

# HFSX350 CAP and GI

Stages for X-ray Applications



HFSX350-CAP

## Heating and Freezing

Precise temperature control from  $< -195^{\circ}\text{C}$  up to  $350^{\circ}\text{C}$  at a rate of up to  $30^{\circ}\text{C}/\text{min}$

## Vacuum Compatibility

For use in spectroscopy, X-ray, GISAXS and GIWAXS beamline applications, and many more

## Capillary Options

Heating block with a capillary tube for liquid and gaseous samples

# Introducing the HFSX350 CAP and HFSX350 GI

Based on the temperature control technology of Linkam's THMS stages, the HFSX350 CAP and GI have been modified for use in a variety of X-ray applications (including Grazing Incidence XRD) and can be found in synchrotron facilities around the world.

For general heating and freezing applications in an X-ray spectrometer, the HFSX350 series has a low space requirement, high temperature stability, and is ideal for horizontal or vertical mounting. Two standard stage types are available:

- **HFSX350-CAP** suitable for use with a 1.7mm capillary tube passing through the heating block for liquid samples.
- **HFSX350-GI** with a flush-mounted heating block for grazing incidence and surface mounted capillary, supplied with mica and Kapton sample windows.

A system requires one of the HFSX350 stage types and a T96-S temperature controller, which is available with either LINK software for computer control, or a LinkPad touch screen for stand-alone control. For cooling below ambient temperatures an optional LNP96-S liquid nitrogen pump is also available.



HFSX350-CAP



HFSX350-GI

## Features

### VACUUM COMPLIANT HEATING BLOCK

For use down to  $10^{-3}$  mbar at maximum temperatures of 350°C. Can also be supplied for non-vacuum use with the standard THMS600 heating block to give a maximum temperature of 600°C.

### WIDE TEMPERATURE RANGE

The temperature range spans from  $< -195^{\circ}\text{C}$  (with the addition of an optional LNP96-S) to 350°C.

### HEATING RATE

The T96-S controller allows the stage to heat samples at a maximum rate of 30°C/min.

### HIGH DEGREE OF ACCURACY AND STABILITY

The embedded high quality Pt100 platinum sensor guarantees accuracy and stability throughout the temperature range.

### VERTICAL SAMPLE SPRING CLIP

For use with solid samples.

### WATER-COOLED

Water-cooled stage body for work above 300°C.

### CUSTOM OPTIONS

Please contact us with details of your requirements.

# Application Examples

The HFSX350 series brings together our thermal analysis and capillary devices in a range of stages for X-ray diffraction analysis, and is suitable for characterising a wide range of materials across research applications including:

## Plastics and Polymers

HFSX350 stages are ideally suited for use with materials and polymers. Perform X-ray characterisation measurements while precisely controlling temperature and atmospheric conditions.

Molecular Structure

Relaxation Modes

Nanocomposites



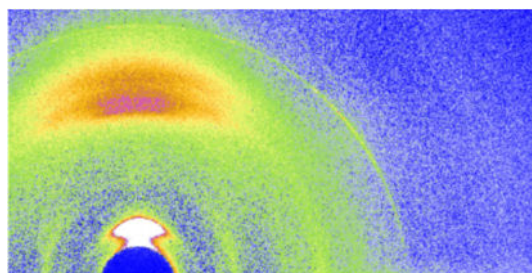
## Semiconductor and Electrical

HFSX350 stages are compatible with beamline techniques such as SAXS/WAXS and other XRD experiments, with a special grazing incidence version for GISAXS/WAX. Measure the thermal evolution at the same time as molecular structure and crystallographic measurements.

Crystallography

Liquid crystals

Photovoltaics



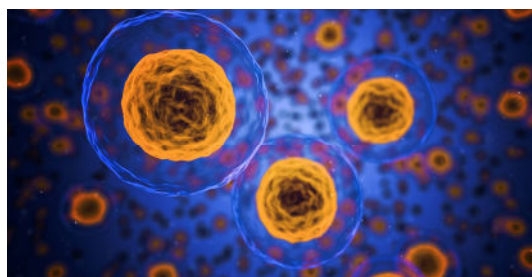
## Life Sciences

HFSX350 stages can be used to combine temperature control with molecular analysis of biological and medical specimens, from analysis of biomaterials and composites to cell morphology, water-ice vitrification and cell preservation.

