N Multiple Sample Quick Moisture - Ash Analyzer for large throughput, **Patented** (*Accurate TGA method*)

Navas Instruments MMS - 3000 Series
For laboratory or production control
Multiple Matrix - Multiple Sample Quick Moisture-Ash analyzer
Applications: Food, animal feed, snacks, dough, wheat, flour, calcium carbonate, coal (Ash in 20-25 minutes), cement (LOI in 20-25 minutes) etc ...

Determination of: Moisture - ash, LOI

MMS – 3000

The MMS-3000 (Multiple Matrix - Multiple Sample TGA) Allows determinations of moisture - ash in a variety of materials with the precision of the thermogravimetric method and with much higher productivity and higher speed than standard TGA analyzers

Fast operation (15 Samples simultaneously), 30 minutes for ash in coal, 120 minutes for ash in flour(Patented)

1 – Continuous operation (Furnace always hot)

2 – Crucibles and samples weighing on external balance during analysis time (Not dead furnace time)

3 – Crucibles deposited by hand on ejector pedestal and automatic insertion on furnace carousel, automatic removal after analysis completion .
No operator attendance needed for crucibles removal, crucibles are only removed and replaced by new crucibles when new samples are weighed on external balance.

4 – Samples are treated independently one to other, samples needing longer analysis time stay longer time, samples with result are automatically ejected for removal.

5 – No time lost on heating and cooling.
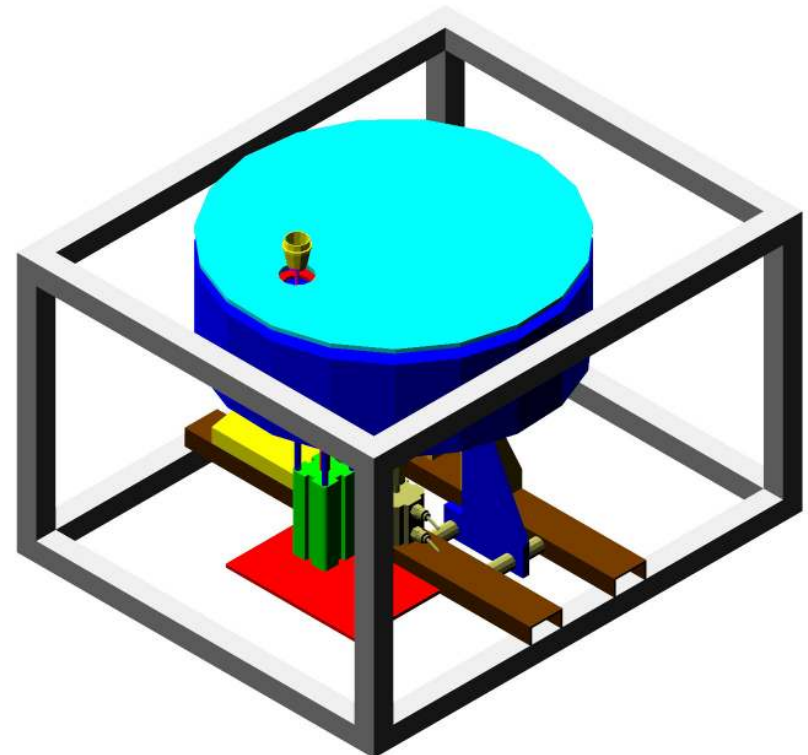
Principle of operation

Moisture or ash multiple sample quick analyzer (patented) by weight loss, the furnace is always hot, crucibles and samples are first weighed on an external balance and immediately presented to an open orifice on the furnace top that has an ejector pedestal, when enter on the keyboard is pressed the crucible is lowered to the internal carousel and the cycle for that sample starts, samples are weighed constantly in a furnace internal balance located below the furnace, after obtaining weight stability and result the crucible is automatically raised for extraction the next time the operator weighs a new sample on the external balance.

