elcometer

PROMAT

User Guide

Elcometer 500

Coating Thickness Gauge

(for concrete and other similar substrates)

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CONTENTS

CONTENTS (continued)

Android™

Made for iPod iPhone iPad

For the avoidance of doubt, please refer to the original English language version.

Material Safety Data Sheets for the ultrasonic couplant and probe tip oil supplied by Elcometer, are available to download via our website:

Elcometer Ultrasonic Couplant Material Safety Data Sheet:

www.elcometer.com/images/stories/MSDS/Elcometer_Ultrasonic_Couplant_Blue.pdf

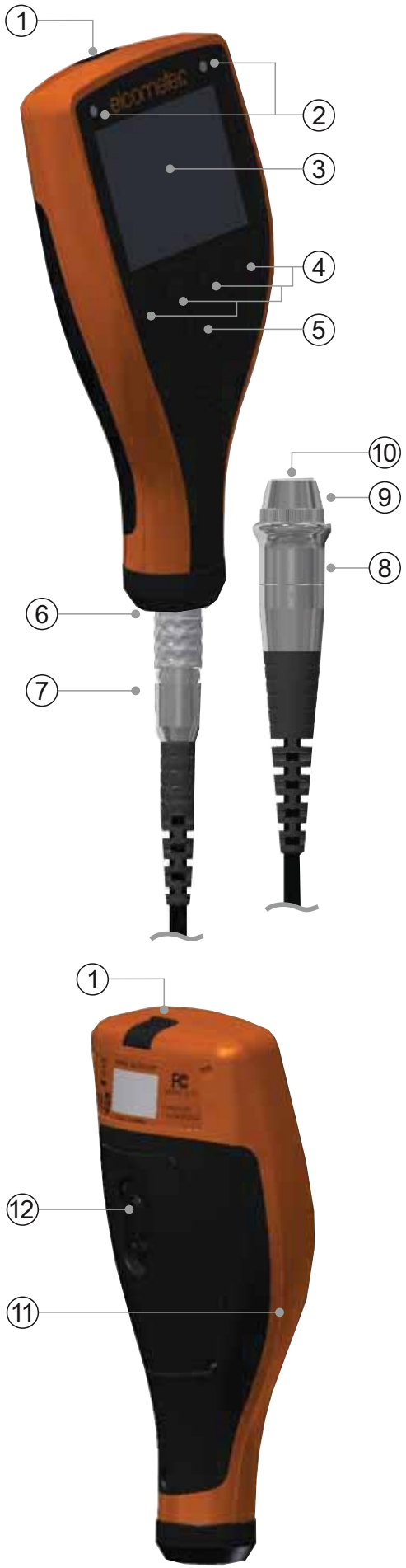
Elcometer Ultrasonic Couplant (High Temperature) Material Safety Data Sheet:

www.elcometer.com/images/stories/MSDS/elcometer_ultrasonic_couplant_hi_temp.pdf

Elcometer Probe Tip Oil Material Safety Data Sheet:

www.elcometer.com/images/stories/MSDS/Elcometer_Probe_Tip_Oil.pdf

1 GAUGE OVERVIEW



1 USB Data Output Socket (below cover)
2 LED Indicators - Red (left), Green (right)
3 LCD Display
4 Softkeys
5 On/Off Key
6 Probe Socket
7 Probe Plug
8 Probe
9 Probe Tip Collar
10 Replaceable Probe Tip
11 Wrist Strap Connection
12 Battery Compartment (¼ turn open/close)

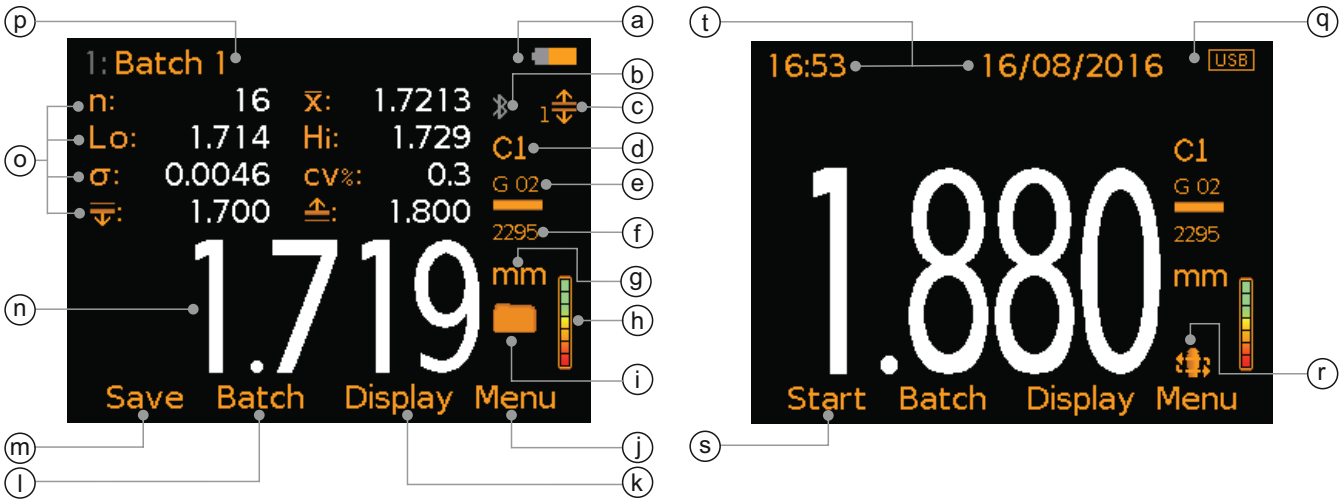
2 BOX CONTENTS

- Elcometer 500 Coating Thickness Gauge
- Probe Tip Oil; 4ml (0.14fl oz Bottle)
- Ultrasonic Couplant; 120ml (4fl oz Bottle)
- AA Batteries; x2
- Protective Case
- Transit Case (Model T only)
- Wrist Harness
- Screen Protector; x3
- ElcoMaster® Software (Model T only)
- USB Cable (Model T only)
- Test Certificate
- User Guide

Note: The Elcometer 500 is supplied as a gauge only without probe - probes must be ordered separately, see Section 20.1 ‘Probes’ on page en-31.

PROMAT

3 THE DISPLAY



		Model
a	Power: Batteries - including battery life indicator	B, T
b	Bluetooth On - Grey: not connected; Orange: connected	T
c	Limits On (with Limit Index Number) - Red: limit exceeded	T
d	Probe Type Connected - C1 or C2	B, T
e	Calibration Method	B, T
f	Calibration: Sound-Velocity	B, T
g	Measurement Units - µm, mm, mils, inch	B, T
h	Signal Strength Indicator - Green: valid and stable reading	B, T
i	Batching On	T
j	Menu Softkey	B, T
k	Display Softkey	B, T
l	Batch Softkey	T
m	Save Current Reading Value	B, T
n	Reading Value - White: valid and stable reading; Grey: probe in free air; Red: limit exceeded	B, T
o	User Selectable Statistics - Maximum of 8	T
p	Batch Name - when in batching	T
q	Power: USB	B, T
r	Scan Mode On - icon flashes during a scan	T
s	Start / Stop Scan - when in Scan Mode	T
t	Date & Time - when enabled and not in batching	T

4 GETTING STARTED

4.1 ENSURING YOUR GAUGE HAS THE LATEST FIRMWARE

To ensure that your gauge has the most up-to-date gauge firmware, allowing you to benefit from the latest features and functionality, we recommend that the gauge is connected to ElcoMaster® on a regular basis and before first use.

Simply connect the gauge via USB to an internet connected computer running ElcoMaster® using the 'Connect Gauge' feature. If a later version of the gauge firmware is available, 'Update Gauge' will be displayed to the right of the gauge details. Click 'Update Gauge' to install the latest firmware.

4.2 FITTING THE BATTERIES

Each gauge is supplied with 2 x AA alkaline batteries.

To insert or replace the batteries:

1 Lift the latch on the battery compartment cover and rotate anti-clockwise to remove the cover.
2 Insert 2 batteries taking care to ensure correct polarity.
3 Refit the cover and rotate the latch clockwise to close.

The battery condition is indicated by a symbol in the top right of the display ( ):

- Full symbol (orange) = batteries at full capacity
- Empty symbol (red, flashing) = batteries at lowest sustainable level

Note: 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.**

4.3 SWITCHING THE GAUGE ON / OFF

To switch on: Press the on/off key for more than 0.5 seconds.

To switch off: Press and hold the on/off key until the screen goes blank.

4 GETTING STARTED (continued)

The gauge can also be set to switch off automatically after a user defined period of inactivity via Menu/Setup/Gauge Auto Off. The default setting is 5 minutes.

4.4 CONNECTING A PROBE

Two probe options are available, C1 and C2. The probe used is determined by the thickness of the coating being measured, see Section 20.1 'Probes' on page en-31 for further information.

