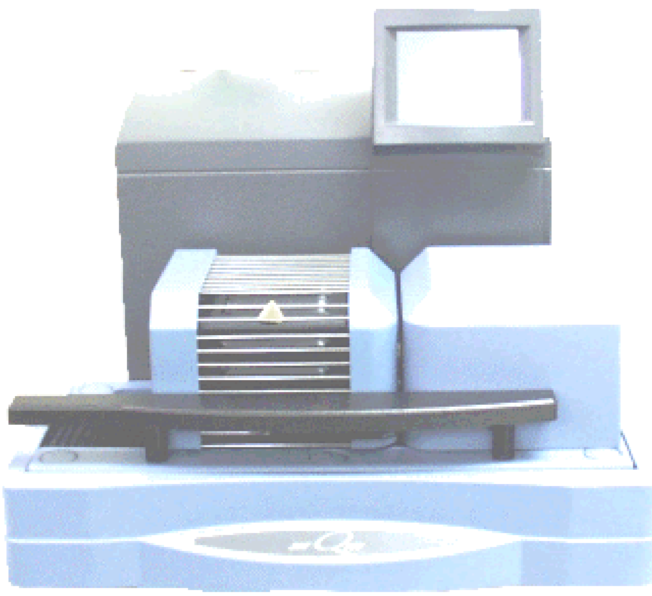
SDT
Simultaneous DSC-TGA



Q Series™
Getting Started Guide

Revision H
Issued March 2010

Notice

Important: TA Instruments Manual Supplement

Please click on the links below to access important information supplemental to this Getting Started Guide:

- TA Instruments Trademarks
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Table of Contents

Notes, Cautions, and Warnings

This manual uses NOTES, CAUTIONS, and WARNINGS to emphasize important and critical instructions.

A NOTE highlights important information about equipment or procedures.

A CAUTION emphasizes a procedure that may damage equipment or cause loss of data if not followed correctly.

A WARNING indicates a procedure that may be hazardous to the operator or to the environment if not followed correctly.

Regulatory Compliance

Safety Standards

<u>*For Canada:*</u>

CAN/CSA-22.2 No. 1010.1-92 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1: General Requirements + Amendments.
CAN/CSA-22.2 No. 1010.2.010-94 Particular requirements for laboratory equipment for the heating of materials + Amendments.

<u>*For the European Economic Area*</u>: (In accordance with Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.)

EN61010-1: 1993 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1: General Requirements + Amendments.
EN61010-2-010: 1994 Particular requirements for laboratory equipment for the heating of materials + Amendments.

<u>*For the United States*</u>:

UL61010A-1 Electrical Equipment for Laboratory Use; Part 1: General Requirements.
IEC 1010-2-010: 1992 Particular requirements for laboratory equipment for the heating of materials + Amendments.

Electromagnetic Compatibility Standards

<u>*For Australia and New Zealand*</u>:

AS/NZS 2064: 1997 Limits and methods of measurement of electronic disturbance characteristics of industrial, scientific and medical (ISM) radiofrequency equipment.

<u>*For Canada*</u>:

ICES-001 Issue 3 March 7, 1998 Interference-Causing Equipment Standard: Industrial, Scientific, and Medical Radio Frequency Generators.

<u>*For the European Economic Area*</u>: (In accordance with Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility.)

EN61326-1: 1997 Electrical equipment for measurement, control, and laboratory use-EMC requirements-Part 1: General Requirements + Amendments (for class A equipment).

<u>*For the United States*</u>:

CFR Title 47 Telecommunication Chapter I Federal Communications Commission, Part 15 Radio frequency devices (FCC regulation pertaining to radiofrequency emissions).

Safety

CAUTION: The operator of this instrument is advised that if the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.

Instrument Symbols

The following labels are displayed on the SDT instrument for your protection:

Symbol	Explanation
	This symbol, on the front of the SDT furnace, indicates that a hot surface may be present. Do not touch this area or allow any material that may melt or burn to come in contact with this surface. This symbol on the rear access panel indicates that you must unplug the instrument *before* doing any maintenance or repair work; voltages exceeding 120 Vac are present in this system.
	High voltages are present in this instrument. If you are not trained in electrical procedures, do not remove the cabinet covers unless specifically instructed to do so in the manual. Maintenance and repair of internal parts must be performed only by TA Instruments or other qualified service personnel.
	This symbol, on the balance side of the furnace, indicates a pinch-point caution. Before the furnace is closed, be sure this area is clear.

Please heed the warning labels and take the necessary precautions when dealing with these areas. The *SDT Q Series Getting Started Guide* contains cautions and warnings that must be followed for your own safety.

Electrical Safety

You must unplug the instrument *before* doing any maintenance or repair work; voltages exceeding 120 volts AC are present in this system.

WARNING: High voltages are present in this instrument. If you are not trained in electrical procedures, do not remove the cabinet covers unless specifically instructed to do so in the manual. Maintenance and repair of internal parts must be performed only by TA Instruments or other qualified service personnel.

WARNING: After transport or storage in humid conditions, this equipment could fail to meet all the safety requirements of the safety standards indicated. Refer to the CAUTION on page 24 for the method used to dry out the equipment before use.

Chemical Safety

Use only the purge gases listed in Chapter 1. Use of other gases could cause damage to the instrument or injury to the operator.

WARNING: Do not use hydrogen or any corrosive or flammable gases in the SDT furnace. Air can be used as a purge gas in the SDT. However, the furnace must be kept clean of volatile hydrocarbons that might combust.

WARNING: The SDT furnace assembly contains a layer of refractory ceramic fiber (RCF) insulation. This insulation is completely encapsulated within the furnace can, which is not meant to be disassembled.

WARNING: If you are using samples that may emit harmful gases, vent the gases by placing the SDT near an exhaust.

Thermal Safety

After running an experiment, allow the open furnace and sample beams to cool down before you touch them.

WARNING: During a sample run, the furnace can be hot enough to burn skin. Avoid contact with the furnace during experiments.

Mechanical Safety

WARNING: Keep your fingers and all other objects out of the path of the furnace when it is moving. The furnace seal is very tight.

Lifting the Instrument

The SDT is a fairly heavy instrument. In order to avoid injury, particularly to the back, please follow this advice:

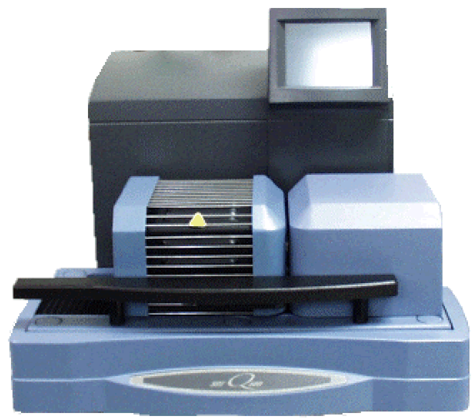
WARNING: Use two people to lift and/or carry the instrument. The instrument is too heavy for one person to handle safely.

Chapter 1

Introducing the SDT

Overview

Your Simultaneous DSC-TGA Q Series™ instrument, or SDT Q600, is an analysis instrument capable of performing both differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA) at the same time.



The SDT measures the heat flow and weight changes associated with transitions and reactions in materials over the temperature range ambient to 1500 °C. The information provided differentiates endothermic and exothermic events which have no associated weight change (*e.g.,* melting and crystallization) from those which involve a weight change (*e.g.,* degradation). Furthermore, performing both DSC and TGA measurements at the same time, on the same instrument and same sample, offers greater productivity and removes experimental and sampling variables as factors in the analysis of data.

The Simultaneous DSC-TGA works in conjunction with a controller and associated software to make up a thermal analysis system.

Your controller is a computer that performs the following functions:

- Provides an interface between you and the analysis instruments
- Enables you to set up experiments and enter constants
- Stores experimental data
- Runs data analysis programs.

Components

The SDT has three major components:

- The sample and reference balance assemblies, which provide the precise measurement of heat flow and sample weight.

- The furnace, which controls the sample atmosphere and temperature.

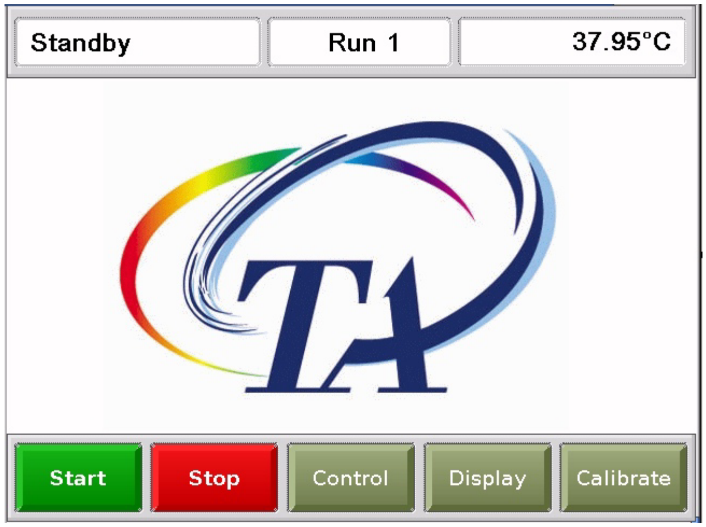
CAUTION: Leaving the furnace at high temperatures for extended periods of time may shorten the life of your furnace. Do not heat the furnace to high temperatures to clean the cups, clean them outside the furnace with a heat source such as a Bunsen burner.

- The cabinet, where the system electronics and mechanics are housed.

NOTE: For more detailed technical reference information, theory of operation, and other information associated with the SDT and not found in this manual, see the online help associated with the instrument control software.

The QSDT Touch Screen with QNX/Platinum™

The SDT Q600 instrument has a built-in integrated display and keypad in the form of a touch screen for local operator control. The functions on the screen change depending upon the menu you are using. This section briefly describes the basic layout of these functions when your instrument has QNX and Platinum capabilities installed.



The *status line* along the top of the display shows the current instrument status, run selection, and temperature.

At the bottom of the screen is a set of keys that are used for the primary instrument functions. See the table below for a description of each key.

The functions in the middle of the touch screen will vary depending on the screen displayed.

QNX/Platinum™ Primary Function Keys

Use the following keys for the main functions of the instrument.

