

30  
YEARS

ORBIT



# Thermogravimetric Analyzer

Reliable and fast proximate analysis

TGA 1500

# TGA 1500 Thermogravimetric Analyzer

Orbit's TGA 1500 is an automated instrument which determines Moisture content, Ash content, Volatile content, Loss on Ignition (LOI) and Fixed Carbon content in a wide range of Organic, Inorganic and Synthetic materials.

Thermogravimetric analysis replaces the traditional analytical techniques that are slow, labour intensive and involve several steps with multiple laboratory equipment such as Muffle furnaces, Ovens and Balances. TGA 1500 with integrated balance combines drying, ashing and weighing processes. This improves the efficiency, precision and provides high sample throughput.

TGA 1500 is applicable in various industries and applications, including coal, coke, ores, cement, lime, foodstuffs, feeds and many more.

## Typical Sample Materials



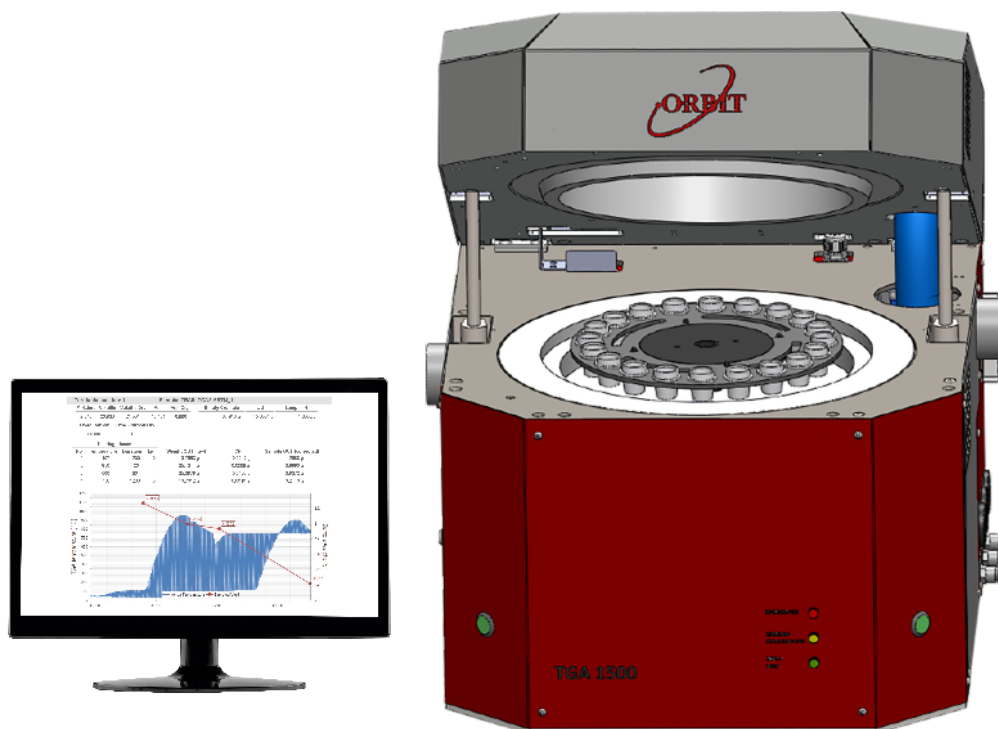
TGA 1500 comes with a PC software that is easy to use and intuitively provides the user with control of the instrument, tracking of samples and measurement data throughout the analysis process.

Typical analysis is performed in air, other gases such as nitrogen and oxygen can also be used to achieve a specific test atmosphere. Samples can be heated and cooled to specified method settings.

Orbit's TGA 1500 is used to analyze samples in accordance with several international standards such as ASTM, ISO, DIN, EN and more.

TGA 1500 has been developed in collaboration with experts from our French Company.

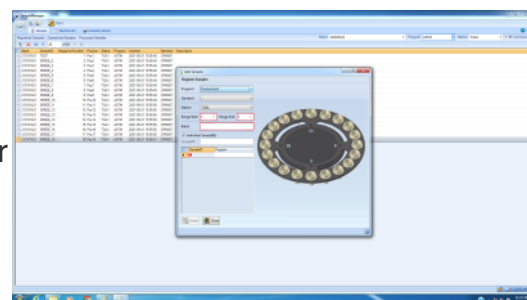
# Reliable and fast proximate analysis by TGA 1500 Thermogravimetric Analyzer



TGA 1500 provides multi-constituent analysis for upto 19 samples at a time. Typical coal analysis method consists of determination of moisture, volatile matter and ash content. The software allows for customization of the analysis steps such as temperature ramping, start temperature & end temperature, programmable gas flows and mass constancy criteria for a fully flexible instrument optimized for every users unique needs.

