

THMS350V Vacuum System

The THMS350V stage enables the user to create low pressure environment during complex heating and cooling profiles. Pressure is measured directly on the sample chamber and displayed in software or on the T95-LinkPad LCD screen.

Features and Benefits

Based upon the proven low pressure and temperature control technology developed for the Freeze Drying System (FDCS196), Linkam has modified the stage body and temperature control element to extend the temperature range from -196°C up to 350°C at a vacuum of 10^{-3} mbar using a simple 1.5L rotary vacuum pump.

It is now possible to carry out ultra low temperature experiments with virtually no gas or air contamination of the sample. By substituting a vacuum port for a gas valve it is also possible to first pull a vacuum and then bleed in the desired gas.

A Pirani gauge can be supplied to relay the sample chamber pressure to either the Linksys 32X software or the LCD touch screen on the T95-LinkPad Controller.

By connecting the vacuum pump to the MV196 motorized valve, pressure can be quickly and accurately varied utilizing simple on screen software controls.

System Options

There are two Vacuum System Options.

THMS350V Vacuum System

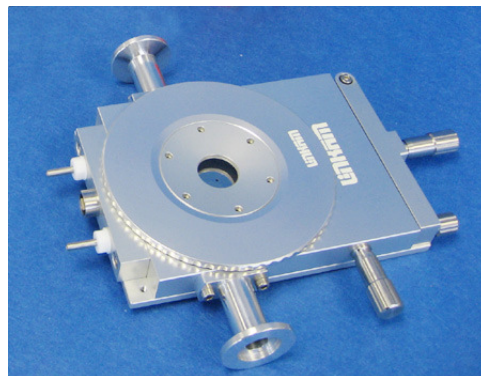
This system includes the THMS350V stage, T95-LinkPad Controller with ergonomic LCD touch screen control, Pirani vacuum gauge.

THMS350V Vacuum Pro System

This system includes the same components as the standard system above, but adding the Linksys 32 system control software, MV196 motorized valve and 1.5L rotary vacuum pump (including all vacuum connectors).

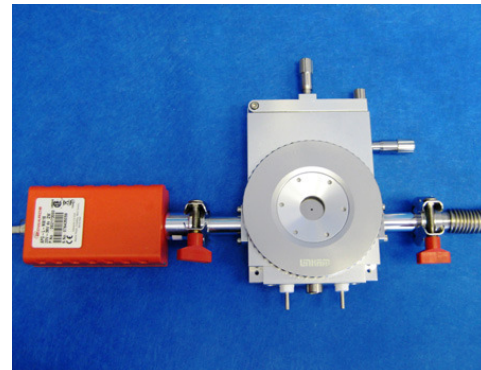
Cooling Option—LNP95

To cool samples from ambient down to -196°C, add the LNP95 liquid nitrogen cooling system. This highly efficient liquid nitrogen pump, using proprietary pumps and tubing, automatically controls pumping rate to ensure minimal liquid nitrogen is required.



The THMS350V heating and freezing stage

Temperature Range -196 to 350°C



Examina Vacuum Stage with Vacuum Gauge attached.



THMS350V system with Cooling option

Optical Specifications

The THMS350V 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 THMS350V this distance is 4.5mm, as seen in the diagram opposite. We recommend that you use an objective lens with at least 4.5mm 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 THMS350V 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 THMS350V 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 and need to be removed when using the hotstage.

Linkam manufactures different stage clamps to attach the THMS350V 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 'Optical Accessories' section on our website.