To connect a probe:

1 Align the red dot on the probe plug with the red dot on the base of the gauge.
2 Push the probe into the gauge, ensuring that the connector is fully engaged.

Elcometer 500 probes will be identified automatically by the gauge when connected and details can be viewed at any time via Menu/About/Probe Information.

4.5 FITTING / REPLACING A PROBE TIP

Probes consist of a probe body, probe tip collar and probe tip (supplied fitted[a]). Probe tips wear over time and any damage to the probe tip, such as scratches, chips or dents, will affect the accuracy of the readings.

The gauge will automatically check for probe tip wear each time it is switched on and a probe is connected.

If probe tip wear is greater than 0.7mm but less than 1mm: The user will be prompted to check the probe tip for wear or damage. After inspection, the user can choose to continue with the current probe tip or fit a new tip.

If probe tip wear is greater than 1mm: The user will be prompted to replace the probe tip.

[a] Additional probe tips and probe tip oil can be purchased from Elcometer or your local Elcometer supplier, see Section 20.1 'Probes' on page en-31.

4 GETTING STARTED (continued)

To fit / replace the probe tip:

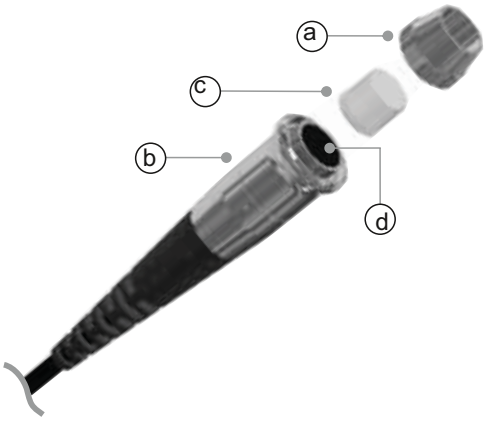
1 Unscrew the probe tip collar *(a)* from the probe body *(b)*.
2 Remove the worn or damaged probe tip.
3 Fit a new probe tip *(c)* by sliding it into the probe tip collar.
4 Apply a small drop of probe tip oil to the sensor plate *(d)*.
5 Refit the probe tip collar to the probe body.

4.6 OILING THE SENSOR PLATE

For the probe to work correctly, there must be no air gap between the probe tip and sensor plate. This is achieved by using a small amount of probe tip oil (supplied with each gauge[a]). The gauge will inform the user when oil is required.

To oil the sensor plate:

1 Unscrew the probe tip collar *(a)* from the probe body *(b)* and remove the probe tip *(c)* from the sensor plate *(d)*.
2 Apply a small drop of probe tip oil to the sensor plate *(d).*
3 Refit the probe tip and probe tip collar to the probe body.



Note: The use of normal oil is not recommended as it could damage the probe tip and affect the accuracy of the gauge. Ultrasonic couplant can be used as an alternative however, the probe tip and sensor plate will need to be cleaned more regularly and couplant re-applied more frequently.

Note: A Material Safety Data Sheet for the probe tip oil supplied by Elcometer is available to download via our website: www.elcometer.com/images/stories/MSDS/Elcometer_Probe_Tip_Oil.pdf

[a] Additional probe tips and probe tip oil can be purchased from Elcometer or your local Elcometer supplier, see Section 20.1 ‘Probes’ on page en-31.

5 TAKING A READING

5.1 BEFORE YOU START

1 Switch the gauge on - see Section 4.3 on page en-5.
2 Connect a probe - see Section 4.4 on page en-6.
3 Oil the sensor plate or replace the probe tip if required - see Sections 4.5 and 4.6 on pages en-6 and en-7.
- The gauge will inform the user when oil is required and when the probe tip is worn or damaged and should be replaced.

4 Set up the gauge parameters - see Section 7 on page en-10.
5 Calibrate the gauge - see Sections 9 and 10 on pages en-15 and en-16.

5.2 TAKING A READING IN STANDARD MODE

1 Apply a small amount of couplant to the coated surface.
2 Press the probe into the couplant, ensuring that the probe is flat against the surface.
3 The display will show a value which is constantly updating (Figure 1).
- The stability of the reading is indicated on the signal strength indicator to the right of the display. If the signal strength indicator is green, it is a valid and stable reading. If not green, ensure there is an adequate film of couplant beneath the probe and that the probe is seated flat against the surface. Alternatively, position the probe nearby on a different area of the test surface until a strong signal is received.
- '<0.15mm' or '>2.50mm' ('<6mils' or '>98mils') indicates a reading outside the probe range when using a C1 probe or '<0.75mm' or '>9.00mm' ('<30mils' or '>355mils') when using a C2 probe.

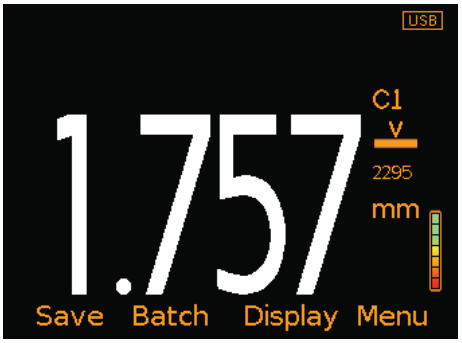


Figure 1

4 Press ‘Save’ to store the current reading in the gauge or batch (Model T) memory.
5 Remove the probe from the surface.
- The reading value turns grey when the probe is removed from the surface (Figure 2).

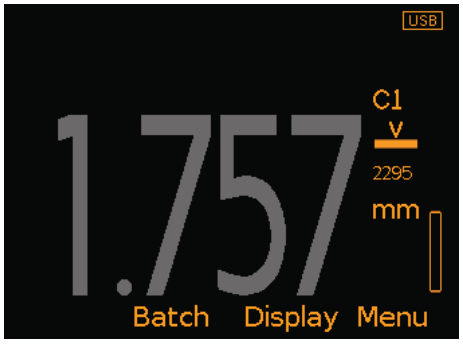


Figure 2

5.3 TAKING A READING IN SCAN MODE - MODEL T

Scan mode allows measurements to be taken quickly over a large surface area by sliding the probe across the coated surface. In Scan Mode, the gauge takes readings at an increased measurement rate and at the end of each scan, the average, lowest and highest reading for the scan are displayed and all three values are saved in the gauge or batch memory.

1 Enable ‘Scan Mode’ via Menu/Setup/Reading/Scan Mode.
2 Apply a small amount of couplant to the coated surface.
3 Press the probe into the couplant, ensuring that it is flat against the surface.

5 TAKING A READING (continued)

4 Press ‘Start’ to begin the scan and slide the probe over the coated surface (Figure 3).

5 The display will show a value which is constantly updating.

- The stability of the reading is indicated on the signal strength indicator to the right of the display. If the signal strength indicator is green, it is a valid and stable reading. If not green, ensure there is an adequate film of couplant beneath the probe and that the probe is seated flat against the surface. Alternatively, position the probe nearby on a different area of the test surface until a strong signal is received.
- '<0.15mm' or '>2.50mm' ('<6mils' or '>98mils') indicates a reading outside the probe range when using a C1 probe or '<0.75mm' or '>9.00mm' ('<30mils' or '>355mils') when using a C2 probe.

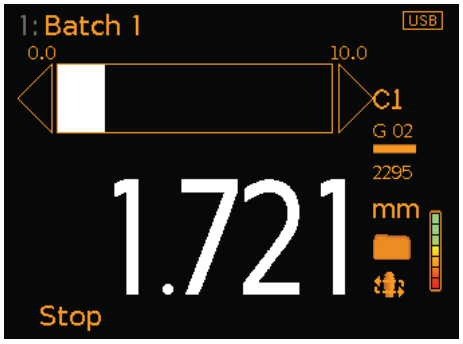


Figure 3

6 Press ‘Stop’ to stop taking readings and complete the scan.

- If the scan is interrupted due to lack of couplant beneath the probe for example, the scan is paused until a good signal is received or ‘Stop’ is pressed.

7 The scanned lowest, average and highest reading will be displayed on screen (Figure 4). Press ‘Save’ to store the scanned readings into the gauge or batch memory. Press ‘Clear’ to disregard the last scan and start again.

8 Remove the probe from the surface.

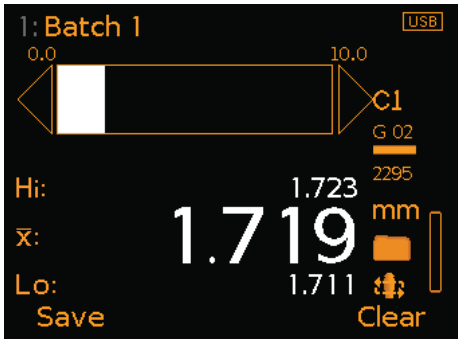


Figure 4

6 VERIFYING THE GAUGE & PROBE PERFORMANCE

Probe tips wear over time which can affect the accuracy of the readings. Any damage to the probe tip such as scratches, chips or dents will also affect the accuracy. Although the gauge will inform the user when the probe tip requires replacement, it is good practice to check the performance of the gauge / probe on a regular basis.

