



LTS120
Temperature Controlled Stage

USER GUIDE

Contents

Before Setting Up your Equipment.....	3
Important Notice.....	4
Warranty.....	4
Technical Support.....	4
Equipment Maintenance.....	4
Feedback.....	4
Safety Precautions.....	5
Symbol Reference.....	5
Introduction.....	6
LTS120 Stage Specification.....	6
LTS120 System.....	6
Assembling the Microscope Slide Holder.....	7
Stage Anatomy.....	8
Lid Assembly.....	8
Stage Assembly.....	8
Mounting Stage to Microscope with Dovetail Substage.....	9
Setting up the Condenser.....	9
Setting up ECP Water Circulator Pump.....	10
Connecting the Instruments.....	11
T95 System Controller Cable Connections.....	11
Sample preparation.....	12
Loading a Sample.....	12
Cooling Connections.....	13
Purging the Stage.....	13
LTSE120 Option.....	15
LTSE120 Stage with Internal Electrical Contacts.....	15
Using the Internal Electrical Contact.....	16
Lemo Connector.....	17
Liquid Crystal Stage	18
Using the Liquid Crystal Cell.....	18
Appendix.....	19
Window Assembly.....	19
Lid Window Assembly.....	19
Bottom Window Assembly.....	19
Spares and Accessories.....	20
Contact Details.....	24

Before Setting Up Your Equipment

Please register your products by going to www.linkam.co.uk and click on the product/software registration button.

You will need to register your equipment with us to:

- Activate your warranty and technical support
- Access the online setup videos
- Permanently unlock the Linksys32 software (if purchased)

If you have purchased Linksys32 software, please install the software first. This process will guide to register all of your products.

See Linksys32 manual for further installation instructions.

A CD with a setup videos is supplied with your system.

Important Notice

Please check that your Linkam equipment has not been damaged during transit. If there is any evidence of external damage **DO NOT SWITCH ON ANY ELECTRICAL ITEMS.**

Contact LINKAM SCIENTIFIC or their appointed distributor immediately. Your warranty may be impaired if Linkam is not informed of any transport damage within 7 working days of delivery.

NO attempt should be made to repair or modify the equipment in any way, as there are **no user replaceable parts.**

No attempt should be made to open the case except by qualified personnel as hazardous voltages are present.

In order to use this equipment successfully, please take time to read this manual all the way through before using it.

Warranty

This equipment has a warranty against defects in material and workmanship for a period of 12 months. Linkam will either repair or replace products that prove to be defective. For warranty service or repair, this product must be returned to Linkam or a designated service facility.

The warranty shall not apply to defects resulting from interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

Technical Support

Any technical questions or queries should be addressed to the Technical Support Department at the address shown on the back of this manual.

Equipment Maintenance

Use a small quantity of isopropyl alcohol with a soft cloth and gently wipe the surface. To clean the stage, use isopropyl alcohol (IPA) and cotton swabs. Take great care not to touch the platinum temperature sensor protruding from the side of the heating element. The sensor is very fragile.

Product Registration

Register your Linkam instrument and software; please go to www.linkam.co.uk to fill in the Product / software Registration form. After registration, you can login to our website to download manuals and access 'How To Videos'.

Feedback

Your feedback will be greatly appreciated, please go to www.linkam.co.uk to fill in the Feedback form.

Safety Precautions

- 1) Read this guide before using the equipment. Save these instructions for later use.
- 2) Follow all warnings and instructions which may be placed on the programmer or stage.
- 3) If for any reason the mains fuse needs to be replaced then it must be replaced by one of the same type and rating as shown in the equipment ratings.
- 4) To prevent electric shock, do not remove the cover of the controller or associated electronics.
- 5) Never use the equipment if a power cable has been damaged. Do not allow any heavy objects to rest on the power cables. Never lay the power cables on the floor.
- 6) Do not obstruct any ventilation holes. Do not attempt to insert anything into these openings. Provide adequate ventilation of at least 75mm all around the equipment.
- 7) Do not expose the equipment to water. If for any reason it gets wet then unplug it from the mains and contact Linkam Scientific Technical Support.
- 8) The equipment is not intended to be used outdoors.
- 9) Each product is equipped with a 3-wire grounded (earth) mains plug or a free-end 3 wire mains lead. The plug only fits into a grounded-type outlet. The free-end mains lead should be connected to a correctly grounded 3-wire mains outlet. Do not defeat the purpose of the grounded (earth) type plug.

