



Linkam Scientific Instruments

TST350

**Temperature Controlled
Tensile Stress Testing Stage**

USER GUIDE

Contents

Before Setting Up Your Equipment.....	3
Important Notice.....	4
Warranty.....	4
Technical Support.....	4
Equipment Maintenance.....	4
Handling Liquid Nitrogen.....	4
Feedback.....	4
Safety Precautions.....	5
Symbol Reference.....	5
Introduction.....	6
TST350 Stage Specifications.....	6
TST350 System.....	6
Stage Anatomy.....	7
Connectors Assembly.....	7
Lid Assembly.....	7
Stage Anatomy.....	8
Mounting Stage to Microscope with Dovetail Substage.....	9
Setting up the Condenser For Koehler Illumination.....	9
Connecting the Instruments.....	10
T95 System Controller Cable Connections.....	10
LNP95 Cooling Pump Connection.....	11
Remove Transit Screws.....	11
Back Panel Cable Connection.....	11
Setting Up ECP Water Circulator Pump.....	12
Sample preparation.....	13
Remove Clamping Jaws.....	13
Prepare Bow-Tie Shape Sample.....	13
Cooling Connections.....	15
Purging Procedure.....	16
Set the LNP95 to Manual Mode.....	16
Filling the Liquid Nitrogen Dewar.....	16
Purging the Stage Method 1.....	17
Purging the Stage Method 2.....	18
Using Linksys32 Software with TST350 Stage.....	19
Tensile Control Panel.....	19
Tensile Stage Setup Menu.....	20
Appendix.....	23
Window Assembly.....	23
Lid Window Assembly.....	23
Bottom Window Assembly.....	23
Replacing Transducer Force Sensor.....	24
TSTE350 With Internal Spring Electrical Contacts Option.....	28
Spares and Accessories.....	29
Troubleshooting.....	30
Contact Details.....	32

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.

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 hot-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.

Handling Liquid Nitrogen

To cool samples below room temperature a LNP95 liquid nitrogen pump is required. Please refer to your health and safety manual for instructions on how to handle liquid nitrogen safely. The Dewar supplied with the LNP95 has a safety release valve built into the siphon assembly. Always use in a well ventilated room.

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 Reference

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 TST350 temperature controlled Tensile Stress Testing System. Please take the time to read through the manual as it will help you to make the most out of the equipment.

Visit our website (www.linkam.co.uk) to register your equipment, this will ensure that we can update you if there are any firmware updates available to your System Controller and Linksys32 software.

TST350 Stage Specifications

Maximum temperature:	350°C
Minimum temperature:	-196°C
Maximum heating rate:	30°C/min
Maximum cooling rate:	30°C/min
Objective Lens WD:	7.7mm
Condenser lens WD:	12.5mm
Aperture for heating block:	5.5x1.5mm
Maximum force:	20N or 200N
Force resolution for 20N beam:	0.001N
Force resolution for 200N beam:	0.01N
Jaws travel distance:	80mm
Positional resolution:	0.01mm
Maximum Speed:	1000µm/s
Minimum speed:	1µm/s
Maximum sample width:	7mm
Maximum sample length:	106mm
Minimum sample length:	26mm
Maximum sample thickness:	2mm



TST350 System with LNP95

TST350 System

The system consists of a TST350 stage, a T95 System Controller, Linksys32 software and optional LNP95 liquid nitrogen cooling pump system.

Linksys32-DV (digital video) or Linksys32-AV (analogue video) video capture software can be added as an option.

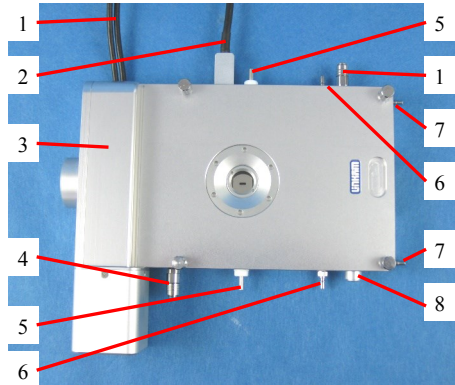
Please install the Linksys32 software first and activate the licence key. See Linksys32 manual for more information.

The TST350 stage is mounted onto the microscope by using either specific stage clamps or an adaptor plate.

Stage Anatomy

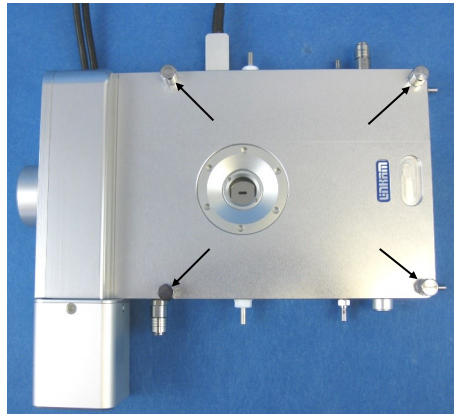
Connectors Assembly

1. TST and TSTMOT Cables
2. T95 Stage Cable
3. Motor Cover
4. Gas Purge Valve
5. Liquid Nitrogen Cooling Connector
6. Stage Body Water Cooling Connector
7. Bypass Stage Body Water Cooling Connector
8. Optional 4 pin Lemo Connector For TSTE350

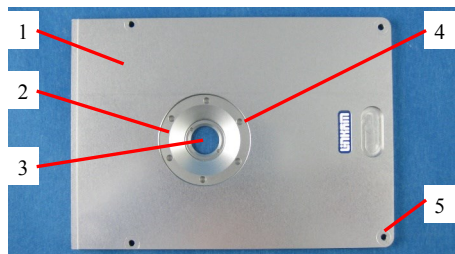


Lid Assembly

Unscrew the top 4 thumbscrews as shown by the arrows in the opposite photo to remove the Lid from the Stage.

