CryoBiology Pro System - MDBCS196

The Linkam Cryobiology Pro System is the top of the range turnkey solution for low temperature biologists working at the cutting edge of research, demanding unrivalled temperature accuracy and motorized sample control. This precision built cryostage system is the no compromise temperature controlled microscopy choice for no compromise research scientists.

Features and Benefits

The MDBCS196 is a motorized version of the BCS196, arguably the most accurate cryobiology stage in the world.

The sample is placed on 7mm diameter quartz cover slip mounted on a pure silver cooling element and encased within a pure silver lid so that temperature is controlled from all sides to ensure a perfectly uniform heat flow.

The sample is motorized in X and Y directions enabling the user to quickly scan around the sample and even store locations of interest for further investigation upon scan completion.

The effects of ice crystal size on sample can be determined by use of the isolated seeding point mounted on one of the cooling tubes which enables ice crystal seeding through the sample.

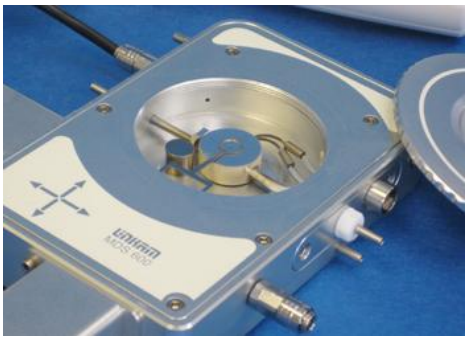
A quenching post mounted near the temperature controlled element enables vitrifying cooling rates of up to 5000°C/min by motorizing the sample from the post onto the pre-cooled silver block.

Cryobiology Pro System including LNP95 liquid nitrogen cooling system

Unrivalled accuracy and control of temperature enable the user to characterize low temperature sample morphology to better than 0.1°C and hold a stability of 0.001°C.

The response time to a 'Hold' or 'Limit' command where the temperature is stable to 0.1°C is only 0.1 seconds at 30°C/min.

The heating element is held by transverse stainless steel tubes to ensure perfect stability in Z-plane, critical to confocal applications.



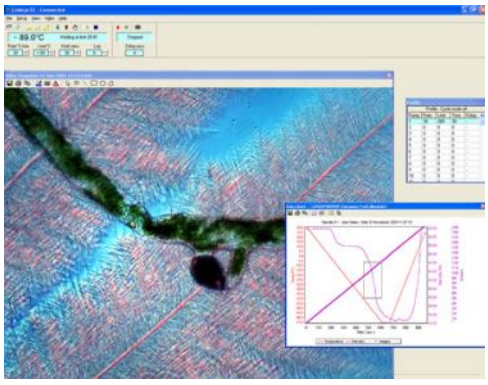
MDBCS196 stage showing seeding post and quenching post for cooling speeds up to 5000°C/min

High Speed Controlled Cooling

The new LNP95 liquid nitrogen cooling system enables a vast range in cooling rates from 0.01 to 100°C/min. This highly efficient liquid nitrogen pump, using proprietary pumps and tubing, automatically controls pumping rate to ensure minimal liquid nitrogen is required and a consistent smooth cooling curve no matter which rate is selected. (Quench post is uncontrolled high speed cooling).

Touch Screen User Interface

The new T95-LinkPad temperature controller with LCD touch screen control is used to quickly program a temperature profile by simply tapping the onscreen controls. Move sample position by dragging your finger across the touch screen.



Linksys 32X-DV System Controller Software

Intuitive Temperature Control Software

The Linksys system control software enables the user to quickly setup complex temperature control profiles.

Up to 100 ramps per profile, where each ramp sets temperature limit, heating/cooling rate and hold time. The profile can be saved for future use along with a temperature/time plot of the experiment.

Optical Specifications

Objective Lenses

The MDBCS196 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 MDBCS196 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.

However, if you have a high NA lens you want to use with less than 4.5mm WD then contact us as it may be possible to modify the lid so that the lens can pass through it and get to within 0.1mm of your sample. Oil immersion is not possible.

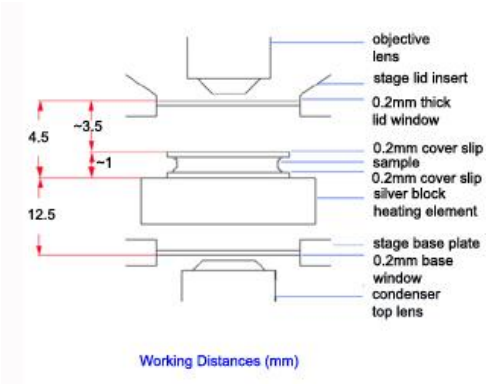


Diagram of objective lens and condenser lens working distances.