Free - end mains leads are colour coded as follows :

Colour	Function
Brown	Live
Blue	Neutral
Green/Yellow	Earth (Ground)

- 10) If any problems occur then unplug the equipment from the mains outlet and contact Linkam Scientific Technical Support.
- 11) Do not remove the cover from the equipment unless the mains inlet has been removed. Any servicing should be carried out by qualified service personnel.

Symbol References

Caution:

This safety symbol is on the back panel of the equipment and warns:-



The user must not make or remove any connections while the unit is powered on.
To avoid electric shock do not remove the cover. Refer servicing to qualified service personnel.

Caution:



This warning symbol indicates that the surface labelled with this symbol may be hot.

Introduction

Thank you for purchasing the LTS120 Heating and Freezing stage system. Please take the time to read through the manual as it will help you to make the most out of the equipment.

LTS120 Stage Specifications

Maximum temperature: 120°C
Minimum temperature: -25°C with ECP
(-40°C with water chill at 5°C)
Maximum heating rate: 30°C/min
Objective Lens WD: 5.4mm
Condenser lens WD: 13.2mm
XY-Manipulators travel: 15mm
Aperture hole: 2.5mm



-LTS120 with T95-LinkPad Option

LTS120 System

The system consists of a LTS120 stage, T95-Linksys32 System Controller.

Linksys32 with digital video capture can be added as an option.

Please install the software on the PC first and activate Linksys32 within 10 days.

T95-LinkPad is also available as an option.

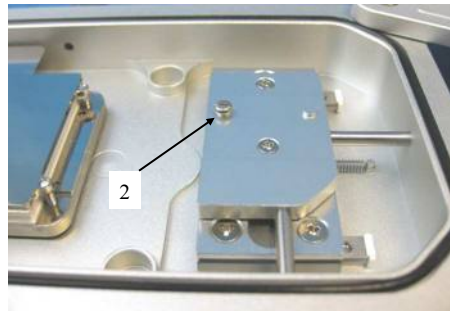
The LTS120 stage is mounted onto the microscope by using either specific stage clamps, an adaptor plate or by simply placing on the XY table of the microscope, using double sided adhesive tape.

Assembling the Microscope Slide Holder

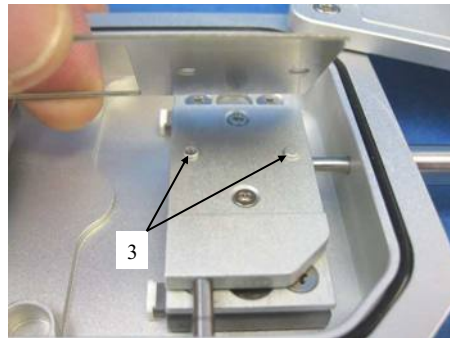
The Microscope Slide Holder (1) is supplied separately from the stage. Fix the holder to the LTS120 stage, by following the instruction below.



Remove the screw (2).



Make sure the 2 holes on the Microscope Glass Slide Holder are lined up with the two notches (3) on the XY Manipulator Assembly and place the holder in place.

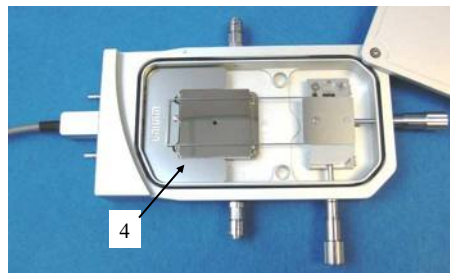


Use the screw (2) to fix the Microscope Slide Holder in place.

Note: when fitted properly the Microscope Slide Holder should not touch the silver heating block (4), the holder should hover about 1mm above it.

If the holder is touching the silver block or hovers too high, remove screw (2) and flip the Microscope Slide Holder over.

Note: the Microscope Slide Holder can be bent into shape with a little force to help.