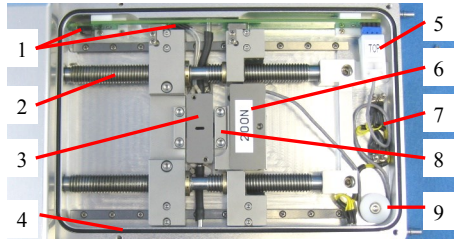


1. Stage Lid
2. Lid Insert
3. Viewing Window (22 x 0.17mm glass)
4. Holes for Tube Clip Holder or Window Tool
5. Hole for Lid Thumbscrew

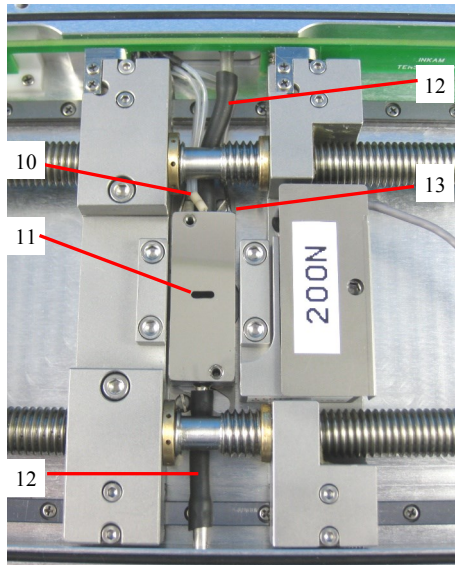


Stage Anatomy

1. Micro Switch
2. Lead Screw
3. Copper/Nickel plated Heater/Cooling Block
4. Rubber seal for Lid and Stage
5. Transducer Sensor Connector
6. Transducer Force Sensor (200N)
7. Optional Internal Spring Electrical Contacts for TSTE350
8. Sample Clamping Jaw
9. Transducer Wire Clamp



10. PT100 Platinum Temperature Sensor
11. Aperture (5.5 x 1.5mm)
12. Liquid Nitrogen Cooling Tube
13. Heating Element Wire



Mounting Stage to Microscope with Dovetail Substage

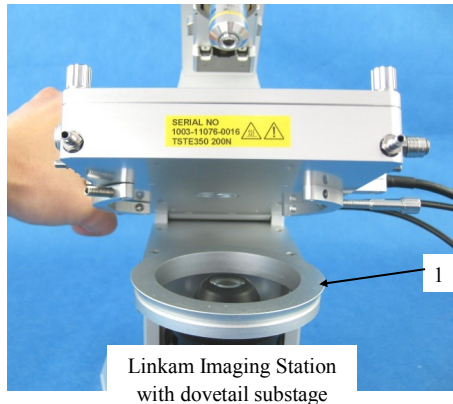
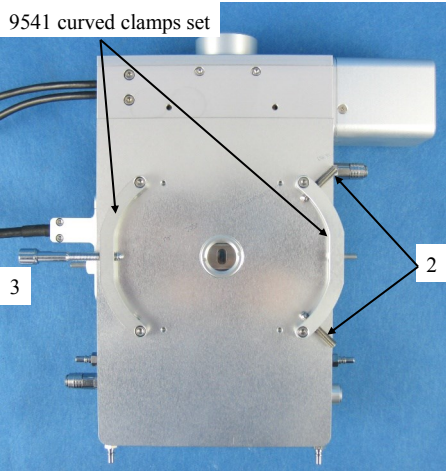
The following description is for mounting the stage on to microscopes which have a circular dovetail substage assembly (1).

Attach the curved stage clamps (part no. 9548) to the base of the stage using the supplied hex screws and the outer most holes in the base plate.

Adjust the two positioning grub screws (2) and locking thumbscrew (3) 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 5x objective lens on the rectangular aperture of the silver block. Using the two positioning grub 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.



Setting up the Condenser for Koehler Illumination.

Place a sample on the TST350 and stretch the sample so it is flat against the surface of the heater. 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>



Connecting the Instruments

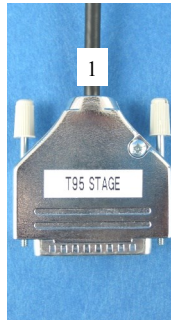
T95 System Controller Cable Connections

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



T95 back panel

From the TST350 Stage: connect the Stage Cable labelled **T95 STAGE** (1) to the Stage Connection Socket (2).

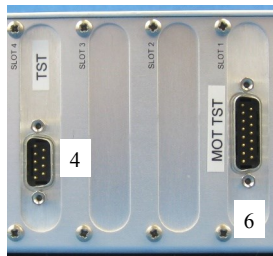


From the TST350 Stage: connect the cable labelled **TST** (3) to **Slot 4** of the T95; labelled **TST** (4).

Connect the cable labelled **MOTTST** (5) to **Slot 1** of the T95; labelled **MOTTST** (6).



Connect the one end of the supplied crossed-over RS232 cable to your PC and the other end to the RS32 Port (7) of the T95.

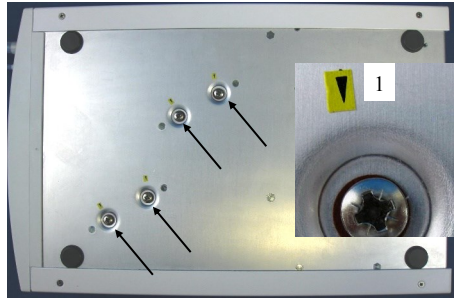


LNP95 Cooling Pump Connection

If your TST350 System is supplied with a LNP95 Liquid Nitrogen Cooling Pump System, setup the LNP95 as described below.

Remove Transit Screws

Before using the LNP95 remove the 4 transit screws, marked by small yellow labels (1), from the base of the LNP95. Transit screws shown by arrows in the adjacent image. These screws hold the pumps in place for shipping.



Keep the screws safe by screwing them into the holes on the back panel as shown by the arrows.

The screws must be replaced back into the transit holes on the base, when shipping back to Linkam for service or repair.



Back Panel Cable Connection

Connect the Instrument Bus Cable (2) between the LNP95 and T95 as shown.

Note: either of the purple coloured Instrument Bus Sockets on the LNP95 can be used.

LNP95 MUST BE SWITCHED ON BEFORE T95 SYSTEM CONTROLLER

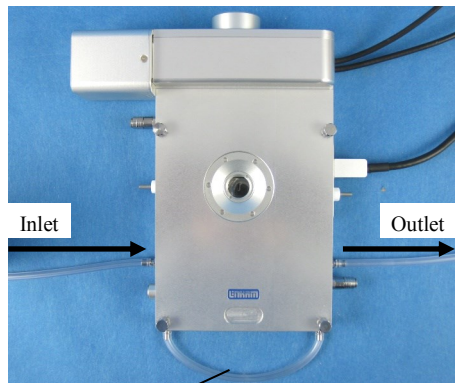


Setting Up ECP Water Circulator Pump

If you have purchased the ECP with the system, read the following to set up the ECP with the TST350 stage. Refer to the ECP manual for more details.



