English

Elcometer 355

Coating Thickness Gauge

Standard Model

Operating Instructions

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A copy of this Instruction Manual is available for download on our Website via www.elcometer.com.

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Thank you for your purchase of this Elcometer 355 Coating Thickness Gauge. Welcome to Elcometer.

Elcometer are world leaders in the design, manufacture and supply of coatings inspection equipment. Our products cover all aspects of coating inspection, from development through application to post application inspection.

The Elcometer 355 Coating Thickness Gauge is a world beating product. With the purchase of this gauge you now have access to the worldwide service and support network of Elcometer. For more information visit our website at www.elcometer.com

1 ABOUT YOUR GAUGE

The Elcometer 355 Coating Thickness Gauge is a handheld gauge for fast and accurate measurement of the thickness of coatings.

With a memory of up to 5000 readings in multiple batches and accuracy to ±1%, your gauge is a measuring system packed with time saving and cost cutting features.

1.1 STANDARDS

The Elcometer 355 can be used in accordance with the following National and International Standards:

FERROUS (F)

ASTM B 499, ASTM D 1186-B, ASTM G 12, BS 3900(C5), BS 5411 (11), DIN 50981, IMO MSC.215 (82), IMO MSC.244(83), ISO 1461, ISO 2063, ISO 2808-7C, *supersedes ISO 2808-6A, BS 3900-C5-6A, BS 5411-11, DIN 50981,* ISO 2808-12, ISO 19840, NF T30-124, SSPC-PA2.

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For the IMO PSPC[a], the thickness of coatings should be recorded. Your Elcometer 355 can be used for this.

NON-FERROUS (NF)

ASTM D 1400, BS 3900 (C5), BS 5411 (3), BS 5599, DIN 50984, ISO 2360 *supersedes BS 5411-3*, ISO 2808-7D *supersedes BS 3900-C5-6B, BS 5411-3, DIN 50984, ISO 2808-6B,* ISO 2808-12, ASTM B244 (probes N1, N4).

FERROUS AND NON-FERROUS (FNF)

AS 2331.1.4, AS 3894.3-B, AS/NZS 1580.108.1, ASTM D 7091 *supersedes ASTM D 1186, ASTM D 1400*, ASTM E 376,   EN 13523-1 *supersedes ECCA T1*,   ISO 2808-12,   US NAVY NSI 009-32, US NAVY PPI 63101-000.

a.   International Marine Organisation, Performance Standard for Protective Coatings.

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1.2 WHAT THE BOX CONTAINS

- Elcometer 355 Standard Gauge
- Leather carry case
- Precision Hand Grip
- Earpiece
- CD containing data collection software
- PC Cable
- Batteries
- Operating instructions

The gauge is packed in cardboard and foam packaging. Please ensure that this packaging is disposed of in an environmentally sensitive manner. Consult your Local Environmental Authority for further guidance.

To maximise the benefits of your new Elcometer 355, please take some time to read these Operating Instructions.

Do not hesitate to contact Elcometer or your Elcometer supplier if you have any questions.

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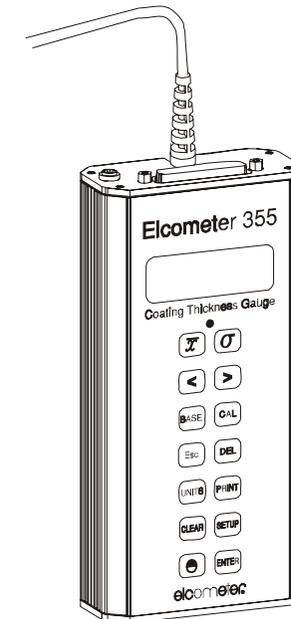
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2 GETTING STARTED

2.1 REMOVING THE CASE

To remove the leather case to gain access to the module and battery compartments, undo the retaining screw located on the bottom of the case and remove the gauge by pushing it through the hole.

2.2 FITTING BATTERIES

Batteries are located under the cover at the rear of the gauge. Fit three LR6 (AA), alkaline dry batteries, or rechargeable equivalent; take care to ensure correct battery polarity.

When the battery symbol ⊟▭▭▭⊞ is shown on the display, the batteries should be replaced. When the symbol starts flashing, the batteries will last approximately one more hour.

Note: Remove the batteries from the instrument if it is to remain unused for a long period of time. This will prevent damage to the instrument in the event of malfunction of the batteries.

Note: All batteries must be disposed of carefully to avoid environmental contamination. Please consult your local Environmental Authority for information on disposal in your region.

Do not dispose of any batteries in fire.
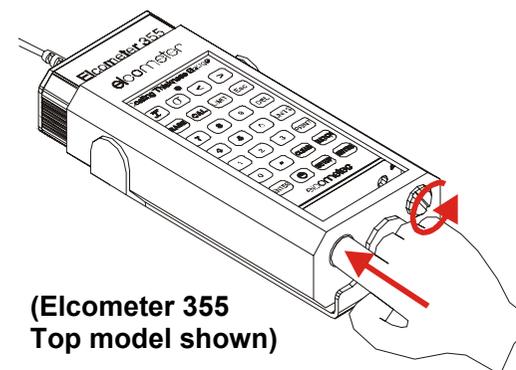
(Elcometer 355 Top model shown)

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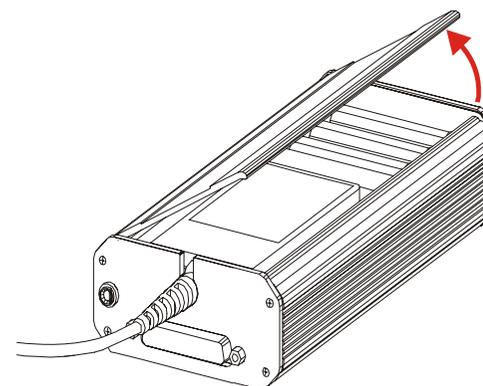
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2.3 CONNECTING A PROBE MODULE

1. Ensure the probe is suitable for the measurements to be made.
2. Switch off the gauge.
3. Open the cover at the back of the gauge.
4. Insert the probe module.
5. Replace the cover.

