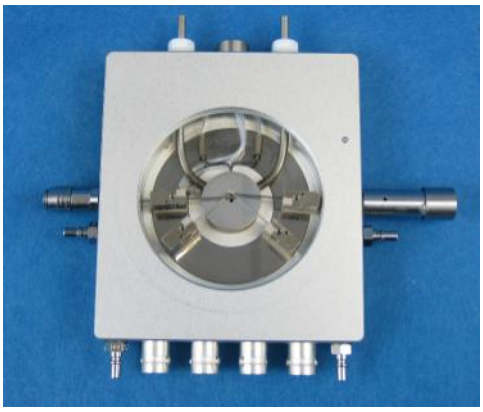
Probe Systems for Microscopy and Spectroscopy

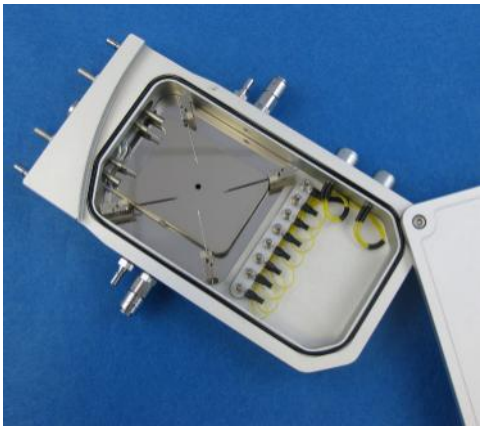
There are many applications that require the measurement of electrical parameters whilst making microscopic or spectroscopic observations. Linkam have designed a range of heating and freezing stages with electrical connectors and probes specifically aimed at areas of research such as MEMS, silicon wafer and liquid crystal materials. These instruments incorporate the new T95 controller technology giving the excellent temperature control expected of Linkam products.

Features and Benefits

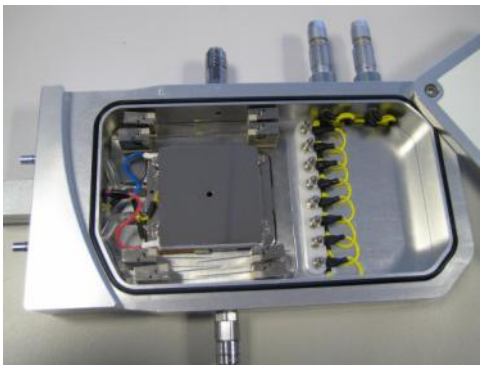
- Superb temperature control whilst making electrical measurements on samples
- Ductile gold-tipped tungsten probes can be formed to shape
- Magnetic bases for easy and stable positioning of probe assembly
- Multi-pin LEMO or BNC connectors
- Compact design
- Can use different inert gases to control the atmosphere
- Easy sample loading
- Suitable for microscopy or stand-alone applications



HFS600E-PB4 with temperature range of -196°C (with LNP95) to 600°C, fitted with BNC feed-through.



The LTS420E-PL8 stage with temperature range of -196°C to 420°C.



The LTS120E-PL8 Peltier heated/cooled probe stage with temperature range of –40°C to +120°C, fitted with spring post connectors and LEMO feed-through.

Systems

Stages

There are a number of probe stage options available:-

HFS600E-PB4 stage

The HFS600E-PB4 heating/freezing stage incorporates 4 probes and 4 BNC connectors. With a temperature range of -196°C (when used with the LNP95) to +600°C this is a versatile instrument, which can be supplied as a variants for high pressure work or using in a vertical orientation (in spectrometers).

LTS420E-PL8/PB4 stages

Based on the successful LTS420 chamber format with it's sliding lid and large-area heater, there are several options available with Lemo or BNC connector options. Temperature ranges from -196°C (with the LNP95) to +420°C .

LTS120E-PL8 Stage

This Peltier controlled stage is part of an entry level system and is designed for experiments in the temperature range of -40°C to +120°C with a stability of 0.1°C . This stage is supplied with a controller and ECP water circulator.

Probe Systems for Microscopy and Spectroscopy

Controllers for HFS600E-PB4 and LTS420E –PL8 / PB4 stages

With the introduction of the T95 controllers, the probe stages have benefited from improved temperature stability and precision. All probe stages can be supplied with either the T95-LinkPad stand-alone, or T95-Linksys computer controller.

