



## **Linksys32**

**Temperature Control and Video Capture Software**

# **USER GUIDE**

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## Introduction

Thank you for purchasing Linksys32 Temperature Control and Data Capture Software with your Linkam System. Linksys32 is only tested with Windows 32-bit operating system; Windows XP with at least Service Pack 3 or Vista with at least Service Pack 1 or Windows 7. You must have Administration rights for the PC to install Linksys32

There is a limit of 10 days to activate the software, after which the temporary key supplied will expire and the software will no longer work. Go to the Product Registration page at [www.linkam.co.uk](http://www.linkam.co.uk) (there is a link on the homepage) within this 10 day period to receive the new registration key, which is unique to the hardware configuration of the PC. This is to avoid illegal distribution of copies of the software.

## Product Registration

Register your Linkam instrument and software; please go to [www.linkam.co.uk](http://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](http://www.linkam.co.uk) to fill in the Feedback form.

## Linksys32 Overview

The Linksys32 software will enable the control of specific features of the hotstage and program complex temperature profiles.

The version of the Linksys32 system purchased will determine which features are enabled in the software. It is possible to upgrade the standard Linksys32 software to the analogue video capture (AV), digital video capture (DV) or CFR compliant version.

There are four versions of Linksys32.

### Linksys32

Manual Temperature control tool bar.  
Automatic control from temperature profile table.  
Real time chart and data store.  
Active X controls to enable integration into third party software.  
No image capture capability.

### Linksys32-AV (Supplied with VideoFusion PCI Card)

Manual Temperature control tool bar.  
Automatic control from temperature profile table.  
Real time chart and data store.  
Real time image capture with gallery review and movie production tools.  
Active X controls to enable integration into third party software.

### Linksys32-DV

Manual Temperature control tool bar.  
Automatic control from temperature profile table.  
Real time chart and data store.  
Real time digital image capture with full image resolution control gallery review and movie production tools.  
Active X controls to enable integration into third party software.

### Linksys32-CFR (AV and DV versions)

Manual Temperature control tool bar.  
Automatic control from temperature profile table, real time chart and data store.

## Software Activation

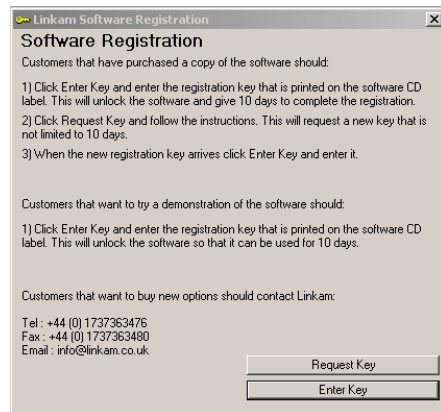
### Code Generation

From the PC Desktop

Click: **Start > All Programs > Linkam > Linksys32 > Register.exe**

To run the 'Linkam Software Registration' window.

Click: **Request Key**



Under 2) Enter the SERIAL NUMBER LKSxxxx as printed on your installation CD into the blank box.

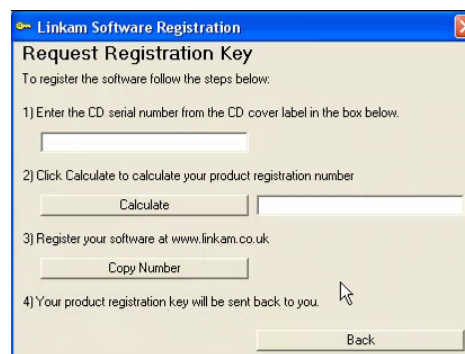
Click: **Calculate**

Under 4) Click '**Copy Number**' and visit the Product Registration page at [www.linkam.co.uk](http://www.linkam.co.uk). Paste the code into the Product Registration Number field and submit the form.

Linkam will email you a new registration key.

Alternatively call Linkam to get the registration key.

Tel: +44 (0) 1737 363 476 between the hours 8am to 5pm GMT.

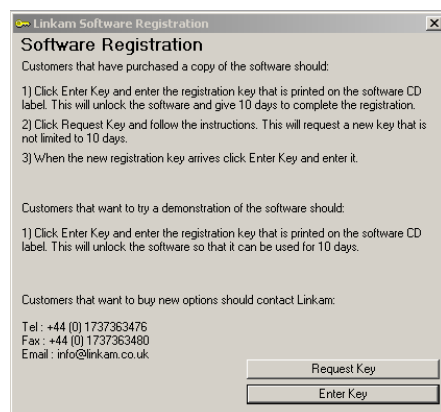


### Code Activation

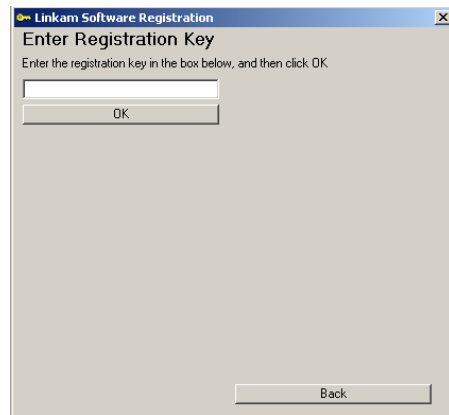
Click: **Start > All Programs > Linkam > Linksys32 > Register.exe**

To run the 'Linkam Software Registration' window.

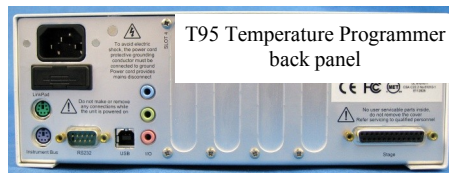
Click the '**Enter Key**' button.



Copy the new code from Linkam and paste it into the blank box and click the 'OK' button to activate the software.



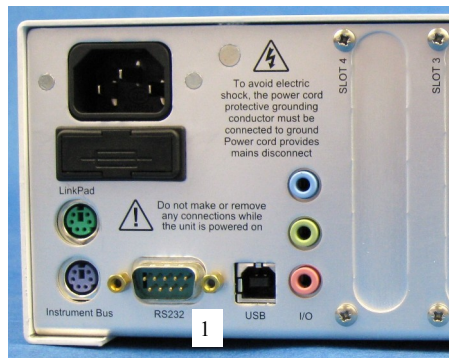
## Cable Connection to T95 Temperature Programmer



### RS232 Cable Connection

Use the supplied crossed-over RS232 cable to connect between the PC Comm port and the T95's RS232 port (1).

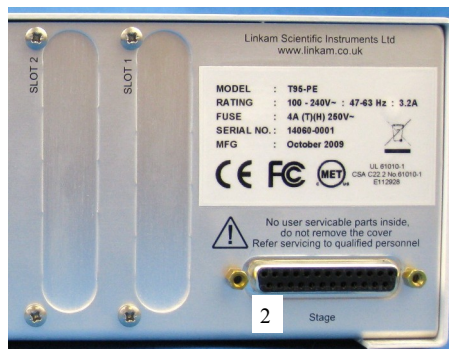
Please refer to the T95 manual for more details.



### Stage Cable Connection

From the stage, connect the Stage Cable to the Stage socket (2).

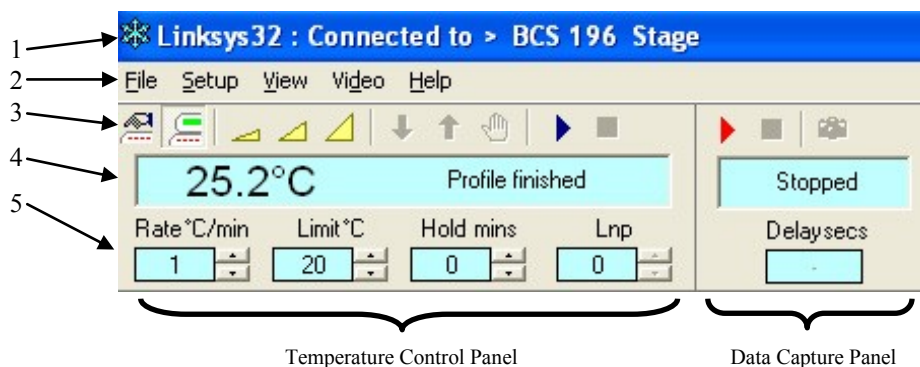
Please refer to the T95 manual for more details.



## Navigation of Linksys32 Toolbars

### *Linksys32 Temperature Control*

The image shows the main control area of the screen. This is divided into the Temperature Control Panel on the left and the Data Capture Panel on the right.



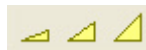
1. The top line of the screen shows that the software is connected to a hotstage. In this case, the BCS196 Biological Cryo-Stage.
2. These are the various menus. The File menu is used to save and open various files and to connect the software to the programmer by the RS232 Comm port on the PC.  
The Setup menu is used to set which Comm port should be used to connect to the temperature controller. It also selects whether to use the manual temperature controls (5) or the Temperature Profile Table.  
The View menu opens the Temperature Profile Table or Real Time Chart.  
The Video menu is only active when Linksys32-AV or DV options have been purchased and will open the live video window.
3. This is the main Temperature and Capture control toolbar. Right click anywhere on the Temperature Control Toolbar or Capture Toolbar for further setup options.



