



EC 2000 Gardner

Lovibond® Water Testing and Colour Measurement

LM162020 Version 2.1

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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.


Lovibond

DECLARATION OF CONFORMITY

The Tintometer Limited, declare that the stated product(s) below conform to the following directives/standards:

DIRECTIVES
89/336/EEC, 92/31/EEC
73/23/EEC, 93/68/EEC

TEST SPECIFICATIONS
EN 61326 – 2-1:2013, EN 301489 – 17 V2 2.2 using the common
Technical requirements of EN 61326 -1:2013 & EN 301489 -1 . 9.2
FCC Rule CFR 47.3013 Part 15.107 and 15.109 Class B

TEST CARRIED OUT
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.

TYPE OF EQUIPMENT
Colorimeter

MODEL(S)
EC Series

N. Barnes

Date: 15th January 2016

N Barnes
(Technical Manager)
On behalf of The Tintometer Ltd

Registered Office:
The Tintometer Limited, Lovibond House, Sun Rise Way, Amesbury SP4 7GR, UK
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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;

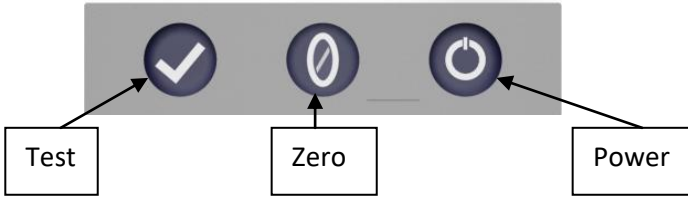
Outside Tolerance = Red;

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

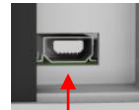
Power- USB:


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.



Top of Instrument



 Top of Connector

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

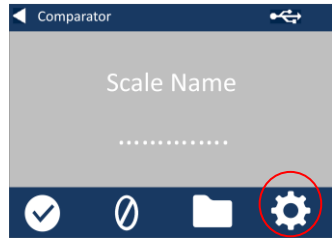
Firmware Version: Vx.x

Build Date: XX/XX/XX

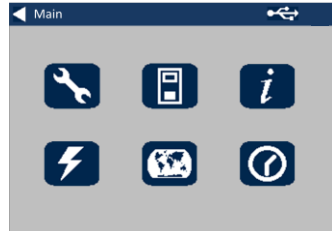
Warranty Date: XX/XX/XX

Settings

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



1a -The settings display will show.

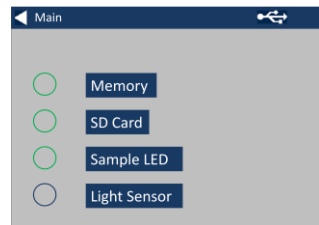


Instrument Diagnostics

2 - For Instrument Diagnostics, press the Diagnostics Icon.



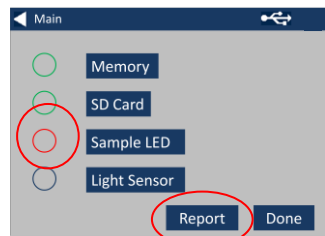
2a - The instrument will perform diagnostics on the Memory, SD Card, LED and Light Sensor.



2b - Any errors will be shown in red.

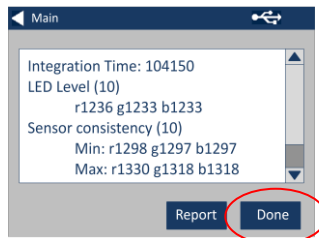
To view detailed information select Report.

Please contact you local service centre for help.



www.lovibondcolour.com/ServiceCenter

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



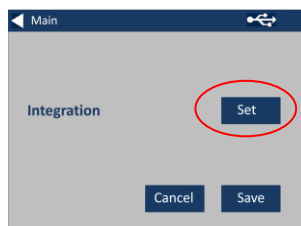
Instrument Settings

3 - For Instrument Settings, press the Instrument Icon

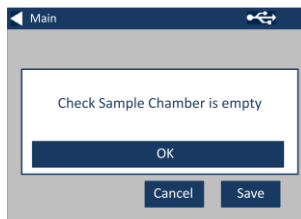


3a – To set the integration time, ensure the sample chamber is empty, and then press Set.