There are two different system controller options:

T95 LinkPad

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

T95 LinkSys

The T95-Linksys system controller including new Linksys 32 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).

For cooling below ambient temperatures the T95 controllers require the additional LNP95 liquid nitrogen cooling system:

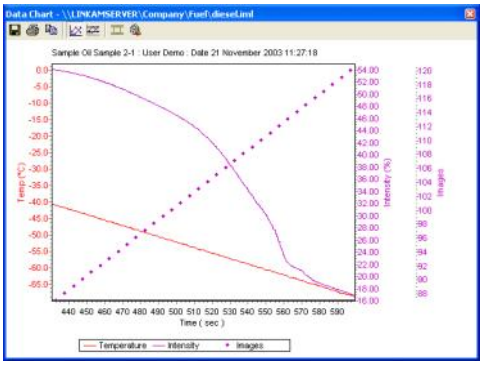
Liquid Nitrogen System (LNP95)

For experiments at temperatures below ambient, or fast cooling experiments from 100°C downwards, then choose the:

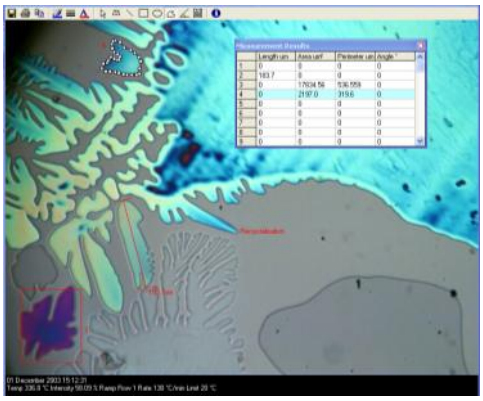
LNP95-LTS system for all LTS420E stages

LNP95-THMS system for all HFS600E-PB4 stages

LTS420E-PL8 with T95-LinkPad controller with LNP95 cooling system



Linksys32 Control Software - showing a temperature profile with image capture points



Linksys32 Control Software - showing a captured image, temperature profile table and graph

Controllers for the LTS120E –P stages

The LTS120E-P stages are supplied as a complete system, with the T95-PE LinkPad peltier controller, and an ECP water circulator giving a temperature range of -25°C to + 120°C . An optional Julabo circulator can be supplied to extend temperature control down to -40°C .

Linksys32 Software

Linksys32 software provides a PC control environment enabling multiple temperature profiles to be set up, recorded and saved.

Working with the QICAM range of digital cameras, Linksys32 is an ideal platform to record a complete experiment. Images can be captured at pre-defined points and are automatically labelled with experimental parameters such as temperature, sample, time and date. Time-lapse movies can be compiled from all, or a selection, of these images at the touch of a button.

Linkam's image analysis tools, supplied as standard, allow the perimeters, diameters and areas of features to be measured and stored as a table prior to export as CSV if required.

Linksys32 software can be used with all of Linkam's probe stages.

LTS120E-PL8 Probe System

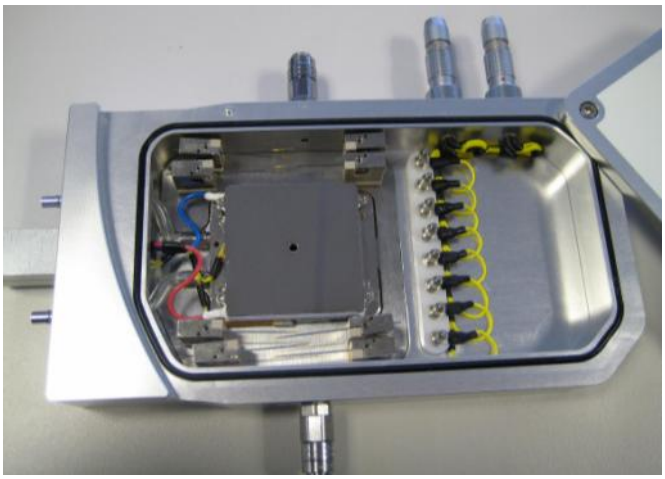
The LTS120E-PL8 peltier controlled heating/freezing stage provides a complete solution in one package. It is supplied with the new T95-PE system controller and ECP water circulator. An ideal system for those experiments requiring a lower range of temperature. As with all Linkam heating stages it can be fitted to most research grade microscopes and it can be supplied with additional windows for UV/IR/x-ray work.