This button sets the control of the Liquid Nitrogen Pump System (LNP95) speed to manual.



This button sets the control of the LNP95 to automatic. The software will determine the speed of the pump necessary to control at the specified cooling rate and temperature.



Each of these three buttons represents a preset rate of heating/cooling. Reset these values by right clicking on the Temperature Control Toolbar.



Click this button to cool at the rate specified in either the manual temperature control display or the Temperature Profile Table.








Click this button to heat at the rate specified in either the manual temperature control display or the Temperature Profile Table.



Click this button to hold the temperature indefinitely.



-  Click this button to start a temperature profile from the settings in the manual temperature control section (5) or in the Temperature Profile Table, if 'Use Profile' has been selected (click: **Setup > Temperature Controller > TempControl > Use Profile**).
-  Click this button to stop a temperature profile as set in the manual temperature control section or in Temperature Profile Table.
-  Click this button to start Data Capture. If AV or DV options are selected images will also be captured.
-  Click this button to stop Data Capture. This will also stop image capture.
-  Click this button to take a snapshot image (feature only enabled for Linksys32-AV or DV option).

4. This line shows the live Temperature Controller Status Display which shows live information from the temperature programmer and the Data Capture Display.

When a hotstage and the software are connected to the temperature programmer. The temperature of the heating/cooling element is displayed on the far left. The current status of the programmer is displayed to the right of the temperature. e.g. 'Profile finished', 'Heating', 'Cooling', 'Programmer Not Connected.'

The Data capture Display shows either 'Recording' or 'Stopped'. If the AV or DV options are available the software will capture images as well as data.

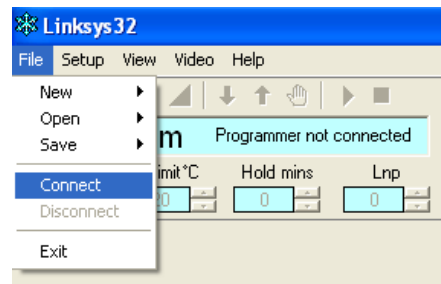
5. This line includes the Manual Temperature Controls and Data Capture Delay Status.  
The Rate, Limit and Hold controls each have up/down nudge buttons to increase or decrease the values. The increments can be changed by right clicking on the Temperature Control Toolbar and using the dropdown menus selected from the 'Nudge Values' menu.

The Capture Delay Status window in the image currently shows '-' this means no images.

## Connecting the PC to Temperature Programmer

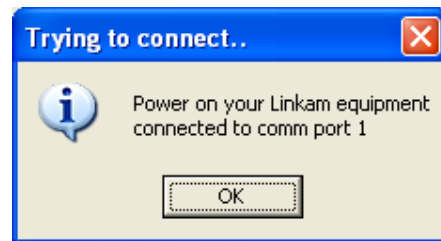
When opening the Linksys32 program the Temperature Control Status Display will show the message 'No Comm - Programmer not connected'. This means that the software does not yet recognize that there is a temperature programmer connected to the RS232 / Comm port.

Click: **File > Connect**



The software will now ask for the equipment connected to Comm port 1 (or whichever Comm port has been selected in the Linksys32 Setup window).

Click: **OK**



If the message:

"No Comm - Comm link broken" the RS232 cable has been connected to a different Comm port than selected in the Temperature Programmer Setup menu.

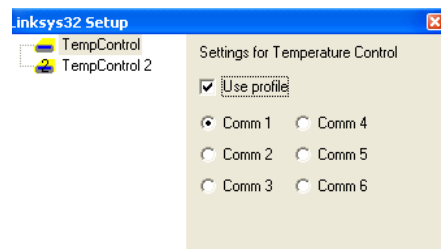
Check the back of the PC to see which Comm port the RS232 cable is connected to.



Click: **Setup > Temperature Controller > TempControl**



In the 'Linksys32 Setup' window; Select the Comm port that the RS232 cable is connected to and then click the 'X' button in the top right hand corner to close the window.





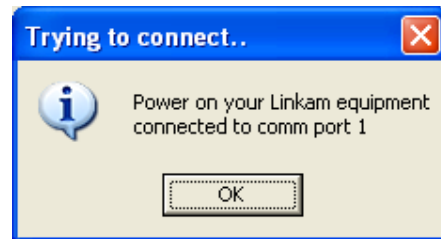
Now connect as before (click: **File > Connect**)

The Software will again ask to '**Power on your Linkam equipment connected to Comm port 1**' or whatever Comm port was selected.

When a successful connection is made the live temperature appear in the display (1).

If the temperature does not appear check that all cables are connected correctly and check that the correct Comm port is selected.

If the system will still not connect please contact Linkam Technical Support.



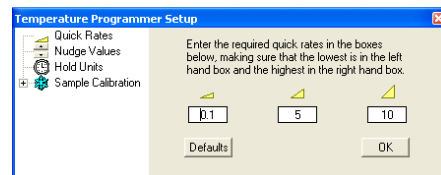
## Setting up the Manual Temperature Controls

To set up the manual temperature controls, right click anywhere on the Temperature Control tool bar (2).



The 'Temperature Programmer Setup' window will appear.

On the left of the window are a series of options that can be set up.



### Quick Rates

This enables the setup of the '**Quick Rate**' buttons. Each of these buttons have a specific rate associated with them. When clicking on one of these buttons in the 'Temperature Control Toolbar' (1), the rate of heating or cooling is immediately changed. This is useful for quickly setting a rate for the T95 Temperature Programmer.

As default the buttons are set to 0.1, 5, and 10°C/min. These values can be changed easily by highlighting the specific rate and typing in a new rate.

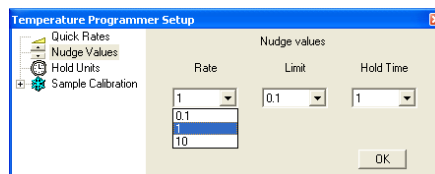
The limits of the Rate are set by the combination of Temperature programmer and hotstage e.g. A T95 and THMS600 have limits between 0.01 and 150°C/min.

The original values are restored by clicking '**Defaults**'.

### *Nudge Values*

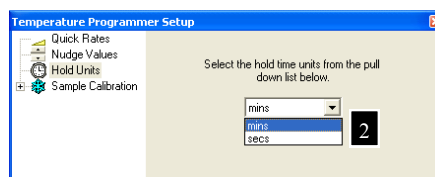
Click on “**Nudge Values**” to show the ‘Nudge Value’ menu. It is possible to change the increment value of each Nudge control on the Manual Temperature Controller.

Click on the drop down menu of Rate, Limit and Hold Time to select the increment change required.



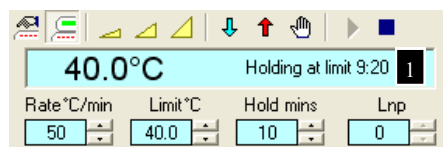
### *Hold Units*

Click on the ‘**Hold Units**’. Use the drop down menu to select either minutes or seconds for time temperature is held at the limit value. When the temperature reaches the specified limit temperature, the hold time in minutes or seconds will begin counting down in the ‘Live Display’ (1).



The Hold time has been selected to be shown in minutes (2).

It is currently at 9 minutes 20 seconds.



### *Sample Calibration*

#### **Do Not Use.**

The temperature of the stage is checked in the factory before shipment. There is no need to do sample calibration.

The temperature of the stage can be checked by doing a melting point of a known sample.

| Compounds name  | Melting Point °C |
|---|------------------|
| Fluid Inclusion standard H <sub>2</sub> O/CO <sub>2</sub> | -56.6            |
| Vanillin  | 83               |
| Benzil  | 96               |
| Acetanilide   | 116              |
| Phenacetin  | 136              |
| Benzanilide   | 165              |
| Sulfanilamide   | 166              |
| Salophen  | 192              |
| Sulfapyridine   | 193              |
| Dicyandiamide   | 210              |
| Saccharin   | 229              |
| Silver metal  | 962              |

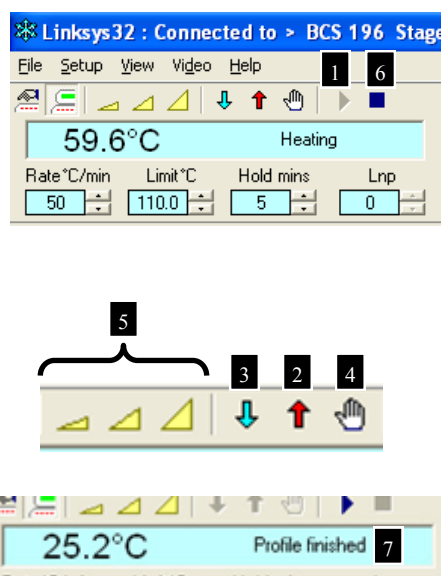
## Using the Manual Temperature Controls

The manual controls make it very simple to quickly start a temperature controlled experiment. Either by using the 'Nudge Controls' or by highlighting the values with the mouse and typing, this can easily change the temperature profile of the experiment.

