Operator Instruction Manual Lovibond® Model Fx

Lovibond® Colour Measurement

Part Code: 169198 Issue 3.0

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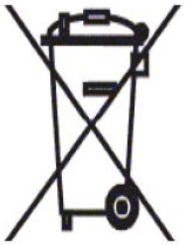
Regulatory



Disposal of Waste Electrical and Electronic Equipment

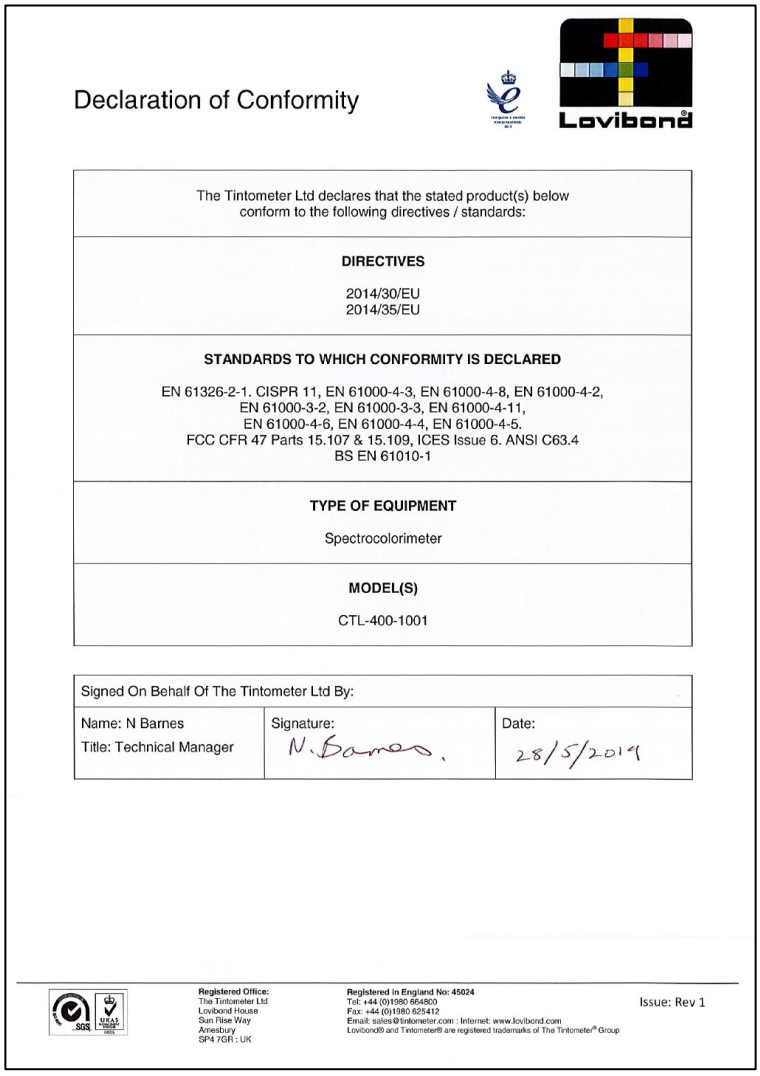
This symbol on the product or on its packaging indicates that this product shall not be treated as general waste. Instead it shall be handed over to an applicable recycling scheme or the original manufacturer for the recycling of electrical and electronic waste.

By ensuring that this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product.

The recycling of materials will help conserve natural resources. For more information about recycling this product, please contact your waste disposal service, the manufacturer or the company from where you purchased this product.

Warning

A moulded plug is fitted to the mains lead for your safety and convenience. The plug should only be changed by an approved service centre.



Declaration of Conformity

Lovibond

The Tintometer Ltd declares that the stated product(s) below conform to the following directives / standards:
DIRECTIVES 2014/30/EU 2014/35/EU
STANDARDS TO WHICH CONFORMITY IS DECLARED EN 61326-2-1. CISPR 11, EN 61000-4-3, EN 61000-4-8, EN 61000-4-2, EN 61000-3-2, EN 61000-3-3, EN 61000-4-11, EN 61000-4-6, EN 61000-4-4, EN 61000-4-5. FCC CFR 47 Parts 15.107 & 15.109, ICES Issue 6. ANSI C63.4 BS EN 61010-1
TYPE OF EQUIPMENT Spectrocolorimeter
MODEL(S) CTL-400-1001

Signed On Behalf Of The Tintometer Ltd By:		
Name: N Barnes Title: Technical Manager	Signature: N. Barnes.	Date: 28/5/2019

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Issue: Rev 1

Introduction

The Lovibond® Model Fx instrument is a high-precision spectrophotometer, which has been designed for the objective colour measurement of clear liquids. It is an easy to use, automatic instrument which overcomes the subjectivity of visual methods. The menu system guides operators through the selection of operating parameters. Thereafter, measurements are initiated by just a single key press and take less than 5 seconds to complete. The Lovibond® Model Fx instrument is a rugged spectrophotometer with aluminium housing that has been coated with a hard powder coat finish to provide the best protection possible. The Lovibond® Model Fx has been designed to function as a QC instrument within the laboratory or on 24-hour operation in a process control environment.

The Lovibond® Model Fx instrument operates as a stand-alone colorimeter containing a standardised light source and collimator, sample chamber, light detector, spectrometer and processor board.

Colour scales

The Lovibond® Model Fx instrument has been designed to meet the colour analysis requirements of light transmitting samples such as edible oils. The Lovibond® Model Fx provides colour data according to the Lovibond® RYBN, AOCS-Tintometer® colour, Chlorophyll and β-Carotene colour spaces and scales.

Technical Specifications

Performance Specifications	Information
Measurement method	Spectrometer
Lamp source	Tungsten Halogen
Wavelength range	400 - 700 nm
Photometric measuring range	0 - 100% Transmittance
Wavelength accuracy	0.2 nm
Spectral bandwidth	15 nm
Photometric accuracy	0.2% Transmittance
Photometric linearity	± 0.01% Transmittance
Stray light	Less than 0.01% Transmittance
Repeatability	± 0.25% Transmittance
Wavelength resolution	1.7 nm
Detectors	Diode array spectrometer

Physical & Environmental Specifications	Information
Enclosure	Powder coated aluminium
Width	310 mm
Height	150 mm
Depth	335 mm
Weight	5.5 kg
Environmental conditions (operating mode)	Temperature : +5°C - +40°C Relative Humidity (non-condensing) : 0% - 90%
Environmental conditions (storage)	Temperature : -20°C - +85°C Relative Humidity (non-condensing) : 0% - 85%
Power	Universal via external power supply: Input range: 100 VAC to 240 VAC. 60 watts (24 volts) Frequency: 50 to 60 Hz

Unpacking

The Lovibond® Model Fx is supplied with:

- Lovibond® Model Fx Instrument
- External Power Supply
- Set of 3 Power Leads (UK, European and United States)
- Quick Start Guide
- Accessory Box Containing
    - 1 * Conformance Standard
    - 1 * 1 inch W600/B/1" Cell
    - 1 * 5¼ inch W600/B/5¼ Cell
    - 1 * 10 mm W600/B/10 Cell

Genuine Lovibond® Cells are supplied with each instrument. Only use genuine Lovibond® cells to ensure repeatability in test results. Other cells may not be manufactured to the same rigorous quality standards.

Replacement Lovibond® cells may be purchased by quoting the description (e.g. W600/B/10).

The cells are coded as follows:

W600 = Type of cell & size/height etc.