Key Name	Description
Start	Begins the experiment. This is the same function as **Start** on the instrument control software. **Start** automatically loads the sample pan and closes the furnace, if necessary, before beginning the experiment.
Stop	If an experiment is running, this key ends the method normally, as though it had run to completion; *i.e.*, the method-end conditions go into effect and the data that has been generated is saved. This is the same function as **Stop** on the instrument control software. If an experiment is not running (the instrument is in a standby or method-end state), the **Stop** key will halt any activity (air cool, all mechanical motion, etc.).
Control *(table continued)*	Displays a list of the control command functions. These are used to control the instrument actions such as furnace movement, sample loading/unloading, taring, etc. Items can be selected from the icons or from the drop-down menu. Select **Apply** to initiate the command. See the next page for more details on this screen.

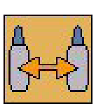
Display	Accesses the display screen, which displays the signals from the instrument such as signal display, real-time plot, instrument information, etc.
Calibrate	Displays the calibration functions available for this instrument.

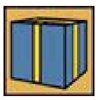
QNX/Platinum™ Control Menu

The Control Menu (see the figure to the right) is accessed by touching the **Control** key at the bottom of the touch screen. A brief description of each control command is provided in the table below.

NOTE: Most of the commands shown are not available during an active experiment.

Select the desired function either from the drop-down list of Control Commands or by pressing the icon. Then press **Apply** to initiate the action.

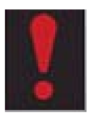
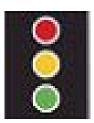
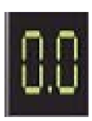
Control Command	Description
FURNACE 	Toggles between the furnace closed (right) and furnace open (left) functions, depending on where the furnace is when you press the key. This key can be pressed while the furnace is moving, to stop and reverse the direction of movement.
AIR COOL 	Toggles the air cool function on or off.
SWITCH GAS  *(table continued)*	Toggles between purge Gas #1 and Gas #2. See page 21 for information on gases to be used with the SDT.

Control Command	Description
TARE 	Zeros the displayed weight of empty sample and reference cups and stores the weight as an offset.
SHUTDOWN 	Shuts down and resets the instrument.
SHIP 	Closes the furnace when the beams are locked down. This is used to override the safety check that normally prevents the furnace from closing, thereby protecting the beams from damage. This is only used when shipping the instrument.
RESET SAVED PARAMETERS	Resets the saved instrument parameters and resets the instrument.

QNX/Platinum™ Display Touch Screen Options

The Display Options are accessed by touching the **Display** key at the bottom of the touch screen. The keys shown in the figure to the right are displayed.

A brief description of the function of each key is provided in the table below.

Key Name		Description
SEGMENTS		Accesses the experimental method that is currently being used for this experiment.
INFORMATION		Displays instrument information such as the software version, options, and the IP address.
STATUS		Displays the three main signals indicating the current status of the experiment.
SIGNALS		Displays the real-time signal data that comes directly from the instrument. The signals displayed here are customized through the instrument control software by accessing **Tools/Instrument Preferences**.
PLOT		Displays a time-based plot of data as it is received from the instrument during experiments.
SCREEN SAVER		Allows you to choose a screen saver for the touch screen.
HOME		Returns to the opening window.

QNX/Platinum™ Calibration Options

The Calibration Options are accessed by touching the **Calibrate** key at the bottom of the touch screen. The key shown in the figure below is displayed. A brief description of the function of this key is provided in the table below.

Key Name	Description
TOUCH SCREEN 	Allows you to calibrate the touch screen display.

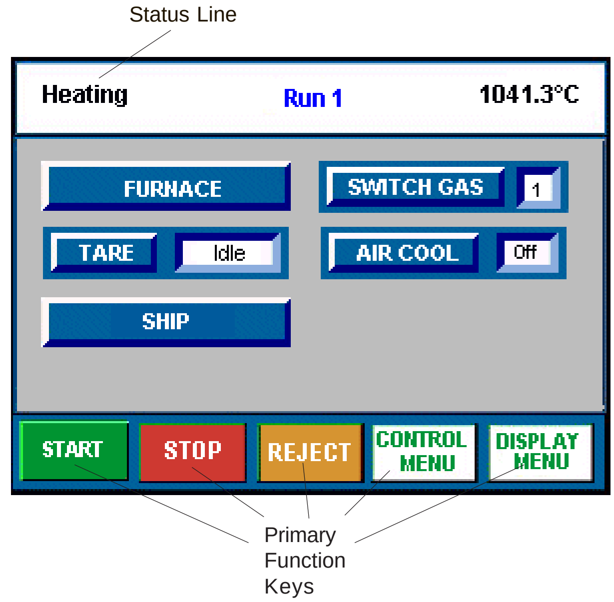
The SDT Q600 Touch Screen (Original)

The Q600 instrument has a built-in integrated display and keypad in the form of a touch screen for local operator control. The functions shown on the screen change depending upon the menu you are using. This section briefly describes the functions of the keys shown on the touch screen displays.

The *status line* along the top of the display (see the figure to the right) shows the current instrument status, current run number, and temperature.

At the bottom of the screen is a set of five keys that are used for the primary instrument functions. These keys are available to you regardless of the menu selected. See the next section for an explanation of the *primary function keys*.

NOTE: Experiment information and instrument constants are entered from the controller keyboard, not the instrument touch screen.



SDT Touch Screen

Primary Function Keys

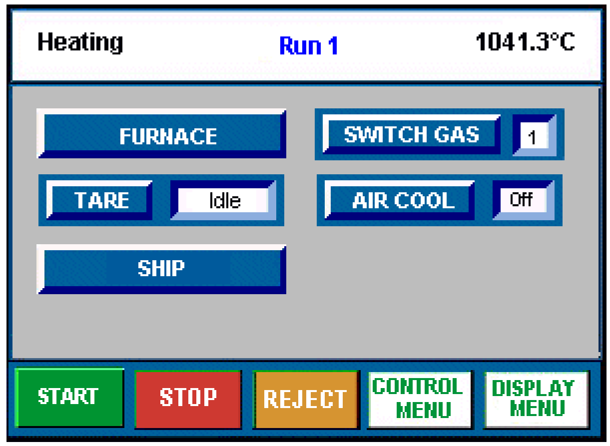
This set of keys, found at the bottom of the touch screen, are used to perform the basic functions of the instrument and to access the two main screens. See the table below for details.

Key Name	Description
START	Begins the experiment. This is the same function as Start on the instrument control software. *Forced Start* can be done by pressing the Start key while the status line displays "Set Up." Forced start begins collecting data during instrument setup.
STOP	If an experiment is running, this key ends the method normally, as though it had run to completion; *i.e.*, the method-end conditions go into effect and the data that has been generated is saved. This is the same function as Stop on the instrument control software. If an experiment is not running (the instrument is in a standby or method-end state), the Stop key will halt any activity (air cool, all mechanical motion, *etc.*).
REJECT	If an experiment is running, REJECT ends the method. The method-end conditions go into effect just as if the method had run to completion. However, the data that has been generated is *discarded*. This is the same function as Reject on the instrument control software. *(table continued)*

Key Name	Description
CONTROL MENU	Displays the Control Menu touch screen keys. These are used to control the instrument actions.
DISPLAY MENU	Accesses the Display Menu screen, which is used to select the desired display option.

Control Menu Keys

The Control Menu is accessed by touching the Control Menu key at the bottom of the touch screen. The keys shown in the figure below are displayed. A brief description of the function of each key is provided in the table below.

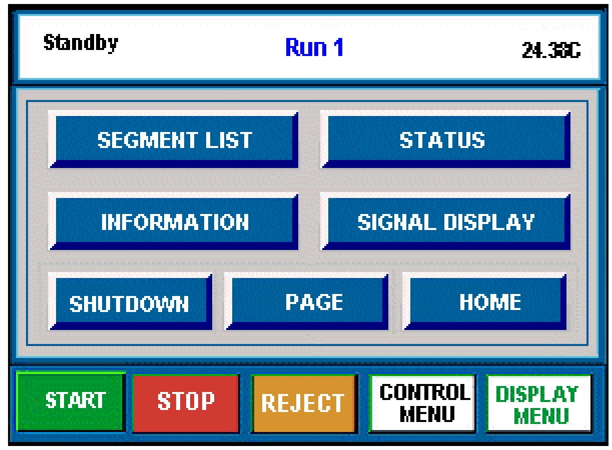


SDT Control Touch Screen

Key Name	Description
FURNACE	Toggles between the furnace closed (right) and furnace open (left) functions, depending on where the furnace is when you press the key. This key can be pressed while the furnace is moving, to stop and reverse the direction of movement.
SWITCH GAS 1	Toggles between purge Gas #1 and Gas #2. See page 21 for information on gases to be used with the SDT.
TARE Idle	Zeros the displayed weight of empty sample and reference cups and stores the weight as an offset.
AIR COOL Off	Toggles the air cool function on or off.
SHIP	Closes the furnace when the beams are locked down. This is used to override the safety check that normally prevents the furnace from closing, thereby protecting the beams from damage. This is only used when shipping the instrument.

Display Menu Keys

The Display Menu is accessed by touching the DISPLAY MENU key at the bottom of the touch screen. The menu shown in the figure here will be displayed. A brief description of the function of each key is provided in the table below.



SDT Display Touch Screen

Key Name	Description
SEGMENT LIST	Accesses the experimental procedure that is currently being used for this experiment and highlights the active segment.
STATUS	Displays the three main signals indicating the current status of the experiment.
INFORMATION	Displays instrument information such as the software version, options, and the IP (Internet Protocol) address.
SIGNAL DISPLAY	Displays the realtime signal data that comes directly from the instrument. The signals displayed here are customized through the instrument control software.
SHUTDOWN	Ensures proper shutdown of the instrument before turning off the power.
PAGE	Beeps to call the controller that is connected to the instrument.
HOME	Returns to the opening window.

Instrument Specifications

The tables found on the following pages contain the technical specifications for the SDT.