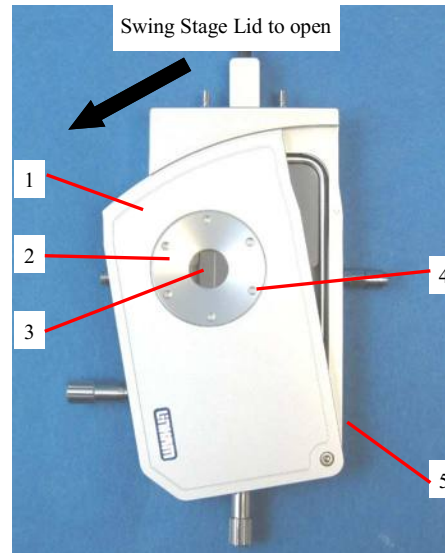


Stage Anatomy

Lid Assembly

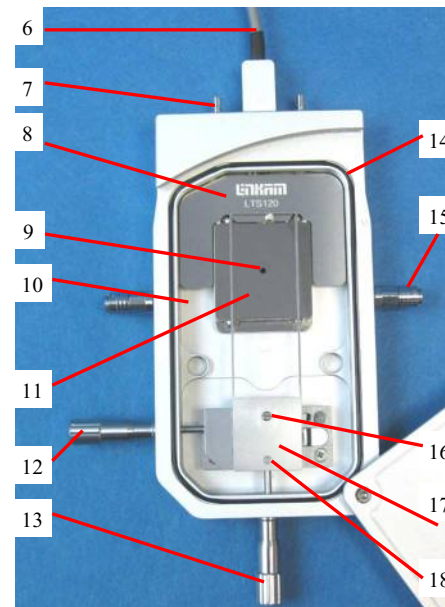
Swing the Stage Lid (1) to open the Stage.

1. Stage Lid
2. Lid Insert
3. Viewing Window
4. Holes for Tube Clip Holder or window removal tool
5. Hinge



Stage Assembly

6. Stage Lead Cable
7. Water Cooling Connector for Peltier element
8. Metal Plate Cover
9. Aperture hole (2.5mm)
10. Stage Chamber
11. Peltier Heating / cooling block (40x40mm)
12. Y-manipulator
13. X-manipulator
14. Rubber sealing o-ring
15. Gas purge valve
16. Fixing crew for microscope Sample Slide holder
17. Microscope Sample Slide Holder
18. Alignment peg for Sample Slide Holder



Mounting Stage to Microscope with Dovetail Substage

Note: the picture in the procedure is for an LTS350, but the LTS120 should fix the same way.

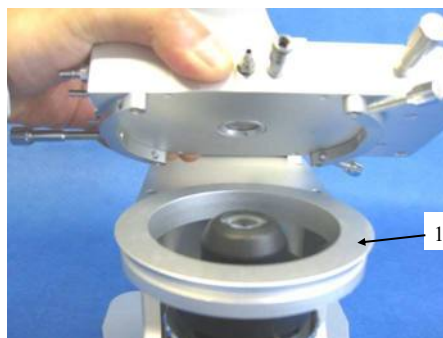
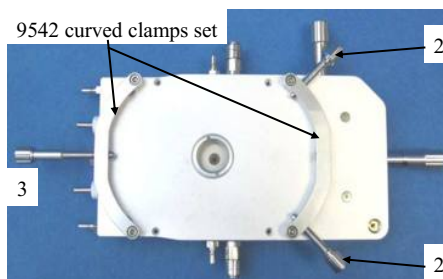
The following description is for mounting the stage on to microscopes which have a circular dovetail substage assembly (1).

Attach the curved stage clamps (part no. 9542) to the base of the stage using the supplied hex screws and the outer most holes in the base plate.

Adjust the two positioning screws (2) so that approximately 5mm of thread is exposed on the inside edge of the clamp. This will roughly position the stage in the centre of the dovetail.

Place the stage onto the dovetail, then focus a 10X objective lens on the aperture of the silver block. Using the two positioning screws (2) ensure that the aperture is in the centre of the field of view and lock the stage in place by tightening the Locking Thumbscrew (3).

For other types of microscope substage, refer to the diagram included with the stage adaptor.



Linkam Imaging Station with dovetail substage

Setting up the Condenser

Place a small sample on a cover slip and place onto the surface of the silver block. Use a 5X or a 10X lens to focus on the sample. Now close down the microscope field diaphragm and adjust the condenser focus so that the edges of the diaphragm are in focus. Now use the condenser positioning screws to centre the condenser in your field of view. Open the diaphragm so that it just fills the field of view.

