

## DESCRIPTION

The **HCS321Gi** gas tight heating and cooling stage is designed specifically for inverted optical microscopes. Its small footprint allows for easy mounting onto all common inverted microscope platforms. The HCS321Gi also offers the widest temperature range available for inverted microcopy applications and a fully enclosed sample chamber for enhanced temperature uniformity. Using a silver heating and cooling block, this plate provides a wide temperature range with exceptional thermal uniformity. The gas tight chamber creates a closed environment to eliminate oxidation, aid in humidity studies, or conserve expensive reacting gases. Additionally, up to 2 optional feedthrough leads are available for sample connection and probing.



## KEY FEATURES

### Compact Design

Suited for use on inverted microscopes where space is limited

### Wide Temperature Range

-190°C to 250°C (with optional **LN2 cooling accessory**)  
Higher temperature limit available (up to 600°C)

### Rapid Heating Rates

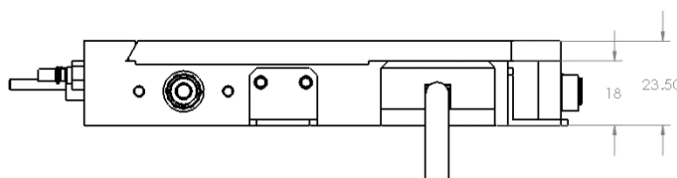
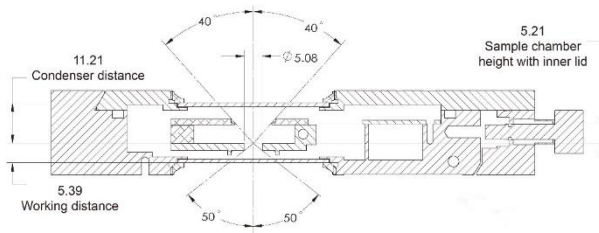
+150°C per minute max rate

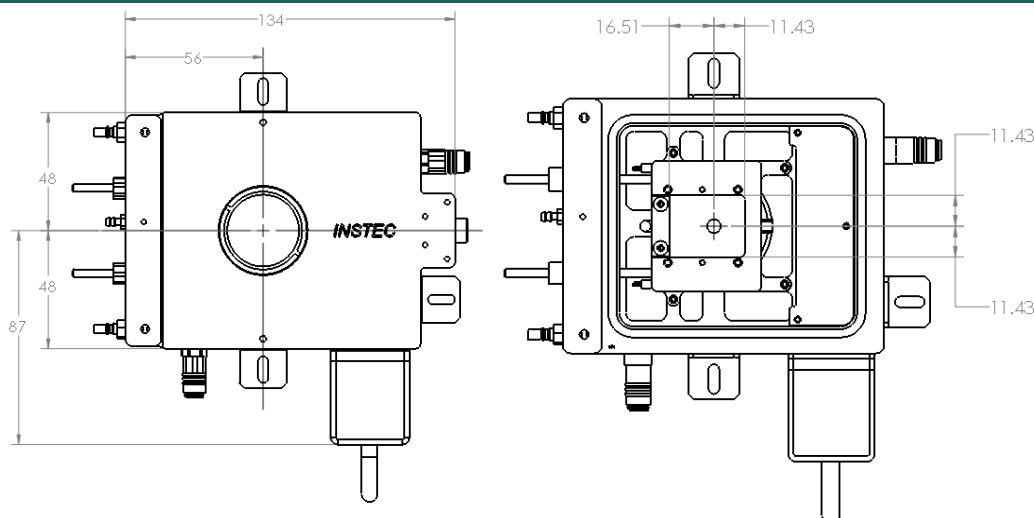
### Gas Tight Chamber

Allows for gas purging for defrosting and prevents condensation and oxidation. Also allows for a controlled atmosphere around sample. Features quick connect and release gas ports

### Accuracy and Stability

A pt100 platinum RTD sensor is embedded into the sample heating and cooling block 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 sensor option and alternative sensor, such as a thermistor, option is also available.