SDT Instrument Characteristics

Dimensions	Depth 56 cm (22 in.) Width 59.7 cm (23.2 in.) Height 48 cm (19 in.)
Weight Weight with a Transformer	32 kg (70 lbs) 40 kg (88 lbs)
Power	120 Vac, 47/63 Hz, 1.44 kVA, standard 230 Vac, 47/63 Hz, 1.44 kVA, if configured with a step-down transformer
Accessory Outlets	120 Vac Only TA-approved accessories
Operating Environment Conditions	Temperature: 15–30 °C Relative Humidity: 5–80 % (non-condensing) Installation Category II Pollution Degree 2 Maximum Altitude: 2000 m (6560 ft)
Thermocouples	Platinum-Platinum/13 % Rhodium Type R
Temperature Control Range	Ambient +5°C to 1500 °C
Heating Rate	100 °C/min to 1000 °C 25 °C/min to 1500 °C

SDT Sampling System/Operating Parameters

The following table contains the specifications associated with the SDT sample cups, balance mechanism, furnace, and purge gases.

Sample Cups	
Types	Platinum, Alumina (Al_20_3)
Volume Capacity	Platinum: 40 μL; 110 μL (recommended for TGA-DTA studies) Alumina: 40 μL; 90 μL (recommended for DSC-TGA studies)
Operating Parameters	
Heat Flow Accuracy (DSC)	Better than ± 2 % (Based on metal melting standards.)
Heat Flow Precision (DSC)	Better than ± 2 % (Based on metal melting standards.)
Temperature Accuracy	±1 °C (Based on metal melting standards.)
Temperature Precision	±0.5 °C (Based on metal melting standards.)
ΔT Sensitivity (DTA)	0.001 °C (200 to 1300 °C)
Weight Sensitivity*	0.1 µg
Weight Accuracy*	±1 %
* NOTE: The SDT balance mechanism is sensitive to changes in the surrounding room temperature. For optimum accuracy, you must regulate the ambient temperature.	
Furnace Purge Gases	Helium, nitrogen, air, argon
Flow Rate	20 to 1000 mL/min, (100 mL/min is typical during experiments) Regulated by the Mass Flow Controller with gas switching capability.
Secondary Purge	Oxygen, air, carbon monoxide, carbon dioxide, nitrogen, helium, argon.
Flow Rate	10 to 100 mL/min (20 mL/min is typical for experiments)

WARNING: The secondary purge is designed to allow introduction of a "reactive" gas at modest concentration in the area of the sample. The secondary purge line is made of stainless steel. The secondary purge tube in the furnace is Inconel®. Hence, only gases which do not react with stainless steel, Inconel®, or platinum (or the alumina furnace tube) should be used as a secondary purge gas. (Remember that platinum is a catalyst, allowing reactions to take place which might not occur in its absence.)

Chapter 2

Installing the SDT

Unpacking/Repacking the SDT

The instructions needed to unpack and repack the instrument are found as separate unpacking instructions in the shipping box and in the online documentation associated with the instrument control software. You may wish to retain all of the shipping hardware, the plywood, and boxes from the instrument in the event you wish to repack and ship your instrument.

WARNING: Have an assistant help you unpack this unit. Do not attempt to do this alone.

Installing the Instrument

Before shipment, the SDT instrument is inspected both electrically and mechanically so that it is ready for operation upon proper installation. Only limited instructions are given in this manual, consult the online documentation for additional information. Installation involves the following procedures:

- Inspecting the system for shipping damage and missing parts
- Connecting the SDT to the TA Instruments controller
- Connecting the purge gas lines, accessories, and power cable
- Unpacking the balance

It is recommended that you have your SDT installed by a TA Instruments Service Representative, call for an installation appointment when you receive your instrument.

CAUTION: To avoid mistakes, read this entire chapter before you begin installation.

Inspecting the System

When you receive your SDT, look over the instrument and shipping container carefully for signs of shipping damage, and check the parts received against the enclosed shipping list.

- If the instrument is damaged, notify the carrier and TA Instruments immediately.
- If the instrument is intact but parts are missing, contact TA Instruments.

Choosing a Location

Because of the sensitivity of SDT experiments, it is important to choose a location for the instrument using the following guidelines. The SDT should be:

In ... a temperature-controlled area.
... a clean, vibration-free environment.
... an area with ample working and ventilation space.

On ... a stable work surface.

Near ... a power outlet (120 Vac, 50 or 60 Hz, 15 amps or 230 Vac, 50 or 60 Hz, 10 amps if configured with a step down transformer).
...your TA Instruments thermal analysis controller.
...compressed lab air and purge gas supplies with suitable regulators and flowmeters, if required.

Away from ... dusty environments.
... exposure to direct sunlight.
... direct air drafts (fans, room air ducts).
... poorly ventilated areas.
... noisy or mechanical vibrations.
... flammable materials.

CAUTION: Drying out the instrument may be needed, if it has been exposed to humid conditions. It is important to be certain that the instrument ground is adequately connected to the facilities ground for safe operation.

Run the following procedure to dry out the instrument:

1 Ramp at 10 °C/min to 400 °C.
2 Isothermal for 30 min.

Connecting Cables and Lines

To connect the cables and gas lines, you will need access to the SDT instrument's rear panel. All directional descriptions are written on the assumption that you are facing the back of the instrument.

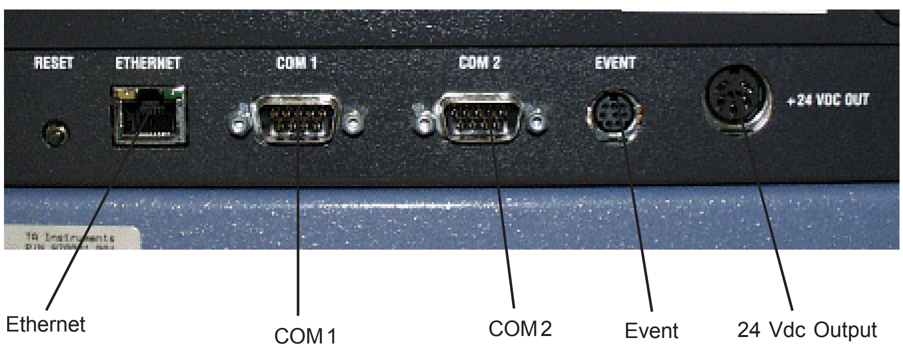
NOTE: Connect all cables before connecting the power cords to outlets. Tighten the thumb-screws on all computer cables.

CAUTION: Whenever plugging or unplugging power cords, handle them by the plugs, not by the cords.

WARNING: Protect power and communications cable paths. Do not create tripping hazards by laying the cables across accessways.

Ports

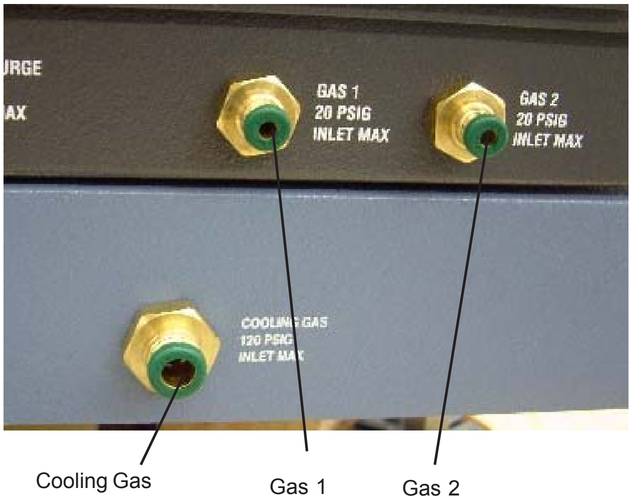
The SDT has ports that are located on the back of the instrument. The following table provides a description of function of each port. Refer to this list when connecting cables and lines.



Five Ports on Left Rear of SDT

Port	Function
Ethernet	Provides network communication capabilities
Com 1	Diagnostic port. (Factory use only.)
Com 2	*Not used for the SDT.*
Event	Capable of the following functions: general purpose relay contact closure, gas switching contact closure sync input, or general purpose input 4 – 24 Vdc for external syncing.
24 Vdc output	*Not used for the SDT.*
	(table continued)

Port	Function
Base Purge (not shown)	*Not used for the SDT.*
Gas 1/Gas 2	Inlet ports that connect to the Mass Flow Controller. Provides ability to switch the primary purge gas during an experiment. 140 kPa gauge (20 psig) maximum pressure.
Cooling Gas	Provides the furnace with air for cooling. 830 kPa gauge (120 psig) maximum pressure.
Secondary Purge (shown on page 30)	Provides a port to introduce an additional ("reactive") gas directly into the vicinity of the sample and reference. External flow regulation is required.

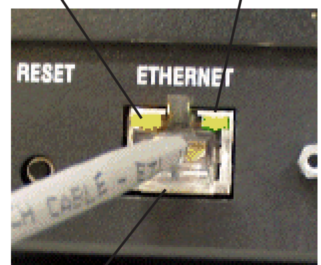


Three Usable Ports on the Right Rear of the SDT

Ethernet Switch Setup

In order to connect the instrument to a network, you will need to make the necessary cable connections as described below. The instrument and controller will be connected to an Ethernet switch. In addition, there are instructions for connecting the controller to a LAN.

Connecting the Instrument to the Switch



1. Locate the Ethernet port on the left rear of the instrument (shown in the figure to the right).

2. Connect one end of the Ethernet cable into the instrument's Ethernet port.

3. Connect the other end of the Ethernet cable to one of the network ports on the Ethernet switch (shown in the figure below).

Ethernet Switch

4. Check the configuration switches, located on the back panel. They must be set to off, or the up position, for the controller to communicate to the instruments.

Configuration Switches

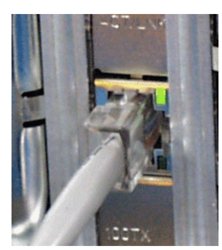
5. Check the Ethernet port on the rear of the instrument. If communication between the instrument and the switch has been properly established, a solid green light and flashing yellow light will appear at the port.

6. Follow the directions in the next section to connect the controller to the Ethernet switch.

Connecting the Controller to the Switch

1. Locate the Ethernet port on the back of the computer.

2. Plug one end of the Ethernet cable into the computer's Ethernet port (shown in the figure to the right).



Computer Ethernet Port

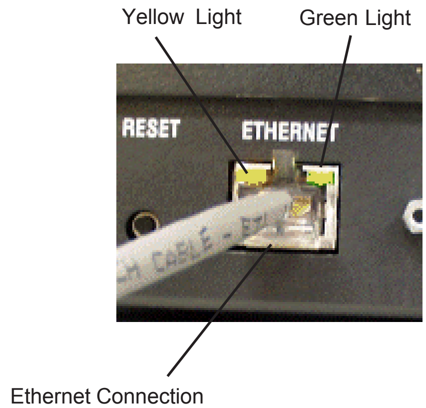
3. Connect the other end of the cable to one of the network ports on the switch.