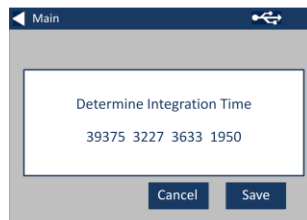
(This will set the optimum time for taking a measurement).



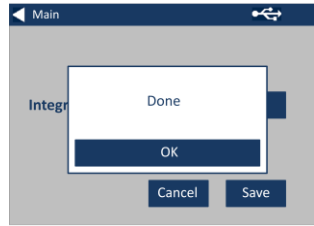
3b– The instrument will advise to check the Sample Chamber. Press OK when empty.



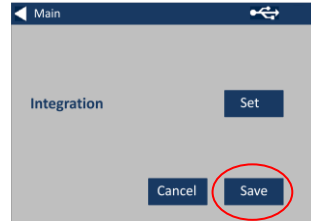
3c – The instrument will determine the integration time, a series of numbers will appear on the screen.



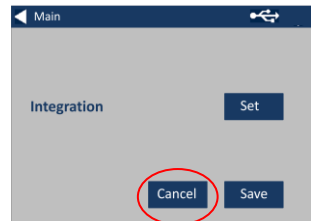
3d – Click OK when complete.



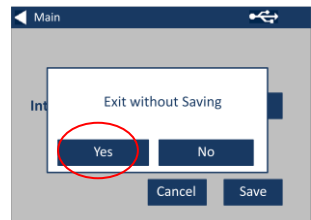
3e - To save the settings, press Save.



3f - To cancel the settings, press Cancel.



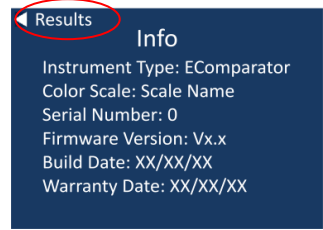
3g – To exit without saving, press Yes, or press No to continue.



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

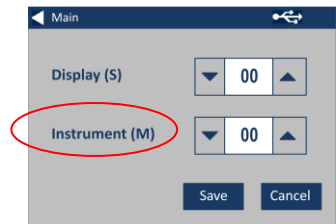
5 - For Power Saving Settings, press the Power Icon.



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

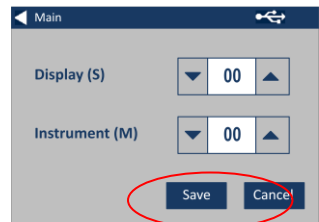


5b – Press the up and down arrows to set the time interval before the instrument shuts down after being inactive.



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.



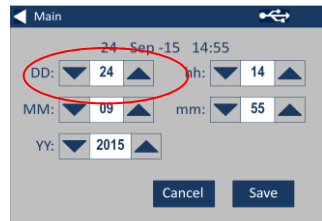
Date and Time

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

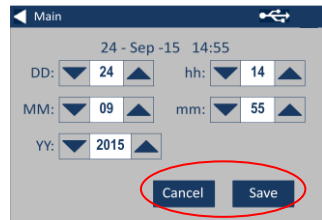


The current time shown is the time the screen was opened, and does not continuously update.

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

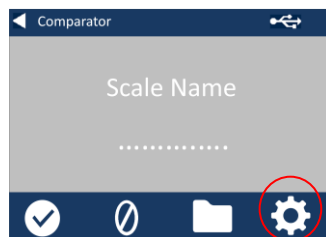


7b - To save the settings, press Save, or to cancel the changes, press Cancel.

