

## **T96 LinkPad User Guide**

**1.1.0**

# **USER GUIDE**

*This page is intentionally blank*

# Table of Contents

<b>Introduction .....</b>	<b>4</b>
<b>Important Notices .....</b>	<b>5</b>
Warranty .....	5
Technical Support.....	5
Feedback .....	5
<b>Controlling the stage .....</b>	<b>6</b>
Basic stage controls.....	8
Profiles and Ramps.....	9
Creating a profile .....	9
Running The Profile .....	10
<b>Stage Specific Controls .....</b>	<b>11</b>
Vacuum stages.....	11
Pressure stages.....	12
Motorised XY stages.....	13
Tensile stages.....	15
DSC stages.....	18
Humidity control.....	19
<b>Options and Information .....</b>	<b>21</b>
Connected hardware.....	21
Option board Information.....	22
Sample Calibration.....	23
<b>Troubleshooting .....</b>	<b>25</b>
Control and connection Errors.....	25

## Introduction

Welcome to your LinkPad Manual. This guide will explain the use of the optional LinkPad Controller.

## **Important Notices**

- 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 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.
- The Linkpad is designed to be used in conjunction with a Linkam T96 temperature controller. Please refer to the T96 Controller manual before use.

### **Warranty**

This equipment has a warranty against defects in material and workmanship for a period of 12 months from the date of shipping. 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 below and on the back of this manual.

Tel: +44(0)1737 363 476

Email: [support@linkam.co.uk](mailto:support@linkam.co.uk)

### **Feedback**

Your feedback will be greatly appreciated, please email us directly [info@linkam.co.uk](mailto:info@linkam.co.uk)

## Controlling the stage

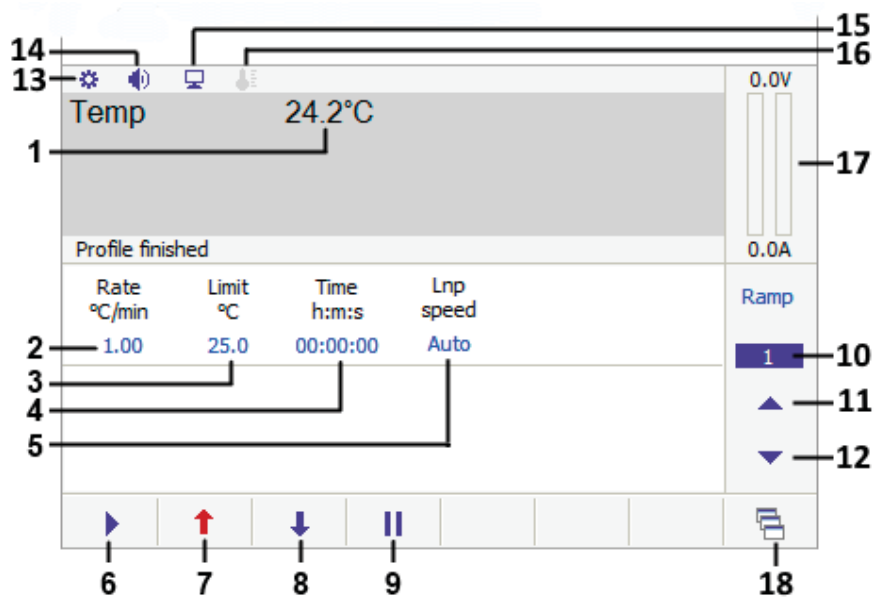


This section explains how to use the LinkPad to control the basic functions of your Linkam stage.

The display screen is touch sensitive, so you can simply operate the Linkpad by finger touches.

If you are using the LinkPad concurrently with the optional LINK software and a PC connection, only sensor data such as temperature will be shown. The power indicators still operate as does the Setup button.

When the LinkPad is connected to a temperature controlled stage without any additional features (such as vacuum or motor control) you will see the following screen:



1. Current stage temperature
2. Heating / Cooling rate
3. Temperature Limit
4. Hold time
5. Liquid nitrogen pump speed (only present if an LNP96 is connected to the T96)
6. Start control
7. Heat override control
8. Cool override control
9. Pause control
10. Ramp number display / Ramp options
11. Next ramp control
12. Previous ramp control
13. Settings and Information
14. Volume icon
15. Computer control icon
16. Sample Calibration icon
17. Stage power input display
18. Feature control functions (only present when an LNP96 is connected or a stage with additional features is in use)

## Basic stage controls

### Heating or cooling the Stage

To set the desired target temperature, tap on the limit control (3) and a keypad will appear:



Limit °C	7	8	9	✖
Current : 25.0 Range : -200.0 -> 420.0	4	5	6	Delete
	1	2	3	-
	0	.	:	Enter

Enter the required value by tapping on the numbers. The currently set limit and the range of acceptable limit values for the connected stage are shown to the left of the keypad.

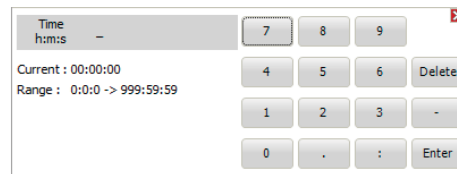
To set the desired rate of temperature change, tap on the Rate control (2) and a keypad will appear:



Rate °C/min	7	8	9	✖
Current : 1.00 Range : 0.01 -> 50.00	4	5	6	Delete
	1	2	3	-
	0	.	:	Enter
	°C/min	°C/hr		

Enter the desired rate using the keypad. The currently set rate and the range of acceptable rate values are displayed to the left of the keypad. The units can be changed between °C/minute and °C/hour from this keypad. Changing the units will update the acceptable range of values.

To set the hold time, which is the amount of time the system will maintain the target temperature once reached, tap on the Hold control (4) and a keypad will appear:



Time h:m:s	7	8	9	✖
Current : 00:00:00 Range : 0:0:0 -> 999:59:59	4	5	6	Delete
	1	2	3	-
	0	.	:	Enter

Enter the desired hold time in hours, minutes and seconds.

If using a system with a liquid nitrogen pump (LNP), the LNP speed value (5) will default to automatic. This means that the system will control the flow rate of liquid nitrogen to match the rate of temperature change specified. If you wish to manually control the speed of the liquid nitrogen flow, tap on the LNP speed (5) and a keypad will appear:



Lnp auto	7	8	9	✖
Current : Auto Range : 0 -> 100	4	5	6	Delete
	1	2	3	-
	0	.	:	Enter
	Man	Auto		

Tap on 'Man' to change the pump to manual mode and enter the desired pump speed as a percentage of maximum speed, with 100 being maximum speed.

**Note:** That using the LNP in this way may impact the accuracy of the rate of temperature change. We recommend using the LNP in automatic mode where possible.

**Note:** If you are using a stage with a Peltier element that cools using the thermoelectric effect, such as the PE120, there are no additional settings needed for cooling. A resistance heated stage such as the THMS600 cannot cool below ambient temperature without the use of an LNP.

Once the required values have been set, begin the experiment by tapping on the start button (6). This will change to a stop button while the system is active. The experiment can be paused at any time by tapping on the pause control (9).

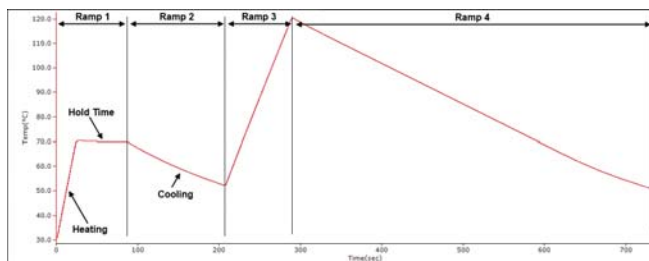
The Heat override (7) or Cool override (8) controls can be tapped at any time during an experiment to force the stage to heat or cool at the currently set rate. These controls will not function unless there is a currently active ramp.



## Profiles and Ramps

On the LinkPad 'Ramp' refers to an individual group of settings (rate, limit, hold time, etc.) that make up one step in an experiment, and a profile is a combination of ramps that makes up a complete experiment.