OG = Optical glass

B = Borosilicate glass for high temperature samples

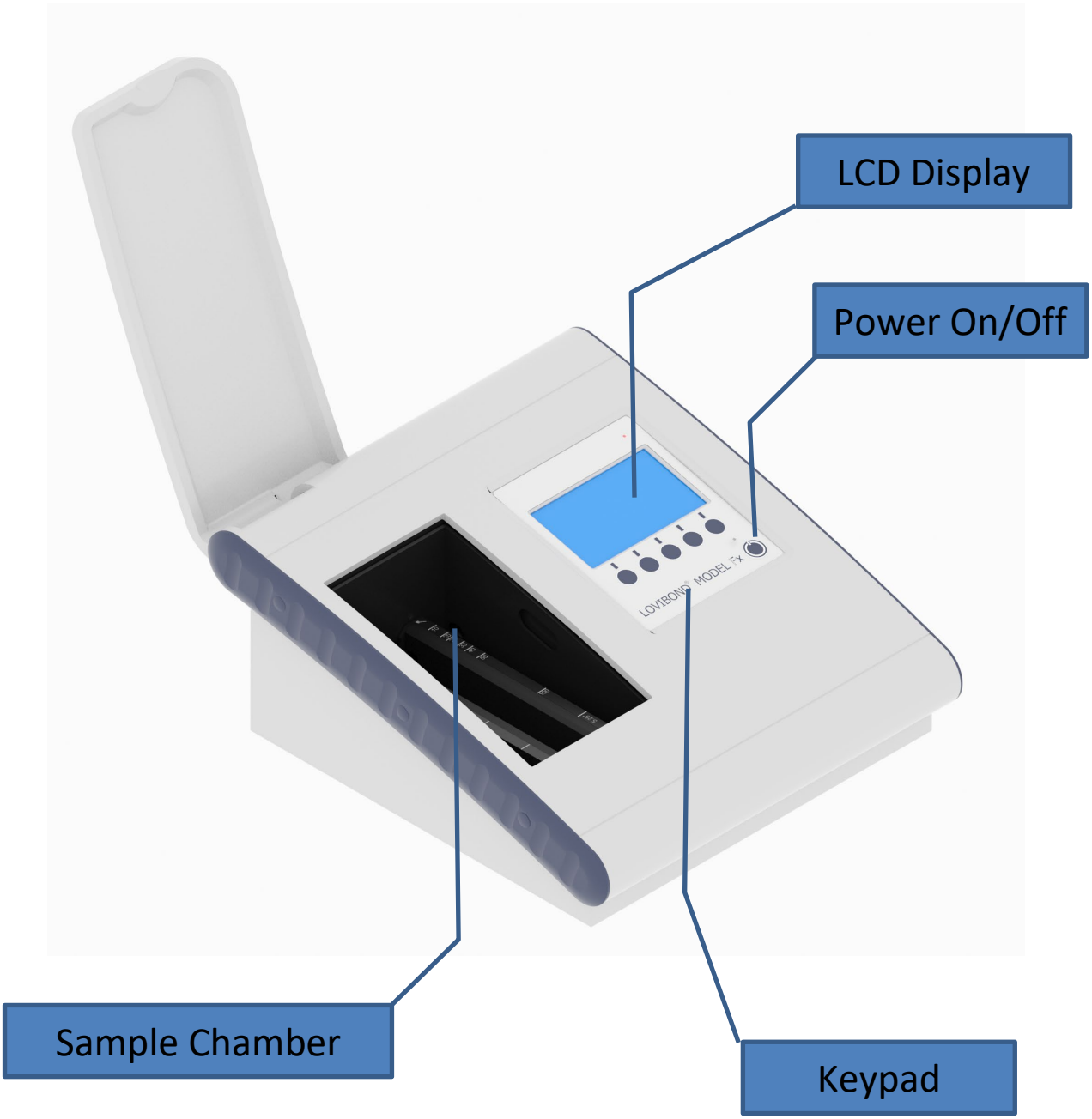
10 = 10 mm path length

50 = 50 mm path length

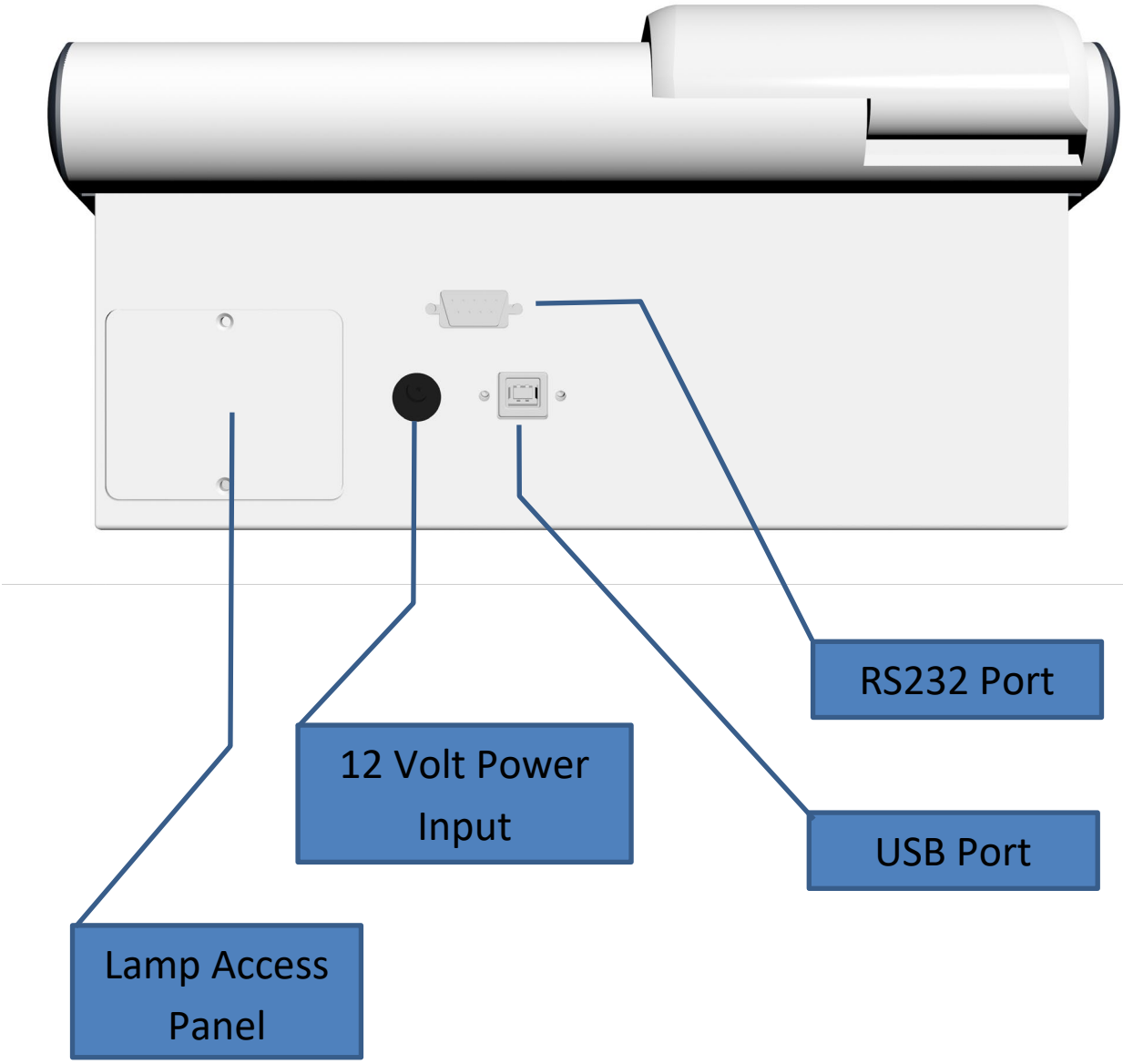
The Lovibond® Model Fx weighs 5.5 kg. One person may easily lift it by placing their hands at either end of the instrument and lifting. Carefully remove the Lovibond® Model Fx from its packing case. Remove the desiccated silica gel pack from the sample chamber. The power supply, mains lead and accessories are all included in the packaging.

The Instrument

Front View



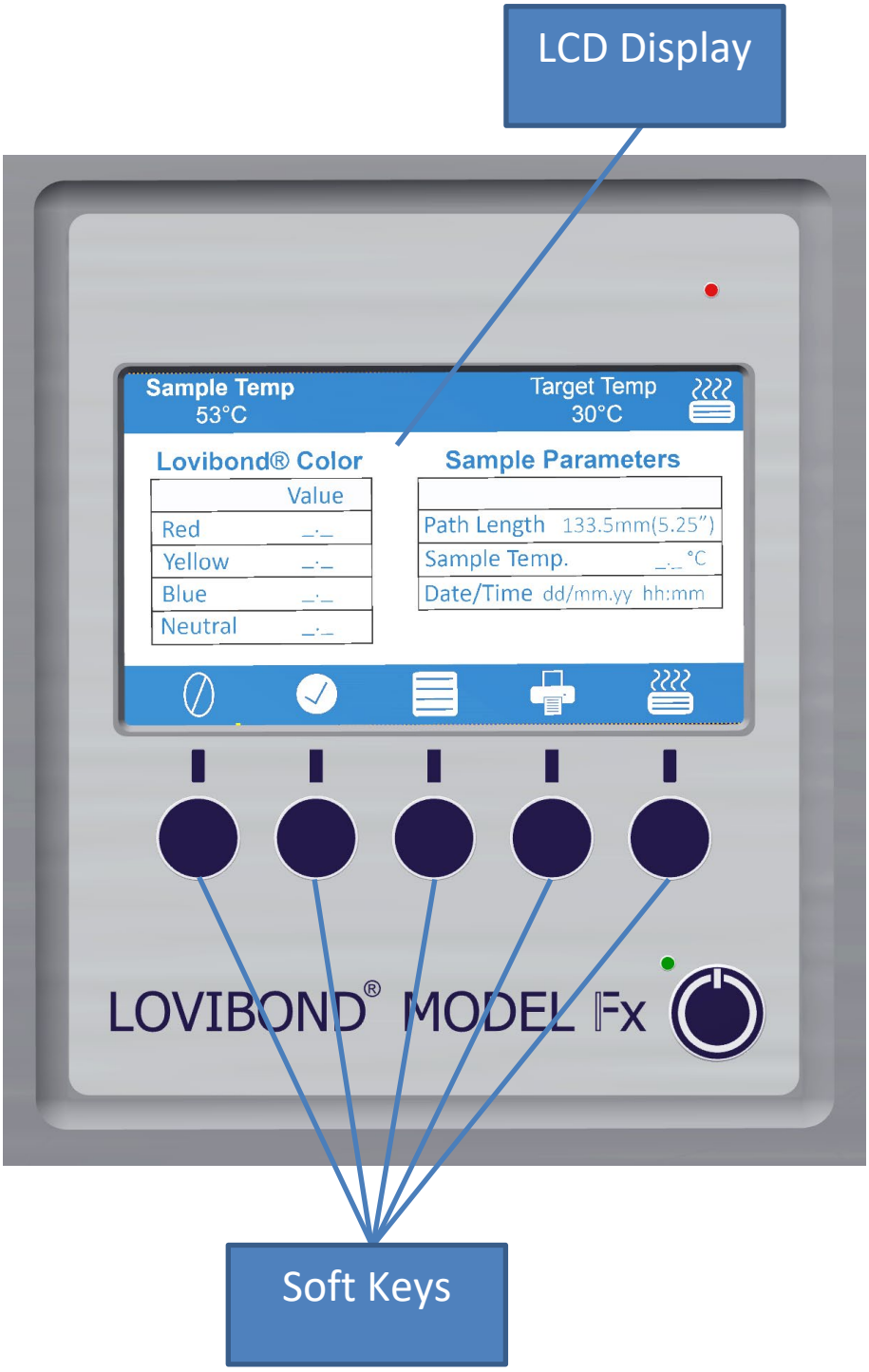
Rear View



Icons

Icon	Description
	Zero: Pressing this key will initiate a baseline measurement
	Test: Pressing this key will initiate the measurement of a sample
	Menu: Pressing this key will bring up the main menu
	Printer: Pressing this key will send the result to a printer connected to the RS232 port of the instrument
	Heater: Pressing this key will bring up the Heater control screen
	Up: Used to move between selections in the menu screen or change values in settings screens
	Down: Used to move between selections in the menu screen or change values in settings screens
	Left: Used to move between selections in the menu screen or change values in settings screens
	Right: Used to move between selections in the menu screen or change values in settings screens
	Enter: Used to select items from menu or confirm changes
	Esc: Used to exit a menu or screen
	OK: Used to accept settings and confirm settings/information
	Refresh: Used to manually refresh the screen, such as Diagnostics
	Instrument Registration: Used to enter registration values and unlock codes.

Keypad



The keys on the keypad can vary in their function. The function of each key will be related to the icon on the display directly above the key.

Installation

Place the instrument on a bench near a mains voltage supply which is free from excessive voltage fluctuations. The external power supply is auto voltage sensing, so no setting up is required for local voltages.

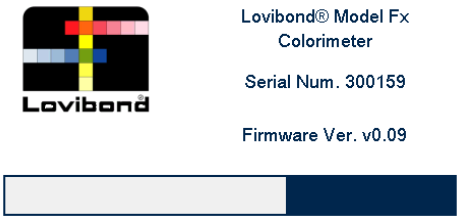
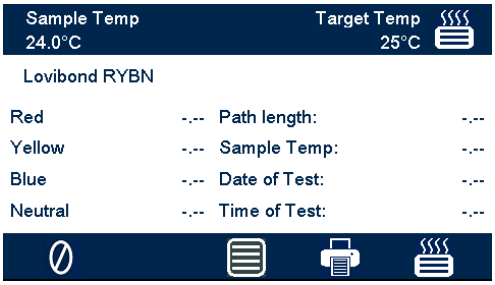
Do not operate the instrument in an atmosphere containing explosive gases.

Plug in the mains lead and switch on. The display will indicate that the instrument is on.

If the instrument has been in a cold environment prior to setting up, allow the instrument to warm up to room temperature and ensure that all condensation has dissipated before switching on.

Always ensure that there is sufficient free space around the instrument to maintain a constant flow of air.

Switching on the instrument

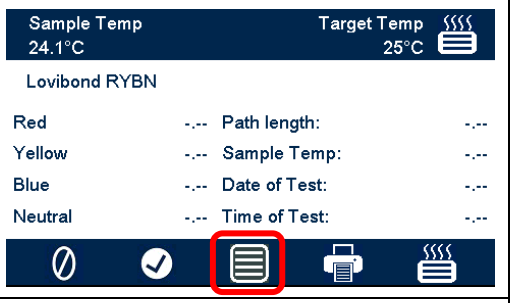
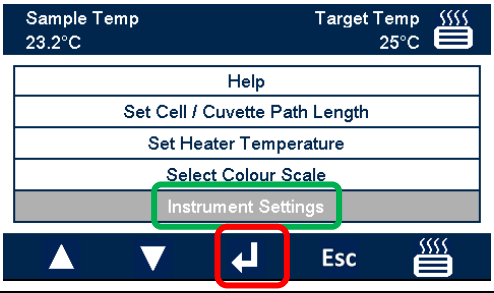
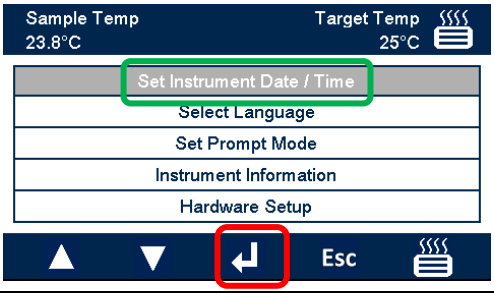
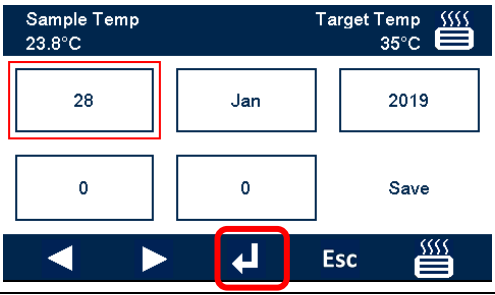
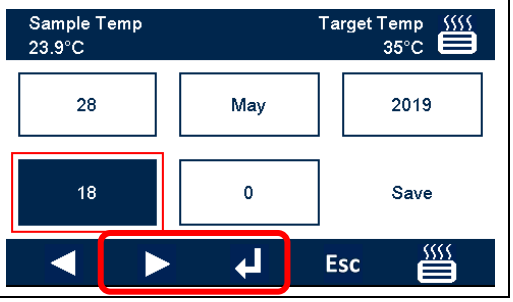
When the instrument is powered on, the display will show the serial number of the instrument. A progress bar will show status of the initialisation routines. Any errors will be shown.	
Once the initialisation has been completed, the following screen will appear.	