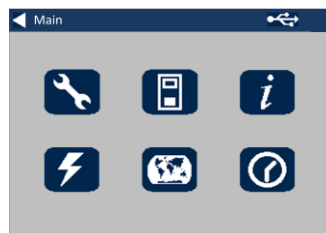


Calibrating the Touch screen

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



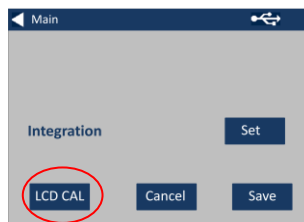
2 -The settings display will show.



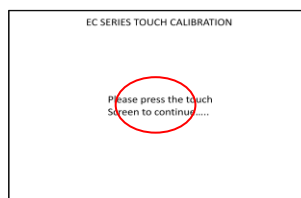
3 - Press the Instrument Icon



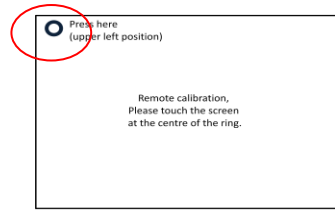
4 – To set the Touch Screen press LCD cal



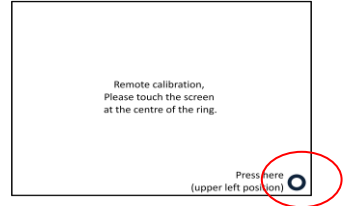
5 – The following screen will appear. With a stylus, press the touch screen.



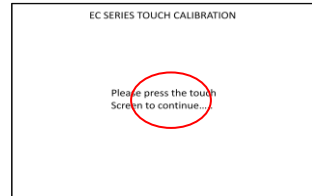
6 – The next screen will appear.
Using a stylus, press the screen in
the centre of the circle (top left)



7 – The next screen will appear,
using a stylus, press the screen in
the centre of the circle (bottom
right)



8 – The instrument will ask you to
repeat steps 5 to 7, five times



9 – When complete the following
screen will appear. To save the
settings, press Save

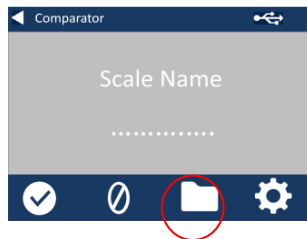


10 – To cancel the settings, press
Cancel

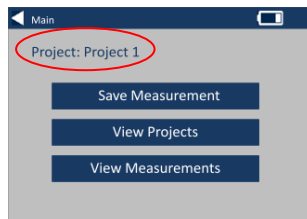


Projects:

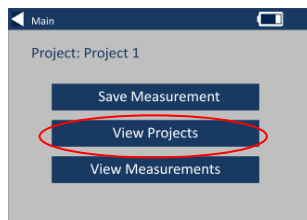
1 - To enter the projects menu, press the Projects Icon on the bottom tool bar.



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

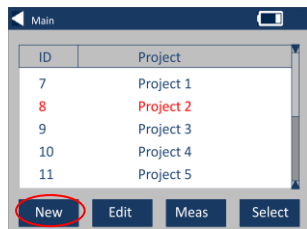


3 – To view, or manage projects, click on View Projects.

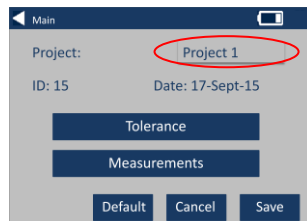


New Projects

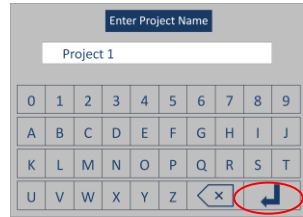
4 – This will bring up a list of the current projects. To create a New Project, click on New.



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

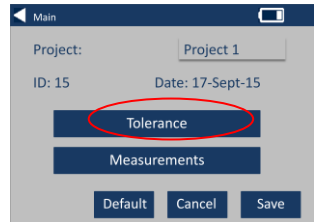


6 – Enter the new project name using the keypad, then select Return.

