

## LTS120—Peltier System

This Peltier controlled system provides a turnkey solution with 0.1°C temperature stability and control, rapid sample loading and precise sample positioning in the range of -40°C to 120°C without requiring liquid nitrogen for cooling.

### Features and Benefits

The LTS120 sample chamber is gas tight and features gas valves to enable purging with inert gas or flow of humidified air.

The stage consists of a large area temperature controlled element with a platinum resistor sensor embedded close to the surface for accurate temperature measurements.

The sample is simply mounted on a standard microscope slide in direct contact with the polished heating element and can be manipulated 15mm in XY direction. The stage lid easily swings open thereby enabling rapid sample change-over.

To minimise the temperature gradient across the sample, the light aperture in the block is only 2.5mm diameter.

The new PE95-LinkPad temperature controller with LCD touch screen control is used to quickly program a temperature profile by simply tapping the on-screen controls.

The intuitive Linksys 32X temperature control software comes as part of the system and enables full PC programming of the temperature.

The system comes as a simple turnkey solution easily operated with little or no experience with temperature controlled stages.

There are stage clamps available to attach the stage to the substage of the microscope or use the Linkam Imaging station to ensure even greater sample access and free up your research microscope for other microscope based applications where sample temperature control is not required.

### Specifications

- Temperature Range -40°C\* to 120°C (\* F200 cryogenic water circulatory needed)
- Sample area of 40x40mm
- 15mm XY manipulation as standard
- Sample holder for standard 76x26mm microscope slides
- Gas tight chamber for atmospheric control
- Swing out lid for easy sample loading
- Can be used with transmitted or reflected light
- Mounts directly to microscope table or substage
- Stage body size: 160x80x24mm
- 100 Ohm platinum sensor
- Temperature stability and accuracy to 0.1°C
- Maximum heating / cooling rate of 30°C/min
- Response time of <1 second at 5°C/min at 50°C
- Objective lens minimum working distance: 6mm
- Condenser lens minimum working distance: 13.2mm



The LTS120 heating and freezing stage

Temperature Range -40°C to 120°C



PE95-LinkPad Temperature Controller



LTS120 stage showing microscope slide holder

## Optical Specifications

The LTS120 is designed to be used with an upright microscope, where the objective lens is above the sample.

When working with heating and freezing stages, 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 LTS120 this distance is 6mm, as seen in the diagram opposite. We recommend that you use an objective lens with at least 6mm 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 LTS120 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 LTS120 to 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.

Linkam manufactures different stage clamps to attach the LTS120 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 3 of this brochure.

## Increase Capability Options

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

Add digital capture to the Linksys 32X system controller software and one of the range of Q-Imaging digital cameras to enable time lapse image capture including all PE95 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).

### Electrical Connections

The **LTSE120** has a Lemo connector built into the side of the stage which is wired to spring clip terminals in the sample chamber to enable electrical measurements to be made directly on the sample relative to temperature.

### Imaging Station

Free up time on your research microscope by attaching your LTS120 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 LTS120 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 the 'Imaging Station' on our website for more information).

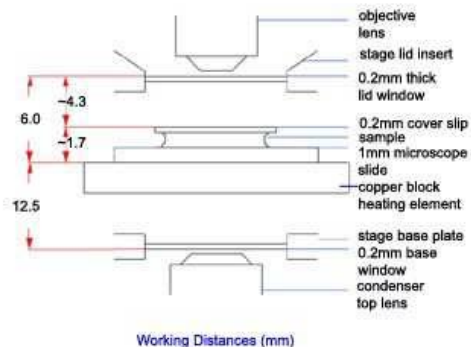
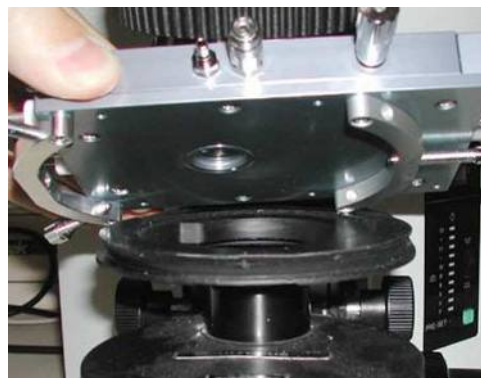


Diagram of objective lens and condenser lens working distances.



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



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

## 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 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

Axiolmager 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.)

## **Linkam Complete Temperature Control Solution**

### **What do you need for a complete solution**

#### **Select System**

Either: Standard LTS120 Peltier System (includes LTS120 stage, PE95-LinkPad standalone system controller, Linksys 32X system controller software and ECP water circulator pump)

Or: LTSE120 System (includes LTSE120 stage with electrical connections inside the stage to make electrical sample measurements such as resistance, capacitance etc...)

#### **Add Cryogenic Water Circulator**

Julabo cryogenic circulator is only required to chill water to 5°C for extended cooling at maximum range of -40°C

#### **Add Condenser Extension Lens if using transmitted light**

See website [‘Condenser Extension Lenses’](#)

#### **Add Stage Clamps to mount to microscope substage**

See ‘Selecting Stage Clamps’ on the previous page to select clamps specific to your microscope.

#### **Add the Digital Video Capture Option**

See website [‘Image Capture’](#) Linksys 32X-DV

#### **Add Q-Imaging Camera**

See website [‘QImaging Cameras’](#)

#### **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 Suggested Spares for your system.**

## Suggested Spares

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

### Part No. Part Name Part Description

<b>22222</b>	<b>LTS Kit</b>	<b>Full Replacement Spares Kit</b>
WGI		Water/Gas Valve Insert <b>x2</b>
WVC		Water/Gas Valve Connector <b>x2</b>
SSR		Silicon Rings for Lid and Base (Set of 4)
WT		Window Tool (for unlocking lid insert and base locking ring)
TCH		Tube Clip Holder (for Nitrogen de-fogging stage lid tube)
ORLTS		Set of O-rings for the Body and Lid
ACCE		Box of Glass for Windows / Sample: 22x0.17mm (x50); 16x0.17mm (x50); 22x0.3mm (x10)
LTS/MSC		76x26mm Microscope Slide Carrier
LTS/MS		Microscope glass slide (76x26x1mm) Box of 100

### Part No. Part Name Part Description

<b>22222</b>	<b>LTS Spare Windows Kit</b>	<b>Spare windows for Lid, Base and Samples</b>
SRR		Silicon Rings for Lid and Base (Set of 4)
ACCE		Box of Glass for Windows / Sample: 22x0.17mm (x50); 16x0.17mm (x50); 22x0.3mm (x10)
LTS/MS		Standard microscope glass slides (76x26x1mm) Box of 100