For example a profile could consist of 3 ramps, with the first being set to increase from ambient temperature to 100°C at 50°C/min, the second to heat from 100 to 150 at 10°C/min and the third to heat from 150 to 160 at 1°C/min and hold at 160 for 10 minutes. An example of a 4 ramp profile is shown below:

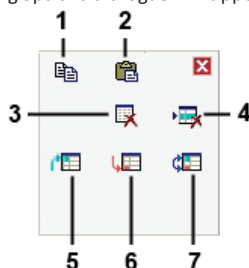


The following section describes how to configure, save, import and export these temperature profiles.

### Creating a profile

A profile is created by entering values into multiple ramps and setting a start ramp and an end ramp.

To select a ramp to edit, tap on either the ramp up control (11) or the ramp down control (12). Once the desired ramp is selected, its properties can be edited by tapping on the blue 'Ramp' display - the following options dialogue will appear:



1. Copy ramp
2. Paste ramp
3. Clear Profile
4. Clear ramp
5. Set start ramp
6. Set end ramp
7. Toggle cycle mode

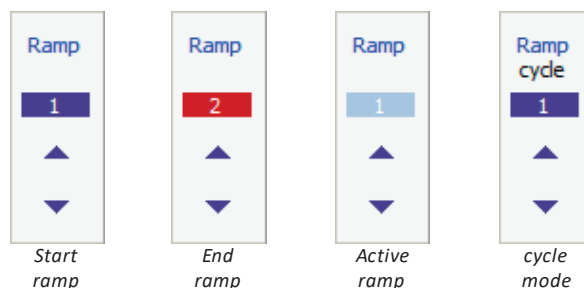
The copy ramp control (1) will copy all the values in the currently selected ramp into memory, these values can be then pasted into another ramp via the paste ramp control (2).

The clear profile control (3) will reset all ramps to default values and the clear ramp control (4) will reset the currently selected ramp to zero values. The clear ramp control cannot be used on ramp 1.

The set start ramp control (5) sets the currently selected ramp to be the first in the profile. Use this if you wish your profile to start on a ramp other than ramp 1. The set end ramp control (6) sets the currently selected ramp to be the end ramp of the profile. This can not be applied to ramp 1. The start ramp of the profile will be highlighted in dark blue and the end ramp will be highlighted in red. When an experiment is in progress the currently active ramp will be highlighted in light blue.

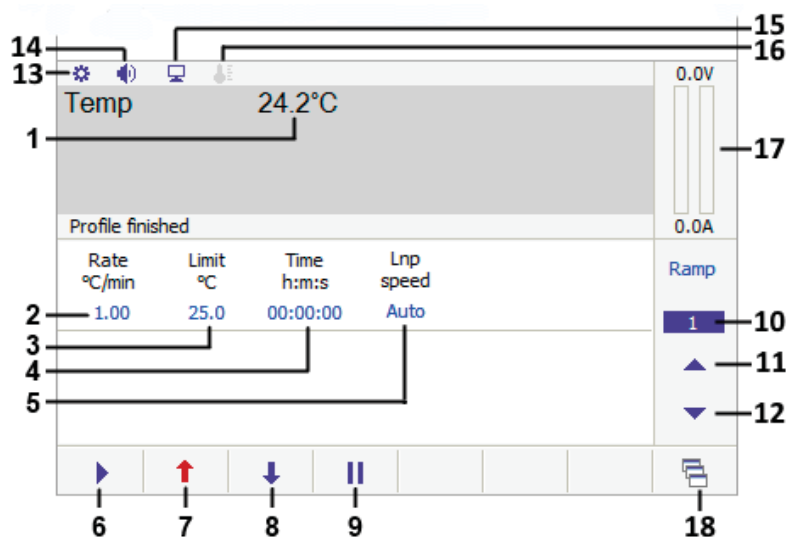
The cycle mode control (7) will toggle ramp cycling on and off. When this is on the profile will return to the start ramp once it finishes the end ramp, whereas when it is off the profile will finish once it completes the end ramp. When cycle mode is engaged the screen is updated to reflect this.

**Note:** A profile will finish if it reaches a ramp with a rate setting of 0.



Once the required values have been entered on each ramp, the start and end ramps configured and cycle mode set as required the profile is complete and ready to use.  
The profiles are automatically saved.

### Running The Profile



1. Current stage temperature
2. Heating / Cooling rate
3. Temperature Limit
4. Hold time
5. Liquid nitrogen pump speed (only present if an LNP96 is connected to the T96)
6. Start control
7. Heat override control
8. Cool override control
9. Pause control
10. Ramp number display / Ramp options
11. Next ramp control
12. Previous ramp control
13. Settings and Information
14. Volume icon
15. Computer control icon
16. Sample Calibration icon
17. Stage power input display
18. Feature control functions (only present when an LNP96 is connected or a stage with additional features is in use)

#### Starting

Once the profile value(s) are entered, simply touch the start button (6) to begin the heating or cooling of the stage.  
The ramp status (10) will change to show which ramp is in progress and the power indicator (17) will show a red bar which rises and falls with the amount of power fed to the stage. If selected the current and voltage will also be displayed.  
At any time the rate limit or time may be changed by simply touching on any of the displayed values (2,3,4,5) and entering a new value.

#### Pause heating/cooling or the hold time

Touching the pause button (9) during the profile will stop the heating/cooling until either the heat (7) or cool (8) button is pressed or the limit is changed.  
If the limit has been reached, touching the pause will stop the time countdown. Touching the pause or changing the hold time will begin the countdown.  
Touching the heat, cool buttons or changing the limit again will exit the hold time and the time value will disappear.

#### Limit reached

When the limit is reached, the hold time if set will be shown and will begin to count down. If a hold time is zero then the next ramp will be started.  
If the next rate value is zero or the stop ramp is reached then the profile will stop.

#### Heat and Cool buttons

The heat (7) and cool (8) buttons are used to override the profile settings e.g. if heating to a limit of 200 and an event occurs you can quickly cool by simply touching the cool button (8).

#### LINK or Computer Control

When the T96 and LinkPad are used with a USB or serial connection (for example to the LINK software) then the LinkPad operation is limited to the stop button only. This is shown on the LinkPad by the computer control icon (15) illuminating. In order to re-enable full LinkPad control simply disconnect the computer software control (in LINK, select Controller -> Disconnect, and to reconnect computer control in LINK, select Controller -> Connect)

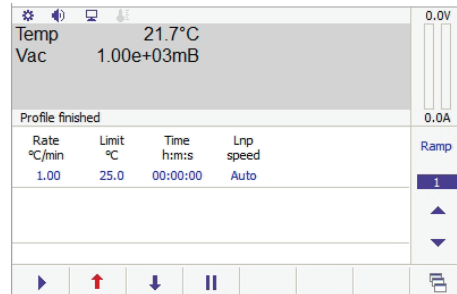
## Stage Specific Controls

The LinkPad display will change depending on the stage type connected to it, giving control over the unique functions of each specific stage.

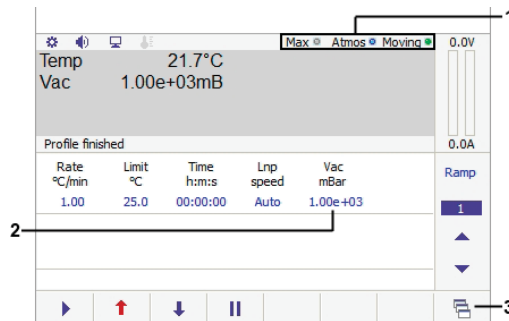
### Vacuum stages

This section applies to all stages with the ability to hold a vacuum, for example the THMS350V or TS1500V.

The only additional information displayed for vacuum stages with no motorised vacuum valve (MV196) is the current vacuum level, in mBar, mTorr or kPa. There are no additional controls.