4. Check the Ethernet port on the rear of the computer. If communication between the computer and the switch has been properly established, a solid green light and flashing yellow light will appear at the port.

5. Follow the directions in the next section to connect the controller to a LAN for networking capabilities.

Connecting the Controller to a LAN

Before you can connect the controller to a LAN, you will need to have already installed a network interface card into the computer.



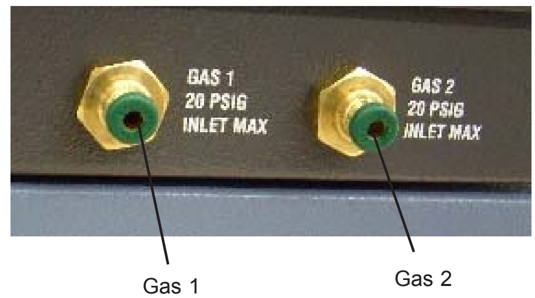
1. Locate the second Ethernet port on the back of the computer.
2. Plug one end of the Ethernet cable into the computer's Ethernet port.
3. Plug the other end into the LAN.
4. Check the Ethernet port on the rear of the computer. If communication between the computer and the LAN has been properly established, a solid green light and flashing yellow light will appear at the port.

Purge Lines

You can control the sample atmosphere during SDT experiments by connecting purge gases to the system. The SDT is equipped with a mass flow controller (MFC) to control the flow rate of the primary purge gas. Up to two different gases may be connected to the instrument to facilitate gas switching. Follow these instructions to connect the purge lines. Refer to the figure below to locate the purge lines.

CAUTION: Do not use any liquid in the purge lines.

Follow these instructions:



1. Locate the Gas 1 port. The Gas 1 port is used to purge the sample area. Nitrogen is the recommended purge gas.

2. Locate the Gas 2 port. The Gas 2 port is also used to purge the sample area and is used when a different purge gas from Gas 1 is desired or when gas switching during an experiment is needed.

3. Connect the primary gas line to the Gas 1 port using 1/8-inch O.D. tubing. Teflon® TFE tubing is recommended and is supplied in the instrument shipping accessory kit. If desired, connect a second gas to the Gas 2 port. The flow rate is controlled through the Mass Flow Controller settings chosen using the instrument control software.

4. Make sure that the pressure of your purge gas source is regulated between 70 to 140 kPa gauge (10 to 20 psig) maximum.

5. Specify the connected gas on the **Instrument Preferences/MFC Page** using the instrument control software.

6. Set the flow rate to the recommended value of 100 mL/min for your experiments on the **Notes Page** of the **Experiment View**. Click **Apply** to save the changes.

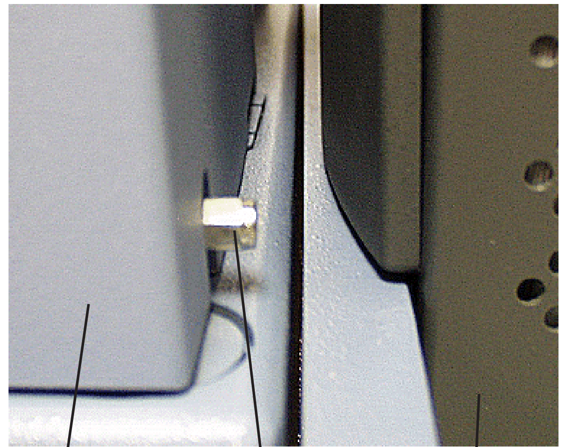
NOTE: If you are using laboratory (house) purge gas, rather than bottled purge gas, it is highly recommended that you install an external drier and a 5 µm filter in the gas line prior to the instrument.

CAUTION: Corrosive gases cannot be used with this instrument.

WARNING: Use of a flammable gas as a purge gas is dangerous and is not recommended for this instrument. For a list of the purge gases that can be used with the SDT instrument, see Chapter 1.

Secondary Purge Line

The secondary purge fitting (shown here) is used to expose the sample to an additional gas, other than that used through the mass flow controller. This gas is introduced into the area of the sample and reference via a thin Inconal® tube mounted between the balance arms. This secondary purge capability is designed to allow a second gas to be introduced in the vicinity of the sample without exposing the balance to that gas. Use the following steps to install the secondary purge line.



CAUTION: Corrosive gases should not be used as the secondary purge.

WARNING: Use of a flammable gas as a purge gas is dangerous and is not recommended for this instrument. For a list of the purge gases that can be used with the SDT instrument, see Chapter 1.

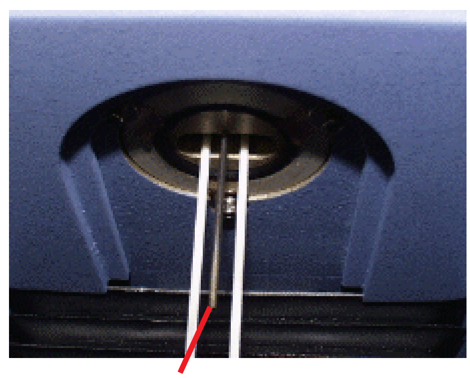
1. Remove the cap from the secondary purge fitting, which is located between the SDT housing and the cabinet on the right-hand side of the instrument.

2. Install the nut and ferrule supplied in the accessory kit.

3. Connect the desired gas to an external flow meter. Flow is controlled via this flow meter and not by using the Notes Page in Experimental View. In addition, the flow rate for the secondary purge is not stored as a signal in the data analysis files.

4. Connect one end of a 1/8-inch O.D. compression tube to the flow meter and the other end to the secondary purge fitting.

5. Regulate the flow meter to a recommended 20 mL/min.



NOTE: The primary purge must be used at all times (100 mL/min recommended). This prevents the secondary purge gas from diffusing back into the balance.

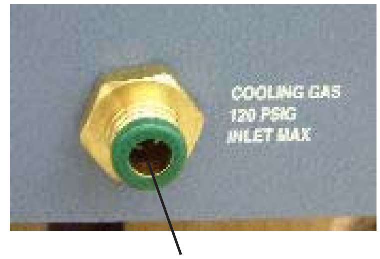
Cooling Gas Line

Use the following steps to install the cooling gas line.

1. Locate the Cooling Gas fitting, a 1/4-inch Legris fitting on the rear of the SDT cabinet, marked with a 830 kPa gauge (120 psig) maximum warning label. See the figure to the right.

2. Make sure your compressed lab air source is regulated to between 170 and 830 kPa gauge (25 and 120 psig) and is free of oil and water vapors.

3. Connect the 1/4 O.D. tubing to the Cooling Gas fitting.



Cooling Gas

NOTE: Nitrogen may also be used as a cooling gas. Whichever gas is chosen as a cooling gas, it should be clean and dry.

NOTE: Air Cool will operate only when the furnace temperature is below 600 °C.

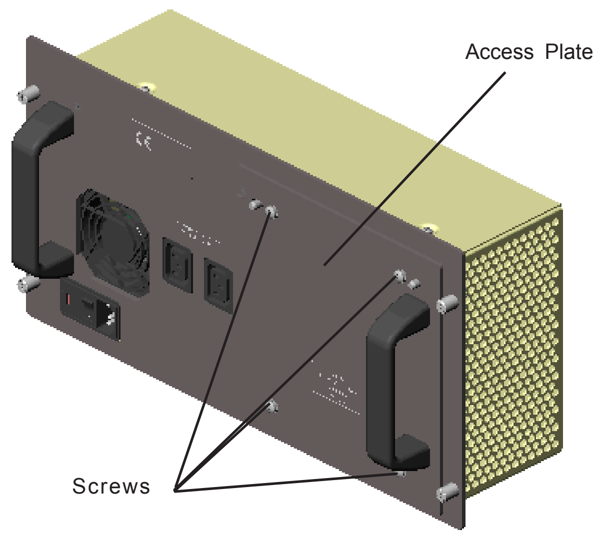
Voltage Configuration Unit

A voltage configuration unit is required if you use 230 Vac, rather than 120 Vac. Follow these steps to install the unit on the Power Control Unit (PCU):

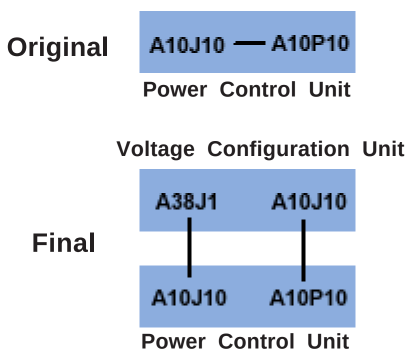
WARNING: High voltages are present in this instrument as indicated by the label. Be sure to unplug the instrument before performing these instructions. See the electrical safety WARNING on page 8.

1. Remove the contents from the shipping box and verify that all of the components are present.

2. Remove the access plate located on the rear of the instrument by removing the four (4) screws that secure it in place. See the to the right.

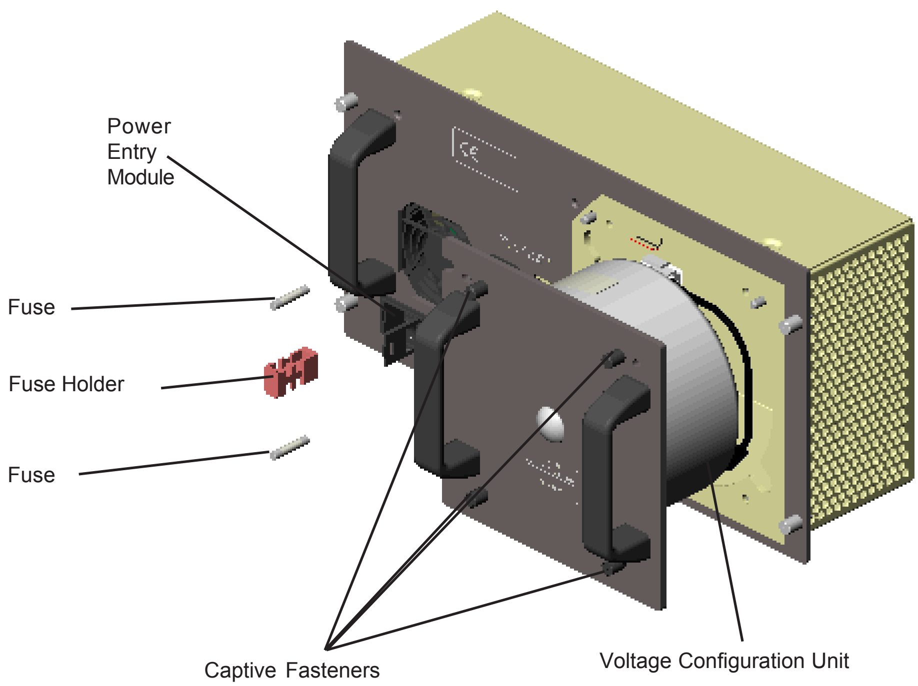


3. Disconnect the A10J10 connector from A10P10 located inside the PCU. Now connect the A10J10 connector on the voltage configuration unit to A10P10 located inside the PCU. Then connect A10J10 located inside the PCU to A38J1 on the anti-surge subassembly. See the diagram below for clarification.

