CryoBiology System - BCS196

The Linkam Cryobiology System is the top of the range turnkey solution for low temperature biologists working at the cutting edge of research, demanding unrivalled temperature accuracy .

Features and Benefits

The BCS196 has been continually improved for last 20 years and is arguably the most accurate cryobiology stage in the world.

The sample is placed on a 0.17mm thick cover slip on a pure silver cooling element accurately controlled by a platinum temperature sensor mounted within 0.5mm of the surface.

The sample can be easily moved in X and Y directions using the precision ground stainless steel manipulators, enabling the user to flow the ice crystal growth across the sample with temperature change.

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

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 BCS196 can be modified with a quench cooling feature that enables you to push the sample from an isolated platform onto the pre-cooled silver block and achieve cooling rates approaching 5000°C/min.

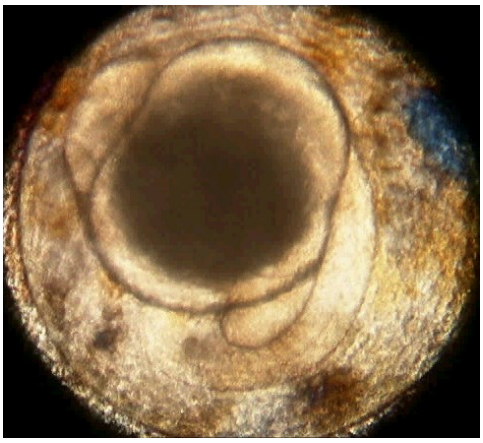
High Speed Controlled Cooling

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 feature is uncontrolled high speed cooling).

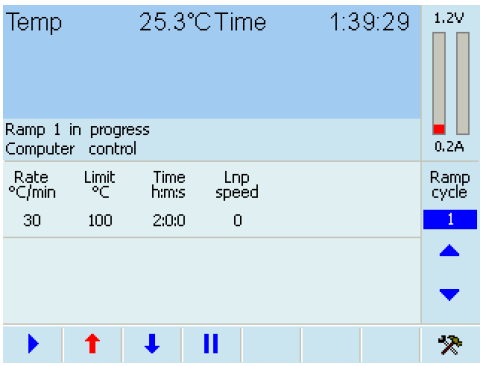
Touch Screen User Interface

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.

Cryobiology System including LNP95 liquid nitrogen cooling system



BCS196 stage showing frozen Zebra Fish Embryo



T95-LinkPad quick and easy touch-screen display

Optical Specifications

Objective Lenses

The BCS196 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 BCS196 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.

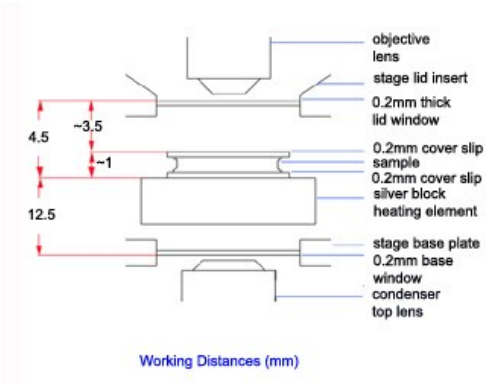


Diagram of objective lens and condenser lens working distances.

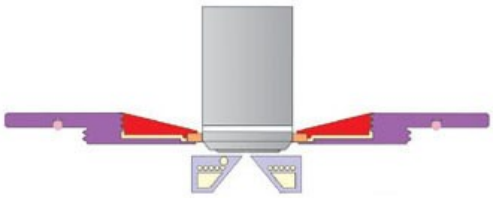


Diagram shows objective lens passing through the stage lid.

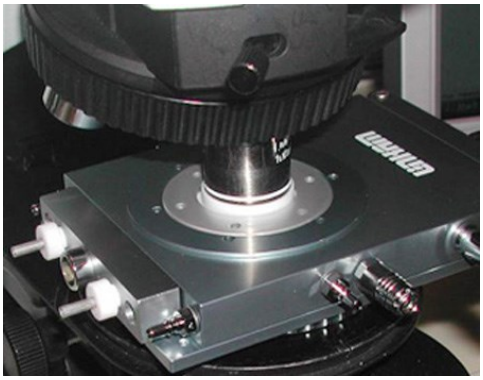
Condenser Lenses

The condenser lens is isolated from the sample by the stage base plate window and the thickness of the heating/cooling element. In the BCS196 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

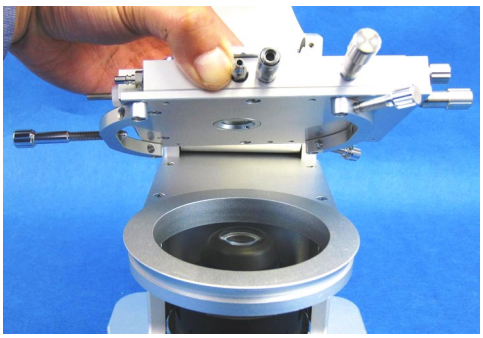


Attaching BCS196 to Microscope

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 BCS196 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.