In the image: a Rate of 50°C/min, a Limit of 110°C and a Hold time of 5 minutes has been set. When the 'Start button' (1) is clicked the hot-stage will heat to the limit temperature at the rate specified and hold at the limit temperature for 5 minutes. At any point it is possible to change any of these three values.

It is also possible to interrupt the profile by clicking on the Heat (2), Cool (3), Hold (4) or any of the three Quick Rate keys (5).

To end the experiment click on the 'Stop' button (6). The Live Display will show the message 'Profile Finished' (7) and the hotstage will return to room temperature at a natural rate.



## Using the Temperature Profile Table

### View Temperature Profile

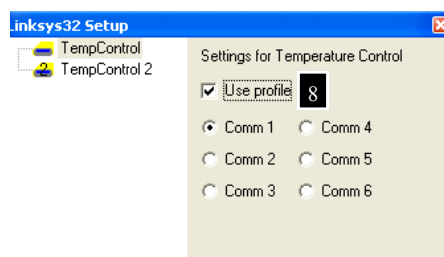
Linksys32 can setup complex temperature profiles of up to 100 ramps. Rate, limit and hold time can be individually programmed for each ramp.

First instruct Linksys32 to use the 'Temperature Profile' rather than manual control (this can be overridden by manual control at any time).

Click: **Setup > Temperature Controller**

Click on the box labelled: 'Use Temperature Profile' (8)

Click on the 'X' in the top right to close the window.



## Temperature Profile Table

Click: **View > Temperature Profile**

The Temperature Profile table shown in the image (1) contains a profile with 6 ramps. At the end of the hold time in each ramp the programmer will move to the next ramp and so on until the profile is complete.

For example, in '**Ramp 1**' the temperature programmer will first heat the stage to 50°C at a rate of 1°C/min and then hold for 1 minute before going to '**Ramp 2**'. The stage will then be cooled to 0°C at a rate of 15°C/min, as there has been no hold time set the stage will then immediately cool further at a slower rate of 5°C/min to -15°C and so on until the last Ramp, (in this case Ramp 6) has been completed.

To enter values in the table, simply click on the box and type in a value. The value will not be registered by the software until '**Enter**' is pressed on the keyboard or the mouse is clicked in another box.

The last column, labelled '**Delay**' is only active in Linksys32-AV or DV and is used to set up the interval between image captures for each ramp. (Further explained in Image Capture section).

As default the first Ramp is set as the '**Start Ramp**'. To change the '**Start Ramp**', right click onto the ramp and select '**Set Start Row**'.

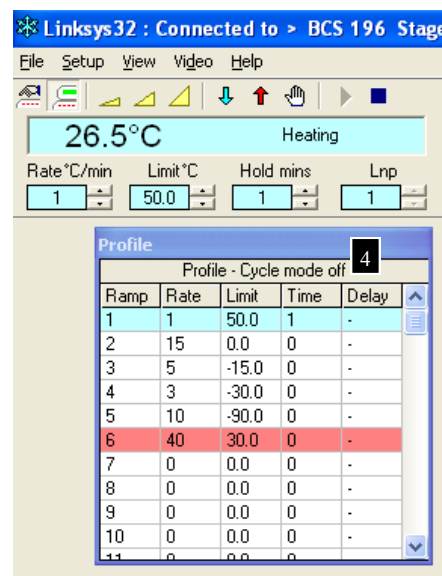
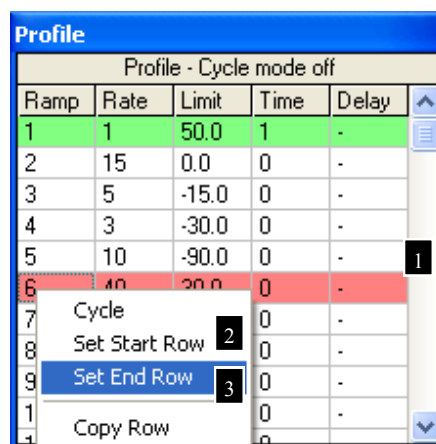
The ramp row will turn green to indicate it as the first ramp that will be executed by the temperature programmer when the '**Start**' button is clicked in the Temperature Control Toolbar.

To set the final or end ramp, right click onto the ramp and select '**Set End Row**' (3). The Ramp will turn red to show it as the end of the experiment.

To cycle between the Start and End Row right click on any Ramp and select '**Cycle**'. To switch off cycle mode, right click on any ramp and click on '**Cycle**'.

The status bar at the top of the Profile table will read either '**Profile - Cycle mode on**' or '**Profile - Cycle mode off**' (4).

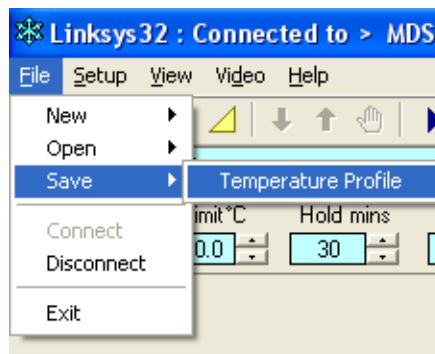
Click '**Start**' in Temperature Profile Toolbar to start the heating/cooling run. The active ramp of the profile is shown as a light blue colour. The values in the profile can be changed at any time during the run and can also be overridden with the manual temperature controls.



### *Saving Temperature Profile*

It is possible to save a Temperature Profile to enable quick setup of similar experiments.

Click: **File > Save > Temperature Profile**



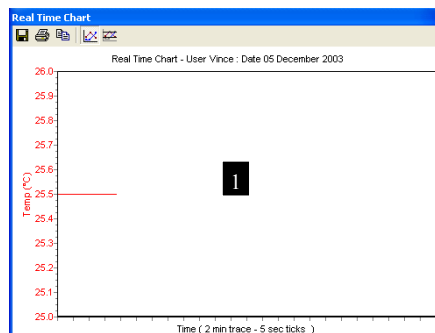
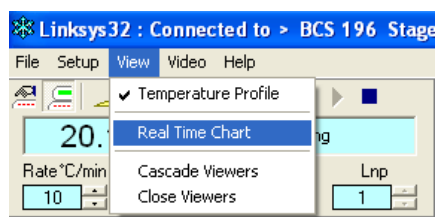
## **Real Time Chart**

### *View Real Time Chart*

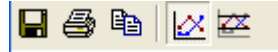
Click: **View > Real Time Chart**

The Real Time Chart (1) is an online plot of the temperature against time. This chart will continue to plot regardless of whether it has started a temperature profile or manually control temperature. It shows a live graphical output of the temperature sensor.

The chart will only be captured to hard disc when the Capture Controls have been set.



### Real Time Chart Toolbar



The **'Save'** button, saves the **'Real Time Chart'** as an image file at that instant.



The **'Print'** button opens the **'Real Time Chart Print Preview'** Setup window. The options on the left of the window are to position the chart on the page. Select the printer to use from the drop down menu. Click on **'Setup'** to access the printer software features.



The **'Copy'** button copies the **'Real Time Chart'** window so that it can be pasted into another Windows application.



The **'Full View'** button selects the whole chart view. (Further explanation below).



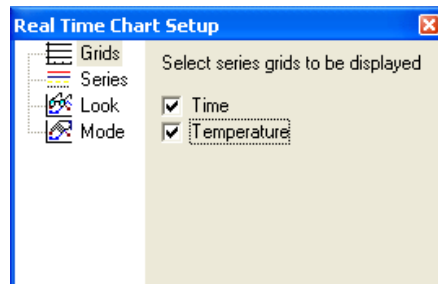
The **'Normalized View'** button selects the **'Normalized View'**.

### Real Time Chart Setup

There are a number of adjustments that can be made to the **'Real Time Chart'** by right clicking anywhere on the **'Chart Tool bar'**.

The first setup menu is **'Grids'**

Click on Time and/or Temperature to show the Chart Grid lines corresponding to the axis.



The next menu is **'Series'**.

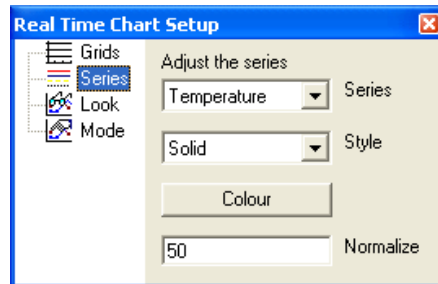
Click on the drop down menu of the series to change the appearance.

With Linksys32-AV or DV there will be an option to select **'Intensity'** (see Image Capture section) in which case the Intensity Series will also be available from the drop down.

