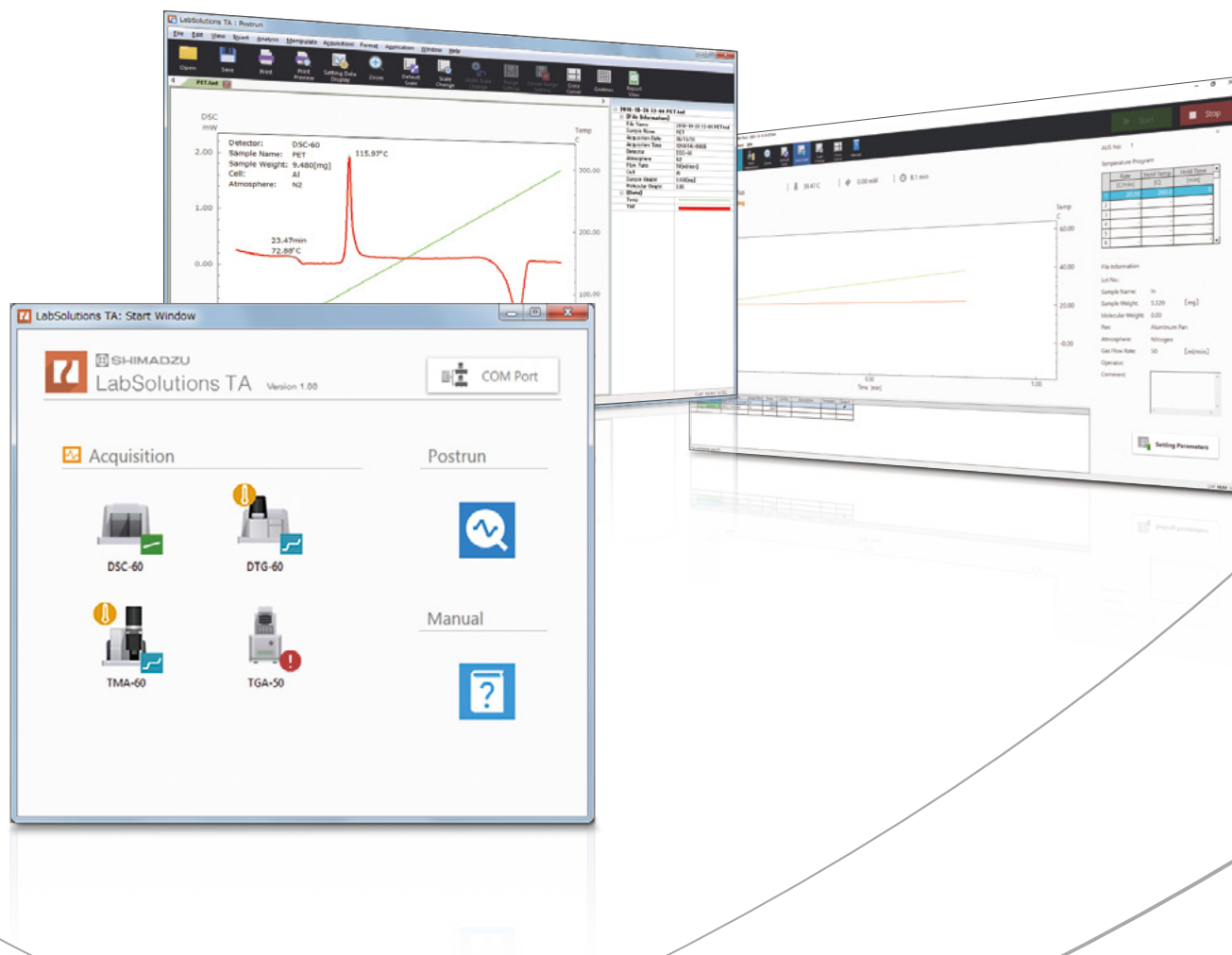# SHIMADZU
Excellence in Science

Software for Thermal Analyzers

LabSolutions TA

# Workstation for Enhanced Operability

A new design and enhanced functions that can be used at a glance

Intuitive operations that allow seamlessly performing the sequence of processes from

measurement to analysis, and the outputting of reports.

As part of the LabSolutions™ family, this software is network compatible.

Comfortable Operation

- Improved operation through clear design
- Enables intuitive mouse operations
- Operational status of instruments can be checked at a glance
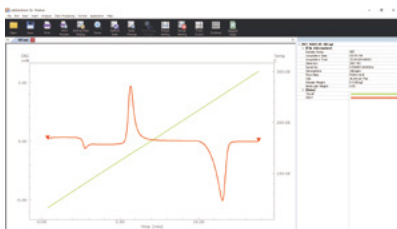
Frequently used functions are arranged as large icons above graphs. Scrolling up and down or left and right on the graph and enlarging and reducing can be performed easily by using the mouse wheel or dragging the cursor.
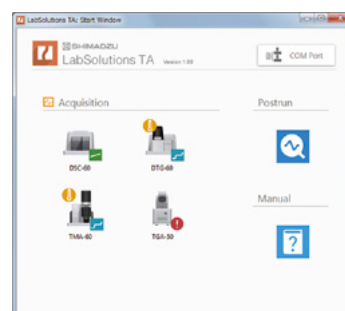
The types and the status of the instruments currently registered are displayed on the start window, so they can be checked at a glance.

