



## EC 3000 ASTM



**Lovibond® Water Testing and Colour Measurement**

LM163010 Version 1.1

# Table of Contents


Environment:	4
Introduction:	5
Keypad:	6
Display Icons:	6
Power- USB:	6
Power- Battery:	6
Firmware and Version Number:	7
Settings	8
Instrument Diagnostics	8
Instrument Settings	9
Information	11
Power Saving Settings	11
Regional Settings	12
Date and Time	12
Projects:	13
New Projects	13
Set Tolerances	14
Averaging and Automatic Log (automatic saving)	15
Edit a Project	16
Delete a Project	16
Make a Project Default	17
Make a Project Current	18
View the Measurements	18
Delete a Measurement	18

Save a Measurement (manual saving) .....	19
Error Warnings: .....	20
Updating the firmware: .....	21
EC 3000 Kit Contents -ASTM .....	23
EC 3000 Technical Data - ASTM: .....	24
Performing a Zero - ASTM: .....	26
Performing a Test - ASTM: .....	27
Performing a Liquid Instrument Validation using a Liquid Reference Standard – ASTM.....	29
Performing an Instrument Validation using a Glass Reference Standard – ASTM .....	32
Sales Offices .....	34

## Environment:



This appliance is marked according to the European Directive 2002/95/EC on the waste of Electrical and Electronic Equipment (WEEE). By ensuring 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.


<b>DECLARATION OF CONFORMITY</b>
The Tintometer Limited, declare that the stated product(s) below conform to the following directives/standards:
<b>DIRECTIVES</b> 89/336/EEC, 92/31/EEC 73/23/EEC, 93/68/EEC
<b>TEST SPECIFICATIONS</b> EN 61326 - 2-1:2013, EN 301489 – 17 v2.2.2 using the common Technical requirements of EN 61326-1:2013 & EN301489-1 v1.9.2
FCC Rules CFR 47:2013 Part 15.107 and 15.109 Class B
<b>TESTS CARRIED OUT</b> Radiated RF & Conducted RF Emissions, Harmonic Current Emissions, Voltage Fluctuation & Flicker, Radiated and Conducted RF Immunity, Electrostatic Discharge Immunity, Electrical Fast Transient Burst Immunity, Voltage Surge Immunity Voltage Dips and Interruptions
<b>TYPE OF EQUIPMENT</b> Colorimeter
<b>MODEL(S)</b>
N Barnes (Technical Manager) On behalf of The Tintometer Ltd
Date: 15 <sup>th</sup> December 2014
<small>Registered Office: The Tintometer Limited - Lovibond House - Solar Way - Solstice Park - Amesbury SP4 7SZ - UK Registered in England No: 45024 Tel: +44(0)1980 064800 Fax: +44(0)1980 625412 Email: <a href="mailto:sales@tintometer.com">sales@tintometer.com</a> Internet: <a href="http://www.tintometer.com">www.tintometer.com</a> Lovibond® &amp; Tintometer® are registered trademarks of The Tintometer Limited</small>

## Introduction:

The Lovibond® EComparator Series provides an easy way to transition from subjective visual measurement to a non-subjective, accurate electronic measurement.

Colour graders who are used to the traditional comparator series sometimes find the upgrade or transition to an electronic system daunting. The assurance of relying on physical colour difference is diminished.

With the EComparator Series, users can view the colour in two different ways:

On-Screen Numerical Display

On-Screen Colour Display of sample and nearest colour scale standards

Touch screen technology allows the EComparator Series to show simple, specific and intuitive menus on screen. Users can set language, date and time, view preferences and create projects with individual tolerance settings. An on-screen warning system of:

Within Tolerance = Green;

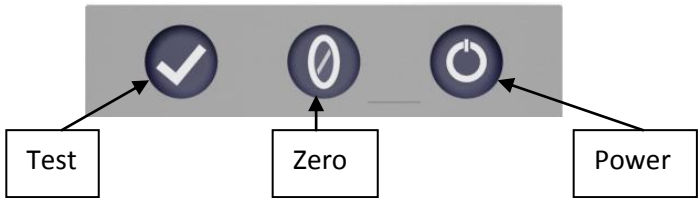
Outside Tolerance = Red;

On Border of Tolerance = Amber

provides the user with immediate information on the sample.

The user friendly ergonomics and intuitive interface guarantee new users can be quickly trained and easily supported. Large data storage (> 20,000 readings), USB connectivity ensure readings can be stored and shared easily and quickly. Flexibility is further enhanced with software packages for Windows®, IOS® and Android™ with multiple language support on-screen.

