

# Melt Station

## (Order Code MLT-BTA)

The Melt Station is a sensor used to measure the melting temperature of solid substances.

**Note:** Vernier products are designed for educational use only.

### What's Included

- Melt Station
- Power supply
- Package of 100 capillary tubes, one closed end

### Compatible Software

See [www.vernier.com/manuals/mlt-bta](http://www.vernier.com/manuals/mlt-bta) for a list of software compatible with the Melt Station.

### Using the Product

#### Using the Melt Station with LabQuest App

You can connect the Melt Station directly to LabQuest®.

#### Example Procedure for LabQuest-Based Data Collection

1. Load a small portion of a solid substance into a capillary tube.
2. Check the control dial on the Melt Station to confirm that it is in the Off position. Connect the Melt Station power supply to a powered electrical outlet.
3. Connect the Melt Station to LabQuest. Turn on LabQuest. In a few moments the meter screen will appear and the temperature of the Melt Station's heating block will be displayed.
4. Carefully place the capillary tube of solid into one of the three slots in the aluminum heating block of the Melt Station. You can tilt the Melt Station toward you slightly for a better look at the heating block.
5. Tilt the Melt Station up or down slightly to get the best view of the solid sample through the viewing lens.
6. The default setting is 100 readings per minute for 20 minutes, which is suitable for most tests. If you want to change the data-collection parameters, tap Mode, in the upper right-hand corner of the meter screen and make the desired changes.
7. Start data collection. On the Melt Station, turn the control knob to the Rapid Heat area. The red LED will come on, indicating the Melt Station is heating. Rapid Heat will warm your solid sample at a rate of  $>10^{\circ}\text{C}/\text{min}$ .
8. Observe the temperature vs. time graph. When the temperature is within about  $10^{\circ}\text{C}$  of the expected melting temperature of your solid sample, turn the control dial to that temperature, which will slow the heating rate to  $\sim 1.5^{\circ}\text{C}/\text{min}$ .
9. Carefully observe your sample. At the first indication of the solid melting, press the Mark button to mark the temperature on your graph. When the entire solid has melted, press the Mark button again to mark the temperature. The




- two marked points describe the melting temperature range of your solid sample. Tap Data Marks to the right of the graph to label or delete a Mark.
10. Stop data collection. Tap the File Cabinet icon (upper right-hand corner of the graph screen) to store your first run. On the Melt Station, turn the control knob to the Fan/Cooling setting. The blue LED will come on, indicating the Melt Station is cooling.
11. Prepare a second solid sample to test. Observe the temperature of the heating block in the meter screen. After the heating block cools to a suitably low temperature, repeat Steps 7–10.

#### Using the Melt Station with Graphical Analysis

Launch Vernier Graphical Analysis®. Connect the Melt Station to your Chromebook, computer, or mobile device. You will need to use an interface.

#### Example Procedure for Data Collection with Graphical Analysis

1. Load a small portion of a solid substance into a capillary tube.
  2. Check the control dial on the Melt Station to confirm that it is in the Off position. Connect the Melt Station power supply to a powered electrical outlet.
  3. Connect the Melt Station to a LabQuest Mini or Go!Link® interface. Launch Graphical Analysis. A default data collection profile will load. The meter will show the temperature of the Melt Station's heating block.
  4. Carefully place the capillary tube of solid into one of the three slots in the aluminum heating block of the Melt Station. You can tilt the Melt Station toward you slightly for a better look at the heating block.
  5. Tilt the Melt Station up or down slightly to get the best view of the solid sample through the viewing lens.
  6. The default setting is 100 readings per minute for 20 minutes, which is suitable for most tests. If you want to change the data-collection parameters, tap Mode, in the lower left-hand corner of the screen and make the desired changes.
  7. Start data collection. On the Melt Station, turn the control knob to the Rapid Heat area. The red LED will come on, indicating the Melt Station is heating. Rapid Heat will warm your solid sample at a rate of  $>10^{\circ}\text{C}/\text{min}$ .
  8. Observe the temperature vs. time graph. When the temperature is within about  $10^{\circ}\text{C}$  of the expected melting temperature of your solid sample, turn the control dial to that temperature, which will slow the heating rate to  $\sim 1.5^{\circ}\text{C}/\text{min}$ .
  9. Carefully observe your sample. When the solid begins to melt, select Graph Tools, , and then Add Annotation. Enter the temperature. When the entire solid has completely melted, add a second annotation. The two values marked on your graph describe the estimated melting temperature range of your substance.
- Note:** If you have Graphical Analysis Pro, it includes a data marking feature. At the first indication of the solid melting, press the Mark button to mark the temperature on your graph. When the entire solid has melted, press the Mark button again to mark the temperature. The two marked points describe the melting temperature range of your solid sample.