Improved Productivity

- Automatic manipulation and automatic analysis functions in template format
- Measurement result reports are automatically prepared
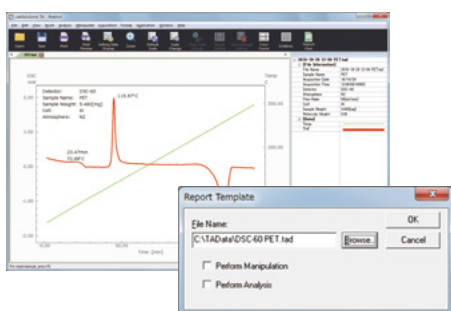
When the template function is used, manipulation and analysis can be automatically performed. By configuring the template in the acquisition program prior to measurement, automatic analysis and report preparation can be performed.

Improved Data Reliability

- Audit trail function for ensuring reliability of the data
- Advanced security and user management functions
- Compatible with ER/ES regulations such as FDA 21 CFR Part 11, PIC/S GMP, etc.

Functions: Start Window

A start window has been adopted to instantaneously assess the status of the instrument.
To display the start window, click the LabSolutions TA icon.
The acquisition program and the Postrun program can be run from this start window.
The software is more user-friendly, easier to understand, and features improved operability.

To Perform Measurements, Start Up the Applicable Instrument with a Single Click

Click an instrument icon to start up the acquisition program. One window is displayed for one instrument.

Start Up Analysis and the Manual Immediately from the Start Window

The Postrun program and the manual can be started up from the start window with one click.
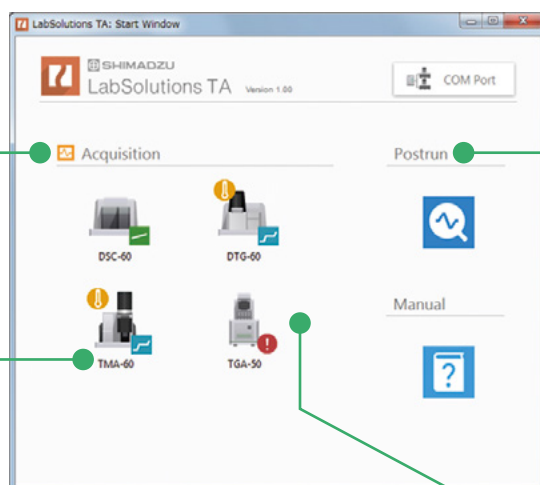
Note: This start window is for LabSolutions TA. Different windows are used for LabSolutions DB TA and LabSolutions CS.

The Instrument Names Can Be Changed

The name displayed for each instrument can be changed.
Naming the instrument in accordance with its installation site or usage application can prevent operational errors.
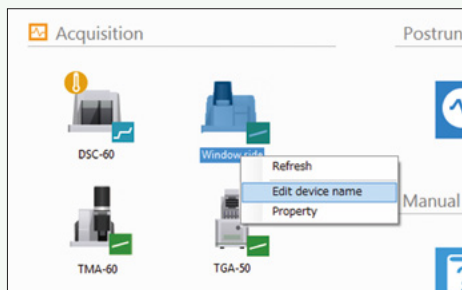
Assess the Instruments Registered and Their Status at a Glance

Lineup of Instrument Models

DSC-60 Series   DTG-60 Series   TMA-60 Series

TGA-50 Series   DTA-50 Series

Instrument Status

Monitoring   Acquiring

Controlling temperature   Error
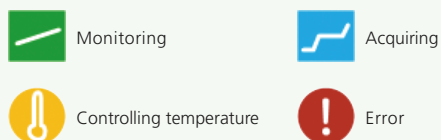
Functions: Acquisition Program

Acquisition Status and Control Status

Displays the status of instrument acquisition (monitoring, acquiring, or error).

Acquisition status

Monitoring   **Acquiring**   **Error**

Signal Value and Remaining Time

The measured signal value and the time remaining until measurements finish are displayed.

Instrument Status

Displays an instrument icon, instrument name, the details of an error, and the status of temperature control.