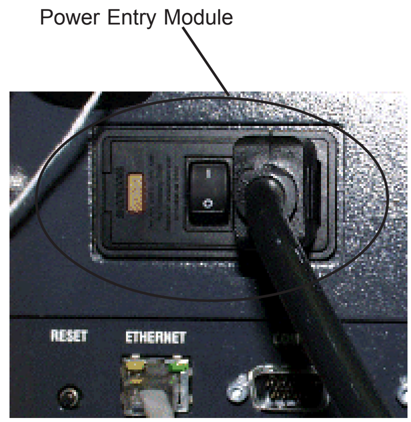


4. Install the subassembly into the PCU and tighten the four (4) captive fasteners to secure it.

5. Remove the fuse holder from the power entry module and replace the 10 amp fuses with 6.3 amp fuses, which are supplied in the kit. Discard the 10 amp fuses. See the figure to the right.



Power Switch



The power switch is located at the rear of the instrument. It is part of the assembly called the *power entry module*, which also contains the power cable connection. The power switch is used to turn the instrument on and off. If a transformer is required, it must be installed before turning on the power.

Power Cable

NOTE: A <HAR>-marked (harmonized) power cable meeting the standards of the country of installation is required for the European Economic Area.

Install the power cable as follows:

1. Make sure the SDT POWER switch is in the Off (0) position.

2. Plug the power cable into the SDT power entry module.

CAUTION: Before plugging the SDT power cable into the wall outlet, make sure the instrument is compatible with the line voltage. Check the label on the back of the unit to verify the voltage.

---

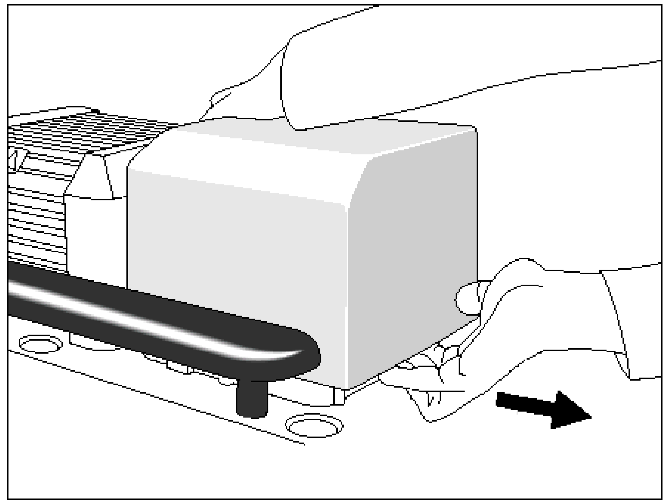
3. Plug the power cable into the wall outlet.

Unpacking the Balance

CAUTION: When unpacking the balance, follow these procedures carefully to prevent damage to the two balance beams.

The SDT is shipped with a balance dress cover, shipping foam, and some mechanical parts locked in position in order to protect the inner mechanisms. Follow these procedures to unpack and prepare your instrument for use:

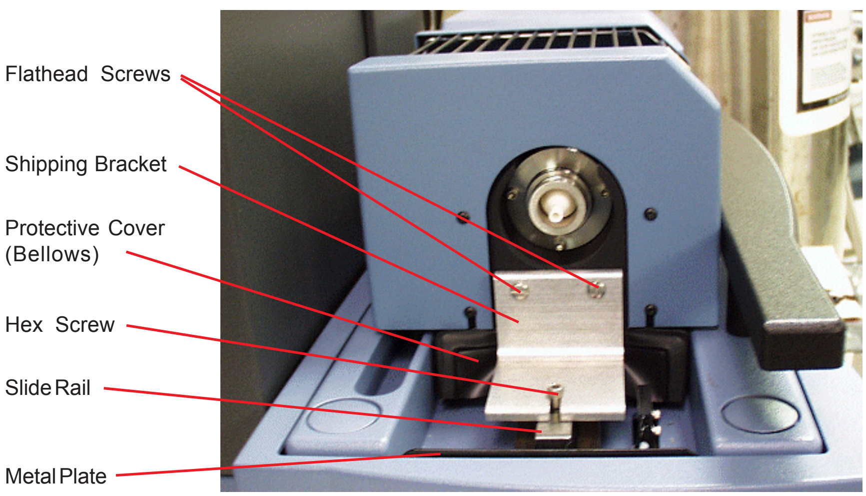
1. Using both hands, grasp the balance dress cover, and work it back and forth slightly as you pull it up. When you have enough clearance, place your fingers under the cover, as shown in the figure to the right. Then pull out on the right bottom edge of the dress cover to clear the balance housing lid as you slide the dress cover up and off.



Removing the Balance Dress Cover

2. Locate the three screws on the shipping bracket positioned on the left side of the furnace (see the figure on the next page). This bracket is used to hold the furnace in place during shipping.

3. Use a flathead screwdriver to completely remove two (2) of the screws and their washers, and use a 10/32 hex wrench to remove the hex screw. Then remove the bracket, but do not discard it. Retain the bracket in case you need to ship your SDT.



Location of the Shipping Bracket Assembly

4. Replace two screws and their washers in the same holes on the left side of the furnace. Place the hex screw back in the slide rail (it has a locking washer already present).

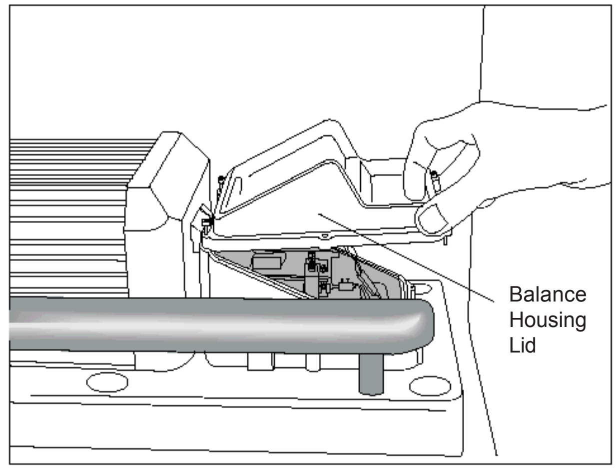
5. Pull the rubber protective cover (bellows) out, and stretch it across to the left. Hook the end of the cover over the black metal plate.

6. Use a 3/32-inch hex wrench to remove the six (6) screws holding the balance housing lid in place.

7. Place one hand on each side of the balance housing lid, and *carefully* lift the right side of the lid, as shown in the figure here.

8. Pivot the right side of the lid upwards first to clear the inner mechanisms of the balance assembly. Then lift up the left side of the lid, and remove the lid entirely.

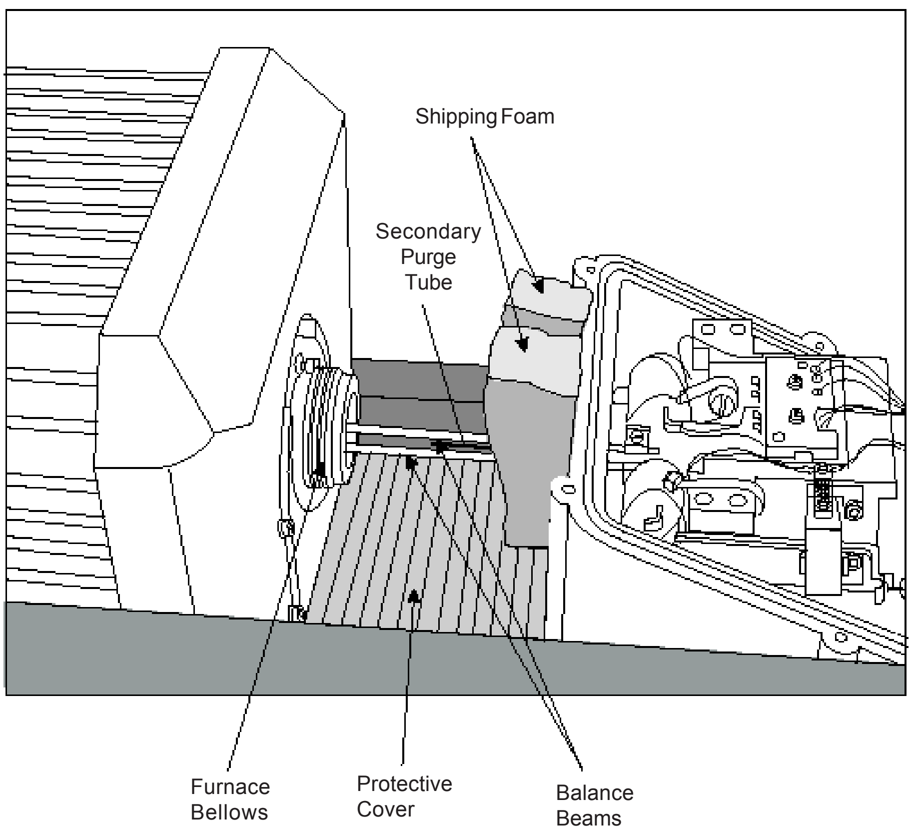
9. Inspect the balance assembly for signs of visible damage. If any damage is found, contact your TA Instruments representative before proceeding further.



Removing the Balance Housing Lid

10. Turn on the SDT's POWER switch.

11. Press the FURNACE key on the instrument touch screen to start the furnace in motion. Stop the furnace by pressing the FURNACE button again (or using the STOP button) when the furnace has opened 5 to 8 cm (2 to 3 inches). This allows enough room to reach the shipping foam around the balance beams, as shown in the figure below.

