 kN of force capacity with 25 mm of dynamic displacement. Utilizing our patented, friction-free, electromagnetic linear motor, the 3310 provides the controllability you need to run a wide range of material characterization and fatigue testing protocols. The ElectroForce 3310's impressive performance extends to much lower forces, controlling applied force to less than 1 N and calibrated displacement accuracy of ± 5 microns and a resolution of 1 nanometer.

Additionally, the 3310 can incorporate options such as our extended stroke (ES) capability for static testing up to 150 mm, torsion actuators for simultaneous axial-torsion loading and environmental chambers such as saline baths or hot/cold chambers to perform testing under a variety of test conditions.

[More information on page 66](#)



TAM IV and 48

The TAM IV is the most sensitive, stable and flexible microcalorimeter system in the world for directly measuring the universal heat signal and, therefore, the quantitative thermodynamic and kinetic observation of any process. It is a unique microcalorimeter system that is completely modular and combines the highest heat flow sensitivity with unmatched long-term temperature stability for measuring many processes that are undetectable by other techniques. A wide range of calorimeter configurations and sample handling systems provide maximum application flexibility and ensure optimum laboratory productivity.

The TAM IV-48 is a high-throughput version of the TAM IV and can accommodate up to 48 individual 4 mL Minicalorimeters. The large number of independent and parallel sample measurements makes this system the optimal solution for sample screening, formulation, and process development. It is equally useful in research laboratories or in QA/QC laboratories including pharmaceutical production control.

[More information on page 42](#)



TAM Air

The new TAM Air from TA Instruments is a powerful isothermal calorimeter with heat flow sensitivity in the microwatt range and unmatched baseline drift performance. This isothermal calorimeter is designed for labs that require high sensitivity, stability and long-term process analysis. The system offers an option of 8-channel or 3-channel calorimeter configurations, and will accommodate 20 mL in the 8-channel configuration and 125 mL in the 3-channel configuration.

The TAM Air is the recognized instrument for research and development, as well as quality control process, for the cement and concrete industries. With the higher volume ampoules in the 3-channel calorimeter, the TAM Air is ideal in food and environmental science applications.

[More information on page 42](#)

NEWEST Products



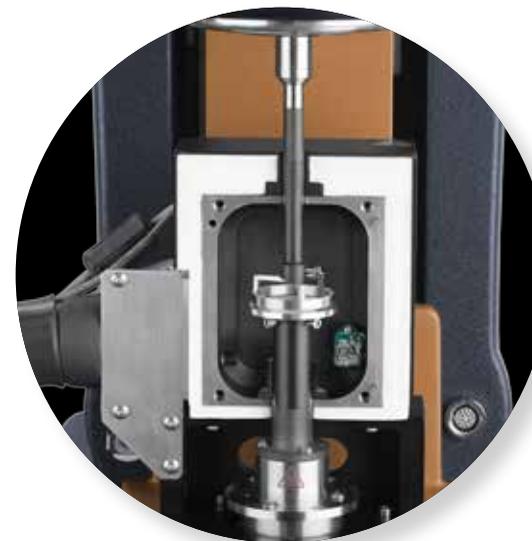
Discovery HP-TGA 750 - High Pressure Thermogravimetric Analyzer

The Discovery HP-TGA 750 is the first product developed jointly with the team from recently acquired Rubotherm and TA, bringing together the industry-leading technologies of both organizations. It is the first and only benchtop high pressure TGA available.

At the core of the new Discovery HP-TGA is a Patented ultra-high-resolution magnetic suspension balance and new temperature control system that combined produces the most sensitive and accurate results. The HP-TGA 750 has higher resolution than any competitive offering, making the system ideal for the measurement of reactions with fast kinetics. The low-volume environmental chamber is optimized for quick gas change and pressurization. It is designed with non-porous isolation material assuring the purest sample atmosphere. The new compact, high-performance furnace delivers heating and cooling rates orders of magnitude higher than competitive systems. The HP-TGA 750 is optimized to test samples at high pressure levels, in even the most severe environments.

[More information on page 22](#)

NEWEST Accessories



Discovery Hybrid Rheometer Relative Humidity Accessory

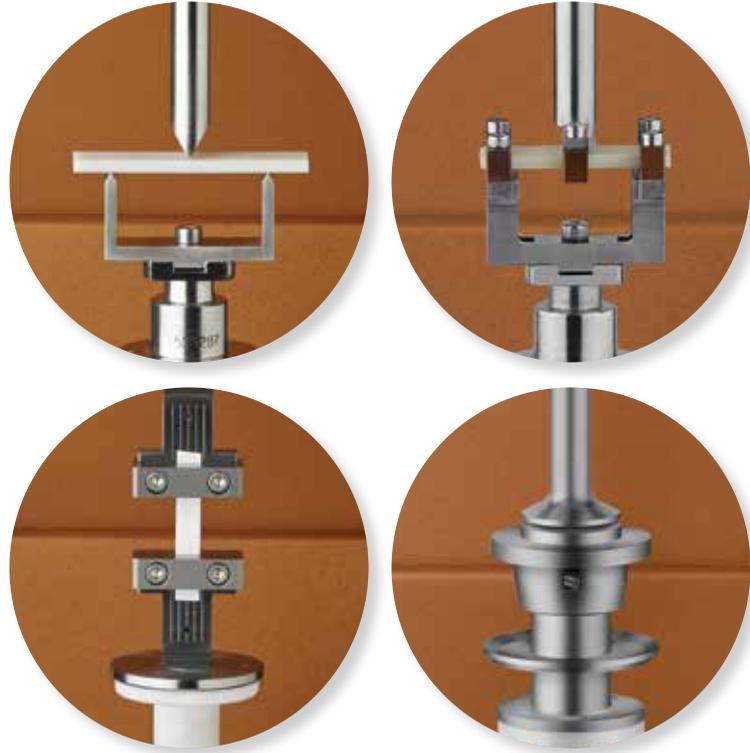
The DHR-RH Accessory is a new environmental system for the Discovery Hybrid Rheometer that enables accurate control of sample temperature and relative humidity. The DHR-RH Accessory employs a custom-designed humidity and temperature chamber that is optimized for rheological measurements. The accessory provides stable, reliable control of temperature and humidity over a wide range of operating conditions. It successfully prevents condensation, a common occurrence in controlled-humidity environments.



Discovery Hybrid Rheometer High Temperature Pressure Cell

The Pressure Cell is a sealed vessel that can be pressurized up to 138 bar (2,000 psi), over a temperature range of -10 °C to 300 °C. It can be used either in self-pressurizing mode, in which the pressure is produced by the volatility of the sample, or by externally applying the pressurization, typically with a high pressure tank of air or nitrogen gas. The accessory includes a 26 mm conical rotor while optional vane and starch rotors are available. All necessary plumbing and gauges are included as a manifold assembly. The Pressure Cell is ideal for studying the effect of pressure on rheological properties, as well as studying the materials that volatilize under atmospheric pressure.

NEWEST Accessories



Discovery Hybrid Rheometer Dynamic Mechanical Analysis (DMA)

The DMA Mode adds a new dimension for testing of solid and soft-solid materials. Now, in addition to the most sensitive and accurate rotational shear measurements, the Discovery Hybrid Rheometer can deliver accurate linear Dynamic Mechanical Analysis (DMA) data. Compatible with the ETC Oven, the new DMA capability is available in: film tension, three-point bend, cantilever, and compression. The new axial DMA capability complements solid torsion testing by providing a direct measure of the modulus of elasticity, or Young's Modulus (E). The new DMA mode is ideal for identifying a material's transition temperatures and provides reliable measurements over the instrument's full range of temperatures. This unique capability is enabled by the DHR's active Force Rebalance Transducer (FRT) and patented magnetic bearing. This technology facilitates amplitude-controlled oscillatory deformation in the axial direction, a capability that is **not possible with instruments that employ air bearings or passive normal force measurements.**



Discovery Hybrid Rheometer Magneto-Rheology Accessory

The new MR Accessory enables the complete characterization of magneto-rheological fluids under the influence of a controlled field. Applied fields up to 1 T and a sample temperature range of -10 °C to 170 °C make the MR Accessory ideal for all studies of MR fluids and ferrofluids. The MR Accessory applies a controlled field through an integrated electromagnetic coil located below the sample. This coil operates in conjunction with an upper yoke to deliver a homogeneous magnetic field that is normal to the plate surface. The system includes a channel to accommodate an optional Hall probe for real-time measurement and closed loop control of the sample field.



Discovery Hybrid Rheometer Modular Microscope Accessory (MMA)

The Modular Microscope Accessory (MMA) enables complete flow visualization - including counter-rotation - with simultaneous rheological measurements on a Discovery Hybrid Rheometer. A high-resolution camera collects images at up to 90 fps coupled with industry-standard microscope objectives that provide magnification up to 100x. Illumination from a blue-light LED can be coupled with a cross-polarizer or dichroic splitter for selective illumination or fluorescence microscopy.

NEWEST Accessories



ARES-G2 Rheometer Orthogonal Superposition Rheology

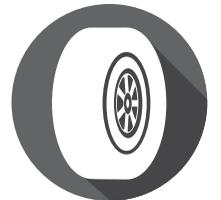
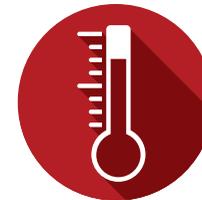
TA Instruments introduces a new dimension in rheological testing exclusive to the ARES-G2. Simultaneous deformation in the angular and axial directions unlocks all new capabilities for probing non-linear and anisotropic behavior of complex fluids. This new testing capability utilizes the unique capabilities of the ARES-G2 FRT to apply oscillation in the axial direction, orthogonal to the direction of angular shear.



Air Chiller Systems

The new Air Chiller System models offer unique gas flow cooling systems that provide the capability for sub-ambient testing without the use of liquid nitrogen. Available in two models, the ACS-2 and ACS-3, the chillers feature a multi-stage cascading compressor design that is capable of utilizing compressed air (7 bar, 200 l/min) as the cooling medium. The ACS-2 and ACS-3 models allow temperature control in rheometers and DMA instruments to temperatures as low as -55 °C and -100 °C respectively. The chiller systems can help eliminate or reduce liquid nitrogen usage and associated hazards from any laboratory and offers an incredible return on investment.

PRODUCT DETAILS



Differential Scanning Calorimeters (DSC)

The World's Finest Line of Differential Scanning Calorimeters

Differential Scanning Calorimeters (DSC) measure temperatures and heat flows associated with thermal transitions in a material. Common usage includes investigation, selection, comparison and end-use performance evaluation of materials in research, quality control and production applications. Properties measured by TA Instruments' DSC techniques include glass transitions, "cold" crystallization, phase changes, melting, crystallization, product stability, cure / cure kinetics, and oxidative stability.

TA Instruments invites you to experience the world's finest line of Differential Scanning Calorimeters, the Discovery **DSC 2500**, **DSC 250** and **DSC 25**. Discover the advanced engineering and attention to detail that provides enhancements in every aspect of DSC technology and a new level of user experience. From the most cost-effective DSC with industry-leading performance, to the most advanced DSC available, there is a Discovery DSC to meet your needs and exceed your expectations.

Features and Benefits:

- New Fusion Cell™ with patented technology for unrivaled performance
- Exclusive T4P Tzero® heat flow technology for ultimate DSC performance in a single run
- New innovative "app-style" touch screen for ease of use
- Reliable linear autosampler with programmable tray positions for worry-free 24/7 operation
- Modulated DSC® (MDSC®) for the most efficient separation of complex thermal events
- Widest range of refrigerated cooling options eliminates liquid nitrogen expense
- Tzero Press and Pans for fast, simple, and reproducible sample preparation
- Commitment to quality backed by the industry's **ONLY** five-year cell and furnace warranty for peace of mind
- Flattest Baselines, Highest Sensitivity, Sharpest Resolution, and Best Repeatability

Applications:

- Glass Transitions, Melting & Crystallization
- Heat Capacity
- Crosslinking and Curing
- Solid-Solid Transitions
- Oxidation



Discovery DSC 25

Discovery DSC 250

Discovery DSC 2500



Thermogravimetric Analysis (TGA)

The World's Finest Line of Thermogravimetric Analyzers

Thermogravimetric Analyzers measure the amount and rate of change in the weight of a material as a function of temperature or time in a controlled atmosphere. Common usage includes investigation, selection, comparison and end-use performance evaluation of materials in research, quality control, and production applications.