To Change the **'Style'** of the Series, click on the drop down menu and change the structure of the line. e.g. solid line, dots, dashes

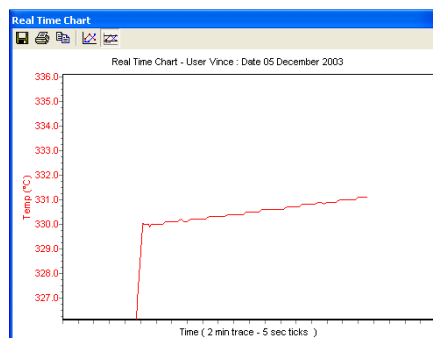
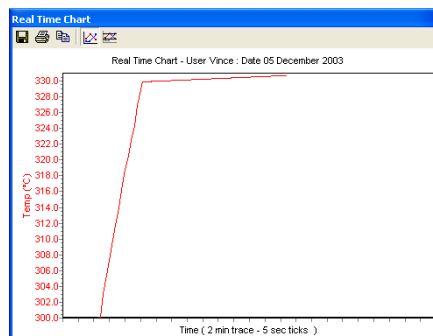
Click on **'Colour'** to change the colour of the line. A window with different colours appears, click on the desired colour and then click **'OK'**.

The **'Normalize'** option scales the selected Series to a normalized range specified in the **'Normalize'** dialogue box.



The online plot will proceed in the centre of the normalized scale when the '**Normalize**' button has been clicked. (Normalize button found on Chart Toolbar).

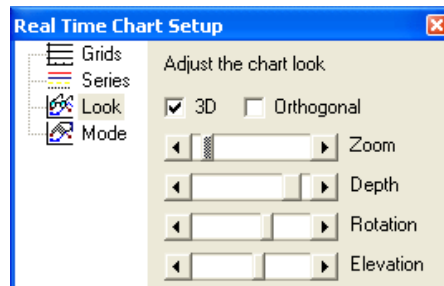
The Normalize feature is used to view only a range of interest. If the temperature profile consists of very slight changes in temperature then it is useful to normalize the view of the chart to a much smaller range than is presented by default. e.g. Ramps 4,5 and 6 take place over a range of 3°C. It would then be beneficial to change the Normalize range to 10 so that the entire Temperature axis represents only 10°C.



The next option in the setup is '**Look**'.  
By selecting this option it is possible to change the overall look of the '**Real Time Chart**'.

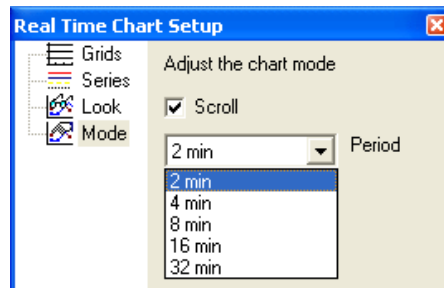
Click on the box labelled '**3D**' to enable the adjustment sliders. Click and drag these sliders to manipulate the chart in 3 dimensions.

Click on '**Orthogonal**' to disable the '**Rotation**' and '**Elevation**' Sliders.



The last option is '**Mode**'.  
When the default mode of plotting the chart is set, the series lines move from left to right along the time axis, when reaching the end, the first half of the chart is discarded and new values are plotted from the halfway mark. By selecting '**Scroll**' the Chart is continuously updated so as each new point is plotted, only one point is discarded at the start of the visible plot. The '**Scroll**' mode allows the entire time axis to be utilised.

The '**Period**' drop down menu enables the time axis scale to be changed. The default is 2 minutes with 5 second intervals.



## Data Capture

Some of the information in this section is only relevant to Linksys32-AV and DV image capture versions of the software. Images and light intensity can only be captured if AV or DV options are available.

The Data Capture feature sample information from the temperature programmer and camera and plots it on a '**Data Chart**' stored as a '**Data File**' in the '**Linkam**' directory on the PC hard-drive.

### Data Capture Setup

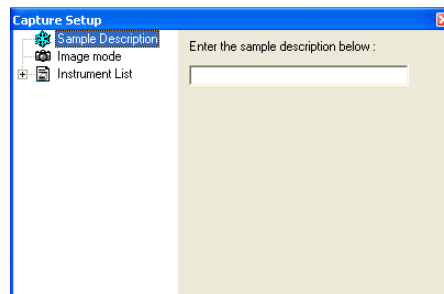
Right Click on the 'Data Capture' Toolbar to open the '**Capture Setup**' window.

The first option is '**Enter the sample description below :**'

Type a sample description into the space provided.

This description will appear at the top of the '**Data Chart**' and at the bottom of every captured image.

Start image capture from the capture control '**Start**' or from temperature run '**Start**' buttons.





The next option is '**Image Mode**'. This is only available within Linksys-32 AV and DV. Select '**Use the values in the Profile**' box to enable '**Image Capture**' control from within each individual ramp in the Profile Table.

In the final column of the Profile table there is a space to type a delay (in seconds) between captured images. The delay is limited by a combination of the set image resolution and the PC processor speed.

Select '**Use the value in the delay box**' to enable '**Image Capture**' control from within the '**Data Capture Control Panel**'. In the image to the right the Delay has been set to capture every 5 seconds (1).

Click on '**Measure Intensity**' (2) to measure a light intensity plot of the experiment. This is particularly useful for subtle phase changes difficult to detect by eye.

The next option is '**Instrument List**'. Add instruments to this list before starting to Capture Data and this information will be also be recorded.

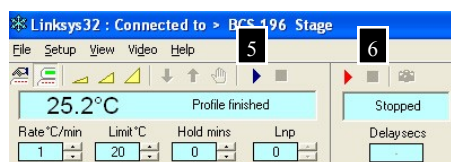
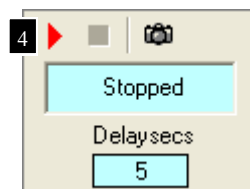
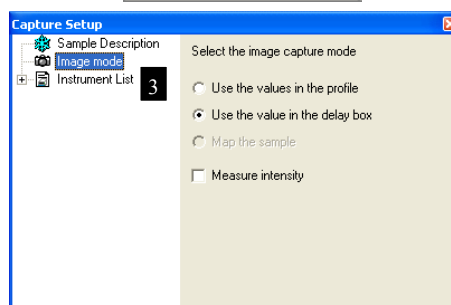
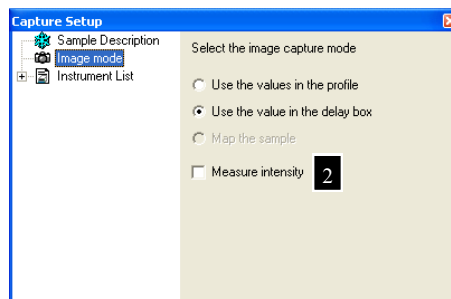
e.g. Add THMS600 hotstage, T95 controller, LNP95/2 cooling pump system to the list so that it is possible to see which instruments were used to capture the data.

### Recording a Data File

To capture and record the data file in the '**Capture setup**' use the capture setup menu described above and click on the red '**Record**' button (4) in the '**Capture Control Panel**'. The Status Message will change from '**Stopped**' to '**Recording**' and the '**Stop**' button will become active. (Temperature programmer data, light intensity data and images will be captured). At this point click on the blue '**Start**' button (5) in the '**Temperature Control Panel**'. The temperature profile taken from either the manual set Temperature Controls or the Profile table in the '**Temperature Control Panel**' will change from '**Profile Finished**' to either '**Heating**' or '**Cooling**'.

The Data Capture can be stopped at any time by pressing the blue '**Stop**' button in the '**Capture Control Panel**' (6).

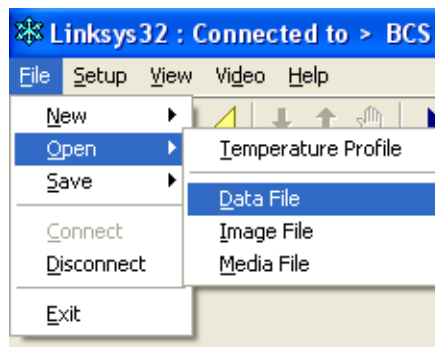
When '**Data Capture**' has stopped a Windows style '**Save IML Data File**' window will appear. Type a unique file name and click '**OK**'.



### Opening a Data File

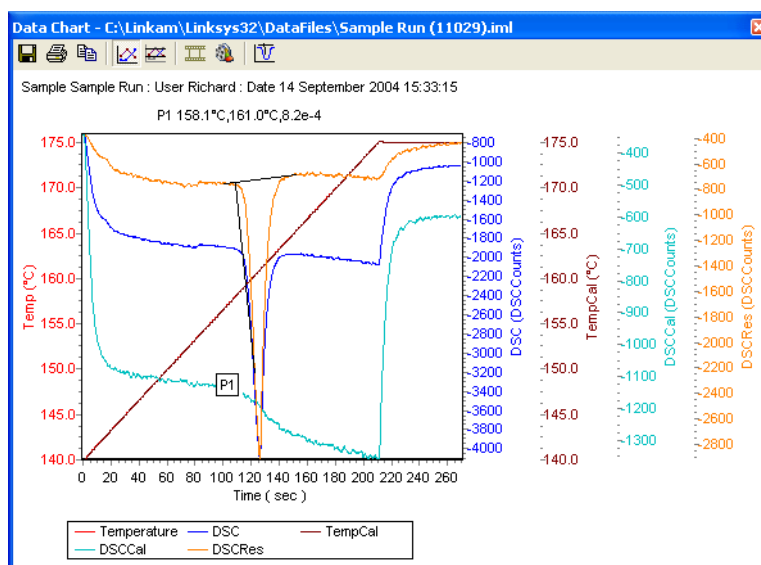
Click: **File > Open > Data File**

Select the file (\*.iml) to open and click '**OK**'.



