

HFS600 Heating and Freezing Stage

The HFS600 stage is based on the design of the THMS600, one of the most widely used heating and freezing stages on the market. Using the highly polished, pure silver heating block technology, heating rates of 150°C/min and an accuracy to 0.1°C are achievable.

Features and Benefits

Experiments can be carried out in the temperature range –196°C to +600°C

Samples can be quickly characterized by heating to within a few degrees of the required temperature at a rate of up to 150°C/min with no overshoot, then slowed down to a few tenths of a degrees per minute to closely examine sample changes. The entire experiment can be saved as an online plot or exported to a spreadsheet application.

The stage body is fitted with quick-to-fit gas ports so that sample atmosphere can be controlled by gas flow and condensation eradicated by dry nitrogen gas purge supplied by the LNP95 cooling pump.

This is a compact system, which can be used either horizontally or vertically in spectrometer systems, and can be fitted with a variety of window materials for Raman, IR, UV and x-ray investigations.



HFS600E-PB4 heating/stage with T95-LinkPad controller and LNP95 cooling system. Temperature Range -196°C to 600°C

System Options

Stages

There are four versions of the HFS600 heating/freezing stage:-

HFS600 — for general heating/freezing applications

HFS600E — with two internal quick-release spring connectors and Lemo feed-through

HFS600E-PB2 — with two gold-tipped tungsten probes and 2 BNC connectors

HFS600E-PB4—with four gold-tipped tungsten probes and 4 BNC connectors

There are two different system controller options:

Controllers

The T95-LinkPad — a standalone controller with ergonomic LCD touch screen control and data sampling of 20 times per second. The controller RS232 connectivity to add Linksys 32 system control software. See the T95 system controller Product Brochure for more details.

The T95-Linksys system controller with Linksys 32 system control software, enabling PC control of temperature, data acquisition and export as well as multiple ramp programming. (Requires PC, cannot be used as standalone controller).

Cooling

The LNP95 cooling pump communicates with the T95 system controller and varies the pump speeds to give a precise flow of liquid nitrogen from the 2L Dewar (supplied), to enable linear cooling speeds from 0.1 to 100°C/min. The exhaust dry nitrogen is then recycled through the pumps and used to keep the tubing flexible and purge the sample chamber to eradicate condensation. (All fittings and Dewar are supplied with the pump).



Standard HFS600 heating/stage



HFS600E-PB4 heating/freezing stage showing the 4 gold-tipped Tungsten probes.

Optical Specifications

The HFS600 is a versatile instrument, which can be supplied as a variants for high pressure work or using in a vertical orientation (in spectrometers).

When working with heating and freezing stages on a microscope, it is necessary to use long working distance objective lenses. If viewing the sample using transmitted light you also require a long working distance condenser lens.

The objective lens is isolated from the sample by the stage lid window which is a fixed distance from the heating/cooling element. In the THMS600 this distance is 4.5mm, as seen in the diagram opposite. We recommend that you use an objective lens with at least 4.7mm working distance.

The condenser lens is isolated from the sample by the stage base plate window and the thickness of the heating/cooling element. In the HFSS600 this distance is 12.5mm.

Linkam make condenser extension lenses for many types of condenser, please select the condenser extension lens from the optical accessories section of our website.

Attaching the HFS600 to a Microscope

Upright microscopes whether standard optical, or part of a Raman or IR system, usually have an XY table or circular POL table to move the sample relative to the objective lens. These tables are mounted to the microscope substage and need to be removed when using the hotstage.

Linkam manufactures different stage clamps to attach the HFS600 stage to many different brands of microscope. The stage clamps are required to adjust the position of the hotstage relative to the light path of the objective lens.

Select the stage clamps you require from the 'Selecting Stage Clamps' section on page 6 of this brochure.

Increase Capability Options

Linksys 32-DV (Digital Image Capture) and Digital Camera

Add digital capture to the Linksys 32 system controller software and one of the range of Q-Imaging digital cameras to enable time lapse image capture including all T95 data saved with the image. Quickly find single or groups of images by dragging a box around an area of the time/temperature graph or scrolling through the gallery. Create movies of experiments and add scale bar, annotations, and measurements. (See 'Software and Image Capture' on our website for more information).

Imaging Station

Free up time on your research microscope by attaching your HFS600 stage to the Linkam Imaging Station instead. The imaging station has been designed specifically for temperature controlled microscopy. Standard microscope lens can be loaded into the quick lock mounting jaws which can be easily swung back out of the way of the stage to allow greater sample access to the HFS600 stage.

A long working distance condenser is built into the base with polarizer and diaphragm. A 100W halogen light source and C-mount for a camera is also supplied. (See 'Imaging Station' on our website for more information).