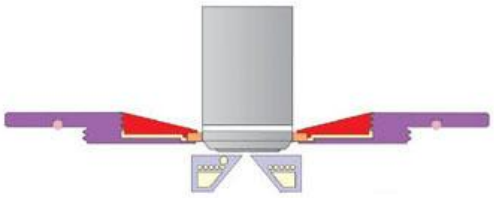


Diagram shows objective lens passing through the stage lid.

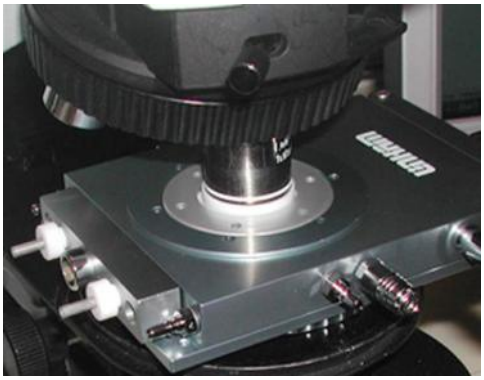
Condenser Lenses

The condenser lens is isolated from the sample by the stage base plate window and the thickness of the heating/cooling element. In the MDBCS196 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.

Phase Contrast

Biological samples are often transparent and require phase contrast techniques to make them visible to the eye. Linkam manufactures phase rings for certain condensers to ensure this technique can be used with the condenser extension lens. Please see the 'Condenser Extension Lenses' section of our website for more information

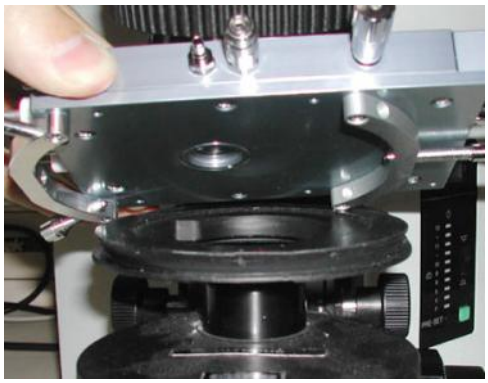


Attaching MDBCS196 to Microscope

Upright microscopes whether standard optical, or part of a Raman or IR system, usually have an XY table or circular rotating polarizing 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 MDBCS196 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 and clamp it into place to prevent further movement during the experiment.

Select the stage clamps you require from the 'Stage Clamps' section on our website.



BCS196 stage with stage clamps being attached to circular dovetail substage.

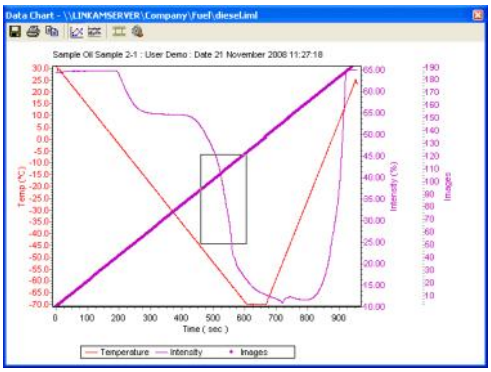
Increase Capability Options

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

Add the DV digital video capture module to the Linksys 32X system controller software and one of the range of Q-Imaging digital cameras to enable both time lapse image and T95 data capture

Quickly find individual or groups of images by dragging a box around an area of the time/temperature graph and loading the images and data into the scrollable gallery.

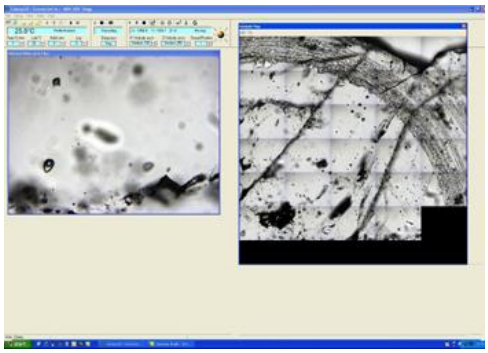
Create movies of experiments and add scale bar, annotations, and measurements to images. (See 'Software and Image Capture' on our website for more information).



Graph of temperature /time/images captured/light intensity.

XY Motorized Sample Position Control

By adding the Linksys 32X-DV option, the MDBCS196 can automatically scan the entire sample capturing high resolution images and constructing an image map. Points of interest can be instantly be relocated for further temperature control analysis by clicking on the specific area in the image map. This feature can save the researcher hours of manual sample mapping.