For more information about Koehler illumination see the extremely informative 'Microscopy Primer' on the Molecular Expressions website.

<http://micro.magnet.fsu.edu/primer/index.html>



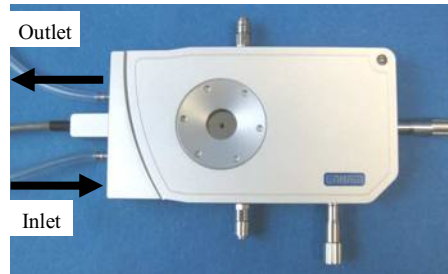
Setting up ECP Water Circulator Pump

The ECP Water Circulator Pump (1) supplied with your LTS120 stage is used to circulate water at ambient temperature to provide the temperature gradient needed to make the Peltier heat and cool.

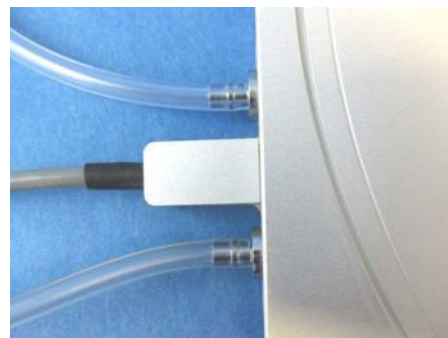
The ECP must be connected to the LTS120. See the ECP manual for instruction setting up the ECP.



Connect the tubing to the Inlet and Outlet as shown.



The tube is pushed directly on to the water Inlet and Outlet connectors.



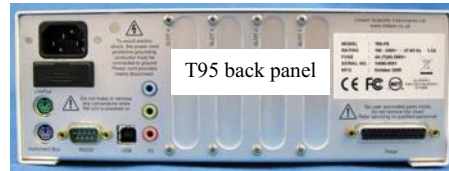
Note: the ECP must be switched on first and circulating water before the LTS120 is used.

Connecting the Instruments

T95 System Controller Cable Connections

For more details on the T95 System Controller please refer to the T95 System Controller manual.

Connect the Stage Cable Connector from the LTS120 stage to the Stage Connection Socket (1).

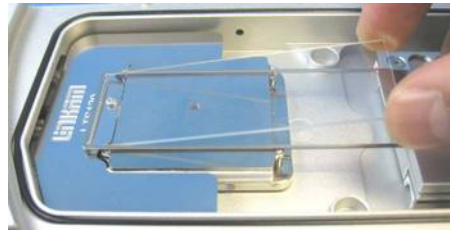


Sample Preparation

Note: Temperature control performance is easily compromised. Therefore it is very important to keep the silver heating block and microscope glass slide clean. Use a soft cloth and IPA (isopropyl alcohol) to clean. Do not use excessive force when cleaning the silver block as this will bend the heater assembly.

Loading a Sample

Place a standard microscope glass slide (26x76mm) in the Microscope Slide Holder, use a spatula and tap on the microscope glass slide to make sure that it is sitting flat on the heating block.



Place the sample on top of the microscope glass slide. Ensure that the sample is as small as possible and that it is as flat as possible. Heat flow into or out of the sample is affected by the amount of sample area in contact with the temperature controlled surface.



Place a 16mm glass cover slip on top of the sample to create a flat surface for the microscope lens to focus on.



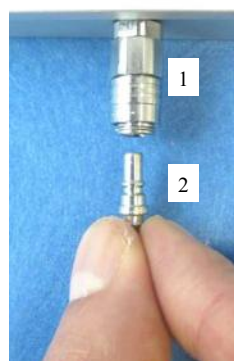
Accurate temperatures can be obtained by keeping the sample as small and flat as possible.

Cooling Connections

These connections need only be made if the experiments are to be carried out below room temperature.

The Gas Purge Valve (1) is opened when the Gas Insert (2) is pushed firmly into the connector. A “click” is heard when the two parts are connected properly. To remove the Gas Insert, push the outer sleeve of Gas Purge Valve toward the stage and the Gas Insert (2) should drop out.

There is a second Gas Purge Valve (3) on the opposite side of the stage to allow the gas to leave the stage. A Gas Insert must also be inserted into this Gas Purge Valve (3) when purging.



