

Linkam Scientific Instruments Ltd



CI 94 Manual

User's Guide

Contents

Regulatory Compliance	3
Important Notice	4
Warranty	4
Technical Support	4
Equipment Maintenance	4
CI94 Technical Specification	5
CI94 Equipment Ratings	5
Safety Precautions	6
Symbol Reference	6
Introduction	7
Various Cables and Connections	8
Stage Lead	8
RS232 Lead	8
I2C Cable	8
Back Panel Programmer Connections	9
Front Panel Controller Buttons	10
Setup Menus Explained	11
Working with the Setup Menus	12
Linksys Temperature Control Software	17
Getting Started	17
Setting up a Temperature Profile	17

Regulatory Compliance

	Declaration of Conformity	
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Manufacturers Name: Linkam Scientific Instruments Ltd
Manufacturers Address: 8 Epsom Downs Metro Centre, Waterfield, Tadworth,
Surrey, KT205LR

Declares that the product as originally delivered

Product Name: TMS94 Temperature Controller
Product Number: TMS94, CI94, TP94

complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

EMC Directive 2004/108/EC
Low Voltage Directive 2006/95/EC

and conforms with the following product standards:

EMC
EN61326-1:2006

Safety
EN 61010-1:2001

28th August 2008
Date



Peter Grocutt
R&D Manager

Important Notice

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

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

Please contact Linkam for custom modifications for specific applications.

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

Warranty

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

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

Technical Support

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

Equipment Maintenance

The programmer does not require any regular maintenance. If for any reason it is necessary to check the electronic calibration then a set of standard resistances can be supplied, which simply plug into the programmer in place of the stage, and indicate known temperature values. The standards are traceable to NAMAS.

Before cleaning the case or front panel of the programmer, remove the mains lead from the wall outlet. Use a small quantity of isopropyl alcohol on a soft cloth and gently wipe the surface.

CI94 Technical Specification

Stages using a platinum resistor sensor

Temperature Range: -196°C to 600.0°C (dependent on Stage)
Temperature Stability: $\pm 0.1^\circ\text{C}$ over the operating temperature of 10° to 40°C
Set Point Resolution: 1°C
Temperature Display: 0.1°C resolution
Control Stability: All stages stable to $\pm 0.1^\circ\text{C}$
Temperature Sensor: Pt100 1/10 DIN or 0.01 Ohm at 0°C
Temperature Accuracy: $\pm 0.1^\circ\text{C}$

Display: 1 row of 16 characters, 5.5mm high LCD display with backlight
Dimensions: 310 x 230 x 80 (deep) mm
Weight: 2.44 Kg (including remote control and stage cable)
Operating environment: $5 \sim 40^\circ\text{C}$
 80% relative humidity at 31°C decreasing linearly to 50% at 40°C (without condensation)

CI94 Equipment Ratings

A.C.Mains Supply: 90 - 264 ~
A.C.Frequency: 47 - 63 Hz
Max current: 2A
Fuse: 2.5A (F) 250V~ Fuse must be replaced by one of the same type and rating.

Safety Precautions

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

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

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

Symbol Reference



Caution -

This safety symbol is seen on the backpanel of the equipment and warns:-
The user must not make or remove any connections while the unit is powered on.
To avoid electric shock do not remove the cover. Refer servicing to qualified service personnel.



Caution -

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

Introduction

The CI94 (Computer Interface) has been specifically designed to give precise temperature control of the Linkam range of heating/freezing Stages. Digital linearisation of the Stage's sensor gives accurate temperature values whilst the function keys have been carefully chosen to allow rapid changes in data values.

A varying d.c. signal is used to control the Stage and results in an even application of power which avoids the bursts seen with conventional burst fire a.c. techniques. Much finer control of the Stage temperature can be now be achieved over the whole range.

Automatic control of the LNP 94/2 is possible which reduces the amount of liquid nitrogen used and gives more repeatable results as the flow is continuously changed according to the set conditions.

The rate, limit and temperature can be superimposed onto a Video Camera Signal using a Linkam VTO232 Video Interface from the output provided.

The Linksys temperature control software enables extremely accurate and complex temperature profiles to be carried out and can be linked with the Linkam Real Time Video Measurement software so that temperature control information can be in laid upon digitally captured images.