When heating the stage above 300°C for a prolonged period of time, the metal casing body of the stage can get quite hot. Connect the tubing from the ECP as shown in the opposite picture to cool the stage.



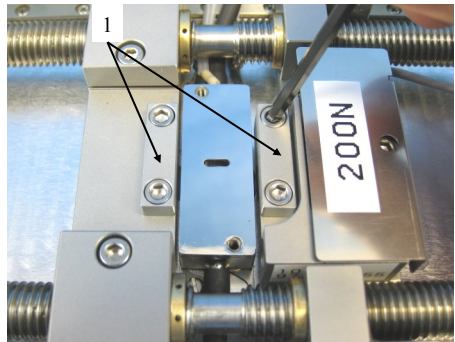
Note: the performance of the stage is not affected whether the ECP is in use or not.

Sample Preparation

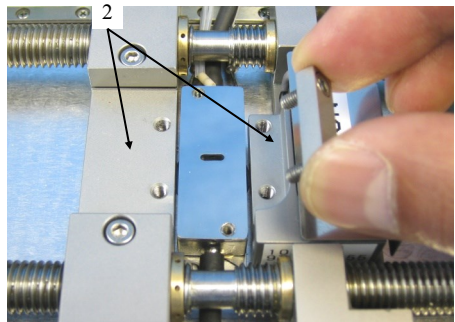
For accurate results it is most important that the surface of the heating/cooling block is extremely clean, since air gaps between the block and the sample window will result in temperature errors. Use IPA (isopropanol) and a soft cloth to clean the top surface of the heater block.

Remove Clamping Jaws:

Using the hex key supplied unscrew the 4x screws from the Clamping Jaws (1).



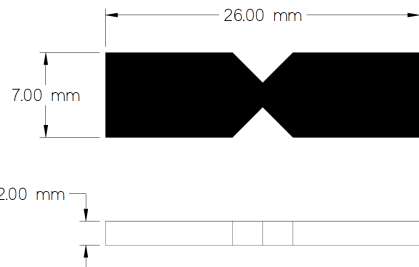
Leave the screws in place and carefully lift the Clamping Jaws away from the Clamping Assembly (2).



Prepare Bow-Tie Shape Sample:

It is recommended that the sample is cut into a Bow-Tie shape.

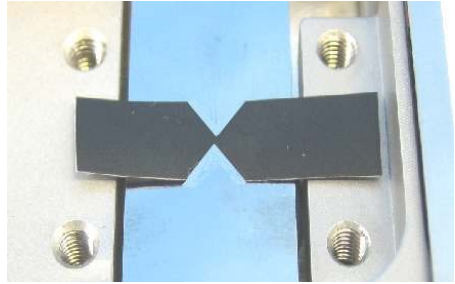
Maximum length: 26.00mm
Minimum width: 7.00mm
Maximum thickness: 2.00mm



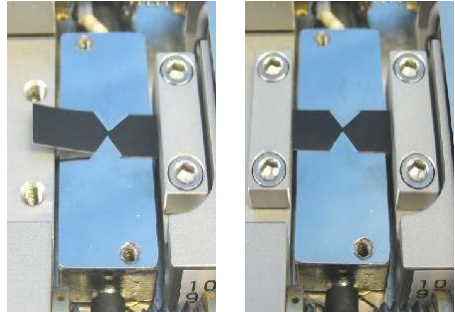
The narrowest area of sample is placed in middle of the heating element and is therefore in the field of view with the microscope. By making the bow-tie shape the point of failure is predictable and can be closely monitored.

Note: accurate temperatures can be obtained by keeping the sample as thin as possible.

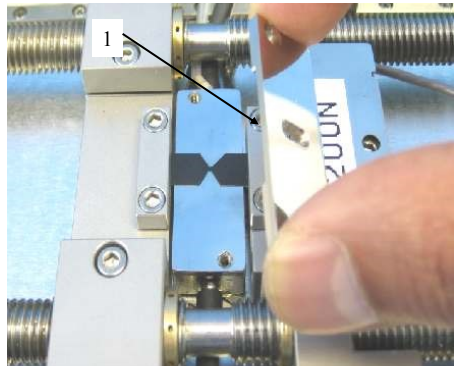
Place the sample between the screw holes on the Clamping Assembly and make sure the narrow part of the sample is over the aperture (if using transmitted light observation).



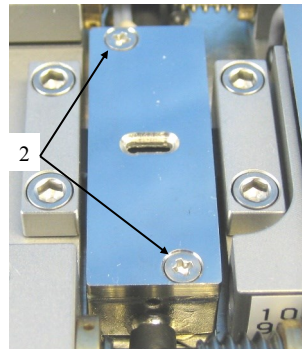
Screw the Jaw Clamps back into position but before tightening the screws, make sure that the sample is pulled through the Jaws so that it lies straight, flat against the heater block and in the correct position.



The optional Heat Shield (1) can be used. The Heat Shield works like an 'oven' and is used to provide temperature stability for the sample.



Place the Heat Shield over the sample and screw it in place with the 2x screws (2).



Cooling Connections

These connections need only be made if the experiments are to be carried out below room temperature using the LNP95 System.

The Dewar siphon (1) is the thick white foam tubing and is attached to the liquid nitrogen Dewar. The thin black capillary tube inside the white foam tube must be inserted into the liquid nitrogen cooling connectors on the stage.

The white tubing slides on to the outside of the connector. Twist the siphon whilst sliding it on and push until it comes to a stop. It does not need to go all the way to the base of the connector.