Systems with the motorised vacuum (MV196) valve will see the following additional information:

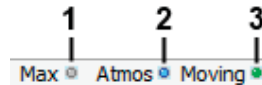


1. Motorised valve status indicators
2. Vacuum level control
3. MV196 (motorised valve) operation

To set the vacuum level tap on the vacuum control (2) and enter the required value.

#### Motorised valve status indicators:

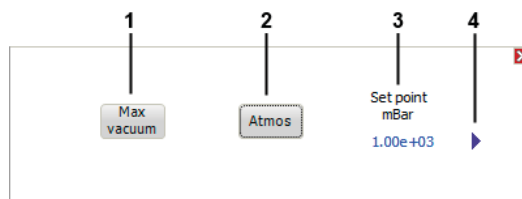
These indicators show at a glance the status of the valve.



- The Max indicator (1) will be illuminated blue when the vacuum level is at maximum - i.e. this light will be illuminated when the valve is in its fully closed position.
- The Atmos indicator (2) will be illuminated blue when the stage is at atmospheric pressure.
- The Moving indicator (3) will be red when the valve motor is active, and green when it is idle.

#### MV196 motorised valve operation

This screen is for controlling the motorised valve manually, as opposed to via a pre-set ramp. When a ramp is in progress these controls will be greyed out and inaccessible.

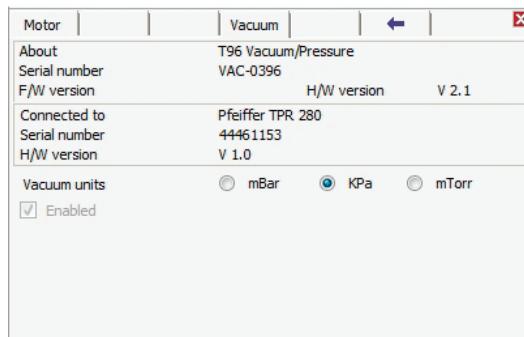


- tap the Atmos button (1) to set the stage pressure to atmospheric pressure.

- tap the Max vacuum button (2) to set the stage pressure to the lowest it can attain.
- tap the blue value under Set point (3) to manually set a pressure level and tap the start button (4) to confirm.

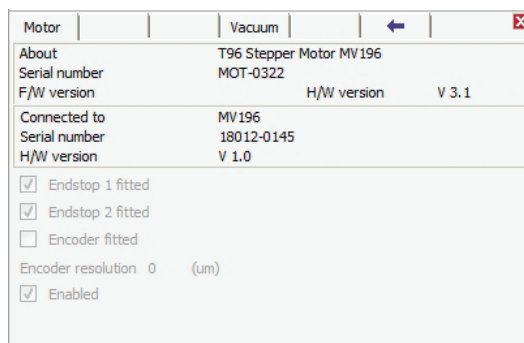
### Expansion board setup

All vacuum capable stages will have a vacuum expansion board fitted to their T96 controller, which has the following setup screen, accessed by tapping on the setup bar and tapping on the blue arrow:



The only changes that can be made are to switch the displayed units between mBar, mTorr and kPa. This cannot be changed while a profile is active.

Systems shipped with a MV196 motorised vacuum valve will also be fitted with a motor control expansion board:

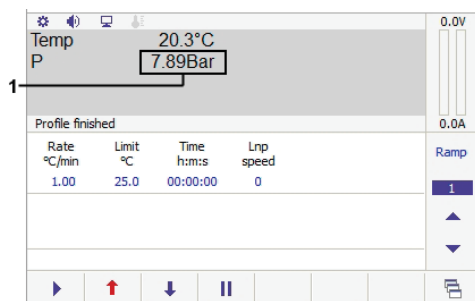


No changes can be made on this screen, it is for information only.

### Pressure stages

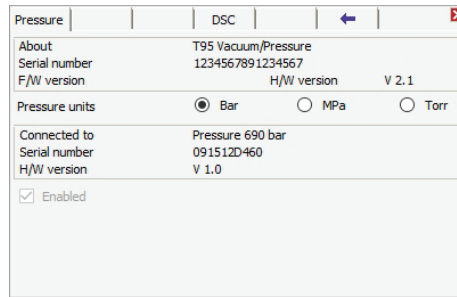
This section applies to all stages that can be pressurised to above atmospheric pressure, including THMS600PS and CCR1000

The only additional information displayed for pressure stages is the pressure, in Bar or Mpa (1). There are no additional controls.



### Expansion board setup

All pressure capable stages will have a pressure expansion board fitted to their T96 controller which has the following setup screen, accessed by tapping on the setup bar and tapping on the blue arrow:



The only changes that can be made are to switch the displayed units between Bar, MPa and Torr. This cannot be changed while a profile is active.

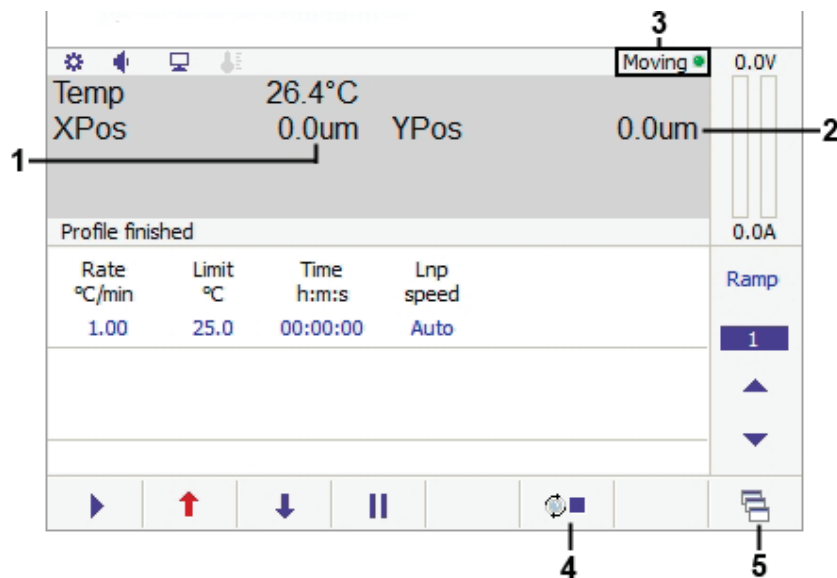
**Note:** Linkam recommends the use of a pressure gauge with these stage types. If you do not have one please contact Linkam Scientific or your local distributor.

### Motorised XY stages

This section applies to stages with motorised XY movement, such as the MDS600.

#### Additional main screen display items:

When a motorised stage is connected, the main control screen will display the following additional information:



1. X axis position
2. Y axis position
3. MDS motor indicator
4. Stop motion control
5. Manual motor control

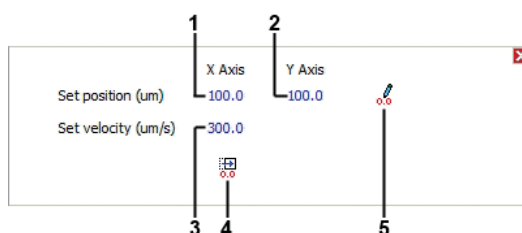
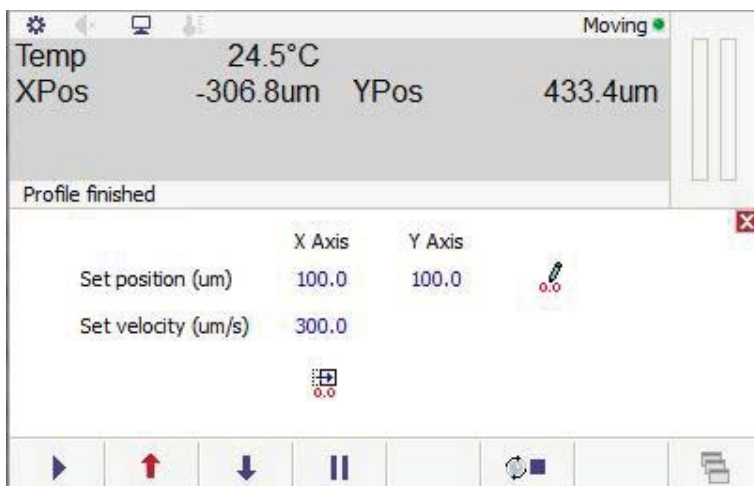
The X and Y position values (1) and (2) are the distance in  $\mu\text{m}$  from the zero position (which can be set at any physical location). Positive values indicate a position above/right of the zero point, whereas negative values indicate a position below/left of the zero point.