The image below (1) shows a Data File. The red line represents the temperature, the thin purple line represents the light intensity change during the experiment and the thick purple line made of individual squares represents each captured image.

The Data Chart Toolbar operates in the same way as the Real Time Chart. Except for two other tool buttons. These buttons will be further explained in the '**Image Capture**' section.



Click to view gallery of captured images.




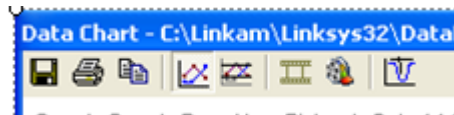
Click to make avi movie of captured images.

Right click on Data Chart Toolbar to access the setup menus. These are similar to the '**Real Time Chart Setup**' Menus.

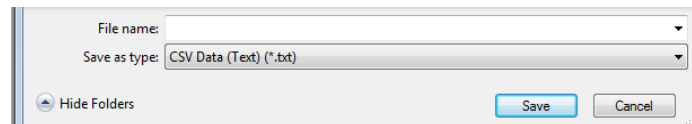
### *Exporting a Data File (Excel)*

The data captured in a Data file (\*.lml) can be exported as a CSV file (\*.text) into a third party software program such as Excel.

Once the data file is opened as shown on previous page, click the '**Export**' button  in the top left of the Data Chart window.



Select '**CSV Data (text) (\*.txt)**' from the '**Save as type:**' drop down menu at the bottom of the window. Type a name for the file and locate the folder in which to save it.



In Excel open a file and choose '**Files of type**'. Select '**Text files (\*.prn, \*.txt, \*.csv)**'. By default the file will be located in the Export folder within Linkam folder on the hard drive.

Click on the file to open it. A '**Text Import Wizard**' is displayed and asks '**Choose the file type**' that best describes the data. Linksys32 exports text data as comma separated so select '**Comma separated**'. A preview is shown below the options.

#### **Click: Next**

The next step window shows the various '**Delimiter**' options. The file exported is '**Comma delimited**' so click on the check box '**Comma**'. Click '**Finish**' to reveal the table in .XLS format ready to manipulate and analyse.

## Image Capture

This is only possible with Linksys32-AV and Linksys32-DV.

### Video Window Setup

Click: **Video > Show Window**

There are two different '**Video Setup**' windows, depending on whether Linksys32-AV or DV is used.

### Linksys32-AV

The live video window will open.

Right click on the image to show the '**Video Setup**' window.

As Default the window size is set to 768x560 pixels.

Select which output from the camera is being used. S-Video will give the best results.

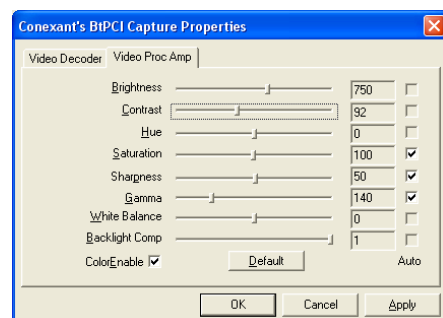
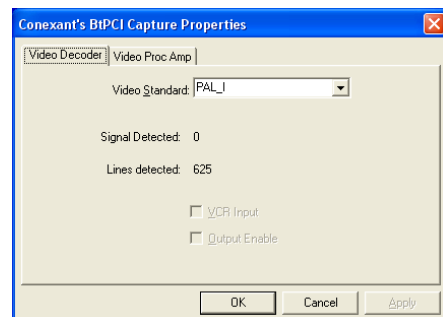
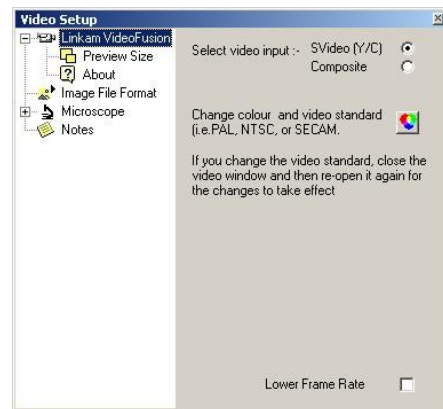
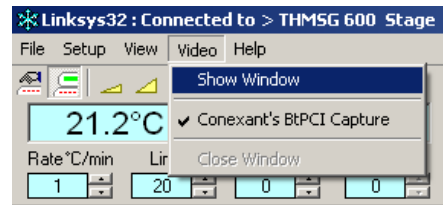
Ensure that the correct Colour and '**Video Standard**' have been selected. (This is dependant on the camera output and is usually specific to where the camera was bought. e.g. PAL/Europe, NTSC/USA, ASIA.

Click on the coloured button to select this.

Select the video standard from the drop down menu.

Click the '**Video Proc Amp**' tab in this window to set the various image properties possible with the camera.

There is a check box at the bottom right of this window which allows it to slow down the frame rate. Click on this box if an older lower specification PC is being used.



The next option is '**Preview Size**'. Click on this option in order to change the size of the live video window. The amount of pixels captured by the capture control will remain unchanged and equal the total available, e.g. 768x576 (PAL).

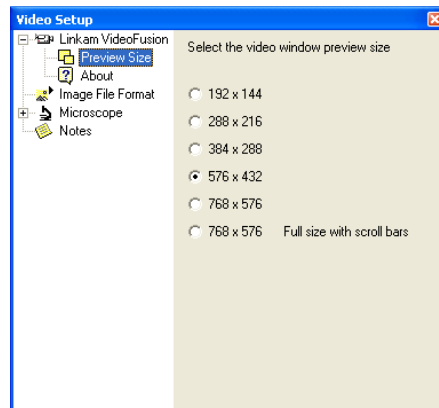
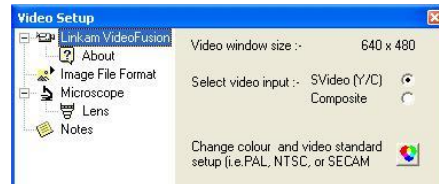
The preview size need only be changed to a smaller size if there is limited space on the monitor screen for other windows.

Click on the '**About**' option to view information about the camera or capture card being used.

The next option is '**Image File Format**'. Select a compression type to use for image capture. JPEG (4:4:4) is the default file format.

Select '**Microscope**' to choose the microscope model being used. This will need to be set up and calibrated if measurements are to be made on the images. (See Calibration Section).

The '**Notes**' option enables the user to type in quick observations during the run, if the images in the .IML data file are then later exported to an .AVI media file these notes will be displayed as the file is played back.



### *Linksys32-DV*

The live video window will open. The number of frames displayed per second is shown on the title bar of the image. E.g. Live Video 11.7 fps (frames per second).

#### **Video Setup**

Right click on the image to show the ‘**Video Setup**’ window.

The first menu option enables control of the fire-wire camera.

The image shows the ‘**Pixelink 1394**’ ‘**Video Setup**’ window. Exposure time can be adjusted by clicking and dragging the slider.

Choose light source by clicking the up and down arrows on the ‘**Light Source**’ box.

Click on the ‘**Lower Frame Rate**’ check box if the PC is not capable of handling the standard fixed frame rate.

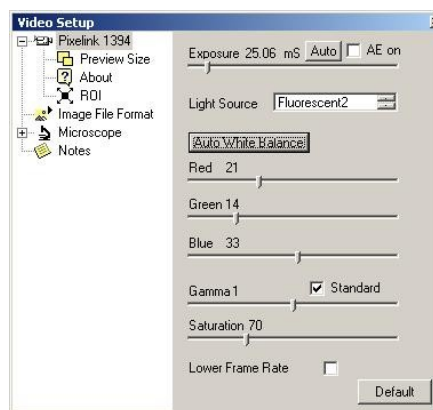
It is recommended that the ‘**Auto**’ button is used to control the exposure time. Increasing exposure time will decrease frame rate.

It is recommended that the ‘**Auto White Balance**’ is used when viewing a new sample. Although it is possible to use the colour slider adjustments to alter the image if necessary.

#### *Preview Size*

The next setup window is preview size. There are a number size options for the live preview window, this is to enable setting for the most suitable size for the available area of the screen. In the case of the Pixelink digital camera the maximum size is 1280x1024, this may be too large for the screen or will block out most of the other on-screen temperature controls that need to be accessed. Changing preview size does not affect the amount of pixels captured when image recording takes place. The full 1280x1024 is captured. It is possible to set a region of interest so that the size of the image captured is reduced but this is not affected by preview size. This is set in the next video setup window, ‘**Set ROI**’ (Region Of Interest).

**Note:** other cameras will have larger maximum preview sizes and ROI sizes.



The default setting in the software will capture the largest image available from the camera sensor, however, to improve file size or simply to discard unwanted area from the captured image it is possible to set a 'Region of Interest'.

Click on the check box '**Show ROI Rectangle**'. A rectangle frame will appear in the live video preview window.

By clicking on the various sizes the size of the ROI rectangle can be changed and ultimately the size of the captured image.

