ADVANCED MEASUREMENT INSTRUMENTS™

TGA 1000/1200/1500

Thermogravimetric Analyzer

ADVANCED MEASUREMENT INSTRUMENTS

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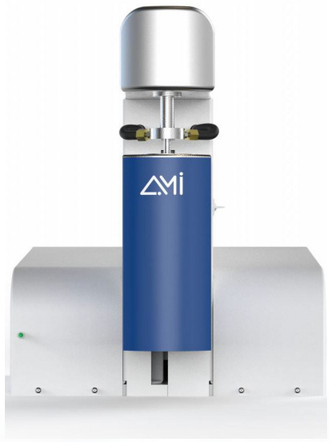
Product Introduction

Based in Wisconsin, Advanced Measurement Instruments (AMI) has been shaping the future of thermal analysis since 1992. With a steadfast commitment to innovation and precision, the company has become a trusted partner for professionals seeking advanced yet affordable solutions. At the forefront of the offerings is the Thermogravimetric Analyzer (TGA) Series, a product line that exemplifies cutting-edge design, exceptional performance, and unmatched value. The TGA Series combines research-grade capabilities with an accessible price point, delivering high-performance thermal analysis tools without compromising on quality. Equipped with advanced high-sensitivity microbalances and compact, state-of-the-art furnaces, these instruments provide unparalleled precision, drastically reduce buoyancy effects, and ensure superior temperature responsiveness.

Renowned for their reliability and versatility, the TGA Series instruments are trusted across a wide range of industries, including plastics, rubber, adhesives, fibers, pharmaceuticals,environmental energy, petrochemicals, and food science. These instruments meet critical customer needs by enabling the characterization and analysis of parameters such as material decomposition temperatures, mass loss percentages, component contents, and residual mass.



Precision **Stability** **Ease of Use**

Typical Applications

- Thermal Stability
- Thermal Pyrolysis
- Oxidation Reactions
- Dehydration Process
- Decomposition
- Process Kinetics
- Combustion Process
- Moisture Content
- Residue and Ash Content

Product Features

Precision

- The proprietary high-sensitivity microbalance provides a capacity of ±200 mg with an impressive resolution of up to 0.1 µg. lt delivers outstanding stability and accuracy in data acquisition, ensuring precise weighing for a wide range of sample types.
- The dual PID control logic, combined with the miniature furnace design, significantly enhances the temperature control response speed and accuracy. This ensures precise and stable temperature regulation throughout the experimental process, resulting in excellent repeatability and stability of TGA test results.

Stability

- The balance utilizes a vertically suspended design, offering enhanced stability in measurement signals by minimizing the impact of thermal radiation. This ensures highly reliable experimental data. Furthermore, the vertical suspension structure is easier to maintain and provides a longer service life.
- The compact furnace design optimizes temperature response sensitivity within the furnace while significantly reducing buoyancy effects. This innovation minimizes dynamic curve drift, further enhancing the accuracy and stability of test results.

Ease of Use

- The software interface is designed with a clean, intuitive user experience and a modular layout, ensuring ease of use and quick learning. Users can effortlessly navigate through tasks such as setting up experimental methods and analyzing results, enabling them to master operations in no time.
- The vertically suspended balance design, combined with the automatic furnace lifting function, enables users to easily place and change samples. Additionally, this design ensures fast stabilization of the sample after placement.

Key Features

Thermogravimetric Analyzer TGA

Proprietary Microbalance

The proprietary TGA microbalance combines high sensitivity, low drift technology, and thermal insulation design to deliver exceptional weighing accuracy. With a resolution as precise as 0.1 μg, it is ideal for high-precision measurements of trace samples. The low-drift technology minimizes the impact of environmental factors, ensuring stable data even in long-duration experiments, while reducing errors caused by drift. Additionally, the thermal insulation design protects the balance from external temperature fluctuations, maintaining internal temperature stability and ensuring reliable results, even in conditions of rapid temperature change or high heat.

Miniature Furnace

The compact heating furnace is designed to significantly minimize gas buoyancy effects, ensuring that dynamic curve drift in TGA remains under 25 μg without requiring additional blank tests.
Additionally, the furnace delivers a rapid temperature response, achieving heating rates of up to 300°C/min, which dramatically shortens experimental time and enhances overall work efficiency.

Precise Temperature Control

The advanced heating technology combined with a dual PID control system ensures precise adherence to the set temperature curve during both heating and cooling processes. With a temperature control accuracy of ±0.1°C, this system significantly reduces the influence of temperature fluctuations, delivering highly reliable experimental results.