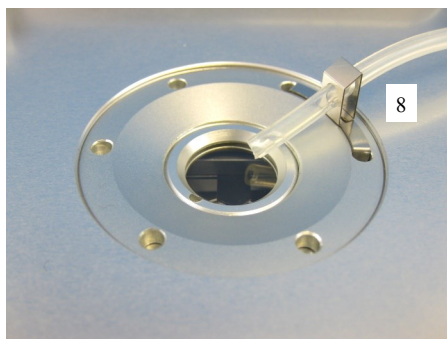
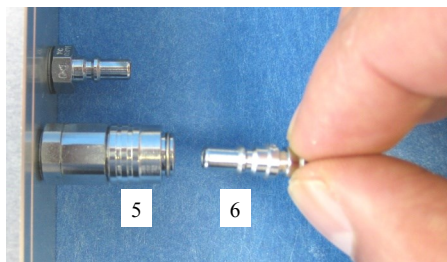
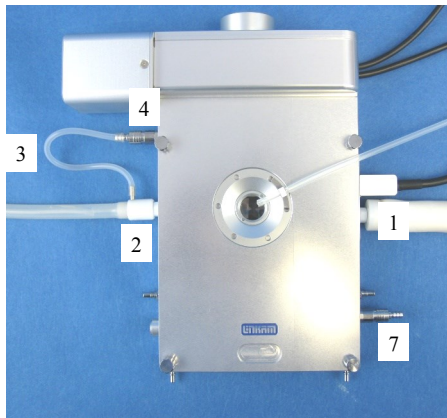
The thicker silicon tube from the LNP95 cooling pump ends in a white PTFE connector (2), this is pushed over the end of the other stainless steel connector as seen in the image.

The short tube branching from the side of this white connector is the Gas Purging Tube (3). There is a valve opening Insert connector (4) inserted into the end of this tube. During the purging procedure, insert this connector into the Gas Purge Valve (5) on the side of the stage to open it.

The Gas Purge Valve (5) is opened when the Gas Insert (6) 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 (6) should drop out.

There is a second Gas Purge Valve 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 (7) when purging.

The smaller tube from the outlet on the LNP95 should be placed in position on the top of the lid using the Tube Clip Holder (8). This tube blows warm recycled nitrogen gas across the lid window to prevent condensation on the viewing window surface.



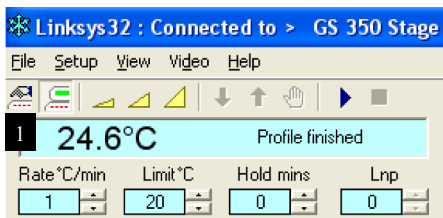
Purging Procedure

Set the LNP95 to Manual Mode

Before starting a cooling experiment, you will need to purge air from the stage chamber with dry nitrogen. This will remove the water in the air which would otherwise condense and freeze on the sample disrupting your image quality.

Before you can start purging, the LNP95 must be set to manual mode. Please refer to Linksys32 software manual for more detail.

Runs Linksys32 software and connect T95 to the PC. In the main menu, click the LNP manual button (1) to set the LNP95 to manual mode.



Filling Liquid Nitrogen Dewar

Please follow your health and safety manual for directions on how to handle liquid nitrogen and ensure that you have the correct safety equipment including gloves and safety goggles.

Fill the Dewar approximately 2/3 full and replace the lid with siphon attached.

DO NOT FASTEN THE CATCHES.

Wait for the nitrogen to stop bubbling before fastening the catches.

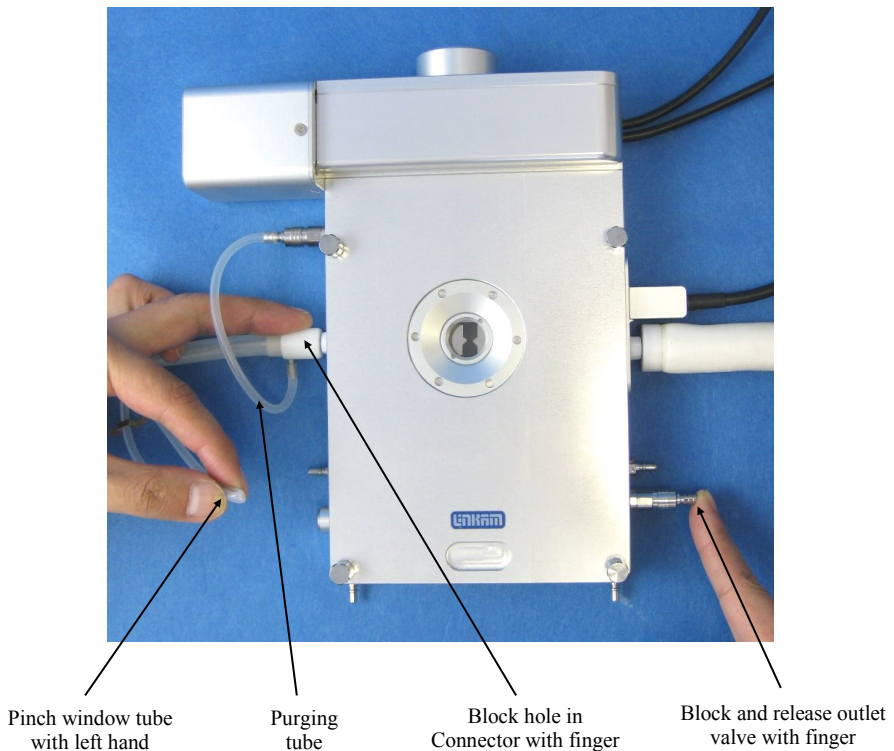
Take care when placing lid on a table to always have the black capillary pointing upwards. It is easily damaged which will impair N₂ flow



Purging the Stage Method 1

There are two methods for purging the stage. Method 1 uses recycled nitrogen gas produced by the LNP95 from the 2L Dewar.

1. Make sure the stage lid is in place.
2. Switch on the temperature programmer and set the limit to 40°C. Press the START button and wait until the temperature limit is reached. Press HOLD to hold the temperature at 40°C.
3. Switch on the LNP95 cooling system and set it to manual mode, (see page 16) and set the speed to maximum of 100.
4. Check that the Gas Inserts are locked into place
5. Using a finger on the left hand, block the hole in the white plastic pump connector found on the perpendicular side to the purging tube. Still working with the left hand, pinch the narrow window tube to block it. This action will divert all of the nitrogen gas to the Purging Tube and through the Stage Chamber.
6. With the nitrogen gas flowing through the Sample Chamber, use a finger on the right hand to block the gas outlet for a few seconds to allow pressure build, then release the gas . Do this for a few minutes to purge the stage.
7. The purging procedure allows mixing of nitrogen gas with the residual air inside the Sample Chamber. By pressurising the chamber with nitrogen gas and releasing it, the air inside the Chamber is being diluted with the nitrogen gas.
8. Remove the two Gas Inserts and unblock the pump connector and window tube.
9. Change the LNP95 to **AUTOMATIC** mode so that the T95 automatically controls pump speed during your cooling experiment
10. Go to www.linkam.co.uk and register your equipment to see videos of how to purge and more.