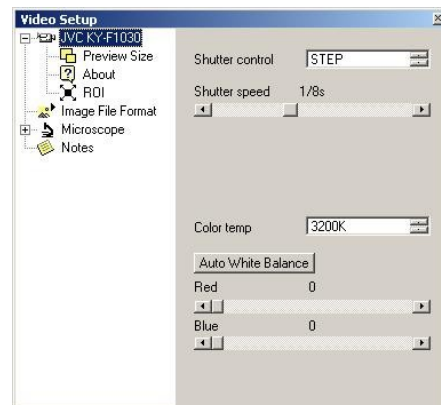
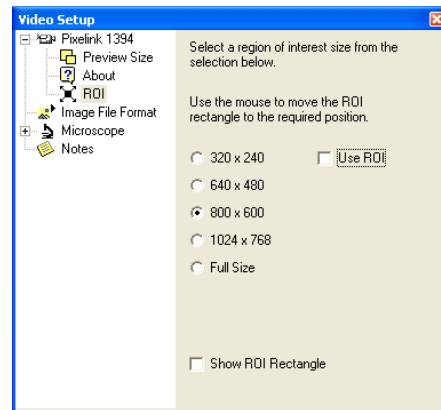
The default position of the ROI is top left of the image. The position of the ROI can be changed by clicking in the rectangle on the image and dragging it to the desired location.

Click on the check box '**Use ROI**' when the size of ROI rectangle is ready to use.

Switch off the rectangle by clicking on the '**Show ROI Rectangle**' to remove the 'tick' from the check box.

Experiment with different ROI sizes and locations to become familiar with how this feature works.

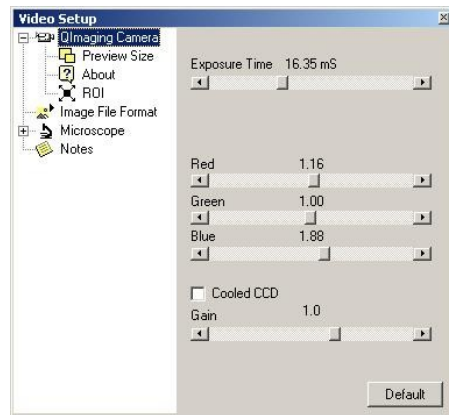
The image shown on the right is the JVC F1030 analogue camera setup window. Shutter speed and colour temperature can be set using the click and drag slide controls.



Linksys32-DV software supports many different Q-Imaging cameras and there are several variations of this setup window depending on which camera is being used.

The sliders can be used to alter the appearance of the live image.

If automatic exposure is selected, the light intensity measurement feature will not function correctly.





### *Lens Calibration*

An optical calibration slide with micrometer scale is needed to do this calibration.

Click: **Video > Show Window**

Right click on the image.

Select '**Microscope**' from the '**Video Setup**' Menu.

Click: **Edit**

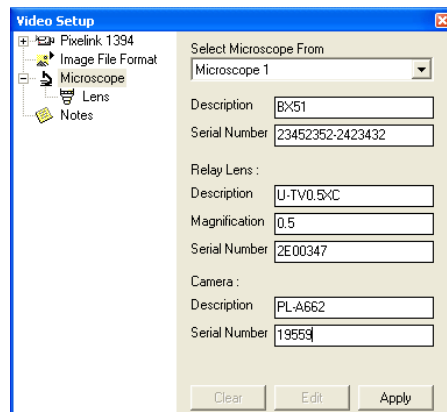
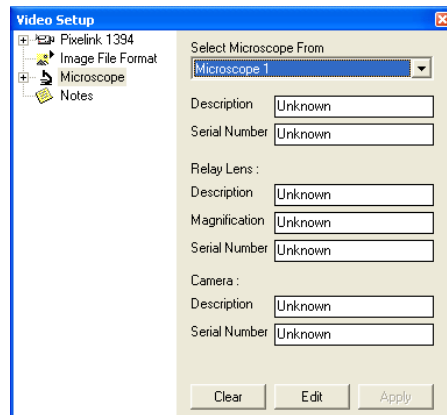
Click: **Unknown**

Clear all the fields filled with the word 'unknown'.

With the fields clear, type in the information describing the microscope as seen in the image on the right.

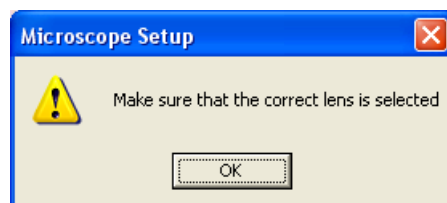
Click: **Apply**

Once information has been completed a window will ask 'Are you sure?'



A window will open to make sure that the lens selected is the correct one that needs to be to calibrated. Rotate the microscope nose piece until the lens to calibrate is in position.

Click: **OK**



Now select the lens needed to create a calibration file for. As this is the first lens to be calibrated, 'Lens 1' has been selected in the image.

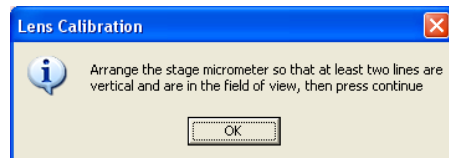
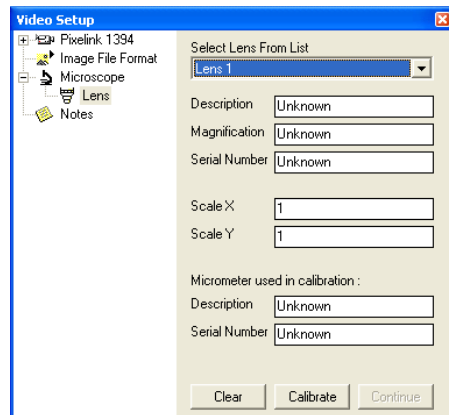
Click: **Calibrate**

A window will appear asking if the microscope, camera and relay lens details have been checked. If they have, click 'Yes'.

Now enter the Lens information e.g. MS PLAN, 10X magnification, Serial number 98786.

If known, enter the Micrometer manufacturer and serial number into the fields available.

Click: **Continue**



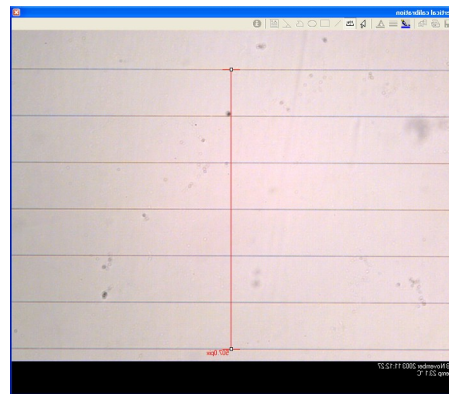
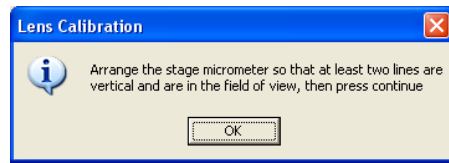
Focus on the micrometer lines and then carefully manipulate the slide so that the lines appear vertically in the Live Video Image.

Click: **Continue**

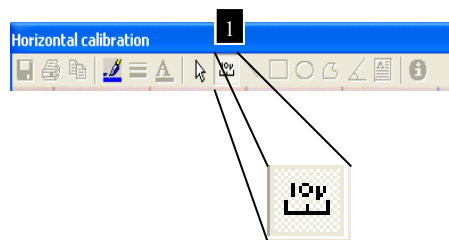


Rotate the camera by 90 degrees and manipulate the micrometer in the live video image so that at least two horizontal lines are in the field of view.

Click: **Continue**

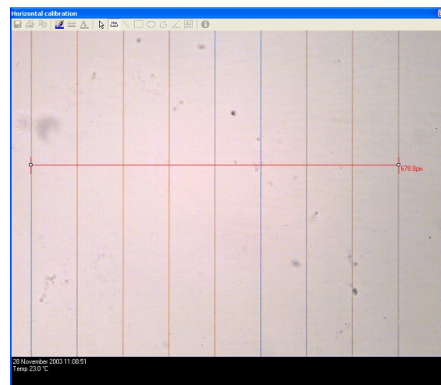


The software has captured the image of the micrometer when it was in the vertical and horizontal positions. Now it needs to measure between the micrometer lines using the '**Ruler**' (1) Tool which must be selected from the 'Image Viewer Toolbar'.



Select the two lines furthest apart and carefully click and drag. Release the mouse button when the guide is exactly between the furthest line.

Click: **Continue**



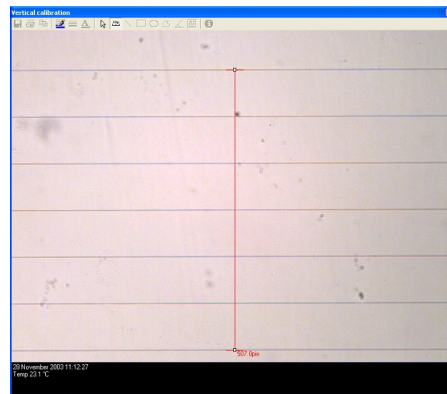
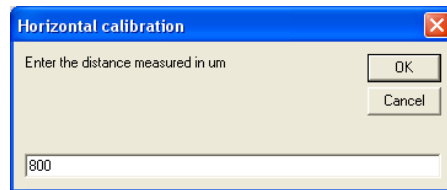
Depending on the scale of the micrometer, count the spaces between the lines and enter in the distance in micrometers that is measured with the **'Ruler Tool'**.