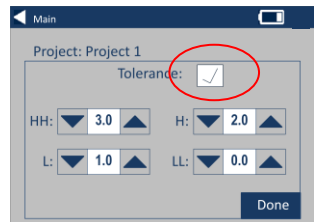


Set Tolerances

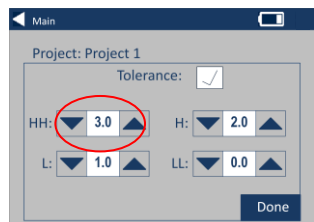
7 – The instrument will display the Project Settings Screen, to set the Tolerances, select Tolerance.

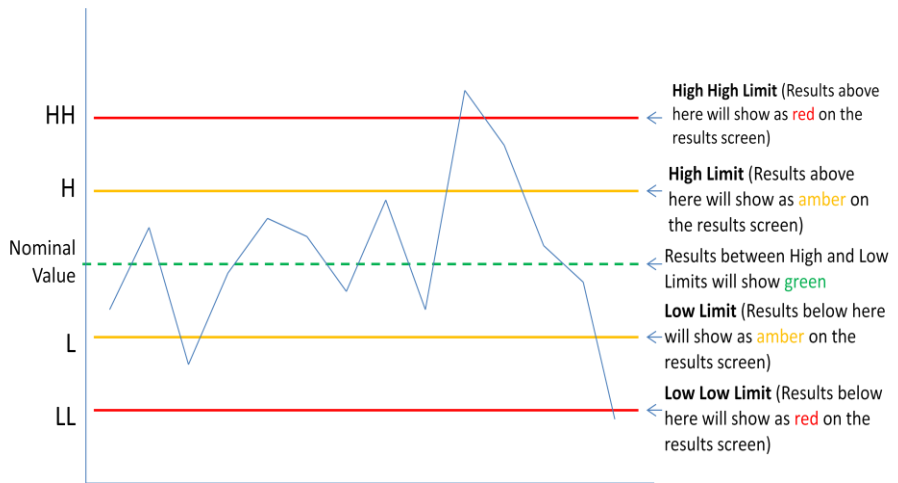


8 – To apply the tolerance limits, select the Tolerance checkbox.



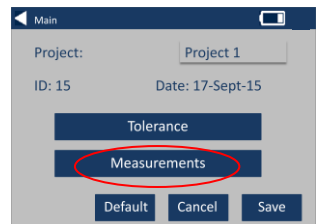
9 – To change the tolerance values, use the appropriate up and down arrows. Select Done when complete.





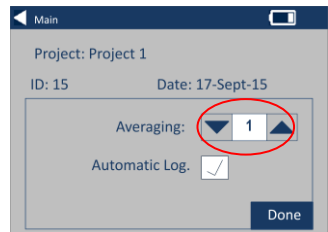
Averaging and Automatic Log (automatic saving)

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

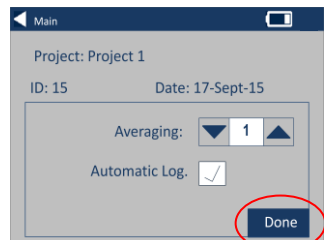


11 – To change the Averaging, use the up and down arrows

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

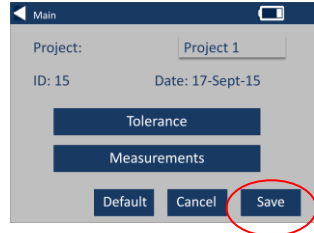


12 – To set the automatic logging, select the Automatic Log checkbox. This will save every measurement that is taken. Select Done when complete.



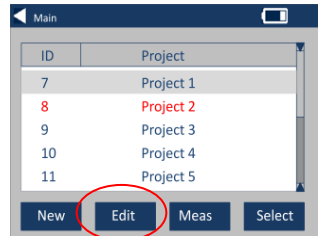
13 – To save all the settings, select Save.