TA Instruments invites you to experience the world's finest line of Thermogravimetric Analyzers, the Discovery **TGA 5500**, **TGA 550**, and **TGA 55**. Discover the advanced engineering and attention to detail that provides enhancements in every aspect of TGA technology and a new level of user experience. From the most cost-effective and flexible TGA with industry-leading performance, to the most advanced TGA available, there is a Discovery TGA to meet your needs and exceed your expectations.

Features and Benefits:

- Tru-Mass™ Balance that ensures detection of even the smallest changes
- New innovative "app-style" touchscreen puts instrument functionality simply One-Touch-Away™, enhancing usability and making it even easier than ever to get great data
- Reliable autosampler provides the most worry-free 24/7 operation, most flexible programming of experiments, and automated calibration and verification routines
- Hi-Res® TGA for the best resolution of overlapping weight losses possible
- Modulated TGA, (MTGA®), for the most efficient measurement of kinetic parameters
- Widest range of heating rates available for productivity and process simulation
- Commitment to quality backed by the industry's **ONLY** five-year furnace warranty for peace of mind

Applications:

- Thermal Stability of Materials
- Oxidative Stability of Materials
- Composition of Multi-component Systems
- Estimated Lifetime of a Product
- Decomposition Kinetics of Materials
- The Effect of Reactive or Corrosive Atmospheres on Materials
- Moisture and Volatiles Content of Materials



Discovery TGA 55

Discovery TGA 550

Discovery TGA 5500



Simultaneous DSC/TGA

DSC/TGA system that delivers the purest real-time simultaneous heat flow and weight data possible

Simultaneous DSC/TGA measures heat flow and weight change as a function of time, temperature and atmosphere in a single experiment.

TA Instruments invites you to experience the world's finest Simultaneous DSC/TGA, the Discovery **SDT 650**. Discover the advanced engineering and attention to detail that provides enhancements in every aspect of performance and a new level of user experience. Available with or without an Autosampler, the Discovery SDT is sure to meet your needs and exceed your expectations.

Features and Benefits:

- Horizontal dual-beam design for superior heat flow and weight measurements.
- Dual-sample TGA mode for double the productivity of competitive systems.
- Ultra-low drift balance design for unrivaled performance in baseline flatness, sensitivity, and resolution.
- Modulated DSC® (MDSC®) for the best determination of heat capacity.
- Hi-Res™ TGA for the best separation of overlapping weight losses.
- Modulated TGA™ (MTGA™) for increased productivity for studying kinetics.
- Reliable linear autosampler with programmable tray positions for worry-free 24/7 operation, most flexible programming of experiments, and automated calibration and verification routines.
- New innovative "app-style" touch screen puts instruments functionality simply One-Touch-Away™, enhancing usability and making it easier than ever to get great data.
- Commitment to quality backed by the industry's **ONLY** five-year furnace warranty for peace of mind.

Applications:

- Thermal and Oxidative Stability of Materials
- Composition of Multi-Component Systems
- Moisture and Volatiles Content of Materials
- Decomposition Kinetics of Materials
- Detection of Phase Transitions: Glass Transition, Crystallization and Melting
- Detection of Solid-Solid Phase Transitions
- Enthalpy and Heats of Reaction
- Specific Heat Capacity by Modulated DSC



Discovery SDT 650

Discovery SDT 650 with Autosampler



High Pressure Thermogravimetric Analysis

High Pressure Thermogravimetric Analysis with Patented Magnetic Suspension Balance

The Discovery **HP-TGA 750** is the latest, most sophisticated thermogravimetric analyzer with the patented* Magnetic Suspension Balance, MSB. For the first time an MSB is incorporated into a true member of the TA Discovery series of instruments – offering all the benefits of a small footprint and the application of the powerful TRIOS software.

It is the perfect instrument for high temperature and high pressure thermogravimetric analysis. The incorporated flexible gas dosing and blending** system with pressure controller provides accurate control of the composition** and the pressure of the reaction atmosphere.

Designed and built with more than 20 years of experience and using the innovative new patented magnetic suspension balance technology, the Discovery HP-TGA provides the highest weighing resolution, best accuracy, reliability, and robustness in the widest application range for TGA.

Features and Benefits:

- Only high pressure TGA available in a compact benchtop design which includes fully integrated gas dosing and pressure control which minimizes lab space requirements
- Compact design can be conveniently located in ventilated fume hoods or glove box environments
- Balance resolution of 0.1 mg for the most accurate measurements of small samples and materials with rapid kinetic reactions
- Environment-controlled balance provides superior baseline stability for utmost confidence in weight change events
- Top-loading configuration for the most convenient sample access and loading
- Non-porous furnace design effectively isolates reaction gas and ensures rapid attainment of vacuum
- Fast heating and cooling rates of up to 200 °C/min reduces unwanted side reactions and improves sample throughput
- Small internal volume allows for quick gas changes and pressurization and saves money on gas consumption
- Curie-point calibration eliminates the effects of the reaction gas type and pressure on temperature measurement

Applications:

Material Science

- Polymer processing
- Metal corrosion
- Inorganic oxides
- Aerospace materials

Environmental

- Synthetic fuels
- CO₂ conversion
- CO₂ sequestration
- Chemical looping

Energy

- Catalysis
- Pyrolysis & Gasification
- Enhanced oil & gas recovery
- Shale gas

Life & Crop Sciences

- Diesel emission reduction
- Calibration trace gas preparation
- Work safety / military
- Toxicology studies



Discovery HP-TGA 750

* European Patent: 1958323, U.S. Patent: 2009/0160279 A1, German Patent : DE 10 2015 116 767.0
** Model-dependent



High Pressure Thermogravimetric Analysis

The world's best high pressure TGA
Capable of operating in difficult environments

The continuous weight measurement of a sample while exposed to controlled temperature and atmospheric conditions provides important information about chemical reactions and structural changes of the material.

Implementing our patented Magnetic Suspension Balance (MSB), the high pressure TGA can measure samples under conditions all other instruments fail: Thermogravimetric Analysis using corrosive or toxic atmospheres from vacuum to high pressures.

Features and Benefits:

- Separation of balance from reaction atmosphere by MSB technology allows for TGA measurements with corrosive, explosive, and toxic reaction gases, as well as high pressure with no need for balance purge gas.
- Magnetic suspension balance can be heated to 200 °C, which avoids condensation of vapors, and allows measurements with high vapor pressures/concentrations.
- Sample can be automatically decoupled from balance during measurement and allows baseline drift to be recorded and corrected. This results in no balance drift, even in long measurements.
- Automatic balance calibration performed during long measurements results in extraordinary accuracy and stability.
- High balance resolution and large weighing range allows for use of big and heavy samples with large dynamic weighing range.
- Small internal volume of atmosphere chamber allows for quick gas changes, low gas consumption, and quick pressurization.
- Highly accurate pressure control reduces balance noise and drift.
- Modular setup allows for different models of gas or gas & vapor dosing available, including gas blending, corrosion resistant versions and high pressure vapor / steam generation and dosing.

Applications:

- **Coal and Biomass Gasification** by TGA measurements at high temperatures and high pressures with different gases and vapors
- **Catalyst Testing** by temperature programmed processes (TPx), sulphidation and coking
- **High Temperature Corrosion Testing** by contactless weighing in corrosive atmospheres and drift-free
- **Pyrolysis Processes** at different temperatures and pressures
- **Decomposition and Degrading Reactions** of toxic substances and waste material
- **CVD Coating Processes** even with aggressive chemicals
- **O₂ and H₂ Getter Material Testing** for chemical looping application



DynTHERM High Pressure TGA



Dynamic Mechanical Analyzer (DMA)

Accurate, Precise, Versatile DMA Measurements Utilize state-of-the-art, non-contact, linear drive technology to provide precise control of stress, and air bearings for low friction support

Dynamic Mechanical Analysis measures the mechanical properties of materials as a function of time, temperature, and frequency. In addition to basic material properties, DMA also quantifies finished part characteristics, reflecting the important contribution that processing has on end-use performance. DMA is commonly used to measure glass transition temperatures and secondary transitions, orientation caused by processing, cold crystallization, cure optimization, filler effects in composites, and much more. DMA provides an accurate measure of material stiffness (modulus) but also other important mechanical properties such as damping, creep, and stress relaxation.

The **Q800** is the world's best-selling DMA, for very good reasons. It utilizes state-of-the-art, non-contact, linear drive technology to provide precise control of stress, and air bearings for low friction support. Strain is measured using optical encoder technology that provides unmatched sensitivity and resolution. With its unique design, the Q800 easily outperforms competitive instruments, and is ideal for high-stiffness applications including composites.

Features and Benefits:

- Magnetic drive motor for precise stress control over a wide force range
- Wide force range: 0.0001 to 18 N
- Temperature range -150 °C to 600 °C
- Unique low-friction air bearing design and enhanced sensitivity for measuring weak samples
- Integrated DMA-RH option to measure viscoelastic properties with changing humidity

Applications:

- Viscoelastic properties (E' , E'' , $\tan \delta$)
- Glass Transitions (T_g)
- Frequency Effects
- Creep and Recovery
- Stress Relaxation
- Secondary Transitions
- Softening and Melting Temperature
- Time-temperature Superposition
- Aging (physical or chemical)
- Curing of Networks
- Crosslink Density
- Orientation Effects
- Effects of Additives
- Resiliency
- Stress-strain Curves
- Shrink Force
- Mullins Effect
- Impact Strength



Q800 DMA with Film Tension Clamp



Thermomechanical Analyzer (TMA)

High-sensitivity mechanical measurements
over a wide temperature range

Thermomechanical Analyzers measure changes in the dimensions of a sample as a function of time, temperature and force in a controlled atmosphere. Common usage includes investigation, selection, comparison and end-use performance evaluation of materials in research, quality control, and production applications. Properties measured by TMA include coefficient of thermal expansion (CTE), glass transitions (T_g), and viscoelastic properties.

The **Q400EM** is the industry-standard research-grade thermomechanical analyzer (TMA), with unmatched flexibility in operating modes, test probes, fixtures, and available signals. The Q400EM Enhanced Mode allows for dynamic experiments to measure complex, storage and loss moduli, as well as Modulated TMA™ in which reversing and non-reversing components of displacement are available. It is ideal for research, teaching, and quality control applications, with unmatched performance.

Features and Benefits:

- Wide Force Range (0.001 – 2 N) to accommodate all deformation modes
- Temperature range -150 °C to 1000 °C for a wide variety of applications
- Non-contact, friction-free motor for low compliance and the highest force control
- Software Programmable Force Loading to ensure quality measurements
- Modulated TMA® to separate expansion from shrinkage and yielding
- Dynamic TMA for viscoelastic measurements
- Cooling reservoir allows passive (e.g. LN₂) cooling or mechanical cooling
- Superior baseline performance
- Wide variety of probes and deformation modes to analyze most materials

Applications:

- Coefficient of Thermal Expansion (CTE)
- Glass Transitions (T_g)
- Thermal Stability of Materials
- Compatibility of Materials
- Suitability of Materials
- Melting and Softening



Q400 TMA



Vapor Sorption Analyzers (SA)

The most sensitive, versatile and productive moisture sorption analyzers on the market

Vapor Sorption Analysis is a technique in which a sample is subjected to varying conditions of humidity and temperature, and the response of the sample is measured gravimetrically. Understanding the effects of water content on structure and properties is critical in the development, processing and end use of a broad spectrum of materials.