Multiple furnace options are available to meet the specific temperature requirements of different materials. With a maximum temperature capability of up to 1500°C, these furnaces are designed to satisfy the rigorous demands of both experimental and industrial applications.

Furnace Auto-Lift System

The instrument is equipped with an automatic furnace lifting system, simplifying experimental operations and preventing equipment damage or safety incidents caused by improper manual handling.

Water Cooling System

The fully automated recirculating bath provides precise and continuous temperature control, which effectively and rapidly reduces the TGA furnace temperature, significantly shortening the experimental time.

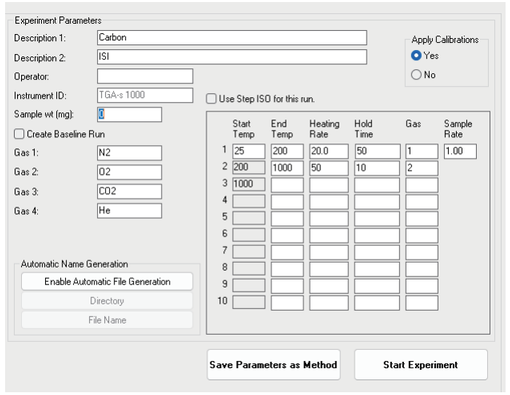
Automatic Gas Switching Control

The gas selector supports one-button switching across multiple gases, accommodating up to 4 input ports. The device features an integrated design, consolidating four gas channels into a single module to meet the need for frequent gas switching during different testing processes.

Evolved Gas Analysis

TGA can be combined with other analytical instruments for online monitoring and qualitative analysis of evolved gases, such as mass spectrometers (MS) or Fourier-transform infrared spectrometers (FTIR).

Software Features



Experiment Program Setup Interface

Technical Specifications

Temperature Range	RT-1000℃	RT-1200℃	RT-1500℃
Temperature Accuracy	±0.5℃		
Temperature Precision	±0.1°C		
Program Rate	0.1-300°C/min	0.1~60°C/min	0.1~60°C/min
Cooling Mode	Water Cooling		
Resolution	0.1 μg		
Measuring Range	±200 mg		
Dynamic Baseline Drift	≤ 25 μg (No blank background subtraction)		
Isothermal Baseline Drift	≤5 μg/h		
Baseline Repeatability	≤10 μg		
Weight	44 lbs.		
Dimensions	16.3 in(W) × 14 in(D) × 16.6 in(H)		
	Options		
Gas Selector	4 Channel Automatic Gas Switching		
Evolved Gas Analysis	MS,FTIR,etc.		

Standard Functions

- 2-point or 6-point mass loss analysis
- Peak temperature analysis
- Weight loss step analysis
- Mass loss initiation point
- Residual mass calculation
- 1st and 2nd derivative analysis
- Data smoothing
- Baseline subtraction

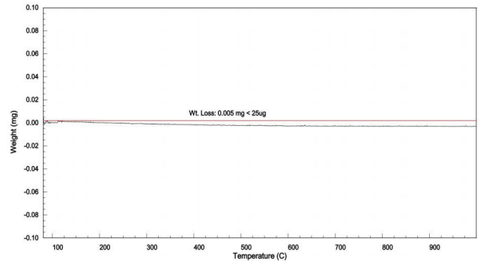
Optional Functions

. High-Resolution thermogravimetric analysis:
Enables effective separation of overlapping mass loss regions, improving resolution, and quickly obtaining experimental data over a wide tempera-ture range.

Typical Materials

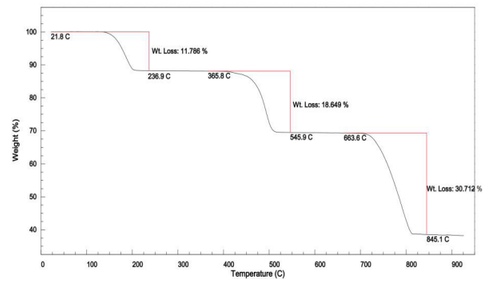
- Petrochemical products
- Coal and other fuels
- Explosives
- Cosmetics
- Thermoplastic materials
- Thermosetting materials
- Rubber
- Coatings
- Elastomers
- Polymers
- Pharmaceuticals
- Food Products
- Catalysts
- Chemicals
- Asphalt
- Ceramics