## Maximum Efficiency & Enhanced Precision

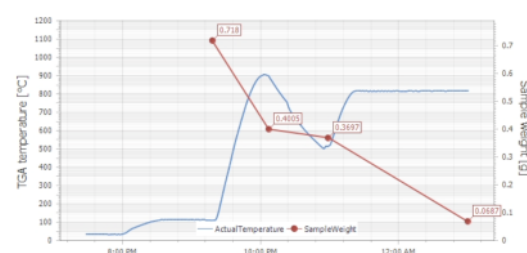
- ✓ High performance Thermogravimetric Analyzer
- ✓ Automated Analysis of upto 19 samples
- ✓ Capable to accept maximum sample weight up to 5 grams, higher range can be offered on request
- ✓ Programmable heating ramp rates as per test methods
- ✓ Windows based control software for operation of the analyzer
- ✓ Integrated balance with 0.1 mg readability for robust and accurate mass determination



## Windows Based Software

- ✓ Ensures precise control and operation of the analyzer
- ✓ Tracks the samples and measurement data throughout the analysis process
- ✓ Graphic display of temperature vs. weight loss measurements
- ✓ Retrieval of sample related information at any given time during analysis
- ✓ 16 Editable programs and data transmission to LIMS
- ✓ During analytical cycle, display of current parameters such as the real time furnace temperature, sample status and time remaining

Turntable position: 3		Sample: 1-09-2020_3							
Empty Crucible	Lid	Sample IN							
22.4363 g	20.9136 g	1.0141 g							
Moisture Volatile Volatile Dry Ash Ash Dry Fixed Carbon Fixed Carbon Dry LOI750 LOI900									
Raw data [%]:	29.198	31.309	44.220	6.775	9.568	32.718	46.212	93.2255	60.5069
- [%]:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Corrected [%]:	29.198	31.309	44.220	6.775	9.568	32.718	46.212	93.2255	60.5069
Heating phase:									
No	Temperature	Duration	Lid	Weight OUT (raw)	CF	Sample OUT (corrected)			
1	108	2000	0	23.1555 g	-0.0012 g	0.7180 g			
2	900	420	1	43.7595 g	-0.0091 g	0.4005 g			
3	500	60	1	43.7196 g	0.0000 g	0.3897 g			
4	815	3600	0	22.5084 g	-0.0034 g	0.0687 g			