Error details

Error Cause(Error code)

DSC-60A Plus

Control-Heating

Instrument icon   Status of temperature control   Instrument name
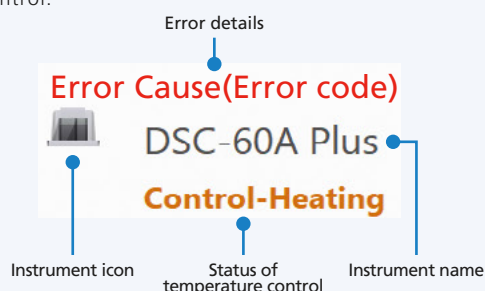
Configure the Temperature During Standby

When the hold temperature is configured, the instrument will standby at the configured temperature.
If you start measurements at a temperature below room temperature, configuring this sample hold temperature to near room temperature simplifies the holding of samples in the furnace.
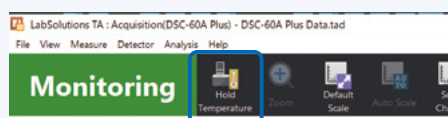
Note: This cannot be used with the 50 series.
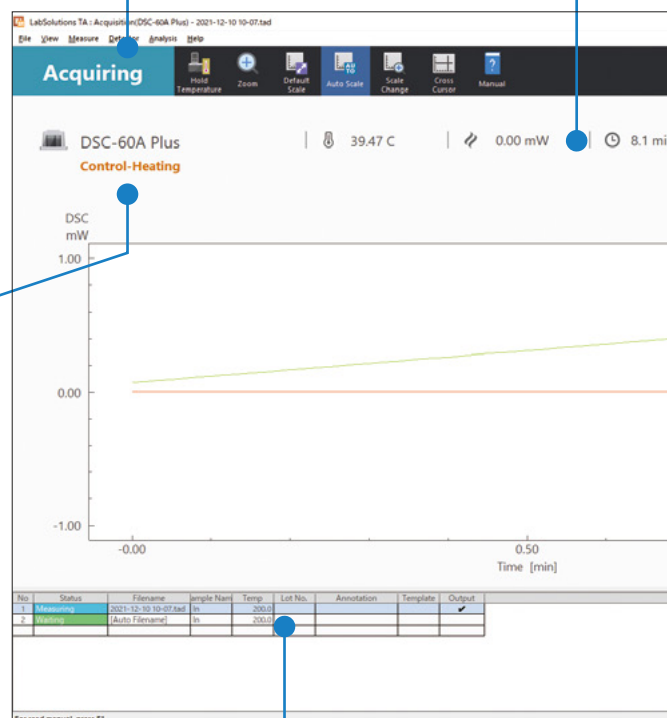
For models equipped with an autosampler, you can click to register the measurement conditions.

Automatic Manipulation and Automatic Analysis Functions (Template Function)

The report format for the data measured can be configured before measurement by using a template. The manipulation and analysis applied to the data in the template file will be automatically applied to the data that is saved using the template. This function can be used when the measurement data is saved. In addition to applying this to the Postrun program, if settings are configured in the acquisition program prior to measurement, they can be applied automatically as soon as measurements are finished, and then saved.

Signal value   Remaining measurement time

⟩ 0.00 mW   🕐 5.3 min
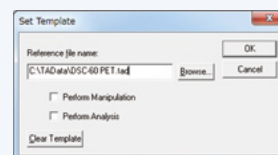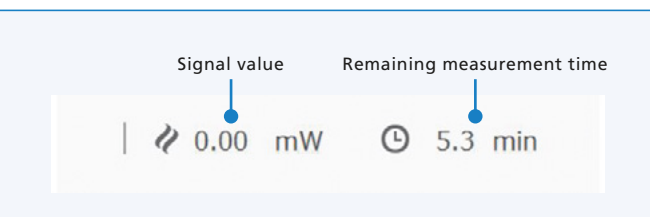
Data During Measurements Can Be Saved (Snap Function)

Click [Save SnapFile] to save the data currently being measured, with a different file name. The data saved can be analyzed with the Postrun program.

LabSolutions TA : Acquisition(DSC
File View Measure Detector Anal
Save SnapFile...
Exit
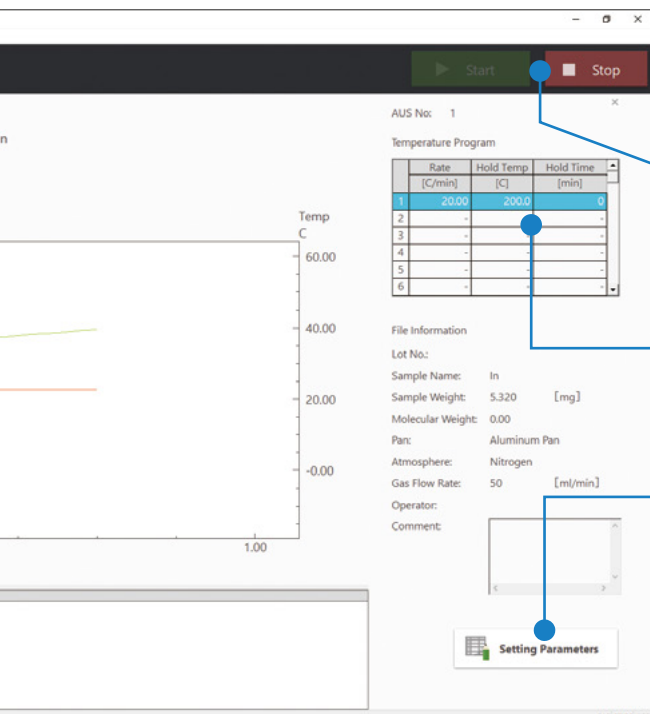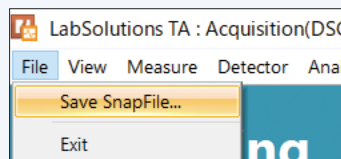
Measurements Can Be Started or Stopped with One Click