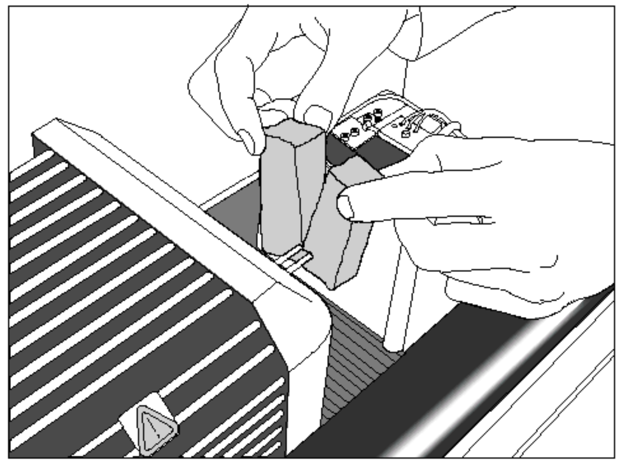


Location of Shipping Foam

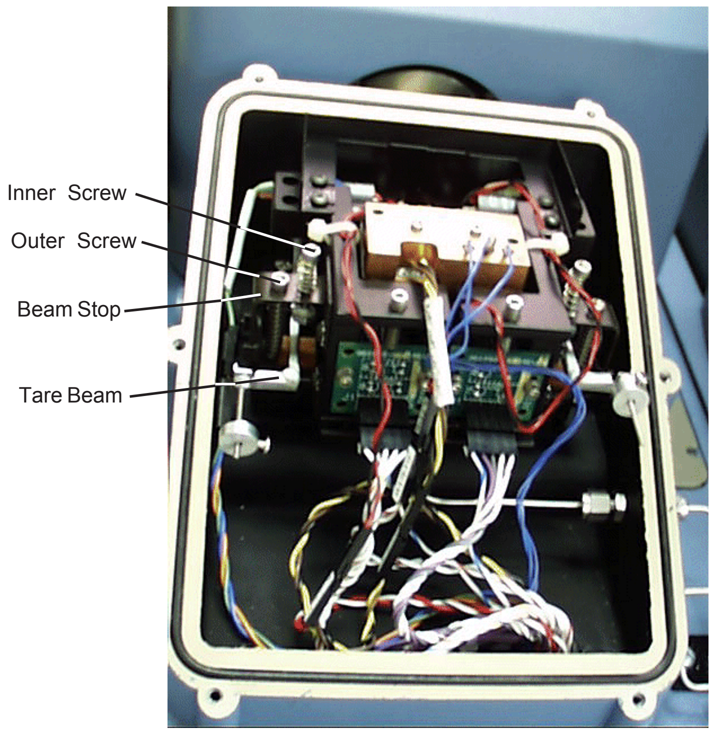
12. Carefully grasp the tops of the foam with both hands, as shown in the figure to the right, and separate the two top portions of the Y-shaped foam.

13. Push the back portion of the foam gently under the beams, and remove the foam *very carefully* to avoid breaking the sample and reference beams.

14. Locate the two screws on the front (sample) beam stop that are holding the tare beam in a locked position for shipment. Refer to the figure below.



Removing the Shipping Foam



Two Screws that Lock Beams

15. Using a 3/32-inch hex wrench, turn the inner screw counterclockwise a few turns to raise it up off the tare beam.

16. Turn the outer screw counterclockwise to loosen the beam stop assembly. This screw should be loosened until the tare beam has freedom of movement in both directions.

17. Carefully turn the inner screw back down (clockwise) so that it is now very close to, but *not touching*, the tare beam. Do the same for the outer screw, so that the bracket is now very close to, but *not touching*, the tare beam. This readjustment of the beam stop ensures that the tare beam does not travel excessively.

18. Repeat steps 14 through 17 for the back (reference) beam stop.

19. Replace the balance housing lid, and reinstall the six (6) screws to hold it in place.

20. Replace the balance dress cover.

NOTE: You must be sure to calibrate the instrument before beginning operation.

Refer to the online help for information on repacking the SDT for shipping, if required.

Starting the Instrument

1. Check all connections between the SDT and the controller. Make sure each component is plugged into the correct connector.

2. Set the instrument power switch to the ON (1) position.

After the proper power up sequence, the TA Instruments logo will be displayed on the touch screen. This indicates that the instrument is ready for use.

NOTE: Allow the SDT to warm up for at least 30 minutes before performing an experiment.

CAUTION: Drying out the instrument may be needed, if it has been exposed to humid conditions. It is important to be certain that the instrument ground is adequately connected to the facilities ground for safe operation.

Run the following procedure to dry out the instrument:

1 Ramp at 10 °C/min to 400 °C
2 Isothermal for 30 min.

Shutting Down the Instrument

Before you decide to power down your instrument, consider the following:

- All of the components of your thermal analysis system are designed to be powered on for long periods.

- The electronics of the SDT and the controller perform more reliably if power fluctuations caused by turning units on and off are minimized.

For these reasons, turning the system and its components on and off frequently is discouraged. Therefore, when you finish running an experiment on your instrument and wish to use the thermal analysis system for some other task, it is recommended that you leave the instrument on.

To ensure proper shutdown of the instrument, it is recommended that you initiate the "Shutdown Instrument" function before turning off or resetting your instrument. This function is available on the instrument touch screen or through the Instrument Control software.

To power down your instrument set the power switch to the OFF (0) position.

Chapter 3

Use, Maintenance, & Diagnostics

Using the SDT

All of your SDT experiments will have the following general outline. In some cases, not all of these steps will be performed. The majority of these steps are performed using the instrument control software. The instructions needed to perform these actions can be found in the online help in the instrument control program; therefore, they will not all be covered in detail here.

- Calibrating the instrument
- Selecting the mode and signals to save.
- Selecting the cup type and material
- Setting the primary purge and secondary gas flow rates
- Creating or choosing the test procedure and entering experiment information through the TA instrument control software
- Selecting and taring two empty sample cups on the sample and reference beams.
- Loading the sample.
- Closing the furnace
- Starting the experiment
- Unloading the sample at the end of the experiment.

To obtain accurate results, follow procedures carefully and check calibration periodically (at least once a month).

Before You Begin

Before you set up an experiment, ensure that the SDT and the controller have been installed properly. Make sure you have:

- Made all necessary cable connections between the SDT and the controller
- Connected all gas lines
- Powered on each unit
- Connected the instrument with the controller
- Become familiar with controller operations
- Calibrated the SDT, if necessary.

Calibrating the SDT

To obtain accurate experimental results, you should calibrate the SDT when you first install it, and periodically thereafter. As a minimum, the SDT should be recalibrated anytime the beam set, experimental heating rate, or purge gas is changed.

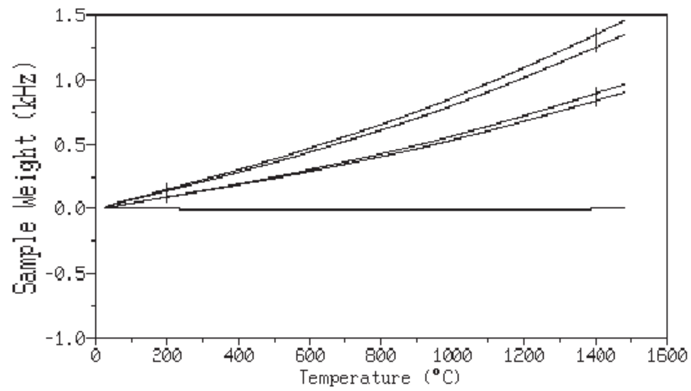
SDT calibration includes the following procedures:

- TGA Weight Calibration: Calibration of the TGA weight signal.
- DTA Baseline Calibration: Calibration of the Delta T signal.
- Temperature Calibration: Calibration of the temperature signal.
- DSC Heat Flow Calibration: Calibration of the heat flow signal.
- Dual Sample Calibration: Calibration of the dual sample weight signals.

These calibrations are all performed in the calibration mode and must be performed in the order shown. (Select **Calibrate** from the instrument control menu.) Detailed information on conducting each of these experiments can be found in the SDT online help documentation.

TGA Weight Calibration

TGA Weight Calibration is based on two runs: one using calibration weights and one using no weights (empty beams). The TGA data from both runs is analyzed, and beam and weight correction factors are calibrated.



TGA Weight Calibration Results

DTA Baseline Calibration

DTA Baseline Calibration is based on analyzing Delta T data collected from a baseline run conducted over the temperature range expected in subsequent experiments. (This experiment usually utilizes the same baseline run obtained for TGA Weight Calibration.)

The DTA baseline is corrected by a linear (slope and offset) function of the sample temperature. This results in shifting and rotating the baseline so that the calibrated portion is near 0°C.

NOTE: The DTA baseline calibration is not required when using the SDT as a DSC-TGA (*i.e*, when not saving the Delta T signal). This is because the DSC Heat Flow Calibration includes a baseline subtraction. However, the shape of the DTA baseline is valuable as a quick verification that the SDT beams are correctly positioned and that DSC heat flow calibration can be successfully completed.

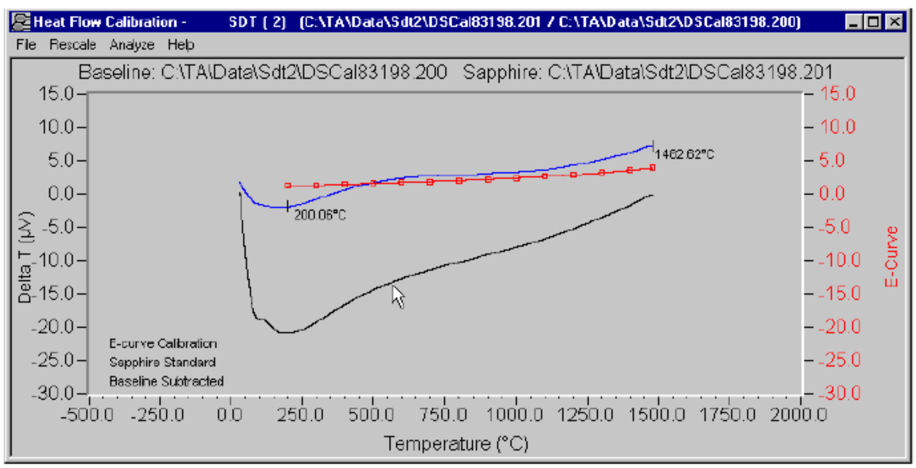
Temperature Calibration

Temperature calibration is based on evaluation of the melting endotherm(s) of a high purity metal standard(s). The recorded onset of melting of this standard(s) is compared with the literature value and the difference is calculated for temperature calibration. Up to five standards may be used. Zinc (419 °C) is supplied in the SDT accessory kit. Other suitable standards are tin (232 °C), aluminum (661 °C), silver (961 °C), gold (1064 °C) and nickel (1455 °C). If you use one known standard and observed melting points, the entire curve is offset, or shifted, to the actual melting point. If you use multiple standards, the temperature is corrected by a cubic spline fit. The multiple-point temperature calibration is more accurate than the one-point calibration.