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

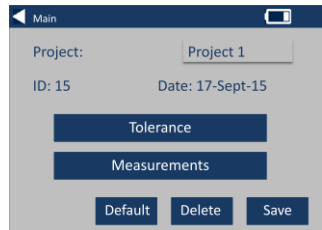


Edit a Project

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

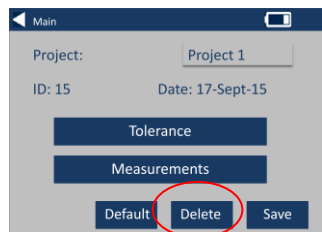


15 – This will bring you to the Project Settings Screen. To make changes follow steps 6-12.

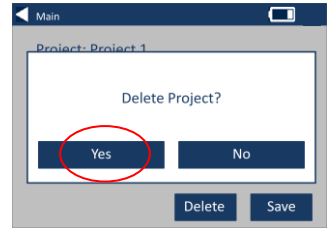


Delete a Project

16 – To delete the project, select Delete.

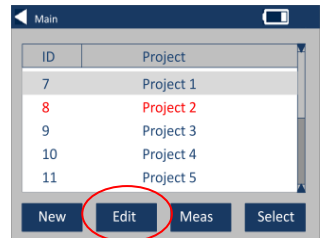


17 – The following prompt will appear. Select Yes to confirm.

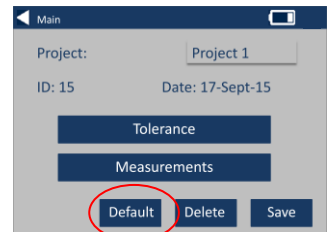


Make a Project Default

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.

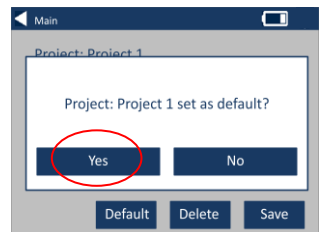


19 – Select Default.



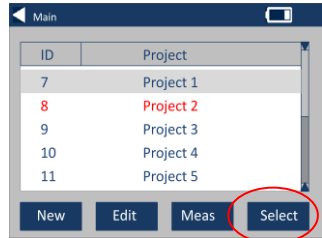
20 – The following prompt will appear. Select Yes to confirm.

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



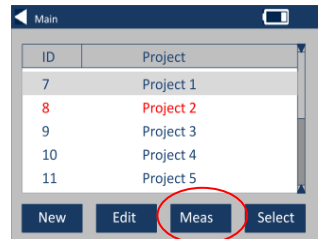
Make a Project Current

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.

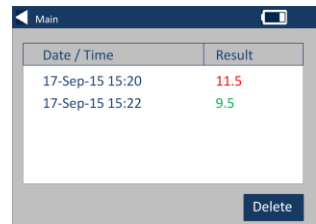


View the Measurements

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

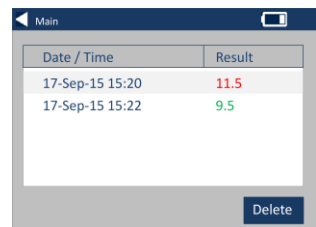


23 – This will bring up a list of the measurements stored for this project. If the tolerance limits are switched on (step 7), the results will be displayed as in the tolerance column (see page 15)

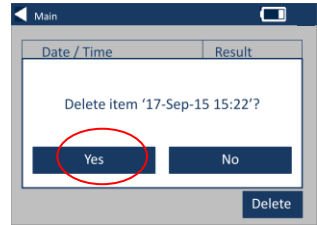


Delete a Measurement

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.

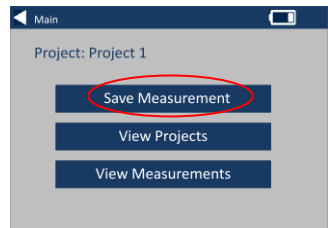


Save a Measurement (manual saving)

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

Upgrading the instrument

For the latest version of the EC 2000 and EC 3000 firmware please contact service@tintometer.com.

1 - Connect the EC Series Instrument to the Host Computer using the USB cable provided.