Features and Benefits

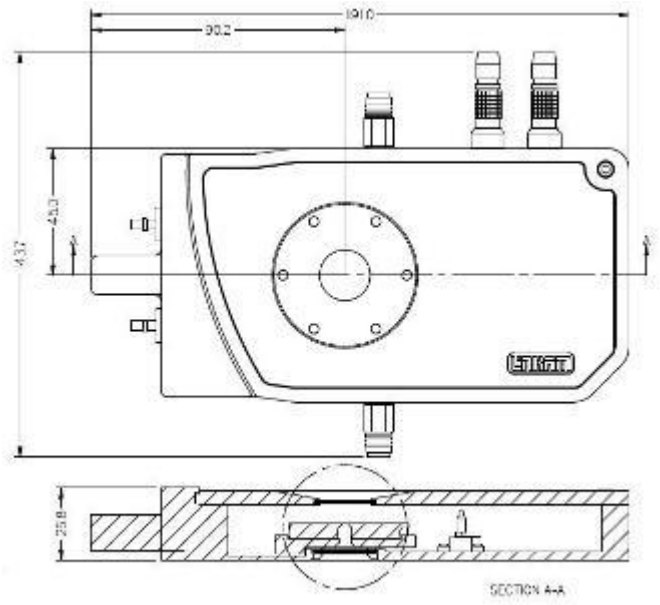
- Large sample format
- No liquid nitrogen required for cooling
- Cost effective system

Specifications

- Temperature Range -40°C* to 120 °C
- Maximum heating / cooling rate of 30°C/min
- Temperature stability & accuracy to 0.1°C
- Response time of <1 second at 5°C/min at 50°C
- Sample area of 40mm x 40mm
- 8 quick-release spring-clip connectors
- 2 x 4-pin Lemo feed-throughs
- 4 x Gold tipped Tungsten probes
- Quick-release gas valves for atmospheric control
- Swing out lid for easy sample loading
- Can be used with transmitted or reflected light
- Mounts directly to microscope table or sub-stage
- 100 ohm platinum sensor
- Highly conductive metal for improved heat transfer
- Objective lens minimum working distance 7.5mm
- Condenser lens minimum working distance 13.2mm



The LTS120E-PL8 Peltier heated/cooled probe stage with temperature range of –40°C to +120°C, fitted with quick-release spring post connectors and LEMO feed-through.



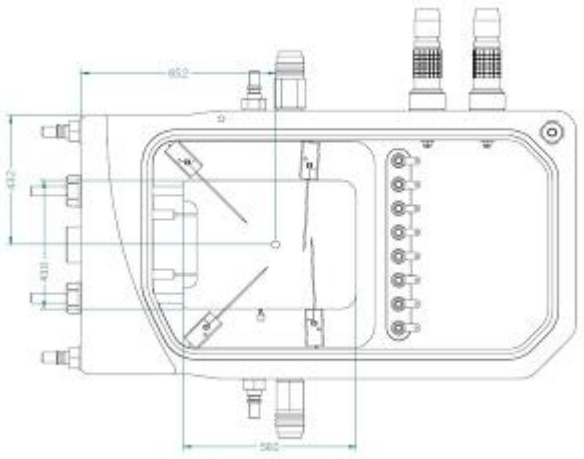
Drawing showing major dimensions and vertical clearance required. When attached to a microscope the objective lens will require a working distance greater than 7.5mm