2.4 SWITCHING THE GAUGE ON AND OFF

- To switch your gauge on, press and hold [ ].

  The red LED flashes, the gauge clicks and all segments of the display are illuminated with the backlight on. The Software Version Number is then displayed.

  The instrument will then start up in the mode last used.

  Completion of start-up is indicated by one long beep and the red LED flashing.

- To switch your gauge off, press and hold [ENTER] for three seconds.

  Your gauge can also be set to switch off automatically - see "Date and time" on page 14.

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2.5 THE DISPLAY
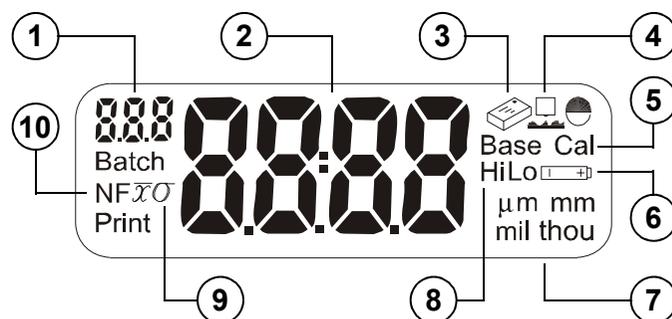
1. Reading number
2. Reading/menu item/value
3. Service required
4. Rough surface
5. Calibration type
6. Battery condition
7. Units
8. Limits
9. Average/Standard deviation
10. Non-ferrous/Ferrous

2.6 INTERFACE

A data output interface is located on the top of your gauge.

2.7 SELECTING A LANGUAGE

The Elcometer 355 has a number of languages built-in.To select a language, see "Language function" on page 17.

2.8 CHANGING UNITS

Your gauge can display coating thickness in μm[b] (microns), mm, mil and thou.

To change units, press [UNITS].

Note: When units are set to mm, the resolution of the display is such that only 1 μm resolution may be shown, e.g. 10.8 μm would be displayed as '0.011' mm.

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b.   μm will not be available as an option on probes which have a range greater than 9999 μm

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3 TAKING A READING

Switch on the gauge.

Place the probe on the surface to be measured. The reading may be inaccurate if the probe is not held as shown.

The green LED will flash and a beep will sound when a valid reading has been taken.

The coating thickness is shown on the display.
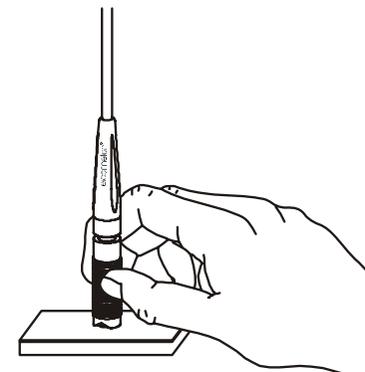
If the reading is just above the range of the module, the display shows:

In certain base conditions a negative over range can occur, indicated by:

In either of these two cases, check and re-calibrate if necessary - see "Calibration - BASE and CAL" on page 9.

In some conditions, the display may show error codes 'E14', 'E15', etc. For details of these error codes, see "Fault Finding / Error Codes" on page 27.

To save readings into memory (batching), refer to the instructions given in "Batches and memory" on page 10.

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4 CALIBRATION - BASE AND CAL

1. Press [BASE] for low end calibration on a zero plate or low value foil and [CAL] for higher foil.

2. Take a number of readings on the required calibration thickness. (Uncoated material for zero or base, a thin foil for rough surface or unusual materials and a thick foil for cal).

    (A wide range of foils is available - see "Foils" on page 32.)

    The foil value shown on the label applies to a measurement position as indicated:

    The display will show an average value - indicated by the [$\overline{x}$] symbol.

3. When the base or cal value shown on the display is stable, then adjust the display to the required value e.g. '0' or the foil value; use the [>] (CalUp) or [<] (CalDown) keys to adjust the value and then press [ENTER].

    The 'base' or 'cal' symbols and [$\overline{x}$] will now be removed from the display.

If a base value greater than zero is entered, the rough surface symbol will be displayed.

This symbol will disappear from the display if the base is reset to zero (0).
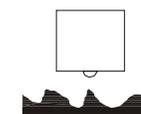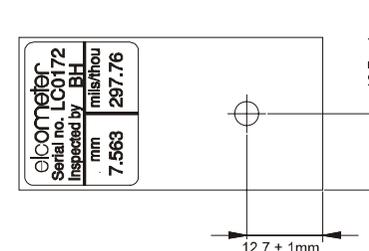
Note: If 'base' or 'cal' are used with regular values, the [BASE] or [CAL] keys may be pressed to recall the last value entered to the display in order to save re-entering the numeric data. [ENTER] is used to confirm the display value in memory.

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5 BATCHES AND MEMORY

5.1 SELECTING A BATCH

Batch numbers between 1 and 25 can be selected as follows.

With the instrument switched on, press [SETUP]. The display will show:

If a batch is selected the batch symbol is on.

This signifies the Auto Batch Entry Menu.

Press [ENTER].

An indication of the remaining memory will be displayed:

Bars will be removed from this display as the memory is filled. The upper bars show approximately 11% increments and the lower bars approximately 1% increments.

If the batch is new, the display will be blank and '0' will be shown as the reading no:

Batch numbers from 1 to 25 are preset and can be shown in the display by pressing [<] or [>] until the batch number required is visible.

When the correct batch number is displayed, press [ENTER] to load this batch in Auto batch mode.

If data exists in the batch selected, the last reading will be displayed.

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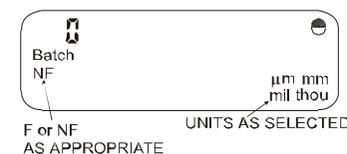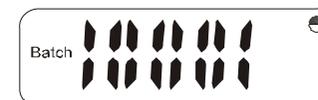
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or, if it is a new batch, then '0' is displayed as a reading number and the reading display is blank.