The extraction of samples does not need operator attention, the samples are removed by the operator when the operator weighs a new crucible and sample for analysis, a crucible with result is replaced by the new crucible already weighed on the external balance.

The internal carousel holds 16 crucibles, 15 available for use and one reference to compensate all crucibles for crucible weight variations due to heat.

This is not a batch analyzer, crucibles come in and crucibles go out automatically, samples do not affect each other due to different analysis time, each sample has a different analysis time according to weight and moisture or ash content, the ones with result will be removed automatically when a new crucible with sample is presented for analysis.

Advantages

1 – The user can weigh crucibles and samples during the analysis in the same PC that manages the instrument.

There is not time wasted in getting the initial weights of crucibles and samples and entering the samples identification codes because initial weights are not obtained inside the instrument but on an external balance during analysis time.

2 – Samples of different materials can be analyzed, no samples condition others, the first to finish will be the first ejected and replaced by the operator with a new crucible with sample already weighed.

3 – No time spent in heating and cooling to start a new batch, in this instrument the furnace is always hot and operates in a continuous process.

All heated parts inside furnace are made of a stainless steel alloy for high temperature (Carousel, spindle and pedestal).

The carousels do not bend nor warp under temperature stress, metal does not break like ceramics.

Ceramic crucibles allow analysis of materials that may attack metal crucibles (Metal crucibles used in other models)

1 Full year warranty on all components including carousel and spindle.
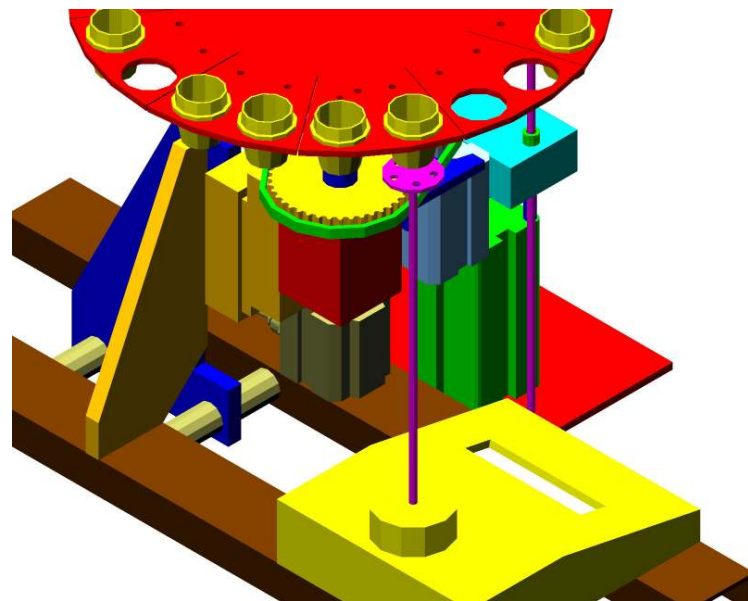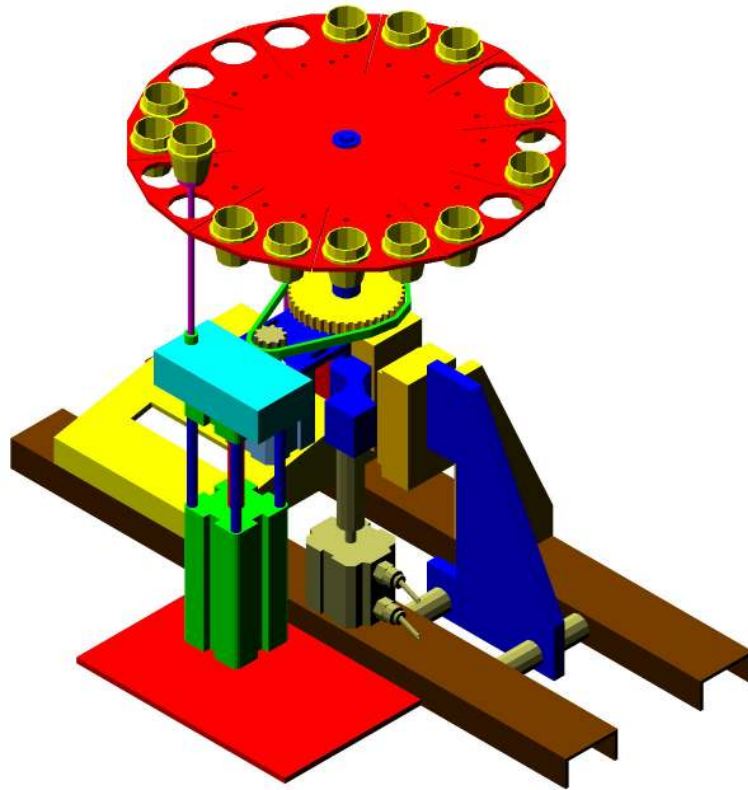
Navas Instruments buys complete brand name balances and temperature controllers from recognized manufacturers.
The balances have display FOR EASY service.
The temperature controller has 2 displays: 1 for the set point and other for the present temperature.
The balances and the temperature controller are programmable using the buttons in the devices.
These devices are manufactured by the experts in the business.