Users can verify the gauge and probe performance in the field using the measurement foils supplied with each probe.

To verify the gauge / probe performance:

1 Press Menu/Calibration/Cal Method/Coating Material and select the measurement foil from the ‘Generic Materials’ list.

2 When prompted, apply couplant to the measurement foil and take a reading.

6 VERIFYING THE GAUGE & PROBE PERFORMANCE (continued)

3 Compare the reading with the measurement foil thickness value as printed on the foil label.

The reading should be within ±2% or 10µm (0.4mils)[b] of the measurement foil thickness value. If outside this range, zero the probe (see Section 12 'Zeroing the Probe' on page en-24) and repeat the process. If the gauge is still outside specification - contact Elcometer or your local supplier for further advice.

7 SETTING THE GAUGE PARAMETERS

7.1 SELECTING YOUR LANGUAGE

1 Press and hold the ON/OFF button until the Elcometer logo is displayed.
2 Press Menu/Setup/Language and select your language using the ↑↓ softkeys.
3 Follow the on screen menus.

To access the language menu when in a foreign language:
1 Switch the gauge OFF.
2 Press and hold the left softkey and switch the gauge ON.
3 Select your language using the ↑↓ softkeys.

7.2 SCREEN SETTINGS

A number of screen settings can be defined by the user via Menu/Setup/Screen Settings including:

- **Screen Brightness;** This can be set to 'Manual' or 'Auto' - the brightness is adjusted automatically using the gauge's ambient light sensor.
- **Screen Timeout;** The display will dim if inactive for more than 15 seconds and will go 'black' if inactive for the period defined. Press any key or tap the gauge to awaken it.

7.3 SETTING UP THE READING DISPLAY

The colour LCD display is split into two halves; Top Display and Bottom Display. The user can define what information is displayed in each half including: Readings, Statistics, Run Chart, Bar Graph and Readings & Differential[c].

[b] Whichever is the greater
[c] Not available in 'Scan Mode' - see Section 5.3 'Taking a Reading in Scan Mode - Model T' on page en-8.

7 SETTING THE GAUGE PARAMETERS (continued)

- **None;** No information is displayed.
- **Readings (Figure 5);** The reading value is displayed using the resolution as defined by the user, see Section 7.7 on page en-13.
- **Statistics - Model B (Figure 6);** The following statistical values are displayed as each measurement is taken:
  Number of Readings, Mean, Lowest Reading, Highest Reading, Standard Deviation, Coefficient of Variation.
  To clear the current statistical values, press Display\Clear Statistics.
- **Selected Statistics - Model T (Figure 7);** Up to 8 statistical values can be displayed as defined by the user via Display/Statistics/Select Statistics.
  Select from:
  Number of Readings, Mean, Lowest Reading, Highest Reading, Standard Deviation, Coefficient of Variation, Low Limit Value, Number Below Low Limit, High Limit Value, Number Above High Limit, Range, NDFT (Nominal Dry Film Thickness) Value.
  To view the current statistical values, press Display/Statistics/View Selected or View All.
  To clear the current statistical values, press Display/Statistics/Clear Statistics.
- **Run Chart - Model T (Figure 8);** A line trend graph of the last 20 measurements which is updated automatically after each reading.
- **Bar Graph - Model T (Figure 9);** An analogue representation of the current measurement value together with the highest (Hi), lowest (Lo) and average ($\bar{x}$) reading. The graph is updated automatically when each reading is taken.

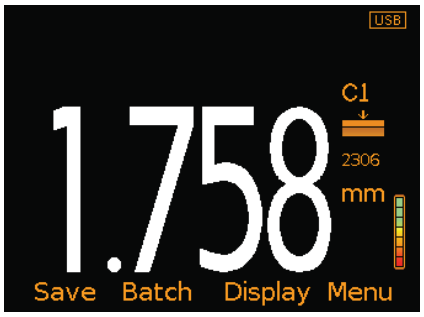


Figure 5: Readings

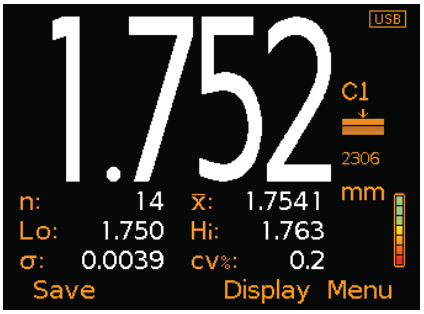


Figure 6: Statistics & Readings (Model B)

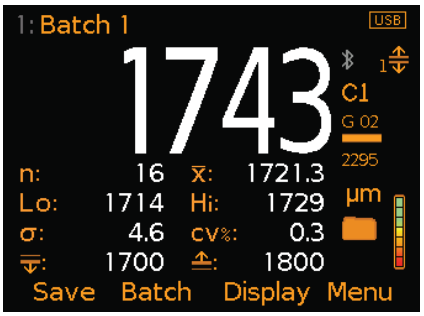


Figure 7: Selected Statistics & Readings (Model T)

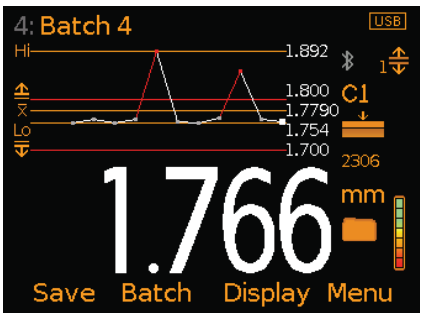


Figure 8: Run Chart & Readings

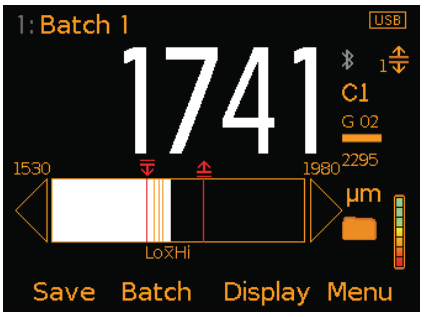


Figure 9: Readings & Bar Graph

7 SETTING THE GAUGE PARAMETERS (continued)

- **Readings & Differential (Δ)[c] - Model T (Figure 10);** The last reading is displayed together with the variation from the NDFT (Nominal Dry Film Thickness) value set via Menu/Limit Memories/Create Limit Memory/ Set NDFT.

Figure 10: Readings & Differential

To setup the display:

1 Press Display/Setup Display/Top Display (or Bottom Display as required).

2 Use the ↑↓ softkeys to highlight the required option and press 'Select'.

Note: If 'None' is selected for one half and 'Readings' or 'Run Chart' for the other half, the readings or run chart will fill the whole screen. If any other combination of options is selected; the data will be shown in the top or bottom display as specified.

7.4 THE MEASUREMENT RANGE

The Elcometer 500 uses the 'Pulse-Echo' measurement technique (the total thickness from the base of the probe to the material density boundary is measured), to non-destructively measure coatings up to 9mm (355mils) thick on concrete and other similar substrates.

Whilst the Elcometer 500 can measure up to 9mm (355mils) of a typical epoxy coating, depending on the probe used, more sound absorbent coatings such as rubber may reduce the measurement range of the gauge. Contact Elcometer for further information.

7.5 MEASUREMENT SUBSTRATES

The Elcometer 500 has been designed to measure coatings on concrete and other similar substrates. These include drywall, plasterboard, concrete block, brick, stone, cinder block and other cementitious materials.

The Elcometer 500 is ideally suited for measuring coatings on rough and smooth substrates alike. Due to the nature of ultrasonic technology, however, as the roughness increases the stability of the reading - as indicated by the signal strength indicator to the right of the display - may deteriorate. If the signal strength indicator is green, it is a valid and stable reading otherwise position the probe nearby on a different area of the test surface until a strong signal is received.

[c] Not available in 'Scan Mode' - see Section 5.3 'Taking a Reading in Scan Mode - Model T' on page en-8.

7 SETTING THE GAUGE PARAMETERS (continued)

7.6 SELECTING THE MEASUREMENT UNITS

The Elcometer 500 can take measurements in µm, mm, mils and inch. To select the measurement units, press Menu/Setup/Units.

7.7 SELECTING THE MEASUREMENT RESOLUTION

The Elcometer 500 has a user selectable measurement resolution of:

- Low: 10µm, 0.01mm, 1mils or 0.001"
- High: 1µm, 0.001mm, 0.1mils or 0.0001"
  (for more precise readings when measuring thinner coatings.)

To select the resolution, press Menu/Setup/Reading/Resolution and select ‘Low’ or ‘High’ as required.

8 SETTING LIMITS - MODEL T

Limits are acceptable tolerance levels as defined by the user, allowing readings to be compared with pre-defined values. The Elcometer 500 Model T can store up to 40 pre-programmed limits.