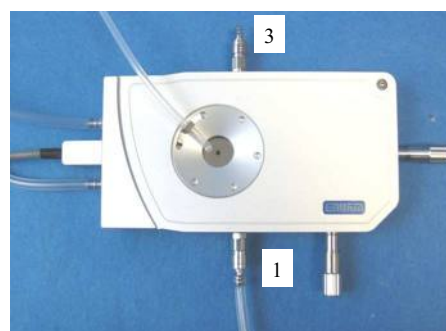
Purging the Stage

This method uses an inert and dry gas from a gas cylinder to purge the stage.

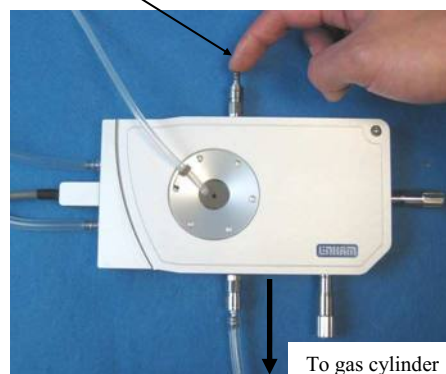
1. Make sure the Stage Lid is in place and the Stage Door is closed.
2. Either use the LinkPad touch screen or Linksys32 software to heat the stage to 40°C.
3. From a gas cylinder connect the Gas Insert with a tubing 3mm inner diameter and 6mm outer diameter to the Gas Purge Valve (1).
4. Connect a Gas Insert to the opposite side Gas Purge Valve (2).
5. Use the gas regulator to set a gas flow rate of 1.5L/min.
6. With the gas flowing through the Sample Chamber, block the gas outlet for a few seconds and releasing the gas outlet valve with a finger. Repeat this for a few minutes to purge the stage.

Reduce the gas flow rate to 20cc/min to continuously purge the stage or remove the two Gas Inserts to keep the chamber under closed inert atmosphere.

Note: Helium gas is not recommended for continuous purging. This gas has a very high thermal conductivity and will cool the silver heating block too much during an experiment and may cause the temperature to fluctuate.

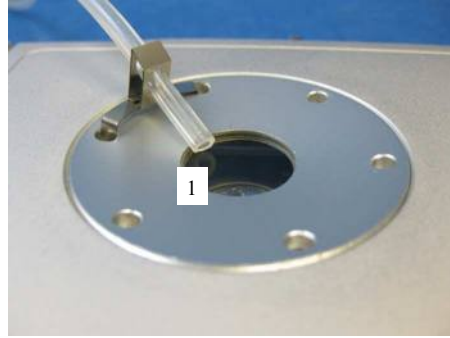


Block and release outlet valve with finger



Connect a silicon tubing 3.5mm diameter from a gas cylinder with a flow rate of 20cc/min and thread it through the Tube Clip Holder (1). Place in position as seen the the opposite picture

This tube blows warm gas across the lid window to prevent condensation on the viewing window surface, when the stage is being used at low temperature.

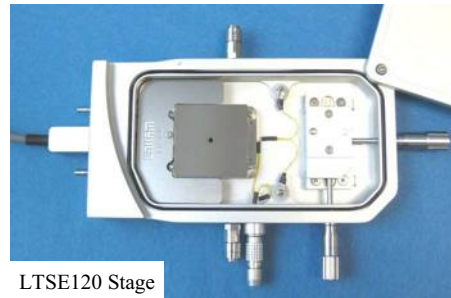


LTSE120 Option

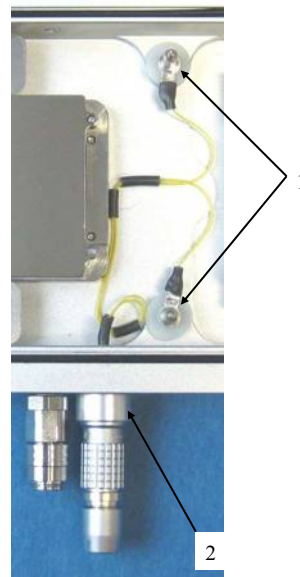
Only read the following if the stage is supplied with internal electrical contacts for LTSE120 or Liquid Crystal Stage.

LTSE120 Stage with Internal Electrical Contacts

The stage is supplied with two internal electrical contact connectors (1) wired to an external Lemo connector (2).