Keypad:



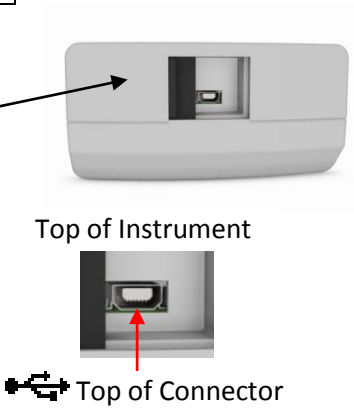
Display Icons:

<u>Icon</u>	<u>Function</u>
	Battery Low
	Powered by Battery
	Powered by USB
	SD Card OK
	Warning

Power- USB:

The USB port can be accessed by sliding the panel at the rear of the instrument.

Ensure the cable connector is inserted into the socket in the correct orientation. The symbol on the USB connector should be facing down.



Power- Battery:

The batteries can be replaced by removing the 4 x screws at the back of the instrument and removing the battery cover.



# Firmware and Version Number:

The Firmware and Version Number will be displayed when the instrument is switched on.

(Please Note: “Scale Name” will be replaced by the Scale your EComparator measures).

◀ Results

Info

Instrument Type: EComparator

Color Scale: Scale Name

Serial Number: 0

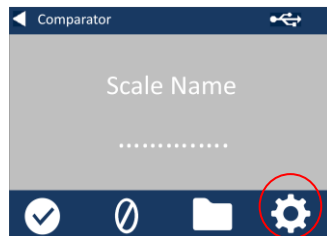
Firmware Version: Vx.x

Build Date: XX/XX/XX

Warranty Date: XX/XX/XX

# Settings

1 - To enter the settings menu, press the settings icon at the bottom tool bar.



1a -The settings display will show.

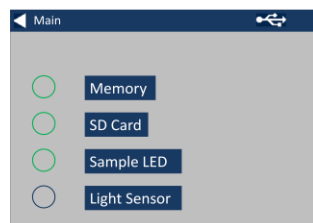


## Instrument Diagnostics

2 - For Instrument Diagnostics, press the Diagnostics Icon.



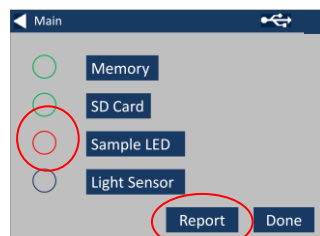
2a - The instrument will perform diagnostics on the Memory, SD Card, LED and Light Sensor.



2b - Any errors will be shown in red.

To view detailed information select Report.

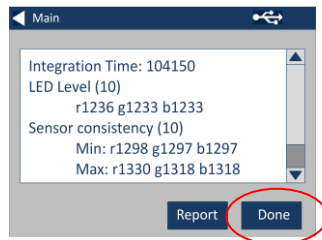
Please contact you local service centre for help.



[www.lovibondcolour.com/ServiceCenter](http://www.lovibondcolour.com/ServiceCenter)



2c - The instrument will display the report. When finished, select Done.



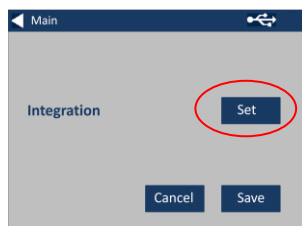
## Instrument Settings

3 - For Instrument Settings, press the Instrument Icon

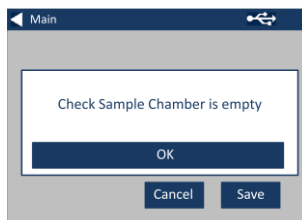


3a – To set the integration time, ensure the sample chamber is empty, and then press Set.

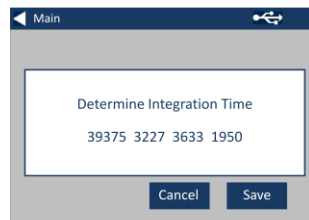
(This will set the optimum time for taking a measurement).



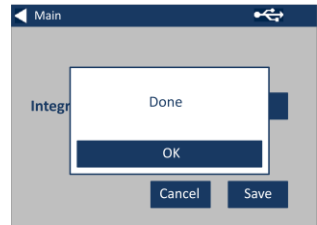
3b– The instrument will advise to check the Sample Chamber. Press OK when empty.



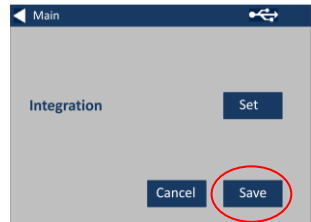
3c – The instrument will determine the integration time, a series of numbers will appear on the screen.