## Maximum Productivity

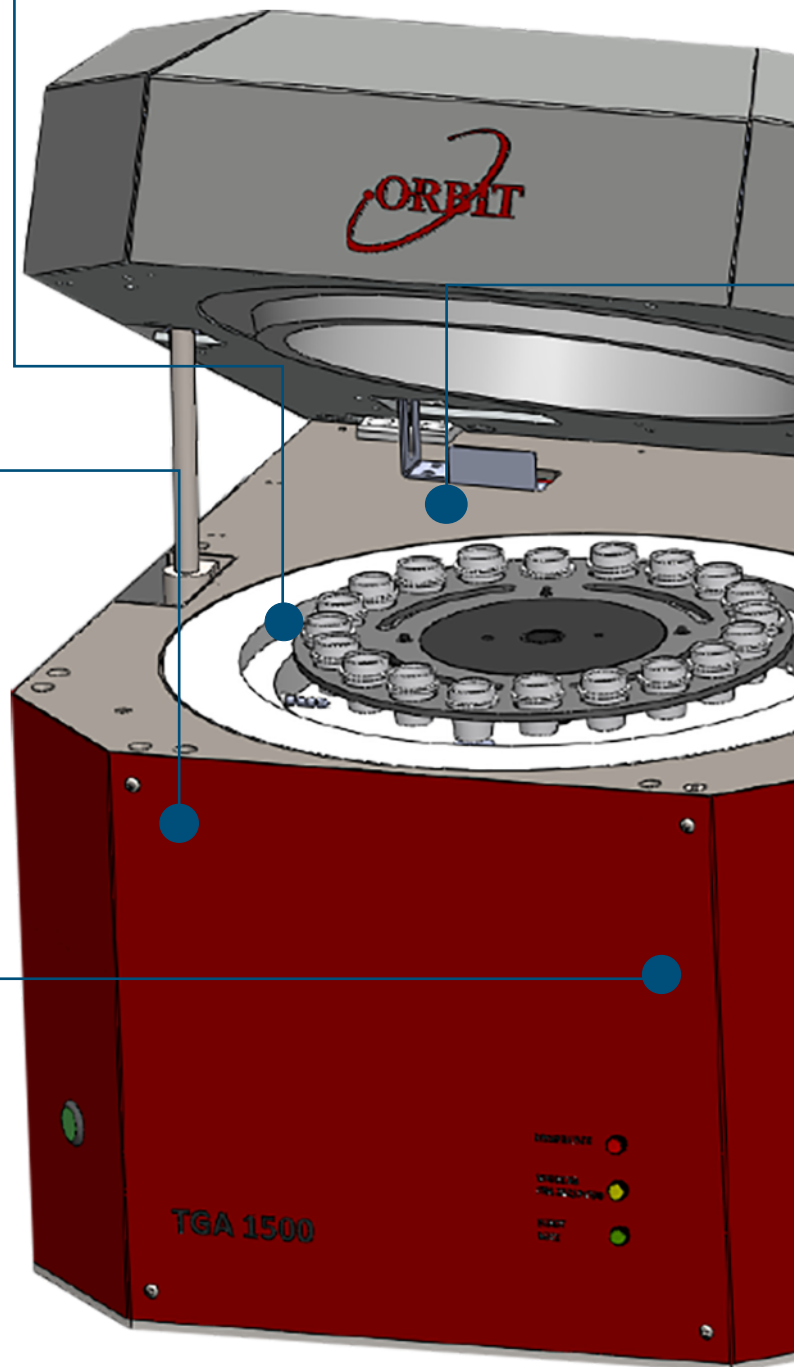
- ✓ 19 position carousel allows for high sample throughput rates
- ✓ Two TGA 1500's can be controlled from a single PC, thereby boosting productivity and reducing costs