Switching off the instrument

To Switch off the instrument, press the power button. A prompt will appear to make sure you want to switch off the instrument. To confirm switching off the instrument press and hold ‘yes’ until the display switches off To return to the menu press ‘no’	

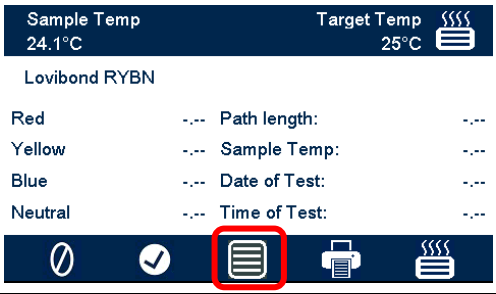
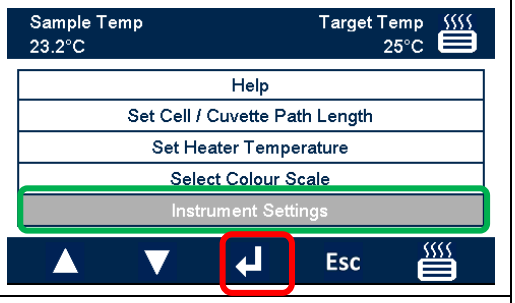
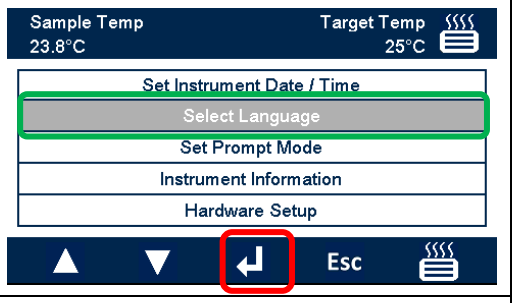
Hardware Setup

Set Date & Time

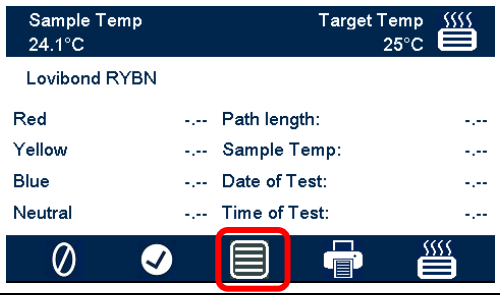
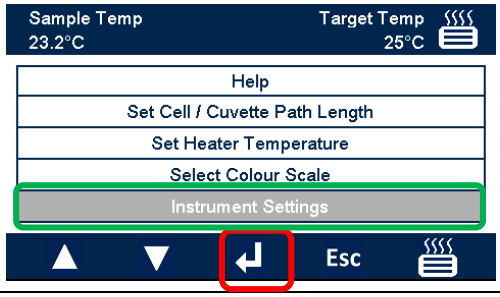
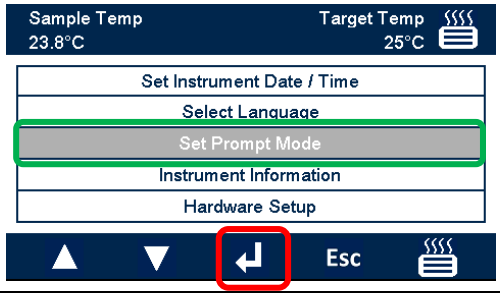
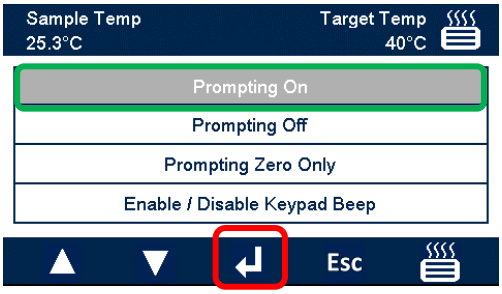
Press the Menu Key	
The Main Menu will appear. Press the Down key until "Instrument Settings" is highlighted, then press the Enter key.	
The Instrument Set up Menu will appear. Press the Down key until "Set Instrument Date / Time" is highlighted then press the Enter key.	
The Set Time and Date screen is displayed. Use the Left and Right keys to move the highlighted red box between the items to be entered. At the chosen item, press Enter.	
The selected Box will turn blue. Now use the Up and Down Keys to change the value in the box. Once the correct value has been set, press Enter. The screen will now return to option of moving between items.	

Once all items have been set, move the red highlight box to “Save” and press Enter. At any time, press Escape to leave screen without making any changes.	

Language Selection

Press the Menu Key.	
The Main Menu will appear. Press the Down key until Instrument Settings is highlighted, then press the Enter key.	
The Instrument Set Up Menu will appear. Press the Down key until “Set Language” is highlighted, then press the Enter key.	
The Select Language Menu will appear. Use the Right key to move the Red selection box to the Flag of the language required. Then press Enter to select..	

Prompt Mode

Press the Menu Key	
The Main Menu will appear. Press the Down key until Instrument Settings is highlighted, then press the Enter key.	
The Instrument Set up Menu will appear. Press the Down key until "Set Prompt Mode" is highlighted, then press the Enter key.	
The Set Prompt Mode Menu will appear. Use the Down key to select the type of prompting required, then press Enter to select.	

The available prompt modes are:

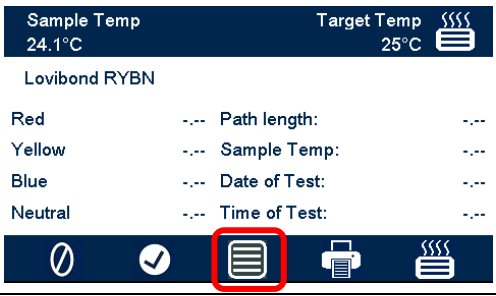
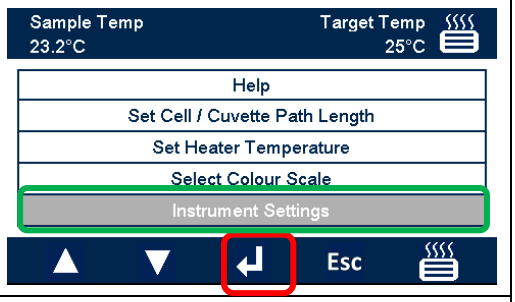
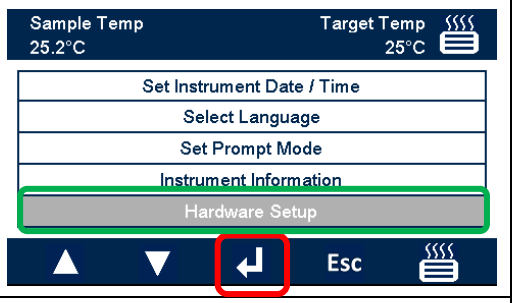
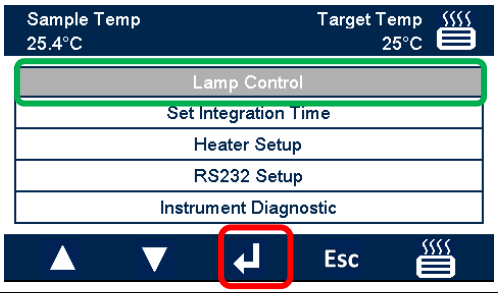
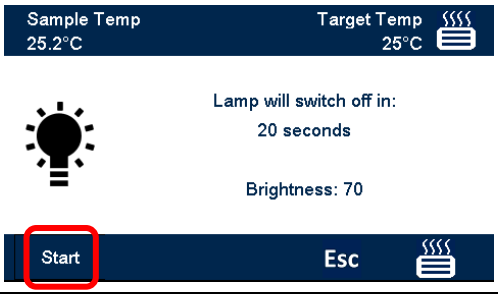
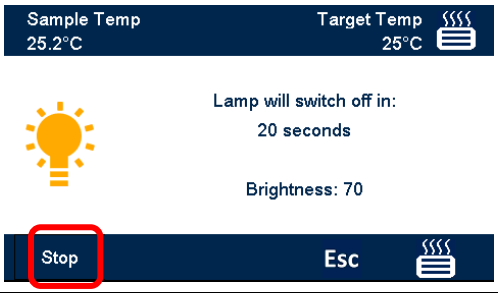
On Any interactions will prompt user to perform certain actions, this is helpful when first using the instrument.

Off No prompts will be requested.

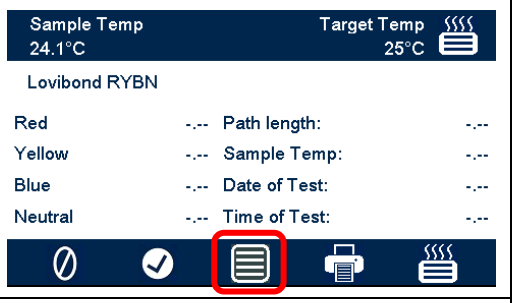
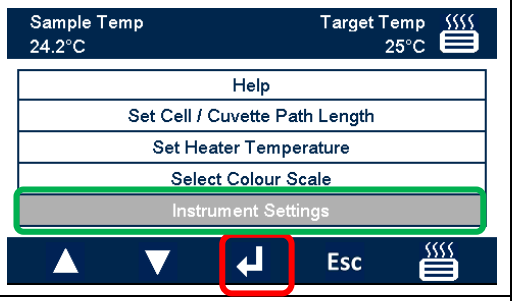
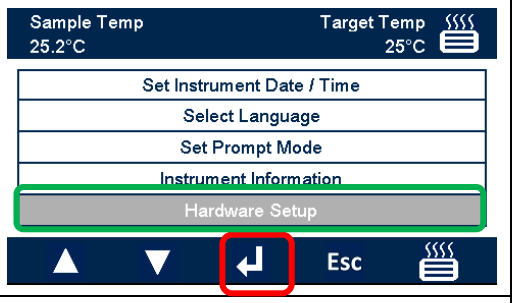
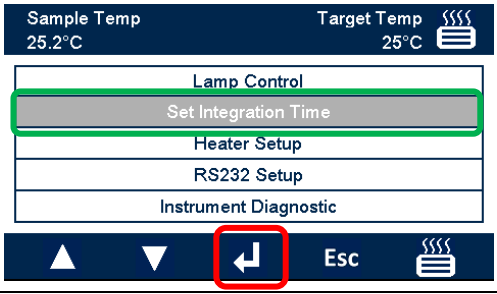
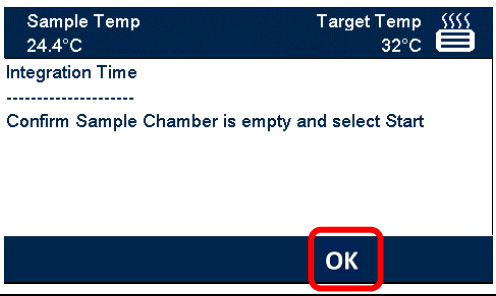
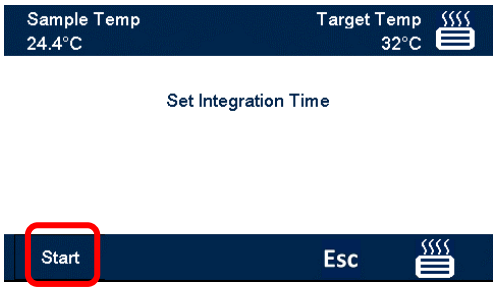
Zero Only User will be prompted to carry out the baseline procedure for the colour scale being measured.