In this calibration, the distance was 800um.

Click: **OK**

Again select the **'Ruler Tool'** from the **'Image Viewer Toolbar'** and measure the distance between the lines furthest apart.

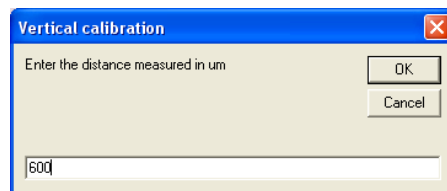
Click: **Continue**



Enter in the distance in micrometers measured with the **'Ruler Tool'**.

In this calibration, the distance was 600um.

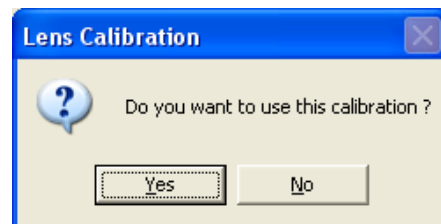
Click: **OK**



Click **'Yes'** to tell the software with the calibration is correct.

To check the calibration. Take a **'Snapshot'** using the **'Camera'** button on the **'Capture Control Toolbar'**.

Then use the **'Ruler Tool'** to measure between any of the micrometer lines. The measurement will be given in um.



## Capturing Images

Capturing or Recording images can be done in one of two ways.

Using the **'Profile Table'** or the **'Delay'** box in the **'Capture Control Panel'**.

### *Using the Profile Table*

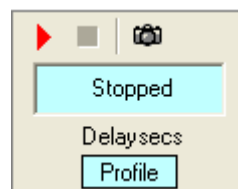
Capturing images using the profile table enables you to set a different capture delay time for each individual ramp. This is particularly useful when certain ramps of the profile require large amounts of images to be captured, e.g. a particular morphological change occurring in a specific range of temperatures.

First ensure that **'Use Profile'** is selected in the **'Temperature Programmer Setup'** Window.

Click: **Setup > Temperature Programmer**

Click the check box for **'Use Profile'**.

Then right click on the Capture Control Toolbar. To show the **'Capture Setup'** Window, click on **'Image Mode'** then click on **'Use the values in the Profile'**. The status window in the 'Capture Control Panel' will change to **'Profile'** as shown in the image.



Now type the delay in seconds for each ramp into the final column labelled **'Delay'** as shown in the image.

Ramp 1 shows that images will be captured every 20 seconds.

To start the temperature profile, first click the red **'Start'** capturing button on the **'Data Capture Panel'**, then press the blue **'Start'** button on the **'Temperature Control Panel'**.

The **'Delay'** time for each ramp can be changed at any point during the profile.

To stop **'Image Capture'**, press **'Stop'** on the **'Data Capture Panel'**.

A **'Save'** window will appear. Type a unique file name for the data file. This file will contain the images and temperature programmer data.

See **'Viewing Images'** to find out how to open and use the recorded **'Data File'**.

| Profile                  |      |       |      |       |  |
|--------------------------|------|-------|------|-------|--|
| Profile - Cycle mode off |      |       |      |       |  |
| Ramp                     | Rate | Limit | Time | Delay |  |
| 1                        | 80   | -90.0 | 5    | 20    |  |
| 2                        | 10   | -60.0 | 2    | 10    |  |
| 3                        | 1    | -54.0 | 0    | 5     |  |
| 4                        | 0    | 0.0   | 0    | -     |  |
| 5                        | 0    | 0.0   | 0    | -     |  |
| 6                        | 0    | 0.0   | 0    | -     |  |
| 7                        | 0    | 0.0   | 0    | -     |  |
| 8                        | 0    | 0.0   | 0    | -     |  |
| 9                        | 0    | 0.0   | 0    | -     |  |
| 10                       | 0    | 0.0   | 0    | -     |  |
| 11                       | 0    | 0.0   | 0    | -     |  |

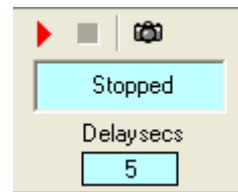
### *Using the Capture Control Panel*

Capturing images using the **'Delay'** box on the **Capture Control Panel**, enables it to capture images at a set delay beginning from a click on the **'Start'** button to a click on the **'Stop'** button. This can be done at any time regardless of whether the manual Temperature Controls or the Temperature Profile is used.

Right click on the Capture Control Toolbar. To show the 'Capture Setup' Window, click on 'Image Mode' then click on 'Use the values in the Delay Box'.

The status window in the 'Capture Control Panel' will change to '-' to show that no time delay has been set.

To set the 'Delaysecs' between captured images, use the mouse to click inside the delay box. Delete the current figure and type the delay in seconds. The image shows a delay of 5 Seconds has been selected. Click on the red 'Start' button to start capture. Click on blue 'Stop' button to stop capture. Type a unique file name into the 'Save' window and click 'OK'.



To take a quick 'Snapshot' at any time, click on the 'Camera' button on the 'Capture' toolbar.



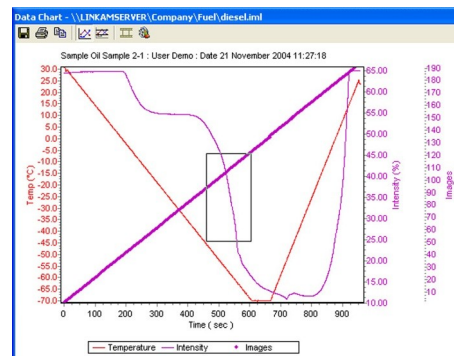
This image can be saved by clicking the 'Save' button.



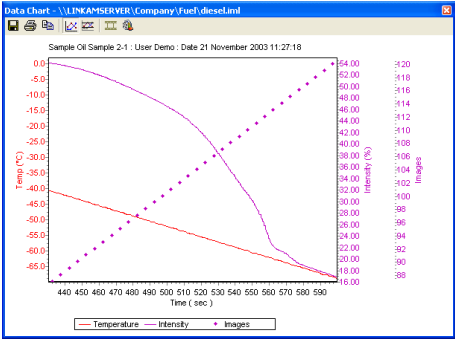
### Viewing Images and Data

Captured images are opened from the Data File (.iml) by clicking on the chart individual points using the mouse.

In order to magnify a section of the Line of Image Points. Right Click and drag down and to the right to draw a box around the selection of images to load into the magnified chart.

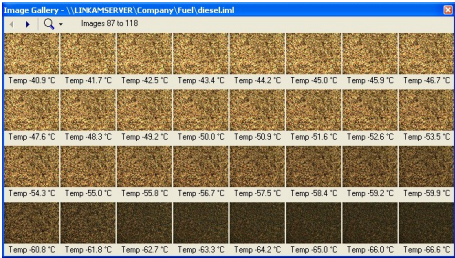


This image shows the magnified line as a series of purple points. Each point represents a captured image. Click on the individual points to view the specific image associated with that point. To return to original size, right click and drag a box toward the top left of the graph.



### Image Gallery

In order to view the selected points in a 'Gallery of Images' click on the 'View Gallery' button found on the 'Data Chart Toolbar'.



Only the images selected on the chart will be loaded into the gallery. By Clicking on the magnifying glass drop down menu, it is possible to view gallery images in a larger format. Use the scrolling buttons to scroll through the selection of images. To reset the 'Data Chart' so that all of the 'Image points' are displayed, click and drag up and left on the chart. It is possible to view the gallery and scroll through the entire set of images or load a new selection of images from another section of the chart.



### *Image Viewer*

To view an individual image at it's captured resolution click on the image point in the chart or on the image thumbnail in the gallery.

The specified image is loaded into an image viewer.

The image viewer can be used to make measurements on the image using the 'Image Viewer Toolbar'.



Save the image to a specific folder.



Print the document. Printer setup window will appear.



Copy the image in order to paste into report or other third party image software.



Change the colour of measurement lines.



Change the Style of measurement lines.



Change the colour of text.



Pointer Tool used to select measurements or text in order to delete from image.



Ruler Tool, click and drag from point to point to make a measurement viewed on the image.



Line Tool, click and drag from point to point to make a measurement viewed in measurement table.



Rectangle area tool. Click and drag to draw a rectangle, area and perimeter viewed in measurement table.



Ellipse area tool. Click and drag to draw ellipse, area and perimeter viewed in measurement table.



Polygon tool. Click points around an irregular object, right click to close the area. Area measurement viewed in area table.



Angle Tool. Click the left mouse button, move the mouse and click the left button again, move the mouse to measure the angle then click the left mouse button again to finish.



Text Tool. Double Click inside the box and drag to the position you want text to start. Type the note then click outside the box. Double click inside to turn on/off border.