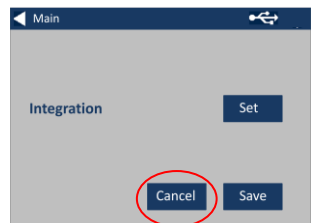
3d – Click OK when complete.



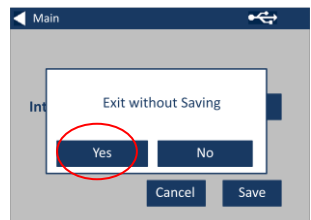
3e - To save the settings, press Save.



3f - To cancel the settings, press Cancel.



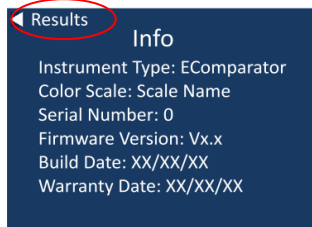
3g – To exit without saving, press Yes, or press No to continue.



## Information

4a – The information screen will be displayed. Press the back arrow to return to the results screen.

(Please Note: “Scale Name” will be replaced by the Scale your EComparator measures).

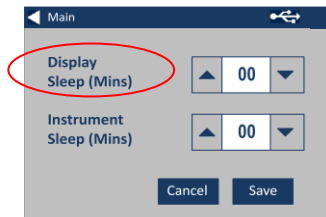


## Power Saving Settings

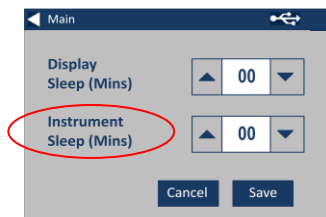
5 - For Power Saving Settings, press the Power Icon.



5a – Press the up and down arrows to adjust the time interval before the display goes to sleep in minute increments.

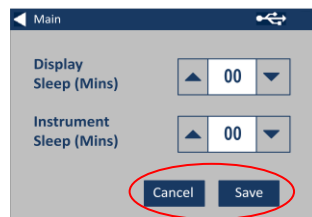


5b – Press the up and down arrows to set the time interval before the instrument shuts down after being inactive.



To restart the instrument, press the power button.

5c - To save the settings, press Save, or to cancel the changes, press Cancel.



5d- If screen starts to dim, press anywhere on the screen to turn backlight on.

## Regional Settings

6 - For Regional Settings, press the Regional Icon.



6a - Select the language that you would like the instrument to display.

The instrument will return to the settings screen.



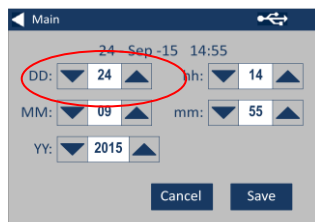
## Date and Time

7 - To set the Date and Time, press the Clock Icon.

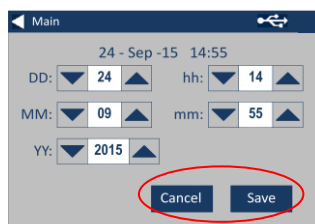


The current time shown is the time the screen was opened, and does not continuously update.

7a – Use the up and down arrows to set the date and time.

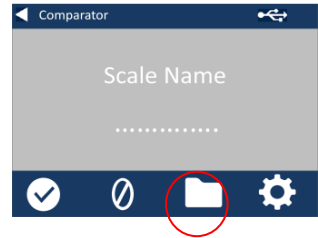


7b - To save the settings, press Save, or to cancel the changes, press Cancel.

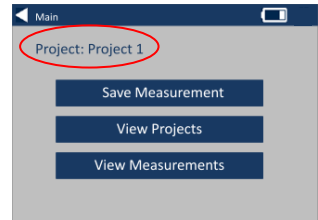


## Projects:

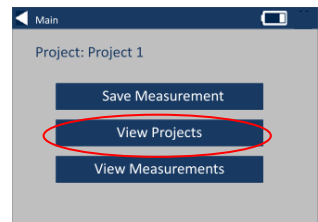
1 - To enter the projects menu, press the Projects Icon on the bottom tool bar.



2 – The projects screen will be displayed. The Project named at the top is the current project.

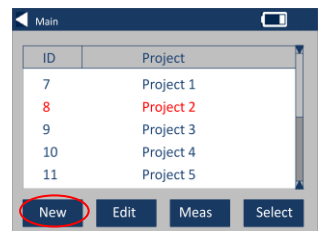


3 – To view, or manage projects, click on View Projects.