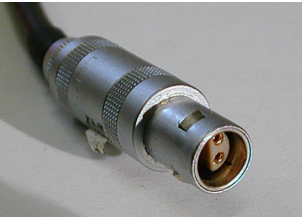
Various Cables and Connections



Stage Lead

This 'D' type end of the cable plugs into the socket on the back of the CI94 marked, 'Stage Lead'.

Screw in the connector so that it does not dislodge accidentally during a profile. The stage lead is specific to the stage, it carries information in the connector that tells the programmer which stage is connected. IN SPITE OF APPEARANCE NOT ALL STAGE LEADS ARE THE SAME.



This end of the stage lead is called a lemo connector and plugs directly into the stage.



RS232 Lead

This cable is the communication cable between the PC and the CI94 when using the Linksys temperature control software, or downloading CI94 software update.

Both ends are similar. One end plugs into the socket marked 'RS232' on the back of the CI94 and the other end plugs into either COMM1 or COMM2 serial ports on the back of your PC

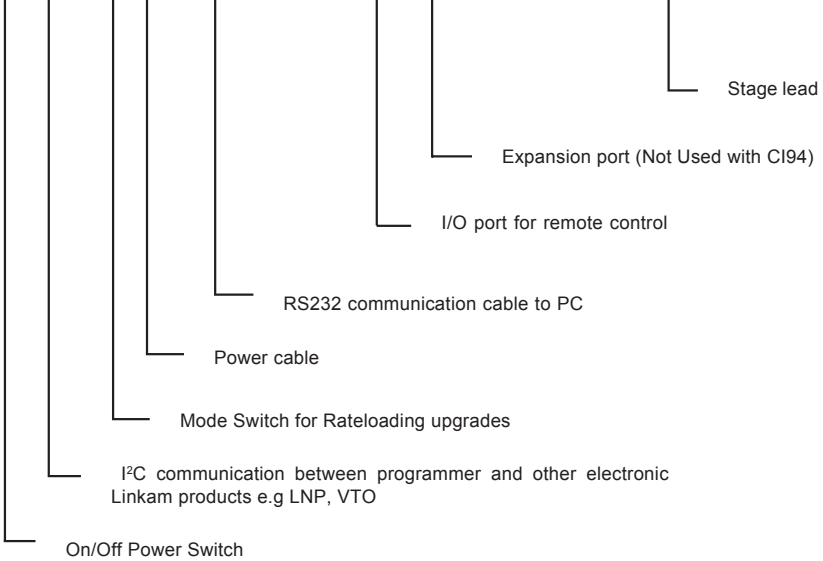


PC Cable

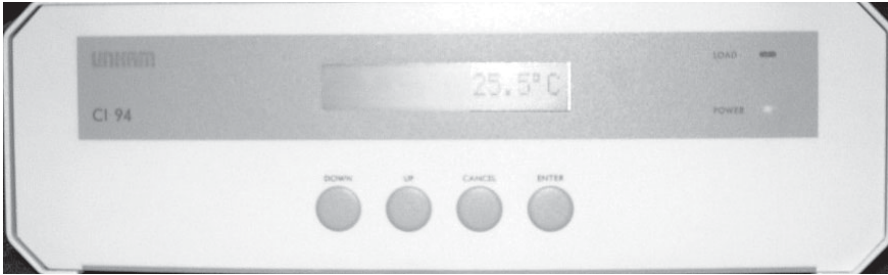
This cable is the communication cable between the CI94 and the LNP94/2 Automatic Cooling pump (or VTO232). Both ends are 4 pin connectors and plug into the sockets marked I²C on the back of the CI94 and LNP94/2.

(It does not matter which I²C socket this cable is plugged into, there is no 'IN' or 'OUT' socket i.e the two sockets next to each other on the LNP94/2)

Back Panel Programmer Connections



Front Panel Controller Buttons



DOWN



Move down a menu screen

UP



Move up a menu screen

CANCEL



Cancels current menu screen and drops down to previous set of menus

ENTER



Selects menu option or moves up to next set of menus.
Also exits a profile if software control is lost due to crash or RS232 cable losing its connection.