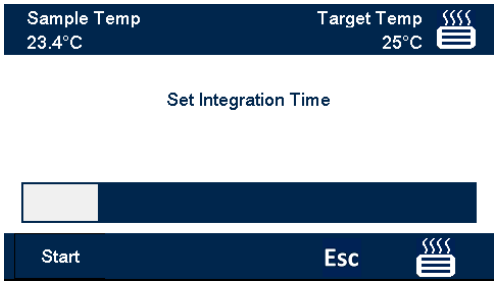
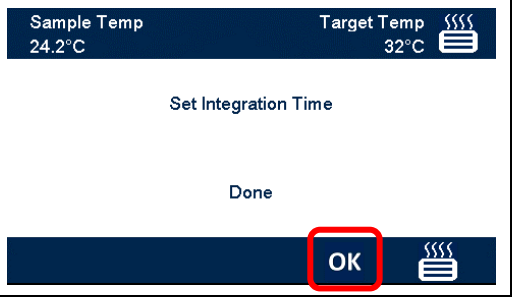
Lamp

The lamp can be tested for brightness compared to the ideal factory setting.

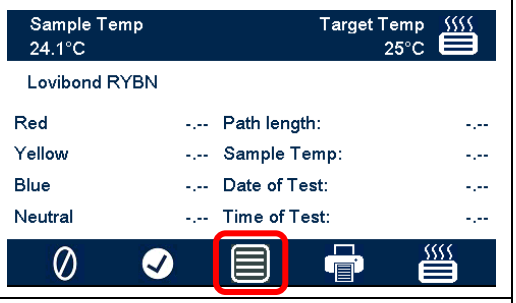
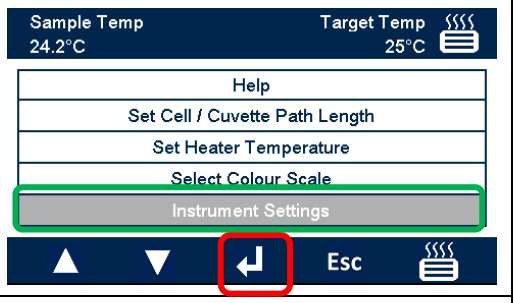
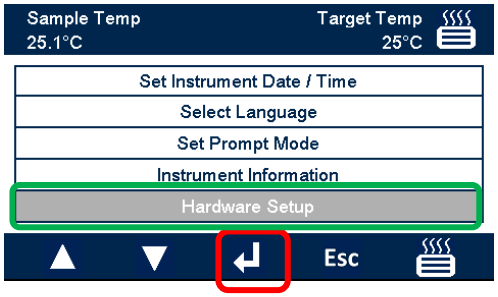
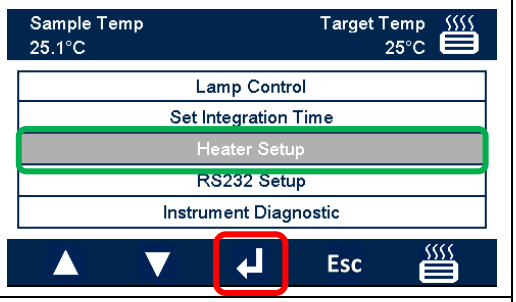
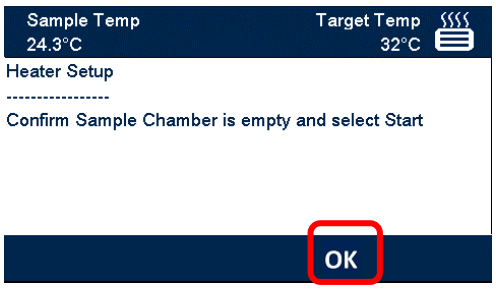
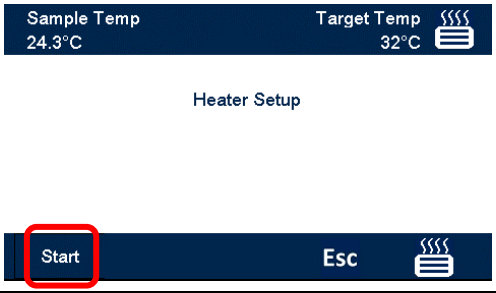
Press the Menu Key	
The Main Menu will appear. Press the Down key until Instrument Settings is highlighted, then press the Enter key.	
The Instrument Set up Menu will appear. Press the Down key until “Hardware Setup” is highlighted, then press the Enter key.	
The Hardware Setup Menu will appear. Press the Down key until “Lamp Control ” is highlighted, then press the Enter key	
Press Start to switch on the lamp. The Lamp Icon will turn yellow when the lamp is ON. A countdown timer from 20 seconds will start and the lamp will be switched off when the counter goes down to 0. The brightness value is the intensity at the reference detector compared to its ideal value.	
Press Stop to turn off the lamp. The Lamp Icon will turn black to indicate that the lamp is OFF.	

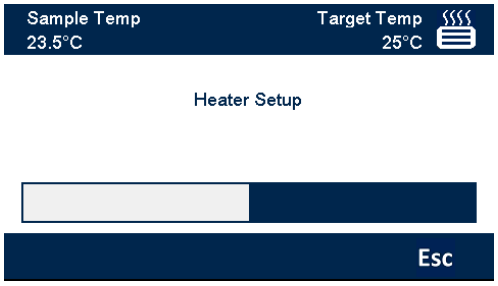
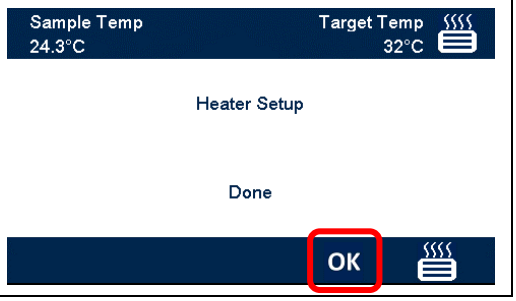
Integration Time

Press the Menu Key.	
The Main Menu will appear. Press the Down key until “Instrument Settings” is highlighted, then press the Enter key.	
The Instrument Set up Menu will appear. Press the Down key until “Hardware Setup” is highlighted, then press the Enter key.	
The Hardware Set Up Menu will appear. Press the Down key until “Set Integration Time” is highlighted, then press the Enter key.	
The instrument will prompt you to check the sample chamber is empty. Press OK when confirmed	
Press, “Start” to begin the Integration Time process.	

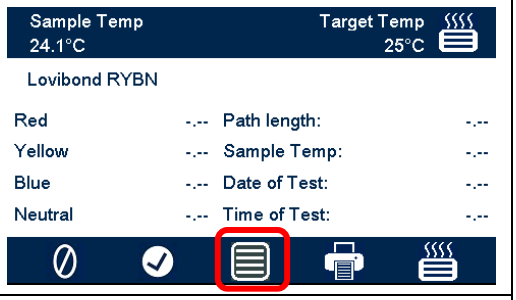
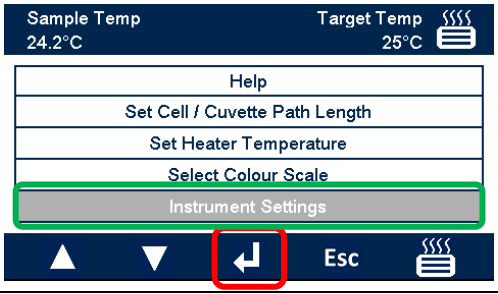
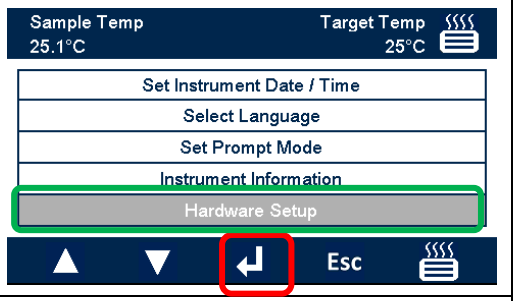
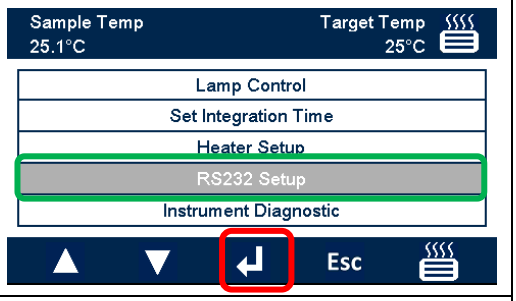
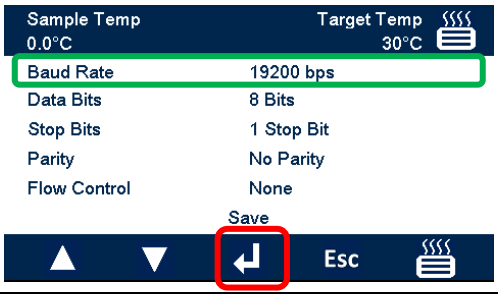
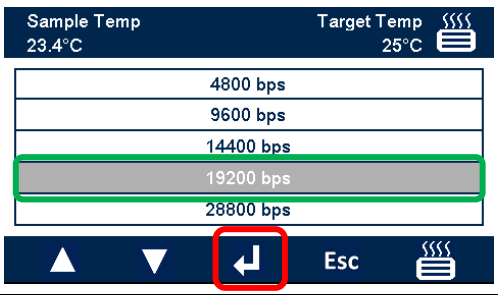
Time process. A progress bar will appear to show the status of the process	
When the process is complete, press “OK” to return to the Hardware Set Up Menu.	

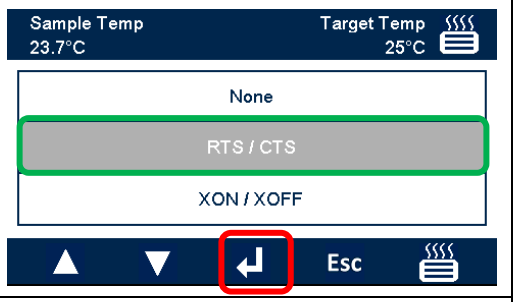
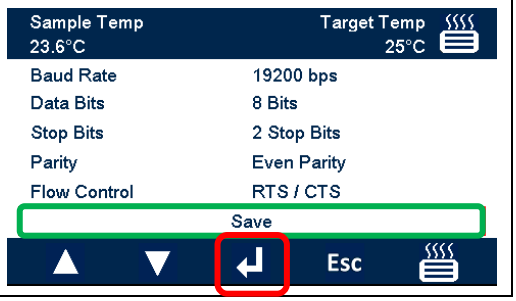
Heater Setup

Press the Menu Key.	
The Main Menu will appear. Press the Down key until “Instrument Settings” is highlighted, then press the Enter key.	
The Instrument Set Up Menu will appear. Press the Down key until “Hardware Setup” is highlighted, then press the Enter key.	
The Hardware Set Up Menu will appear. Press the Down key until “Heater Setup” is highlighted, then press the Enter key	
The instrument will prompt you to check the sample chamber is empty. Press OK when confirmed	
Press, “Start” to begin the Heater Set up process.	

A progress bar will appear to show the status of the process.	
When the process is complete, press “OK” to return to the Hardware Set Up Menu.	