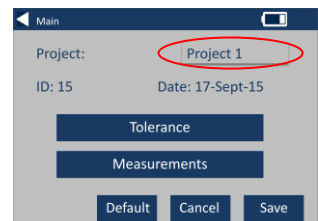


## New Projects

4 – This will bring up a list of the current projects. To create a New Project, click on New.



5 – To change the name, select the name box.



6 – Enter the new project name using the keypad, then select Return.

Enter Project Name											
Project 1											
0	1	2	3	4	5	6	7	8	9		
A	B	C	D	E	F	G	H	I	J		
K	L	M	N	O	P	Q	R	S	T		
U	V	W	X	Y	Z	Delete	Return				

## Set Tolerances

7 – The instrument will display the Project Settings Screen, to set the Tolerances, select Tolerance.

Main

Project: Project 1

ID: 15 Date: 17-Sept-15

**Tolerance**

Measurements

Default Cancel Save

8 – To apply the tolerance limits, select the Tolerance checkbox.

Main

Project: Project 1

Tolerance: ☒

HH: 3.0 H: 2.0

L: 1.0 LL: 0.0

Done

9 – To change the tolerance values, use the appropriate up and down arrows. Select Done when complete.

Main

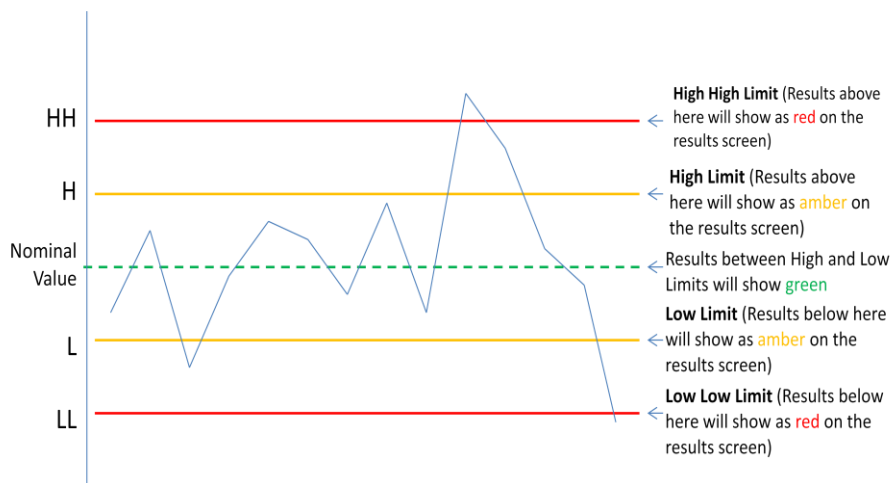
Project: Project 1

Tolerance: ☒

HH: 3.0 H: 2.0

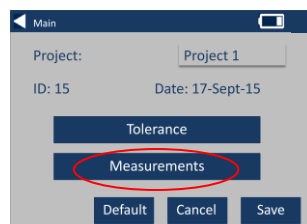
L: 1.0 LL: 0.0

Done



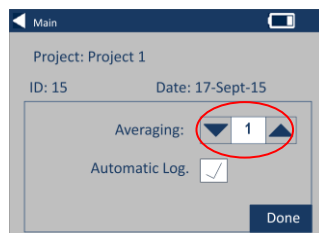
## Averaging and Automatic Log (automatic saving)

10 – To change the Averaging and Automatic Log (automatic saving), select Measurements.

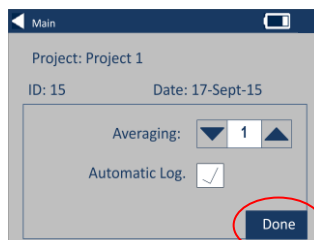


11 – To change the Averaging, use the up and down arrows

(This will set the number of measurements taken per test then take an average of those measurements).

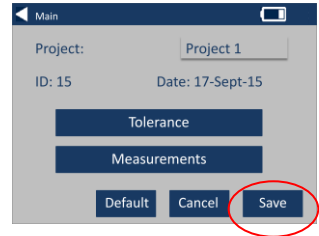


12 – To set the automatic logging, select the Automatic Log checkbox. This will save every measurement that is taken. Select Done when complete.



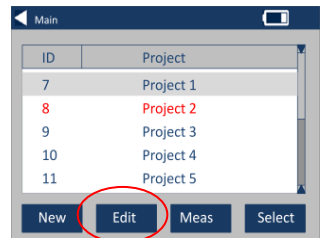
13 – To save all the settings, select Save.

NOTE: Until save is selected, neither Tolerance nor Measurements are saved.