All the electric and pneumatic parts in the TGA can be acquired locally: Magnetic switches, relays, pneumatic valves, pistons etc…
With no dependency on Navas Instruments, However for our customers convenience we do maintain a complete parts and service department.

Other TGA manufacturers use special electronics that can only be purchased from the manufacturer at very high price.

All the sensors are magnetic not affected by dust.
Very few proprietary electronics (Only 2 boards), that are located in 2 PC slots.

ACCESS FOR SERVICE from back, sides, front and underneath.

Competitive Time line for Running Samples

CONVENTIONAL TGA

Analysis time
(ALIVE TIME)

Analysis time
(ALIVE TIME)

Initial crucibles &
samples weights
(DEAD TIME)

Heat-Up
(DEAD
TIME)

Cool-
Down
(DEAD
TIME)

Initial crucibles &
samples weights
(DEAD TIME)

Heat-Up
(DEAD
TIME)

Cool-
Down
(DEAD
TIME)

Initial crucibles &
samples weights
(DEAD TIME)

Heat-Up
(DEAD
TIME)

20 - 30 % Active time

MMS-3000 is always making analysis, samples are loaded and extracted
with furnace hot while samples inside furnace lose weight

NAVAS TGA

100 % Active time

The windows software allows easy instrument operation. Integration with **Microsoft Office**, results are stored in Microsoft Access Data base automatically, data can be exported automatically and manually in TXT, CSV and XLS formats to Microsoft Excel or several Laboratory Information Management Systems (**LIMS**).

The program also allows printing automatically and manually using customizable layouts.

Configurable parameters for all slopes up to 8 sets of settings: Final temperatures, plateau deviations, gases, etc…