TA Instruments offers the most sensitive, versatile, and productive moisture sorption analyzers on the market. The **Q5000 SA** combines a high-sensitivity thermobalance, innovative humidity control chamber, and reliable autosampler. The **VTI-SA** boasts an integrated dew-point analyzer and organic solvent capability. Innovative technology combined with our unparalleled reputation for service and support make TA Instruments the clear choice of scientists worldwide for vapor sorption studies.

Features and Benefits:

- Ultra-sensitive thermobalance with superior baseline stability for superior results
- Symmetric system for the most accurate data
- Autosampler (Q5000SA) for improved productivity
- Large Mass option (VTI-SA+)
- Camera, Raman options on VTI-SA+

Applications:

- Characterization of Pharmaceutical Materials
 - Evaluation of Amorphous Structure
 - Hydrate Characterization
 - Characterization of Morphological Stability
 - Organic Vapor Sorption
- Characterization of Polymers in Humid Environments
- Packaging Films
- Electronics



Q5000 SA



Gravimetric Sorption Analyzers

The world's best pressure sorption analyzer
capable of operating in difficult environments

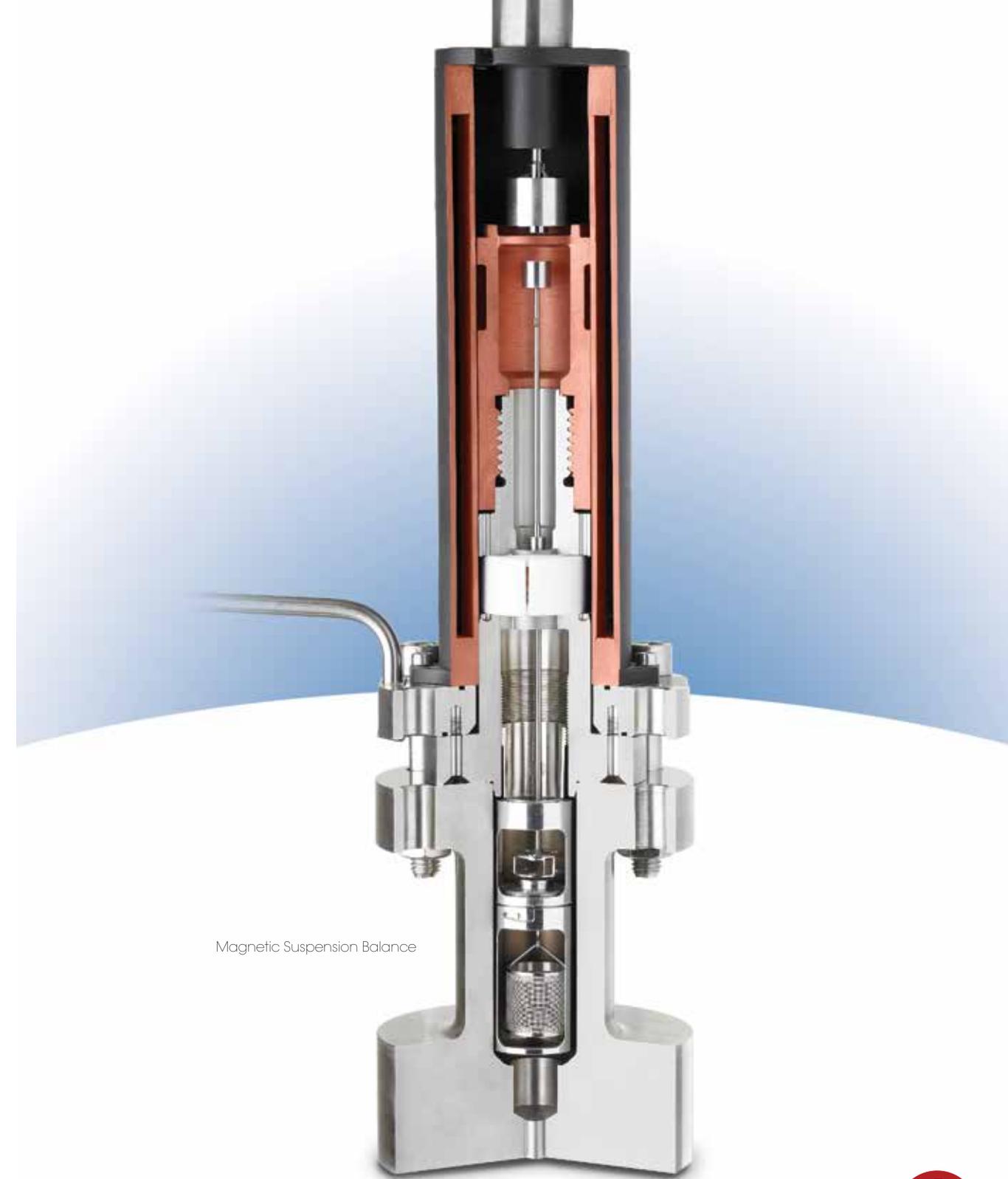
The heart of IsoSORP® Sorption Analysis instruments is the Magnetic Suspension Balance for accurately weighing sample material. The patented Magnetic Suspension Balance allows for highly accurate weight measurements of samples in closed vessels. The sample is weighed from the outside and the suspension force is contactlessly transmitted from the pressurised measuring cell to a microbalance at ambient atmosphere. This means that the sorption ability of a sample in a closed reactor can be analyzed even under extreme conditions, including high pressure and/or toxic atmospheres with the utmost accuracy.

Features and Benefits:

- **Contact-free weighing under extreme conditions** The patented magnetic suspension coupling allows weighing in hermetically closed reactors. By separation of measurement area (sample) and weighing area (balance), damage or contamination of the balance caused by process media or experimental conditions can be avoided. The reactor is completely metal sealed and heated so that even highly aggressive or corrosive fluids or vapors can be used over a wide pressure and temperature range.
- **Excellent long-term stability** The sample can be automatically disconnected from the balance at any time to re-tare or recalibrate the balance. Afterwards, the sample is reconnected to the balance and the measurement continued. This way, high-precision long-term measurements can be performed without any baseline drift or accuracy loss.
- **Simultaneous density measurement** With IsoSORP instruments the sample weight and the density of the process fluid can be determined in a single measurement. This is achieved by weighing a titanium sinker as second inert sample.
- **Modular construction** The Magnetic Suspension Balance can be easily adapted to new applications. Existing instruments can be updated with many functional modules. A large number of custom configurations have already been realized.

Applications:

- Adsorption Isotherms and Kinetics
- Surface Area and Porosity
- Absorption and Solubilities
- Gas Storage
- Diffusion and Permeation
- Separations
- Wetting and Drying Process
- Corrosion Studies
- Incineration or Conversion of Toxic Materials



Magnetic Suspension Balance



General Purpose Heat Flow Meters

For the direct determination of thermal conductivity using a guarded heat flow method for material types including solids, liquids, pastes, powders, and more

The TA Instruments **DTC 25** and **DTC 300** Thermal Conductivity Meters measure thermal conductivity according to the ASTM E1530 guarded heat flow meter method. The DTC 25 is a single temperature test instrument, ideally suited for quality control and screening of materials. The DTC 300 is a versatile guarded heat flow meter that covers a wide conductivity range using three different easily interchangeable stack modules. Metals, ceramics, polymers, composites, glass and rubber can all be tested accurately. Non-solids such as pastes or liquids can be tested using special containers. Thin films and paper products can also be tested using a multi-layer technique.

The **FOX 50** Heat Flow Meter is an accurate, easy-to-use instrument for measuring thermal conductivity according to ASTM C518 and ISO 8301. Configured with the identical high-performance features of the larger FOX systems, it provides rapid results in a compact footprint. Covering a wide range of temperatures, the FOX 50 is an ideal choice for measurements of medium-conductivity materials such as plastics, ceramics, glasses, composites, concrete, and more.

Features and Benefits:

Discovery Thermal Conductivity (DTC)

- Conforms to ASTM E1530
- Reproducible sample load for accurate measurements
- Wide temperature analytical range from -20 °C to 300 °C (DTC 300)
- Interchangeable measuring stacks expand the thermal conductivity range from 0.0005 to 0.5 m²K/W (DTC 300)
- Optional chiller providing coolant at a fixed temperature (DTC 25) and optional refrigerated circulator provides a heat sink temperature to -40 °C (DTC 300)

Applications:

- Measurement of thermal conductivity and specific heat of foams
- Glass- and Rockwool
- Vermiculite
- Concrete
- Refractories
- Polymers (also up to the melt)

FOX 50

- Conforms to ASTM C518 and ISO 8301
 - Compact size and cost-effective system
 - Solid state heating/cooling for precise temperature control
 - Optical encoder for the most accurate measurement of sample thickness
 - Proprietary thin film heat flux transducers
 - Optional liquid cell for testing of fluids
 - Interfacial resistance correction (two-thickness method)
 - Automatic sample feeder for high-throughput analyses
- Composites
 - Elastomers
 - Liquids and Pastes
 - Geological/Oil, Glass/Ceramics for Building materials
 - Automotive
 - Appliances
 - Energy & Renewables



FOX Guarded Hot Plate System

The most intuitive solution for testing insulating materials
in accordance with international standard test methods
ASTM C177, ISO 8302, and EN 12667

The **FOX 600 GHP** is a Guarded Hot Plate system that provides absolute thermal conductivity of insulating materials over a wide temperature range. It is especially well-suited for measurements at high temperatures, exhibiting unrivaled temperature and dimensional stability.

In a Guarded Hot Plate system a temperature difference is established across a sample of known thickness. The thermal conductivity is calculated from the temperature difference across the known thickness and the steady state power per area required to maintain the temperature difference. The Guarded Hot Plate uses a direct measurement of the electrical power supplied to the hot plate rather than heat flow meter signals from a Heat Flux Transducer.

The 600 GHP uses an advanced single-sample test method, allowing for fast cycle time while guaranteeing accuracy. It is easy to use and provides stable, uniform temperature control. Independently controlled heaters and matched thermocouples guarantee a homogeneity of ± 0.02 °C across the entire sample. Signals are evaluated every 0.7 seconds to rapidly bring the system to the selected temperatures and achieve/maintain equilibrium.

From its cutting edge heat sinks to its revolutionary hot plate design, the 600 GHP is unquestionably the most advanced Guarded Hot Plate System on the market.

Features and Benefits:

- Single-sample design eliminates the need for two identical test specimens and guarantees uniform, vertically directed heat flow
- Superior temperature uniformity verified by 40 matched thermocouples
- Outstanding temperature stability
- Optical encoders at all four plate corners deliver the most accurate digital measurement of sample thickness
- Direct measurement of thermal conductivity

Applications:

- Measurement of thermal conductivity and specific heat of Foams
- Glass- and Rockwool
- Vermiculite
- Concrete
- Refractories
- Polymers (also up to the melt)
- Composites
- Elastomers
- Liquids and Pastes
- Geological/Oil, Glass/Ceramics for Building Materials
- Automotive
- Appliances
- Energy & Renewables



FOX 600 GHP



Affinity Isothermal Titration Calorimetry (ITC)

TA Instruments has perfected what others have attempted. The Affinity ITC is a powerful tool for measuring a wide variety of molecular interactions. It provides all ITC users the highest confidence in generating superior ITC data

Isothermal titration calorimetry (ITC) is a powerful analytical technique for in-depth characterization of molecular binding events. Thermodynamic binding signatures not only reveal the strength of a binding event, but the specific or non-specific driving forces involved.

The **Affinity ITC** and **ITC Auto** are designed for the most challenging life science laboratory environments that require high sensitivity, high productivity and the most advanced ITC technologies. The Affinity ITC brings advanced engineering to all critical aspects of the measurement ensuring the highest quality ITC data.