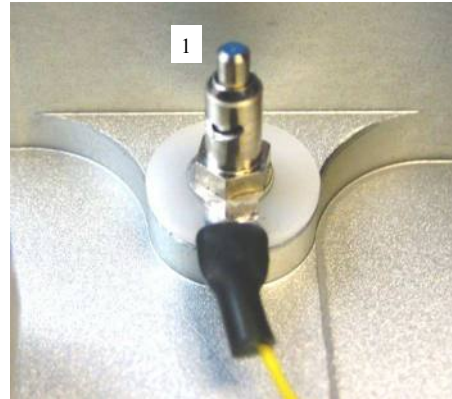


LTSE120 Stage

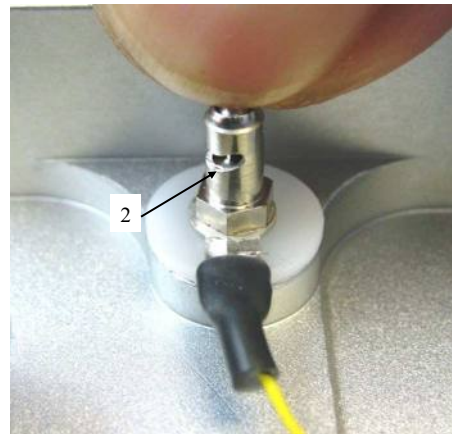


Using the Internal Electrical Contact

The internal electrical contact has a self-closing spring loaded pin (1).



Using a finger tip push in the pin to open the electrical contact and insert a wire into the contact (2).



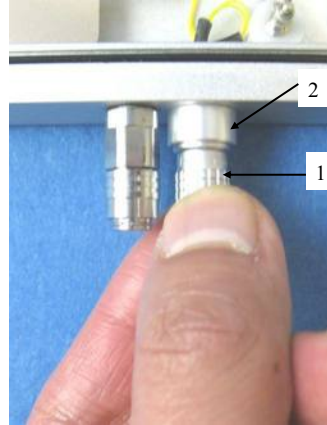
Release the finger when the wire is in place.



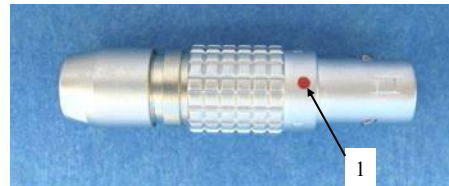
Lemo Connector

Remove the Lemo (1) plug by holding it firmly and pull it gently away from the Stage.

Wire up the Lemo to your instrument.



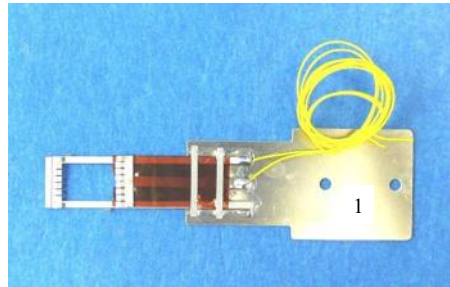
To reconnect the Lemo, line up the red dot on the Lemo plug (1) to the red dot on the Lemo socket (2) and push the Lemo firmly into place.



Liquid Crystal Stage

Only read the following if your stage is a LTSE120 Liquid Crystal Stage.

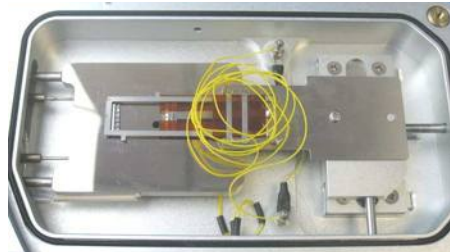
The Liquid Crystal System is supplied with a Liquid Crystal Slide Holder (1) and 5 Liquid Crystal Cells (5um gap, capillary fill, ITO coated and anti parallel aligned).



Assemble the Liquid Crystal Holder (1) to the XY Assembly as shown on page 6.

Note: make sure the Liquid Cell Holder is the right way up as shown in the opposite picture.