DSC Heat Flow Calibration

SDT heat flow calibration is based on analyzing the heat capacity curve for sapphire over the range 200 to 1500 °C (see the figure below) and the heat of fusion of high purity zinc metal. Three experimental runs are required: one using an empty alumina cup (90 µL) for both the reference and sample (baseline run) and one using a sapphire standard (supplied in the SDT Accessory Kit) as the sample. The measured heat capacity for sapphire is compared with the literature value at multiple temperatures across the range and mathematically fitted to generate a heat flow calibration curve.

This calibration curve may be further refined by a third experiment that measures the heat of fusion of high purity zinc wire (supplied in the accessory kit). The heat of fusion is measured and the cell constant is calculated using the known value of the heat of fusion of zinc (108.7 J/g) and the equation "Cell Constant = Known Value/Measured Value." The calculated value of the cell constant is then entered into the software.



DSC Heat Flow Calibration

Dual Sample Calibration

Dual Calibration is an alternative method for providing reference data that allows both pans for use with samples. A baseline run is made with tared, empty pans on both sides and the weight and temperature profiles observed for each side are stored as cubic spline functions of temperature. These stored profiles then provide historical reference data for subsequent Dual Sample runs. For optimum results the same cups should be used in subsequent dual sample experiments.

Running an SDT Experiment

Experimental Procedure

All of your SDT experiments will have the following general outline. In some cases, not all of these steps will be performed. See the instrument control software online help for anything not covered in this manual.

- Attaching and setting up the purge gas.
- Selecting the desired mode of operation and the signals to be saved (heat flow, weight, and/or Delta T).
- Selecting, loading and taring the sample cup (and a reference cup) on the balance.
- Selecting and preparing a sample. This involves preparing a sample of the appropriate size and placing the sample in the cup.
- Entering experiment and procedure information through the TA controller, this includes both sample and instrument information.
- Closing the furnace.
- Starting the experiment.

Selecting the SDT Mode and Signals

There are four available modes that can be used when running experiments on the SDT—standard, calibration, dual sample, and dual sample calibration.

- The *calibration mode* should be used before performing any standard experiments. This mode calibrates the weight, DTA baseline, temperature and/or heat flow. The available signals used in this mode cannot be changed.

- The *standard mode* is used for conducting all other non-calibration experiments. In this mode the signals to be stored for each experiment can be individually selected. Some of the available signals are Weight, Heat Flow, Delta T (°C) and Delta T (microV).

- The *dual sample mode* is used for conducting all normal (noncalibration) dual sample experiments. The available signals used in this mode include Temperature Difference (°C), Temperature Difference (°C/mg), Weight (mg), and Weight Percent (%) for both side A (sample beam side) and side B (reference beam side). This mode is only used for conducting ramping temperature experiments under the same conditions (e.g., heating rate, purge, etc.) used in the dual sample calibration. For optimum results the same SDT cups used during the dual sample calibration should be used.

- The *dual sample calibration mode* is used before performing dual sample SDT experiments. This mode calibrates the weights A and B obtained from the two balance arms. The available signals in this mode cannot be changed.

The SDT is used to perform simultaneous measurements of TGA and either DSC (most commonly used) or DTA, depending upon the desired experiment. Throughout this manual and the online help documentation you will see reference to *DSC-TGA experiments* or *TGA-DTA experiments*. This nomenclature refers to experiments that save heat flow and weight, or weight and delta T (µV and/or °C), respectively.

Preparing SDT Samples

Two kinds of specialized sample cups are available for the SDT. In addition, these cups come in several sizes. The criteria for choosing a sample cup are simple:

- *For DSC-TGA experiments*, the ceramic (alumina) 90 µL cups **must** be used. These cups are compatible (*i.e.*, do not affect the results) with most high temperature materials. In addition, the sapphire DSC heat flow calibration standard has been specifically cut to fit the 90 µL cups.

- *For TGA-DTA experiments*, the ceramic (40 µL or 90 µL) or platinum (40 µL or 110 µL) cups are acceptable alternatives. Platinum is generally preferred for TGA-DTA work because it is easy to clean and does not react with most organics and polymers. Ceramic is a better choice for inorganics or corrosive materials.

All cup types are reusable. To clean a cup between experiments, use a Bunsen burner or a propane torch to burn out any residue.

CAUTION: Do not heat the furnace to high temperatures to clean the cups, clean them outside the furnace as directed above. Leaving the furnace at high temperatures for extended periods of time may shorten the life of your furnace.

WARNING: Using platinum cups at high temperatures (i.e., above 800°C) increases the likelihood that they may stick to the platinum sensor in the sample and reference platforms. This can cause damage to the sensor when the cup is removed, and may result in the need to replace the sample and reference beam assembly.

To prevent this from occurring, you can (1) use a ceramic cup, or (2) place some finegrain alumina powder between the platinum cup and the sensor before you start a TGA-DTA experiment.

NOTE: Alumina absorbs moisture. Before using alumina, you will need to dry it. Store alumina powder in a desiccator.

Taring and Loading the SDT Cups

Taring the SDT cups ensures that the weights measured by the balance reflects the weight of the sample only. You should tare the SDT cups before each experiment with the furnace closed, even if you use the same cup in consecutive experiments.

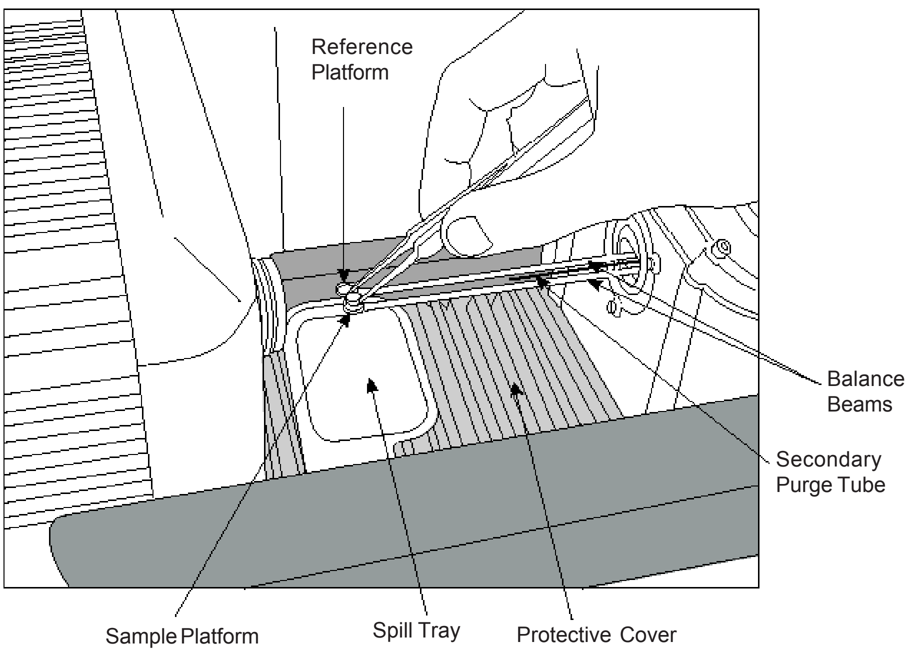
When you tare a cup, the SDT reads the weight of the empty cup and then stores the weight as an offset, which is subtracted from subsequent weight measurements. For optimum accuracy, the weight reading must be stable before it is accepted as an offset. When you use the automatic tare procedure, the SDT will determine when the weight reading is sufficiently stable.

Because the SDT has two balance assemblies, taring is done for both the reference and sample SDT cups.

NOTE: Always use tweezers to handle SDT cups.

1. Press the FURNACE key on the instrument touch screen to open the furnace.

2. Place an empty SDT cup on the platform for the front sample balance assembly, making sure that it is seated properly (see the figure below).



Loading the SDT Sample Cup

3. Place an empty SDT cup on the platform for the back reference balance assembly, making sure that it is seated properly (see the figure on the previous page).

4. Press the FURNACE key to close the furnace and protect the cups from air currents.

5. Press the TARE key on the instrument touch screen. The SDT will automatically weigh the cups and store the weights as the offset.

NOTE: The instrument will not tare if the furnace is open, if the temperature is changing too rapidly (*i.e.*, if the temperature causes the weight to change by more than 3.0 µg in a 10-second period), or while the instrument is in calibration mode.

6. Press the FURNACE key to open the furnace.

   After taring the SDT cups, you can load your reference material (such as aluminum oxide), if desired, by following steps 7 through 11. If you do not plan on using a reference material, skip to step 12.

   NOTE: A reference material (such as aluminum oxide) is recommended for TGA-DTA experiments as a way to minimize the difference in heat capacity between the reference and sample cups; thereby improving the baseline. Reference material should not be used for DSC-TGA experiments. Rather, calibration and subsequent sample experiments should be performed with an empty alumina cup as the reference.

   CAUTION: Spilling sample material on the platform could cause permanent contamination of the platform. If this occurs, both balance beams would need to be replaced. Therefore, remove the cups from the beams when loading samples.

   ---

7. Rotate the spill tray into position under the beams.

8. Remove the reference cup from the rear (reference) platform.

9. Place the same amount of reference material inside the reference cup as you are planning to use for your sample.

   NOTE: For DSC-TGA experiments a reference material is not used.

10. Replace the filled cup on the reference platform.

11. Press the DISPLAY MENU key on the instrument touch screen, then touch the SIGNAL DISPLAY key and observe the reference weight. If the weight is acceptable, go on to step 12. If it is not acceptable, repeat steps 8 through 11 as needed.