Features and Benefits:

- AccuShot™ and FlexSpin™ for efficient mixing at the slowest rate possible ensuring sample integrity.
- Solid-state active heating and cooling for true isothermal temperature control
- Choice of standard volume (1.0 mL) or low volume cells (190 µL)
- Industry-proven 96-well, temperature-controlled autosampler. Automation is field upgradeable
- Fully automated, user-selectable system cleaning routines eliminate run-to-run contamination
- NanoAnalyze™ software features enabling method optimization, data fitting, batch analysis, graphing and data export

Applications:

- **Binding Interactions:** Direct binding or a competition assay that opens the dynamic range of measured binding constants
- **Michaelis-Menten Enzyme Kinetics:** Obtain K_m , K_{cat} , and v_{max} from a single experiment in either incremental or continuous mode
- **K_{on}/K_{off} rates:** Pair thermodynamic data with kinetic information for a thorough understanding
- **Oligomer Characterization:** Understand and quantify higher order structure
- **Micelle or liposome characterization:** Determine the critical concentration that these structures form
- **Quality Control:** Determine the active concentration of components of an assay through enthalpy and stoichiometry. Answer the question whether or not tags or conjugates change the binding dynamics of a system
- **Life Sciences:** Investigate metabolic rates or whole cells or similar with and without an artificially induced event such as injecting a drug



Affinity ITC with Autosampler



Nano Differential Scanning Calorimetry (Nano DSC)

TA Instruments' microcalorimeter DSC's are powerful tools with unmatched sensitivity for the characterization of molecular structure and molecular stability of in-solution or solid/semi-solid samples

Differential scanning calorimetry (DSC) is a technique for studying structural stability and because of the strong structure-function relationship it is a critical characterization tool for any macromolecule. A DSC thermogram will yield the T_m , the heat capacity (C_p), and directly measures the enthalpy – the component that describes the energy required to break hydrogen bonds and hydrophobic interactions that stabilize a molecule. The shape of a thermogram, including number of peaks, are as unique as the molecule of itself. All of these physical features are completed under native conditions with a minimal amount of sample.

Features and Benefits of the NanoDSC and Auto NanoDSC:

- Micrograms of sample required for ease of use
- Outstanding signal to noise 15 nW and baseline repeatability, 28 nW, in typical operating mode for optimized sensitivity
- Solid-state thermoelectric temperature control
- Small benchtop footprint
- Programming for up to 96 samples with matching buffers for productivity

Applications:

- **Biopolymer Stability** – describes native, folded material
- **Biopolymer Structure** – domain, subunit, oligomerization
- **Ligand Interactions** – Ideal of “ultra-tight” binding. Drug binding to proteins, nucleic acids, or more complex systems
- **Membrane Structure** – lipid bilayers, membrane bound proteins, drug encapsulation, additive incorporation
- **Pressure Perturbation** – structure and solvation
- **Complex Milieu** – whole cells, plasma, tissue



Nano DSC



Isothermal Microcalorimetry

Based on the pioneering Thermometric technology, our instruments offer maximum sensitivity, flexibility, and productivity

Isothermal Microcalorimetry is an extremely sensitive technique and is complementary to TA Instruments differential scanning calorimeters. TAM is a microcalorimeter system represented by TAM IV, TAM IV-48 and TAM Air.

TAM IV – Based on Thermometric technology, TAM IV is a unique modular microcalorimeter system that combines the highest heat flow sensitivity with unmatched long-term temperature stability for measuring many processes that are undetectable by other techniques. A wide range of calorimeter configurations and sample handling systems provide maximum application flexibility and ensure optimum laboratory productivity for samples requiring low nanowatt sensitivity.

TAM IV-48 – TAM IV-48 is a high-throughput version of the TAM IV and can accommodate up to 48 individual 4 mL Minicalorimeters.

TAM Air – This instrument can be configured with either a twin-type 20 mL 8-channel or a 125 mL 3-channel calorimeter block. The calorimeter is designed for sensitive and stable heat flow measurements requiring milliwatt sensitivity. The operating temperature range is 5 – 90 °C with a thermostat temperature regulation of ± 0.02 °C. The TAM Air is the recognized standard in research and development, as well as quality control during cement and concrete manufacturing and preparation.

Features and Benefits:

- Ability to perform independent and parallel sample measurements
- Accommodates reaction vessel size from 1 mL up to 125 mL for solids, liquids, or gases
- Reliable operation from 4 to 150 °C with temperature control within ± 100 μ K
- Multiple operational mode options – heat flow, dynamic correction, step isothermal and slow scanning
- Additional reaction systems of humidity, perfusion, titration, and pressure sensing

Applications:

- Pharmaceutical: Amorphicity, Polymorphism, Dissolution and Excipient compatibility
- Propellant safety and stability
- Battery efficiency
- Microorganism detection
- Material stability, compatibility, and adsorption
- Corrosion
- Curing studies – epoxy, cement
- Polymer studies – oxidation, stabilizer effects



Push-Rod Dilatometry

Widest range of dilatometer offering with industry-leading measurement accuracy and resolution

A dilatometer is a precision instrument for the measurement of dimensional changes in materials as a function of temperature. Dilatometry can be used for many material types including ceramics, glasses, metals, and polymers, and provides measurements of a wide variety of properties including thermal expansion, coefficient of thermal expansion, sintering temperature, shrinkage steps, phase transitions, density change, softening point, and glass transition temperature. However, no single dilatometer can meet the testing requirements of such a wide range of materials and material property measurements. Only TA Instruments is capable of providing the right instrument to match your specific application needs by offering the widest range of dilatometers, with the widest range of temperatures and environmental options.

Features and Benefits:

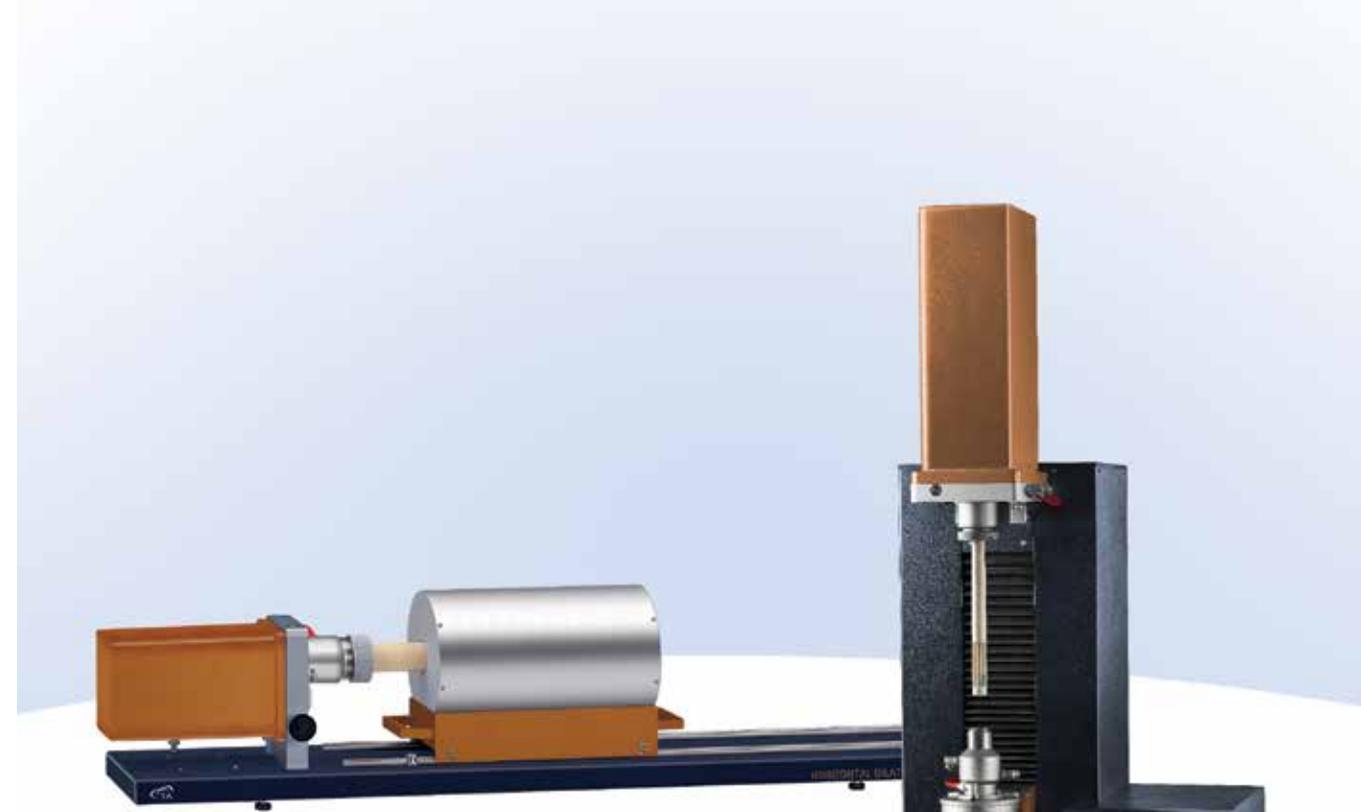
- Horizontal and Vertical design for the best fit with your application, regardless if you need to determine thermal linear expansion and CTE, or study sintering processes of ceramics and alloys.
- TA Instruments' exclusive True Differential design compensates for the actual dimensional changes of the measuring system dependent upon the temperature program selected. The result is a thermal expansion curve not dependent on unknown calibration factors resulting in industry-leading accuracy and precision for CTE values, regardless of the material tested.
- Newly designed furnaces delivering a zero temperature gradient across the specimen, and a cool-down time that can be as short as 13 minutes from 1000 °C to room temperature. This is up to 15 times shorter than competitive instruments, and 10x better productivity.
- High-resolution optical encoder with 1 nm resolution used in both horizontal and vertical push-rod dilatometers, to test smaller specimens at higher temperature scan rates with no thermal gradient across the sample and maintain the necessary sensitivity.
- Linear sample load maintained throughout the experiment regardless of dimensional change for the most accurate measurements.

Horizontal Dilatometry Applications:

- Linear Thermal Expansion and Coefficient of Thermal Expansion up to temperatures close to softening point of materials such as glass, metals, alloys, polymers, refractories, semiconductors and traditional and advanced ceramics. typical industries include automotive, aerospace, defense, electronics, energy and nuclear, powder metallurgy and additive manufacturing

Vertical Dilatometry Applications:

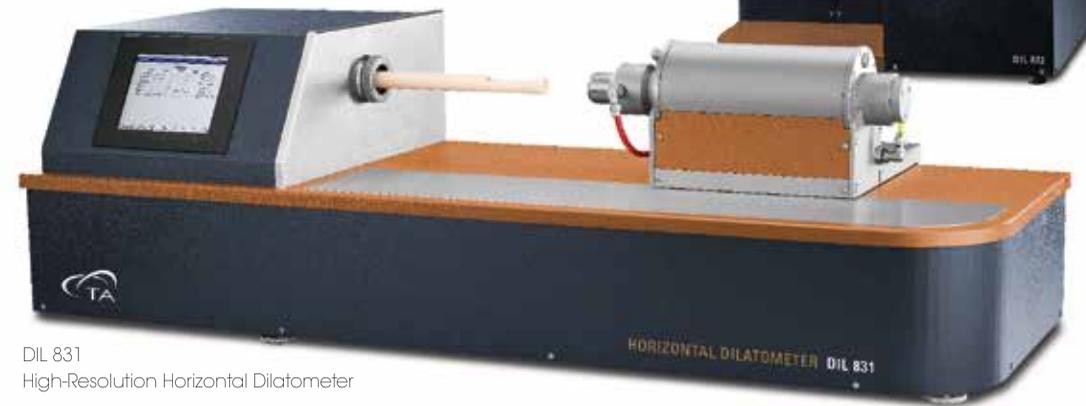
- Sintering and Rate Controlled Sintering (RCS) studies of materials such as ceramics, alloys, traditional and advanced ceramics, metals, steel and alloys
- Linear thermal expansion and coefficient of thermal expansion of incoherent, coarse powders of materials used in ceramics, refractories, traditional and advanced ceramics, automotive, building, energy nuclear and powder metallurgy



DIL 800 Series
Horizontal Dilatometer



DIL 822
High Resolution Vertical Dilatometer



DIL 831
High-Resolution Horizontal Dilatometer



Optical Dilatometers

Contactless dilatometry for the most accurate and precise expansion measurements and sintering studies

Optical dilatometry is an innovative and versatile technique to measure, with no contact with the sample, dimensional changes in the submicro range and beyond the softening point into the melt of a material, reproducing actual industrial firing cycle conditions.

