

# THMS350V / HFS350EV / TS1500V

Temperature Control Stages with a Vacuum Chamber



HFS350EV-PB4

## Heating and Freezing

Stages covering a wide temperature range from < -195°C up to 1500°C

## Pressure Measurement

Monitor sample chamber pressure using a vacuum gauge

## Vacuum Control

Optional motorised vacuum control valve

# Introducing the THMS350V and HFS350EV

Linkam's THMS350V enables the user to create a low pressure environment during complex heating and cooling profiles. Using the well-established low pressure and temperature control technology developed for Linkam's FDCS196 freeze drying system, the THMS350V offers an extended temperature range from  $< -195^{\circ}\text{C}$  to  $350^{\circ}\text{C}$ , whilst also retaining the capability for vacuums down to  $10^{-3}$  mbar. This allows users to carry out ultra low temperature experiments with virtually no gas or air contamination of the sample.

The vacuum is achieved by using a simple 2.5L rotary vacuum pump with the pressure measured directly on the vacuum chamber using a Pirani vacuum gauge. By adding the optional MV196 motorised valve, pressure can be quickly and accurately controlled.

The HFS350EV stage is similar to the THMS350V, but it does not support sample manipulation and has electrical connections as standard. Versions of both stage types are also available with electrical connections in the sample chamber, enabling measurements such as resistivity and capacitance to be taken during a heating/cooling run. Please see our Electrical and Probe brochure for more information.

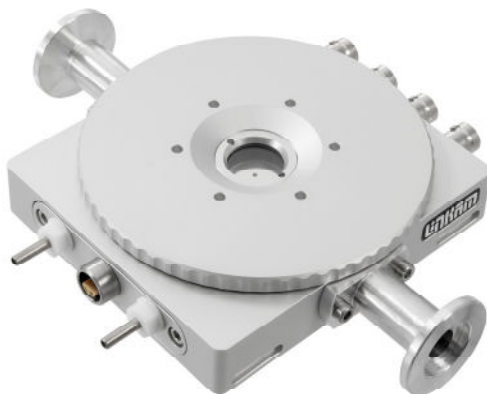
A system requires a THMS350V or HFS350EV stage and a T96-S temperature controller, which is available with either LINK software for computer control, or a LinkPad touch screen for stand-alone control, and a Pirani vacuum gauge. The optional MV196 motorised valve adds vacuum control, and for cooling below ambient temperatures an optional LNP96-S liquid nitrogen pump is also available.

The THMS350V is also available as part of two pre-configured systems:

- **THMS350V Vacuum System** which comprises a THMS350V stage, T96-S LinkPad Controller and Pirani vacuum gauge.
- **THMS350V Vacuum Pro System** which additionally includes LINK software, a 2.5L vacuum pump and MV196 motorised valve for vacuum control.



THMS350V



HFS350EV-PB4

## Features

### UNIFORM VACUUM

Chamber pressure can be monitored by a Pirani vacuum gauge mounted directly on the stage which allows a perfectly uniform vacuum to be maintained.

### WIDE TEMPERATURE RANGE

The temperature range spans from  $< -195^{\circ}\text{C}$  (using the optional LNP96-S) up to  $350^{\circ}\text{C}$ , accommodating a versatile range of experimental conditions.

### SMALL SAMPLE VOLUME

With the THMS350V you can observe the lyophilisation process using only  $\sim 5\mu\text{L}$  of sample which ensures minimal loss of APIs. This also helps save on research costs by reducing waste.

### ELECTRICAL CONNECTIONS

Alternative versions with electrical connections for sample measurement are available.

### AUTOMATIC PRESSURE CONTROL

Add ultimate control to your freeze-drying system with Linkam's MV196 motorised valve.

### CUSTOM OPTIONS

Please contact us with details of your requirements.