Application Data



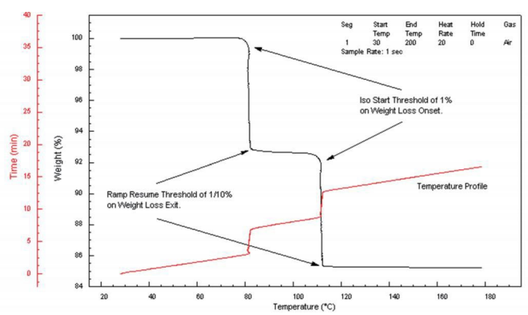
Dynamic Baseline Drift

In a typical TGA test, the sample mass may increase due to the "buoyancy effect" of the gas. However, the design of the miniature heating furnace ensures that the drift of the dynamic thermogravimetric curve remains below 25 μg, eliminating the need for baseline curve subtraction.



Weight Loss Step Analysis

The analysis software enables clear observation of the weight loss ratio and corresponding temperatures at each stage of the process. For instance, the thermogravimetric curve of hydrated calcium oxalate demonstrates three distinct stages. In the first stage, bound water evaporates, producing water vapor and leaving behind calcium oxalate. In the second stage, calcium oxalate decomposes into calcium carbonate and carbon monoxide. Finally, in the third stage, calcium carbonate further breaks down into calcium oxide and carbon dioxide.



High-Resolution TGA

The high-resolution TGA technology intelligently adjusts the heating rate in response to the sample's decomposition rate,effectively separating overlapping mass loss regions and enhancing resolution. This enables the rapid collection of experimental data across a wide temperature range. The exceptional resolution achieved with this advanced technology is particularly beneficial for analyzing the mass loss curve in TGA and the first derivative signals (DTG), providing highly detailed and accurate results.

Accessories and Consumables

Crucibles

Crucibles serve as sample containers in thermal analysis measurements, effectively protecting sensors and preventing measurement contamination. The selection of crucible type is critical for result quality. We offer various crucible options to meet different testing requirements, ensuring accurate and reliable measurement results.

Gas Selector Accessory

The gas selector supports one-button switching across multiple gases, accommodating up to 4 input ports. It simplifies valve disassembly and assembly when sampling different gases, effectively minimizing leakage risks associated with manual handling. Additionally, the instrument features an automatic purging process, ensuring efficient gas line purification.

Fully Automated Chiller

The fully automated recirculating bath provides precise and continuous temperature control. When used in conjunction with the water cooled TGA, it enables rapid cooling of the furnace, significantly improving experimental efficiency.

Mass Spectrometer

The Online Gas Mass Spectrometer is a quadrupole mass spectrometer specifically designed for the efficient collection and analysis of TGA evolved gases, with a mass range of 1-300 amu. It offers sensitivity at the parts-per-billion (ppb) level, ensuring precise analysis of low-concentration gases.

AMI Thermal Analysis Series Products

Differential Scanning Calorimeter (DSC)

The DSC is a device used to measure the energy changes absorbed or released by a sample during variations in time or temperature. The DSC sensor is a heat flow measurement platform employing specialized technology, designed to deliver exceptional performance and testing reliability. Examples of measurements conducted using DSC include enthalpy of melting, glass transition, crystallization, purity, and specific heat capacity.

Thermogravimetric Analyzer (TGA)

The TGA measures changes in the weight of a sample as a function of temperature or time. This product supports the editing of multiple program segments, allowing for the design of complex experiments involving heating, cooling,or isothermal conditions. It also features automatic gas switching during temperature ramps, while its vertical supension design ensures stable and accurate weight readings throughout the experiment. The TGA's micro-furnace provides rapid response to temperature changes and enables quick cooling between multiple experiments.

Simultaneous Thermal Analyzer (STA)

AMI introduces anew generation of high-performance STA, featuring a microbalance with 0.1 µg resolution, advanced control algorithms, and structural design. The STA is ideally suited for evolved gas analysis, capable of precisely capturing minute mass changes and thermal effects. It is also equipped with an atmosphere control system that provides specific gas environments, aiding in the simulation of real-world conditions. The STA is flexibly configurable to meet all your specific thermal analysis testing needs.

Thermomechanical Analyzer (TMA)

Thermal expansion is a primary cause of mechanical stress and electronic component failure. The TMA can accurately determine the glass transition temperature and stress relief points of materials, identify critical points that may lead to delamination, and ensure the stability of electronic performance. This new thermomechanical analyzer features a simple and robust design, specifically tailored for measuring the expansion of small components and the low expansion rates of circuit boards and component materials.