LTS420E-P stage Systems

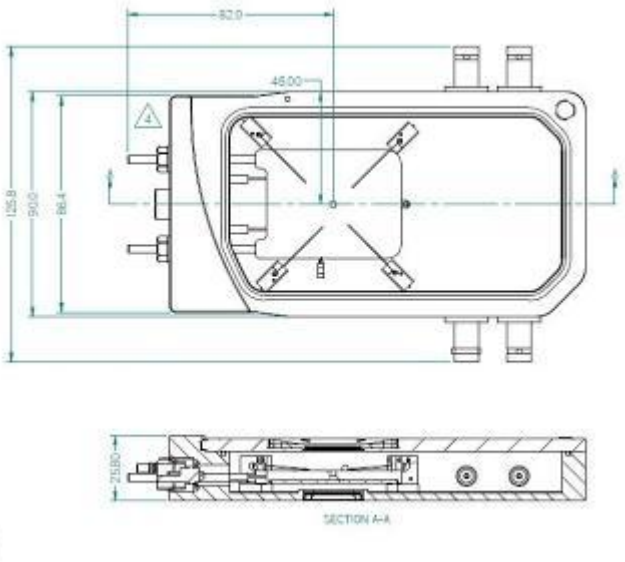
The LTS420E heating/freezing probe stages provide a wider temperature range for larger samples. They are supplied with the new T95-HS LinkPad system controller, and the optional LNP95 liquid nitrogen cooling system when fast cooling between +100°C to –196°C is required. As with all Linkam heating stages they can be fitted to most research grade microscopes and can be supplied with additional windows for UV/IR/x-ray work. The LTS series are ideal for small stand-alone experiments on the bench.

Features and Benefits

- Large sample format
- Wide temperature range (-196°C to +420°C)
- Faster cooling (with LNP95)
- Up to 8 probes (LTS420E-PL8)
- Lemo (LTS420E-PL8) or BNC (LTS420E-PB4) connectors (for handling lower signal strength)
- Easy sample loading



Layout of the LTS420E-PL8 showing the 8 quick-release spring connectors and the two Lemo feed-throughs.



Layout of the LTS420E-PB4 showing the 4 BNC connectors. When attached to a microscope, objective lenses with a working distance greater than 8.6mm will be required.

Specifications

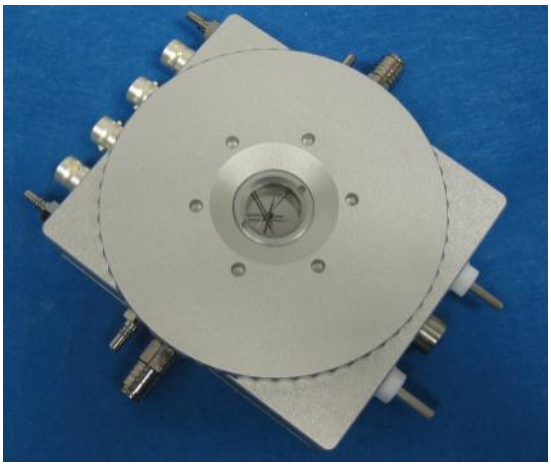
- Temperature Range -196°C to 420 °C
- Temperature stability <0.1°C
- Minimum Heating Rate 0.01°C/min
- Maximum heating rate of 50°C/min
- Response time of <1 second at 5°C/min at 50°C
- Sample area of 53.5mm x 43mm
- 100 Ramp temperature profile programming
- Quick-release gas valves for atmospheric control
- Can be used with transmitted or reflected light
- Objective lens minimum working distance: 8.5 mm
- Condenser lens minimum working distance: 13.2mm
- Stage body size: 169 x 110 x 25.8mm

HFS600E-PB4 stage Systems

The HFS600E –PB4 heating/freezing probe stage provides the widest temperature range for smaller samples. It is supplied with the new T95-STD LinkPad system controller and the optional LNP95 liquid nitrogen cooling system when fast cooling between +100°C to –196°C is required. As with all Linkam heating stages it can be fitted to most research grade microscopes and can be supplied with additional windows for UV/IR/x-ray work.