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

Top of Instrument

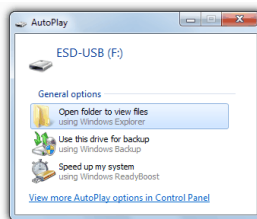


Top of Connector

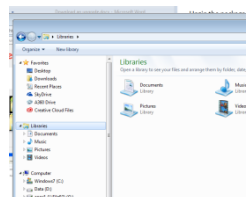
3 - Turn on the instrument



4 - If an 'Autoplay' popup appears on the Host Computer select 'Open folder to view files'.



5 - Otherwise open windows explorer and select the appropriate Removable Disk.



6 - The disk contents will be similar to the following:

Name	Date modified	Type	Size
Image	23/03/2016 16:23	File folder	
CheckSd.bin	01/01/2013 11:00	BIN File	1 KB
ERRLOG.TXT	01/01/2013 11:00	Text Document	1 KB
Pr000.V1a	01/01/2013 11:00	V1A File	1 KB
Pr-01.V1a	01/01/2013 11:00	V1A File	1 KB
SETTINGS.BIN	01/01/2013 11:00	BIN File	1 KB

7 - If the 'Image' folder is present delete it and its contents.

Name	Date modified	Type
Image	23/03/2016 16:23	File folder
CheckSd.bin	01/01/2013 11:00	BIN File
ERRLOG.TXT	01/01/2013 11:00	Text Document

8 - Copy the new 'Image' folder from the upgrade package to the instrument.

9 - Turn off the instrument.



10 - Press and hold the 'Read' button (the left hand button on the instrument keypad). Whilst holding this button, turn the instrument on.



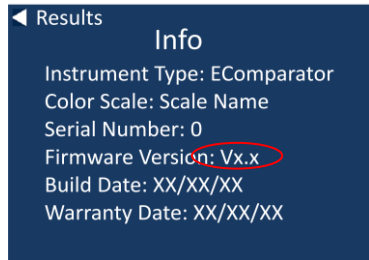
11 - Continue to hold this the Read button until the screen turns white. The instrument is now installing the upgrade package. When installation is complete the instrument turns off.



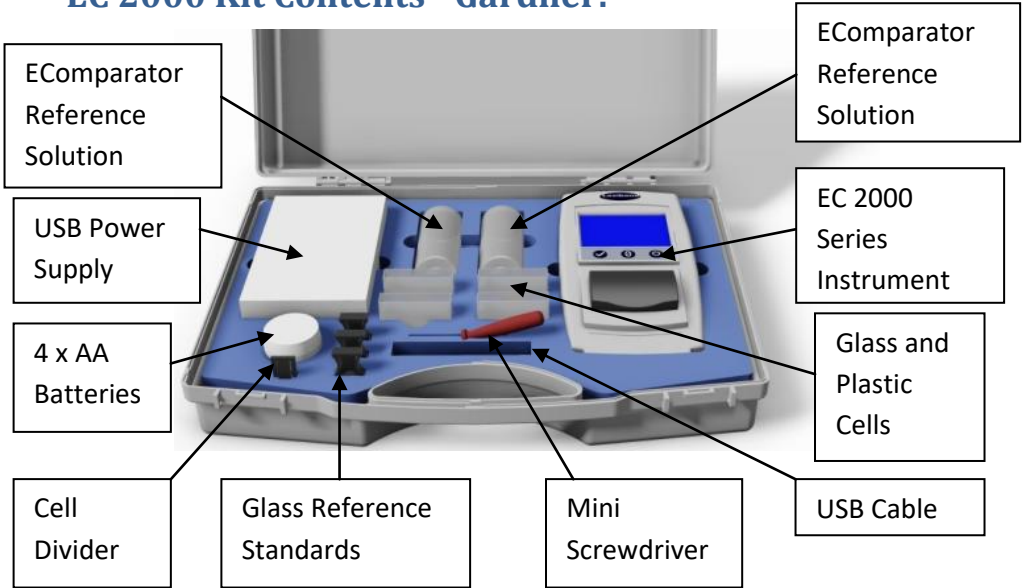
12 - Turn the instrument on.