Limits can be created on the gauge or via PC using ElcoMaster®, and saved into the gauge memory for future selection. Using ElcoMaster®, saved limits can be transferred to other gauges.

Each Limit can consist of an NDFT (Nominal Dry Film Thickness) value (x:) - required for 'Readings & Differential' - a low (▼:) and / or high (▲:) limit value.

If a measurement is taken which falls outside set limits, the appropriate limit icon and the reading value turn red, the red LED flashes and the alarm beeps (Figure 11).

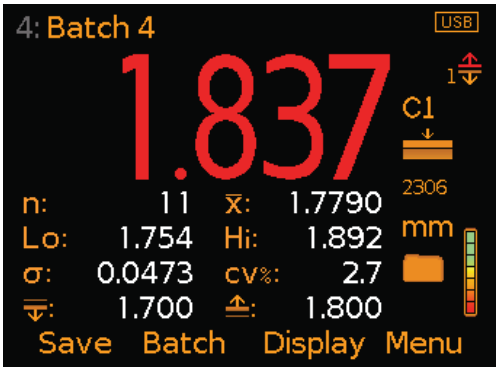


Figure 11

Limits can either be created for individual readings or when a new batch is opened, see Sections 8.1 and 8.2. Different batches can have different limit values.

When created, limits are stored in the gauge limit memory and are available for future selection, see Section 8.3.

Saved limits can be renamed and the values can be amended at any time, see Sections 8.4 and 8.5.

8 SETTING LIMITS - MODEL T (continued)

8.1 CREATING LIMITS FOR INDIVIDUAL READINGS

1 Press Menu/Limit Memories/Create Limit Memory/Set Upper Limit (or 'Set Lower Limit').
2 Use the ↑↓ softkeys to set the required value and press 'Set'.
3 If required, repeat Step 2 for 'Set Lower Limit' (or 'Set Upper Limit') and 'Set NDFT'.
4 When all values have been set, use the ↑↓ softkeys to highlight 'Save Limit Memory n' and press 'Select' to save.

8.2 CREATING LIMITS FOR A NEW BATCH

1 Press Batch/New Batch/Batch Limits/Create Limit Memory/ Set Upper Limit (or 'Set Lower Limit').
2 Use the ↑↓ softkeys to set the required value and press 'Set'.
3 If required, repeat Step 2 for 'Set Lower Limit' (or 'Set Upper Limit') and 'Set NDFT'.
4 When all values have been set, use the ↑↓ softkeys to highlight 'Save Limit Memory n' and press 'Select' to save.

Batch limits can be viewed at any time via Batch/Review Batch/Batch Information.

8.3 SELECTING SAVED LIMITS

1 Press Menu/Limit Memories/Select Limit Memory or when in Batching, press Batch/New Batch/Batch Limits/Select Limit Memory.
2 Use the ↑↓ softkeys to highlight the limit memory required and press 'Select'.

When a limit memory is in use, n⇳ is displayed to the right of the measurement screen, where n = the limit memory index number.

8.4 RENAMING LIMITS

1 Press Menu/Limit Memories/Edit Limit Memory/Rename Limit Memory.
2 Use the ↑↓ softkeys to highlight the limit memory to be renamed and press 'Select'.
3 Use the ←→ softkeys to rename the limit memory.
4 Select 'Ok' to save the changes or 'Escape' to exit and disregard any amendments made.

8 SETTING LIMITS - MODEL T (continued)

8.5 AMENDING LIMITS

1 Press Menu/Limit Memories/Edit Limit Memory/Amend Limit Memory.
2 Use the ↑↓ softkeys to highlight the limit memory to be amended and press ‘Select’.
3 Use the ↑↓ softkeys to highlight ‘Set Upper Limit’ (or ‘Set Lower Limit’) and press ‘Select’.
4 Use the ↑↓ softkeys to set the required value and press ‘Set’.
5 If required, repeat Steps 3-4 for ‘Set Lower Limit’ (or ‘Set Upper Limit’) and ‘Set NDFT’.
6 When all values have been amended as required, use the ↑↓ softkeys to highlight ‘Save Limit Memory n’ and press ‘Select’ to save the changes.

9 CALIBRATION METHODS

Calibration is the process of setting the gauge to known coating thickness values to ensure accurate and repeatable readings on different coating materials.

A choice of calibration methods is available, see Table 2: Calibration Methods. To select the calibration method, press Menu/Calibration/Cal Method.

The calibration method currently selected is indicated by the calibration method icon on the right of the measurement screen.

TABLE 2: CALIBRATION METHODS

Calibration Method	Icon	Description
1 Point		A reading is taken on a substrate with a coating of known thickness and adjusted accordingly. See Section 10.2 ‘Using 1 Point Calibration’ on page en-16 and Section 11 ‘Using the Coating Calibration Mould’ on page en-22.
Coating Material		The coating material is selected from a pre-defined list of generic or user defined coating materials, stored in the gauge memory. See Section 10.5 ‘Using Coating Material Calibration’ on page en-19 and Section 11 ‘Using the Coating Calibration Mould’ on page en-22.

9 CALIBRATION METHODS (continued)

TABLE 2: CALIBRATION METHODS (continued)		
Calibration Method	**Icon**	**Description**
Velocity Entry		If the sound-velocity of the coating is known, simply enter the value. See Section 10.3 'Using Velocity Entry' on page en-18 and Section 11 'Using the Coating Calibration Mould' on page en-22.

10 CALIBRATING YOUR GAUGE

The gauge should be calibrated each time a different probe is used or a different type of coating is measured.

10.1 BEFORE YOU START

1 Switch the gauge on - see Section 4.3 on page 5.
2 Connect a probe - see Section 4.4 on page en-6.
3 Oil the sensor plate or replace the probe tip if required - see Sections 4.5 and 4.6 on pages en-6 and en-7.
- The gauge will inform the user when oil is required and when the probe tip is worn or damaged and should be replaced.

10.2 USING 1 POINT CALIBRATION

This procedure requires a sample of the coating with a known thickness, measured by some other means such as a dry film thickness gauge.

If a sample is not readily available, one can be created using the Elcometer 500 Coating Calibration Mould (CCM), see Section 11 on page en-22.

1 Press Menu/Calibration/Cal Method and select '1 Point'. If '1 Point' is already selected, simply press Menu/Calibration/Calibrate.
- The calibration method currently selected is indicated by the icon to the right of the display.

2 To ensure accurate and repeatable readings and to check for probe wear, the user will be prompted to zero the probe; clean the probe surface, hold the probe in free air and press 'Zero'.
- The 'Zero Probe' procedure is not only part of the calibration process, it can also be performed at any time to check that there is sufficient probe tip oil on the sensor plate and the condition of the probe tip. See Section 12 ' Zeroing the Probe' on page en-24 for further information.

3 When prompted, apply couplant to the coated sample.
- If a sample with a coating of known thickness is not readily available, one can be created using the Elcometer 500 Coating Calibration Mould (CCM), see Section 11 on page en-22.

10 CALIBRATING YOUR GAUGE (continued)

4 Place the probe on to the coated sample, ensuring that it is flat against the surface (Figure 12). The display will show a thickness value which is constantly updating.

- The stability of the reading is indicated on the signal strength indicator to the right of the display. If the signal strength indicator is green, it is a valid and stable reading. If not green, ensure there is an adequate film of couplant beneath the probe and that the probe is seated flat against the surface. Alternatively, position the probe nearby on a different area of the test surface until a strong signal is received.

Figure 12

5 Remove the probe from the surface. The last reading is held on screen (Figure 13). If not representative, repeat Steps 3-4.

- Excessive use of couplant can result in a distorted reading when the probe is removed from the surface. If this occurs, clean the probe tip and coated surface, then repeat Steps 3-4.

Figure 13

6 Press ‘Adjust’ and using the ↑↓ softkeys, adjust the reading to the known thickness value, then press ‘Set’ to set the value (Figure 14).

Figure 14

At the end of the calibration procedure, the user is given the option to save the coating calibration in the gauge memory for future use, see Section 10.4 ‘Saving the Coating Calibration’ on page en-19 for further information.

The gauge is calibrated using the coating thickness value entered and the derived sound-velocity is displayed to the right of the measurement screen, below the calibration method icon (Figure 15).

Pressing ‘Escape’ at any time will exit the calibration procedure without calibrating the gauge.

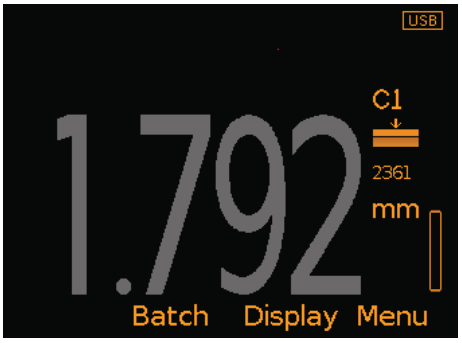


Figure 15

10 CALIBRATING YOUR GAUGE (continued)

10.3 USING VELOCITY ENTRY

To calibrate the gauge using this method, the user must know the sound-velocity of the coating material. If the sound-velocity is not known, '1 Point' or 'Coating Material' Calibration can be used or alternatively, the sound-velocity can be determined by using the Elcometer 500 Coating Calibration Mould (CCM), see Section 11 on page en-22.