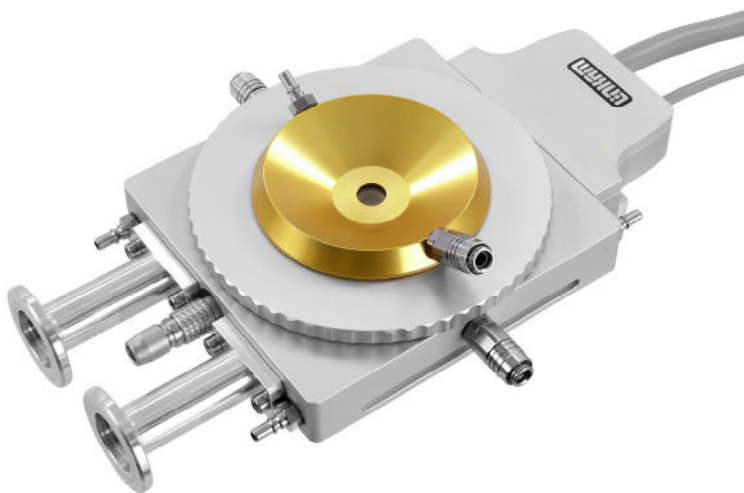
# Introducing the TS1500V

Based on the highly successful TS series of high temperature stages, Linkam's TS1500V has been modified to support a vacuum down to 10<sup>-3</sup> mbar and is based on a ceramic heater with a temperature range of ambient to 1500°C. The vacuum is achieved by using a simple 2.5L rotary vacuum pump with the pressure measured directly on the vacuum chamber using a Pirani vacuum gauge. By adding the optional MV196 motorised valve, pressure can be quickly and accurately controlled.

Samples are quickly characterised by heating to within a few degrees of the required temperature at a high rate, then slowed down to a few tenths of a degree per minute to closely examine sample changes. Our LINK software can be used to control the entire experiment and additionally allows the experimental data to be charted or exported for further analysis.

A system requires a TS1500V stage 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, as well as a Pirani vacuum gauge. The optional MV196 motorised valve adds vacuum control.

TS1000V and TS1200V stages supporting different sample sizes are also available, as are versions with electrical connections in the sample chamber. Please see our Electrical and Probe brochure for more information.



## Features

### WIDE TEMPERATURE RANGE

The temperature range spans from ambient up to 1500°C safely with a water-cooled body, accommodating a wide range of experimental conditions.

### RAPID HEATING / COOLING RATES

The powerful T96-S controller allows the stage to heat samples at a maximum rate of 200°C/minute.

### CUSTOM OPTIONS

Please contact us with details of your requirements.

## Technical Specification

	HFS350EV	THMS350V	TS-V Series
<b>Temperature Range</b>	< -195°C * to 350°C	< -195°C * to 350°C	Ambient to 1500°C †
<b>Heating/Cooling Rates</b>	0.01°C to 30°C/min	0.01°C to 30°C/min	0.01°C to 200°C/min
<b>Temperature Stability</b>	< 0.1°C	< 0.1°C	< 1°C
<b>Sample Area / Cup Size</b>	22mm diameter	22mm diameter	TS1500 7mm ø x 3mm depth TS1500 7mm ø x 6mm depth TS1200 10mm ø x 5mm depth TS1000 17mm ø x 3mm depth
<b>Objective Working Distance</b>	4.8mm	4.8mm	Dependent on stage type
<b>Condenser Working Distance</b>	13.2mm	13.2mm	Dependent on stage type
<b>XY Sample Manipulation</b>	No	Up to 15mm in both directions	No

\* For sub-ambient temperatures the LNP96-S cooling pump is required.

† TS1200 stages have a maximum temperature of 1200°C, and TS1000 stages 1000°C

## 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.

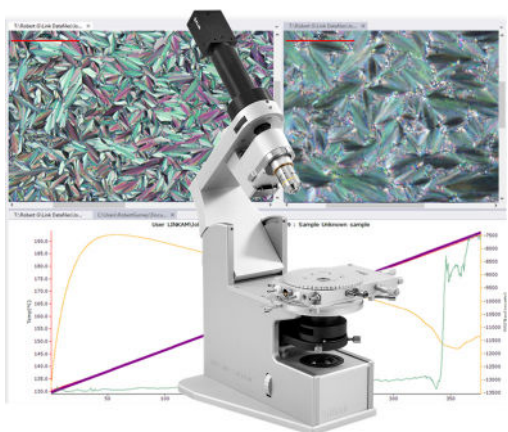


### MV196 Motorised Valve

The MV196 is a motorised valve system enabling precise control of the vacuum level between 0.1 to 100mBar.

It can be used in conjunction with all of Linkam's vacuum-compatible instruments alongside the T96-S controller and a vacuum pump. Other Linkam vacuum stages include the THMSEL350V and the FDCS196.

The vacuum set point can be controlled from either the LinkPad or LINK software. The MV196 is shown here with an optional vacuum pump.



### Imaging Station

The Imaging Station provides a digital imaging platform compatible with Linkam temperature and environmental control systems. Use our high-resolution camera to capture images and videos of your samples while controlling the temperature and environmental conditions.

The Imaging Station has been specially designed with a pivoted mechanism to allow greater access to your Linkam stage, making it quick and easy to access the chamber and change samples. It has a built-in LED light source for transmitted light with further options available for reflected light, polarisation and phase contrast imaging.

The Imaging Station is also compatible with a range of long working distance objective lenses which can be easily switched with the quick-release mechanism.

## Contact Details


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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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