13 - Confirm that the Firmware has been successfully installed by checking the Firmware Version field on the Information screen.



EC 2000 Kit Contents - Gardner:



Item	Included
Instrument Type	EC 2000
Power Supply	•
USB Cable	•
Screwdriver	•
Pot of 4x AA Batteries	•
Liquid Reference Standard 1	•
Glass Cell	• 1x W100 OG 10 mm
Plastic Cell	• 3x W100 10 mm
Glass Reference Standard 1	•
Spare Cell Divider	•

• = Available in the kit

EC 2000 Technical Data - Gardner

The Gardner Colour scale as specified in ASTM D1544 is a single number, one dimensional, colour scale for grading the colour of similarly coloured liquids such as resins, varnishes, lacquers, drying oils, fatty acids, lecithin's, sunflower oil and linseed oil.

The scale ranges from a pale yellow to a red in shade and is described in terms of the values 1-18. To comply with specifications, a 10mm path length must be used.

The light yellow Gardner colour numbers (1 to 8) are based on potassium chloroplatinate solutions, numbers 9 to 18 on solutions of ferric chloride, cobaltous chloride and hydrochloric acid.

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.

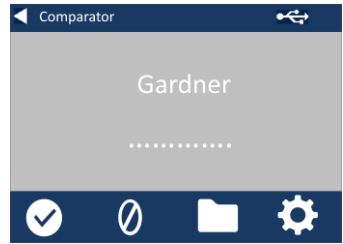
The EComparators are fully equivalent to the appropriate Visual International Standards and fully compliant with Automatic International Standards detailed below:

EC 2000 Gardner (ASTM D1544, D6166, ISO 4630-2) because in section "Significance and use" of ASTM D6166 section 4.1, *"This test method provides a more precise way of measuring Gardner Colour than described in Test Method D1544."* In the Scope of ISO 4630-2 it states *"The method described provides a more precise way of measuring Gardner colour than that described in ISO 4630-1"*.

Parameter	Details
Colour Scales	Gardner
Range	0 to 18
Resolution	0.1
Repeatability	± 0.2

Performing a Zero - Gardner:

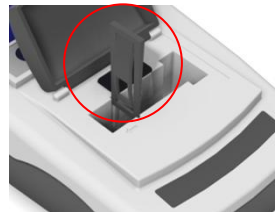
1 – Once initiated, the instrument will display:



2 - Ensure there is no cell in the sample chamber.



3 - Insert the cell divider in the groove in the sample chamber as shown.



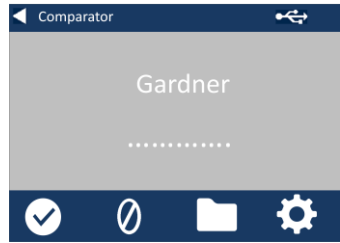
4 - Close the sample lid and press the zero key on the keypad or the display.



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



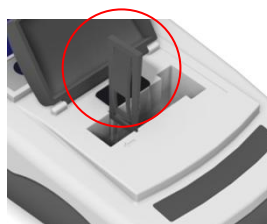
6 - When complete, the instrument will display:



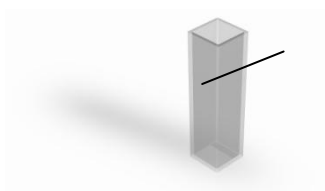
Performing a Test - Gardner:

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

1 - Insert the cell divider in the groove in the sample chamber as shown.



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



3 - Place the cell in the sample chamber of the EC 2000 Gardner, on the left hand side of the cell divider.



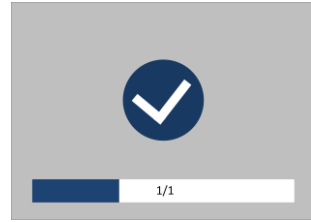
4 - Close the sample lid and press the test key on the keypad or the display.