1 Press Menu/Calibration/Cal Method and select 'Velocity Entry'. If 'Velocity Entry' is already selected, simply press Menu/Calibration/Calibrate.
- The calibration method currently selected is indicated by the icon to the right of the display.

2 Enter the known sound-velocity using the ↑↓ softkeys to select 0 to 9 and the → softkey to move to the next digit, followed by 'Set' to use the value entered (Figure 16).
- If the sound-velocity of the test coating is not known, it can be determined by using the Elcometer 500 Coating Calibration Mould (CCM), see Section 11 on page en-22.

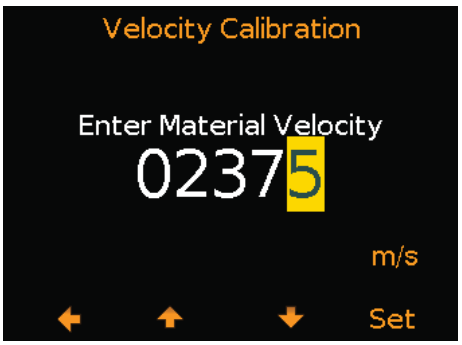


Figure 16

3 To ensure accurate and repeatable readings and check for probe wear, the user will be prompted to zero the probe; clean the probe surface, hold the probe in free air and press 'Zero'.
- The 'Zero Probe' procedure is not only part of the calibration process, it can also be performed at any time to check that there is sufficient probe tip oil on the sensor plate and the condition of the probe tip. See Section 12 'Zeroing the Probe' on page en-24 for further information

At the end of the calibration procedure, the user is given the option to save the coating calibration in the gauge memory for future use, see Section 10.4 'Saving the Coating Calibration' on page en-19 for further information.

The gauge is calibrated using the sound-velocity entered which is then displayed to the right of the measurement screen, below the calibration method icon (Figure 17).

Pressing 'Escape' at any time will exit the calibration procedure without calibrating the gauge.

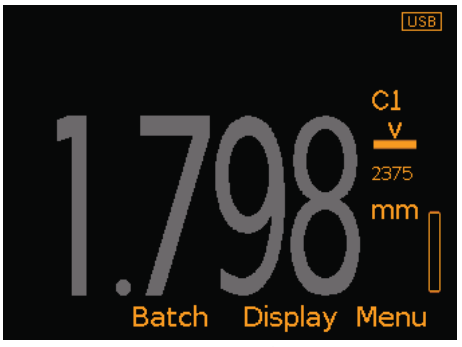


Figure 17

10 CALIBRATING YOUR GAUGE (continued)

10.4 SAVING THE COATING CALIBRATION

At the end of '1 Point' and 'Velocity Entry' calibration, the user is given the option to save the coating calibration in the gauge memory for future use.

When prompted, select 'Yes' (Figure 18) to save and name the calibration as appropriate for the specific coating or job for example.

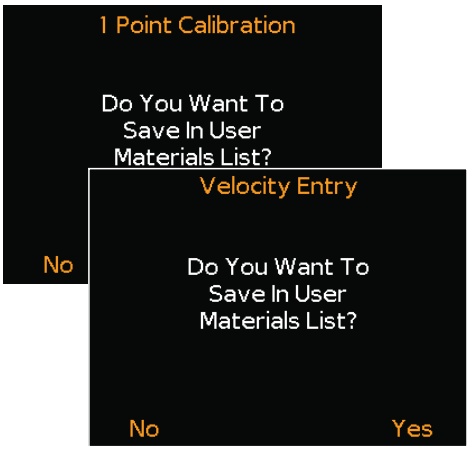


Figure 18

The coating calibration is then saved in the 'User Materials' list for future selection using the 'Coating Material' calibration method, see Section 10.5 'Using Coating Material Calibration'.

Using ElcoMaster®, saved 'User Materials' lists can be transferred to other Elcometer 500 gauges, at any time.

10.5 USING COATING MATERIAL CALIBRATION

The gauge is calibrated using the known sound-velocity of a coating material as selected by the user from one of two pre-defined lists stored in the gauge.

- **'Generic Materials'**: Choose from Epoxy, PVC, Rubber, Polyurethane, Bitumen.
- **'User Materials':** A list of up to 60 user defined coating materials with unique sound-velocities and names, created by either:
    - Saving '1 Point' or 'Velocity Entry' calibrations - see Section 10.2 'Using 1-Point Calibration' on page en-16 and Section 10.3 'Using Velocity Entry' on page en-18;
    - Using the Elcometer 500 Coating Calibration Mould (CCM) to determine the sound-velocity of the coating material - see Section 11 on page en-22 for further information.

Using ElcoMaster®, saved 'User Materials' lists can be transferred to other Elcometer 500 gauges, at any time.

Note: CAUTION - different colours of the same material may have different sound-velocities.

10 CALIBRATING YOUR GAUGE (continued)

1 Press Menu/Calibration/Cal Method and select 'Coating Material' followed by 'User Materials' or 'Generic Materials'. If the coating material required is already selected, simply press Menu/Calibration/Calibrate.
   - The calibration method currently selected is indicated by the icon to the right of the display.

2 Use the ↑↓ softkeys to highlight the required coating material followed by 'Select' (Figure 19).

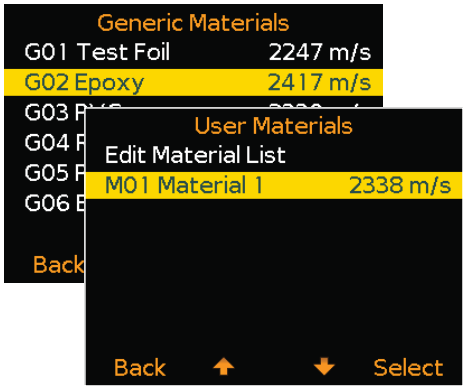


Figure 19

The gauge is calibrated using the sound-velocity of the coating material selected which is then displayed to the right of the measurement screen, below the calibration method icon, with the coating material list index number above (Figure 20).

Pressing 'Escape' at any time will exit the calibration procedure without calibrating the gauge.

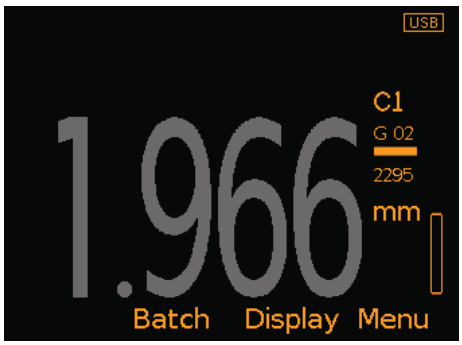


Figure 20

10.6 USING FACTORY CALIBRATION

Press Menu/Calibration/Factory Calibration to restore the default factory calibration sound-velocity setting of 2390m/s (approximately 0.0941in/µs), the sound-velocity of a typical epoxy coating.

10.7 TESTING & VALIDATING THE GAUGE CALIBRATION

This feature allows the user to test and validate the gauge calibration by taking a reading on a sample with a coating of known thickness, without the reading being saved.

To test and validate the calibration:

1 Press Menu/Calibration/Test Calibration.

2 When prompted, apply couplant to the coated sample.
   - If a sample with a coating of known thickness is not readily available, one can be created using the Elcometer 500 Coating Calibration Mould (CCM), see Section 11 on page en-22.

10 CALIBRATING YOUR GAUGE (continued)

3 Place the probe on to the coated sample, ensuring that it is flat against the surface. The display will show a thickness value which is constantly updating (Figure 21).

- The stability of the reading is indicated on the signal strength indicator to the right of the display. If the signal strength indicator is green, it is a valid and stable reading. If not green, ensure there is an adequate film of couplant beneath the probe and that the probe is seated flat against the surface. Alternatively, position the probe nearby on a different area of the test surface until a strong signal is received.

Figure 21

4 Remove the probe from the coated sample. The last reading is held on screen. If not representative, repeat Steps 2-3.

- Excessive use of couplant can result in a distorted reading when the probe is removed from the surface. If this occurs, clean the probe tip and coated surface, then repeat Steps 2-3.

5 Press ‘Validate’ to retain the existing calibration but refresh the associated time and date of calibration to the current time and date, ‘Cal’ to re-calibrate the gauge or ‘Ok’ to exit the test calibration procedure.

10.8 LOCKING THE CALIBRATION - MODEL T

Using the ‘PIN Lock’ feature, the calibration settings can be ‘locked’, preventing the user from making any changes to the calibration without first disabling PIN lock.