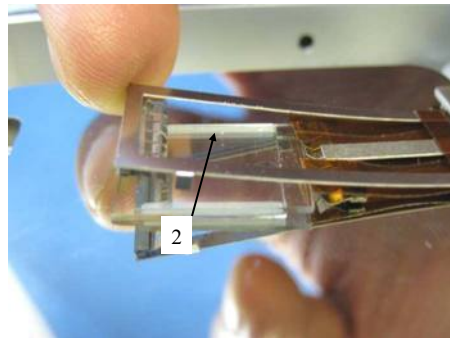
Connect the two wires from the Liquid Cell Holder to the Internal Electrical Contacts as shown on page 15.



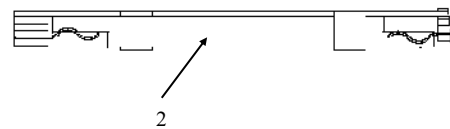
Using the Liquid Crystal Cell

Fill the Liquid Crystal Cell (2) with your sample.

Lift the Liquid Cell Holder and slide in the Liquid Crystal Cell.



Make sure the Liquid Crystal Cell is seated correctly as seen in the opposite diagram.



Appendix

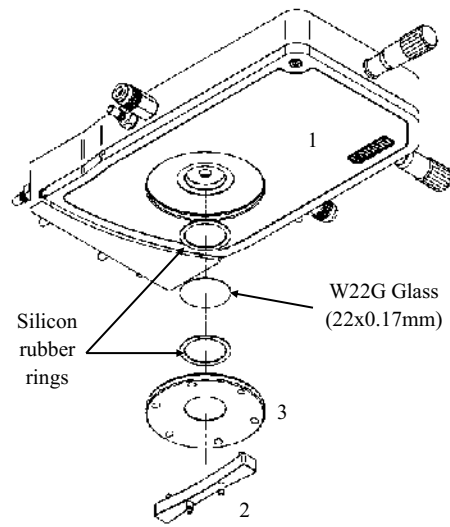
Window Assembly

Lid Window Assembly

To replace the windows in the Stage Lid (1) use the Window Tool (2) and align the two wide spacing pins to the Tube Clip Holder holes and unscrew the Lid Insert (3).

The Stage Lid and Lid Insert should be turned upside down as shown in the diagram opposite and reassembled in the order indicated.

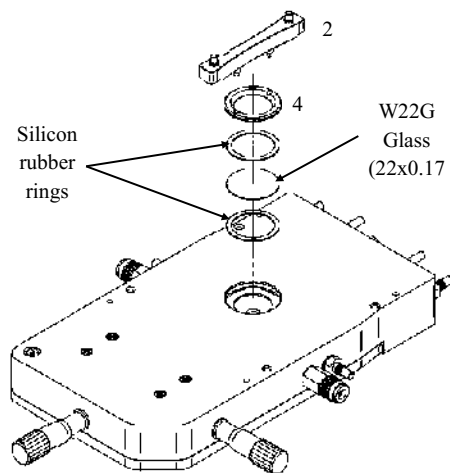
The Lid Insert should be screwed down until the cover slips are held firmly, then turn the assembly over and screw down the Lid Insert until it is felt to come to a stop.



Bottom Window Assembly

Use two narrow spacing pins of Window Tool (2) to align it to the two holes of Window Locking Ring (4) and unscrew.

Reassemble the bottom window as shown in the opposite diagram.



Spares and Accessories

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

The LTS120 heating element is extremely durable if used carefully. However 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	LTS Kit	Full Replacement Spares Kit
	WGI	Water/Gas Valve Insert x2
	WVC	Water/Gas Valve Connector x2
	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
22222	LTS Spare Windows Kit	Spare windows for Lid, Base and Samples
	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

Part No.	Part Name	Part Description
18010	FWP	110 volt F200 re-circulating water system
18011	FWP	240 volt F200 re-circulating water system

Spares and Accessories

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

The LTS120 heating element is extremely durable if used carefully. However 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	LTS/LCC	Liquid Crystal Cell Carrier
	LCC5	Liquid Crystal Cell (5um gap, anti parallel aligned, capillary fill) x20

Part No.	Part Name	Part Description
2149	LCC5	Liquid Crystal Cell (5um gap, anti parallel aligned, capillary fill) x20

Part No.	Part Name	Part Description
2908	LTSB	Spare LTS350 Heating Element with Platinum Temperature Sensor

This page is intentionally Blank

This page is intentionally Blank