The software allows importing samples identification codes from LIMS in text files to speed up the samples weighing
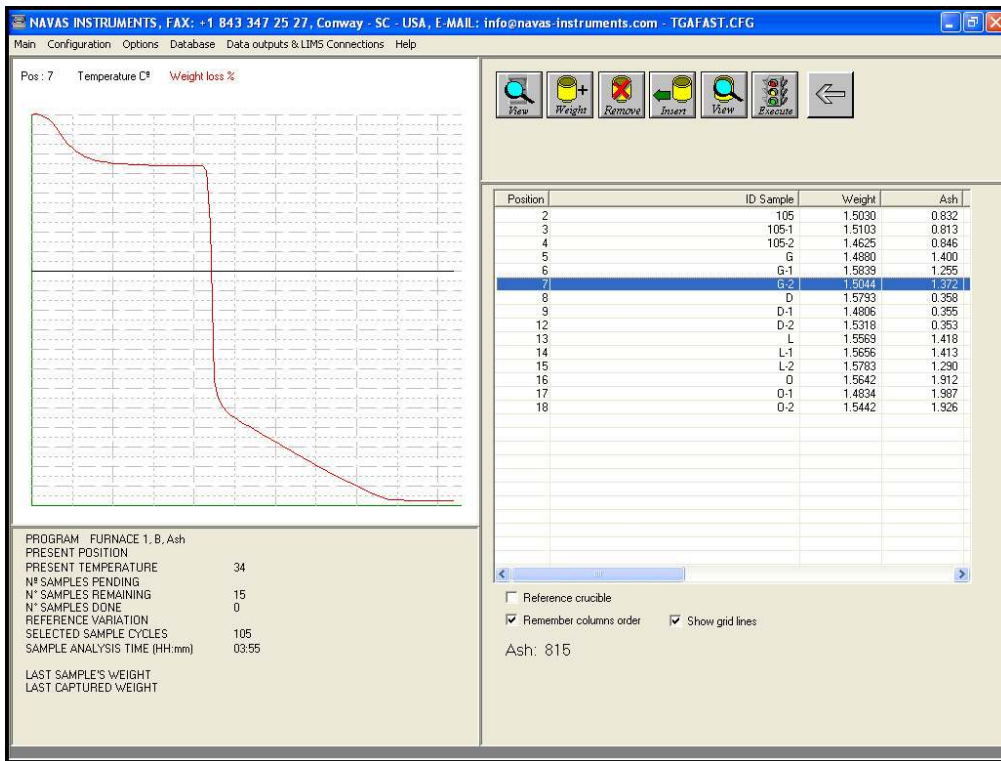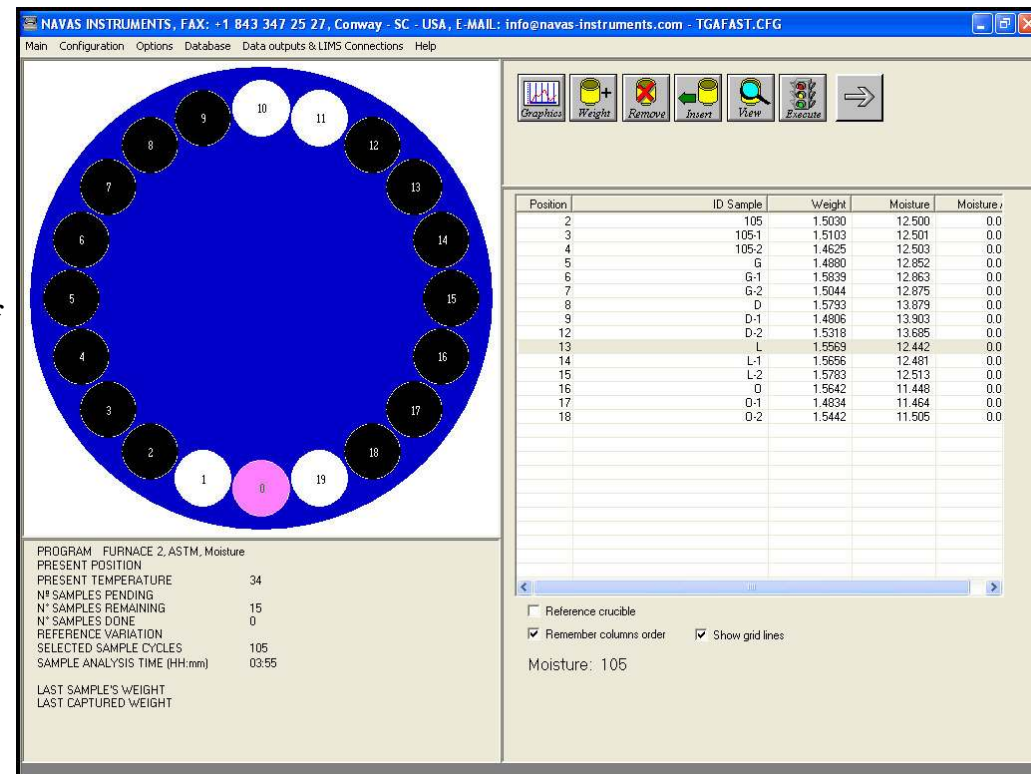
Dynamic system monitoring

The instrument does not need operator attention during analysis, The analysis process is fully automatic.