12. Remove the sample cup from the front (sample) platform.

13. Place the sample material in the sample cup. If a reference material was used, measure out approximately the same amount of sample material.

14. Position the cup on the sample platform, making sure that the sample cup is seated correctly on the platform.

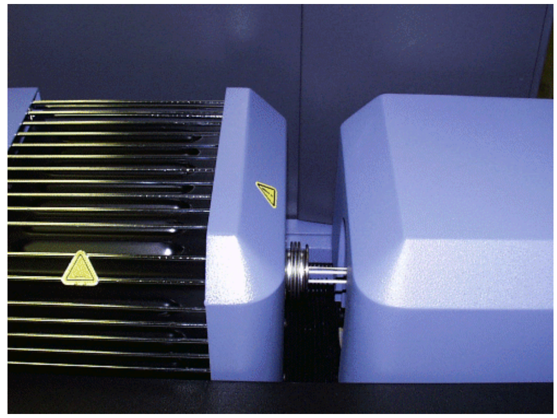
    NOTE: Reproducible positioning of the sample and reference cups on the sample and reference platforms (beam sensors) is critical to obtaining optimum SDT performance, particularly for DSC-TGA calibration and experiments. Because "centering" the cup on the platform is difficult to do repeatedly, it is recommended that the cups be positioned so that they are always located all the way to one side of the platform. In addition, the rotational placement of the cups should be consistent. This can be accomplished by scribing a small mark on the cup and always facing it in the same direction on the platform.

15. Press the DISPLAY MENU key on the instrument touch screen, then touch the SIGNAL DISPLAY key and observe the sample weight. If the weight is acceptable, go on to step 16. If it is not, repeat steps 12 through 15 as needed.

16. Return the spill tray to its position under the armrest.

17. Press the FURNACE key on the instrument touch screen to close the furnace around the sample material.

> NOTE: If the weight is out of range (<Range or >Range), the furnace will not close. This feature prevents damage to the balance beams.



Furnace Closing

Dual Sample Operation

The SDT Q600 can be operated in dual sample mode. This mode provides comparative TGA-DTA information for two samples simultaneously. When running dual sample experiments, signals are captured in a single data file for sides A (sample) and B (reference).

> NOTE: The signals saved assume that Weight A is from the sample (front) platform and Weight B is from the reference (back) platform.

When running dual sample experiments, follow these recommendations:

- Perform dual sample calibration after all of the standard calibration procedures have been completed.

- Select **View/Experiment View**, then select the SDT Dual Sample mode from the list of available modes. Enter the names of the two samples in the "Sample Name" field (*e.g.,* Sample 1/Sample 2). Up to 32 total characters can be used.

- Position two clean SDT pans on the sample and reference beams. Then press **TARE**. (For optimum results the sample pans used fo dual sample calibration should be used.)

- When dual sample mode is selected, a different list of saved signals is available for storage in the data file. These signals include Temperature Difference (°C), Temperature Difference (°C/mg), Weight (mg), and Weight Percent (%) for both side A (sample beam side) and side B (reference beam side). It is important to select the normalized signals (°C/mg and % signals), if these signals are desired for display and analysis within the Universal Analysis program.

- To monitor the weight changes on the SDT Signal Display touch screen, select **Tools/Instrument Preferences/LCD Signals** using the instrument control program. Then select Weight and Weight %.

> NOTE: Only six signals can be selected for display at any one time on the instrument touch screen. Therefore, in order to select the dual sample signals, two of the standard default signals must be unchecked.

- The absolute accuracy of the weight and temperature difference results obtained in dual sample operation is not as good as those obtained in single sample operation. Therefore, single sample operation is recommended for optimum results. In addition, it is recommended that the dual sample mode be used only for ramp experiments.

- The data for both samples (A and B) are contained in a single data file. You can separate the data by selecting the corresponding signal group (A or B) within the Universal Analysis program.

Setting Up the Purge Gases

The SDT is configured with both a primary and a secondary purge. This sections discusses the use and setup of these purge gases.

Primary Purge

The primary purge enters the SDT through the Gas 1/Gas 2 ports on the rear of the instrument (see Chapter 2 to connect the primary purge lines). The primary purge flows through the balance chamber and across the sample and reference measurement system before exiting out the end of the furnace tube. Because this purge flows through the balance chamber, the primary purge should be limited to common, preferably insert, gases such as nitrogen. Air can also be used as the primary purge.

The primary purge is regulated by an internal mass flow controller (MFC) and a gas switching accessory. The MFC continuously monitors and controls the gas flow rate and allows the flow rate to be stored in the data files, if desired, and the gas switching accessory allows the primary purge gas to be changed in the middle of an experiment.

The primary purge is used in all SDT experiments. Typical flow rates are 100 mL/min.

Secondary Purge

The secondary purge provides additional experimental flexibility for introduction of a more reactive gas without exposing the sensitive balance assembly to that gas. The secondary purge enters the SDT through a special port located on the SDT housing (see Chapter 2 to connect the secondary purge). This purge flows into the furnace area from a small diameter tube located between the reference and sample balance arms.

The flow rate of the secondary purge is usually lower than the primary purge (nominally 20 mL/min). Therefore, the primary purge prevents the secondary purge from back diffusing into the balance chamber, but rather sweeps the secondary purge across the sample and reference before exiting at the end of the furnace tube.

The secondary purge rate is controlled using an optional external flow meter and is not a stored signal. The secondary purge is not used in most SDT experiments.

Starting an Experiment

Before you start the experiment, ensure that the SDT is online with the controller and you have entered all necessary information through the instrument control software.

> NOTE: Once the experiment is started, operations are best performed at the computer keyboard. The SDT is very sensitive to motion and might pick up the vibration caused by touching a key on the instrument touch screen.

Close the furnace, then start the experiment by touching the START key on the instrument touch screen, or by selecting **Start** on the instrument control software.

Stopping an Experiment

If for some reason you need to discontinue the experiment, you can stop it at any point by touching the STOP key on the touch screen, or by selecting **Stop** through the instrument control software. Another function that stops the experiment is **Reject**. However, the Reject function discards all of the data from the experiment; the Stop function saves any data collected up to the point at which the experiment was stopped.

Maintaining the Instrument

The primary maintenance procedures described in this section are the customer's responsibility. Any further maintenance should be performed by a representative of TA Instruments or other qualified service personnel. Consult the online documentation installed with the instrument control software for further information.

WARNING: Because of the high voltages in this instrument, untrained personnel must not attempt to test or repair any electrical circuits.

Cleaning the Instrument

You can clean the SDT touch screen as often as you like. The touch screen should be cleaned with a household liquid glass cleaner and soft cloth. Wet the cloth, not the touch screen with the glass cleaner, and then wipe off the touch screen and surrounding surfaces.

CAUTION: Do not use harsh chemicals, abrasive cleansers, steel wool, or any rough materials to clean the touch screen as you may scratch the surface and degrade its properties.

Cleaning the Furnace

To remove any contaminants that have accumulated inside the furnace, it is recommended that you clean the furnace after every 10 runs by heating it to approximately 1000 °C in air at a ramp rate of 20 °C/minute. Keep the time allowed for this cleaning to the minimum needed. Leaving the furnace at high temperatures for extended periods of time may shorten the life of your furnace.

Cleaning the Protective Cover (Bellows)

CAUTION: DO NOT REMOVE the protective cover at any time.

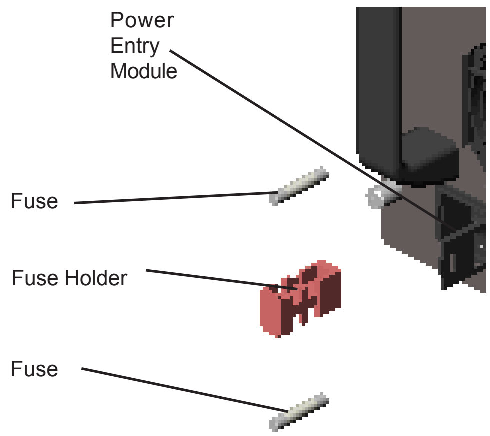
Remove dust from the folds of the cover with compressed air. To clean up any spills onto the cover, wipe gently with a soft rag or paper towel moistened with water and mild soap.

Replacing Fuses

WARNING: Always unplug the instrument before you examine or replace the fuses.

The SDT contains internal fuses that are not user serviceable. If any of the internal fuses blows, a hazard may exist. Call your TA Instruments service representative.

The only fuses that you can replace yourself are the fuses located in the power entry module located at the rear of the instrument. To check or change these fuses:



1. Turn the instrument off and remove the power cord.

2. Insert a small screwdriver at the edge of the power entry module door and pry it open.

3. Insert the screwdriver on the edge of the fuse holder to pull it out of the instrument.

4. Remove old fuses and replace the fuses only with the type and rating indicated on the instrument's rear panel.

5. Place fuse holder back into opening and push the door shut.

Replacement Parts

This section lists the replacement parts for the SDT that are available from TA Instruments. Some parts must be replaced by a service representative. See the tables below to order parts.

Fuses, Cords, and Cables

Part Number	Description
205221.001	Fuse (6.3 A, 250 V)
205221.002	Fuse (10 A, 250 V)
251470.025	Ethernet cable [6 m (25 ft), shielded]
253827.000	Power cord
920223.901	Event cable

SDT Accessories and Sample Cups

Part Number	Description
920063.901	Power Control Unit
961020.901	Furnace assembly (includes ceramic furnace tube)
259508.000	Brass tweezers
259509.000	Spatula, curved, 165 mm long
270226.022	O-ring, furnace tube
960017.901	SDT Dual Beam Kit
960148.901	Platinum sample cups, 40 µL; pkg of 3 (for TGA-DTA studies)
960149.901	Platinum sample cups, 110 µL; pkg of 3 (for TGA-DTA studies)
960072.901	Alumina sample cups, 40 µL; pkg of 3 (for TGA-DTA studies)
960070.901	Alumina sample cups, 90 µL; pkg of 3 (for DSC-TGA studies)
960239.901	Alumina sample lids; pkg of 3 (for DSC-TGA studies)

SDT Calibration/Reference Materials

Part Number	Description
915079.903	Sapphire DSC heat flow calibration standard
900905.901	Calcium oxalate
952183.901	Vial of aluminum wire for temperature calibration
960014.901	Calibration weight set
960034.901	Aluminum oxide reference material for TGA-DTA studies

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