The indicator light (3) will be green while the motors are at rest and will switch to red when the motors are in motion.

Tap the stop motion control (4) to stop motor movement at any time. Heating will not be stopped when this control is used.

## Manual motor control

These controls are used to move the sample carrier to a specific position.



1. X Axis position control
2. Y Axis position control
3. Velocity control
4. Go to zero position
5. Set zero position

The X axis (1) and Y axis (2) controls move the sample carrier to the position set, which is in  $\mu\text{m}$  from the zero position. tap on the control and a keypad will appear where a position value can be set. tap on the number to enter a new position and tap enter to accept and move to the new position.

The velocity control (3) adjusts the speed at which the sample carrier will move when using the controls on this screen. It does not affect the joystick controlled movement or the scanning movement. Speeds can be set by tapping on the blue value and entering the required velocity on the resulting keypad.

The go to zero control (4) will move the sample carrier to the currently set zero position.

The set zero control (5) will set the current position of the sample carrier as the zero point. This will change the XPos and YPos values on the main screen to zero without physically moving the sample carrier.

**Note:** If using a camera see the section on camera alignment in the optional LINK software manual and for stage alignment please see the manual for your Linkam stage.

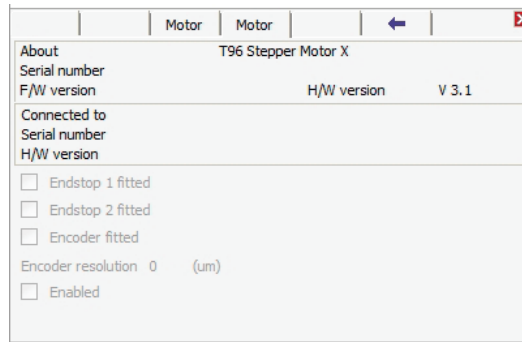
## Scanning

Motorised stages in combination with the optional LINK software and Linkam digital camera can 'scan' an area of your sample that is larger than the field of vision. It does this by taking an image of the field of vision, moving the sample to the next field of view in the defined area and taking another image. Once all images are taken it will stitch the images together into one large image.

Please contact your local Linkam Distributor for more details.

## Expansion Board Setup

All motorised stages will have two motor control expansion boards fitted which have the following setup screen (both screens are identical, barring that one is for X and one is for Y Axis movement), accessed by taping on the setup bar and taping on the blue arrow:



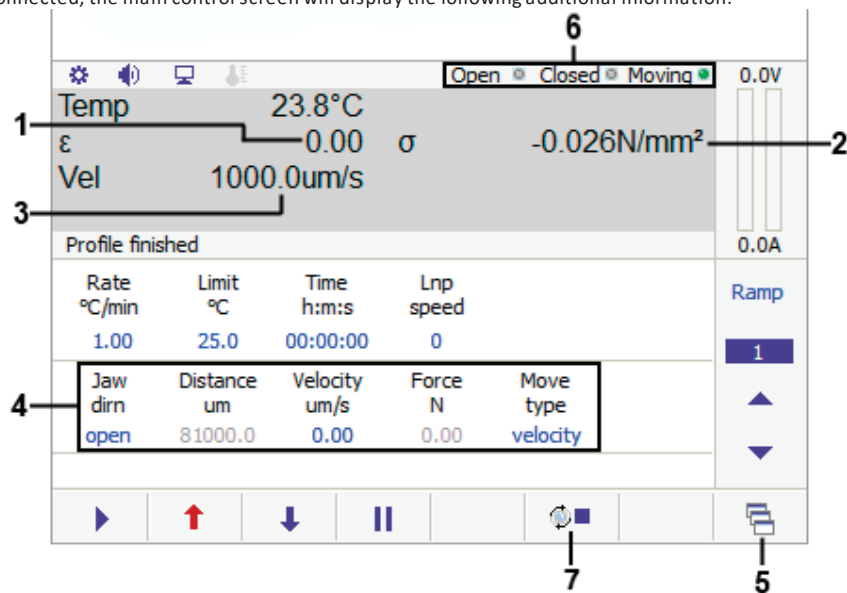
No options can be changed on this screen, it is for information only.

## Tensile stages

This section applies to the TST range of stages, which include the TST350, TST350E and TST250V.



### Additional main screen display items:

When a tensile stage is connected, the main control screen will display the following additional information:



1. Distance between Jaws / Stress value
2. Force being applied / Strain value
3. Current velocity
4. Tensile control panel
5. Manual Tensile Control/Tensile Setup
6. Current jaw status indicators
7. Tensile pause button

Current jaw status (6) shows the current motion status of the jaws. If they are currently in motion the moving indicator will be red, and green when they are stationary. The open and closed indicators will light up blue when the jaws are in their fully open and closed positions respectively.

A tensile motion pause button (7) will appear when the stage motors are currently in motion. It will appear as a stop symbol  when the motors are started and when taped it will pause the motor operation and change to a start symbol . Tap the button again to resume motion. Heating will **not** be paused when this control is used.

**Note:** Select between Distance/Force and Stress/Strain display in the force tab in option board setup screen. In order for Stress/Strain values to be accurate you must enter values for sample width and thickness in the Tensile setup screen.

### Tensile Control Panel

These controls are used to set the tensile parameters of a ramp.

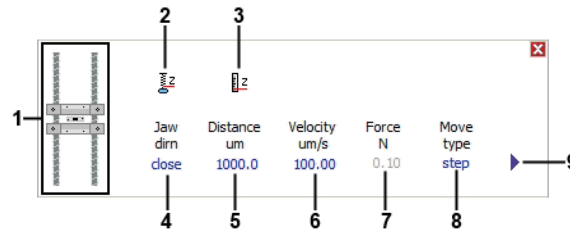
1	2	3	4	5
Jaw dirn	Distance um	Velocity um/s	Force N	Move type
open	81000.0	0.00	0.00	velocity

1. Jaw movement direction (opening/closing)
  2. Step distance (micrometers)
  3. Jaw speed (micrometers per second)
  4. Force applied (newtons)
  5. Movement type (step/cycle/velocity/force)
- Step movement moves the jaws apart in discreet steps of the distance set.
  - Cycle movement cycles the jaws open and shut by the set distance.
  - Velocity mode moves the jaws in the specified direction at the specified velocity.
  - Force mode will apply a constant force value to the sample.

Set the tensile parameters of the current ramp using these controls.

### Manual Tensile Function

This screen is for controlling the tensile functions manually, as opposed to via a pre-set ramp. When a ramp is in progress these options will be greyed out and inaccessible.



1. Graphical representation of jaw state
2. Zero force control
3. Zero distance control
4. Jaw direction (open/close)
5. Step distance
6. Jaw velocity
7. Force
8. Action type (step/cycle/velocity/force)
9. Start action

Set up your desired action, and tap the start action button (9) to perform the action. the Zero force (2) and distance (3) controls allow you to set the force and distance readings to zero prior to starting the action. The movement of the tension jaws will be shown on the graphical representation (1)

### Tensile Setup

Use this screen to set calibration values for your TST system

1	2	3	4	5	6
Force prop	Force int	Force deriv	Width mm	Height mm	Jaw-Jaw um
2.00	0.0	0.0	10.0	0.1	15000.0

1. Proportional force
2. Integral force
3. Derivative force
4. Sample width
5. Sample height (thickness)
6. Calibration distance between jaws

Proportional (1), Integral (2) and Derivative (3) (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.**

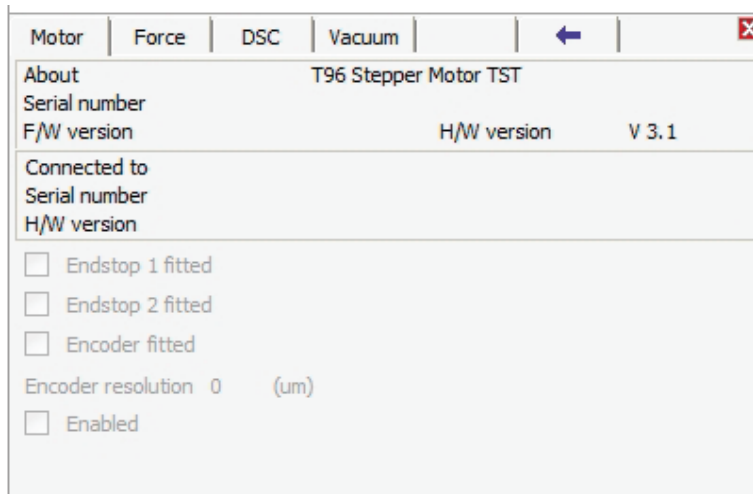
Sample width (4) and Sample Height (5) are values allowing the system to accurately calculate Stress/Strain. If you have selected Stress/Strain as a display output you must enter the values for your sample here.