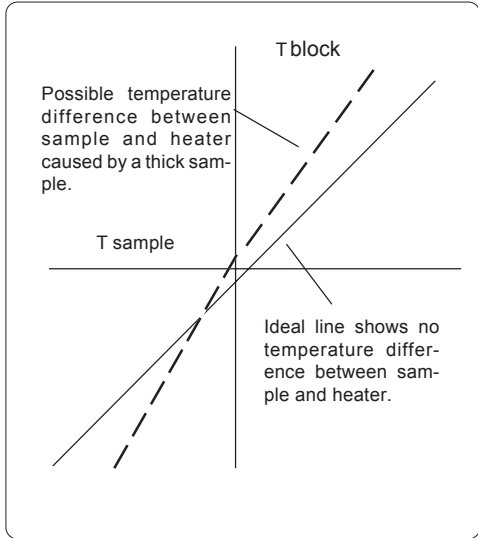
Setup Menus Explained

The setup menus are accessed by following the instructions on the next few pages. The dotted lines lead to the menu screen that will be seen when the button shown next to the line is pressed.

Sample Calibration

The output from the platinum resistor in the Stage is accurately converted to temperature in the CI94 to better than 0.01°C. The platinum resistor is mounted as near to the top surface of the silver or copper block as possible, which due to its high thermal conductivity gives very little temperature difference. However, when the sample is thick or if the sample is placed on a cover slip or crucible, it is possible that some temperature gradient can appear, causing the known temperature characteristics of a material to change.

Using the sample calibration features of the CI94, these known (theoretical) values and the experimental values can be used by the CI94 to draw a new temperature curve. A positive and a negative temperature as well as a value for zero can be entered, although it is not necessary to enter all three sets of data. For instance the zero value can be left at zero and just a positive or negative value determined and entered. This can be done in theLinksys software by selecting 'Calibration' then clicking 'Sample Cal'.



Unit Details

These menus need to be quoted when you request a software update for your CI94.

Test Modes

These menus are for fault finding when contacting Linkam by phone or email.

Vstg + Istg

These values are the Voltage (V) of the Stage and the current (I) of the Stage.

Vres +Vfan

These values are the Voltage reservoir and the Voltage of the fan.

Electronic Cal

This contains the menu 'Instrument Cal' which re-linearises the on-board resistor.

The 'Stage/mod setup' menu allows the chip in the stage lead to be reprogrammed without the unit needing to be returned to Linkam.

RS232

This menu allows you to set the speed of the RS232 port if creating your own control software. It also allows you to set parity. Contact Linkam for 'Serial Comms' manual.

Display contrast

This menu allows you to set the contrast of the screen from 1 to 9.

Working with the Setup Menus

When the CI94 is switched on the display automatically scrolls through five screens.

To access the setup menus press the ENTER button when you see this screen.
If Enter is not pressed the screens will scroll as follows.

Linkam CI94

For Menu > Enter

Connected to

THMS600 Stage

25.2°C

The CI94 can be fitted with two different options;
Vacuum or
DSC

If the vacuum board is fitted, the CI94 will display a reading of either mbar or Torr in the linksys temperature window.

If the DSC board is fitted, the CI94 will display a reading of DSC counts also shown in Linksys temperature window.

Depending on which board is fitted the screens will scroll as shown to the right.