AUS No: 1

Temperature Program

	Rate [C/min]	Hold Temp [C]	Hold Time [min]
1	20.00	200.0	0
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-
6	-	-	-

File Information
Lot No.:
Sample Name: In
Sample Weight: 5.320   [mg]
Molecular Weight: 0.00
Pan: Aluminum Pan
Atmosphere: Nitrogen
Gas Flow Rate: 50   [ml/min]
Operator:
Comment:

Temp
C
60.00
40.00
20.00
-0.00
1.00

▶ Start   ■ Stop

Setting Parameters
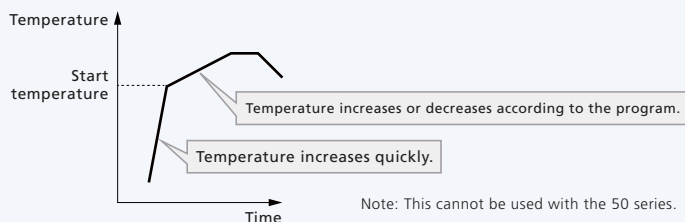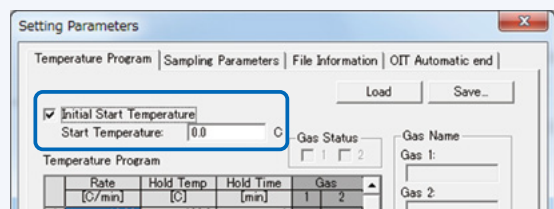
Current Measurement Information

Measurement Parameters Can Be Changed with One Click

Scrolling and Enlarging Graphs Can Be Changed Easily with the Mouse Wheel

By using the mouse wheel and dragging the cursor, it is easy to scroll the graph, or to enlarge or reduce the display.

Start Temperature Function

If the start temperature has been configured, as soon as measurement has started, the temperature will quickly increase or decrease to the specified value. After this, the temperature will be increased or decreased in accordance with the prescribed temperature program. If temperatures at which changes such as melting or exothermic peaks appear are already known, the measurement time can be reduced by configuring a temperature close to this temperature as the start temperature.

Setting Parameters

Temperature Program | Sampling Parameters | File Information | OIT Automatic end |

Load   Save...

☑ Initial Start Temperature
Start Temperature: 0.0   C

Temperature Program

	Rate [C/min]	Hold Temp [C]	Hold Time [min]	Gas 1	2

Gas Status
☐ 1 ☐ 2

Gas Name
Gas 1:
Gas 2

Temperature

Start temperature

Temperature increases or decreases according to the program.

Temperature increases quickly.

Note: This cannot be used with the 50 series.

Time

Functions: Postrun Program

Data Curves Can Be Displayed with One Click

Select [Display Parameters] to select only the curve you wish to display in the graph.
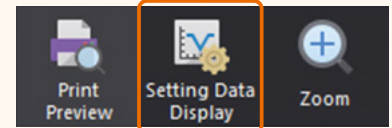
Compatible with a Variety of Analyses

■ DSC, DTA, TG, and TMA

- Temperature
- Time
- Tangent line intersection
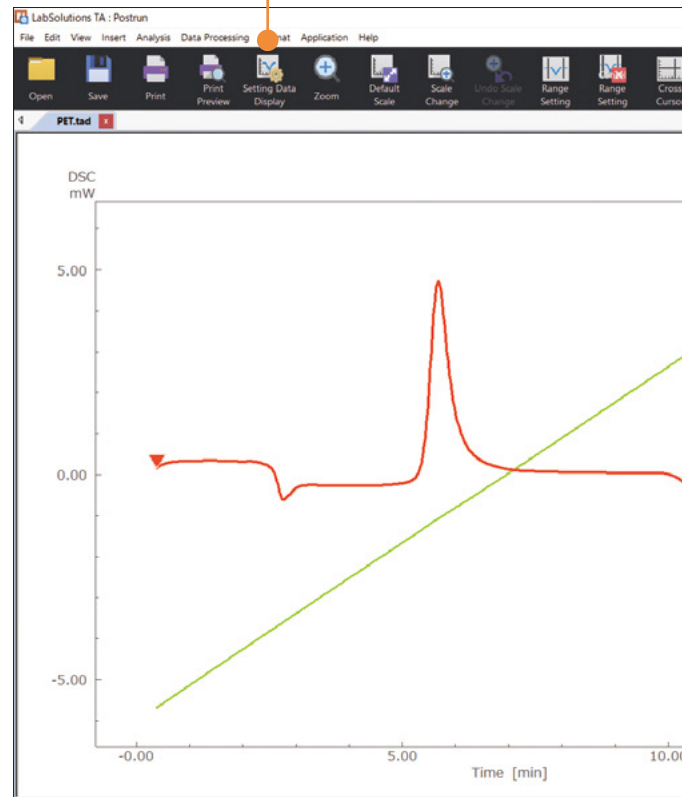- Peak top
- Signal difference
- Peak height