Users can still test the calibration via Menu/Calibration/Test Calibration when ‘PIN Lock’ is enabled, but are unable to validate or re-calibrate the gauge.

For more information on ‘PIN Lock’, see Section 13 ‘PIN Lock - Model T’ on page en-25.

11 USING THE COATING CALIBRATION MOULD

In addition to measuring coatings on concrete and other similar substrates (see Section 7.5 'Measurement Substrates' on page en-12), the Elcometer 500 C1 and C2 coating thickness probes have been designed to measure coatings on the steel Elcometer 500 Coating Calibration mould (CCM) for calibration purposes.

Available to purchase as an optional accessory, the Elcometer 500 Coating Calibration Mould (CCM) is a steel mould with two chambers - a sample chamber and overflow chamber - which can be used to determine the sound-velocity of coating materials for calibration.

By using the Elcometer 500 CCM following the procedure outlined below, the Elcometer 500 gauge calibration will be traceable to National and International Standards.

To use the Elcometer 500 CCM:

1 Place the Elcometer 500 CCM onto a flat, horizontal surface.

2 Completely fill the sample chamber *(a)* with the test coating, making sure that there is a slight dome or meniscus (Figure 22).

3 Using the plastic scraper supplied *(b)*, scrape over the coating allowing the excess to fall into the overflow chamber *(c)* (Figure 23).

4 Allow the coating to dry, ensuring that the Elcometer 500 CCM remains flat at all times.

Figure 22

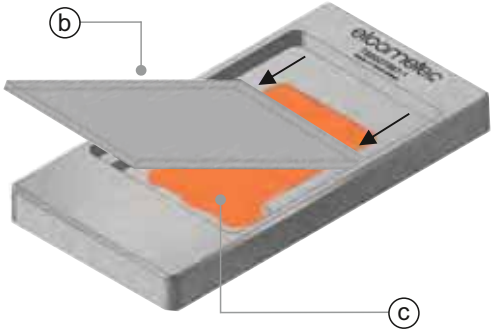
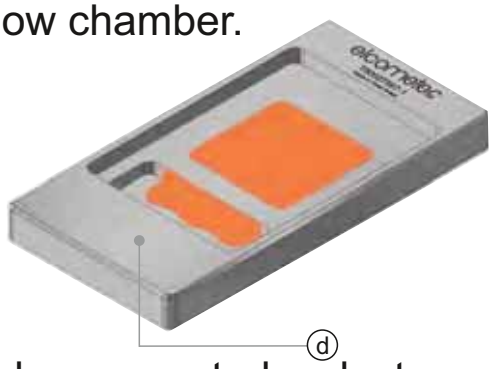


Figure 23

11 USING THE COATING CALIBRATION MOULD (continued)

5 When fully cured, using an Elcometer 456 ferrous coating thickness gauge, measure and record the dry film thickness at the centre of the coating in the sample chamber. The value can be written on the dried coating in the overflow chamber.

- The Elcometer 456 ferrous coating thickness gauge must be calibrated on the Elcometer 500 CCM, using a calibration foil or shim and the base of the CCM as a zero plate *(d)*, prior to taking the dry film thickness measurement. Refer to the Elcometer 456 user guide for instructions on how to do this.



6 Using the Elcometer 500 gauge with probe connected, select Menu/Calibration/Cal Method/1 Point and take a measurement of the coating in the sample chamber.

- The measurement should be taken in approximately the same location as the dry film thickness measurement taken in Step 5.

7 Press ‘Adjust’ and using the ↑↓ softkeys, adjust the reading to the dry film thickness value measured with the Elcometer 456, then press ‘Set’ to set the value.

8 Press ‘Yes’ to save into the ‘User Materials’ list for future selection and insert an appropriate name for the coating.

The Elcometer 500 gauge can now be calibrated by using the ‘Coating Material’ calibration method (see Section 10.5 on page en-19) and selecting the user defined coating from the ‘User Materials’ list.

Up to 60 user defined coatings can be stored in the gauge memory. Using ElcoMaster®, saved ‘User Materials’ lists can be transferred to other Elcometer 500 gauges, at any time.

Description	Part Number
Elcometer 500 Coating Calibration Mould (CCM)	T50027567-1

12 ZEROING THE PROBE

The ‘Zero Probe’ procedure is part of the calibration process however, a probe zero can be performed at any time to check that there is sufficient probe tip oil on the sensor plate and the condition of the probe tip.

12.1 BEFORE YOU START

1 Clean the probe surface of any couplant residue.
2 Connect the probe - see Section 4.4 on page en-6.
3 Switch the gauge on - see Section 4.3 on page en-5.

12.2 TO ZERO THE PROBE

1 Press Menu/Calibration/Zero Probe.
2 Hold the (clean) probe in free air and press ‘Zero’ (Figure 24).

Figure 24

If the signal strength indicator is not green: The user will be prompted apply probe tip oil. Apply oil to the sensor plate, see Section 4.6 on page en-7, press ‘Ok’ and repeat Step 2 above.

If the signal strength indicator is green and the probe tip wear is less than 0.7mm: The zero probe procedure will complete and the gauge will revert to the reading screen (or calibration screen if zeroing as part of the calibration procedure).

If the signal strength indicator is green and the probe tip wear is greater than 0.7mm but less than 1mm: The user will be prompted to check the probe tip for wear or damage. After inspection, the user can choose to continue with the current probe tip or fit a new tip (recommended), see Section 4.5 on page en-6. Press ‘Ok’ to complete the zero probe procedure and revert to the reading screen (or calibration screen if zeroing as part of the calibration procedure).

If the signal strength indicator is green and the probe tip wear is greater than 1mm: The user will be prompted to replace the probe tip. Replace the probe tip, see Section 4.5 on page en-6, press ‘Ok’ and repeat Step 2 above.

13 PIN LOCK

The 'PIN Lock' feature prevents the user from accidentally adjusting the gauge settings.

To set a PIN code:

1 Press Menu/Setup/PIN Lock.

2 Set the four digit PIN code using the ↑↓ softkeys to select 0 to 9 and the ➔ softkey to move to the next digit[d] (Figure 25).

3 Press 'Ok' to set, 'Escape' to cancel or 'Adjust' to amend the PIN code.

Figure 25

When enabled, the following features are disabled and can not be adjusted:

Model B

Menu/Calibration/Calibrate
Menu/Calibration/Cal Method
Menu/Reset
Menu/Calibration/Factory Calibration

Model T

Menu/Calibration/Calibrate
Menu/Calibration/Cal Method
Menu/Reset
Menu/Calibration/Factory Calibration
Menu/Limit Memories/Create Limit Memory
Batch/Edit Batch/Delete Batch
Menu/Limit Memories/Edit Limit Memory
Batch/Deleted Reading
Batch/New Batch/Batch Limits/Create Limit Memory

To unlock the PIN code:

1 Press Menu/Setup/PIN Lock.

2 Enter the four digit PIN code using the ↑↓ softkeys to select 0 to 9 and the ➔ softkey to move to the next digit[d].

3 Press 'Ok' or 'Escape' to cancel.

Note: Should the user forget or lose the PIN code, it can be disabled via ElcoMaster®. Using the USB cable supplied, simply connect the gauge to a PC with ElcoMaster® version 2.0.57 or higher installed and select Edit/Clear PIN.

14 BATCHING - MODEL T

The Elcometer 500 Model T can store 100,000 readings in up to 1,000 batches. The following batch functions are available:

- **Batch/New Batch;** Creates a new batch.
- **Batch/New Batch/Fixed Batch Size;** Pre-define the number of readings which are stored in a batch. The gauge will notify the user when a batch is complete and ask if another batch is to be opened. These batches are then linked when transferred to ElcoMaster®.

[d] The ➔ softkey will appear when the first 'X' is changed to a number.

14 BATCHING - MODEL T (continued)

- **Batch/Open Existing Batch;** Open an existing batch.
- **Batch/Review Batch**; Review the readings, statistics, batch information, calibration and limit information and a graph of all readings - see Section 15 'Reviewing Batch Data - Model T'.
- **Batch/Copy Batch**; Copy a batch including the batch header information, calibration and limit information.
- **Batch/Edit Batch/Rename Batch**; Rename an existing batch.
- **Batch/Edit Batch/Clear Batch**; Clear all readings within a batch - but leaving all batch header information.
- **Batch/Edit Batch/Delete Batch**; Delete a single batch or all batches entirely from the gauge.
- **Batch/Deleted Reading/Delete Without Tag**; Delete the last reading entirely.
- **Batch/Deleted Reading/Delete With Tag**; Delete the last reading but mark it as deleted in the batch memory.

