

# USB-TC

## Increase Thermal Wavelength Stability



The new USB Temperature Controller (USB-TC) is an attachable heating device for our USB4000 and USB2000+ Miniature Spectrometers that greatly improves the thermal stability of your measurements. The USB-TC attaches directly to the spectrometer and maintains wavelength thermal stability to within  $\pm 0.025$  pixels/ $^{\circ}\text{C}$ , making it ideal for industrial and other settings where temperature variations can affect spectral performance.

The USB-TC is available with pre-selected setpoint temperatures

### USB-TC Specifications

USB-TC w/USB2000+ or USB4000	
Size (cm):	6.35 x 8.9 x 3.18
Weight:	227 g (8 oz.)
Wavelength thermal stability:	$\pm 0.1$ $^{\circ}\text{C}$ of setpoint temperature $\pm 0.025$ pixels/ $^{\circ}\text{C}$
Setpoint temperature:	Factory-adjustable between 25-55 $^{\circ}\text{C}$
Time to stabilize:	With constant ambient temperature, stabilizes to within 0.1 $^{\circ}\text{C}$ of the final temperature within 30 minutes of power-up
Operating range:	5 $^{\circ}\text{C}$ to 40 $^{\circ}\text{C}$ below setpoint ( $\Delta$ over which stability is maintained to $\pm 0.1$ $^{\circ}\text{C}$ )
Ambient temperature range:	Controls spectrometer to selected temperature when ambient temperature is between 5 $^{\circ}\text{C}$ and 40 $^{\circ}\text{C}$ below selected temperature
Environmental conditions:	0 $^{\circ}\text{C}$ to 50 $^{\circ}\text{C}$
Temperature accuracy:	Selected temperature $\pm 2$ $^{\circ}\text{C}$
Over-temperature threshold:	65 $^{\circ}\text{C}$ $\pm 2$ $^{\circ}\text{C}$
Humidity:	0-95% non-condensing

between 25-55  $^{\circ}\text{C}$  and comes with a 12 VDC, 3A power supply. With constant ambient temperature, the USB-TC stabilizes to within 0.1  $^{\circ}\text{C}$  of the final temperature within 30 minutes of power-up. The system will operate in temperatures ranging from 5-40  $^{\circ}\text{C}$  below the setpoint temperature.

The USB-TC is available with new spectrometer purchases or as a retrofit option for existing owners of USB2000+ and USB4000 spectrometers. Contact an Applications Scientist for details.



## Tech Tip

### Thermal Wavelength Stability in Spectrometers

Stability is a broad term that encompasses various elements of the spectrometer system, including the optical bench, electronics and light source. More specifically, thermal wavelength stability in spectrometers is a measure of the change in specifications (performance) at various temperatures; thermal stability is typically expressed in pixels per  $^{\circ}\text{C}$  for a passive device or as  $\pm$   $^{\circ}\text{C}$  per setpoint temperature with an active device.

Ocean Optics provides three primary options for maintaining thermal stability in spectrometers:

- **Temperature Controllers** are active devices for controlling temperature. Examples are the USB-TC, which regulates device temperature; our SteadiQ spectrometer chamber, which regulates the environment temperature; and the thermoelectric coolers that typically regulate detector

temperature in the QE65000, NIRQuest and other spectrometers.

- In **Passive Temperature Stabilization**, the spectrometer's athermal design promotes stability. For example, Torus has an optical bench design that minimizes temperature-related instability.
- The **Procedural Approach** uses experiment controls to mitigate the effects of temperature variation. Examples include taking frequent reference and dark measurements, integrating reference monitoring into the procedure and using electrical dark correction.

See individual product pages for thermal wavelength stability specifications.