■ DSC or DTA

- Heat
- Glass transition
- DSC peak automation

■ TG

- Weight loss
- Automatic weight loss
- Weight loss→ratio   temperature

■ TMA

- Expansion and average expansion

Capable of a Variety of Data Manipulations

■ DSC, DTA, TG, and TMA

- Smoothing
- Baseline correction (blank, virtual line)
- Temperature manipulation

■ DSC or DTA

- Calorific manipulation

■ TMA

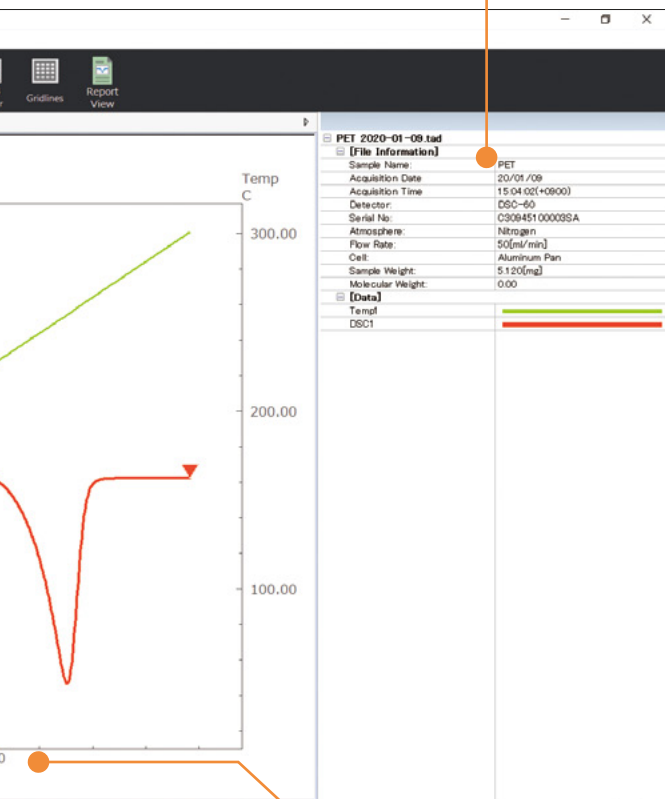- Total expansion correction and differential expansion correction

Automatic Manipulation and Automatic Analysis Functions (Template Function)

The report format for the data can be configured by using a template.
The manipulation and analysis applied to the data in the template file will be automatically applied to the data that is saved using the template.
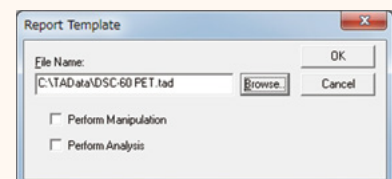
Measurement Information for the Data Curve

Analysis Range Can Be Configured for Only the Part Required

For a specified data curve, a specified range can be displayed, and the rest of the data can be deleted from the window.

● Specifying an Analysis Range for a Data Set with Temperature on the Horizontal Axis, Including Repeated Heating and Cooling

Curves in the same temperature range overlap
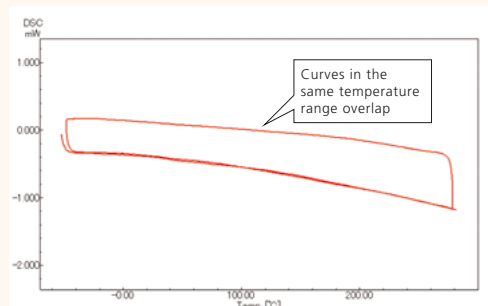
Configuring the Analysis Range

They can be analyzed as separate data sets.
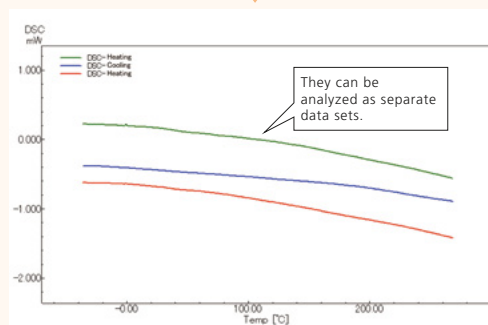
The data within the range will be labeled individually, with each section treated as a separate data set, simplifying analysis.