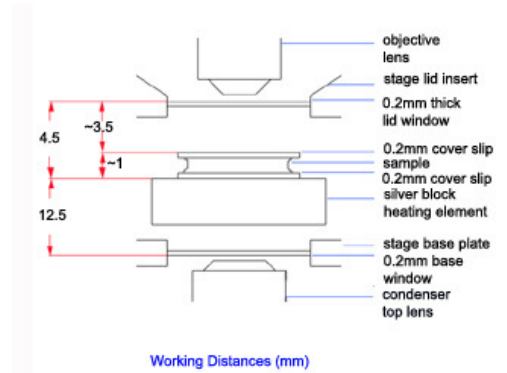
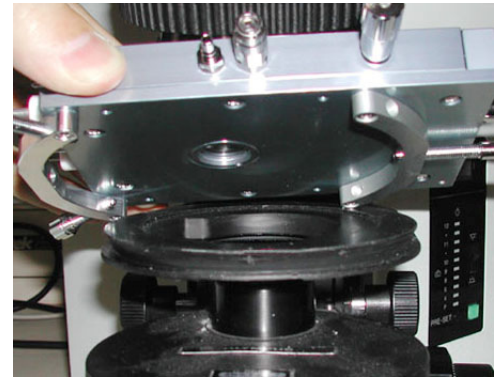


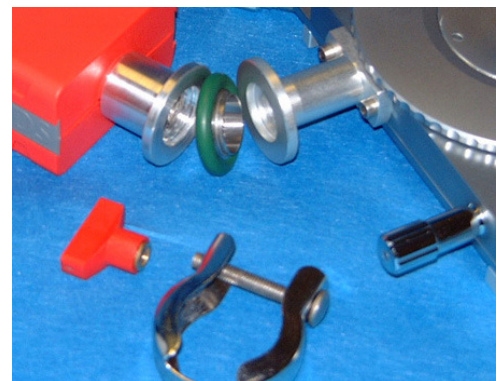
Diagram of objective lens and condenser lens working distances.



Hotstage similar to THMS350V with stage clamps being attached to circular dovetail substage.

Specifications

- Temperature range -196 °C to 350 °C
- Up to 150 °C/min heating
- Temperature stability <0.1 °C
- 16mm XY sample manipulation
- Sample area 22mm diameter
- Vacuum tight sample chamber to 10⁻³mbar even with XY manipulation
- Clamps directly to the microscope substage for stability
- 100 Ohm platinum resistor sensor
- Silver heating block for high thermal conductivity
- Direct injection of the coolant into the heating element
- Single ultra thin lid window 0.3mm
- Objective lens working distance: 4.5mm
- Condenser lens minimum working distance: 12.5mm
- Range of condenser extension lenses available
- Can be used with all microscope techniques
- Suitable for Confocal, Laser Raman, IR and X-ray
- Stage body size: 137x92x22 mm



Pirani Vacuum gauge connections with THMS350V stage

Increase Capability Options

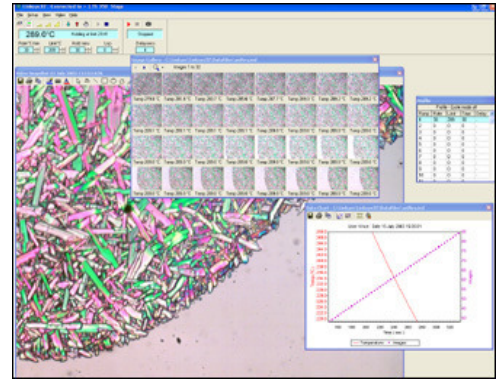
Linksys 32X-DV (Digital Image Capture) and Digital Camera

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 T95 data saved with the image.

Setup up your temperature profile and pressures for your lyophilisation cycle and leave the software to control the stage and captures images, enabling you to carry on with other tasks.

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. For more information, see 'Software and Image Capture' on our website.



Q-Imaging Cameras

Linkam supports the entire range of Q-Imaging CCD firewire cameras.

The QICAM fast 1394 shown here is designed for high resolution brightfield scientific and industrial applications. A progressive scan interline CCD sensor gives a resolution of 1.92 million pixels in 12-bit digital output.

This camera is ideally suited to the polarized colourful images seen in many of the birefringent crystalline structures seen in freeze drying.



MV196 Motorized Valve

A motorized valve receives pressure data via the T95-LinkPad and controls the vacuum pressure inside the sample chamber. You can dial in a specific vacuum value as part of a temperature profile and the valve will automatically control the pressure. You will need an '1.5L rotary vacuum pump' for this valve to function optimally. (Including with the Pro system).