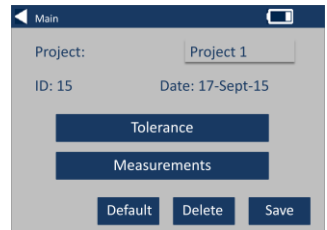


## Edit a Project

14 – To edit a project, go to the projects list. Highlight the project by clicking on it, and then select Edit.

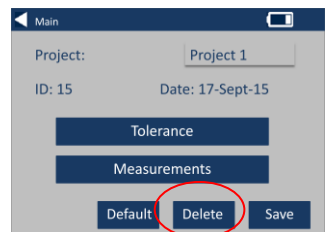


15 – This will bring you to the Project Settings Screen. To make changes follow steps 6-12.



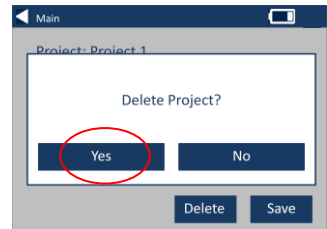
## Delete a Project

16 – To delete the project, select Delete.



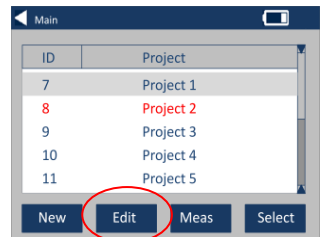


17 – The following prompt will appear. Select Yes to confirm.

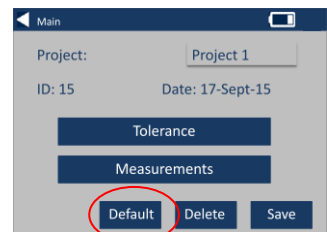


### Make a Project Default

18 – To make a project Default, go to the projects list (this will highlight the project that is current when the instrument is switched on). Highlight the project and select Edit.

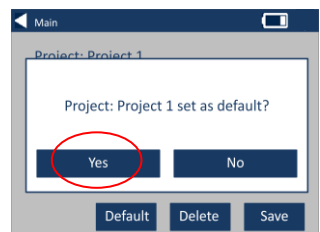


19 – Select Default.



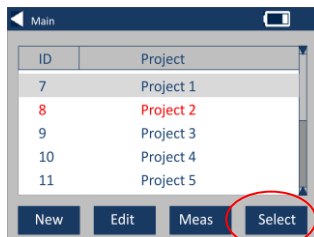
20 – The following prompt will appear. Select Yes to confirm.

**NOTE:** The first project (ID 1) can not be deleted, but can be re-named.



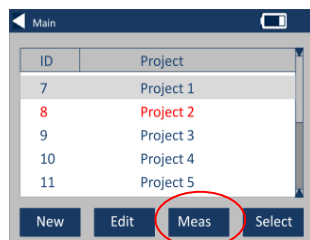
## Make a Project Current

21 – To make a project current, go to the project list, highlight the project required then press Select. All readings will be saved into the current project.

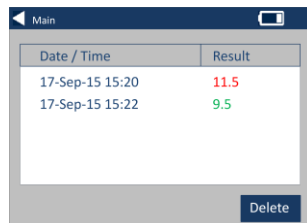


## View the Measurements

22 – To view the measurements of a project, go to the projects list, highlight the project required then press Meas.

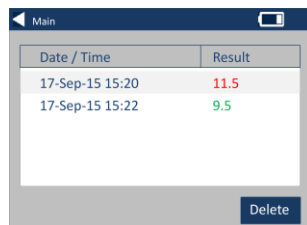


23 – This will bring up a list of the measurements stored for this project. If the tolerance limits are switched on (step 7), the results will be displayed as in the tolerance column (see page 15)

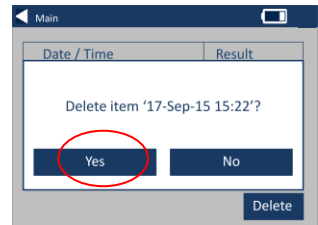


## Delete a Measurement

24 – To delete a measurement, highlight the measurement then select Delete.



25 – The following prompt will appear. Select Yes to confirm.



26 – To view the measurements from the main project screen for the current project (named at the top of the screen), select View Measurements.

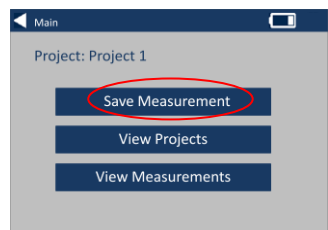


### Save a Measurement (manual saving)

27 – If automatic saving is not enabled, you can **save** every measurement taken by selecting Projects.



28 – On the main projects screen, select Save Measurement. This will save to the current project.