Change the Axis

Right-Click on the axis to easily change the time axis and the temperature axis.

Scrolling and Enlarging Graphs Can Be Changed Easily with the Mouse Wheel

By using the mouse wheel and dragging the cursor, it is easy to scroll the graph, or to enlarge or reduce the display.

LabSolutions TA System

Three types of data management methods are available depending on the laboratory.
Network management with LabSolutions can also be used for thermal analysis.

▌ LabSolutions TA

Data files are saved and managed in a folder on the PC.
There is no user management.
While carrying over the functionality of the TA-60WS, software operability has been improved, making it more user friendly.
This software is recommended for people who would prefer the same method as before, and people who use the system only occasionally.
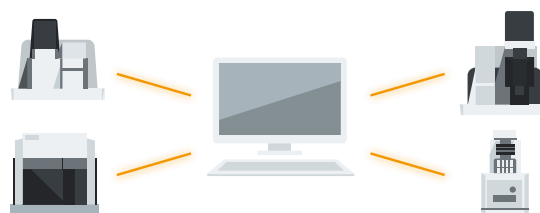
▌ LabSolutions DB TA

LabSolutions DB TA, which can provide secure data management on a single PC, integrates data management functions into LabSolutions TA, and is compatible with FDA 21 CFR Part 11, PIC/S GMP, and other regulations. This configuration is ideal for customers who manage their data on a single PC. It is recommended for customers who do not require a network connection and want ER/ES compliance only for a stand-alone system.
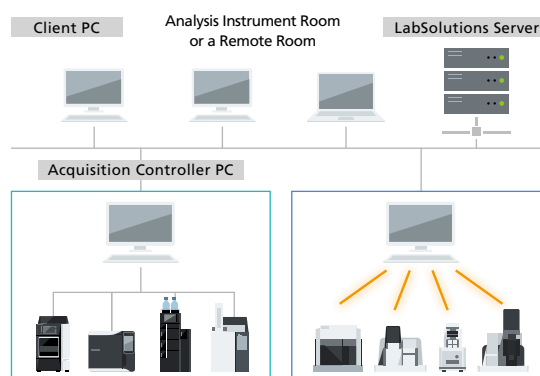
▌ LabSolutions CS

With LabSolutions CS, all analysis data is managed with a database on a server computer, so the data can be read from any computer on the network.
This is recommended if there are many users, LC and GC data is managed together on a server, and the customer wants ER/ES compatibility.

Note: A license is required in order to read data on a PC other than the acquisition controller PC to which the thermal analyzer is connected.

Client PC **Analysis Instrument Room or a Remote Room** **LabSolutions Server**

Acquisition Controller PC

Comparison of Data Management Methods

Name	LabSolutions TA	LabSolutions DB TA	LabSolutions CS
Data management method	Measurement data files are saved and managed in a folder on the PC.	Measurement data files are saved and managed in the LabSolutions database.	
Data browsing location	Browse files within folders on a hard drive on the PC.	Browse files within the database.	
LabSolutions database	Not available	Change "This can be used." to Available (The database is on a local PC.)	Change "This can be used." to Available (The database is on a server.)
User management	Not available	Change "This can be used." to Available	
Rights groups management	Not available	Change "This can be used." to Available	
Project management	Not available	Change "This can be used." to Available	
Stand-alone/network	Used in stand-alone mode.	Used in stand-alone mode.	Used over a network. You can browse the LabSolutions TA data from a browsing PC using the database manager.
Backing up data	This is performed for each file using Explorer.	This is performed for each database.	

Differential Scanning Calorimeter

DSC-60 Plus Series

This instrument varies the sample temperature in accordance with a program, and measures the heat flow.

Melting	Glass transition	Crystallization
Hardening Polymerization Reaction	Sublimation Evaporation Dehydration	Thermal decomposition
Thermal expansion Thermal contraction	Investigation of thermal history	Specific heat

DSC-60 Plus

The new detector in the DSC-60 Plus series and heating furnace unit achieve a stable baseline across the entire measured temperature range (-140°C to 600°C) as well as top-class calorimetric sensitivity for a DSC. It also features a wide dynamic range of ±150 mW.

Simultaneous TG/DTA

DTG-60 Series

This instrument varies the sample temperature in accordance with a program, and simultaneously measures the change in mass of the sample (TG) and the temperature difference between the sample and a standard substance (DTA).

Melting	Glass transition	Crystallization
Hardening Polymerization Reaction	Sublimation Evaporation Dehydration	Thermal decomposition
Thermal expansion Thermal contraction	Investigation of thermal history	Specific heat

DTG-60

This simultaneous TG-DTA (thermogravimetry/differential thermal analysis) measuring instrument features a differential type top loading balance with a Roberval mechanism, and a plugin type highsensitivity thermocouple.
It can measure samples up to 1 g. It also provides improved DTA sensitivity at high temperatures. With the auto DTG models (60A/60AH) that incorporates a autosampler, it is possible to place about one day's worth of samples. They are also capable of automatically measuring both empty cells and samples.