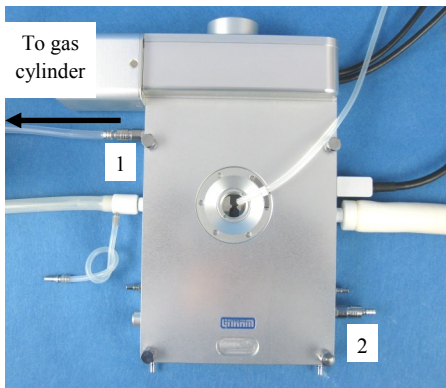
Purging the Stage Method 2

This method uses an inert gas from a gas cylinder to purge the stage at temperatures above ambient when the LNP95 is not required.

1. Make sure the Stage Lid is in place and the Stage Door is closed.
2. From a gas cylinder connect the Gas Insert with a tubing 3mm inner diameter and 6mm outer diameter to the Gas Purge Valve (1).
3. Connect a Gas Insert to the opposite side Gas Purge Valve (2).
4. Use the gas regulator to set a gas flow rate of 1.5L/min.
5. 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. Do 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 heating block too much during an experiment and may cause the temperature to fluctuate.



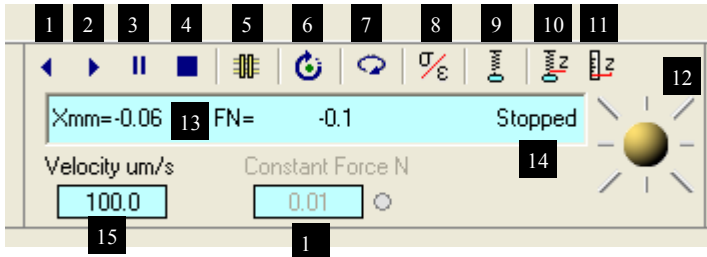
Block and release outlet valve with finger

Using Linksys32 Software with TST350 Stage

Please refer to Linksys32 manual to connect the T95 System Controller to a PC and to control the temperature of the TST350. The following chapter will provide extra information to control the tensile function of the TST350 using Linksys32 software.

Tensile Control Panel

When connected with Linksys32 software there is an additional Tensile Control Panel in the main menu of Linksys32.

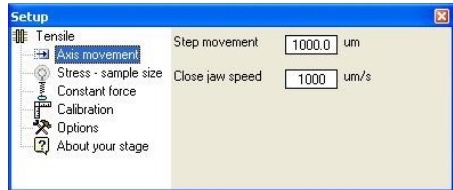


1. **Close Jaws**
2. **Open Jaws**
3. **Pause** opening or closing of Jaws
4. **Stop** Jaws movement
5. **Return** to home position (Jaws closed)
6. Select **Free Continuous Movement**, press again to select **Step Movement** (step size defined in setup)
7. **Cycles** the jaws **Open** and **Close** by the defined distance in the **Step** setup window
8. **Toggle** between displaying **Force** and **Distance** or **Stress** and **Strain**
9. Select **Constant Force Mode** (type valued for the force in Newton (N), speed will vary to ensure a constant force is applied to the sample).
10. **Zero the Force Reading**. Force value can be zeroed at start of experiment, even if sample has been pretension
11. **Zero the Distance Reading**. Sets distance to zero at any point along the travel of the jaws.
12. **Joystick**, grab this button with the mouse and drag left or right like to open or close the Jaws for easier control of the jaws than the **Open** and **Close** buttons.
13. **Value Display Xmm** (distance), **FN** (force) or **Stress** (ϵ), **Strain** (δ /Nmm²)
13. **Status: Stopped, Paused** or **Opening jaws**
14. **Velocity** of Jaws speed, type in a value for the Jaws speed. Not applicable when **Constant Force Mode** is selected.
15. **Constant Force N**, type in a value for constant force when **Constant Force Mode** (9) is selected (red light beside the Constant Force N text window will be lit).

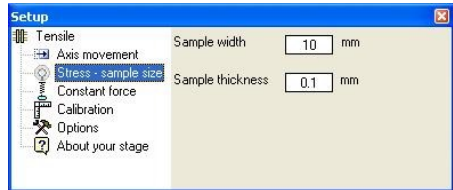
Tensile Stage Setup Menu

Right click the mouse on the tool bar to access the **Setup Menu**.

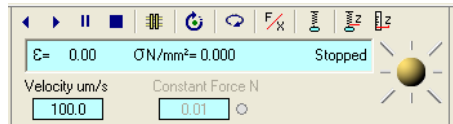
Axis movement: type a distance in μm in the text box for the **Step movement** of the jaws. When the **Open Jaws** button is clicked, the Jaws will move the specified distance and stop. You can also set the **Close jaw speed** for when the Jaws return to the home position



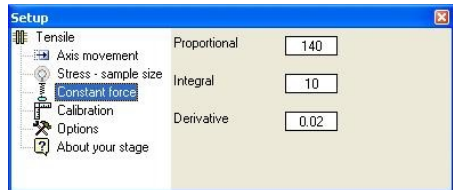
Stress - sample size: if the **Stress/Strain** display has been selected by clicking the **Toggle Stress/Strain** button, then sample width and thickness must be entered in the appropriate boxes.



Note: the TST350 is primarily designed for you to see your sample under tensile stress. The TST350 can only measure three values; temperature, distance and force. The values display in the Tensile Control Panel for the **Stress/Strain** are a mathematical values calculated based on the force measured and the sample size entered. It is **not** a true reading, since the sample size will deform and will not be constant as the Jaws are opened.



Constant Force: Proportional, Integral, Derivative (**PID**) are values for Constant Force. These values should only be changed after discussion with Linkam Scientific as they have been found to give a reasonable PID control feedback for force based on a number of samples.



Calibration: the **Calibrate distance** and **Calibration values** are preset values from Linkam.

Calibration distance: to calibrate the distance the sample should be removed. Click the **Calibrate** button (1).

Click the **OK** button (2) in the new pop-up window. The jaws will be closed and then opened to 50000µm.