15 REVIEWING BATCH DATA - MODEL T

15.1 BATCH STATISTICS (Batch/Review Batch/Statistics)

Displays statistical information for the batch including (Figure 26):

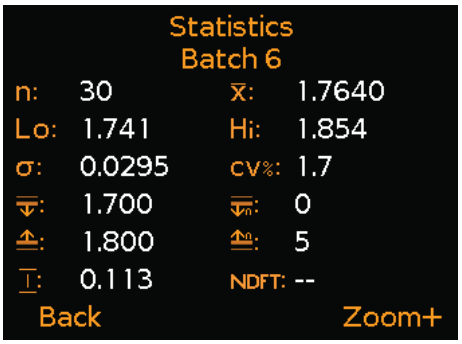


Figure 26

- Number of readings in the batch (n:)
- Average reading for the batch[e] ($\bar{x}$:)
- Lowest reading in the batch[e] (Lo:)
- Highest reading in the batch[e] (Hi:)
- Standard Deviation[e] (σ:)
- Coefficient of Variation[e] (cv%:)
- Low limit value (▼:) - if set - and the number of readings below the low limit (▼n:)
- High limit value (▲:) - if set - and the number of readings above the high limit (▲n:)
- Range[e] (I); the difference between the highest and lowest reading in the batch
- NDFT (Nominal Dry Film Thickness) value (NDFT:)

[e] For batches of more than one reading.

15 REVIEWING BATCH DATA - MODEL T (continued)

15.2 BATCH READINGS (Batch/Review Batch/Readings)

Displays the reading value together with date and time stamp for each individual reading in the batch.

Press the ↑↓ softkeys to scroll through the readings and → to move to the next information screen (Figure 27).

Readings outside any enabled limits for the batch are displayed in red with the appropriate limit icon to the left of the reading, (▼) if the reading is below the low limit and (▲) if above the high limit.

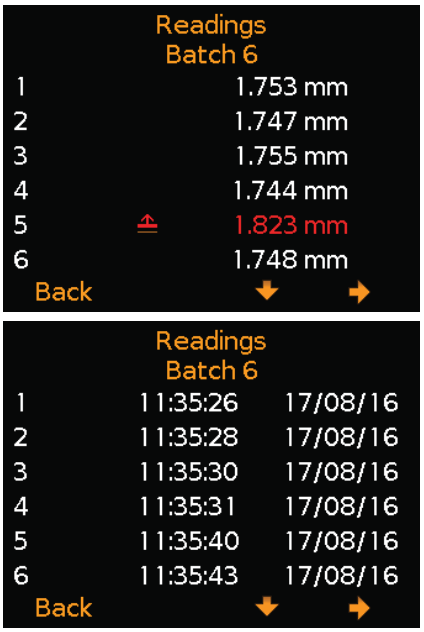


Figure 27

15.3 BATCH GRAPH (Batch/Review Batch/Batch Graph)

Allows the users to view the readings within the batch as a column bar graph. Up to five horizontal axes are displayed representing different values / statistics as follows:

- Highest reading in the batch[e] (Hi:)
- Lowest reading in the batch[e] (Lo:)
- Average reading for the batch[e] ($\bar{X}$:)
- Low Limit (▼:); *when set and enabled*
- High Limit (▲:); *when set and enabled*

If limits were not set and enabled, the readings are displayed as white vertical bars. If limits were set and enabled, readings are displayed as white bars if within set limits or red; if outside set limits (Figure 28).

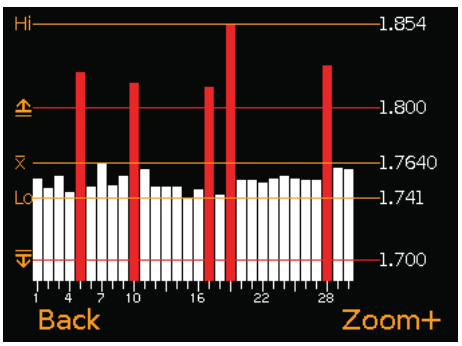


Figure 28

If there are more readings in the batch than can be displayed on a single screen, multiple readings will be combined into one bar. Should a single reading within the 'combined bar' be outside set limits, the whole bar will be red.

[e] For batches of more than one reading.

15 REVIEWING BATCH DATA - MODEL T (continued)

Pressing the 'Zoom+' softkey, allows each individual reading to be displayed, thereby showing the individual readings outside the set limits (Figure 29).

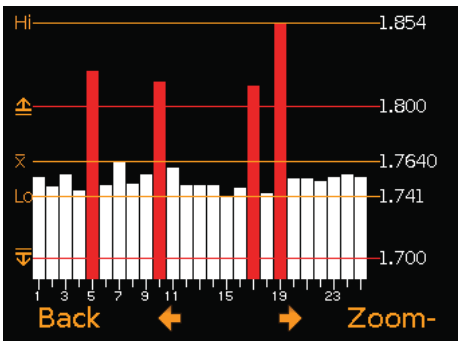


Figure 29

When zoomed in, the graph will always display the first 25 readings. Pressing the ➔ softkey will display the next 25 readings in the batch (Figure 30).

Subsequent presses of the ➔ softkey will scroll forwards through the readings, 25 readings at a time. Pressing the ➔ softkey will scroll backwards.

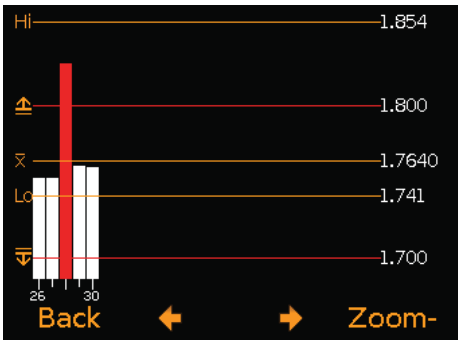
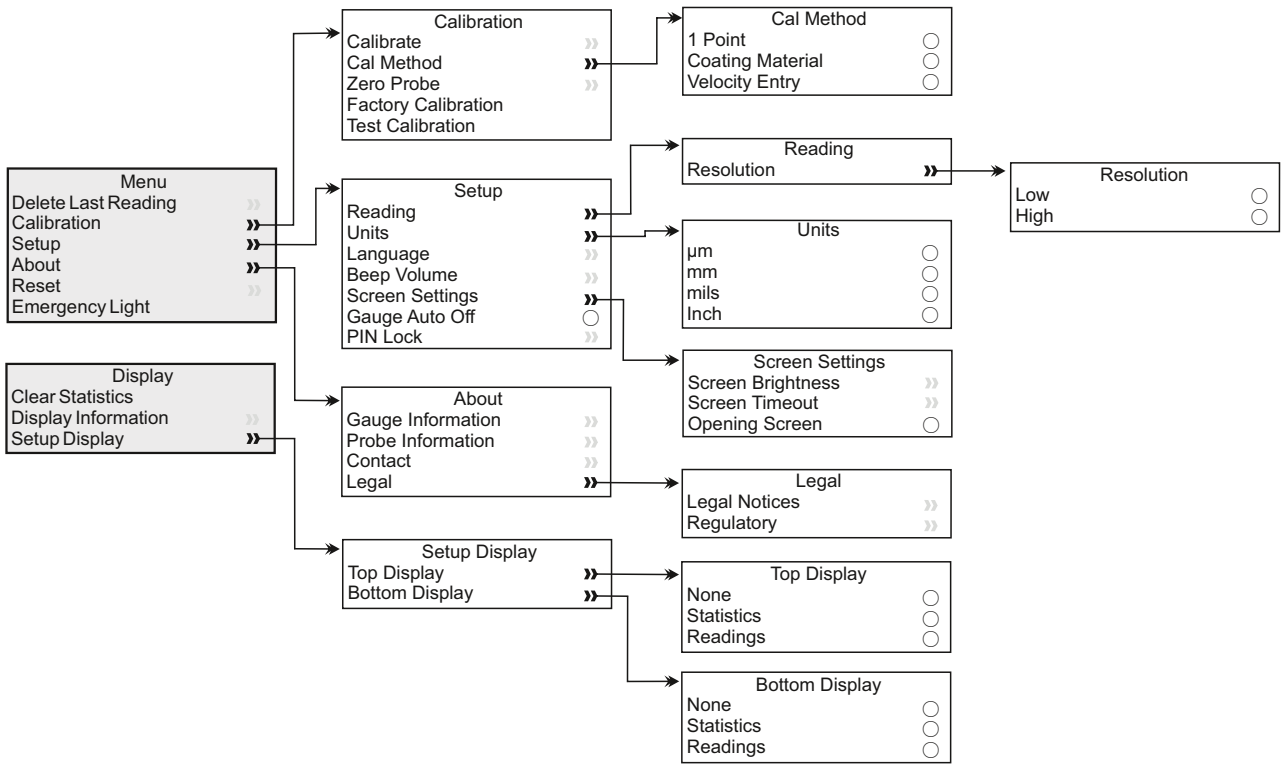