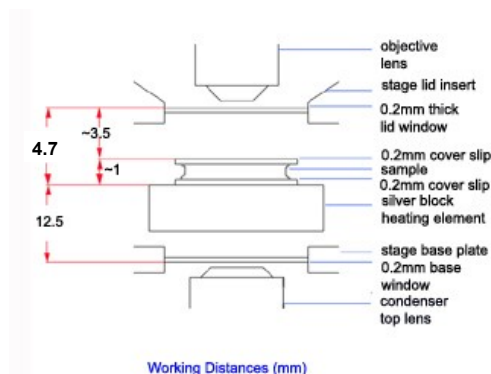
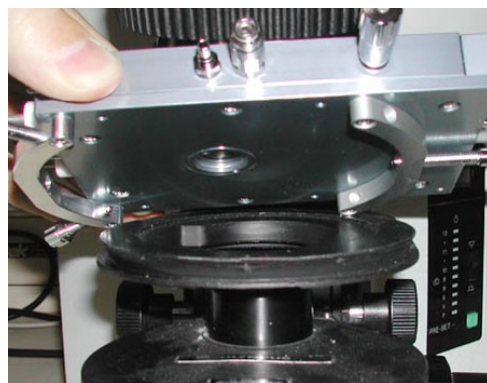
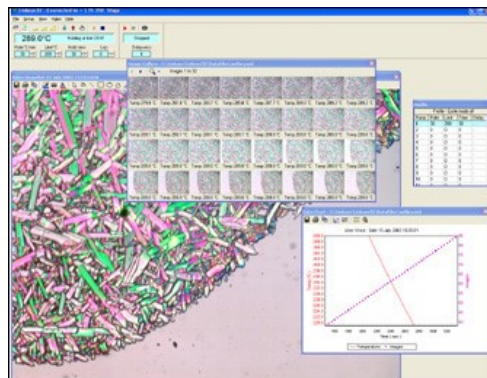


Diagram of objective lens and condenser lens working distances.



HFS600 stage with stage clamps being attached to circular dovetail substage.



Linksys 32-DV System Controller Software



Linkam Imaging Station. Optics are tilted back to allow easy access to sample

Specifications

- Temperature range -196° to 600°C (cooling option required)
- Up to 150°C/min heating
- Temperature stability: <0.1°C
- Silver heating block for high thermal conductivity
- 100ohm platinum resistor sensor. 1/10th Din Class B to 0.1°C
- Sample area 22 mm diameter
- Gas tight chamber for atmospheric control
- Light aperture: 2 mm diameter
- Single ultra thin lid window - 0.17mm
- Minimum objective lens working distance: 4.7mm
- Minimum condenser lens working distance: 12.5mm
- Can be used with all microscope techniques
- Suitable for Confocal, Laser Raman and X-Ray
- Can be used vertically in spectrometers or on synchrotron beam-lines
- Water cooled stage body for high temperature work (>300°C)

Read on to see what you need for the complete Linkam temperature control solution.

Linkam Complete Temperature Control Solution

1) Select Heating Stage

- | | | |
|--------------|-------------|---|
| 11000 | HFS600 | Heating Stage |
| 11001 | HFS600E | Heating Stage with Electrical connector posts inside Stage |
| 11073 | HFS600E-PB2 | Probe Stage - HFS600E Stage Assembly with 2 x BNC screw fit fittings and 2 Probes |
| 11074 | HFS600E-PB4 | Probe Stage - HFS600E Stage Assembly with 4 x BNC screw fit fittings and 4 Probes |

2) Add Controller

- | | |
|--------------|--|
| 14065 | T95-LinkPad standalone system controller |
| 14066 | T95-Linksys PC interface and Linksys 32 system controller software |

3) Add Cooling Option to extend range from Ambient to -196°C

- | | |
|--------------|--|
| 14050 | LNP95 (includes tubing, 2L Dewar and siphon) |
|--------------|--|

4) Add an ECP if using the stage above 300°C

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|-------------|------------|---|
| 0998 | ECP | Water Circulator Pump (stage body and window cooling)(220-240V, 50Hz) |
| 0997 | ECP | Water Circulator Pump (stage body and window cooling)(110-130V) |
| 0995 | ECP | Water Circulator Pump (stage body and window cooling)(220V,60Hz) |
| 0977 | ECP | Water Circulator Pump (stage body and window cooling)(100V,60Hz) |

5) Add Condenser Lens if using transmitted light

See website 'Condenser Extension Lenses'

6) Add Stage Clamp to mount to microscope substage

See 'Selecting Stage Clamps' on page 6 to select clamps specific to your microscope.

7) Add System Control Software (not necessary if T95 LinkSys controller is selected).