The contactless measuring principle of optical dilatometers greatly simplifies the sample preparation process because it reduces the need for a very precise parallelism between the two ends of the specimen and the shape of the sample. The software automatically aligns the optical paths of sample extremities.

DIL 806 Features and Benefits:

- Three different temperature ranges for maximum flexibility: -150 °C to 600 °C, RT to 1000 °C, RT to 1400 °C
- Patented Shadow-Meter contactless design leaves the sample undisturbed and allows for testing even the softest materials and fragile samples, otherwise impossible with traditional push-rod systems
- Absolute measurements with no need of tedious correction tests and time-consuming calibrations exactly matching samples' experimental conditions
- Patented plate-shaped furnace provides superior temperature uniformity and response time, improving measurements reproducibility and increasing sample throughput
- Natural complement to other techniques for the complete characterization of thermophysical properties, the DIL 806 accommodates many sample types and shapes. The very same specimen measured in the DIL 806 may be used for dynamic mechanical analysis, flash method for thermal conductivity, surface hardness density and more
- Greatly simplified sample loading with comfortable access to sample chamber, and the 30 mm-wide measurement area removes restrictions on sample position
- Automatic detection of initial sample length, which is directly entered in the parameters file

ODP 868 Features and Benefits:

- Optical Dilatometry Platform capable of operating in five different modes for control of raw materials, characterization of semi-finished products, and optimization of industrial process at laboratory scale:
 - Heating Microscopy
 - Horizontal and Vertical Optical Dilatometry
 - Optical Absolute and Relative Fleximetry
- All functions driven by micro-stepper motors and full PC-controlled operations on XYZ axis, including cameras and furnace positioning, minimize user interaction and increase measurement reproducibility
- Instrument control and data analysis with Misura 4™, the proven software suite with Client/Server architecture structure and MorphometriX™, the innovative image analysis engine with an unmatched acquisition rate of up to 14 fps for shape identification with precision better than the human eye, and proprietary algorithms to correct asymmetries in sample geometry and improve reproducibility
- New highly responsive furnace offers unmatched ease of operations over a wide range of temperatures with up to 200 °C/sec heating rates to replicate actual manufacturing cycles



ODP 868 Optical Dilatometry Platform

DIL 806 Optical Dilatometer



Heating Microscope

The Heating Microscopes HM 867 are the ideal instruments to study flattening/melting behavior

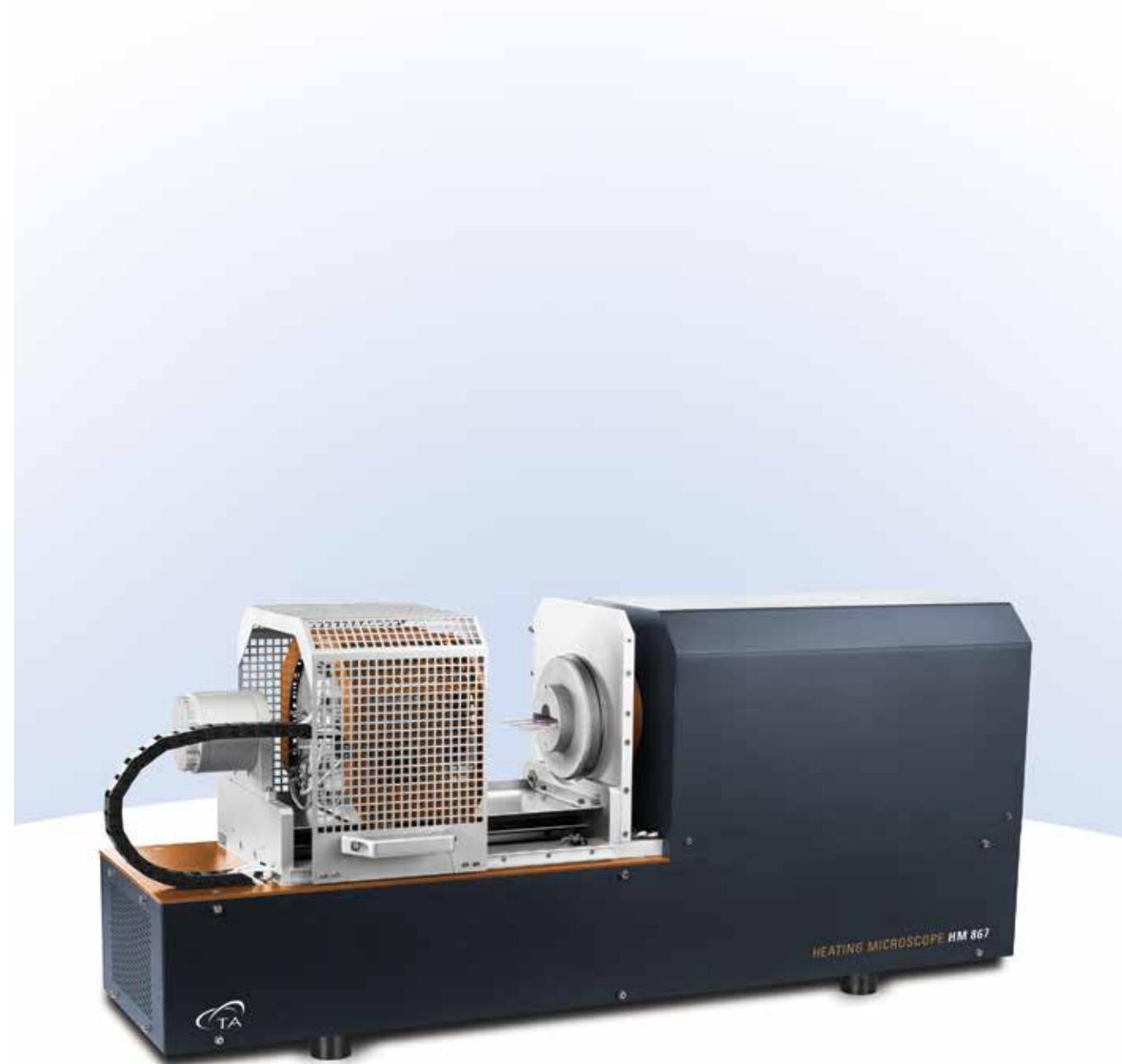
The result of over twenty years of R&D of optical instruments for the study of the thermomechanical behavior of materials, **HM 867** makes possible the analysis of samples beyond the limits of classical heating microscopy. Its versatility makes the HM 867 the most innovative tool for both R&D and for the optimization of all the industrial processes that involve thermal cycles.

Adopting state-of-the-art technologies in the field of optical and thermal analysis, it is supplied with Misura 4 Thermal Analysis software, the proven software platform that provides an intuitive interface for instrument control and data handling and features the most thorough and precise image analysis.

Heating microscope frames the entire specimen and acquires images of a specimen according to time or temperature intervals to determine the characteristic temperatures and shapes of the material and study the behavior of materials simulating temperature profile of the actual industrial process

Features and Benefits:

- **8 times productivity with new large furnace** The newly designed large and highly responsive furnace can accommodate up to eight specimens simultaneously. For ash fusibility test it is possible to use 19 mm tall ASTM samples
- **Up to 100% of dimensional changes of sample original size** Able to follow and identify shape changes ranging from softening through the molten state, Heating Microscope can identify bidimensional variations of up to 100% of sample original shape and extend tests to a temperature range hundreds of degrees higher than classic dilatometry
- **5 MPx HD camera for industry-leading bidimensional resolution** TA Instruments' proprietary design of the new magnetic motor guarantees a sample load with an unsurpassed ± 0.005 N linearity over the entire displacement range of 5000 μm , and ensures a truly constant contact between push-rod and sample regardless of the specimen dimensional changes and the rate at which they occur. A key instrument capability for truly accurate sintering studies
- **Flash Mode** Proven and reliable, the technology of TA Instruments' optical encoder brings to dilatometry an unprecedented resolution, at least 10x better compared to LVDT technology, and also allows testing of very small specimens of stable, high-performance materials exhibiting extremely small dimensional changes
- **International standard methods** Compliance to all major standard test methods for ash fusibility testing, including ASTM C372, ASTM D1857, CEN/TR 15404, BS 1016:Part 15, CEN/TS 15370-1, DIN 51730, ISO 12891, ISO 540, NF M03-048



HM 867 Heating Microscope



Laser and Xenon Flash Analysis

The most powerful laser and xenon sources for the most accurate measurements

The Light Flash technique provides information on a material's ability to store and transfer heat through measurements of thermal diffusivity, thermal conductivity, and specific heat capacity. Thorough understanding of these properties is critical for any process or material which experiences a large or fast temperature gradient, or for which the tolerance for temperature change is exacting. Accurate values of these properties are essential for modeling and managing heat, whether the component of interest is called on to insulate, conduct, or simply withstand temperature changes. Information about these properties is routinely used in heat transfer models of all complexities. Heat transfer property measurements also reflect important information about material composition, purity and structure, as well as secondary performance characteristics such as tolerance to thermal shock.

Features and Benefits:

- At least 40% more powerful xenon and laser sources than any other instrument on the market to deliver better signal for more accurate and precise measurements
- Proprietary Class 1 Nd:Glass laser sources guarantee best fit with analytical requirements, consistent quality, and long-term service support
- Innovative design with streamlined optical paths maximize light pulse homogeneity on the sample surface and higher energy on the detector
- Wide range of temperatures
- Industry-leading temperature control technology ensures no temperature gradients across the samples' heat zone
- Standard multi-sampling capabilities on all Xenon and high temperature Laser Flash models with up to 5x throughput allow the reliable simultaneous measurement of multiple properties, including Thermal Diffusivity, Specific Heat and Thermal Conductivity
- Compliant with international standards such as ASTM E1461, ASTM C714, ASTM E2585, ISO 13826, ISO 18755, ISO 22007-4, DIN EN821-2,3, DIN 30905, BS-ENV 1159

Applications:

- Measurement of Thermal Diffusivity
- Specific Heat and Thermal Conductivity of materials as Metals and Steel
- Alloys
- Glass and Ceramics
- High-performance composites
- Carbon/Graphite filled conductive polymers
- Refractories
- Semiconductors
- Molten salts for renewable energies
- Automotive
- Aerospace
- Defense
- Electronics
- Energy and Nuclear
- Powder Metallurgy and Additive Manufacturing



Discovery Laser Flash DLF 1600

Discovery Laser Flash DLF 1200



Quenching Dilatometry

Heating rates up to 4000 °C/S and quenching rates up to 2500 °C/S to characterize and optimize steel and metal alloys processing

Quenching dilatometers are used to study the heat treatment of steel and metal alloys. They identify the heating rate, the quenching rate and the isothermal dwell times used in metals manufacturing to yield the crystalline structure necessary to meet required physical properties.

The related microstructural changes may be observed through process simulation with real-time monitoring of dimensional change. Measurements of distinct alloy compositions are used to create time-temperature transformation diagrams (TTT) and continuous-cooling transformation diagrams (CCT), which are critical in process design and optimization. With heating rates up to 4000 °C/S and cooling rates of 2500 °C/S, the DIL 805 Series Quenching Dilatometers provide the most accurate measurements over the widest range of heating, cooling and deformation conditions, allowing for the most sophisticated characterization and optimization of metals.