Features and Benefits

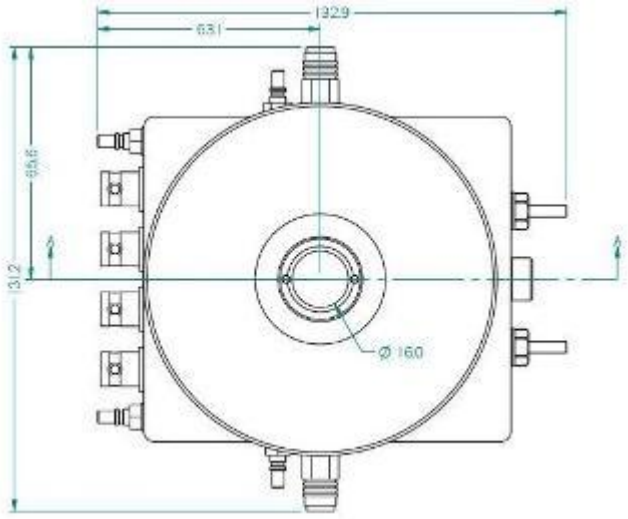
- Compact system
- Widest temperature range
- Fastest heating and cooling rates (with LNP95)
- Can be used vertically



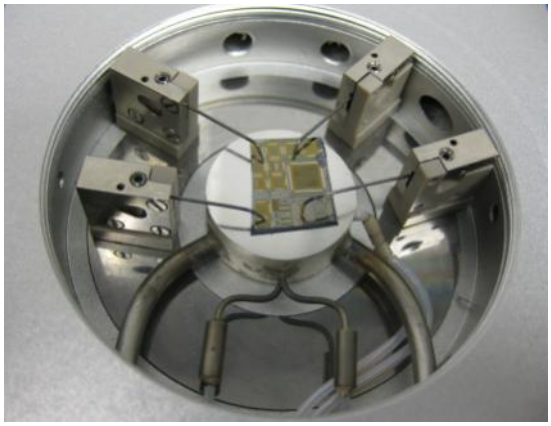
HFS600E-PB4 showing the 4 BNC feed-throughs, gas purge ports, liquid nitrogen cooling connectors, and water cooling inlets and outlets

Specifications

- Temperature Range -196°C (with LNP95) to 600°C
- Temperature stability <0.1°C
- Minimum Heating Rate 0.01°C/min
- Maximum heating rate of 150°C/min
- Maximum cooling rate 100°C/min
- Response time of <1 second at 5°C/min at 50°C
- Sample area of 22mm diameter
- 100 Ramp temperature profile programming
- Quick-release gas valves for atmospheric control
- Can be used with transmitted or reflected light
- Objective lens minimum working distance: 4.7mm
- Condenser lens minimum working distance: 12.5mm



HFS600E-PB4 - major dimensions (above) and detail showing the probes on a small circuit board (below)



What do you need for a complete Temperature Control Solution?

1a) Select either LTS120E-PL8 Probe system

22222 LTS120E-PL8 System (inc. T95-PE LinkPad controller and ECP water circulator)

Now go to step (5)

OR

1b) Select Probe stage

11088 LTS420E-PL8 stage or **11087** LTS420E-PB4 stage

11073 HFS600E-PB2 stage or **11074** HFS600E-PB4 stage

2) Select Controller

14067 T95-HS LinkPad — for stand-alone control of LTS420E-P stages

14068 T95-HS Linksys — for PC control of LTS420E-P stages

14065 T95-STD LinkPad — for stand-alone control of HFS600E stages

14066 T95—STD Linksys — for PC control of HFS600E stages

3) Select cooling option (for sample cooling down to -196°C)

14051 LTS-LNP95 — for LTS420E Systems (standard 39cm tubing incl. 2 litre Dewar)

14050 THMS-LNP95 — for HFS600E Systems (standard 39cm tubing incl. 2 litre Dewar)

4) Add Water circulator for body and window cooling when heating above 300°C

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), 50Hz)

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 Stage Clamp to mount to microscope sub-stage

See following page, or for full listing 'Stage Clamps' for Leica, Nikon, Olympus and Zeiss microscopes

6) Add condenser extension lens for KÖhler illumination at longer working distances

See website for full listing of Condenser lenses for Leica, Nikon, Olympus and Zeiss microscopes

7) Add software

15001 Linksys32 Temperature Control Software (supplied automatically with T95-Linksys controller)

15005 Linksys32 DV-NC Temperature Control and Digital Video Capture Software. Compatible with the range of Linkam tested cameras.

8) Add Camera

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

E50i/E55i — 9548 curved clamps

LV100 with substage MBD65000 — 9774 adapter plate and clamps

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

80i/90i with Rotabable 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

AxioImager 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