## Error Warnings:

Warning	Description
Error 1	SD Card Error
Error 2	Light Level Too High
Error 3	Light Level Too Low
Error 4	Sensor Error
Error 5	File System Error
Error 6	Communication Error
Error 7	Keypad Error
Error 10	Non Volatile Memory Error

Please contact you local Service Centre for help:

[www.lovibondcolour.com/ServiceCentre](http://www.lovibondcolour.com/ServiceCentre)

## Updating the firmware:

The latest version of the EC 2000 and EC 3000 firmware can be obtained from the internet, [www.lovibondcolour.com](http://www.lovibondcolour.com)

1 - Ensure that the EComparator Instrument is connected to a Computer running a Microsoft® Operating System (XP,7,8).



**NOTE:** This update cannot be performed on an Apple Mac or Linux® system

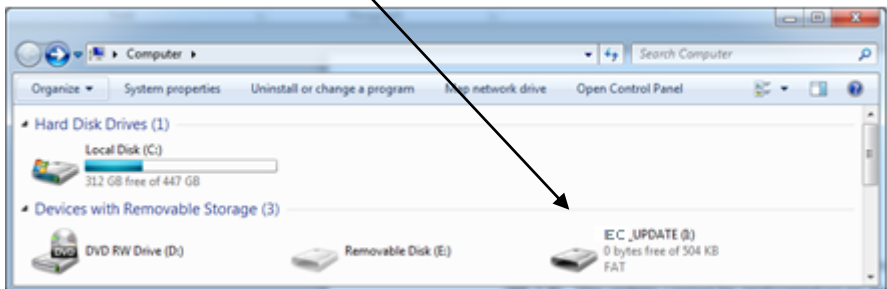
2 – Switch off the instrument.



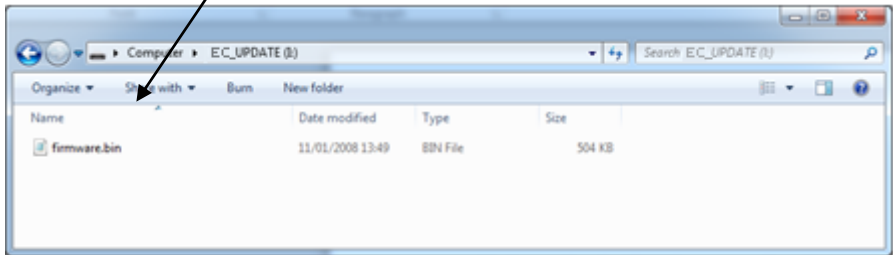
3 – Press and hold down the test key on the keypad whilst switching on the EComparator Series instrument.



4 – A drive named “EC\_UPDATE” will appear on your PC.

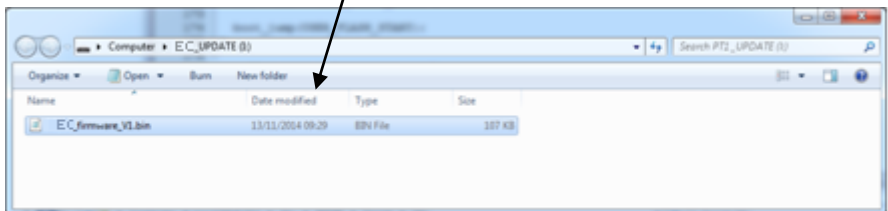


5 - Open the drive "EC\_UPDATE" the contents of the drive will show a file named "firmware.bin".



6 - Delete the file "firmware.bin"

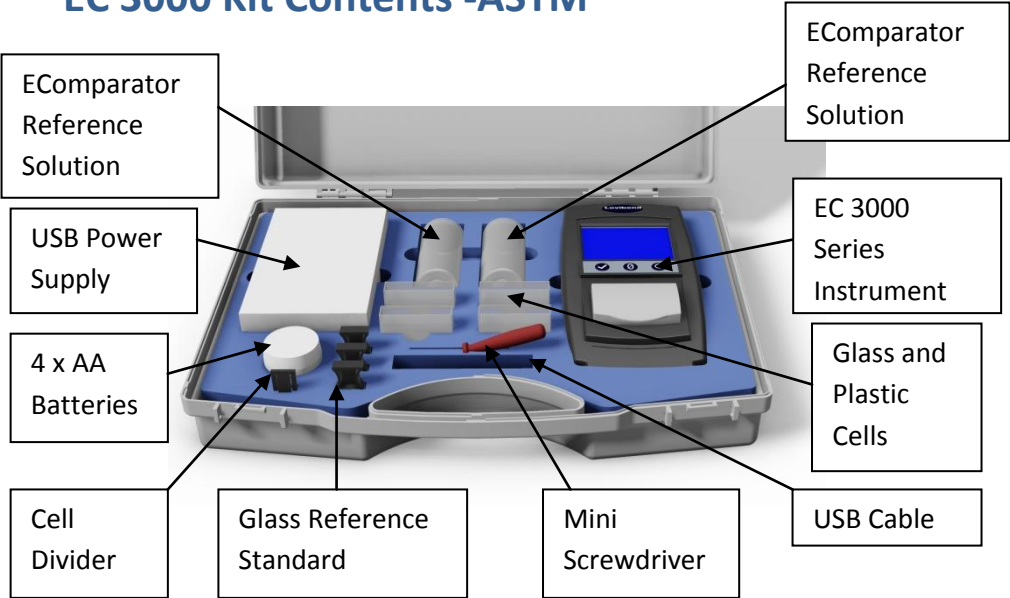
7 - Now copy the Update File onto this drive.