**The calibration distance between jaws setting (6) should NOT be used.**

### Expansion Board Setup

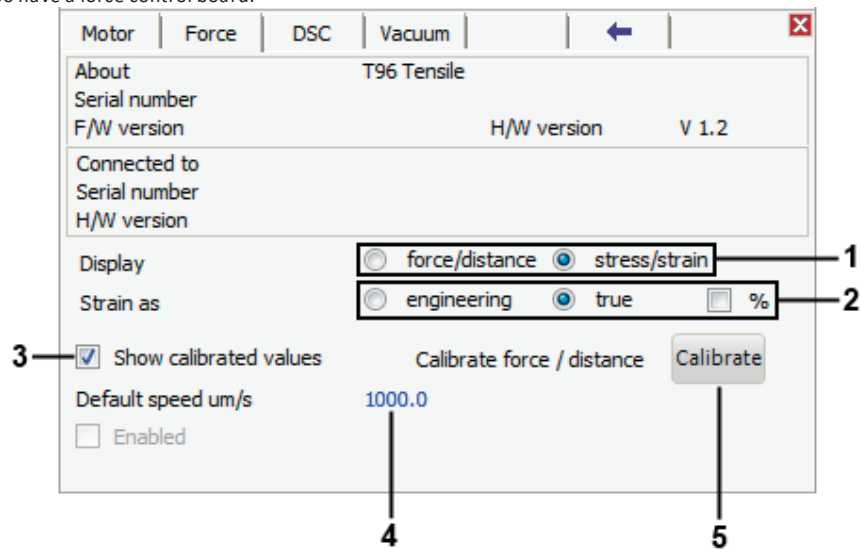
All Tensile stages will have an motor control expansion board fitted which has the following setup screen, accessed by tapping on the setup bar and tapping on the blue arrow:





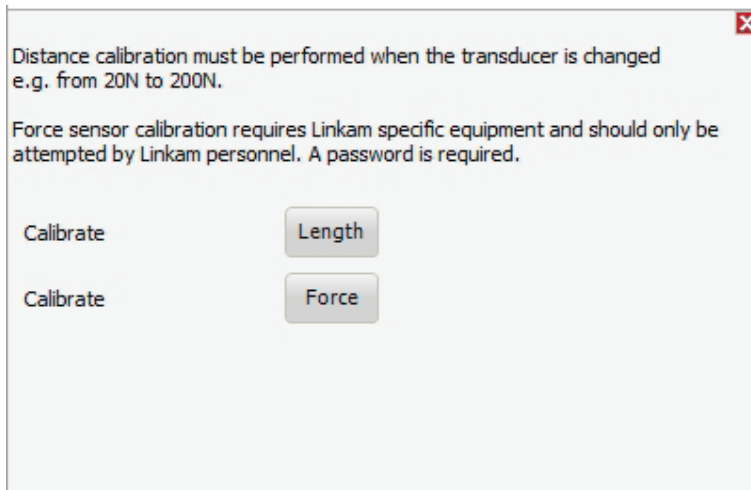
No options can be changed on this screen, it is for information only.

Tensile stages will all also have a force control board.

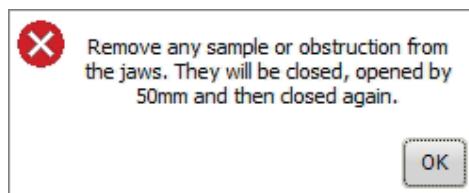


- Change the display between force/distance and stress/strain by using the display radio buttons (1)
- Strain can be expressed in two different ways, as "engineering strain" and "true strain". Engineering strain is the ratio of the change in length to the original length, whereas the true strain is similar but based on the instantaneous length of the specimen as the test progresses. Choose between true and engineering strain using the strain radio buttons (2). Tick the % box if you wish to show the strain in percent
- The 'Show calibrated values' check box (3) switches the display between the raw output from the transducer, and the calibrated value. The default is to display the calibrated values.
- To change the default speed at which the jaws move, tap on the default speed setting (4). A keypad will appear where you can choose a speed.
- The Calibrate control (5) will open the tensile calibration screen.

#### Tensile Calibration



If the force transducer in the stage is changed for any reason (such as swapping between the 20N and 200N transducer) a distance calibration must be performed. To begin this, tap on the 'Length' button, which will pop up a confirmation dialogue:



Make sure the jaws are free of obstructions and tap the OK button to continue, which will return you to the main control screen while the calibration takes place. This process is automatic, the tensile displays will change to 'Cal' versions while this is happening, as below:

Temp	21.70°C		
DCal	19499	FCal	65
Vel	1000.0um/s		

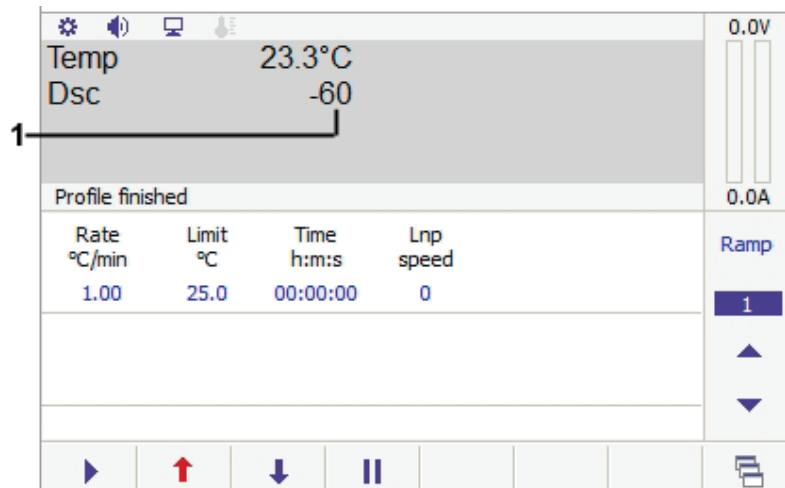
While these readings show 'DCal' and 'FCal' do not operate the stage, the readings will revert to normal once the calibration is complete and the system is ready for use.

**Important note:** The Force calibration button is only for use by Linkam Scientific and requires a password to access. **Do not attempt to use this control.**

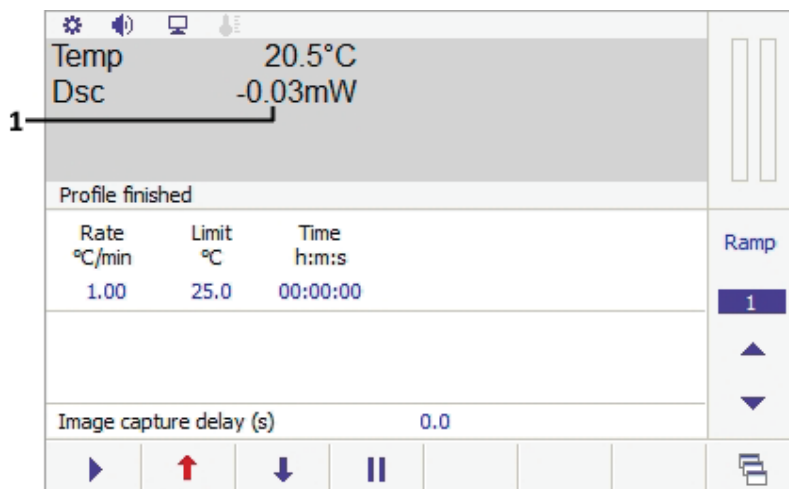
### DSC stages

This section applies to the DSC600, DSCX600 and DSC450 stages only.