If the existing batch has been created with a different module to the one currently connected, the display shows 'E14'.

Immediate mode is designated as 'BATCH 0'. Returning to immediate mode from batch mode clears all previous immediate mode data and starts at reading '0'.

5.2 CLEAR/DELETE BATCH DATA

Data within a batch may be 'cleared' leaving the probe type and calibration. Alternatively the batch data and its associated probe type and calibration may be 'deleted'.

CLEARING BATCH DATA

Select the batch to be cleared - see "Selecting a batch" on page 10

Press [CLEAR] and the display will alternate between 'Clr' and 'batch no' as shown (batch number 14 in this example).
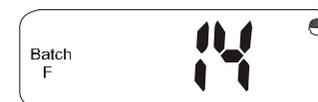
Press [ENTER] to clear the selected batch. If 'Batch 0' is selected and [CLEAR] is pressed, then all batches may be cleared and the display will alternate as shown:

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alternating with

Press [ENTER] to clear all batches, or [Esc] to cancel the operation. Press [Esc] again to return to immediate mode.

DELETING BATCH DATA

Select the batch to be deleted - see "Selecting a batch" on page 10.

Press [DEL] and the display will alternate between 'dEL' and 'batch no' as shown (batch number 14 in this example).

Press [ENTER] to delete the selected batch or [Esc] to cancel the operation.
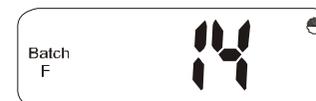
If 'Batch 0' is selected and [DEL] is pressed, then all batches may be deleted and the display will alternate between 'dEL' and 'ALL?'

Press [ENTER] to delete all batches or [Esc] to stop the operation.
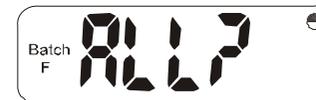
6 SETUP

The setup mode enables the User to adjust a number of different functions to suit the way the instrument is operated. The setup mode is based around 10 functions, each of which has sub-functions.

After pressing [SETUP], Function No 10 (for auto batching mode) will be displayed:

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Other functions may be selected by using [<] or [>] to go through the list. If [<] or [>] are pressed the individual functions are displayed and [ENTER] must then be pressed to select that function for modification. The symbol 'nA' in the display indicates that the function is not available in the Standard version of software.

Once a function is entered, [<] or [>] are used to either select the alternatives, or modify the value.

Sub-functions are displayed using a second number in the 'n' display. e.g. '11' for baud function within 'Prnt'.

Select the required value for the function or sub-function by pressing [ENTER]. Exit the function by pressing [SETUP] the required number of times (or [Esc]) to step back through the Sub Menus.

This display signifies the end of each menu's options.

The following sections describe each function (in numerical order).

6.1 PRINTER SETUP FUNCTIONS

Having pressed [SETUP] use [<] or [>] to select:

Press [ENTER].

Printer SetUp Sub-Functions

For serial printing, the printer's baud rate must be selected in the range 300-38,400.

Press [ENTER] and use [<] or [>] to select one of the options which are available e.g.
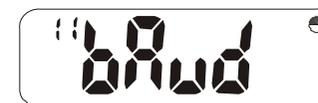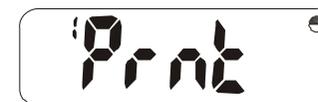
Press [ENTER] to set this option to required rate and return to the Printer SetUp Menu, or [Esc] to cancel the operation.

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Continue stepping through the Printer SetUp Menu by using [>]. Press [ENTER] at the required option and use [<] and [>] to select within that option ([Esc] cancels the operation):

End of line character is Cr or CrLF.

Selects 80 or 42 column printing (42 col. for Elcometer Portable Printer).

Page length 0-100 lines (0 for continuous printing).

0-10 spaces of indentation from left (not available with 42 column printer).

Type of report: Full or PArt (no readings).

6.2 DATE AND TIME

When setting the date and time, the display flashes a 2 digit pair for day, month, hours or minutes. These may be adjusted up or down by using [<] and [>] respectively. The year is a 4 digit number with limits of 1994 and 2093 and is adjusted using the [<] and [>] keys as before.

Having pressed [SETUP], use [<] or [>] to select, followed by [ENTER]:

Date and Time Sub Functions.

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Use [<] or [>] to select any of the following five sub functions:

Date format by Country

`²¹ Coun`

There are two date formats available:

`dM`

or

`Md`

d:M for Day:Month (UK)

M:d for Month:Day (USA)

Press [ENTER] or [Esc] to return to the 'Coun' display.

Continue stepping through the time and date functions by using [>]. Press [ENTER] at the required option and use [<] and [>] to select within that option ([Esc] cancels the operation):

Set day/month and year).

`²² dAtE`

Set time of day.

`²³ t I`

Time stamp (not available on Elcometer 355 model Standard).

`²⁴ tStA`

Switch off timeout period in minutes (1-30) or 0 for none.

`²⁵ oFFt`

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6.3 BEEPER FUNCTION

Having pressed [SETUP], use [<] or [>] to select:

Press [ENTER], and set beeper volume level using [<] or [>] (1 - 4 or 0 for none).

Press [ENTER] to return to the 'bEEP' display or [Esc] to cancel the operation.

6.4 PASSWORD FUNCTION

Having pressed [SETUP], use [<] or [>] to select:

Password Function

 (not available on Elcometer 355 model Standard)

6.5 AUTO MEASUREMENT MODE FUNCTION

Having pressed [SETUP], [<] or [>] selects:

This mode takes readings automatically and displays them digitally in the chosen units giving a form of analogue display. Press [ENTER] and use [<] and [>] to toggle between:

no - Normal digital Coating Thickness mode.

YES - Produces readings automatically.

The beeper should be turned off to stop it sounding continuously. Press [ENTER] to set this option or [Esc] to cancel the operation.

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6.6 BATTERY FUNCTION

Having pressed [SETUP], use [<] or [>] to select:

Press [ENTER] to show the battery level as a number of units. New alkaline batteries should display approximately 220 units. New Rechargeable batteries should display approximately 180 units. All batteries need to be replaced at readings of approximately 145. Note that Elcometer supplied rechargeable batteries should give a life of 1hr. between a flashing and a constant battery symbol, but alkaline batteries should last for a number of hours.