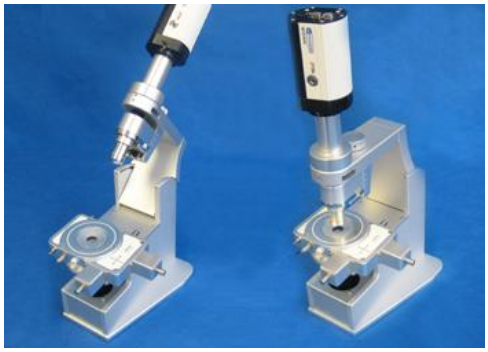


Motor driven image map of fluid inclusions in quartz.

Imaging Station

Free up time on your research microscope by attaching your MDBCS196 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 MDBCS196 stage. Optical performance is similar to a high grade research microscope.

A long working distance condenser is built into the base with polarizer and diaphragm. A phase ring slide can be inserted into the condenser. 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

Specifications

- Temperature range: -196°C to 125°C
- Controlled heating and cooling rates of 0.01 to 150°C/min
- 16mm XY sample manipulation
- Designed for use with the Linksys 32X software
- N2 ventilated windows to eliminate condensation
- Novel low profile lid design for rapid lens change
- Extremely efficient use of liquid nitrogen
- Stage body size: 160x80x24mm
- Mounts directly on microscope substage using stage clamps
- Objective lens working distance: 0.1mm to 4.5mm
- Condenser lens minimum working distance: 12.7mm
- Light aperture: 1.3mm diameter for accurate sample temperatures
- special lid available for short working distance objectives

Linkam Complete Temperature Control Solution

What do you need for a complete solution

Select System

Cryobiology Pro System includes MDBCS196 stage and T95-LinkPad standalone system controller, Linksys 32X software and LNP95 liquid nitrogen pump with 2L Dewar and all necessary 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 the Digital Video Capture Option

Digital video capture module Linksys 32X-DV requires a 1394 firewire connection.

Add Q-Imaging Camera

Q-Imaging camera required for digital video capture (Linksys 32X-DV). See website 'Q-Imaging Cameras'

Add Linkam Imaging Station

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

See website 'Imaging Station'

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 MDBCS196 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.

Part No.	Part Name	Part Description
22222	**MDBCS-K**	**Full Replacement Spares Kit**
	WGI	Water/Gas Valve Insert **x2**
	WVC	Water/Gas Valve Connector **x2**
	SRR	Silicon Rings for Lid and Base (Set of 4)
	LSR	Large Sample Ring
	TCH	Tube Clip Holder (for Nitrogen de-fogging stage lid tube)
	TUBE	3x6x150mm Clear PVC Tube
	MDS/CC	Crucible Carrier
	G7MTB	7mm diameter offset Sample Carrier
	G16M	16mm Sample Carrier
	G16.3M	16.3mm Sample carrier for MDBCS196
	THMS/Q	15mm inner diameter Quartz Crucible for THMS/CC **x2**
	W16Q	Quartz Sample Window 16mm diameter 0.3mm thick **x2**
	W7Q	Standard Quartz Window (7mm diameter) **x2**
	ACCE	Box of Glass for Windows / Sample: 22x0.17mm (x50); 16x0.17mm (x50); 22x0.3mm (x10) **x2**
	WT	Window Tool (for unlocking lid insert and base locking ring)
	LT	22mm Lock Tool
	HEXK	2.5mm Ball Driver Hex Key

Part No.	Part Name	Part Description
22222	**MDBCS Spare Windows Kit**	**Spare Windows for Lid, Base and samples**
	THMS/Q	15mm inner diameter Quartz Crucible for THMS/CC **x2**
	W16Q	Quartz Sample Window 16mm diameter 0.3mm thick **x2**
	W7Q	Standard Quartz Window (7mm diameter) **x2**
	ACCE	Box of Glass for Windows / Sample: 22x0.17mm (x50); 16x0.17mm (x50); 22x0.3mm (x10) **x2**

Part No.	Part Name	Part Description
22222	**WS Kit**	**Precision Temperature kit**
	W7S	7mm diameter Sapphire Sample Window (0.3mm thick) **x20**
	G7MT	7mm Sample Carrier (tapered)
	SCO	22mm diameter Silver Cover Lid to fit on block for accurate temperature

Part No.	Part Name	Part Description
9552	**MDBCSB**	**Spare Silver Heating Element incl. Platinum Temperature Sensor**