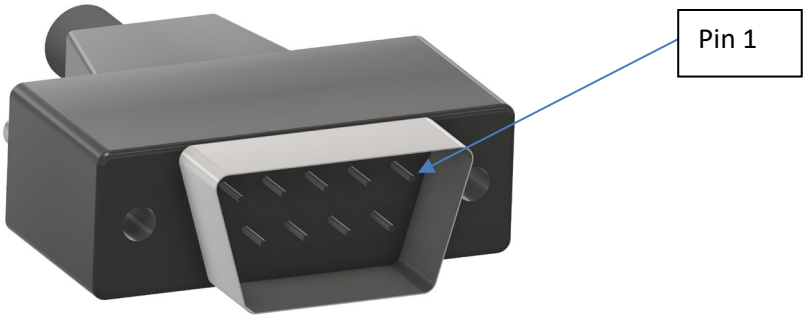
RS232 Printer Setup

Press the Menu Key.	
The Main Menu will appear. Press the Down key until “Instrument Settings” is highlighted, then press the Enter key.	
The Instrument Set Up Menu will appear. Press the Down key until “Hardware setup” is highlighted, then press the Enter key.	
The Hardware Set Up Menu will appear. Press the Down key until “RS232 Setup” is highlighted, then press the Enter key.	
The current settings for the RS232 port will be shown. Press Enter to modify any setting or Esc to return to the Hardware Set up Menu. Pressing Change will bring up each parameter in a series of screens.	
To change the Baud rate, Press the Up or Down keys until the required setting is highlighted. Then press Enter. Press Esc to return to the previous screen.	

To change the Data Bits, press the Up or Down keys until the required setting is highlighted. Then press Enter. Press Esc to return to the previous screen.	
To change the Stop Bits, press the Up or Down keys until the required setting is highlighted. Then press Enter. Press Esc to return to the previous screen.	
To change the Parity, press the Up or Down keys until the required setting is highlighted. Then press Enter. Press Esc to return to the previous screen.	
To change the Flow Control, press the Up or Down keys until the required setting is highlighted. Then press Enter. Press Esc to return to the previous screen.	
The settings for the RS232 port will be shown. To save the settings press the Up or Down key to highlight “Save” the press enter. Or press Escape to return.	

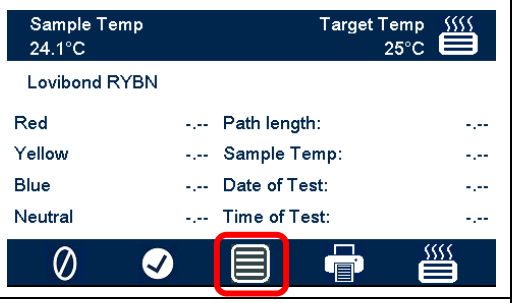
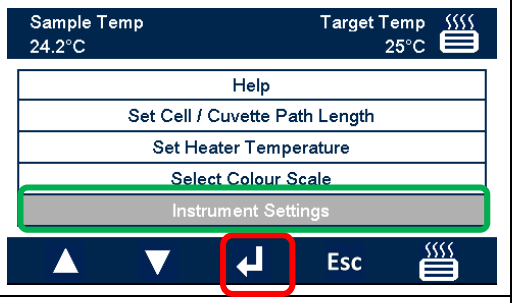
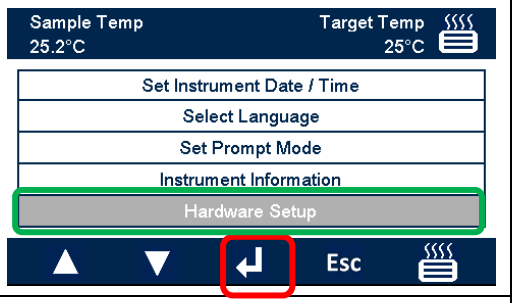
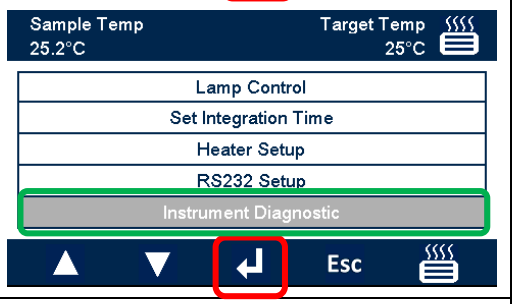
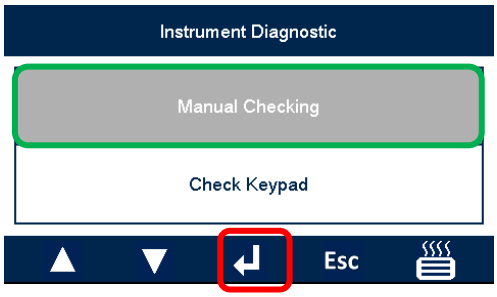
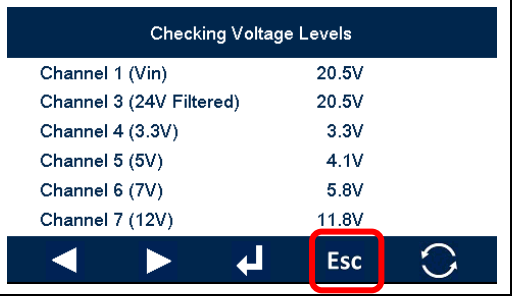
RS232 Connector Wiring Diagram

If you wish to use a printer other than that supplied by The Tintometer Ltd, please use the wiring diagram below for the RS232 connector.

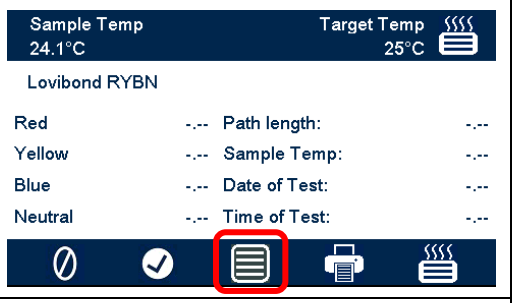
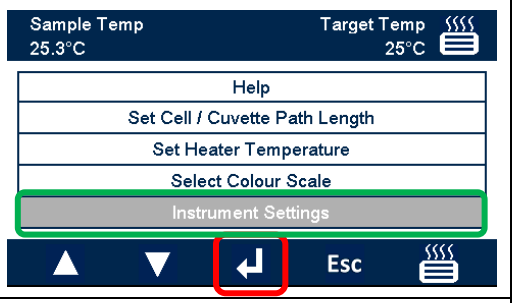
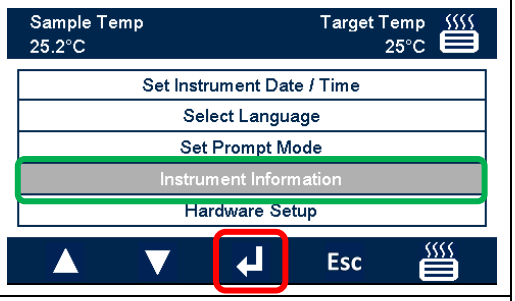
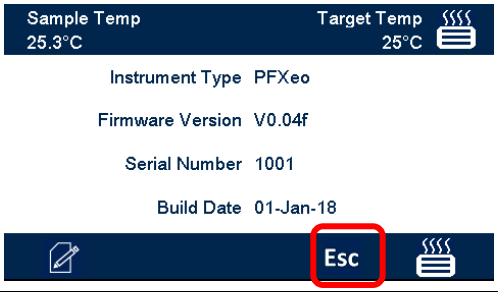


Lovibond® Model Fx		**Printer**	
2	RX	2	RX
3	TX	3	TX
5	Gnd	5	Gnd
8	CTS	8	CTS
7	RTS	7	RTS

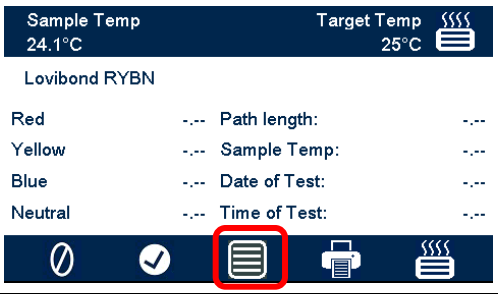
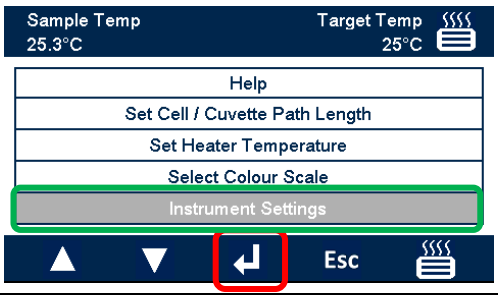
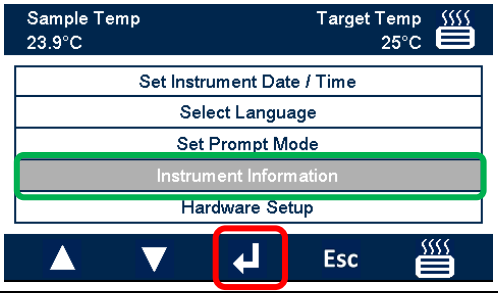
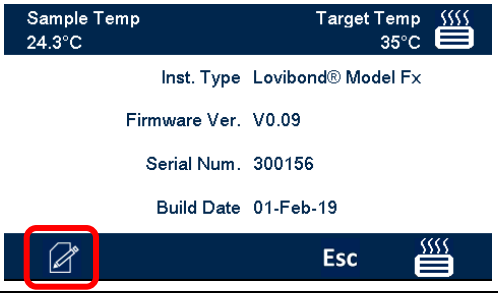
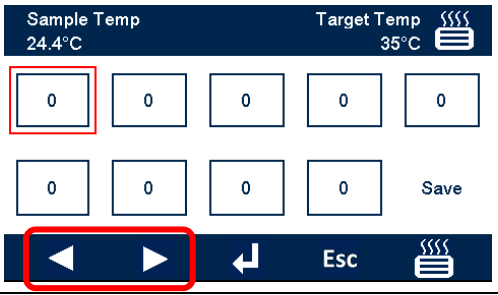
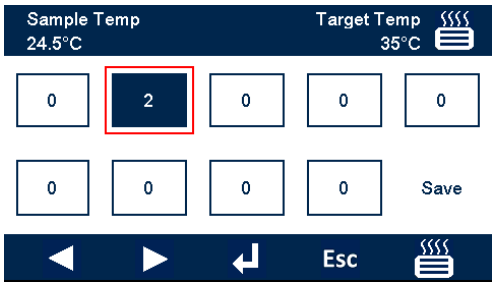
Instrument Diagnostics

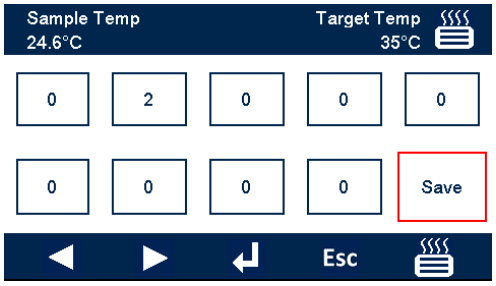
Press the Menu key	
The Main Menu will appear. Press the Down key until "Instrument Settings" is highlighted then press the Enter key.	
The Instrument Settings Menu will appear. Press the Down key until "Hardware Setup" is highlighted then press the Enter key.	
The Hardware Set up Menu will appear. Press the Down key until "Instrument Diagnostics" is highlighted, then press the enter key.	
The Diagnostic screen will be displayed. Press Enter to initialise the diagnostic routine. A progress bar will appear to show how far along the routine is. The status of each test will be shown as text in the middle of the screen. When the routine has completed, a report can be sent to the printer. Pressing Esc at any time will exit the routine.	 