Imaging Station

Free up time on your research microscope by attaching your THMS350V 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 THMS350V 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).



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

What do you need for a complete temperature control solution?

Select System

Either [Examina Vacuum System](#) (includes THMS350V stage with Pirani vacuum gauge and T95-LinkPad standalone system controller)

Or [Examina Vacuum Pro System](#) (includes THMS350V stage with vacuum gauge and T95-LinkPad standalone system controller, Linksys 32X system control software, 1.5L rotary vacuum pump, MV196 Motorized Valve, includes vacuum fittings and tubing.)

Add Cooling Option if required

LNP95 liquid nitrogen cooling pump with 2L Dewar and connections

Add Condenser Lens if using transmitted light

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

Add Stage Clamp to mount to microscope substage

See website [‘Stage Clamps’](#)

Add System Control Software if Pro system is not selected

Linksys 32X enables temperature control.

Add the Digital Video Capture Option to Linksys 32X temperature control software

Linksys 32X-DV, set up temperature control profiles, display live image, capture time lapse images with data. Requires camera

Add Q-Imaging Camera

Camera is required if Linksys 32X-DV is added to system. See website [‘Q-Imaging Camera’](#)

Add Linkam Imaging Station

Alternative to be used in place of your existing microscope for temperature controlled microscopy.

See website [‘Imaging Station’](#)

Note:

If Motorized Valve MV196 is not purchased as part of the THMS350V Pro System, then the T95-LinkPad will have to be returned to Linkam to be modified to enable control of the valve.

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 THMS350V cooling 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.

Part No. Part Name Part Description

22222	THMS Kit	Full Replacement Spares Kit
WG		Water/Gas Valve Insert x2
WVC		Water/Gas Valve Connector x2
SSR		Silicon Rings for Lid and Base (Set of 4)
RI17		Stainless Steel Ring Set
THC		Tube Clip Holder (for Nitrogen de-fogging stage lid tube)
ORTHMS		Set of O-Rings for THMS Stage Body and Lid
THMS/Q		15mm diameter Quartz Crucible for THMS/CC
ACCE		Box of Glass for Windows / Sample: 22x0.17mm (x50); 16x0.17mm (x50); 22x0.3mm (x10) x2
THMS/CC		Crucible Carrier for THMS600
TUBE		3x6x150mm Clear PVC Tube
WT		Window Tool (for unlocking lid insert and base locking ring)
TUBE		3x6x150mm Clear PVC Tube
SO		Silicon Oil (1/4 fl.oz)

Suggested Spares

Part No.	Part Name	Part Description
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22222	THMS Spare Windows Kit	Spare windows for Lid, Base and samples
THMS/Q		15mm diameter Quartz Crucible for THMS/CC
ACCE		Box of Glass for Windows / Sample: 22x0.17mm (x50); 16x0.17mm (x50); 22x0.3mm (x10) x2
SRR		Silicon Rings for Lid and Base (Set of 4)
SO		Silicon Oil (1/4 fl.oz)

Part No.	Part Name	Part Description
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9811	THMSVB	Spare Heating Element incl. Platinum Temperature Sensor
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Part No.	Part Name	Part Description
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22222	W/S	Precision Temperature Kit
G7T		Sample Carrier for 7mm diameter Tapered Edge Window
W7S		7mm diameter Sapphire Sample Window (0.3mm thick) x10
SCO		Silver Cover Lid
SO		Silicon Oil (1/4 fl.oz)

Suggested Spares

Part No.	Part Name	Part Description
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18006	VP	E2M1.5 Vacuum pump (including - EMF3 Mist Filter)
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Part No.	Part Name	Part Description
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22222	Vac-CK	Vacuum Connection Kit
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NW10-EB	NW10 Elbow 90 degree
NW10-O	10mm bore vacuum O-ring
NW10/16-O	10 to 16mm bore vacuum O-ring
NW16-FH	500mm stainless steel flexible hose
NW16-O	Clamping ring x3
NW16-CR	Clamping Ring
VG	Vacuum grease