Features and Benefits:

- Induction furnace with up to 4000 °C/S in heating and up to 2500 °C/S in cooling to closely simulate the material response for any production or heat treatment process
- -160 °C up to 1500 °C temperature range for the complete characterization of the austenite to martensite transformation
- Deformation mode with controlled deformation rates of 0.01 to 200 mm/s to develop time-temperature-transformation diagrams after deformation (DTTT diagram) for the optimization of steel industry processes such as hot or cold rolling
- Alternating tensile and compressive loading mode to emulate mill processing, and force-controlled or strain-controlled cycles up to (respectively) 8 kN or 20 mm/s
- Optical module to monitor with contactless and absolute measurement specimen's dimensional changes in two directions during the test run
- Alpha measuring head with True Differential LVDT for high-precision measurements of the coefficient of thermal expansion (CTE) and the softening point

Applications:

- Steel Phase Transformation
- Continuous Cooling Transformation (CCT) and Time Temperature Transformation Diagrams
- 3-Step Deformation Test
- True Stress vs. True Strain Curves
- Stress/Strain Cycling Plots of materials like steel and metal alloys.



DIL 805L Quenching Dilatometer



The world's highest performing rheometers and the most complete range of easy-to-use accessories

Rheology is the study of flow and deformation, or stress-strain relationships of materials. Rheometers measure materials from low viscosity liquids to stiff solids in terms of viscosity, modulus, and elasticity or damping.

Most industrially relevant materials exhibit complex rheological behavior that determines processability and end-use performance. Rheological measurements are critical to a wide range of industries including aerospace, asphalt, automotive, ceramics, elastomers, electronics, food, personal care, biomedical, paints and coatings, inks, petroleum products, pharmaceuticals, and more. A rheometer can be used to measure and understand how rheological properties influence every stage of industrial production.

TA Instruments designs and manufactures the world's most versatile platform for rheological measurements. A full range of environmental systems and measurement accessories are powered by SmartSwap™ technology for fast exchange & automatic configuration.

Features and Benefits:

ARES-G2

- True separate-motor-and-transducer (SMT) design for true inertia-free oscillation and transient data
- Non-compliant Force and Torque Rebalance Transducers (FRT, TRT) optimized for the most exacting stress measurements
- 800 mN.m brushless DC motor designed for the most accurate strains and fastest transient response
- Unique axial capabilities for DMA and Orthogonal Superposition (OSP)

Discovery Hybrid Rheometer (DHR)

- Second generation magnetic bearing provides lower measurable torques than air-bearing designs
- Advanced drag cup motor for true strain and stress control, and low inertia for superior oscillation data and fastest transient response
- Force Rebalance Transducer (FRT) for accurate normal stress measurements, precision axial force control, and unique DMA capability
- Widest range of temperature systems and accessories

Applications:

Formulation: Measure and predict the consequences of formulations based on chemistry, concentration, and phase structure. Study existing materials and understand formulation based on rheological properties.

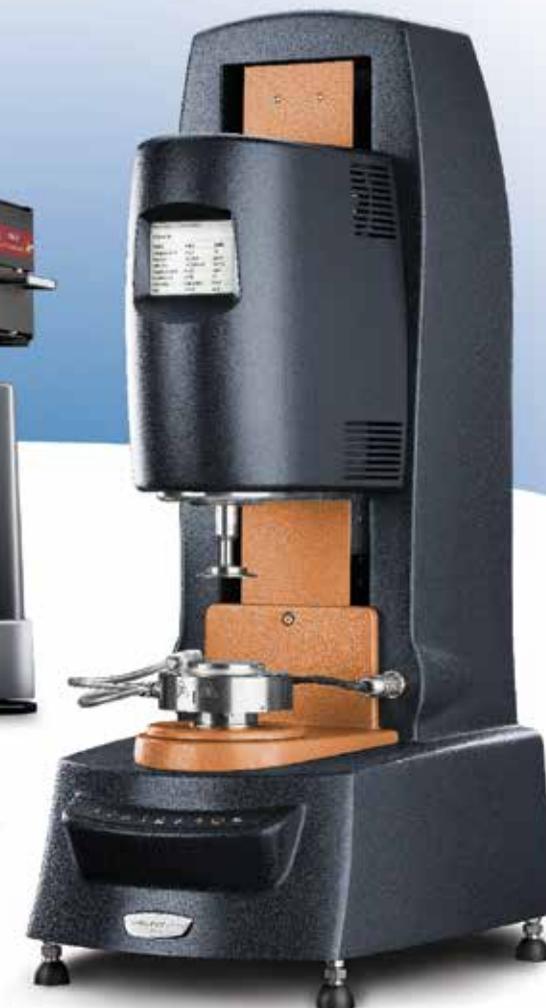
Processing: Choose formulations and processes that save time, power, and preserve desired finished properties.

Performance Prediction: Make a priori predictions of material performance based on known use conditions without specifically mimicking application conditions.

Consumer Acceptance: Quantitatively optimize properties that customers perceive as valuable based on consistency, texture, mouth feel, behavior at chewing and swallowing, applicability, spreading, pourability, and stability during storage.



ARES-G2 with FCO



HR-3 with Peltier Plate



RSA-G2 Solids Analyzer

For the widest range of traditional
and advanced mechanical measurements

Solid and soft-solid materials encounter a range of mechanical deformations (stresses and strains) over a wide variety of environmental conditions in practical daily use. This is important for nearly every industry, including aerospace, asphalt, automotive, ceramics, elastomers, electronics, food, personal care, biomedical, paints and other coatings, pharmaceuticals, metals, etc. The deformations experienced can be static or cyclic in nature, and the environments can be moderate to extreme temperatures, temperature cycling, or exposure to different liquids such as water or oil. The increasing demands for high quality, high-performing products makes it vitally important to understand the complex viscoelastic mechanical properties of these materials to determine and ensure their suitability for applications, processability, and end-use performance. The RSA-G2 is the ideal platform for fully characterizing and understanding complex mechanical behavior of solids.

The **RSA-G2** is the most advanced platform for mechanical analysis of solids. The separate motor and transducer technology of the RSA-G2 ensures the purest mechanical data through independent control of deformation and measurement of stress. It is capable of performing the most accurate DMA measurements as well as many additional experiments including creep and recovery, stress relaxation, stress ramps, strain rate ramps, iso-strain, iso-force, fatigue, multiwave, arbitrary waveform, and dielectric thermal analysis. With such a broad range of solid analysis techniques, the RSA-G2 is uniquely positioned to address the widest range of applications from the R&D bench to the quality control lab. This new high-performance instrument represents the fourth generation of dual-head mechanical analyzers, featuring a new forced convection oven for precise and accurate temperature control, extensive array of clamping systems to accommodate the widest range of sample shapes and stiffness, and immersion testing capability. In addition, the RSA-G2 doubles as a DETA, or Dielectric Thermal Analyzer, for stand-alone or simultaneous measurements.

Features and Benefits:

- Separate-motor-and-transducer (SMT) design for most accurate mechanical data over the widest operating range
- Wide force range: 0.0005 to 35 N
- Advanced Forced Convection Oven (FCO) provides the fastest and most accurate temperature control from -150 °C to 600 °C
- Advanced submersion testing capabilities

Applications:

- | | | |
|--|-------------------------------------|------------------------|
| • Viscoelastic properties (E' , E'' , $\tan \delta$) | • Softening and Melting Temperature | • Effects of Additives |
| • Glass Transitions (T_g) | • Time-temperature Superposition | • Resiliency |
| • Frequency Effects | • Aging (physical or chemical) | • Stress-strain Curves |
| • Creep and Recovery | • Curing of Networks | • Shrink Force |
| • Stress Relaxation | • Crosslink Density | • Mullins Effect |
| • Secondary Transitions | • Orientation Effects | • Impact Strength |



RSA-G2 with Three-Point Bending Clamp



ARES-G2 Accessories

All TA Instruments rheology temperature systems and accessories are designed with superior performance and ease-of-use in mind. These systems are designed to extend the industry-leading performance of the world's highest performing rheometers to the specific requirements of your application.

The Discovery Hybrid Rheometer offers the convenience and versatility of Smart Swap™ geometries, temperature systems, and accessories. Smart Swap™ technologies provide fast and easy interchanging of accessories and automatic detection and configuration of the rheometer for operation.



Forced Convection Oven (FCO)



Advanced Peltier System (APS)



Orthogonal Superposition & 2D-SAOS



Dynamic Mechanical Analysis (DMA)



UV Curing Accessory



Dielectric Thermal Analysis Accessory (DETA)



Extensional Viscosity Fixture (EVF)



Tribo-Rheometry Accessory



Solid Torsion



SER3 Universal Testing Platform



Immersion Cup



Peltier Solvent Trap and Evaporation Blocker



Air Chiller System



Cone and Partitioned Plate Accessory



Interfacial Rheology



Electro-rheology (ER) Accessory

Discovery Hybrid Rheometer Accessories



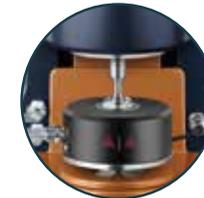
DMA



Relative Humidity



Electrically Heated Plates



Dual Stage Peltier Plate



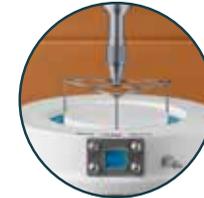
Advanced Microscopy



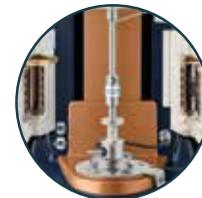
Magneto-rheology



Tribology



Interfacial Rheology



Dielectric



High Pressure



Small Angle Light Scattering (SALS)



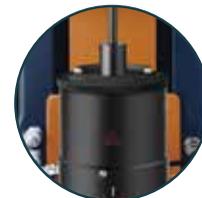
UV Curing



Environmental Test Chamber



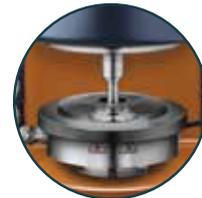
Immobilization



Peltier Concentric Cylinders



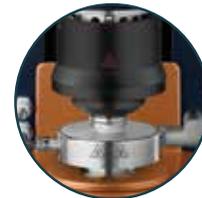
High Temperature Concentric Cylinders



Solvent Trap



Advanced Peltier Plate



Upper Heated Plate (UHP)



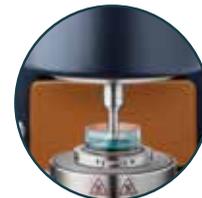
Building Materials



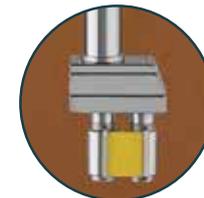
Electro-rheology



Starch Pasting Cell



Immersion Cell



SER3 Extensional



Rubber Process Analyzer

Rubber testing systems with the latest measurement technology for the most accurate, reliable and reproducible data available

The TA Instruments **RPA elite** rubber process analyzer (RPA) is the most advanced rotorless rotational shear rheometer dedicated to the complete characterization of polymers, rubber and rubber compounds at all stages of manufacture. The **RPA elite** provides invaluable viscoelastic data on materials that are uncured, through the curing process, and in situ cured materials. The ultra-rigid test frame, high-resolution variable direct drive motor, ultra-stiff wide-range torque transducer, and precision temperature control provide the most precise and accurate torque, viscosity and viscoelastic properties of elastomers over the widest ranges of testing conditions. The fully flexible architecture of the **RPA elite** enables advanced testing capabilities beyond any other rubber rheometer including: complete post-cure viscoelastic characterization, fully programmable sealing pressure, large amplitude oscillatory shear (LAOS) and arbitrary waveform deformations. The **RPA flex** delivers the unrivaled measurement performance of the **RPA elite** in a focused system specifically suited for the limited needs of manufacturing and production control.