Instrument Information

Press the Menu Key	
The Main Menu will appear. Press the Down key until "Instrument Settings" is highlighted, then press the Enter key.	
The Instrument Set up Menu will appear. Press the Down key until "Instrument Information" is highlighted, then press the Enter key.	
The Instrument Information screen is displayed. Press Esc to leave screen.	

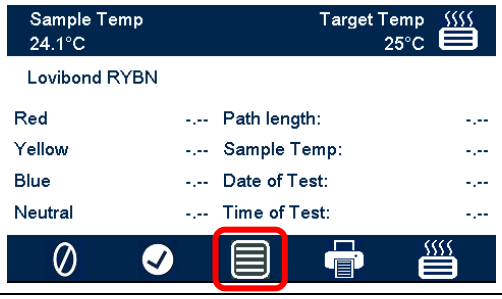
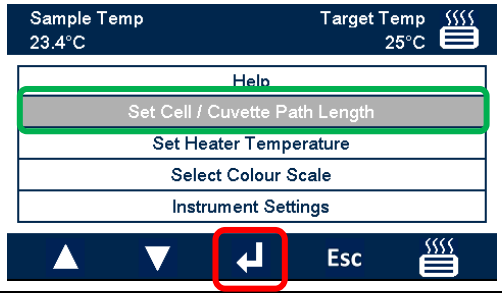
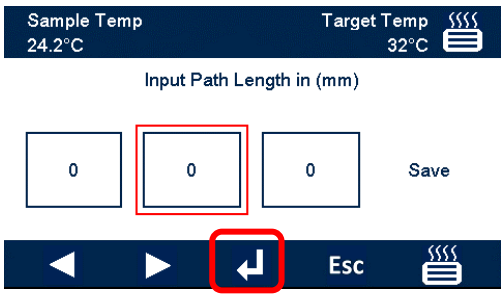
Instrument Registration

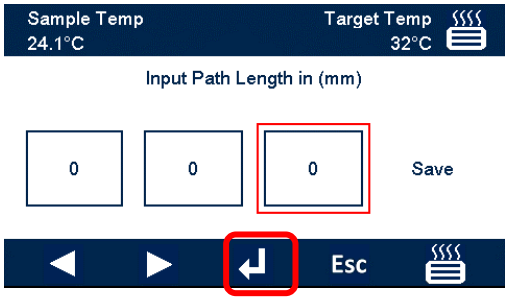
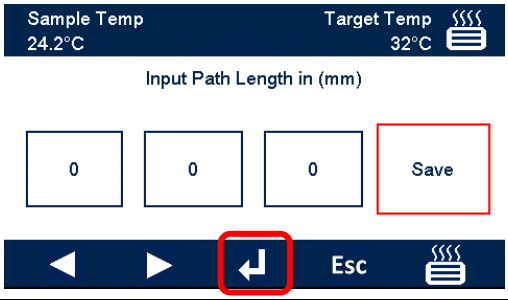
Press the Menu Key	
The Main Menu will appear. Press the Down key until “Instrument Settings” is highlighted, then press the Enter key.	
The Instrument Set up Menu will appear. Press the Down key until “Instrument Information” is highlighted, then press the Enter key.	
The Instrument Information screen is displayed. Press the Instrument Registration key.	
The Instrument Registration Screen will appear. Use the Left and Right keys to move the highlighted red box between the items. At the chosen item, press the Instrument Registration button.	
The Box chosen will turn blue. Now use the Up and Down Keys to change the value in the box. Once the correct value has been set, press Enter, this will return to the screen where you can move between items.	

Once all items have been set, move the red highlight box to “Save”. A message will then appear showing ‘Success’ or any error. At any time, press Esc to leave screen without making any changes.	

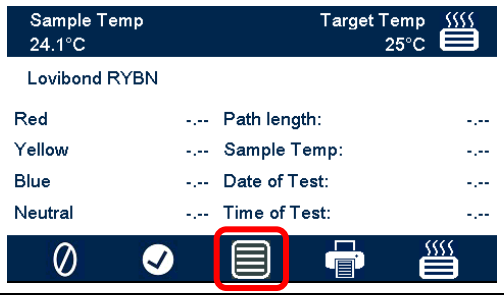
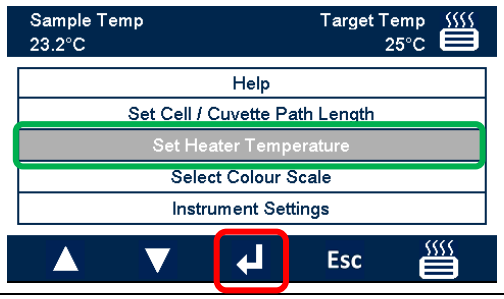
Instrument Settings

Set Path Length

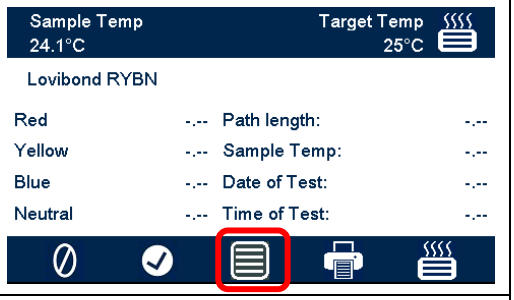
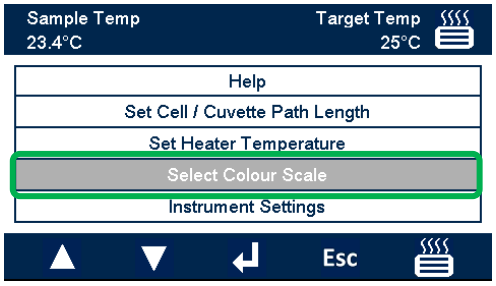
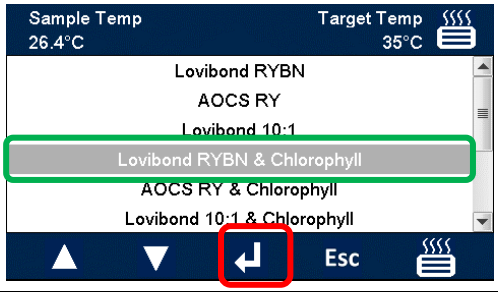
Press the Menu Key	
The Main Menu will appear. Press the Down key until "Set Cell / Cuvette Path Length" is highlighted, then press the Enter key.	
The Path Length Menu will appear. Press the Down key until the desired path length is highlighted, then press the Enter key. If the required path length is not in the menu, select "User" and press enter.	
Select whether the path length units should be Metric or Imperial.	
The Path Length Screen will appear. Use the Left and Right keys to move the highlighted red box between the items. At the chosen item, press the Enter Button.	

The Box chosen will turn blue. Now use the Up and Down Keys to change the value in the box. Once the correct value has been set, press Enter, this will return to the screen where you can move between items.	
Once all items have been set, move the red highlight box to "Save".	

Heater Settings

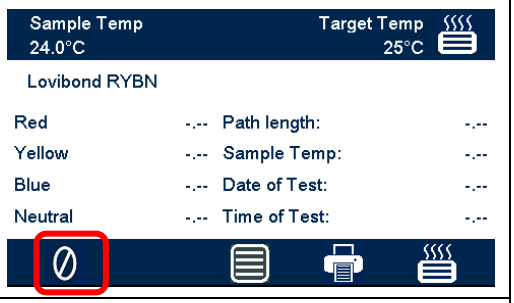
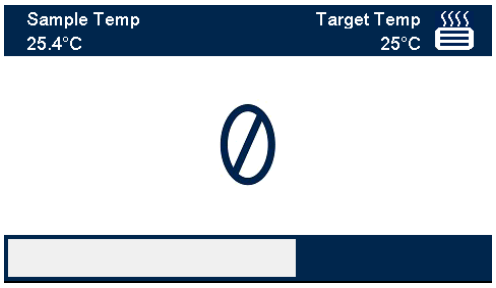
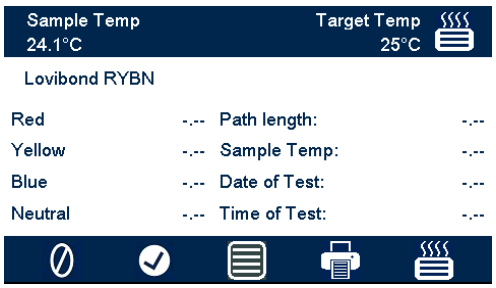
Press the Menu Key or Heater Key **Note**: the heater settings can be accessed directly from most screens where the heater key is available.	
The Main Menu will appear. Press the Down key until "Set Heater Temperature" is highlighted, then press the Enter key.	
Changing the Target Temperature Press the Up and Down keys to set the required block temperature, then press Enter to set. Note: this temperature will be the temperature of the heater block. The heater block has an integral thermocouple to measure its temperature.	
Switch Heater On / Off This key will change dependant on the status of the heater. Press Switch On to turn the heater on Or Press Switch Off to turn the heater off	
Heater Status The status of the heater is always displayed in the top right corner of the display. The colour of the heater icon will change to indicate the status of the heater: White: Heater is switched off Red: Heater is on and the heater is heating Green: Heater is on and has reached target temperature When the heater reaches the target temperature, it will flicker between 'heating' and 'reached temperature' as it maintains the target temperature.	

Colour Scales

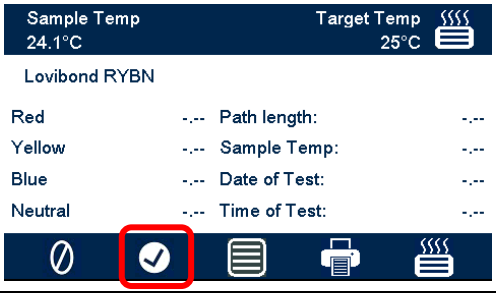
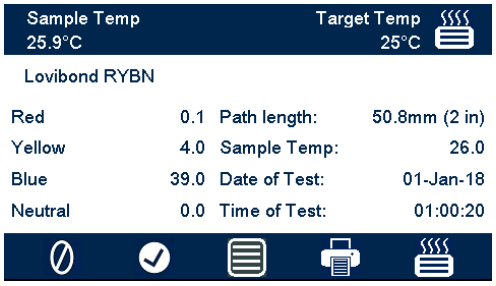
Press the Menu Key	
The Main Menu will appear. Press the Down key until "Select Colour Scale" is highlighted, then press the Enter key.	
The Colour Scale Selection Menu will appear. Press the Down key until the desired Colour Scale is highlighted, then press the Enter key.	