Press any operations key to return to the 'bAtt' display.

6.7 BACKLIGHT FUNCTION

Having pressed [SETUP], use [<] or [>] to select:

Backlight Enable/Disable.

Press [ENTER] and use [<] and [>] to toggle between:

on - Ensures the backlight is on at all times when required, but timed to maximise battery life.

oFF - The backlight will be off at all times except for power up display test.

Press [ENTER] to set this option or [Esc] to cancel the operation.
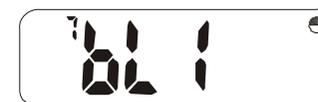
6.8 LANGUAGE FUNCTION

Having pressed [SETUP], use [<] or [>] to select:

Language formats used on printouts.

Press [ENTER] to see which language version is active.
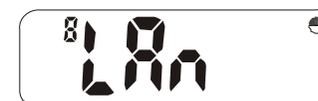
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The following languages are available:

English German

French Portuguese
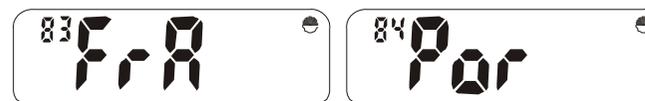
Swedish Danish

Press [SETUP], [ENTER] or [Esc] to return to the 'LAn' display.

6.9 REASONABLE LIMITS FUNCTION

Not available with standard software.

The 'nA' message will be displayed and the Elcometer 355 then exits the SetUp Menu automatically.

6.10 AUTOBATCH

This signifies the Autobatch entry Menu.

Note: If a batch is selected the batch symbol is on.

Pressing [ENTER] will consecutively display the following information:

This display shows the memory level for approximately 1 second.

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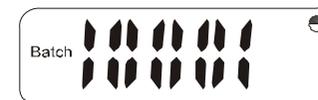
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F or NF symbol shows batch with reading for F or NF probe.

The preset batch numbers from 0-25 can be shown in the display by pressing [<] or [>].

Note: Immediate mode is designated as 'BATCH 0'. Returning to immediate mode from batch mode clears all previous immediate mode data and starts at reading '0'.

Note: If 'E14' is displayed when entering an existing batch, the batch has been set up with a different type of probe module.

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6.11 SETUP CHART

10 bAtC — Preset Batches 1-25 0=Immediate mode

9 rEAS — nA

8 LAn — 81 Eng / 82 dEu / 83 FrA / 84 Por / 85 Sue / 86 dAn / 0 End

7 bLI — on / oFF

6 bAtt — batt 210

5 Auto — YES / no

4 PASS — nA

3 bEEP — 1,2,3,4

2 tl — 21 Coun (d:M / M:d) / 22 dAte (4.10) / 23 tl (1994) / 24 tStA (nA) / 25 offt (off 5) / 0 End

1 Prnt — 11 bAud (38400 / 19200 / 9600 / 4800 / 2400 / 1200 / 600 / 300 / PAr) / 12 EoI (CrLf / Cr) / 13 8042 (80 / 42) / 14 LEn (LEn 66) / 15 Ind (Ind 0) / 16 rEP (FuLL / PArt) / 0 End

0 End

20
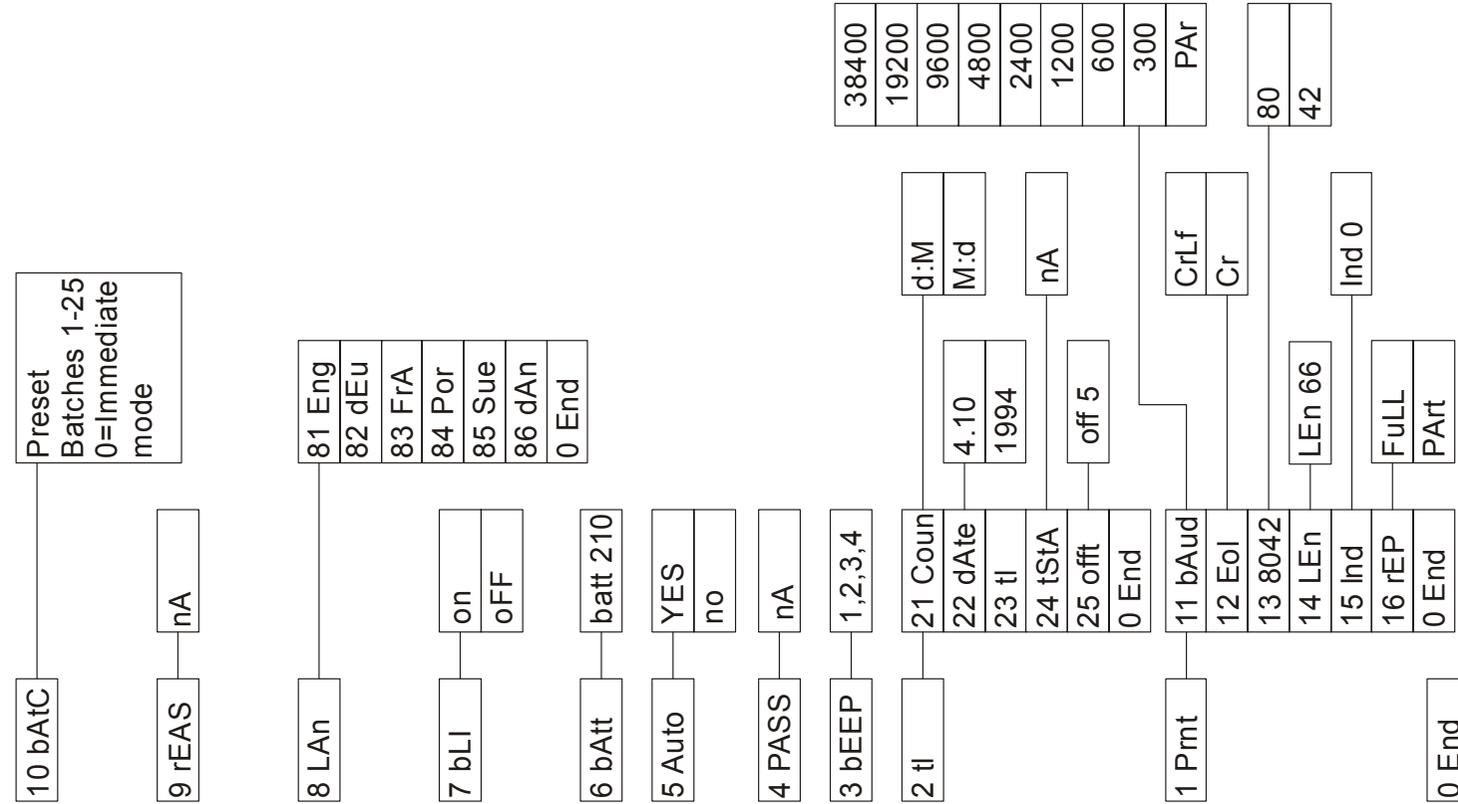
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7 STATISTICS