- | | |
|--------------|------------|
| 15001 | Linksys 32 |
|--------------|------------|

or if you require image capture, then go to (8)

8) Add System Control software including the Digital Video Capture Option

Please note that Linksys32DV software is compatible only with Linkam cameras

15005 Linksys 32DV or

15013 Linksys 32DV add-on (if T95 Linksys selected in step (2))

9) Add Q-Imaging Camera

5719 QIC-F-CLR-12 QICAM Fast 1394 non-cooled CCD Colour - Bayer Mosaic, 12-bit camera

Or see website 'QImaging Cameras' for more options

10) Add Linkam Imaging Station

Alternative to be used in place of your existing microscope for temperature controlled microscopy. See website 'Imaging Station'

See the next page for stage adaptors for your system.

Selecting Stage Clamps

Select a suitable Stage Clamp to mount to your microscope substage. Stage clamps are listed by microscope make and model.

Olympus Upright Microscopes

BX series — 9542 curved clamp

U-SRP Polarising Table — 9654 SRP adapter plate

Nikon Upright Microscopes

Microphot — 9675 Nikon Microphot Adapter

Optiphot 2 Pol — 9669 clamping plate

E800 — 9674 clamping plate

Optiphot 1/2, Labphot 2 — 9542 curved clamp

LV100 with substage MBD65000 — 9775 adapter plate

80i/90i with substage for Mechanical stage (not rotatable) — 9785 adapter plate and clamps

80i/90i with Rotatable Mechanical stage — 9564 adapter plate

Pol Table — 9654 clamping plate

Zeiss Upright Microscopes

Axiophot, Axioplan, Axioplan 2, Axioskop 2, Axioskop 40 — 9564 clamps

Axiolab, Axioskop & AxioTech — 9565 clamps

Axiomager and Axio Scope — 9734 adaptor plate and clamp

Leica Upright Microscopes

Leitz Ortholux 2 & Orthoplan — 9667 clamping plate

Leitz Metallux 3 — 9671 clamping plate

DMRX, DMRB and DMRB(A) — 9673 clamping plate

Laborlux — 9677 clamping plate

DMLP — 9676 clamping plate

DMLB/M & ATC200 — 9542 curved clamp

DM1000, DM 2000, DM2500, DM4000M, DM5000 and DM6000M — 9670 clamping plate
(Fits onto XY table part 11561090. Also fits DM2500M with Leica XY table part 11888705)

DM2500-P — 9654 clamping plate

DM1000, DM2000, DM2500, DM4000M, DM5000 and DM6000M — 9787 adapter plate and clamps

Other

Meiji microscopes — 9679 adapter

Perkin Elmer Auto Image microscope — 9680 adapter

Marzhauser 116x116 Adapter — 9805 adapter

(This is suitable for the Marzhauser Scan 75x50 table, which has a recess of 116x116mm.)

Suggested Spares

These spares are organised into convenient kits. Purchase a spares kit to avoid downtime with your stage and eliminate future shipping costs.

The HFS600 heating element is extremely durable if used carefully. However, it is made from pure silver which is a soft metal. It can be easily scratched, which will compromise the heat flow to the sample and reduce accuracy. The platinum temperature sensor is brittle and can be broken if cleaning is not carefully performed. We recommend a spare heating element to avoid downtime with your stage while element is being repaired.

Please quote **part number** when ordering.

7537 HFS600 Full Replacement Spares Kit

2200	Water/Gas Valve Insert	2
2202	Water/Gas Valve Insert	2
2061S	Silicon Rings for Lid and Base (Set of 4)	1
2231	Tube Clip Holder (for Nitrogen de-fogging stage lid tube)	1
9837	HFS O-Ring Kit	
2013	Box of Glass Windows	2
7017	Plastic tube for stage body water cooling	1
2638	Window Tool (for unlocking lid insert and base locking ring)	1
2252	Large sample ring	1
2694	22x0.5mm Quartz	2

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7535

HFS600E-PB4 Full Replacement Spares Kit

2200	Water/Gas Valve Insert	2
2202	Water/Gas Valve Insert	2
2061S	Silicon Rings for Lid and Base (Set of 4)	1
2231	Tube Clip Holder (for Nitrogen de-fogging stage lid tube)	1
9837	HFS O-Ring Kit	
2013	Box of Glass Windows	2
7017	Plastic tube for stage body water cooling	1
2638	Window Tool (for unlocking lid insert and base locking ring)	1
5135	Tungsten Needle Probe	4
6241	Type A yellow PTFE 7/0.15 (metre)	1
2252	Large sample ring	1
2694	22x0.5mm Quartz	2
3053	0.89mm Hex Key (for probes)	1