

DESCRIPTION

The **TS102S** Thermoelectric (TEC) stage is an entry-level microscope stage designed for applications requiring temperature control on a budget. Using a thermoelectric heater, this stage provides cooling down to -30°C without the use of liquid nitrogen, ultimately simplifying the system setup and reducing operating costs. The extremely slim form factor makes it compatible with virtually any microscope, upright or inverted. The TS102S stage is a great choice for researchers needing to preform quick thermal microscopy experiments over a moderate temperature range.



KEY FEATURES

Low Profile Open-Face Design

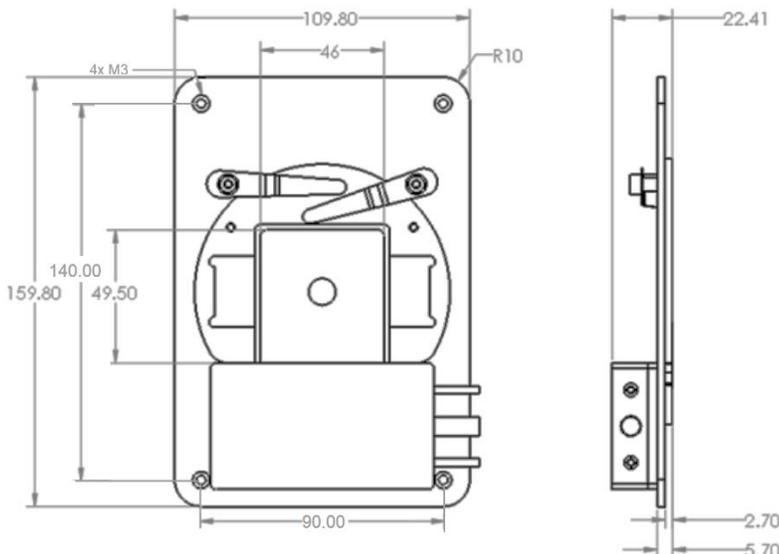
The 45mm x 45mm thermal area accommodates standard 25mm x 75mm microscope slides as well as other small samples. The 10mm transmission aperture can be customized to be larger or smaller, optimizing the balance between temperature uniformity and viewing area. The open-face design supports extremely short working distances, but the sample will be vulnerable to condensation at lower temperatures.

Thermoelectric Heating and Cooling

TEC heating and cooling provides exceptional temperature stability and range without the need for consumable coolant. Heat up to 120°C and cool down to -25°C with our standard C100W benchtop water circulator, or -30°C with an upgraded [CW5000 Chiller](#).

Accuracy and Stability

A pt100 platinum RTD sensor is embedded into the sample area to guarantee high temperature accuracy and stability. The RTD sensor is calibrated to measure the temperature of the surface of the sample heating block—giving the closest and most accurate reading of sample possible.



Additional Features

- Includes standalone [mK2000](#) temperature controller and C100W* benchtop water circulator (*standard temp limit is -25°C , operation at -30°C requires CW5000 and valve box)
- Includes 'InstecApp' Windows software for optional operation via PC
- Integrated sample clips ensure great thermal contact

THERMAL SPECIFICATIONS

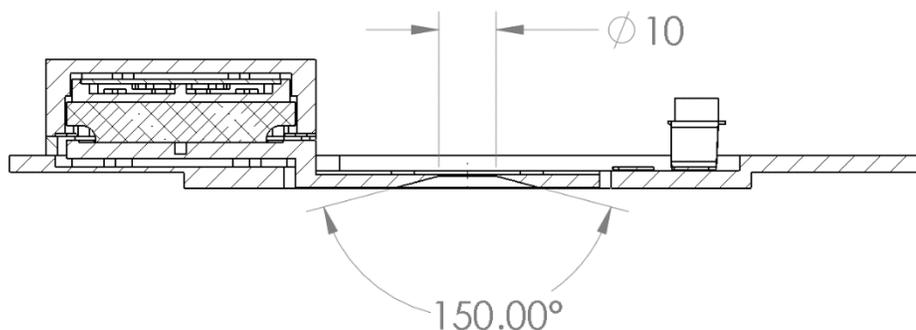
| | |
|----------------------------------|--|
| Temperature Control | <i>mK2000</i> with bidirectional LVDC output |
| Thermal Block | Clear anodized aluminum |
| Minimum Temperature | -25°C with standard water circulator -30°C with optional upgraded chiller and valve box |
| Maximum Temperature | 90°C (Optional upgrade for 120°C upper limit available) |
| Temperature Sensor | 100 Ω Platinum RTD |
| Maximum Heating Rate | +25°C per minute at 37°C |
| Maximum Cooling Rate | -15°C per minute at 37°C |
| Minimum Heating and Cooling Rate | ±0.01°C per minute |
| Temperature Resolution | 0.01°C |
| Temperature Stability | ±0.05°C |
| Power supply | Universal power input – 150W max (Not including water-cooling accessories) |
| Software | Windows software to record and export temperature vs time data |