Features and Benefits:

- High-resolution variable direct drive motor for absolute strain control
- Proprietary high stiffness, wide torque range transducer with high sensitivity for noise-free data
- Extremely rigid test frame for accurate compliance-free data
- Pneumatic locking cylinders with adjustable platen closing force and pressure sensor
- Available autosampler for unattended operation
- User calibration and user-replaceable seals

Applications:

- Cure curves and kinetics
- Polymer characterization
- Polymer viscosity
- Molecular weight and distribution
- Long chain branching determination
- Filler network structure
- Optimize all stages of rubber processing
- Mixing process optimization
- Stress relaxation
- Pressure curves



RPA elite



Moving Die Rheometer - MDR

Reliable, accurate, and easy-to-operate rotorless curemeter perfect for routine and standards-driven testing of rubber curing

The **MDR one** Moving Die Rheometer (MDR) is a reliable, accurate, and easy-to-operate rotorless curemeter perfect for routine and standards-driven testing of rubber curing. The MDR *one* is configured for measuring curing profiles of rubber compounds under isothermal and non-isothermal test conditions at constant strain and frequency. The MDR *one* employs sealed biconical dies meeting all relevant ASTM, ISO, and DIN standards. The unique design includes an ultra-rigid test frame, direct drive motor, precision temperature control with optional cooling, available Autosampler, and intuitive Scarabaeus Control and Analysis software making it the ideal platform for QC or R&D environments.

Features and Benefits:

- Unmatched data precision, accuracy, and reproducibility
- Robust, field-proven torque transducer for high stability and reliable torque measurements
- Extremely rigid test frame for accurate compliance free data
- Available 20-sample automation for simple unattended operation
- Pneumatic locking cylinders for repeatable sample sealing
- Powerful and intuitive Scarabaeus Software available in multiple languages & compatible with other manufacturers' instruments
- User calibration and user-replaceable seals

Applications:

- Isothermal and non-isothermal cure curves
- Scorch time
- Conversion time
- Pressure curves for blowing reactions



MDR one



Mooney Viscometer

Mooney Viscometer incorporates the latest measurement technology for the traditional Mooney viscosity, Mooney scorch, and stress relaxation measurement in the rubber industry

The **MV one** Mooney Viscometer incorporates the latest measurement technology for the traditional Mooney viscosity, Mooney scorch, and stress relaxation measurement in the rubber industry. The *MV one* is a fully featured instrument configured for standard viscosity, scorch and stress relaxation (linear, logarithmic, ISO, Mooney Stress-relaxation Rate) testing of rubber compounds under isothermal test conditions at constant speed of 2 rpm. An optional continuously variable motor mode allows tests over a speed range of 0.1 to 10 rpm. The *MV one* Mooney Viscometer is equipped with low mass rotors that meet all relevant ASTM, ISO, and DIN standards. All TA Instruments rubber testing instruments are constructed on ultra-rigid test frames and include direct drive motors, precision temperature control and the powerful and intuitive Scarabaeus Control and Analysis Software.

Features and Benefits:

- Superior design for unmatched data precision and accuracy
- Extremely rigid test frame for accurate compliance-free data
- Low mass rotor design and direct heating for fast and accurate temperature control
- Available high-resolution variable speed direct drive motor
- Automated internal torque calibration
- Long-life user-replaceable seals
- Powerful and Intuitive Scarabaeus Software available in multiple languages
- Large (38.10 mm) and small (30.48 mm) diameter rotors Mooney viscosity, stress relaxation, scorch

Applications:

- Polymer characterization
- Mooney viscosity
- Mooney scorch
- Mooney relaxation



MV one



ElectroForce® Mechanical Test Instruments

Industry-leading Performance, Versatility, and Durability

The design of new materials and products requires a thorough assessment of material properties and performance within, and often beyond, the boundaries of intended use. ElectroForce® test instruments provide a revolutionary approach to dynamic material characterization and accelerated mechanical fatigue featuring proprietary ElectroForce linear motion technologies and advanced WinTest® controls. Supported by the industry's only 10-year motor warranty, ElectroForce test instruments are available in a range of force capacities, from 22 N up to 15 kN, and are also very lab-friendly thanks to their clean, quiet and maintenance-free operation.

ElectroForce mechanical test instruments are available in versatile load-frame configurations or the highly flexible and configurable TestBench® breadboard-based platform. Furthermore, the performance of these instruments can be enhanced through the addition of a variety of grips, fixtures, environmental chambers and low force sensors. In addition, many ElectroForce test instruments support the addition of secondary motors such as torsion motors, which provide combined axial-torsion testing capabilities, or extended stroke motors, which significantly increase the performance envelope of test instruments for quasi-static test protocols. As a result, ElectroForce test instruments set a new standard for performance, versatility, and durability.

Features and Benefits:

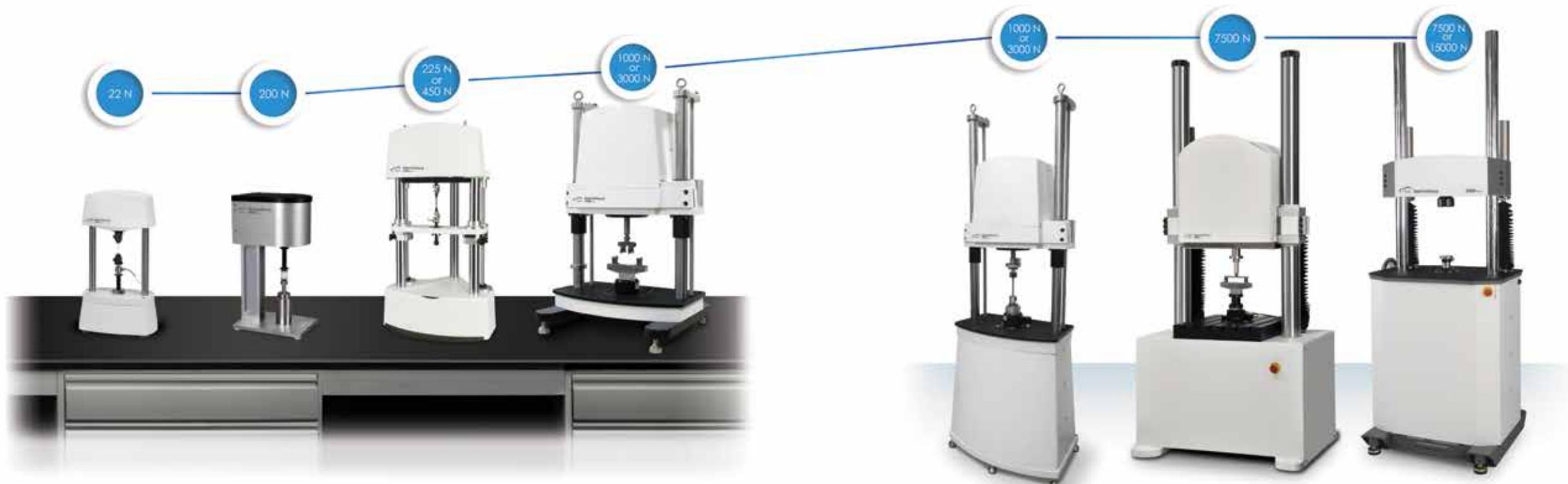
- Patented ElectroForce linear motors operate without bearings and friction, providing optimal control for high-resolution, low-force testing which leads to more precise material property characterization.
- Very low motor moving-mass delivers industry-leading speed and frequency response.
- Durable, maintenance-free motor design, supported by a 10-year motor warranty.
- Test instruments available in a wide range of force capacities, from 22 N to 15 kN maximum force capacity.
- A wide range of accessories and sensors enhance test instrument capabilities to provide hundreds of configurations and unparalleled versatility.
- Lab-friendly instruments are air-cooled, clean-room compatible with whisper-quiet operation.

Applications:

- Accelerated fatigue
- Component and device durability
- Dynamic mechanical analysis (DMA)
- Stress-relaxation and creep
- Load-to-failure testing
- Quality control and reliability testing
- Mechanical stimulation for in vivo loading
- Replication of physiologic or real-life loading conditions

Instruments:

- ElectroForce 3100
- ElectroForce 3200
- ElectroForce 3300
- ElectroForce 3500
- ElectroForce 5500
- ElectroForce TestBench



ElectroForce® Cardiovascular Test Instruments

Accelerating the Development of Life-saving Technologies

ElectroForce Cardiovascular test instruments comprise the most comprehensive portfolio of testing solutions for endovascular and interventional cardiology medical devices. Whether the goal is to determine the durability limits of a device, component or characterize an entire structure, ElectroForce cardiovascular test instruments are trusted for testing along the entire development pathway. For over 20 years, ElectroForce test instruments have been used for research, development, and validation of innovative cardiovascular therapies – supporting hundreds of regulatory submissions and approvals.

Solutions include the **DuraPulse Stent/Graft** and **Heart Valve durability** test instruments, multi-specimen fatigue on **ElectroForce 3200** and **3300** test instruments, the application of combined physiologic motions delivered by the patented Multi-axial Peripheral Stent test instrument, and the particle collection capabilities of our drug-eluting stent test instruments. They support the advancement of your research and product development activities by testing at accelerated frequencies, reducing the testing time that is needed to meet international regulatory requirements and impart confidence that results from unrivaled dynamic performance and proven reliability over billions of cycles.

Features and Benefits:

- Broadest portfolio of test instruments for testing a variety of devices including bare metal and drug-eluting stents, heart valves, septal closure devices, vena cava filters, cardiac leads, and vascular grafts.
- Widest range of displacement, force, and pressure control to meet the most demanding test requirements.
- Test multiple samples simultaneously to increase throughput and satisfy regulatory requirements for confidence of device success.
- Durable, maintenance-free motor design, supported by a 10-year motor warranty, results in reliable long-term testing.
- Very low motor moving-mass delivers industry-leading frequency and acceleration response.
- Lab-friendly instruments are air-cooled, clean-room compatible with whisper-quiet operation.

Applications:

- Pulsatile fatigue of stents and grafts
- Heart valve durability
- Multi-specimen tension-compression fatigue of devices or components
- Complex motion fatigue simulation of peripheral stents
- Particle capture of drug-eluting stents under axial or pulsatile fatigue conditions
- Anisotropic material characterization of biomaterials



DuraPulse™ Stent/Graft Test (SGT) Instrument



DuraPulse™ Heart Valve Test Instrument



ElectroForce® Multi-Specimen Fatigue Testing Systems



ElectroForce® BioDynamic® Test Instruments

Transformational Biomedical Technology Engineered to Advance Tissue Growth

Functional tissue engineering requires a combination of chemical and mechanical cues to support and influence the development of tissue constructs that can be used to replace diseased tissues. TA Instruments offers a range of bioreactor solutions to support advancing research and development of tissue-engineered medical devices.

Three-dimensional cell culture is made simple with **3DCulturePro™**, a compact, perfusion-only bioreactor that integrates a toolless chamber with an integrated media reservoir. Available as a single, stand-alone chamber or in a multi-chamber configuration, 3DCulturePro delivers reproducible and reliable tissue growth at an affordable price.

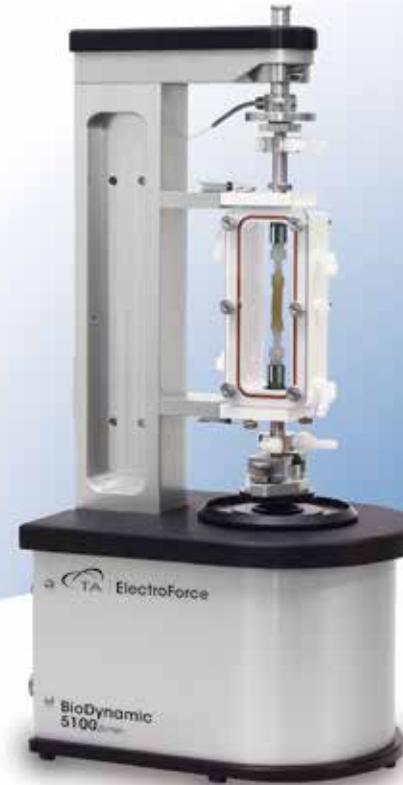
BioDynamic® bioreactors, which incorporate ElectroForce® motor technology, combine mechanical stimulation and characterization to perform long-term tissue engineering within a sterile cell culture environment. Available in single or multi-chamber configurations, BioDynamic bioreactors simulate in vivo conditions, bridging the gap between basic in vitro exploratory studies in culture dishes and in vivo animal experiments.