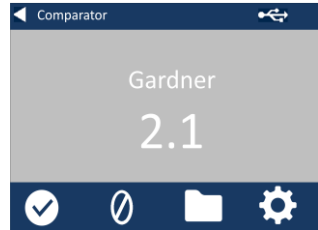
5 - While performing a test, the instrument will display:



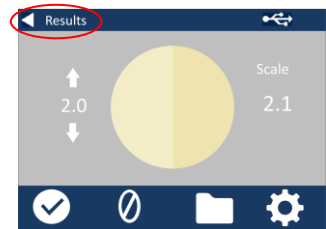
6 – If averaging is set the instrument will display:



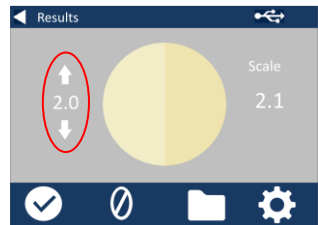
7 - The instrument will display the result as:



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



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



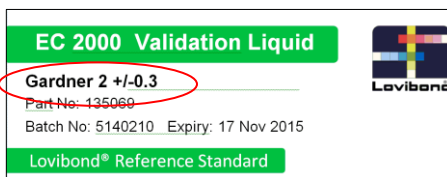
Performing a Liquid Instrument Validation- Gardner

The EC 2000 Gardner is supplied with one bottle of Validation Liquid.

This liquid is used to validate that the instrument is measuring within the specified tolerances



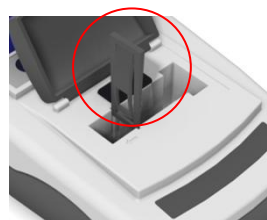
1 –Select the bottle of validation liquid and ensure that the selected validation liquid is within its expiry date.



2 – Ensure the sample chamber is empty.



3 - Insert the cell divider in the groove in the sample chamber as shown.



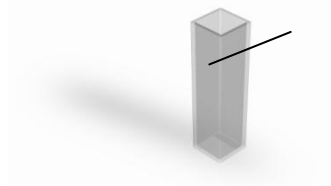
4 - Close the sample lid and press the Zero key.



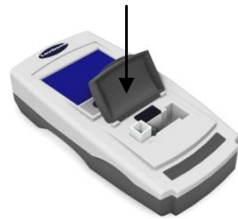
5 - While performing a zero, the instrument will display:



6 – Fill the supplied 10 mm cell 2/3 with the reference solution.



7 - Place the cell in the sample chamber of the EC2000 Gardner.



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



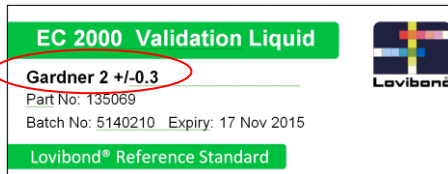
9 - While performing a test, the instrument will display:



10 - The instrument will display the result.



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

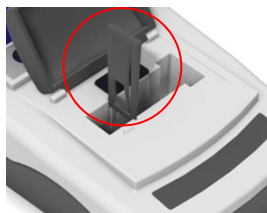


Performing an Instrument Validation using a Glass Standard – Gardner

1 –Ensure the sample chamber is empty



2 - Insert the cell divider in the groove in the sample chamber as shown, and close the lid



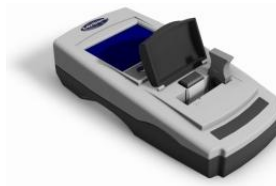
3 – Press the zero key



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



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



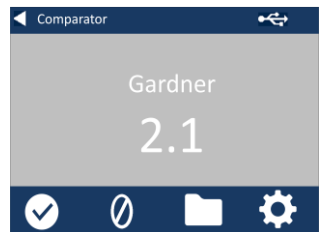
6— Press the test key on the keypad.



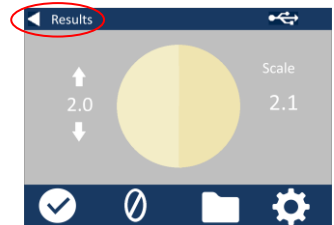
7 - While performing a test, the instrument will display:



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



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



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