Pharmaceuticals

Vitrification

Medical Applications



# Technical Specification

## Temperature Range

< -195°C (with the addition of an optional LNP96-S) to 350°C

## Heating Rate

0.01°C to 30°C /min

## Vertical Sample Spring Clip

For use with solid samples

## Temperature Stability


< 0.1°C

## Vacuum Compliant Heating Block

For use down to  $10^{-3}$  mbar at maximum temperatures of 350°C. Can also be supplied with the standard THMS600 heating block for non-vacuum use with a maximum temperature of 600°C.



 [www.linkam.co.uk](http://www.linkam.co.uk)

 +44 (0)1737 363476

 [info@linkam.co.uk](mailto:info@linkam.co.uk)

## Discover More...



### Control Options

Take control of your experiment with LINK software, or the stand-alone LinkPad touch screen, alongside the T96 temperature controller.

Both LINK software and LinkPad share a unified user interface that can control and monitor temperature and many other parameters including vacuum, humidity, tensile and shear force (dependent on system). The LinkPad provides an easy-to-use interface to the T96, for total control without a PC. Profiles with up to 100 ramps can be programmed, allowing simulation of complex processes.

LINK software enhances this with data-logging functions and real time graphical feedback. Optional modules to enhance your system include the LINK Imaging Module for synchronised image capture, the LINK Extended Measurements module to measure key image features, the LINK 21CFR11 Module for data regulatory compliance, and LINK TASC providing image-based thermal analysis.

### DSC600 and DSCX600

Linkam's DSC600 and DSCX600 are novel single cell DSC/DTA systems which are optimised for simultaneous imaging and heat flow measurements. Their unique design allows the cell to be used on a variety of systems, including optical microscopes, FT-IR and Raman spectrometers.

The DSC600 enables the user to measure and image thermal phase transitions (such as melting points and glass transitions) of a wide range of substances whilst accurately controlling temperature from  $< -195^{\circ}\text{C}$  to  $600^{\circ}\text{C}$ .

The DSCX600 has been specifically optimised for use with X-ray systems including WAX/SAX and synchrotron systems. The low mass single furnace ensures rapid heating and cooling rates (up to  $130^{\circ}\text{C}/\text{min}$ ) and a fast response time so that manufacturing processes may be replicated.



### CAP500

The CAP500 is designed to study samples in a  $\leq 50\text{mm}$  section of high pressure quartz capillary with temperature control from  $< -195^{\circ}\text{C}$  up to  $500^{\circ}\text{C}$ .

Samples can be pumped through the capillary at a specific pressure using a pump and pressure gauge to investigate the rheology of the sample with respect to temperature and pressure using brightfield, IR or Raman microscopy.

The CAP500 has also been used to study the geological fluid inclusions created in quartz capillaries. Our dual capillary CAP500 option allows two capillaries to be tested simultaneously.



## Contact Details


Linkam Scientific Instruments Ltd.  
Unit 8 Epsom Downs Metro Centre  
Waterfield  
Tadworth  
KT20 5LR  
United Kingdom

We make scientific instruments that help characterise materials from polymers to biological tissue and metals to composites. Our instruments are used for research by the world's most advanced scientific organisations and companies. Each of our instruments are designed and manufactured in-house by our team of highly experienced electronics, software and mechanical design engineers. We design and develop solutions for sample characterisation by collaborating with the best scientists in the world. Will you be next?

Linkam products are constantly being improved, hence specifications are subject to change without notice.  
TASC products are a family of techniques developed by Prof. Mike Reading (Cyversa) and Linkam.



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 [info@linkam.co.uk](mailto:info@linkam.co.uk)