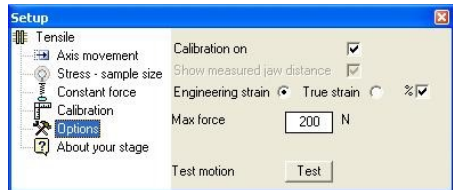
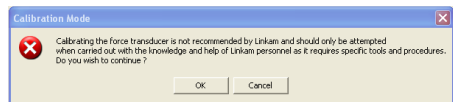
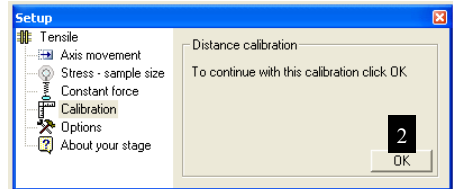
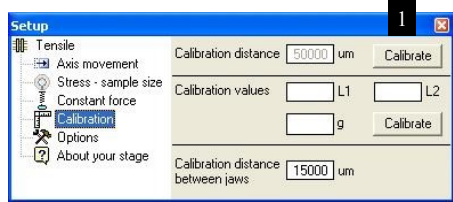
Calibration values: DO NOT change the **Calibration values**, each force transducer is calibrated at Linkam before shipping. If you believe that your transducer is reading incorrect values, please contact Linkam first for calibration procedure. Incorrectly calibrating may render the instrument unusable.

Options: When the **Calibration on** check-box is ticked the tensile module will show the force values in Newton (N) with calibration applied. When un-ticked the raw output from the transducer will be shown. (value reading up to 33000).

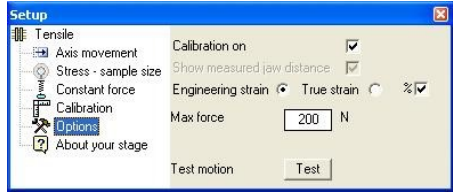
The amount of stretch or elongation the specimen undergoes during tensile testing and can be expressed as an absolute measurement in the change in length or as a relative measurement called **‘Strain’**. Strain itself can be expressed in two different ways:

Engineering strain: is the ratio of the change in length to the original length.

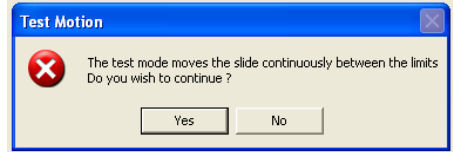
True strain: is similar to engineering strain, but based on the instantaneous length of the specimen as the test progresses, where L_i is the instantaneous length and L_0 the initial length. Tick the % box if you wish to show the strain in percent (default).



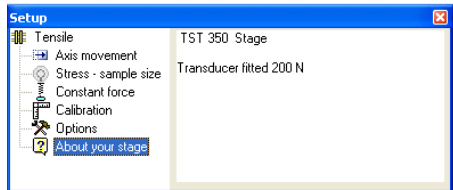
Max force: if the force exceeds the value shown (automatically detected by the controller when transducer is connected to stage) then the jaws will be closed and a message box will appear informing the user that the maximum force value has been exceeded.



Test Motion: forces the stage to move repeatedly at the Close jaw speed from one end of its travel to the other.



About your stage: details about your stage and the transducer fitted are shown here.



Appendix

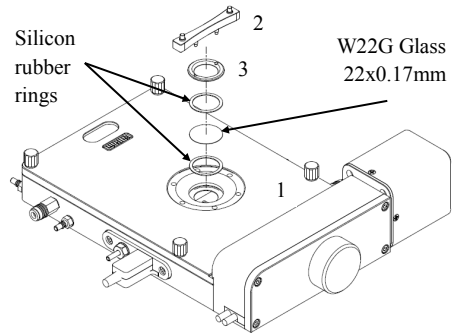
Window Assembly

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.

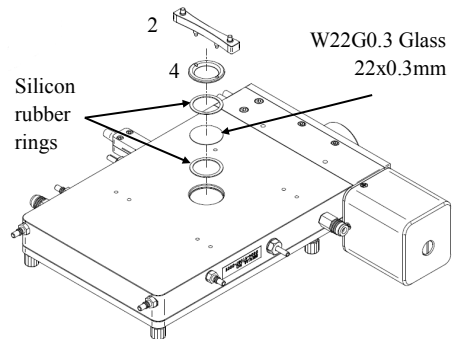
The Lid Insert should be screwed down until the cover slips are held firmly, then turn the assembly over and screw down the Lid Insert until it is felt to come to a stop.



Bottom Window Assembly

Use the 22mm Lock 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

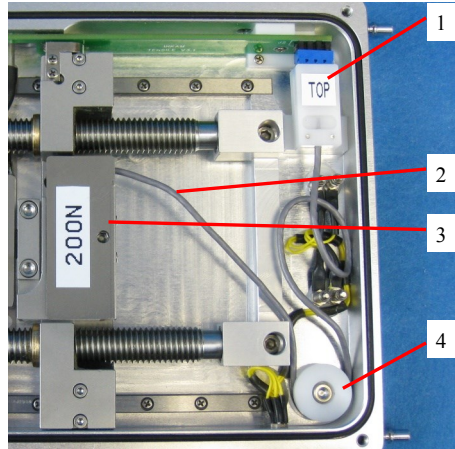


Replacing Transducer Force Sensor

Your stage is fitted with a 20N or a 200N transducer.

Force Transducer Assembly

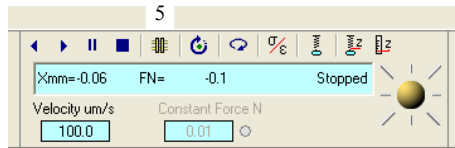
1. Transducer Sensor Connector
2. Transducer Cable
3. Transducer Assembly
4. Wire Clamp



Replacing Transducer Force Sensor

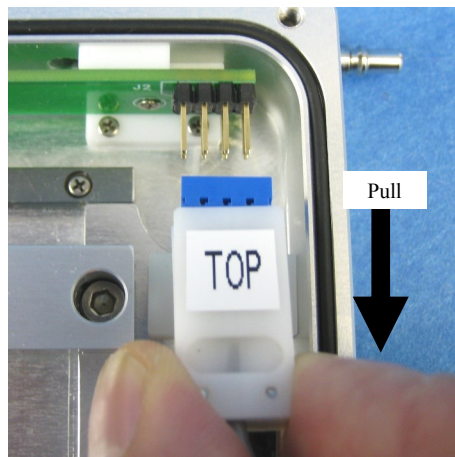
Additional transducers can be purchased and fitted to the stage.