The only additional information displayed for a DSC600 or DSCX600 stage is the DSC count (1). There are no additional controls. Please see your DSC600 stage manual for an explanation of DSC counts.



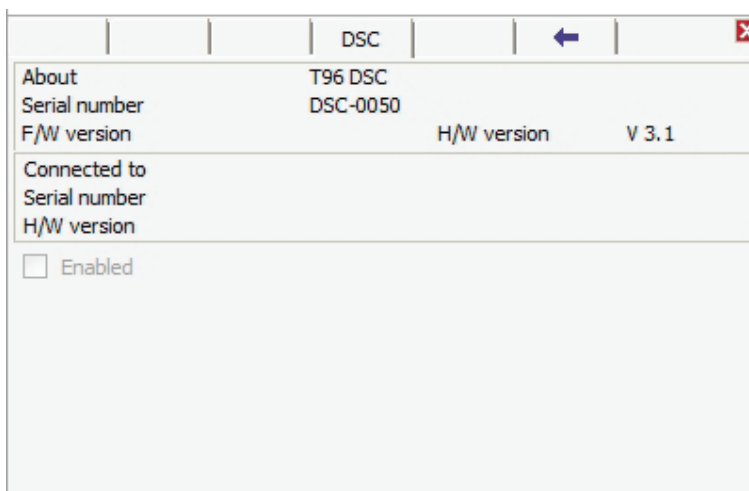
The only additional information displayed for a DSC450 stage is the Dsc value in mW (1). There are no additional controls. Please see your DSC450 stage manual for further information.



Please note it is not possible to record data using the LinkPad. The DSC stages should ideally be controlled using the optional LINK software.

### Expansion board setup

DSC600, DSCX600 and DSC450 stages will have a DSC sensor expansion board fitted to their T96 controller, which has the following setup screen, accessed by taping on the options bar and taping on the blue arrow:



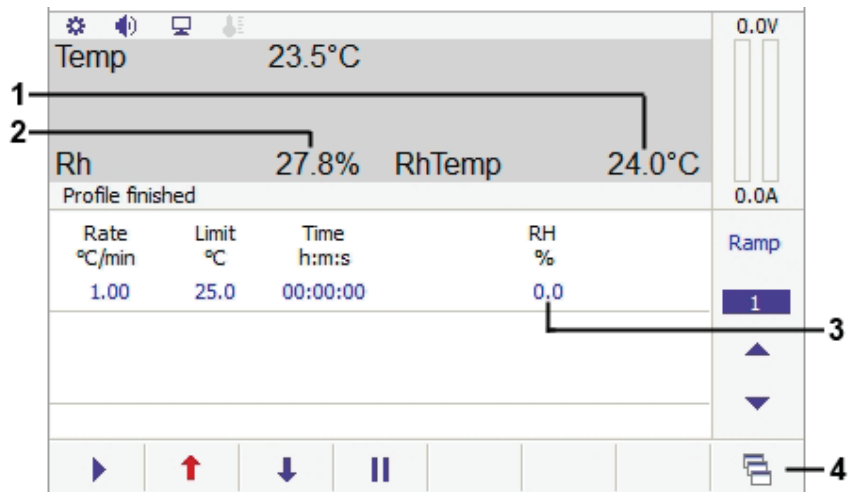
No changes can be made on this screen, it is for information only.

### Humidity control

This section applies if you have a Linkam RH95 humidity controller attached to your system.

#### Additional main screen display items:

When an RH95 is attached to the T96 controller, the LinkPad main screen will display the following additional items:

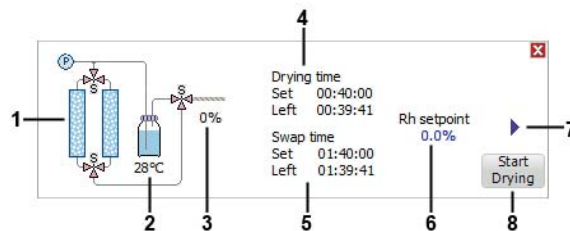


1. Humidity sensor temperature
2. Relative humidity reading
3. Relative humidity control
4. Manual RH95 control

- The humidity sensor also contains a temperature sensor. The RhTemp display (1) shows the current temperature at the humidity sensor in degrees Celsius.
- The Rh reading (2) shows the current humidity of the chamber as a percentage.
- The desired Rh% for the current ramp can be set using the RH control (3).

#### Manual RH95 Control

This screen provides information on the current status of the RH95 and manual humidity controls. These controls can only be used when the system is inactive, if there is a ramp in progress they will be greyed out and inaccessible.



1. Graphical display of the RH95 system status
2. RH95 water bottle temperature
3. Heater wire power level.
4. Drying time display
5. Swap time display
6. RH% manual control
7. Start button
8. Drying control

- The graphical display (1) will update to show which desiccant tube is currently drying out by highlighting it in red, and a blue arrow will appear next to the currently active tube.
- The water temperature display (2) shows the temperature of the water bottle in the RH95.
- The humidity supply tube has a heater wire inside it to maintain the air temperature. The power display (3) shows the power being put into this heater wire as a percentage of maximum.
- The drying time display (4) shows the amount of time remaining on the current drying cycle, which is the currently inactive desiccant tube being dried out.
- The swap time display (5) shows the amount of time remaining before the active tube is swapped, and a drying cycle started on the previously active tube.
- The Rh setpoint control (6) is used to manually set a Rh% without linking to a heating or cooling ramp.
- The start button (7) will begin changing the chamber humidity to that set in the Rh setpoint control.
- The drying control (8) begins a drying cycle. This flows warm air through both desiccant tubes to dry them out. This action should be performed after you first receive your RH95 system.

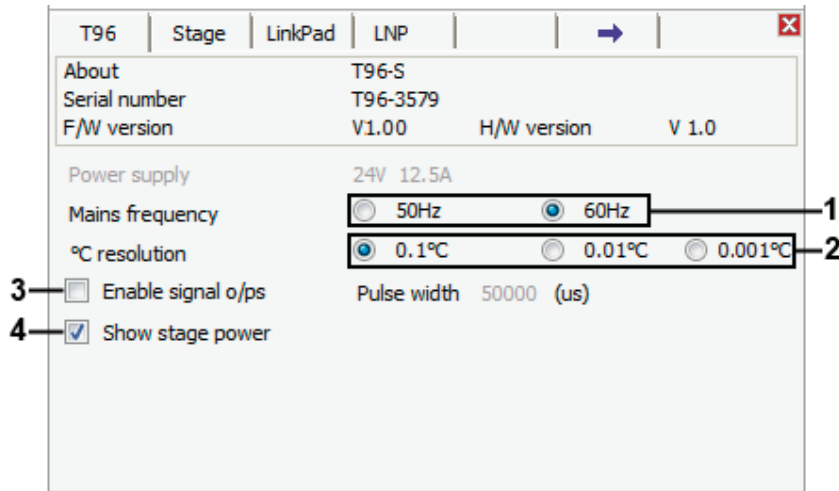
## Options and Information

This section describes the setup and option screens in the LinkPad software.