The stats keys [$\overline{x}$], [σ], [<] and [>] will display (for 1 second or for as long as the key is pressed) mean, standard deviation, lowest and highest readings whether in immediate (Batch 0) or auto batch mode.

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8 TRANSFERRING READINGS TO A COMPUTER

Your gauge comes complete with software which allows data to be transferred to a PC using a cable. The CD supplied with your gauge includes the following software.

- **Elcometer Data Transfer Software (EDTS⁺ Excel Link).** This software allows the user to transfer data from the memory of the gauge into Microsoft Excel using the PC connection cable. The data can then be processed in software such as Word or Excel.

- **ElcoMaster Software for Measurement Data.** This software allows the user to transfer data from the memory of the gauge to a PC for archiving, analysis and reporting. Data is transferred using the PC connection cable. ElcoMaster includes all the charts that you may need together with a report designer to let you design your reports the way you wish to see these.

- **ElcoMaster Data Conversion Software.** This software converts existing measurement data to ElcoMaster format. The following types of measurement data can be converted; Elcometer EDCS Win, EDCS Plus and EDCS.

All this software can also be downloaded from the Elcometer website www.elcometer.com

8.1 TRANSFERRING USING A PC CABLE

1. Connect your gauge to your PC COM port using the cable supplied. For USB, use the optional adapter, sales part number T99916716.
2. Switch on your gauge.
3. Start the software and follow the instructions included with the software.

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9 PRINTING

The Elcometer 355 can be used with EPSON compatible serial and parallel printers with the appropriate interface leads. The setup mode may be used to select either the baud rate for serial printers or the parallel output printing mode. If the Elcometer portable mini printer is being used, the 42 column mode should be selected with the 8042 sub-function within the Prnt function of setup - see "Printer setup functions" on page 13. The Full report can be shortened to PArt, which has statistics and histogram (not Batch 0).

9.1 PRINTER COMMANDS

Press [PRINT] to access the printing functions:

Use [<] or [>] to move between Print modes, [ENTER] to set a particular option or [Esc] to exit.
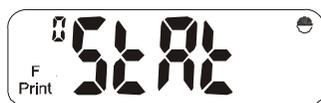
Press [ENTER] to print statistics and histogram for current batch* or immediate mode data.

Press [ENTER] for continuous printing mode as readings are taken.

Press [ENTER] to print a selected F batch*. Use [<] and [>] to select required F batch. Press [ENTER] to print.

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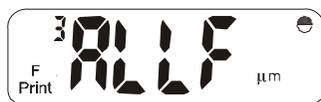
Press [ENTER] to print all F batches* in the order in which they were used.
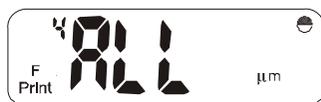
Press [ENTER] to print all F and then all N batches* used.

Press [ENTER] to print a selected N batch*. Use [<] and [>] to select required F batch. Press [ENTER] to print.
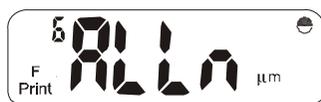
Press [ENTER] to print all N batches* in the order in which they were used.
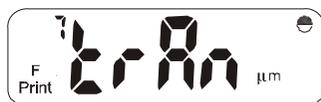
Press [ENTER] to select specific transfer mode which may be used to transfer data to Elcometer's ElcoMaster™ Software or to other data collectors.

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Use [<] and [>] to select the required sub-function of transfer mode. Sub-functions 72 to 76 (incl.) mimic print functions 2 to 6 shown previously.

Note: Sub-functions 71 (COnt) and 70 (oFF) are not available in the Elcometer 355 standard model. (If the User tries to operate either of these 2 sub-functions, the 'nA' message will be displayed before being returned to the 'trAn' display).

Press [SETUP] or [Esc] to return to the 'trAn' display.

Continue with [>] to view
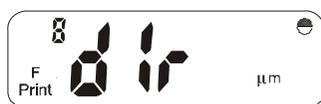
Press [ENTER] to print out a 'directory' of all batches stored within the instrument. Data will include probe type, scale and number of readings. Press [ENTER], [SETUP] or [Esc] to exit this option.

Press [ENTER] to view a number of software related functions.

Use [<] and [>] to select the required sub-function (numbers 91 to 96 incl.) as follows:

Press [ENTER] to display the software issue and version no. in form V.xx where x = issue no.

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92 Prob — Press [ENTER] to display the probe type and scale number.

93 CLoC — Press [ENTER] to display the current time, with the seconds in the small reading number display. Press any key to exit.

94 SEtu — Press [ENTER] to print out the current setup parameters as detailed in 'Setup '.

95 SE9 — Press [ENTER] to show all display segments and show the backlight is working. Press [ENTER], [Esc] or [SETUP] to end.

96 oFF — Press [ENTER] to turn the Elcometer 355 off, or [Esc] or [SETUP] to return to the 'SoFt' display.