Important note: make sure the Jaws are closed. Click **Return** to home position (Jaws closed) button (5). And also ensure that all equipment is **switched off** during the replacement.

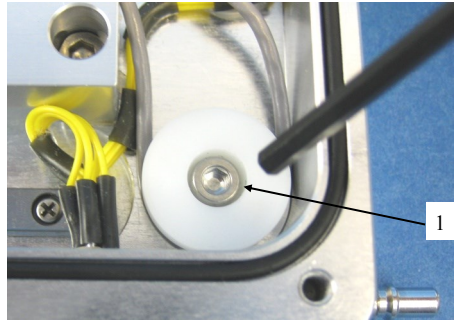


Firmly grip the Transducer Sensor Connector and gently pull the connector from the TST350 stage.

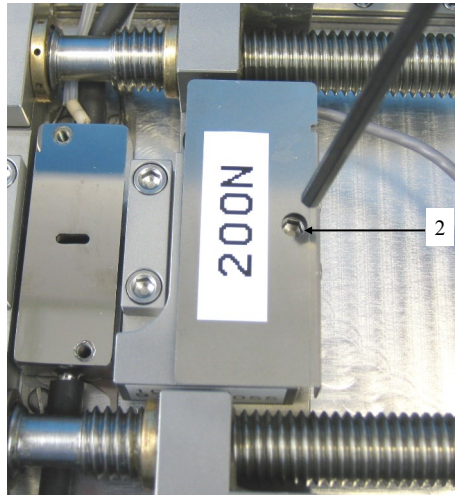
Please Note: You cannot place beams from a T94 controlled stage into a T95 controlled stage or vice versa. This will throw out the beam calibrations.



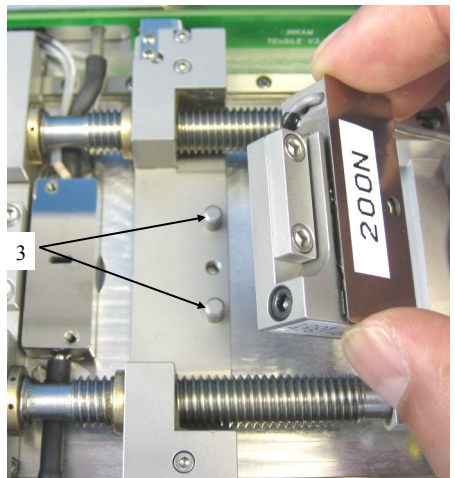
Unscrew the hex screw (1) in the Wire Clamp to free the Transducer Cable.



Unscrew the fixing screw (2) in the Transducer Assembly.

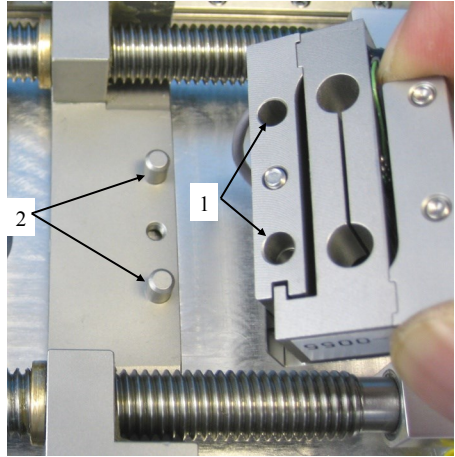


Lift the Transducer Assembly carefully off the 2x pillars (3) on the base of the stage.

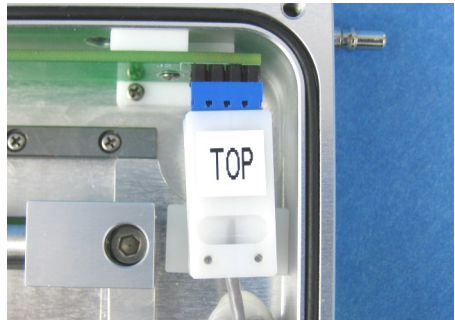


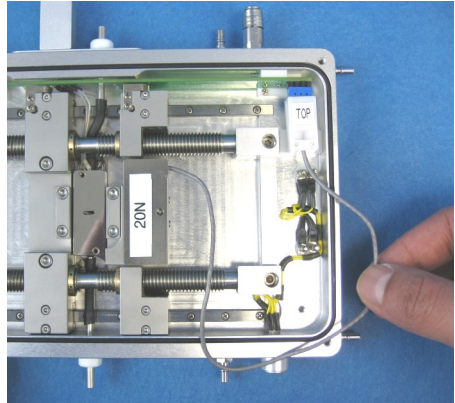
To install the new Transducer Sensor.

Align the two holes (1) on the base of the Transducer with the two pillars (2) on the base of the TST350 and screw the new Transducer in place.

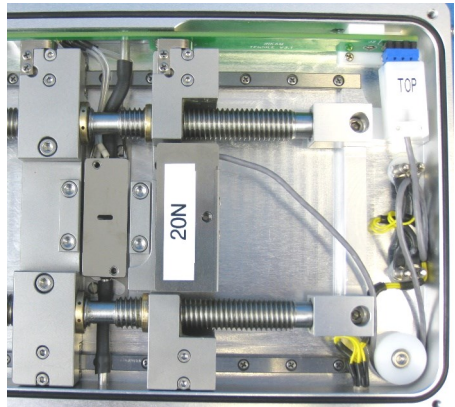


Plug in the Transducer Connector and make sure the word 'TOP' is on top.





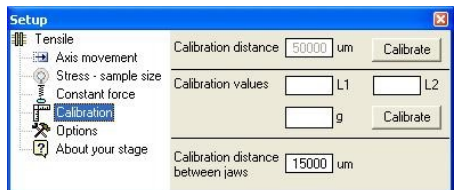
Wrap the Transducer Cable around the Wire Clamps and fix it into place. Do not tighten the screw as yet, adjust the length of the Transducer Cable from the Transducer to the Wire Clamps as shown in the opposite photo and tighten the screw.



The calibration values and limits are stored in a chip in the Transducer Connector. When connected Linksys32 software will recognise that a different sensor is connected and adjust the settings automatically.