### Connected hardware

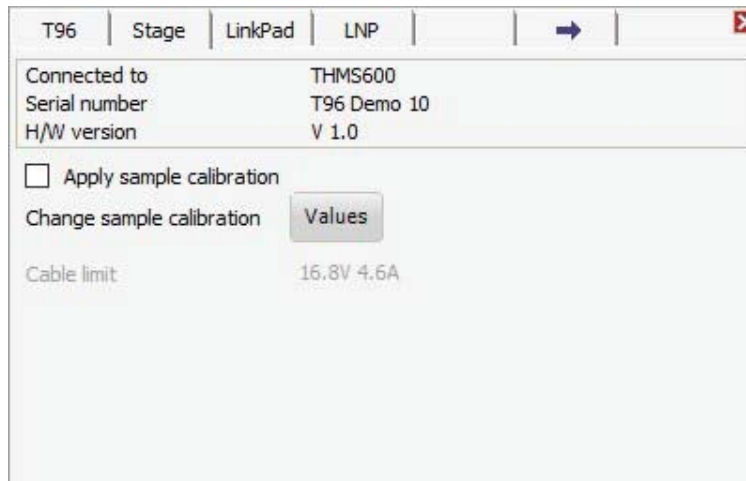
Information and options screens for the connected hardware can be accessed by taping on the settings icon at the top left of the main screen.

#### T96 options



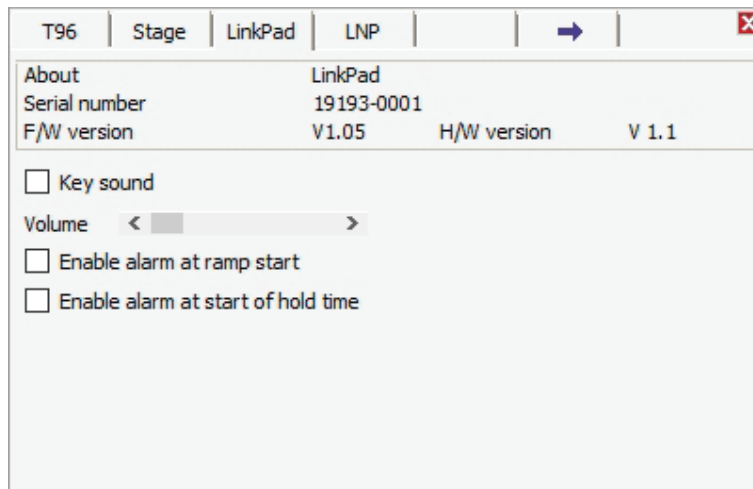
- This screen displays information concerning the model and serial number of the connected temperature controller and the rating of the internal power supply.
- The mains frequency can be changed between 50 and 60Hz, using the radio buttons (1).
- The number of decimal places displayed on the temperature readout can be selected using the radio buttons (2). Either one, two or three decimal places can be used. For high temperature TSXXXX stages this changes from 0 decimal places to 1 decimal place.
- Enabling the 'Enable signal o/ps' checkbox (3) brings up a representation of the green and pink rear panel 3.5mm connectors on the main running display, and allows you to configure their signal profile
- If the 'Show stage power' box is checked, the power currently being supplied to the heating block will be displayed on the main screen, in amps and volts.

#### Stage options



This screen shows the model and serial number of the connected stage and allows the configuration of [Sample Calibration](#).

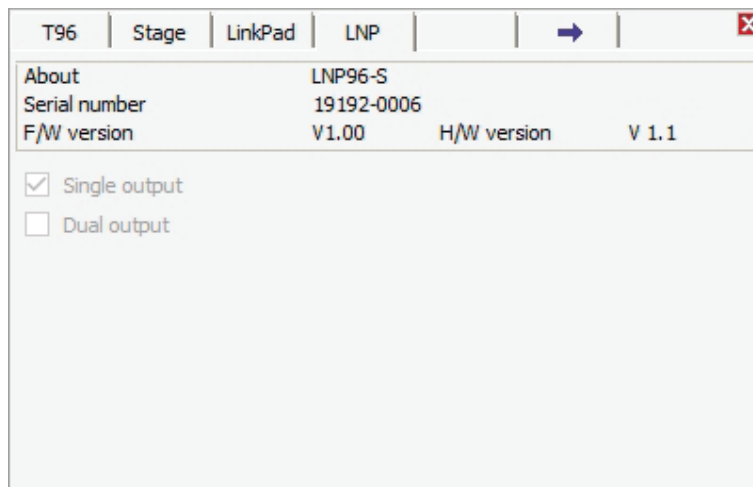
#### Linkpad options



This screen shows the serial number and firmware version of the connected LinkPad.

Key pad tones are enabled by ticking the 'Key sound' check box. To disable them, uncheck the box. Alarms can be configured to sound at the start of each ramp and/or the start of each hold time in the profile by checking the respective option. The volume of the key tones and alarms can be adjusted via the 'Volume' slider.

#### LNP options



The screen displays the serial number and firmware version of the connected LNP96, if present. This screen is for information only, no changes can be made.

#### Option board Information

To get to the option board information touch the blue right arrow tab and to go back to the T96 system controller information touch the blue arrow tab again (now pointing left).

#### Dual T/C Tab

T96 System Controllers connected to a high temperature stage require a dual thermocouple option board. This tab shows which stage is connected and it's serial number. The other input of the dual card will be blank.

#### Tensile Tab

T96 System Controllers setup for a tensile stage require a signal conditioning option board. This tab shows which beam type is connected to the system, allows the user to select whether the display will show stress/strain or force/distance and true or engineering strain, allows a default motor speed to be set and allows a distance calibration to be performed.

**Note:** In order for Stress/Strain values to be accurate you must enter values for sample width and thickness in the Tensile setup screen.

#### Vacuum Tab

T96 System Controllers setup for a Pirani vacuum gauge require a signal conditioning option board. To change the displayed vacuum value between mBar, mTorr and kPa simply touch the desired radio button.

#### Pressure Tab

T96 System Controllers setup for a pressure gauge require a signal conditioning option board.

To change the displayed vacuum value from Bar to MPa simply touch the desired radio button.

### Motor Tab

T96 System Controllers connected to stages which have motorised movement, such as the MDS600, TST350 or the GS350 require a number of motor drive option boards, one for each motor.

Each motor tab will show the detail of the board and how it is configured and which stage is connected.

Extra information about the end stops and encoders are also detailed.

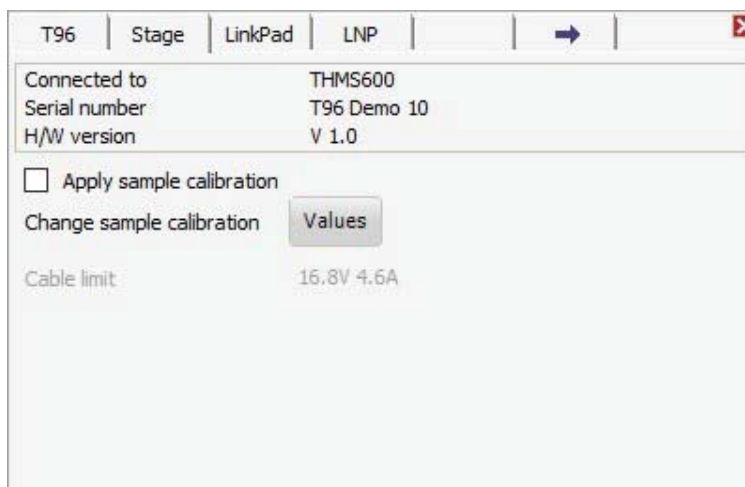
### DSC Tab

DSC stages requires an option board with further signal conditioning circuitry for the highly sensitive DSC signal. This tab does not have any settings a user may change and only details the stage it is connected to and also details of the option boards hardware.