Sample Measurement

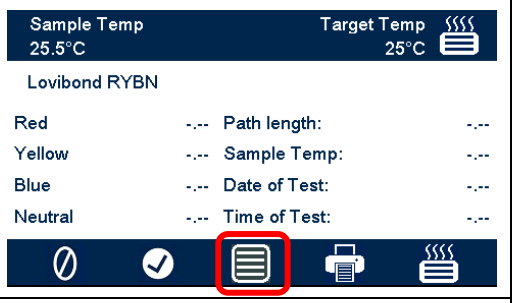
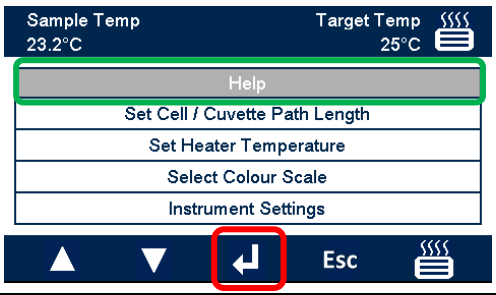
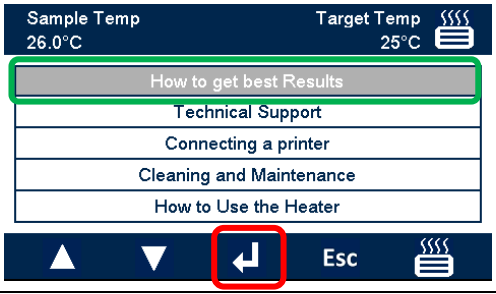
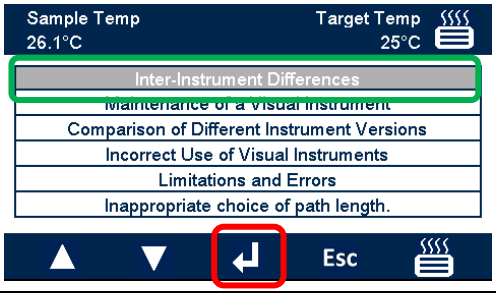
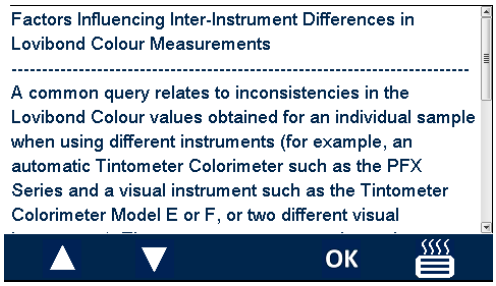
Performing a Baseline Measurement

Ensure the sample chamber is empty. Press Zero	
The screen will change to the Zero Screen with a progress Bar	
The result screen for the selected colour scale will be shown without any values	

Performing a Test

Insert a sample into the sample chamber and then press Test	
When performing a test, the screen will change to the test screen with a progress Bar	
The result screen for the selected colour scale.	

Help

Press the Menu Key	
The Main Menu will appear. Press the Down key until "Help" is highlighted, then press the Enter key.	
Use the Up and Down Keys to select the required Help topic. Then press Enter to view the Help information. If "How to get best results" is selected another menu will appear	
Again use the Up and Down keys to select the required Help topic. Then press Enter to view the Help information.	
The Help files will be displayed on screen.	

Certified colour reference materials

Lovibond® certified colour reference materials are ideal for routine calibration of colour measuring instruments and verification of test data. They have full traceability to internationally recognised standards: AOCS and Tintometer® Lovibond® RYBN certified under ISO 9001 quality system. Each standard is with an expiry date of guarantee of colour stability and full certification including MSDS. The values indicated in the table are typical nominal values. Individual values may vary but these are always specified on the certificate of calibration supplied with each standard.

Colour Scale	Nominal Certified Value	Order Code	Accreditation
AOCS-Tintometer® Colour (AOCS Cc 13j - 97, Cc 13b - 45)	0.3R 2.0Y (5¼")	13 42 40	ISO 9001
	1.0R 9.0Y (5¼")	13 42 50	ISO 9001
	1.2R 12Y (5¼")	13 42 60	ISO 9001
	2.2R 22Y (5¼")	13 42 70	ISO 9001
	3.4R 28Y (5¼")	13 42 80	ISO 9001
Lovibond® RYBN Colour (AOCS Cc 13j - 97)	0.4R 1.9Y 0.1N (5¼")	13 40 80	ISO 9001
	1.0R 4.3Y 0.1N (5¼")	13 40 90	ISO 9001
	1.4R 7.3Y 0.2N (5¼")	13 41 00	ISO 9001
	1.6R 11.0Y 0.1N (5¼")	13 41 10	ISO 9001
	1.8R 14.0Y 0.3N (5¼")	13 41 20	ISO 9001
	2.5R 24.0Y 0.5N (5¼")	13 41 30	ISO 9001
	3.3R 33.0Y 0.3N (5¼")	13 42 30	ISO 9001

Factors Influencing Inter-Instrument Differences in Lovibond® Colour Measurements

A common query relates to inconsistencies in the Lovibond® Colour values obtained for an individual sample when using different instruments (for example, an automatic Tintometer® Colorimeter such as the PFX Series and a visual instrument such as the Tintometer® Colorimeter Model E or F, or two different visual instruments). There are many reasons why such inconsistencies can arise. We have attempted to provide below a detailed list of the main factors which influence inter-instrument differences that should help you to resolve these queries. These factors fall into four main categories:

- Poor maintenance of a visual instrument
- Comparison of different instrument versions
- Incorrect use of visual instrument
- Limitations and errors associated with automatic measurement

Poor Maintenance of a Visual Instrument

The Tintometer® Colorimeter Model E or F is a precision optical instrument and any discoloration of the white surfaces or dirt on the various optical components will affect the nature and balance of illumination within the instrument and result in false readings. As a result, for consistency and accuracy in colour measurement, the Tintometer® Colorimeter should be kept as clean as possible and the whiteness of the sample chamber and the white reference maintained. Particular attention should be given to the following areas:

Dirt and grease on the glass filters and racks. These can be cleaned with a soft cloth or washed gently with warm soapy water.

Dust and dirt which gathers in the optical viewing system and can settle on the lens and correction filter. If dirty, the optical viewing system can be dismantled and the components cleaned with a suitable soft cloth. Be sure to reassemble correctly (see Tintometer® Colorimeter manual).

Discoloration of the white reference. Periodic replacement is necessary to maintain accuracy of measurement.

Light source discoloration. In the Tintometer® Model E and earlier models, the tungsten bulbs will discolour with age so that the instrument's illumination is no longer standardised. As a result, the bulbs should be changed periodically.

Discoloration and spillage in the white light sample chamber. It is important to remove any spillage immediately and clean the chamber area.

Dirt on the bulb diffuser plates reducing the amount of illumination to the sample. These should be cleaned or replaced if dirty.

Comparison of Different Instrument Versions

Users often assume that there is only one version of the Tintometer® Model E and Model F Colorimeters; in fact, these instruments have, for some time, been supplied in slightly varying formats to meet the requirements of national and international standard test methods which specify use of the Tintometer®. In particular, BS 684 Section 1.14, ISO/FDIS 15305 and AOCS Cc13e-92, all standard test methods for the determination of Lovibond® colour of animal and vegetable fats and oils, specify the use of the Model F (BS 684) (previously the Model E version AF905). These instruments include racks, which are fitted with colourless glass compensating slides in the sample field and a black sheath to prevent light entering the sides of the sample cell; they will give different readings to the standard Tintometer® Colorimeter versions and to automatic Lovibond® instruments.

Incorrect Use of Visual Instruments

Incorrect use of neutral racks. The two neutral racks included with the Tintometer® Colorimeter should be used to dull the sample so that the brightness in the sample field and the brightness in the comparison field are comparable. Many visual instrument users fail to use neutral glasses; the result will be a lighter colour measurement to compensate for brightness in the sample field.

Inappropriate choice of path length. The optical path length of the cell used should be related to the colour intensity of the sample. As a guide, it is advisable to restrict the colour intensity of the sample to less than a total of 30 - 40 Lovibond® units. Using a shorter path length cell can reduce colour intensity.

Subjectivity of visual measurement. Visual measurements are influenced by the discriminatory power of operators, their interpretation of a colour match and physiological factors such as age, eye fatigue and colour vision.

Limitations and Errors Associated with Automatic Measurement

Use with samples which are turbid or crystalline. This will affect colour measurement since turbidity prevents light being transmitted through the sample.

Lack of care in sample cell cleaning and sample preparation. Any contamination, uneven mixing or a temperature gradient might distort the light transmitted through the sample and affect measurements.

Maintenance

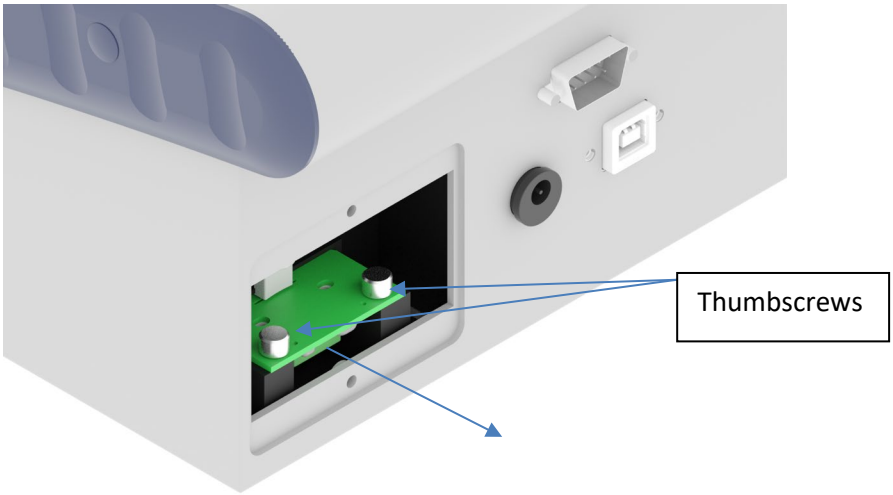
Cleaning the Sample Chamber

The sample chamber can be removed for routine cleaning or replacement. To remove the sample chamber, open the sample chamber lid to its full extent. The sample chamber can then be lifted free from the instrument base as shown in the diagram. Disconnect the heater power cable and thermocouple leads from the connectors in the sample chamber area to access under the sample chamber.

Replacing the Lamp

The expected lamp life is 600,000 measurements before failure. When replacing the lamp, always unplug the instrument from the power supply. Undo the two thumbscrews at the back of the instrument and remove the lamp plate, then undo the thumbscrews on the lamp assembly, remove the Lamp PCB and replace with the new Lamp PCB.

Do not touch the glass lens on the lamp, as fingerprints will impair its performance. Replace the lamp block and tighten the thumbscrews.

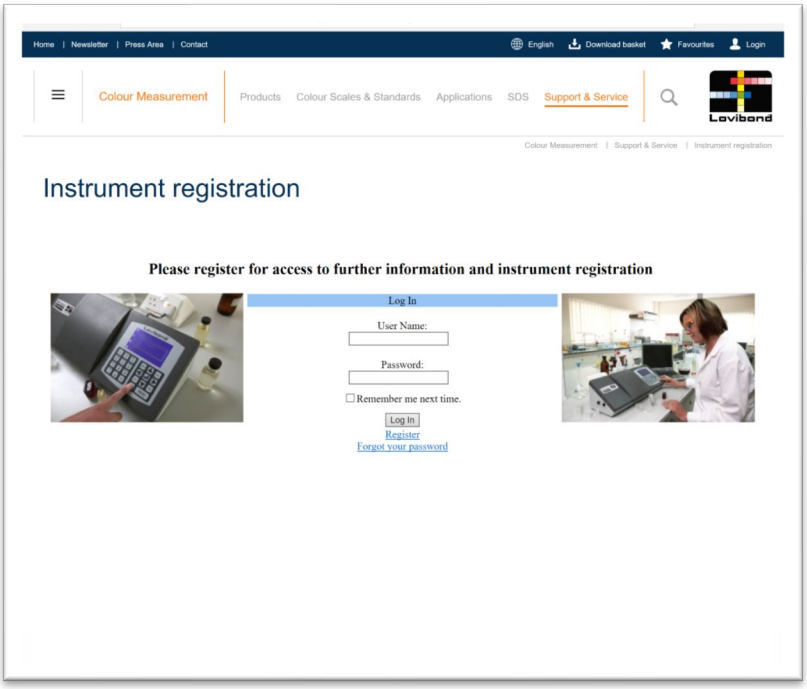


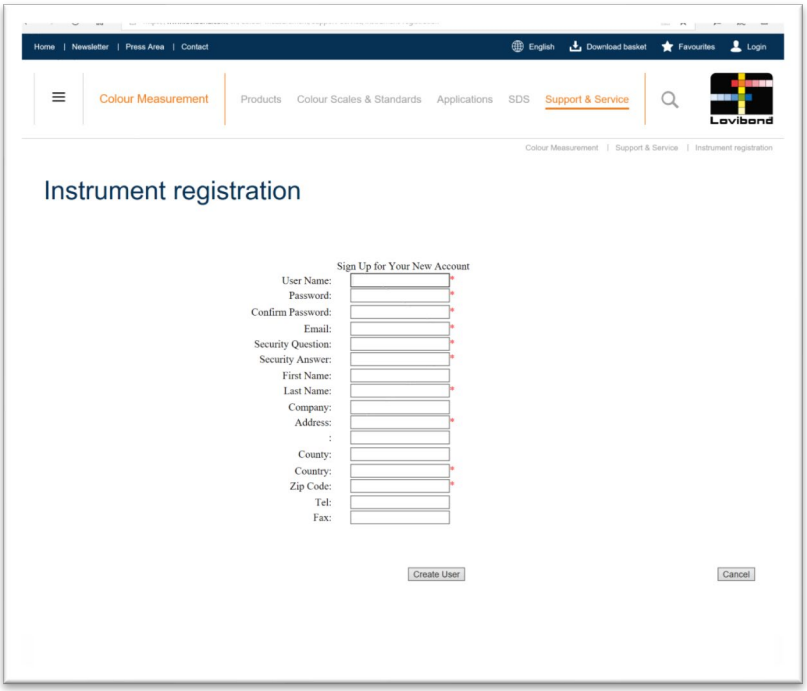
Appendix A:

Registering Your Instrument

To register your instrument, go to https://www.lovibond.com/en/Colour-Measurement and Support and Service. Then select Instrument registration.