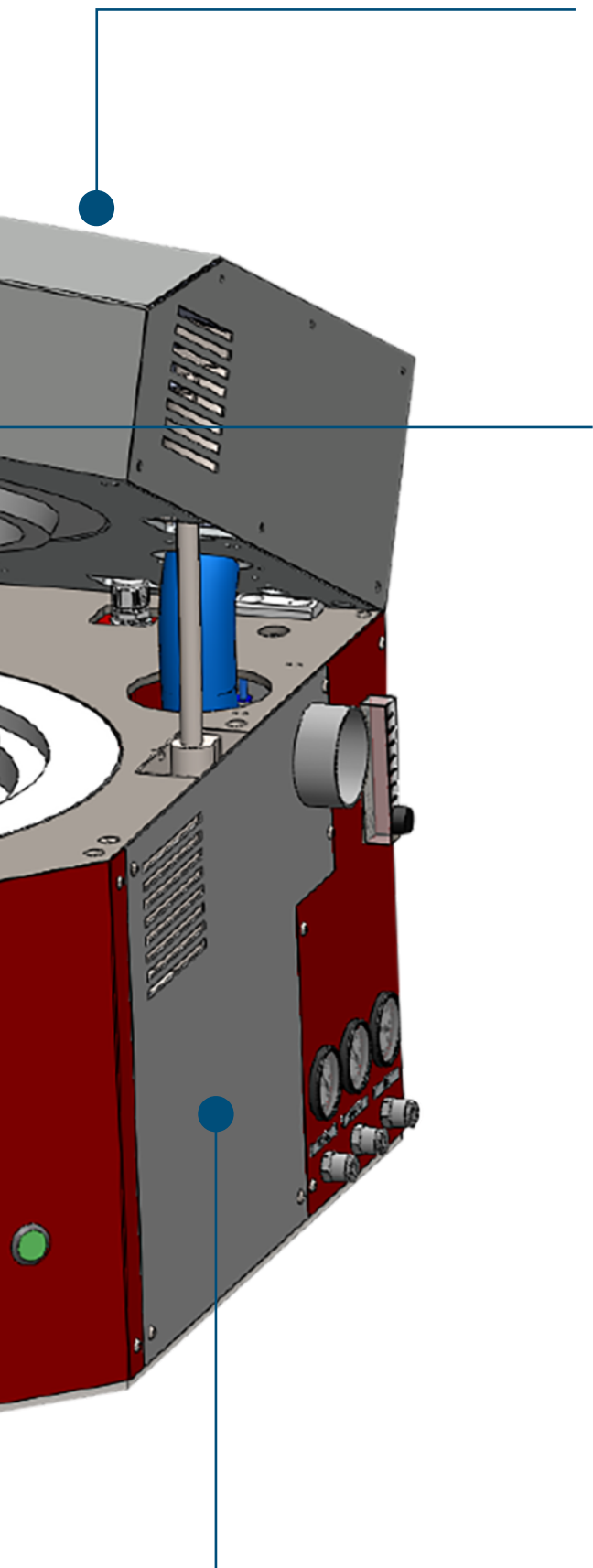
## Furnace Cooling

After completion of analysis, cooling process is automatically started with user programmable furnace lid opening, to improve the cool down time.

## Exceptional Performance

- ✓ Pneumatic carousel control mechanism increases the long-term reliability by eliminating oscillation and increasing position accuracy
- ✓ Automatic control of furnace atmosphere and programmable gas flow rates (Air, Nitrogen or Oxygen)



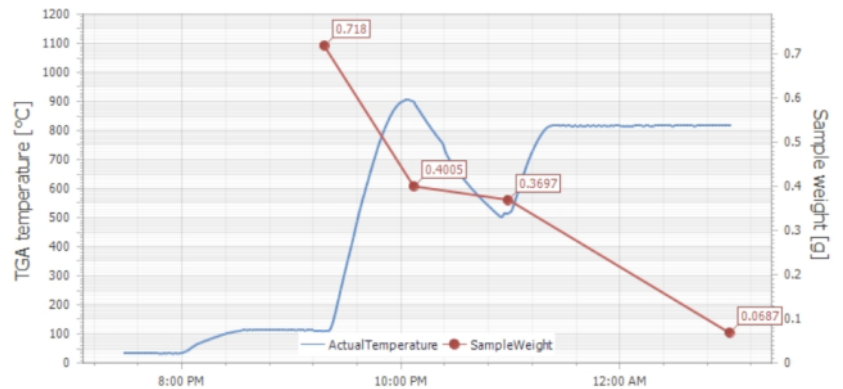


## Powerful Heating Elements

- ✓ High power heating elements provide fast temperature ramping and excellent temperature stability
- ✓ Embedded multi-element design ensures that temperatures are uniform throughout the furnace chamber

## Automatic Analysis

- ✓ Automatic end point recognition, user programmable method settings, skipping of empty crucibles allow for optimized analysis time



Graphical representation of results

## Integrated Precision Balance

- ✓ Insulated balance that is isolated from the heat and ambient atmosphere for stable and precise measurements
- ✓ High precision balance accurate to 0.1mg for precise weight measurements

## Superior Performance and Accuracy

- ✓ TGA 1500 is a powerful thermogravimetric analyzer that combines best-in-class hardware with an intuitive software housed in a rugged design providing the best analytical performance
- ✓ The carousel is made of special material which are not susceptible to warping under High temperature stress
- ✓ TGA 1500 is also available in a dual furnace package (TGA 1500D) which allows for two TGA's to be operated from a single PC for laboratories that require the highest sample throughput



The TGA 1500 complies with the following international standards, among others:

Standard	Material to be analysed	Title of the standard
ASTM D7582-15	Coal and Coke	Standard Test Methods for Proximate Analysis by Macro Thermogravimetric Analysis
ASTM D5142	Coal and Coke	Standard Test Methods for Proximate Analysis by Instrumental Procedures
ISO 562	Hard Coal and Coke	Determination of volatile matter
ASTM D7348	Solid Combustion Residues	Standard Test Methods for Loss on Ignition (LOI) of Solid Combustion Residues
DIN 51718	Solid Fuels	Determination of the water content and the moisture of analysis sample
ASTM E1755	Biomass	Standard Test Method for Ash in Biomass
DIN 51719	Solid fuels	Solid mineral fuels - Determination of ash content
ISO11722	Solid mineral fuels	Hard coal - Determination of moisture in the general analysis test sample by drying in nitrogen
ISO1171	Solid mineral fuels	Determination of Ash
EN 15148	Biomass	Solid biofuels - Determination of the content of volatile matter
EN 14775	Biomass	Solid biofuels - Determination of Ash content
AS1038	Coal & Coke	Proximate analysis & Testing
BS1016	Coal & Coke	Proximate analysis