The software allows accessing the graphics dynamically during the analysis and after the analysis and monitoring the evolution of the analysis process.

1 - The user can select the rows in the data panel list and view the graphics dynamically in the graphics panel.

2 - The user can view the state of the furnace carousel dynamically, this provides a visual indication of the amount of samples inside furnace.

3 - The process variables are displayed dynamically during analysis (Amount of samples in furnace carousel, present temperature, present carousel position, last samples weight etc...)

Slope 1 | Slope 2 | Slope 3 | Slope 4

SQL FILTERS

| Query all | Column | Operator | Value | | Add ---> | | Date = 2007/10/22 |
| | Date | Equal to | 22/10/2007 | | <--- Remove | | Ash > 0.32 |

Furnace name	Date ▲	Time	N° Analysis	Position	ID Sample	Serial N°	Weight
FURNACE 1	2007/10/22	14:54:45	1	11	A10	2	1.9687
FURNACE 1	2007/10/22	14:59:31	2	7	A09	1	1.9967
FURNACE 1	2007/10/22	15:00:23	3	9	A09	3	1.9846
FURNACE 1	2007/10/22	15:00:49	4	10	A10	1	2.0304
FURNACE 1	2007/10/22	15:01:16	5	12	A10	3	2.0037
FURNACE 1	2007/10/22	15:01:42	6	13	A12	1	1.8917
FURNACE 1	2007/10/22	15:05:37	7	8	A09	2	2.1968
FURNACE 1	2007/10/22	15:05:52	8	14	A12	2	2.0554
FURNACE 1	2007/10/22	15:06:05	9	15	A12	3	1.9769
FURNACE 1	2007/10/22	15:16:18	10	2	A05	2	1.9833
FURNACE 1	2007/10/22	15:21:33	11	1	A05	1	2.0456
FURNACE 1	2007/10/22	15:24:19	12	3	A05	3	2.0839
FURNACE 1	2007/10/22	15:27:06	13	4	A08	1	2.0864
FURNACE 1	2007/10/22	15:27:32	14	5	A08	2	2.0420
FURNACE 1	2007/10/22	15:28:05	15	6	A08	3	1.9592
FURNACE 1	2007/10/22	18:09:50	16	6	A14	2	1.9165
FURNACE 1	2007/10/22	18:10:16	17	7	A14	3	1.9368
FURNACE 1	2007/10/22	18:14:07	18	2	A13	1	2.0626
FURNACE 1	2007/10/22	18:14:34	19	3	A13	2	1.9895
FURNACE 1	2007/10/22	18:15:00	20	4	A13	3	1.9590
FURNACE 1	2007/10/22	18:15:26	21	5	A14	1	2.0573
FURNACE 1	2007/10/22	18:24:16	22	12	A17	2	2.0661
FURNACE 1	2007/10/22	18:24:42	23	13	A17	3	2.0192
FURNACE 1	2007/10/22	18:49:32	24	11	A17	1	2.0961
FURNACE 1	2007/10/22	18:58:48	25	8	A16	1	2.0684
FURNACE 1	2007/10/22	18:59:17	26	9	A16	2	1.9426

Printing on printer
- N° Fields: 5
- N° Registers: 20
- N° Copies: 1
- Print

Exporting on text files
- N° Fields: 31
- N° Registers: 1000
- Export ...