Note: The batch symbol may be displayed if the instrument is in batch mode when the [PRINT] key is pressed. Also the units symbol will be dependent upon the units in use. For simplicity, µm are shown in all of the above displays.

* Detail depends on the setting of Report - whether it is Full or PArt.

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10 FAULT FINDING / ERROR CODES

To cancel any error code press [ENTER] or [Esc]:

Code	Explanation
E01	Calibration has been lost.
E02	Cal difference error is too large/small.
E03	A base value with too great a difference to that currently stored.
E04	Cal was attempted with too large a value.
E05	Base was attempted with too large a value.
E06	Number of readings is greater than 999.
E07	Too many readings stored.
E08	The printer is off-line. (There may be a delay of approximately 30 seconds before receiving this message).
E10	The memory is full.
E11	No readings were taken before trying to enter a base or cal factor.

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Code	Explanation
E13	Selected batch type not available.
E14	The probe module currently used is different to when this batch was created.
E15	The probe module is not responding or is not plugged in.
E18	Calibration Factor error. Too large a value has been entered for a Cal Factor.
E99	Cannot complete standard deviation calculation

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11 STORAGE

This gauge incorporates a Liquid Crystal Display (LCD). If the display is heated above 50°C (120°F) it may be damaged. This can happen if the gauge is left in a car parked in strong sunlight.

Always store the gauge in its carrying pouch when it is not being used.

Remove the batteries from the gauge and store them separately if the gauge is to remain unused for a long period of time. This will prevent damage to the gauge in the event of malfunction of the batteries.

12 MAINTENANCE

You own one of the finest hand-held coating thickness gauges in the world. If looked after, it will last a lifetime.

If you are not sure if your gauge is performing correctly, please contact Elcometer or your local Elcometer supplier for advice.

If during calibration the ⬡ symbol appears, this indicates that servicing is required.

If the ⬡ symbol is flashing, the instrument can still be used, but it should be returned for service at the next convenient opportunity.

If the symbol remains solid on the display while the instrument is switched on, then the instrument cannot be calibrated and should be returned for servicing immediately.

If you return your Elcometer 355 for any reason, please describe why as fully as possible. Make sure that you include any probe modules that are associated with the condition, as most faults are associated with the consumable item (the probe) and an alternative module may allow further use of your gauge. Regular checks of the probe module performance are therefore recommended.

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The gauge does not contain any user-serviceable components. In the unlikely event of a fault, the gauge should be returned to your local Elcometer supplier or directly to Elcometer. The warranty will be invalidated if the gauge has been opened.

Contact details can be found:

- on the outside cover of these operating instructions
- at www.elcometer.com

13 ACCESSORIES

A range of optional accessories is available for your Elcometer 355 Coating Thickness Gauge. For more information, or to place an order, please contact Elcometer or your local Elcometer supplier.

Consult the following sections for details of:

- probe modules
- foils
- precision hand grip
- probe placement jig
- protective covers
- rechargeable batteries
- dry batteries
- headphones/earpiece

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13.1 PROBE MODULES

Elcometer's unique Probe Modules allow versatile application of the Elcometer 355 Coating Thickness Gauges. Probe Modules can be freely interchanged as required on both ferrous (F) and non-ferrous (NF) metal substrates. Most Probe Modules are capable of an accuracy of ±1% of the reading on a variety of coatings and surfaces.

Probe type	Part number	Range	Accuracy	Resolution	in range
F1 Standard	T35511952	0 µm to 1500 µm 0 mils to 60 mils	±1% or ±1 µm ±1% or ±0.04 mil	0.1 µm 0.05 µm 1.0 µm 0.005 mils 0.02 mils 0.05 mils	0 µm to 200 µm 200 µm to 500 µm 500 µm to 1500 µm 0 mils to 8 mils 8 mils to 20 mils 20 mils to 60 mils
F1 Right Angle	T35511953				
F1 Telescopic	T35511959				
F1 A (Automotive)	T35512400				
F2 Standard	T35511954	0 mm to 5 mm 0 mils to 200 mils	±1% or ±5 µm ±1% or ±0.2 mil	2 µm 5 µm 0.1 mils 0.2 mils	0 µm to 0.5 mm 0.5 mm to 5 mm 0 mils to 20 mils 20 mils to 200 mils
F2 Right Angle	T35511955				
F2 Telescopic	T35511960				
F3 Standard	T35511956	0 mm to 13 mm 0 mils to 500 mils	±2% or ±30 µm ±1% or ±1 mils	5 µm 10 µm 0.2 mils 0.5 mils	0 µm to 1mm 1 mm to 13 mm 0 mils to 40 mils 40 mils to 500 mils
F4 Standard	T35511950	0 µm to 250 µm 0 mils to 10 mils	±1% or ±1 µm ±1% or ±0.04 mil	0.1 µm 0.005 mils	0 µm to 250 µm 0 mils to 10 mils
F4 Right Angle	T35511951				

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Probe type	Part number	Range	Accuracy	Resolution	in range
F5 (Rebar)	T35511962	0 µm to 800 µm 0 mils to 32 mils	±1% or ±2 µm ±1% or ±0.08 mil	1 µm 0.1 mils	0 µm to 800 µm 0 mils to 32 mils
F6 Standard	T35511964	0 mm to 25 mm 0 mils to 1000 mils	±2% or ±100 µm ±1% or ±4 mils	10 µm 50 µm 0.5 mils 2 mils	0 mm to 5 mm 5 mm to 25 mm 0 mils to 200 mils 200 mils to 1000 mils
N1 Standard	T35511982	0 µm to 1500 µm 0 mils to 60 mils	±1% or ±1 µm ±1% or ±0.04 mil	0.1 µm 0.05 µm 1.0 µm 0.005 mils 0.02 mils 0.05 mils	0 µm to 200 µm 200 µm to 500 µm 500 µm to 1500 µm 0 mils to 8 mils 8 mils to 20 mils 20 mils to 60 mils
N1 Right Angle	T35511983				
N2 Standard	T35511984	0 mm to 5 mm 0 mils to 200 mils	±1% or ±15 µm ±1% or ±0.6 mil	2 µm 5 µm 0.1 mils 0.2 mils	0 mm to 0.5 mm 0.5 mm to 5 mm 0 mils to 20 mils 20 mils to 200 mils
N4 (Anodisers)	T35511980	0 µm to 250 µm 0 mils to 10 mils	±1% or ±1 µm ±1% or ±0.04 mil	0.1 µm 0.005 mils	0 µm to 250 µm 0 mils to 10 mils

13.2 Foils

Each probe module is supplied with an appropriate set of precision foils measured using a linear displacement transducer with an accuracy of 1% or 1 µm (whichever is the greater) of the reading.