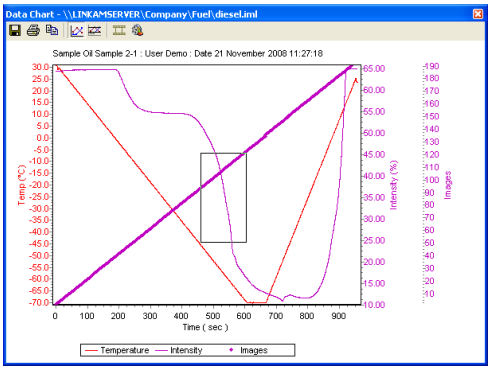
BCS196 stage with stage clamps being attached to circular dovetail substage.

Increase Capability Options

Intuitive Temperature Control Software

The Linksys 32 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.



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

Linksys 32-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).

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

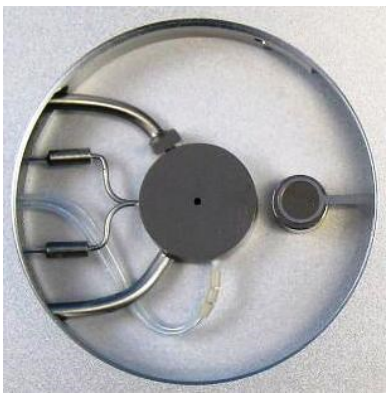
Imaging Station

Free up time on your research microscope by attaching your BCS196 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 BCS196 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).

High speed quench cooling.

Transfer sample from isolated platform onto pre-cooled silver block to vitrify sample at rates approaching 5000°C/min



Specifications

- Temperature range: -196°C to 125°C
- Controlled heating and cooling rates of 0.01 to 150°C/min
- 15mm XY sample manipulation
- Designed for use with the Linksys32 software
- Nitrogen gas ventilated windows to eliminate condensation
- Novel low profile lid design for rapid lens change
- Extremely efficient use of liquid nitrogen
- Stage body size: 135 x 92 x 22.1mm
- 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 BCS196 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 Linksys32 Software Option

For temperature control using multi-ramp profiles, storing and recalling your experimental conditions

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 BCS196 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	**BCS Full Kit**	**BCS Full Replacement Spares Kit**
	WGI	Gas Valve Insert **x2**
	WVC	Gas Valve Connector **x2**
	SRR	Silicon Rings for Lid and Base (Set of 4)
	LSR	Large Stainless Steel Sample Ring
	TCH	Tube Clip Holder (for Nitrogen de-fogging stage lid tube)
	BCS/CC	BCS Crucible Carrier
	G16	16mm Sample Carrier (BCS Style)
	BCS/Q	15mm inner diameter Quartz Crucible for BCS/CC **x2**
	W16Q	Quartz Sample Window 16mm diameter 0.3mm thick **x4**
	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)
	W22Q	22mm diameter Quartz base Window (0.5mm thick) **x2**
	W13G	13mm diameter Glass Sample Window (0.17mm thick) Box of 100

Part No.	Part Name	Part Description
22222	**BCS Spare**	**Spare Windows for Lid, Base and Samples**
	BCS/Q	15mm inner diameter Quartz Crucible for BCS/CC **x2**
	W16Q	Quartz Sample Window 16mm diameter 0.3mm thick **x4**
	ACCE	Box of Glass for Windows / Sample: 22x0.17mm (x50); 16x0.17mm (x50); 22x0.3mm (x10) x2; 13x0.17mm (x10) **x2**
	SRR	Silicon Rings for Lid and Base (Set of 4)
	W13G	13mm diameter Glass Sample Window (0.17mm thick) Box of 100
	W16Q	Quartz Sample Window 16mm diameter 0.3mm thick **x4**
	W22Q	22mm diameter Quartz base Window (0.5mm thick) **x2**
22222	**BCS CP Full**	**Full Spare for BCS196 with Quench Cooling Option**
	G7T	Sample Carrier for 7mm diameter Tapered Edge Window
	W7S	7mm diameter Sapphire Sample Window (0.3mm thick)
7502	**W7S Spare**	**7mm diameter Sapphire Sample Window (0.3mm thick) Pack of 20**
22222	**WS Kit with**	**Sapphire Precision Temperature Kit with SCO (not for use with polarised light)**
	W7S	7mm diameter Sapphire Sample Window (0.3mm thick) **x20**
	G7	Sample Carrier for 7mm diameter Standard Straight Edge Window
	SCO	22mm diameter Silver Cover Lid to fit on block for accurate temperature
9585	**BCSB**	**Spare Silver Heating Element incl. Platinum Temperature Sensor**