Exporting to serial port
- N° Registers: 1000
- Send to RS-232 Serial port

☑ Remember columns order   ☑ Show grid lines

N° RECORDS : 27

View graphic   Delete

OK   Cancel

Open data base connectivity

The software has a powerful **ODBC data base** which allows filtering the data and sorting the rows and columns and exporting to several spreadsheets like **Microsoft Excel directly,** or Corel Quattro Pro or Lotus 123 etc through ASCII text files.
The **ODBC data base** allows the user configuring the format in which will be saved the data.

All the analysis data are archived in a **Microsoft Access** file (.MDB extension) which can be opened also using Microsoft Access.

The data base does not use proprietary formats, all the data is stored in standard formats and is accessible also using other programs in the market

Configurable data exports to LIMS

The data can be exported manually and also automatically after the analysis to **LIMS** (Laboratory Information Management Systems). There are 3 formats for data outputs:

1- Serial port: with configurable port parameters (Baud rate, parity, data bits etc...) & configurable reports formats.

2 - Text and Excel files: in .TXT, .CSV, and .XLS formats that use the **(American Standard Code for Information Interchange)** format, fully configurable reports.

3- Printer: Automatic printer data output during analysis for instant access to results with fully configurable reports.

Data exports & LIMS Connection settings FURNACE: FURNACE 1.

Slope 1 | Slope 2 | Slope 3 | Slope 4

Move header items by drag and drop and sort by clicking on header.
Records will be exported to the LIMS automatically in the same order you have selected in the header control.
If you click "Remember last columns order" the order will be saved when you press "OK", this feature is useful if you want to change between the default columns order or the defined by you.
Select the number of fields (Columns) to export from left to right also select the widths for text fields, numeric fields and date will be exported with fixed width.

Date ▲	Time	N° Analysis	ID Sample	Weight	Ash

☑ Export also header (columns titles)
If marked do not confuse the column names with the column values

☑ Remember last columns order
If clicked the columns oder will be saved after closing this window

☐ Add serial N° beside ID Codes

N° Fields (Columns) to export: 31

N° Records in each file: 28

Type of file extension
- ○ Export with .TXT extension (ASCII Text file)
- ● Export with .CSV extension (Comma separated values) — WARNING: All ocurrences of Comma ',' character entered as part of an ID code or database field will be replaced by Space (' ') and ignored
- ○ Export with .XLS extension, Microsoft Excel format

Decimals for data exports
Be careful if you combine comma for decimals with .CSV format or with a comma delimiter character as it is used comma for decimals in some countries
- ● Point for decimals   ○ Comma for decimals

Data exports with .TXT extension
- ● Delimit fields using spaces to reach fixed width — Text fields widths: 20
- ○ Delimit fields using a separator character — Delimiter character (Separator value): ; — WARNING: All ocurrences of this character entered as part of an ID code or database field will be replaced with Space (' ') character.

NOTE: THIS FEATURE CAN BE USED TO EXPORT TO A LIMS AND ALSO TO OPEN WITH SPREADSHEETS.
THE FORMAT USED IS ASCII TEXT FILES (AMERICAN STANDARD CODE FOR INFORMATION INTERCHANGE).

OK   Cancel

The software allows recovering the graphics of samples directly from the data base tables.

The user can also:

1 - Print graphics with weight loss or gain evolution and temperatures.

2 - Export graphics to ASCII text and Microsoft Excel files: The software allows automatic and manual export of 2 types of data:

2.1- Data base records exports in TXT, CSV and XLS formats with results, dates, times, sample identification codes and row data etc...