8 - Switch OFF the Instrument and then switch back it ON. The instrument will restart with the updated firmware.



# EC 3000 Kit Contents -ASTM



Item	Included
Instrument Type	EC 3000
Power Supply	•
USB Cable	•
Screwdriver	•
Pot of 4x AA Batteries	•
Liquid Reference Standard 1	•
Liquid Reference Standard 2	•
Glass Cell	• 2x W100 OG 33 mm
Plastic Cell	• 2x W100 33 mm
Glass Reference Standard 1	•
Glass Reference Standard 2	•

- Available in the kit

## EC 3000 Technical Data - ASTM:

Sometime referred to as the "**mineral oil color value**", the ASTM Colour Scale is widely used for the grading of petroleum products such as lubricating oils, heating oils and diesel fuel oils.

Mineral oils are constantly checked for colour during processing in order to establish when they have been refined to the required grade. Colour is also used as a means of confirming that the correct oil or fuel is being used for its intended use and that no contamination or degradation of quality has occurred.

ASTM D1500 is a single number, one dimensional, colour scale ranging from a pale straw through to a deep red in sixteen steps (0.5 - 8.0 units in increments of 0.5 units). Visual Comparators can achieve a resolution of 0.5 units, the EC 3000 instruments achieve a resolution of 0.1.

To comply with specifications, a 33 mm path length must be used.

ASTM D1500 superseded the 12-step D155 NPA (National Petroleum Association) scale in 1960.

Other petroleum products that do not fall within the scope of ASTM D1500 such as undyed gasoline, white spirit, petroleum wax and kerosene may be graded using the Saybolt test ASTM D156 or IP (Institute of Petroleum) 17.

Please note the Chinese Industrial Standard SH/T 0168 (0 to 25) is directly related to ASTM D1500 (0 to 8.0).

**Guaranteed Agreement with International Standards;** for many product types, a characteristic set of standards was agreed and adopted to aid colour control and the communication of colour specifications worldwide;



the result is a selection of colour grading scales that have been adopted as international industry standards.

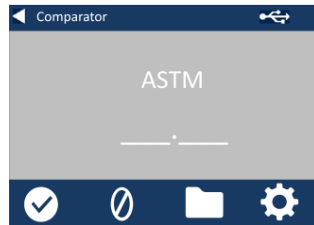
The EComparators are fully equivalent to the appropriate Visual International Standards and fully compliant with Automatic International Standards detailed below:

**EC 3000 ASTM Color (ASTM D1500, D6045)** because in the scope of ASTM: D6045 it states *“This test method correlates to Test Method D 156 and Test Method D 1500 as calculated by the instrumentation”*.

Parameter	Details
Colour Scales	ASTM
Range	0 to 80
Resolution	0.1
Repeatability	$\pm 0.1$

## Performing a Zero - ASTM:

1 – After initiation, the instrument will display:



2 – Ensure the sample chamber is empty.



3 - Close the sample lid and press the zero key on the keypad or the display.



4 - While performing a zero, the instrument will display:



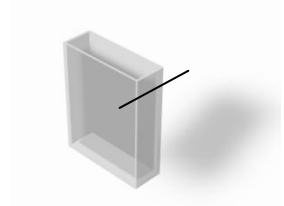
5 - When complete, the instrument will display:



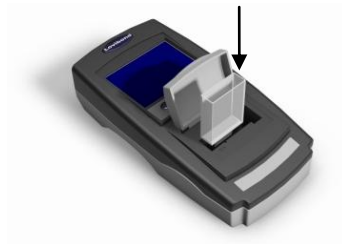
## Performing a Test - ASTM:

**Note:** Ensure that the sample being measured is free from turbidity; if necessary, filter the sample through a 0.45 micron filter paper.