Thermomechanical Analyzer

TMA-60 Series

This instrument varies the sample temperature in accordance with a program, and the changes in the sample dimensions are measured while applying a constant pressure to the sample during this process.

Melting	Glass transition	Crystallization
Hardening Polymerization Reaction	Sublimation Evaporation Dehydration	Thermal decomposition
Thermal expansion Thermal contraction	Investigation of thermal history	Specific heat

TMA-60

This analyzer can handle a wide variety of samples and measurement methods and a large temperature range to perform thorough measurement of the mechanical properties of materials. A highprecision digital sensor allows displacement measurement with a low drift in a wide range.

Optional Software

A variety of optional software is available for LabSolutions TA, providing excellent operability and functionality, and further expanding the range of applications.

Temperature-Modulated DSC Program `DSC`

Using temperature-modulated DSC measurements, you can separate complex data such as overlapping transitions and reactions, and can measure specific heat. For specific heat measurements, the number of measurement cycles is fewer than with standard DSC measurements, the process is easier, and pseudo isothermal measurements, which were impossible with standard DSC, can now be performed.

PET Glass Transition Measurements
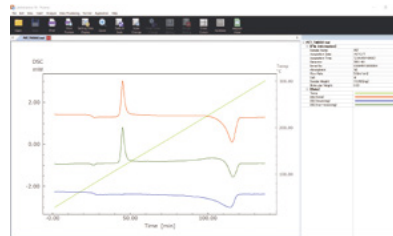
Partial Area Analysis Program `DSC` `DTG` `DTA`

This software can calculate partial fusion rates at various temperatures, and find the temperature at which the specified partial fusion rate is shown, for use as a quality control index.

Fusion of Chocolate
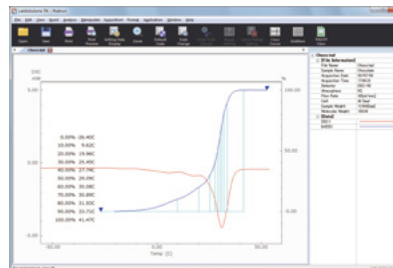
Purity Analysis Program `DSC`

In measurements of purity using DSC, pretreatment of samples is not required, even for trace samples, and the purity is obtained quickly and with easy operations. It is widely used for analysis of pharmaceuticals, industrial chemicals, and reagents.
With calculations by this program, the purity can be calculated accurately, even for materials that degrade during fusion.

Purity of Benzoic Acid
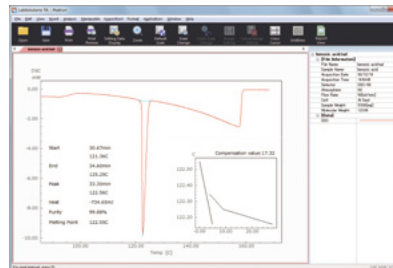
Dynamic Temperature Control Program `DTG` `TMA`

Controls the temperature that switches between high and low rise speeds in a temperature program, corresponding to the rate of change of the TG weight signal and the TMA displacement signal.
In comparison to measurements in which the temperature rises at a constant rate, the software is useful for improving the resolution with multi stage changes in TG, and for sintering conditions for ceramic materials in TMA.

Dehydration of Copper Sulfate
(Dynamic/Temperature Increases at a Constant Rate)
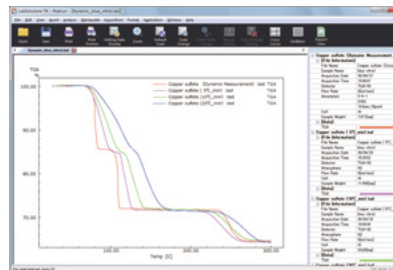
OIT Automatic End Program `DSC`

By measuring the oxidation induction time (OIT) with DSC, the effect of antioxidants contained in polymer materials, such as rubber and plastic, resistance to heat and light, and degree of deterioration can be evaluated.
In this program, the measurement is automatically finished after the detection of a peak due to oxidation, and the oxidation induction time can be automatically analyzed from the rise start time of the peak.

OIT Measurement of Polypropylene
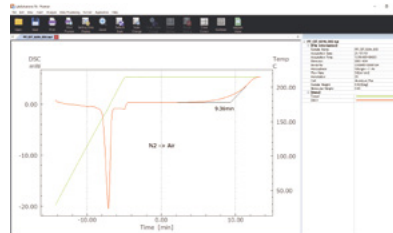
Specific Heat Analysis Program* `DSC`

To measure the specific heat of samples using DSC, a comparison of the calorific values of three measurement results (a blank, a standard, and the sample) is calculated.
With this program, the above-mentioned calculations are automated, so finding the specific heat is easy. In addition to determining the desired specific heat at each temperature, the program can also calculate the specific heat simultaneously at preset temperatures (up to 15 temperatures).