10. Stop data collection. The run is stored automatically in the software. On the Melt Station, turn the control knob to the Fan/Cooling setting. The blue LED will come on, indicating the Melt Station is cooling.
11. Prepare a second solid sample to test. Observe the temperature of the heating block in the meter screen. After the heating block cools to a suitably low temperature, repeat Steps 7–10.

## Videos

View videos related to this product at [www.vernier.com/mlt-bta](http://www.vernier.com/mlt-bta)

## Calibrating the Sensor

The temperature sensor embedded in the aluminum heating block of the Melt Station will never need to be calibrated. The sensor is carefully calibrated before it ships, and this unique calibration is stored on a smart chip in the sensor.

**Note:** There is no method to perform a calibration of this sensor in any of our software programs.

## Specifications

Dimensions	<ul style="list-style-type: none"> <li>• Base: 13 cm × 15 cm × 1.5 cm</li> <li>• Body: 9 cm × 9 cm × 24 cm</li> </ul>
Melt Station weight	1.0 kg (2.2 lbs.)
Resolution	0.10°C
Accuracy	± 0.31 + 0.0006 <i>T</i> , where <i>T</i> is the temperature in Celsius
Safety shut down	The heating block is automatically powered down after approximately sixty minutes of heating.
Capillary tubes	1.4–1.8 mm outside diameter, 100 mm length
Capillary tube slots	3
Viewing lens	27 mm diameter (functional), 30 mm (actual)
Lighting of capillary slots	3 white LEDs
Lighting of control dial	<ul style="list-style-type: none"> <li>• Red LED (indicates heating mode)</li> <li>• Blue LED (indicates cooling mode with cooling fan running)</li> <li>• Yellow LED (safety shut off activated)</li> </ul>
Melt Station + AC adapter weight	1.2 kg (2.6 lbs.)
Range	Ambient to 260°C
Temperature sensor	Class A, Platinum resistance temperature detector (RTD)
Typical	: ± 0.4°C (<200°C); ± 0.5°C (>200°C)

Calibration	Factory calibrated
Power	24VDC to unit, universal AC adapter 100–240 VAC 50–60 Hz input
Power consumption	40W max., < 0.5A @ 110V

## Care and Maintenance

### Routine Maintenance

Before performing any maintenance on a Melt Station, please note the following safety points.

- Make sure the unit is unplugged and the heating block is cool before attempting service of any kind.
- Always wear safety glasses while servicing or cleaning the unit.
- Do not open the lower case. All user-serviceable parts are accessed by removing the lens panel only.
- Make sure the unit is properly reassembled and inspected before returning it to the classroom or laboratory.
- Do not service the unit if any parts are missing or damaged.

### Cleaning Outside Surfaces

Clean the outside metal surfaces of the Melt Station with a cloth dampened with a mild detergent solution. Do not use organic solvents to clean the Melt Station.

### Removing Broken Capillary Tubes

Follow the steps below to remove a broken capillary tube from the Melt Station.

**Caution:** Do not handle a broken capillary tube with your fingers. Wear safety glasses or safety goggles.

1. Turn off the Melt Station and allow it to cool to room temperature. Unplug the power cord from the device.
2. Place the Melt Station unit on its back side so the capillary tube slots are as close to horizontal as possible. This will make it easier to safely remove the glass shards.
3. Remove the two threaded screws holding the lens panel in place. Set the screws and the viewing lens aside.
4. Use a 3/32 inch hex key to remove the two screws holding the metal spring fingers in place. Set the screws and spring fingers aside. Use the same hex key to loosen the screw holding the glass window in place. Slide the glass window up to remove it, and set it aside. **Caution:** The edges of the glass may be sharp.
5. Use an appropriate tool to carefully remove the broken capillary tube from its slot and deposit it in a glass waste container. If the capillary tube is loose in the slot, you can very carefully tip the Melt Station over to slide the tube into a waste container.
6. Replace the glass window, metal fingers, and viewing lens. Carefully tighten the screws to be snug rather than extremely tight. Remember that you may want to remove these pieces again in the future.