1 – Fill a clean Cell 2/3 full with the sample.



2 - Place the cell in the sample chamber of the EComparator, push to the left hand side.



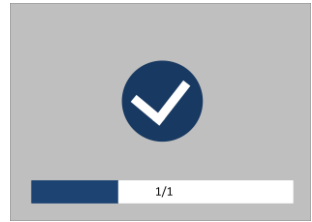
3 - Close the sample lid and press the test key on the keypad or the display.



4 - While performing a test, the instrument will display:



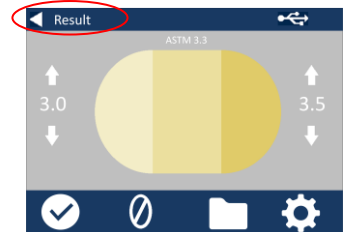
5 – If averaging is set the instrument will measure again and display:



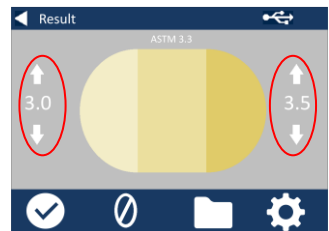
6 - The instrument will display the result as:



7 - Press the result button on the display to change between numeric and comparator mode.



8 - Press the up and down arrows to view the stages / steps as they would be on the visual disc.



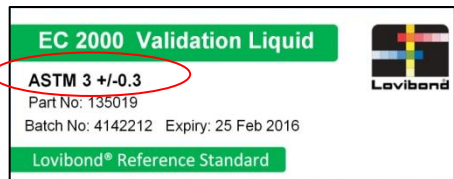
# Performing a Liquid Instrument Validation using a Liquid Reference Standard – ASTM

The EC 3000 Saybolt and ASTM are supplied with two bottles of Validation Liquid.



These liquids are used to validate that the instrument is measuring within the specified tolerances.

1 –Select a bottle of validation liquid and ensure that the selected validation liquid is within its expiry date.



2 – Ensure the sample chamber is empty.



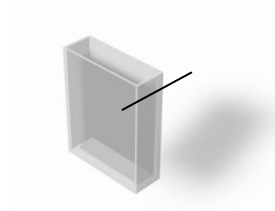
3 - Close the sample lid and press the Zero key.



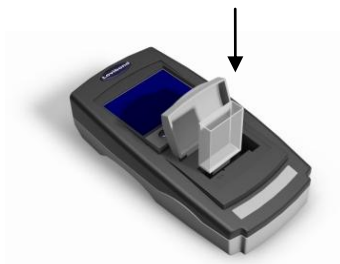
4 - While performing a zero, the instrument will display:



5 – Fill the supplied cell 2/3 with the reference solution.



6 - Place the cell in the sample chamber of the EComparator, push to the left hand side.



7 - Close the sample lid and press the test key on the keypad or the display.



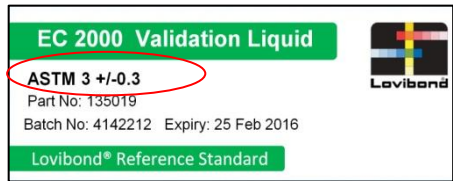
8 - While performing a test, the instrument will display:



9 - The instrument will display the result.



10 - Compare the result from the instrument to the value on the label of the validation liquid, to check it is within the specified tolerances.



# Performing an Instrument Validation using a Glass Reference Standard – ASTM

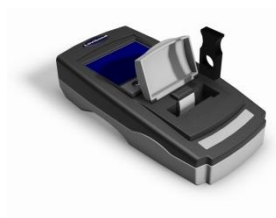
1 – Ensure the sample chamber is empty



2 –Close the sample lid and press the zero key



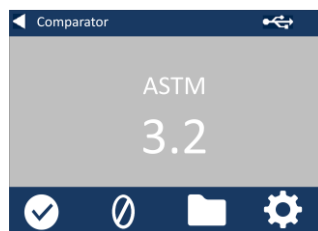
3– Place the selected standard in the sample chamber on the right hand side.



4– Press the test key on the keypad

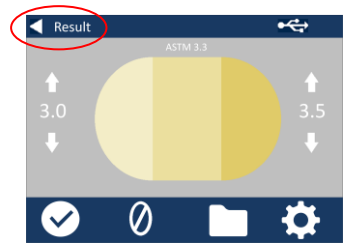


4– The result will be displayed on the screen. Compare these results to those on the label of the standard





5- Press the back arrow on the display to change between numeric and comparator mode



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