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These sets are consumable items and will need replacing on a regular basis depending on their use and the care taken during use and storage.

If required, these foil sets or individual foils can be supported at the time of purchase by an optional Calibration Certificate with traceability to National Standards. Foil set sales part numbers are as follows:

Foil Set	Part Number	
	Without Certificate	With Certificate
Scale 1 : 1500 µm (60 mils)	T99022255-1	T99022255-1C
Scale 2 : 5000 µm (200 mils)	T99022255-2	T99022255-2C
Scale 3 : 13 mm (500 mils)	T99022255-3	T99022255-3C
Scale 4 : 250 µm (10 mils)	T99022255-4	T99022255-4C
Scale 5 : 800 µm (32 mils)	T99022255-5	T99022255-5C
Scale 6: 25 mm (980 mils)	T99022255-6	T99022255-6C

Also available on request are Certified Coated Thickness Standards on ferrous or non ferrous metal substrates, consisting of a zero plate and 4 thickness values to Customer's requirements and measured to an accuracy of 1% or 1mm whichever is the greater. These Standards are all supplied with a Calibration Certificate.

13.3 Precision hand grip

The Elcometer 355 is supplied with a precision hand grip for use with the F1, F2 and N1 standard style probes. The grip is designed to help control the placement of the probe on surfaces in a repeatable way so that the optimum accuracy capability can be achieved. The grip controls the cable and positions the tip at

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right angles to the substrate to avoid any errors that are introduced by variations in these parameters. The probe can be used without the grip where the smaller diameter probe is advantageous, but some effect on accuracy may result from the probe twisting between measurements or not being truly set at right angles to the substrate. If a replacement Hand Grip is required, use Sales Part Number T35512026.

13.4 Probe placement jig

A probe stand which can be used to position a range of probes on small components is available. Use Sales Part Number T95012880.

13.5 Protective covers

The Elcometer 355 is supplied with some clear plastic, disposable sheets which protect the unit from overspray. Additional covers are available in lots of 10. Use Sales Part Number T35512051.

13.6 Re-chargeable batteries

The Elcometer 355 can be operated using 3 x 1.2 V nickel metal hydride (NiMH) cells which are charged externally. Suitable chargers are available for all voltage options.

13.7 Dry batteries

The Elcometer 355 can be powered by 3 x 1.5 V (LR6) AA alkaline cells. Zinc carbon batteries will give a shorter operating life.

13.8 Headphones/earpiece

The Elcometer 355 has a 3.5mm jack socket fitted to the top end plate next to the 25 way D socket. This may be used with an earpiece with volume control (Part No. T35512220) or with headphones (Part No. T35512216) so that the beeper signals can be heard in high ambient noise environments.

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14 TECHNICAL SPECIFICATION

For specification details of probe modules please see the separate probe Module Data Sheet.

Instrument Dimensions: 175 mm x 83 mm x 42 mm (6.9" x 3.3" x 1.6")

Weight: 650 g (1.43 lbs) (incl. probe module and batteries)

Operating Temperature: 0°C to 50°C (32°F to 120°F)

Storage Temperature: -10°C to 60°C (14°F to 140°F)

Batteries: 3 x 1.5 V AA cells alkaline or 3 x 1.2 V NiMH re-chargeable cells

Battery Life: Alkaline   40 hours minimum
                 NiMH   20 hours minimum

15 RELATED EQUIPMENT

Elcometer produces a wide range of coating thickness gauges and associated paint inspection equipment. Users of the Elcometer 355 may also benefit from the following Elcometer products:

• Elcometer 550 Uncured Powder Thickness Gauges

• Elcometer 157 Coating Thickness Gauge

• Elcometer 211 Coating Thickness Gauge

• Elcometer 101 Coating Thickness Gauge

For further information contact Elcometer, your local Elcometer supplier or visit www.elcometer.com

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16 TUTORIAL

This tutorial is intended to demonstrate the features of the Elcometer 355 Standard instrument and is designed to work with an F1 module fitted to an unused Elcometer 355. If other modules are used, or if information is stored from previous operations, the response of the instrument to the commands below may be different. It is also intended to familiarise the User with of the functions of the Elcometer 355, but actual use of the instrument depends on application and requirements of the process.

16.1 Switch ON

To switch on press and hold [🔽]. Note display of all segments and software identification.
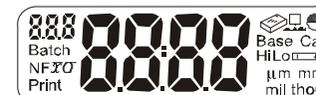
The instrument 'wakes up' in the mode last used. To switch off, press and hold [ENTER] for approximately 3 seconds).

Note: *The instrument will normally switch off automatically after 1 minute if no operation is carried out - see "Date and time" on page 14 to adjust.*

16.2 Select Immediate Mode (Batch 0)

Press [SETUP] and the display shows:

Note: *If a batch is selected the batch symbol is on.*

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Press [ENTER] and the display will flash:

The batch number is then shown.

Press [ENTER] again and the display will show:
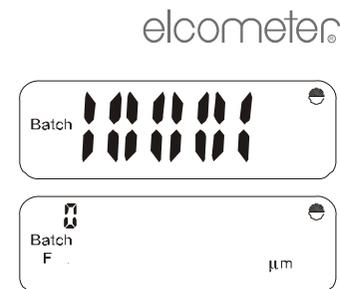
16.3 Display some Statistics

Take a set of up to five readings on a foil on a mild steel surface. (e.g. 935 microns).