Features and Benefits:

- 3DCulturePro and BioDynamic bioreactors are designed for use within cell culture incubators.
- Versatile chambers accommodate vascular and orthopaedic tissues.
- All components in contact with fluid are suitable for autoclaving and ethylene oxide sterilization.
- Transparent chamber viewing windows allow you to image samples during stimulation.
- Non-metallic MRI-compatible BioDynamic chamber available.
- ElectroForce maintenance-free motors facilitate precise force, displacement, and pressure control with unrivaled responsiveness to replicate physiologically-relevant loading conditions.
- Multi-axial loading capabilities: axial (compression/tension), axial/torsion, axial/pulsatile, and combined axial/pulsatile/torsion.
- Flow ports let you design the flow/perfusion loop that is appropriate for your research.
- Multi-chamber systems are available to measure statistical variability.
- Add BioDynamic bioreactor chambers to standard ElectroForce load frame test instruments to extend the capabilities of existing systems.

Applications:

- Scaffold material characterization
- Stimulation of tissue constructs to promote cell differentiation and mechanotransduction
- Biomedical research of dynamic flow cultures
- Validation of medical devices in pre-clinical in vitro systems
- In vitro test beds or ex vivo drug delivery systems for drug development



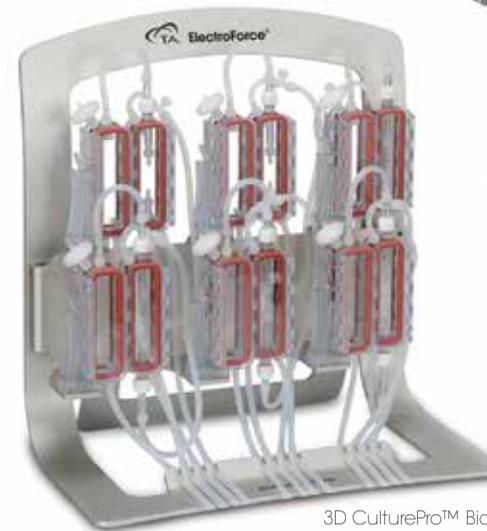
BioDynamic 5100



BioDynamic 5200



Off Axis Pulsatile System



3D CulturePro™ Bioreactors





Refrigerated Cooling Systems (RCS)

Refrigerated Cooling System 120

The Refrigerated Cooling System (RCS120) employs a three-stage refrigeration system, which permits convenient DSC/MDSC operation over the temperature range from -120 °C to 400 °C. The RCS 120 enables temperature cycling, controlled and ballistic cooling experiments, and is compatible with the Discovery Series DSC 2500, DSC 250, and DSC 25.

Refrigerated Cooling System 90

The Refrigerated Cooling System (RCS90) employs a two-stage refrigeration system, which permits convenient DSC/MDSC operation over the temperature range from -90 to 550 °C. Ballistic cooling from 500 °C to ambient is achieved in about 7 minutes. The RCS90 is compatible with all TA DSC's.

Refrigerated Cooling System 40

The Refrigerated Cooling System (RCS40) employs a single-stage refrigeration system, which permits convenient DSC/MDSC operation over the temperature range from -40 to 400 °C. Ballistic cooling from 400 °C to ambient is achieved in about 7 minutes. The RCS40 is compatible with all TA DSC's.



Air Chiller System (ACS-3)

The Air Chiller System (ACS-3) is a unique gas flow cooling system. It is equipped with a three-stage cascading compressor design, enabling testing to unprecedented temperatures as low as -100 °C. This flexible Air Chiller is available for use with the DMA Q800, all DHR Rheometer models with ETC, and the ARES-G2 Rheometer & RSA-G2 Solids Analyzer with FCO. The ACS-3 can help eliminate or reduce liquid nitrogen usage and associated hazards from any laboratory and offers an incredible return on investment estimated between two to three years.



Finned Air Cooling System (FACS)

The FACS is an innovative cooling accessory that offers a cost-effective alternative to the RCS or LN2P cooling systems. The FACS can be used for controlled cooling experiments, thermal cycling studies, and to improve sample turnaround time. Stable baselines and linear heating and cooling rates can be achieved between ambient and 725 °C. The FACS can be used with the Quench cooling accessory to extend the lower temperature capability to -180 °C. It is compatible with Discovery DSC 2500, 250, and 250.



Discovery Liquid Nitrogen Pump (Discovery LN Pump)

The Discovery LN Pump provides the highest performance and greatest flexibility in cooling for the Discovery DSC. It facilitates the lowest operational temperature (to -180 °C), greatest cooling rate capacity (to 140 °C/min), fastest sub-ambient equilibration times, and an upper temperature limit of 550 °C. Operating at ambient pressure, the Discovery LN Pump uses liquid nitrogen efficiently, thus reducing operating costs. It includes a 50-liter Dewar with auto-fill capability which allows the Discovery LN Pump to be automatically refilled from a larger source, even during a DSC experiment, for uninterrupted operation.



The Photocalorimeter Accessory (PCA)

The Photocalorimeter Accessory (PCA) permits characterization of photocuring materials between -50 and 250 °C. UV/Visible light (320- 500 nm) from a 200 W high pressure mercury source is transmitted to the sample chamber via an extended range, dual-quartz light guide with neutral density or band pass filters. Tzero® technology permits direct and accurate measurement of light intensity at both the sample and reference positions without the need for an external radiometer. It also provides for simultaneous measurement of two samples. Compatible with DHR and ARES rheometers as well as the Discovery DSC.



At TA Instruments we've been refining thermal analysis technology for over 50 years, and we're the **only company to provide a 5-year warranty on cells and furnaces.**

 Innovation, Quality and Support

TA Instruments has a reputation for product innovation and quality. Combined with our dedication to support, it's easy to see why TA Instruments enjoys outstanding customer loyalty.

Service is a cornerstone of the support we provide our customers every day. The vast array of training products ensures that our customers utilize their instruments effectively, maximizing return on investment. To provide this support, TA Instruments has assembled the largest worldwide team of service and support professionals in the industry.

Others promise good support. Talk to our customers and learn how TA Instruments consistently **delivers** exceptional support.



Lifetime Support Plan

Our experience with over 10,000 installations has shown that when users are well-trained, systems receive routine preventive maintenance, and problems and concerns are addressed promptly, the result is improved instrument performance, increased uptime, and reduced cost of ownership.

The Lifetime Support Plan (LSP) has been designed to make this comprehensive support available for a modest, easily budgeted annual subscription fee that is predicated on the benefits of uninterrupted coverage initiated at installation, and continued for the life of the instrument.

The Lifetime Support Plan (LSP) is available only for new instruments at the time of purchase, or prior to the end of the warranty period. Once initiated, the LSP is renewable annually (maximum of 2 years at a time) to provide uninterrupted coverage for the life of the instrument. The plan includes:

- An annual Performance Maintenance Visit (PMV). Following a detailed checklist, your local, factory-trained Service Engineer will upgrade software and firmware as appropriate and provide a thorough cleaning, inspection, and calibration of the hardware. Wear items are replaced (at no additional cost) as necessary. In addition to the benefits of preventive hardware & software maintenance and calibration, the PMV provides a great opportunity to review system operation with your service engineer, often resulting in improved methods, productivity, and results.
- Should on-site repairs be needed, LSP subscribers receive priority response. The plan coverage includes all service parts, labor, and travel required to get your system running at optimum performance. No need for repair-related purchase orders.



Advantage Support Contract

Advantage Support Contracts provide peace of mind, knowing that any problems that occur will be corrected rapidly and without further cost. These agreements include the following benefits:

- **Tiered Contract Levels.** All contracts include labor, travel expenses, and repair parts so you only have one cost to consider when budgeting maintenance on your system, but provide various options for added value.
- **Instrument training** is available as part of select contracts, ensuring that operators have access to TA Instruments extensive instrument training programs.
- **Preventative Maintenance Visits.** Included with Premium contracts or added Lifetime Support Plans, as an option, keep your system functioning at peak performance and help reduce downtime. A Field Service Representative will verify system performance, and calibrate using certified standards.
- **Discount on Parts and Cell/Furnace Coverage.** On select contracts, parts and consumables can be purchased at a 10% discount, and DSC cells and furnaces are covered.
- **Priority Response Time and Problem Resolution.** Phone calls to our Field Service Representatives are typically returned within one business day and calls to our Technical Hotline (before 2:00 p.m. EST) are returned the same business day. Priority service ensures that repair problems are resolved within (3) three business days of receiving phone contact, minimizing downtime.



Additional Service Options

TA Instruments offers additional options for instrument repair, in addition to the Support Contracts and plans. The service provided is of equal quality, with rapid response. Only genuine, quality TA parts are used and instrument performance is always verified after repairs are completed.

- **Demand Services** On-site demand service is available if you elect not to cover your instrument with a Support Contract. With demand service, you pay only for the service required to correct a specific problem. The cost for demand services will depend on where you are located, the amount of time required to correct the problem, and the parts used.
- **Service Shop** TA Instruments maintains a large staff of in-house Service Specialists trained in all aspects of instrument repair. Instruments can be returned to the regional service shops for repair to save travel cost associated with on-site demand service, for more extensive repairs, or for upgrades not available in the field. The cost will depend on how long it takes to evaluate and repair the problem, what parts are needed, and the freight costs.
- **PMV Service** A qualified TA Field Service Representative provides calibration using reference materials traceable to a National Reference Laboratory (NRL) and appropriate ASTM International Standard Procedures. Certificates of standards traceability and calibration are provided as documentation. The PMV provides a great opportunity to review operation with your service engineer, often resulting in improved methods, productivity, and results.
- **IQ/OQ Product Offering** The IQ/OQ protocol will define the methods and documentation that will be used to evaluate the TA instrument for installation and operation in accordance with TA Instruments specifications and intended use. Successful completion of this protocol will verify that the instrument operates in accordance with intended usage.
- **Calibration with Certified Standards** A qualified Field Service Representative will provide calibration using reference materials traceable to a National Reference Laboratory (NRL) and appropriate ASTM International Standard Procedures. Certificates of standards traceability and calibration are provided as documentation. This calibration is included as part of the Preventive Maintenance Visit, or on a time and materials basis.





Academic Support Plan

The Academic Support Plan (ASP) provides a way to extend our partnership with academic users to maintain our mutual investment in instruments and expertise. Once initiated, the ASP is renewable annually (maximum of 2 years at a time) to provide uninterrupted coverage for the life of the instrument. The plan includes:

- FREE tuition to regularly scheduled Theory and Applications Training courses given at TA locations around the world.
- Complete repair coverage designed to utilize academic resources and capabilities. Service guidance/consultation will be provided via phone and email. If remote diagnosis/repair is not successful, a factory-trained service engineer will be dispatched to make necessary repairs. Coverage includes remote diagnosis, service parts and on-site labor and travel (should it be needed).
- In addition to traditional service parts, coverage INCLUDES furnaces, DSC cells and other temperature systems.
- Repair coverage extends to include a standard accessory purchased from TA Instruments.
- 10% discount on supplies & consumables (for covered instruments).





AMERICAS

New Castle, DE USA

Lindon, UT USA

Wakefield, MA USA

Eden Prairie, MN USA

Chicago, IL USA

Irvine, CA USA

Montreal, Canada

Toronto, Canada

Mexico City, Mexico

São Paulo, Brazil

EUROPE

Hüllhorst, Germany

Bochum, Germany

Eschborn, Germany

Wetzlar, Germany

Elstree, United Kingdom

Brussels, Belgium

Etten-Leur, Netherlands

Paris, France

Barcelona, Spain

Milano, Italy

Warsaw, Poland

Prague, Czech Republic

Sollentuna, Sweden

Copenhagen, Denmark

ASIA & AUSTRALIA

Shanghai, China

Beijing, China

Tokyo, Japan

Seoul, South Korea

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