# Technical Specification Sheet

## TGA 1500 Thermogravimetric Analyzer

<i>Furnace Temperature</i>	
Minimum Temperature	Ambient
Max Temperature	1000 deg C
Temperature Control Precision	±2% (or) ±2 deg C
Temperature Stability	±2% (or) ±2 deg C
<i>Programmable Ramp Rate</i>	
Ramp Rate	10 deg C /minute to 50 deg C /minute
Balance	Integrated Balance (up to 220grams)
Balance Resolution	0.0001g (0.1mg)
Balance Readability	0.0001g (0.1mg)
Weight Loss	0 -100%
Sample Size	up to 5 grams (Higher range can be offered on request)
Number of Samples	19 Samples +1 Reference
Number of Carousels	One for Crucibles
Carousel Material	The carousel is made of special material which is not susceptible to warping under High temperature stress
Weighing Precision	0.02% RSD (on inert Samples)
<i>Electrical Power Requirements</i>	
TGA 3000	230V ( ± 10%) / single phase / 50/60Hz / 15A
Computer	230V (± 10%) / single phase / 50/60Hz / 2A

### Ordering Information:

**22-200000:** TGA 1500, Thermogravimetric Analyzer with Single Furnace

**23-220000:** TGA 1500D, Thermogravimetric Analyzer with Dual Furnace

**22-100146:** Ceramic Crucible, PK/1

**22-112255:** Metal Carousel, 20 Positions, Crucibles

**22-107373:** Ceramic Carousel, 20 Positions, Lower

## Other analyzers from Orbit for Coal, Mineral and Material analysis:

### CSBox Tube Analyzer

CSBox Tube Analyzer with High Temperature Resistance Tube Furnace for determination of Carbon and Sulfur in Organic materials.

CSBOX Tube Analyzer is used in a wide range of organic samples like coal, coke, fuel oils, soil, biomass and other organic samples.

It determines Carbon and Sulfur with minimal sample preparation. It consists of two independent infrared cells with wide measuring range of Carbon and Sulfur. The measuring range of each infrared cell is modified to the user's specific requirement to ensure optimum measurement conditions for each application.

CSBox Tube is supplied with a comprehensive user friendly software which includes statistic reports, diagnostics features and other functions.



- ✓ High efficiency Horizontal Resistance Tube furnace design 1400 deg C (up to 1600 in HT Model)
- ✓ Programmable furnace temperatures and programmable temperature ramp rates
- ✓ Concentric ceramic furnace tube with ceramic lance directing the oxygen to the sample to ensure rapid analysis times and for complete combustion
- ✓ Two individual solid state IR detectors for Carbon and Sulfur
- ✓ High efficiency horizontal tube furnace design
- ✓ Rapid, Precise, accurate and reliable Carbon and Sulfur analysis in Organic samples

### Ash Fusion Analyzer

Uses Latest Technology to determine Fusion Temperatures

IF 2000G-HDC for Coal and Coke ash samples

IF 2000G-HDBM for Biomass, Refuse-Derived Fuel (RFD), Solid mineral fuel and Solid Bio Fuel Ash samples

Orbit Ash Fusion Analyzer automatically determines four critical temperatures: Deformation Temperature, Softening Temperature, Hemispherical Temperature and Fluid Temperature. It is a Fully automatic instrument for determining the ash fusion points by means of image analysis. Orbit's Ash fusion Analyzer uses modern technology for monitoring, computing, storing results and curves obtained during the test. Up to 6 samples can be analysed in each batch.

- ✓ Fully automatic instrument for determining the ash fusion points by means of image analysis
- ✓ Up to 6 samples can be analysed in each batch
- ✓ Real time monitoring of the samples and test process
- ✓ Integrated high resolution camera which is isolated from the high temperature area to improve camera life
- ✓ Temperature is identified by quickly scrolling through the stored image
- ✓ Capable to record the complete analysis video and digital capture of the images
- ✓ Adjustable grid scale for each test specimen
- ✓ Maximum furnace temperature: IF2000G-HDC : 1600 deg C and IF2000G-HDBM : 1800 deg C



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