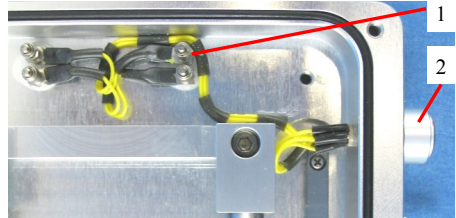
You must do a **Calibration distance** (see page 21) for the TST350 stage to work correctly with the new Transducer.



TSTE350 with Internal Spring Electrical Contacts Option

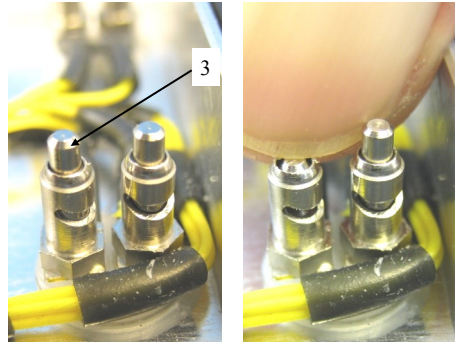
A variation of the TST350 is the TSTE350 Stage. This stage is supplied with 2 or 4 Internal Spring Electrical Contact connectors (1) wired to an external Lemo socket (2).

Picture show TSTE350 with 4 internal electrical contacts.



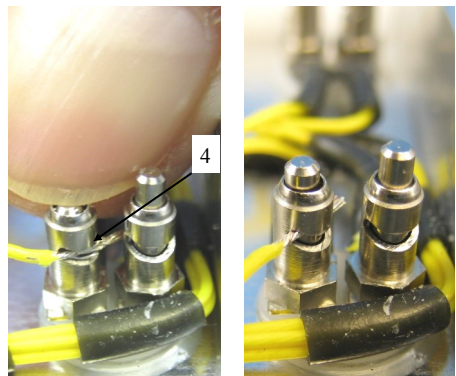
Each Electrical Contact has a self-closing spring loaded pin (3).

Using a finger tip push down the pin to open the Electrical Contact connector.



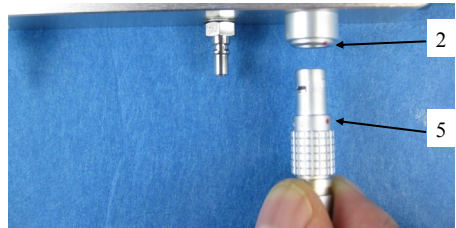
Insert a wire into the open contact (4).

Release the finger when the wire is in place.



To connect the supplied Lemo plug, line up the red dot on the Lemo plug (5) to the red dot on the Lemo socket (2) and push the Lemo firmly into place.

Note: remove the Lemo plug by holding it firmly and pull it gently away from the Stage.



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.

Part No.	Part Name	Part Description
----------	-----------	------------------

9571	TST-20	Force Transducer 0-20N with 0.001Resolution
------	--------	---

9571	TST-200	Force Transducer with 0-200N with 0.01 Resolution
------	---------	---

Part No.	Part Name	Part Description
----------	-----------	------------------

22222	TST Kit	Full Kit for TST350
-------	---------	---------------------

	SRR	Silicon Ring Set for Lid and Base, set of 4
--	-----	---

	W22G	22mm diameter Glass Lid Window (0.17mm thick) Box of 50
--	------	---

	W22G0.3	22mm diameter Glass Base Window (0.3mm thick) Box of 50
--	---------	---

	TCH	Tube Clip Holder (for Nitrogen de-fogging stage lid tube, for TST-LNP95 cooling system)
--	-----	---

	TST-OLID	Nitrile 'O'-ring for Lid
--	----------	--------------------------

	HX2.5	Hand Tool 2.5mm
--	-------	-----------------

	TST-CLP	Sample Clamp with Screws
--	---------	--------------------------

	TCO	Cover Lid to fit on block for accurate temperature
--	-----	--

22222	TST WKit	Windows kit for LTS350
-------	----------	------------------------

	SRR	Silicon Ring Set for Lid and Base, set of 4
--	-----	---

	W22G	22mm diameter Glass Lid Window (0.17mm thick) Box of 200
--	------	--

	W22G0.3	22mm diameter Glass Base Window (0.3mm thick) Box of 200
--	---------	--

	TCH	Tube Clip Holder (for Nitrogen de-fogging stage lid tube, for TST-LNP95 cooling system)
--	-----	---

Part No.	Part Name	Part Description
----------	-----------	------------------

0998	ECP	Water Circulator Pump (stage body and window cooling) (220-240V)
------	-----	--

0997	ECP	Water Circulator Pump (stage body and window cooling) (110-130V)
------	-----	--

Troubleshooting

Cooling fault diagnosis

Ensure that all connections to the stage and Dewar are as described in the specific manual and that the stage lid and top windows are properly sealed.

1. *The cooling rate is less than programmed.*

There can be several causes of this problem, the most likely being that one of the connectors has become blocked or damaged. Check that each tube is fitted tightly to the connector and that none of the tubing is twisted or has come loose. The larger diameter tube leading from the LNP95 consists of a tube within a tube, check that the internal tube is connected, it may have come loose. Any constrictions of either the tubing or the connector will have a drastic effect on the cooling ability of the LNP95. If the connectors and tubing are OK, check that the capillary tubing to the Dewar flask is not bent or damaged and that the filter is intact and unblocked. If any damage has occurred to any of these items then it will be necessary to replace them. If no damage is found, check that the silver block is not constricted. This can be checked, simply by blowing through one of the steel cooling tubes using a compressed air line.

2. *Condensation and ice forming on the upper side of window*

Realign the window gas tube clip to the required position in the stage lid.

4. *Condensation on the sample and/or the underside of lid window*

This is due to the stage not being sealed properly and therefore allowing moisture in during purging or cooling. Check that the lid and bottom window are sealed correctly and that the silicon seals are in position.

Please visit www.Linkam.co.uk for more FAQ for the stage and instruments.

This page is intentionally blank

Linkam Scientific Instruments Ltd

Tel: +44(0)1737 363 476

Fax: +44(0)1737 363 480

Email: support@linkam.co.uk

Unit 8 Epsom Downs Metro Centre
Waterfield, Tadworth, Surrey, KT20 5LR, UK
www.linkam.co.uk

Version: 1.01.032010