Do not wrap the cable tightly around the Melt Station for storage. Repeatedly doing so can irreparably damage the wires and is not covered under warranty.

## How the Sensor Works

The Melt Station contains an aluminum heating block. There are three slots for capillary tubes in the heating block. A capillary tube containing a solid substance is placed in the heating block and the block is heated by an embedded element. An RTD-based temperature sensor, also embedded in the heating block, measures the temperature of the heating block and therefore the capillary tube of substance. The temperature sensor connects to a Vernier data-collection interface, which allows you to monitor and record readings with Graphical Analysis software or LabQuest App. The substance to be melted is viewed through a 6X lens.




The temperature control on the Melt Station is divided into three regions:

- The first area, next to the Off position (⏻), is for cooling the heating block after you have completed a melting temperature run. When you turn the control knob to the cooling position, the fan and the blue LED will come on.
- The second area is divided into specific temperature settings. These temperatures correspond to the expected melting temperature of the substance. You will choose one of these settings when the Melt Station has warmed to within about 10°C of the expected melting temperature of your solid sample. The warming rate will slow to ~1.5°C/min at each of these settings.
- The third area is Rapid Heat. In Rapid Heat, the Melt Station will warm at a rate of >10°C/min.

## Safety Automatic Shut Off

An important safety feature of the Melt Station is the Automatic Shut Off. After you turn the control knob to heating, an internal timer starts a 60-minute countdown. After 60 minutes have elapsed, the Melt Station will automatically turn off the heating element and the yellow LED will come on. To reset the Melt Station, simply turn the control knob to the cooling position or the Off position.

## Symbols on the Melt Station Control Dial

	Off position
	Cooling fan on
	Rapid heating; heating rate at >10°C/min

## Features of the Melt Station

- A Gimbal mount allows you to tilt the Melt Station for easy placement of the capillary tube in the heating block and adjust the viewing angle of the lens.
- Uses simple, direct temperature control.
- LED indicator lighting informs you when the Melt Station is heating (red), cooling (blue), or on auto shut down (yellow).
- A cooling fan greatly reduces the time between tests. In most cases, the Melt Station will be ready for the next test in 2–3 minutes.

- Data graphed using the Data Mark software feature (available with LabQuest and Graphical Analysis Pro) allows you to mark the beginning and ending of the melting temperature range.
- An excellent viewing window containing a 6X lens with a typical viewing distance of 5 inches offers a clear view of the capillary tubes up to two feet away. The viewing area is illuminated with focused LED lighting.
- An automatic shut off after approximately 60 minutes of heating provides added safety.

## Troubleshooting

For troubleshooting and FAQs, see [www.vernier.com/til/2321](http://www.vernier.com/til/2321)

## Repair Information

If you have watched the related product video(s), followed the troubleshooting steps, and are still having trouble with your Melt Station, contact Vernier Technical Support at [support@vernier.com](mailto:support@vernier.com) or call 888-837-6437. Support specialists will work with you to determine if the unit needs to be sent in for repair. At that time, a Return Merchandise Authorization (RMA) number will be issued and instructions will be communicated on how to return the unit for repair.

## Accessories/Replacements

Item	Order Code
Melt Station Capillary Tubes	MLT-TUBE
Replacement Melt Station Power Supply	MLT-PS

## Warranty

Warranty information for this product can be found on the Support tab at [www.vernier.com/mlt-bta](http://www.vernier.com/mlt-bta)

General warranty information can be found at [www.vernier.com/warranty](http://www.vernier.com/warranty)

## Disposal

When disposing of this electronic product, do not treat it as household waste. Its disposal is subject to regulations that vary by country and region. This item should be given to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring that this product is disposed of correctly, you help prevent potential negative consequences on human health or on the environment. The recycling of materials will help to conserve natural resources. For more detailed information about recycling this product, contact your local city office or your disposal service.

Battery recycling information is available at [www.call2recycle.org](http://www.call2recycle.org)

Do not puncture or expose the battery to excessive heat or flame.



The symbol, shown here, indicates that this product must not be disposed of in a standard waste container.



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Rev. 9/12/2024

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