With Option

FDCS Ver 1.0

DSC Ver 1.0

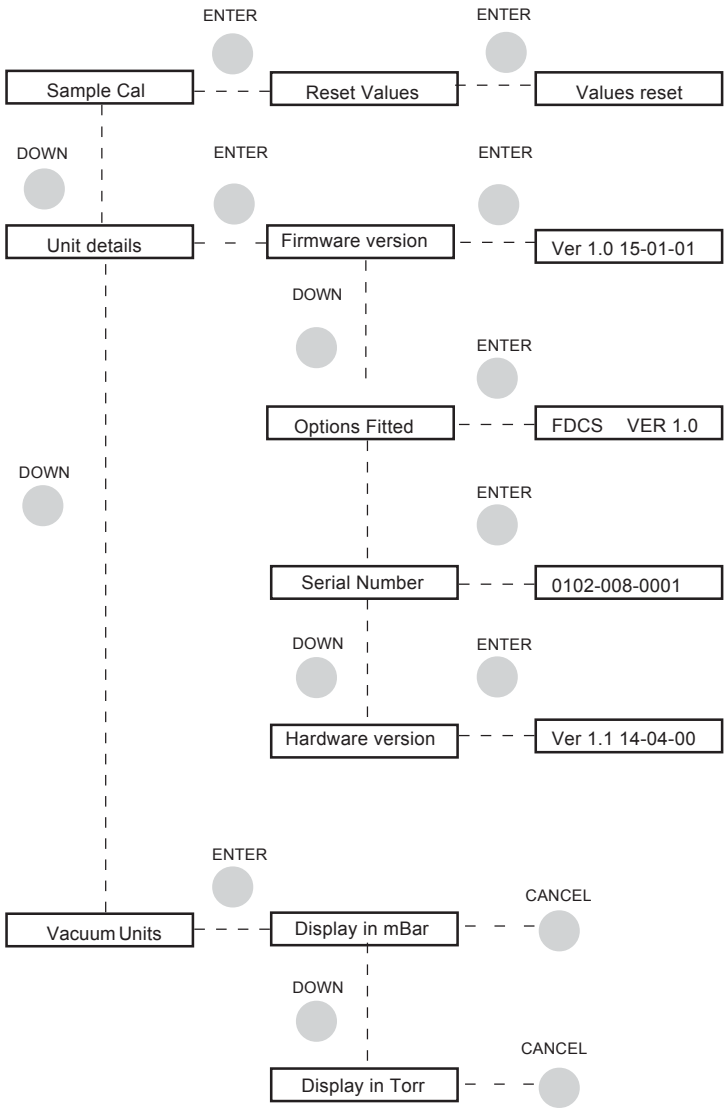
25.2°C

OR

OPTION

SETUP MENU

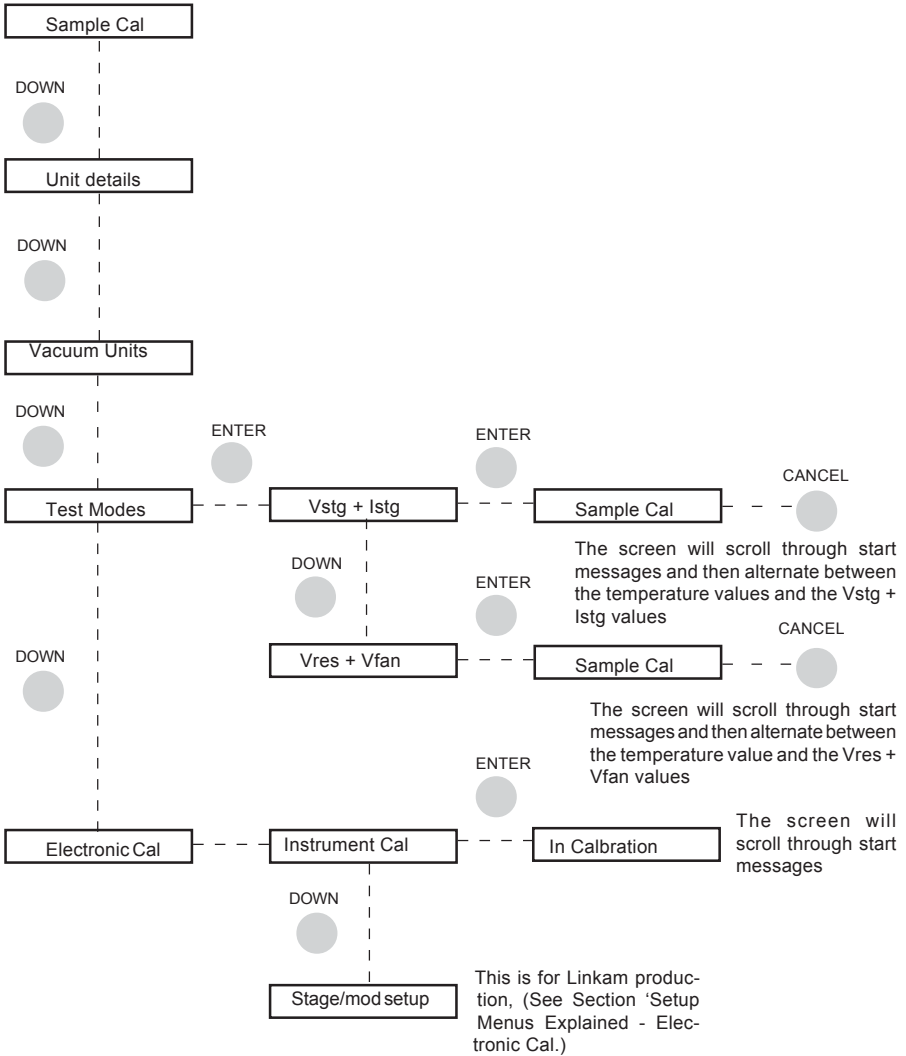
INFO/SELECT



SETUP MENU

OPTION

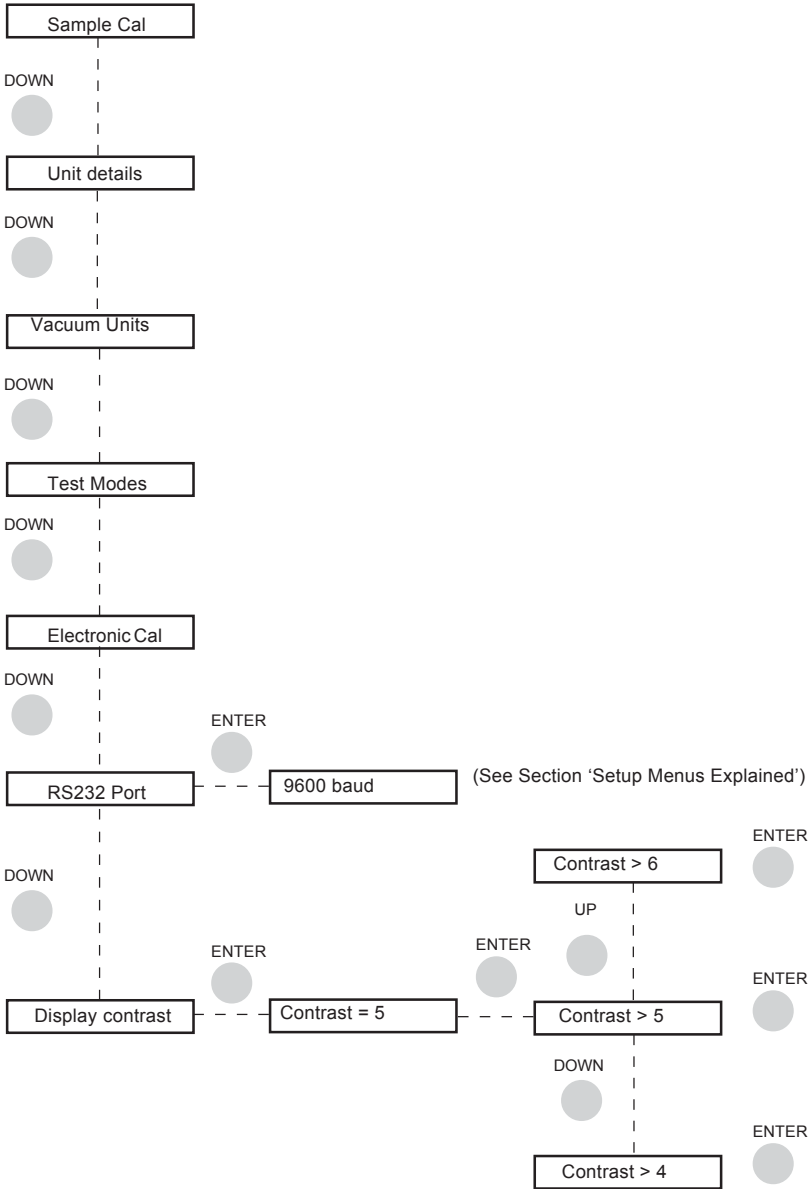
INFO OR SELECT



SETUP MENU

OPTION

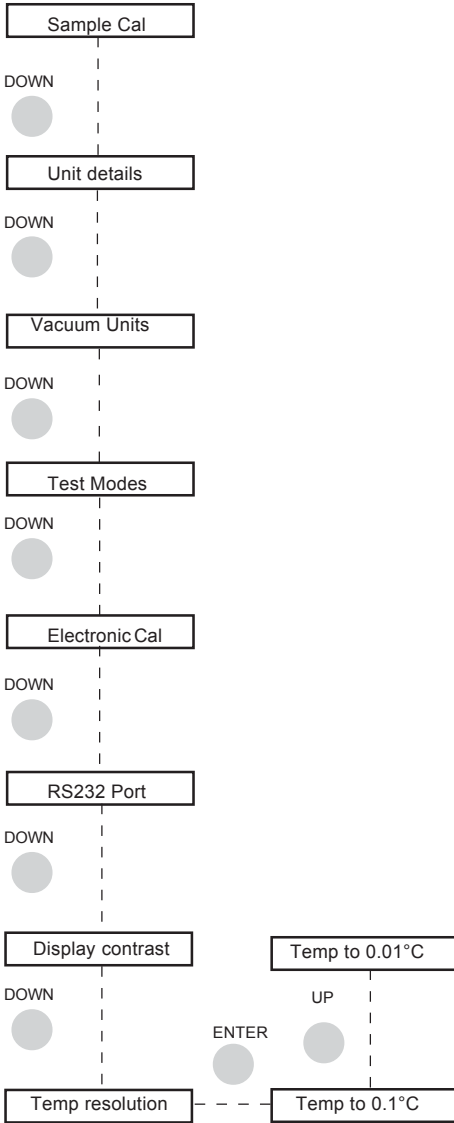
INFO OR SELECT



SETUP MENU

OPTION

INFO OR SELECT



Linksys Temperature Control Software

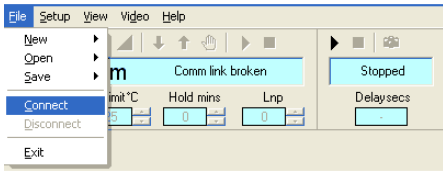
Getting Started

Full explanation of all the Linksys 32 menus and options are explained in the 'Help' in the software.

Presuming that you have already installed Linksys 32 correctly (Installation information on the software CD supplied with Linksys 32), open the program from your windows START menu.

Now go to **File > Connect**