SBR Specific Heat Measurements
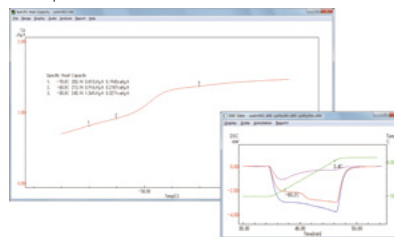
Stress-Strain Analysis Program* `TMA`

The stress versus strain curve for materials can be obtained by plotting the data measured with TMA (time/temperature, displacement and load) with strain on the horizontal axis and stress on the vertical axis, thereby learning the temperature change in Young's modulus and averaged Young's modulus for films and fibers. In addition, up to 12 analyzed stress-strain curve data sets can be overlapped.

Young's Modulus for Magnetic Tape
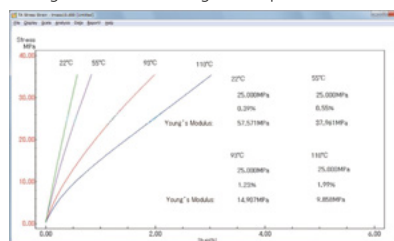
Reaction Rate Analysis (TG) Program* `DTG` `TGA`

This software analyzes the data from the decomposition reaction of a sample, obtained from thermogravimetry, using the Ozawa method. It then obtains the activation energy, the frequency factor and other reaction rate parameters. It is applied to estimations of reaction mechanisms, evaluation of the thermostability of materials, and estimations of material operating life.
It can be used for a wide range of samples, including high molecular weight materials, electrical insulation materials, thermally stable polymers, composite materials, and pharmaceuticals.

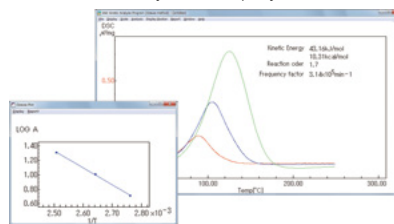Analysis of the Reaction Rate of Nicotinamide
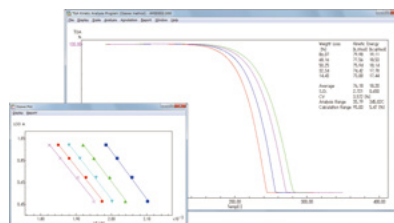
Reaction Rate Analysis (DSC) Program* `DSC`

This software is applied to the analysis of reaction rates for chemical reactions (such as the curing of epoxy resins) without changes in weight. As when using TG, the analysis is performed via the Ozawa method. Using the DSC data measured by changing the heating rate, an Ozawa plot is charted, and the activation energy, frequency factor, and other reaction rate parameters are obtained. As an example, the figure shows a reaction rate analysis of the curing reaction for an epoxy resin. The relationship between the curing temperature, curing time, and degree of curing can be simulated based on the parameters obtained.

Reaction Rate Analysis of an Epoxy Resin

* Not compatible with LabSolutions DB TA and LabSolutions CS

Specifications

Applicable operating system	OS: Windows® 10 Pro 64-bit, Windows® 7 Professional 32-bit Communication port[*1]: Serial RS-232C D-SUB9 pin (USB-serial converter is not supported.)
Controllable instruments	60 series: DSC-60/60A, DSC-60 Plus/60A Plus, DTG-60/60H, DTG-60A/60AH, TMA-60/60H 50 series: TGA-50/50H/51/51H, DTA-50
Data acquisition	Thermal analysis instrument control: Up to four units, sampling interval: 1 sec as standard, 0.1 sec at minimum (when using one instrument)
Analysis items	Group display of analysis results, overlaid results (homogeneous and heterogeneous data analysis, unlimited number of data points, batch analysis functions) Temperature, time, tangent line intersect, peak top, signal difference, peak height (For all techniques) Heat, glass transition, DSC peak automation (For DSC and TGA analysis) Weight loss, automatic weight loss, weight loss ratio → temperature (For TG analysis) Expansion and average expansion (For TMA analysis)
Data correction	Smoothing, baseline correction (blank, virtual line), temperature calibration (all techniques), heat calibration (DSC and DTA), total expansion correction, differential expansion correction (TMA)
Data protection	If the measurement is not completed normally, such as when the device power is cut off during the measurement, the data up to the moment before the cutoff is stored in a temporary file.
GLP/GMP compliance[*2]	Audit trail function, recording of operation logs and data logs (records)
Security functions[*2]	Interlinking with LabSolutions security functions, specifying rights by user group
Other	OLE function[*3], ASCII conversion functions (data, file information, measurement program, analysis results, correction logs), saving as text file[*3]

*1 PC and the instrument communicate via interface of TA-60WS software
*2 Compatible with LabSolutions DB TA and LabSolutions CS
*3 Not compatible with LabSolutions DB TA and LabSolutions CS

SHIMADZU

Shimadzu Corporation

www.shimadzu.com/an/