2.2- Graphics exports in TXT, CSV and XLS formats, with all the cycle numbers, times, temperatures, weights and first derivatives for each sample

The graphics data exports allows making your own statistics in the spreadsheet of your choice, Excel, Quattro pro, Lotus 123, or other.
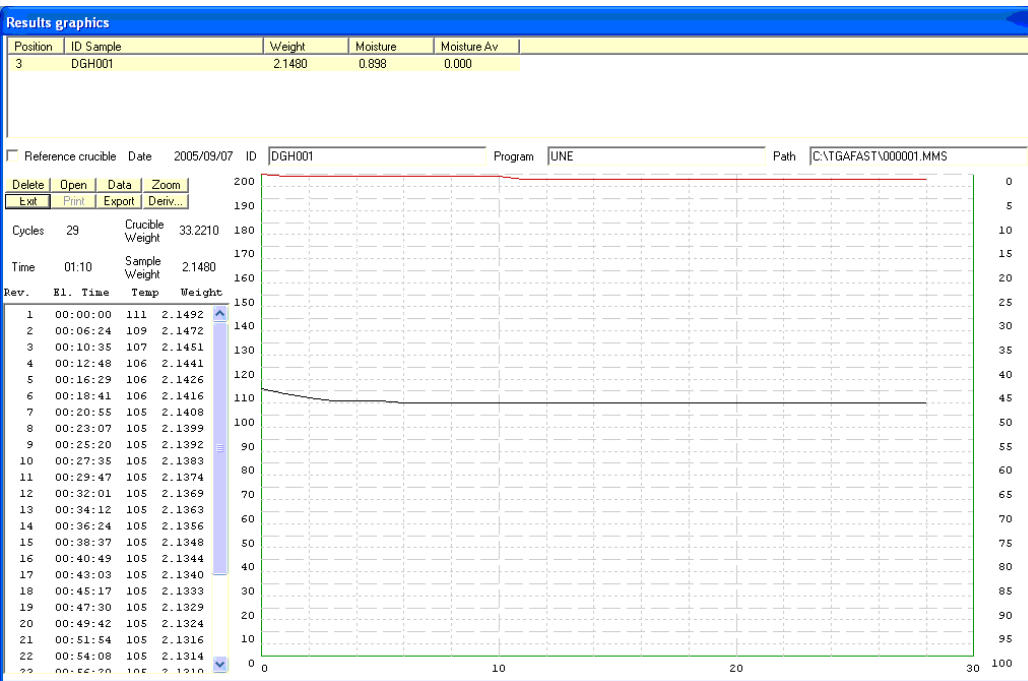
Easy to use diagnostics

The diagnostics window allows activating manually all the mechanical functions of the instrument and checking the operation of the magnetic sensors, the balances and the furnace temperature controller.

The weight present in the balances, the temperature and the sensors are shown on the screen in real time as they are changing.

i.e. If there is a problem with the stability of the balances the weight on the screen will be moving.

If the there is not gas pressure it is shown in the window etc ...

MMS - 3000 Series Technical Specifications

- Sample size: 0.1 ~ 10 grams
- Number of samples simultaneously: 1 to 15, other models with different number of samples, Continues process
- Weight Loss/Gain range: 0 ~ 100 %
- Instrument precision : Standard deviation of ± 0.0002 g
- 2 Complete brand name precision balances with display ,Sensitivity : 0.0001 gram, (external & internal)
- Furnace temperature range: 50 ~ 1000 º C
- Furnace temperature stability:
    ± 1ºC at 105ºC.
    ± 2ºC at other temperatures.
    Controlled with brand name temperature controller.

- Programs :
    Up to 8 editable programs with configurable parameters for each slope (Final temperatures, ramp rates, plateau deviations, gases etc...).
- Processor and equipment:
    Standard PC with Pentium® processor and 2 electronic boards plugged inside for system control.
    Communications with digital balance and controller by RS-232 cables.
    Color monitor.
    Color printer.
    Keyboard.
    Mouse.
- Software:
    Visual Software in Windows® .
    With all possible features you will need.
- Data transmission Software:
    Connection to other PC in intranet included in ASCII text files, TXT, CSV and XLS formats for Excel or other programs like QuattroPro® or Lotus® 123.

Complies with standard methodologies related to this type TGA analysis

Navas Instruments <u>MMS - 3000</u> Series Multiple Matrix - Multiple Sample TGA

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