You will then see the following message telling you to power up your linkam equipment connected to comm port 1.

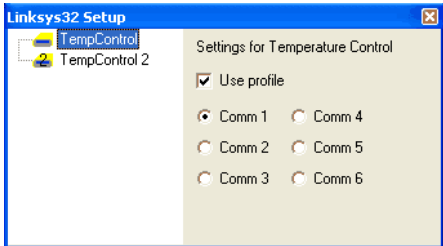


Power on your CI94 controller and click 'OK'. The room temperature will now be displayed in the tool bar.

Setting up a Temperature Profile

In order to setup a temperature control experiment using the temperature profile table, you will first have to select this from the Temperature Control Setup menu.

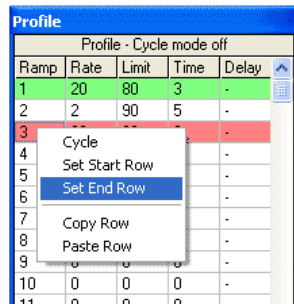
Go to the toolbar and select Setup > Temperature Controller. Select the 'Use Profile' check box and then close the menu window.



Now go back to the tool bar and select 'View > Profile'



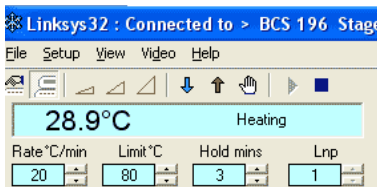
Type in the rate of heating, the limit and the time to hold the limit temperature in each ramp of the profile. Right click your mouse on the last ramp in the table to 'Set the End Row'