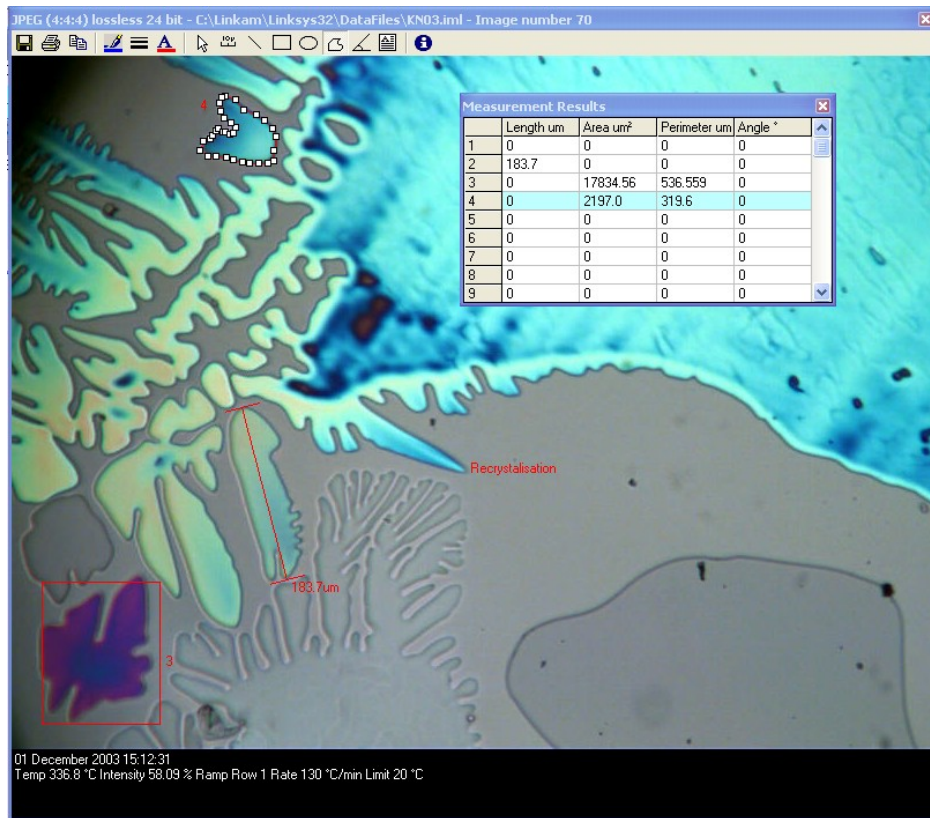


This will display the Measurements Results table. When the Pointer Tool is used to highlight a measurement object the corresponding data will be highlighted in blue.



This image has been loaded into the image viewer by clicking on an image thumbnail from the gallery. Various measurements have been made on the image.

In its current format the image can only be opened in Linksys software. Although it is compressed in a universally recognized format specified in the '**Video Setup**' menu (e.g. JPEG). It still has the '**Data File**' extension '.iml'. In order to save this image as a media file recognized by other Windows programs it is necessary to access the '**Image Viewer Setup**'.



Temperature Programmer information is displayed at the bottom of the image.

### *Image Viewer Setup*

Right Click on the '**Image Viewer Toolbar**'. To show the '**Viewer Setup**' window.

Click on '**Notes**' to see all the information regarding the system it is using, i.e. microscope, camera, programmer, stage, name of file, time/date etc...

(Note: Some of this information is dependent on whether the data is entered into the information in the '**Video Setup**').

Click on '**Image Format**', to set the way the image is 'Saved' onto the hard drive.

Depending on the format selected, this may be able to set a 'Quality Factor' for the compression.

If '**Linkam image file**' is selected, the image will be saved as an '.LIF' (Linkam Image File).

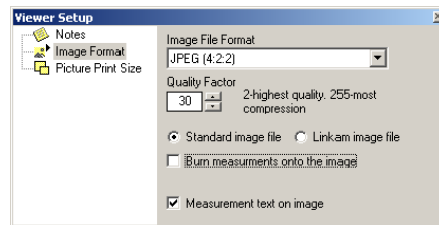
In this format measurement information is stored with the image, so that it is possible to open the image again and make further measurements or remove existing ones.

If '**Standard image file**' is selected then the image will be saved in a format so that the image can be opened in other software packages.

If the box labelled '**Burn measurements onto the image**' is selected, the measurements made with the measurement tools will be burned onto the image. It will then be impossible to remove them using the Linksys32 software.

If the box '**Measurements text on image**' is selected, it will display the measurement number or 'Ruler Tool' length next to the measurement on the image.

Click on the '**X**' to save changes and close window.

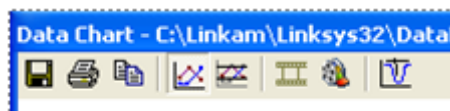


## Creating Avi Movies

Sometimes the best way to view a sample change with temperature is to make a time lapse movie.

Select the number of images to create a movie from by dragging a rectangle around the corresponding section of the image plot on the Data Chart (See 'Viewing Images and Data').

Now click on the '**Create Avi**' button on the Data Chart Toolbar.



The '**Media Maker**' window will appear.

In this case the number of images or frames selected from the Data Chart was 158.

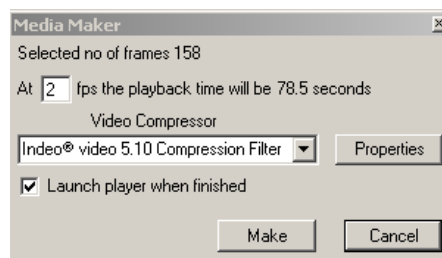
Type in a value to specify the number of frames per second the playback will be shown at. It is recommended the user experiment with this number to get the best results for the type of sample recorded. The total time of movie playback is dependent on the frames per second.

There are a number of 'Video Compressors' available. Linkam recommends the '**Indeo Video 5.10 Compression filter**'. To view the properties of the compressor, click the '**Properties**' button.

Click the '**Launch Player When Finished**' check box to open and play the movie as soon as the file is made.

When everything is set up, click on '**Make**'.

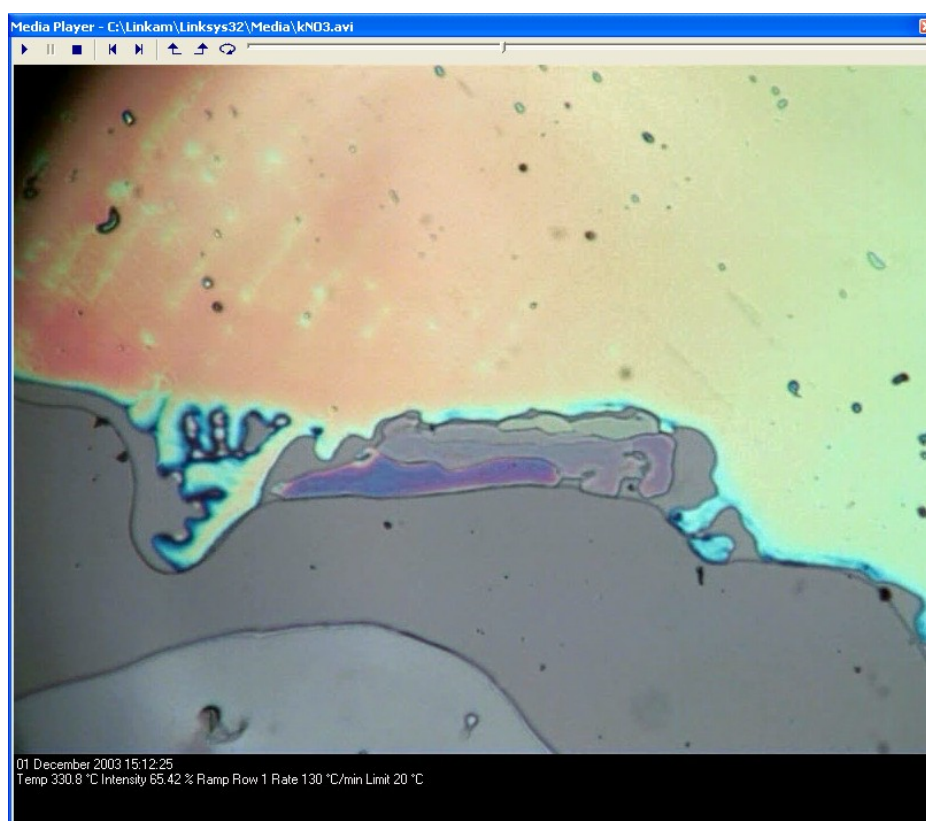
A progress bar at the bottom of the page will show when the movie has been created.



The Media Player opens and will automatically start playing the movie. The first frame shows the information associated with the image file. Use the play, pause, and stop buttons as you would in any other media player. The movie can also move forward or backward one frame at a time using the frame control buttons.



It is also possible to mark the beginning and end of a section to cycle by using the 'mark start and end' buttons. Then click '**Repeat**' button



### *Data Recovery*

If the Linksys32 software crashes during a run, close and reopen the program. On the top menu bar click 'Help' and then select 'Data Recovery' from the dropdown menu.

This should open up a window which contains files of the last data that was captured before the software crashed.

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