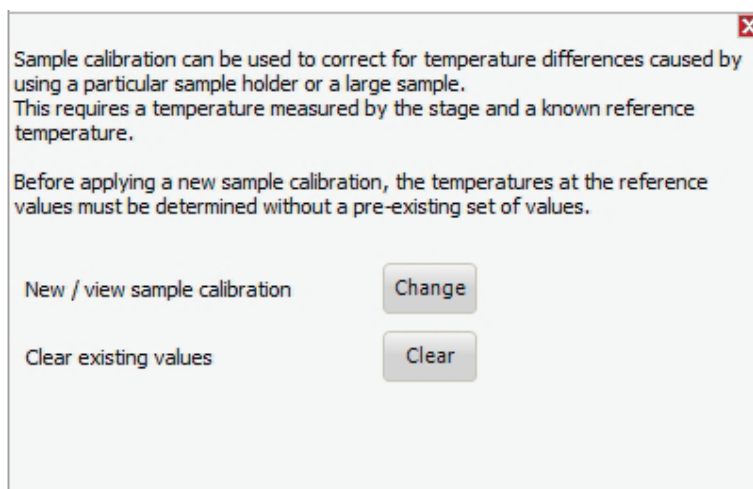
### Sample Calibration

Depending on the specific properties of your sample (for example; total mass, thermal conductivity, surface area and flatness), it is possible that thermal losses between the heating block and the sample or a temperature gradient through the sample may cause a difference between the reported temperature of the stage and the actual temperature of your sample. To account for this, the Sample Calibration function has been included with the Linkpad or LINK software to allow you to apply an offset to the displayed temperature, if required.

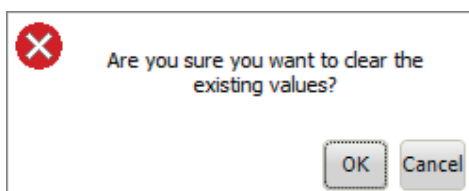
To use sample calibration tap on the settings bar and select the 'Stage' tab and the following screen will appear:



Tap the 'Values' button and a further screen will appear:



To reset any stored values to the default settings tap the 'Clear' button which will cause a confirmation prompt to appear:



tap 'OK' and the stored values will be cleared, tapping on cancel will leave the values as they are currently set.

To enter the offset values you require, tap on the 'Change' button and a further screen will appear:

Up to five sample calibration points can be entered, but it is not necessary to use them all.  
If you do not wish to use a point then enter the same value in both the Reference value and Stage measured fields.

Range °C	Reference value °C	Stage measured value °C
Lowest	-100.0	-100.0
-	0.0	0.0
-	100.0	100.0
-	200.0	200.0
Highest	300.0	300.0


The reference value is the expected temperature, and the Stage measured value is the displayed temperature. For example if you have a pure sample that has a known melting point of 50°C and the displayed temperature when the sample melts is 50.3°C, you would enter 50.0 in the 'Reference value' field and 50.3 in the 'Stage measured value' field.

As long as the following rules are observed, any values can be entered - the default temperatures are guidelines only.

- Up to 5 calibration points can be applied at different temperature ranges.
- If you do not wish to use a calibration point then leave both values the same.
- The calibration points must be in ascending order of temperature
- The temperature ranges chosen must not overlap
- The maximum offset within any point pair is 20°C. If you are experiencing a discrepancy of greater than 20°C, please contact Linkam technical support.

Once the required values have been entered, tap 'Apply' to save them, and tap the 'X' to close this window.

To activate sample calibration, check the 'Apply sample calibration' check box on the initial stage setting screen.

When there is an active sample calibration, the sample calibration indicator  on the main options bar will be illuminated.

**Note:** The sample calibration values are stored on stage lead of the currently connected stage. Each stage lead can have its own set of stored values.

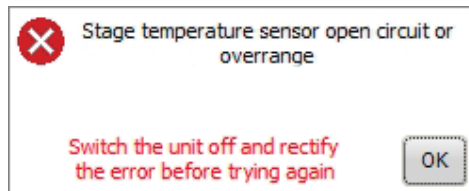


## Troubleshooting

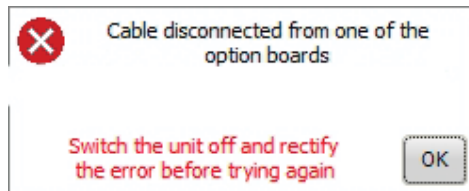
This section provides tips on resolving issues that may arise when using the LinkPad.

### Control and connection Errors

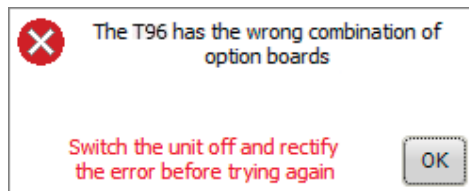
This section describes the various error messages that LinkPad can generate when attempting to connect to or control a Linkam stage, and what actions to take to resolve them.



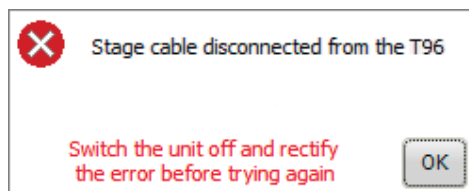
This error occurs when there is a connection broken on the stage temperature sensor. This error may be caused by a stage lead cable disconnected from the stage or may indicate a broken wire on the stage temperature sensor. If the Stage lead is correctly connected, contact Linkam Scientific technical support.



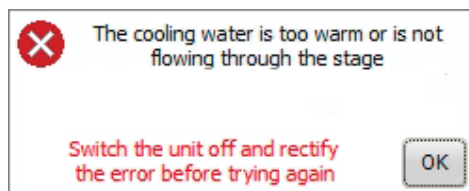
This error occurs when the stage type connected requires an additional cable connected to an expansion board in the T96, but it is disconnected. Power the unit off and check that any additional cables (such as vacuum sensor or DSC sensor cable) are connected, and that you are using the correct stage lead for your stage.



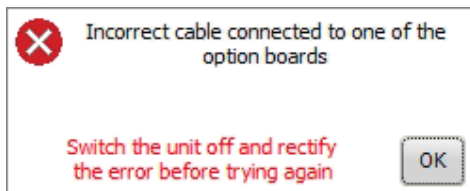
This error occurs when the connected stage calls for option boards to be fitted into the T96, but the system cannot detect those boards. Check that you are using the correct stage lead and T96 control unit.



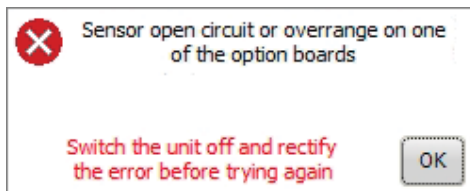
This error occurs when the T96 is powered on with no stage cable connected to it. Power the unit off and make sure your stage lead is connected to the T96 controller.



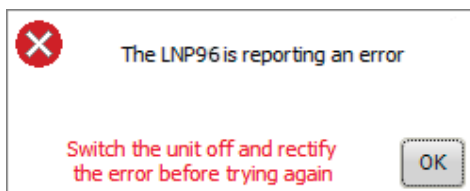
This error occurs when the water temperature sensor in your stage reaches too high a temperature. Check that the water pump is actively pumping and that the water has not become too warm. This error can only occur with peltier stages.



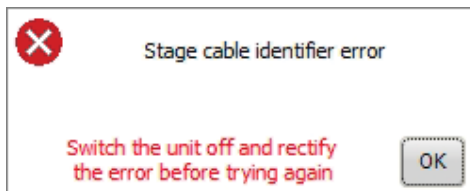
This error occurs when an incorrect cable is connected to an expansion board in the T96, for example if a vacuum gauge is connected to a DSC sensor board. Power the unit off and make sure the correct accessories are connected to your control unit.



This error occurs when there is a fault with an accessory (such as a vacuum gauge) that is connected to an expansion board on the T96 controller. If you see this message, contact Linkam Scientific technical support.



This error occurs when there is an internal problem with a connected LNP96. If you see this error, please contact Linkam Scientific technical support.



This error occurs when the T96 controller does not recognise the identifier chip on the attached stage lead. Contact Linkam scientific technical support if you see this message.

Linkam Scientific Instruments Ltd

Tel: +44(0)1737 363 476

Fax: +44(0)1737 363 480

Email: [support@linkam.co.uk](mailto:support@linkam.co.uk)

Unit 8 Epsom Downs Metro Centre  
Waterfield, Tadworth, Surrey, KT20 5LR, UK  
[www.linkam.co.uk](http://www.linkam.co.uk)