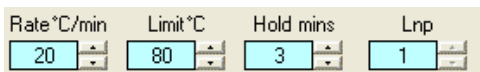
Press the start button to start the profile as entered in the Profile Table



Start and Stop buttons

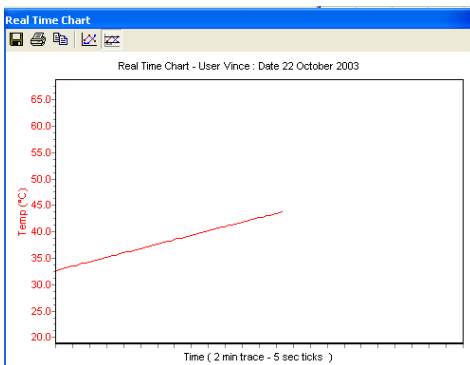
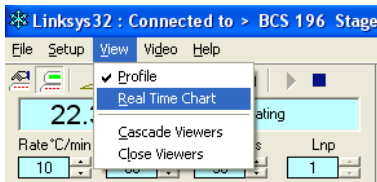


You can override the Temperature Profile table by either highlighting the rate, limit and hold info in the temperature control panel (shown to the right), and simply typing the value you require, or you can use the nudge buttons found to the right of the values to nudge each value up or down in 1 unit increments.



Nudge controls

To show an online plot, select 'View > Real Time Chart' from the toolbar. You will see the chart below updating the temperature plot in real time.



Real Time chart

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