## Additional Features

- Includes standalone *mK2000* temperature controller
- Includes 'InstecApp' Windows compatible software for optional operation via PC
- Comes standard with optical glass windows that can be easily replaced with IR or UV transparent glass.

## THERMAL SPECIFICATIONS

Temperature Control	<i>mK2000</i> with programmable precision switching PID method
Thermal Block	Silver
Sample Thermal Cover	Removable Inner sample cover with additional window
Temperature Minimum	-190°C (with optional liquid N2 cooling)
Temperature Maximum	250°C (up to 600°C option available)
Temperature Sensor	100 Ω Platinum RTD
Maximum Heating Rate	+80°C per minute at 100°C
Maximum Cooling Rate	-30°C per minute at 100°C
Minimum Heating and Cooling Rate	±0.01°C per minute
Temperature Resolution	0.01°C
Temperature Stability	±0.05°C (>25°C), ±0.1°C (<25°C)
Power supply	Universal power input
Software	Windows software to record and export temperature-time data

## OPTICAL SPECIFICATIONS

Optical access	Reflection and transmission capability
Optical windows	Removable and exchangeable windows permit full-spectrum transparency
Minimum Objective Working Distance	5.39 mm
Minimum Condenser Working Distance	11.21 mm
Top Window	Ø36.5 mm
Top Viewing Angle	±40° from normal
Transmission Aperture	Ø5 mm
Bottom Window	Ø36.5 mm
Bottom Viewing Angle	±50° from normal
Window Defrost	Integrated external window defrost

## STRUCTURAL SPECIFICATIONS

Sample Area	23 mm x 28 mm
Chamber Height	10.2 mm without removable inner cover 5.2 mm with removable inner cover
Atmosphere Control	Gas tight chamber with purge to control humidity, condensation, and oxidation
Frame Cooling	Integrated frame cooling with optional chiller system
Mounting	Horizontal mounting capability
Frame Dimensions	135mm x 134 mm x 23.5 mm
Weight	610 g

## OPTIONS

### Controlled Cooling

Extend lower temperature limit to  $-190^{\circ}\text{C}$  with **LN2-P** cooling accessory; includes tubing and dewar (2L, 10L, or 30L). Enables active cooling with rates of up to  $-30^{\circ}\text{C}$  per minute (at  $100^{\circ}\text{C}$ ).

### Frame Cooling

Safety always comes first – keep the frame of the HCS321Gi cool and safe to touch with an optional water circulator. (see **C100W** chiller) Frame cooling option allows thermal control of frame independent of sample thermal block and aids in preventing frost buildup when cooling sample is being cooled below freezing temperatures.

### Spacer Set

Increase chamber height with fitted **spacer kit** to allow fitment of taller samples, while maintaining the gas tight capability with the top cover.

### Inner Cover

The chamber height is the distance between the top surface of the thermal block and the bottom surface of the outer cover. With an optional inner cover, the distance is minimized in design to allow for just enough room for intended samples (slides, slipcovers, wafer pieces, etc.) and to decrease the minimum objective working distance. By closing the distance, the vertical temperature gradients are also significantly reduced.



### Electrical Feedthroughs

Add up to 8 electrical feedthroughs for applying electric field to sample.

### Camera

Integrate digital image acquisition with sample temperature overlay. Includes software (WinDV thru InstecApp) USB 2.0 connection, 1.92-megapixel resolution, C-mount microscope connection standard. (see **MITO2**)

### Mounting Adapter

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

### Windows

Additionally available windows are Sapphire, BaF<sub>2</sub>, CaF<sub>2</sub>, ZnSe (see HCS601GXY-IRM for IR applications).

## APPLICATIONS

With its versatility and wide selection of options and configurations, the HCP621G hot and cold plate is suitable for several different applications and experiments.

### Electrical

- Semiconductors
- MEMS devices
- PCBs

### Materials

- Metallurgy
- Crystallization
- Melting Point Analysis
- Oxidization
- Cloud Point Analysis

### Geology

- Fluid inclusion
- Thermal maturation

### Oil and Gas

- Characterization
- Flow Studies

### Polymers

- Temperature testing
- Formulation

### Space Science

- Solar panel component testing
- Material testing under vacuum