OPTICAL SPECIFICATIONS

| | |
|------------------------------------|--|
| Optical access | Reflection and Transmission capability |
| Minimum Objective Working Distance | 0mm |
| Minimum Condenser Working Distance | 3mm |
| Transmission Aperture | Ø10mm (Options available for Ø5mm, Ø8mm, or Ø12mm) |

STRUCTURAL SPECIFICATIONS

| | |
|------------------|---|
| Sample Area | 45mm x 45mm |
| Sample Access | Open-face with sample clamps and 25mm x 75mm glass slide groove |
| Frame Cooling | Integrated TEC cooling with included C100W water-cooler. Optional chiller upgrade for increased temperature limit is available. |
| Mounting | Horizontal or Vertical mounting capability (140mm x 90mm through hole pattern, 99mm diameter dovetail insert) |
| Frame Dimensions | 160mm x 110mm x 21.7mm |
| Weight | 500g |



OPTIONS



Upgraded Chiller

Achieve lower minimum temperature with an upgraded water-cooler. The CW5000 has an internal refrigeration unit which cools down to 5°C, lowering the minimum temperature reachable by TEC systems. Chiller upgrade also requires FVC11 valve box for flow control.



Microscope

Entry-level polarizing microscope offering superior performance for a variety of research applications. The CX40's Modular design makes it viable for a wide range of demanding observational applications. (see [TPM-CX40](#))



Camera

Integrate digital image acquisition with sample temperature overlay. Includes software (WinDV via InstecApp), USB 3.0 connection, 20 megapixel resolution, and standard C-mount microscope connection. (see [MITO2](#))



Mounting Adapter

Various mounting adapters are available for most microscope models and/or instruments. Custom mounting adapters may also be made to fit each and every application.

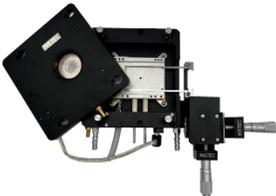
Condensation and the TS102S

The TS102S open-face design is low-profile and convenient to use, but is prone to condensation when cooling below 0°C.

To prevent condensation, consider upgrading to a controlled atmosphere model such as the TS102VXY or TSA12Gi.



SIMILAR PRODUCTS

| | HCS302/HCS302XY | HCS402/HCS402XY | TS102VXY | TS102Si |
|--|---|---|--|---|
| |  |  |  |  |
| Temperature Range | -190°C to 400°C | -190°C to 400°C | -40 to 120°C | -30°C to 120°C |
| Atmospheric Control | | | ✓ | |
| Sample Area | 38mm x 50mm | 38mm x 50mm | 40mm x 40mm | Ø35mm/ 24mm x 75mm |
| Sample Cooling | LN2 | LN2 | TEC | TEC |
| Thermal Block | Aluminum | Aluminum | Aluminum | Aluminum |
| Option to Increase Chamber Height | ✓ | ✓ | | |
| Side Loading | ✓ | ✓ | | |

Other products to consider....



HCS621GXY heating and cooling stage with 28mm x 28mm sample area. Temperature range from -190°C to 600°C. Gas-tight chamber with gas purge capabilities. Includes XY positioning and option to add electrical feedthroughs. Offer greatly increased temperature range over TS102S but requires LN2 cooling, larger working distance, and is optimized for upright microscopy.



TP102G Gas-tight heating and cooling plate. -30°C to 120°C without consumable coolant such as LN2. Optional inner lid for maximizing temperature uniformity. Offers gas-tight sample area to prevent condensation, but requires smaller sample sizes than the TS102S and does not have a transmission aperture. For transmission capability, see **TS102VXY**.



TSA12Gi Thermoelectric heating and cooling plate for inverted optical microscopy. Gas-tight chamber supports 25mm by 75mm glass slides, or 35mm petri dishes. Temperature range -25°C to 120°C. 5.4mm minimum objective working distance, 22.8mm minimum condenser working distance. 12mm diameter transmission aperture. Offers improved performance over TS102S, and supports petri dishes, but requires longer working distances. Optimized for inverted microscopy.

CONTACT A REPRESENTATIVE 