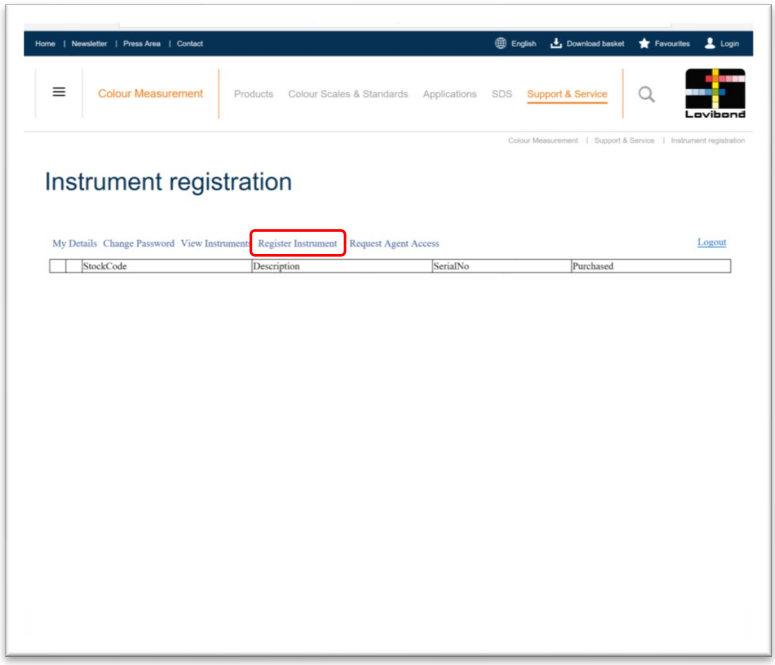
To register for the first time, select register.



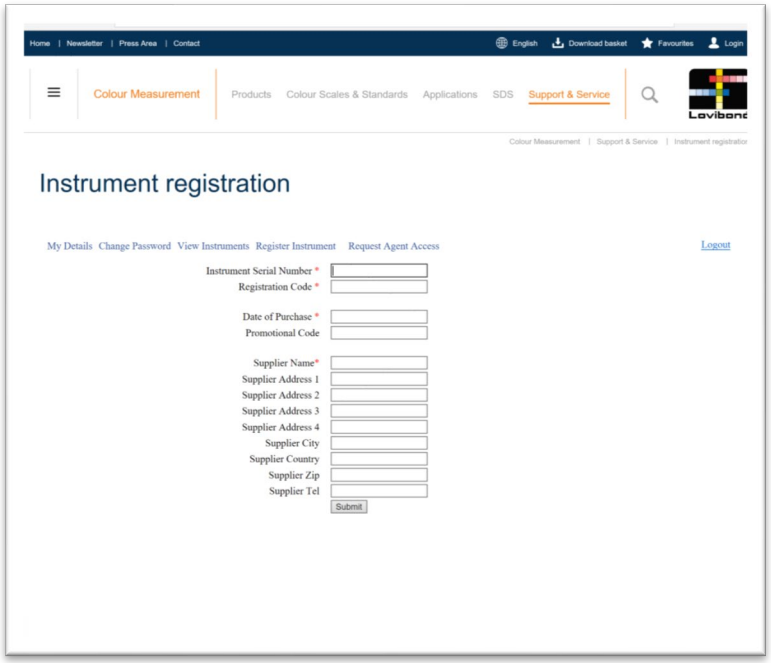


Fill in the required information. Any fields with a red "*" by the side are required and must be filled in. If, as in the example above, the two password fields do not match, a red warning will appear at the bottom of the page.

Once all the fields have been filled with the required data, Click "Create User".



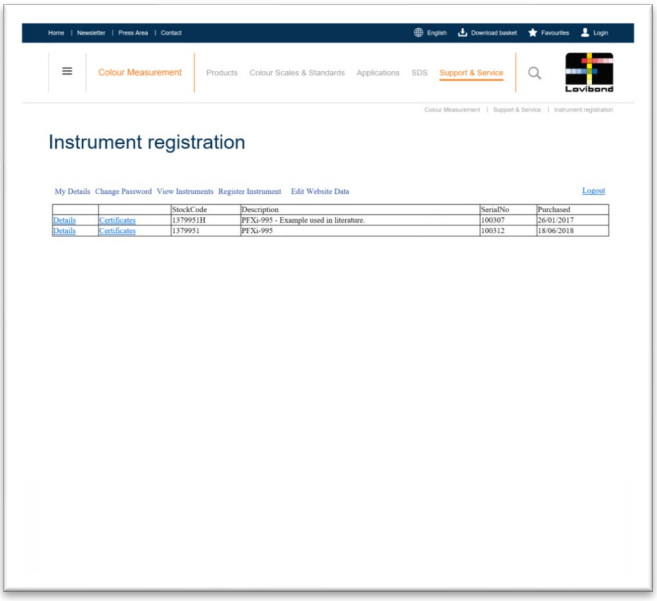
Click on "Register Instrument"



Information about the instrument can now be entered. The serial number of the instrument can be found on the label at the rear of the instrument. The registration code can be found on the Certificate of Conformity for the instrument.

Please fill in the details of the supplier of the instrument. This allows The Tintometer Ltd to inform them of any issues.

At the end of the process, a confirmation of registration is provided.



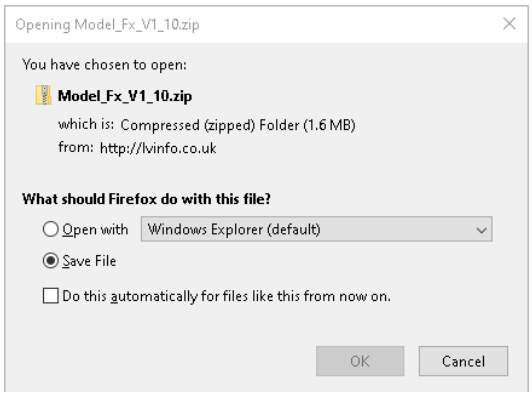
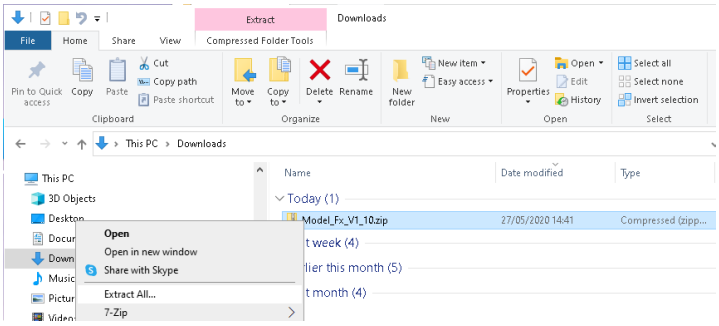
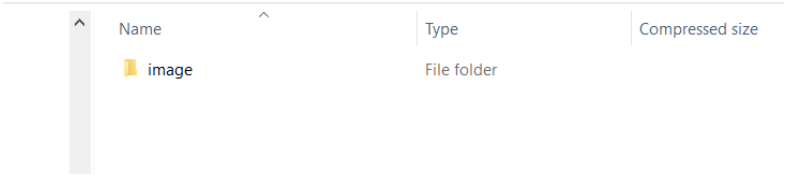
The instrument is now registered.

By selecting an instrument, it is possible to view its registration code. This can be done for each instrument that has been registered.

Appendix B:

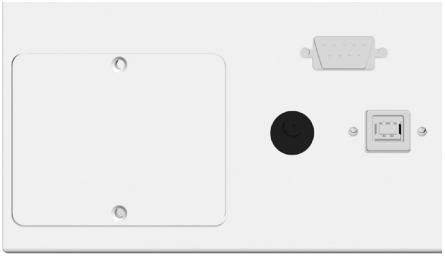
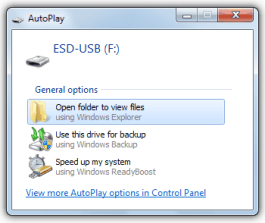
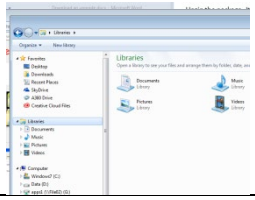
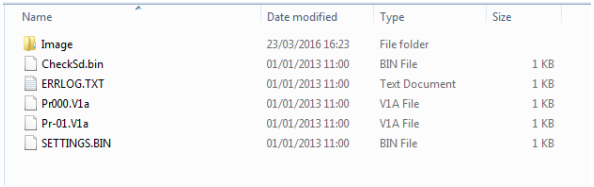
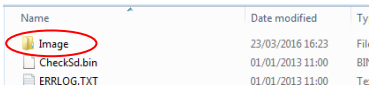
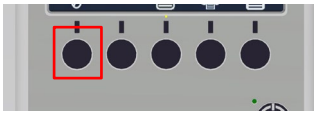
Upgrading the Firmware

To download the files required to upgrade your Lovibond® Model Fx instrument, please follow these instructions:

1 - Click on the link to download the upgrade file.	http://lvinfo.co.uk/downloads/Instruments/Model_Fx/
2 - If your web browser does not open automatically, open a browser and copy and paste the link into your browser.	 Pick your download file from the list
3 - You may get a message to save the file: The file is usually downloaded to your Downloads folder.	
4 - Use Windows® Explorer to open the Downloads folder. Right click on the folder and extract the files, to the suggested location or a location of your choice:	
5 - Open this location after file extraction. There should be a folder called ‘image’ within this folder.	

Upgrading the instrument

For the latest version of the Lovibond® Model Fx firmware, please contact service@tintometer.com.

1 - Connect the Lovibond® Model Fx Instrument to the host computer using the USB cable provided.	
2 - Turn on the instrument	
3 - If an 'Autoplay' popup appears on the host computer, select 'Open folder to view files'.	
4 - Otherwise, open Windows® explorer and select the appropriate Removable Disk.	
5 - The disk contents will be similar to the following:	
6 - If the 'Image' folder is present, delete it and its contents.	
7 - Copy the new 'Image' folder from the upgrade package to the instrument.	
8 - Turn off the instrument.	
9 - Press and hold the left hand button on the instrument keypad. Whilst holding this button, turn the instrument on. The screen will turn white while the instrument is installing the upgrade	  +

package. When installation is complete, the instrument turns off.	
10 - Turn the instrument on.	
11 - Confirm that the Firmware has been successfully installed by checking the Firmware Version field on the information screen (see xxx for details).	

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