The number of readings increments in the top left hand corner as each reading is displayed. The last reading is held on the display.

Press and hold:

[$\overline{x}$] to read mean

[σ] to read standard deviation

[<] to read lowest reading

[>] to read highest reading

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16.4 Operate in different Units

Change units by pressing [UNITS] once for mm, again for mil, again for thou, again for return to µm, Note the change in value of the reading as the units change.

16.5 Set CALibration and BASE Values

Ensure the display shows 'µm'. Press [CAL] and the display will show:

Take a set of readings on a known value of foil on a steel substrate. The display will show the running mean for the set of readings.

Modify the reading to be the actual value of the foil using the [>] or [<] and press [ENTER]. 'Cal' will disappear and the reading display will blank.

Press [BASE] and the display will show:

Take a set of readings on the bare steel substrate.

Enter zero either by accepting '0.0' in the display by pressing [ENTER], or by modifying the value in the display to read 0.0 by using the [>] or [<] keys and then pressing [ENTER].

16.6 Send Readings to Memory

Set up Batch 1 by pressing [SETUP] [ENTER], adjusting the display to '1' using [>]. Then press [ENTER]. The display will show:

Take a set of readings and view $\overline{x}$, σ, < and> as before.

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16.7 Show use of 'DEL' and 'CLEAR' Controls

Set up Batch 2 by pressing [SETUP] [ENTER], adjusting the display to read '2' using [>] and pressing [ENTER]. (The 'batch' symbol will always flash until [ENTER] is pressed).

Take a set of readings as before. Now press [DEL] and note that the last reading is deleted.

Press [CLEAR] and the display will flash:

and

Press [ENTER] and Batch 2 readings will be cleared.

16.8 See which Batches are being used

Standard software has Batch numbers 1 to 25 present.

Press [SETUP] and [ENTER]. The current batch number is displayed. Using [>] step through each batch number. If 'F' or 'N' flashes, then data is stored in the batch. If neither 'F' nor 'NF' flashes there is no data in that batch.

16.9 SETUP FUNCTIONS

Press [SETUP] and the display will show:

Use [>] twice to get to the Printer Setup Menu.

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Press [ENTER] to select the printer setup, and the display will show:

Press [>] to step through the baud rate selections to:

This selects 80 column format (A4) or 42 column format (Elcometer Portable Printer). Press [ENTER]. [<] and [>] will toggle between 80 and 42. Select 42 and press [ENTER].

Press [SETUP] or [Esc] to return to the 'Prnt' display.

Press [>] to select the time and date option:

Press [ENTER].

Use [>] to select 'dAtE' and press [ENTER]. The day number will flash. Press [ENTER] and the month number will flash; [ENTER] again and the year flashes.

Press [ENTER] again to return to the Sub Menu. Press [SETUP] or [Esc] to return to:
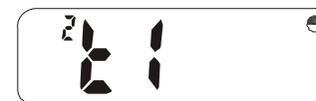
Press [>] to step through the Main Menu to the beeper volume option:

Press [ENTER] to display the current volume, 0-4. (0=Off, 4=Loudest). Press [<] or [>] to step through these options. Press [ENTER] to select choice and return to the 'bEEp' display (or [Esc] to cancel the operation).

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Press [>] to step through to Password Select option:

`PASS`

Note: *This function is not available in Standard software. If [ENTER] is pressed at this stage the instrument will return to the readings mode.*

Press [SETUP] and use [>] to step through to backlight option:

`bLi`

Pressing [ENTER] displays current status - 'oFF' or 'on'. [<] or [>] toggles between these two options. [ENTER] selects the chosen status and returns to the 'bLi' display.

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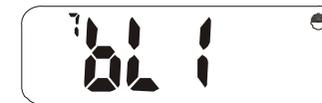
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17 QUICK REFERENCE GUIDE

[🔶]	Switch on
[ENTER]	Enter data or batch mode / Switch off - hold key down
[$\overline{x}$]	Display mean
[σ]	Display standard deviation
[<]	Display lowest reading
[>]	Display highest reading
[BASE]	Set lowest calibration point
[CAL]	Set highest calibration point
[Esc]	Escape from function
[DEL]	Delete last reading
[UNITS]	Select units - µm, mm, mil, thou
[PRINT]	Select print modes
[CLEAR]	Clears immediate mode and readings and statistics from a batch
[SETUP]	Setup User defined values e.g. batch selection

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Basic Calibration

In the following section [<] or [>] is used to vary the number entered.

[BASE]	Select mode	[CAL]
[<], [>]	Adjust value	[<], [>]
[BASE]	Select previous value	[CAL]
[ENTER]	[ENTER]	

Batch Mode

[SETUP]	Select mode
[<] or [>]	Scroll through batches
[ENTER]	Select batch

Batch Clear

[SETUP] [ENTER] [CLEAR] [ENTER] [ENTER]

To clear current batch

[SETUP] [ENTER] ([<] or [>]) [CLEAR] [ENTER] [ENTER]

To clear specified batch

[SETUP] [ENTER] ([<] or [>] to Batch 0) [CLEAR] [ENTER] [ENTER]

To clear all batches

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Batch Delete

[SETUP] [ENTER] [DEL] [ENTER] [ENTER]

To delete current batch

[SETUP] [ENTER] ([<] or [>]) [DEL] [ENTER] [ENTER]

To delete specified batch

[SETUP] [ENTER] ([<] or [>] to Batch 0) [DEL] [ENTER] [ENTER]

To delete all batches

SetUp Mode

[SETUP] [<] or [>] then [ENTER]

To select required function

Then use: [<] or [>] [ENTER]

For sub-function

[<] or [>] [ENTER]

To change sub-function

[SETUP] (+ [SETUP] or [Esc] as necessary)

To exit

Printing Mode

[PRINT] [<] [>] [ENTER]

To select print mode

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Switch Instrument Off

Hold down [ENTER] for more than 3 seconds

Note: *The Elcometer 355 will automatically switch off after 60 seconds (User selectable between 1 and 30 minutes - see "Date and time" on page 14).*

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