Figure 30

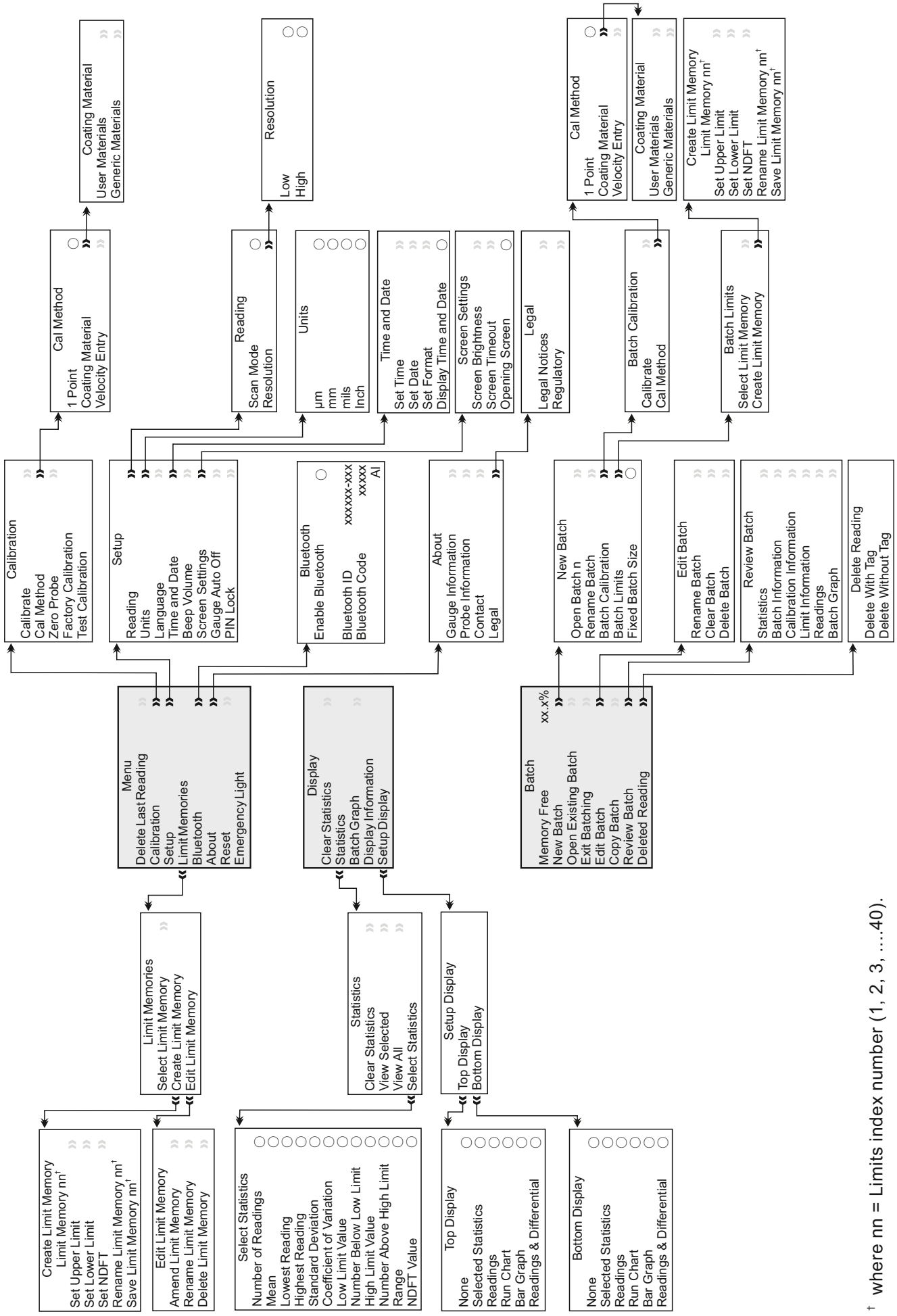
Pressing the 'Zoom-' softkey returns to the original overview graph of all readings in the batch.

Pressing the 'Back' softkey returns the gauge to the Batch/Review Batch menu.

16 MENU STRUCTURE - MODEL B



17 MENU STRUCTURE - MODEL T



† where nn = Limits index number (1, 2, 3, ...40).

18 DOWNLOADING DATA

18.1 USING ELCOMASTER® ON A PC

Using ElcoMaster® - supplied with the Elcometer 500 Model T and available as a free download at elcometer.com - gauges can transmit readings to a PC for archiving and report generation. Data can be transferred via USB (Model B & T) or Bluetooth® (Model T). For more information on ElcoMaster® visit www.elcometer.com

18.2 USING ELCOMASTER® MOBILE APPS - MODEL T

Ideal when out in the field or on-site, using the ElcoMaster® Android™ or iOS Mobile App users can:

- Store live readings directly on to a mobile device and save them into batches together with GPS coordinates.
- Add photographs of the test surface.
- Map readings on to a map, photograph or diagram.
- Inspection data can be transferred from mobile to PC for further analysis and reporting.

For more information on ElcoMaster® Mobile Apps visit www.elcometer.com

ANDROID APP ON Google play

Compatible with smart phones and tablets running Android 2.1 or above. To install, download via www.elcometer.com or using the Google Play™ Store app, and follow the on screen instructions.

Available on the App Store

Made for iPhone 6 Plus, iPhone 6, iPhone 5s, iPhone 5c, iPhone 5, iPhone 4s, iPhone 4, iPad Air 2, iPad mini 3, iPad Air, iPad mini 2, iPad (3rd and 4th generation), iPad mini, iPad 2, and iPod touch (4th and 5th generation). To install, download via www.elcometer.com or the App Store, and follow the on screen instructions.

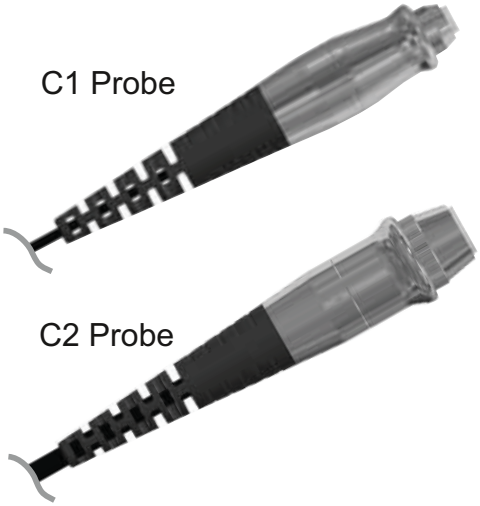
19 UPGRADING YOUR GAUGE

Gauge firmware can be upgraded to the latest version by the user via ElcoMaster®, as it becomes available. ElcoMaster® will inform the user of any updates when the gauge is connected to the PC with an internet connection.

20 SPARES & ACCESSORIES

20.1 PROBES

Two probe options are available; C1 and C2, which can measure coatings up to 2.50mm (98mils) and 9mm (355mils) thick[f] respectively.



As the Elcometer 500 uses ultrasonic technology to non-destructively measure the coating thickness on concrete and other similar substrates, the gauge/probe's overall measurement range is determined by the coating's formulation.

Whilst the Elcometer 500 can measure up to 9mm (355mils) of a typical epoxy coating, more sound absorbent coatings such as rubber, will reduce the measurement range of the gauge.

Similarly, due to the nature of the measurement technology, coatings with high levels of 'aggregate' may also affect the performance of the gauge.

Elcometer 500 probes will be identified automatically by the gauge when connected and details can be viewed at any time via Menu/About/Probe Information.

The Elcometer 500 is supplied as a gauge only, without probe - probes must be ordered separately.

Probes are supplied with a probe tip (fitted), two measurement foils[g] for verifying the gauge and probe performance, see Section 6 on page en-9, and a test certificate.

[f] Epoxy coatings, thickness on other materials may vary.
[g] C1 Probes supplied with nominal values 1 & 2mm (40 & 80mils)
C2 Probes supplied with nominal values 3 & 8mm (120 & 310mils)

20 SPARES & ACCESSORIES (continued)

Probe Type	Measuring Range[f]	Accuracy	Part Number
C1	0.15 - 2.50mm (6 - 98mils)	±2% or ±0.01mm (±2% or 0.4mils)	T500-C1
C2	0.75 - 9mm (30 - 355mils)		T500-C2
C1	Replacement Probe Tip; Pack of 2		T50027602-1
C2	Replacement Probe Tip; Pack of 2		T50027602-2
C1 / C2	Probe Tip Oil; 4ml (0.14fl oz) Bottle		T50027604
C1	Foil Set: 1 & 2mm (40 & 80mils)		T99022255-13
C1	Foil Set - Certified: 1 & 2mm (40 & 80mils)		T99022255-13C
C2	Foil Set: 3 & 8mm (120 & 310mils)		T99022255-14
C2	Foil Set - Certified: 3 & 8mm (120 & 310mils)		T99022255-14C

Note: A Material Safety Data Sheet for the probe tip oil supplied by Elcometer is available to download via our website:
www.elcometer.com/images/stories/MSDS/Elcometer_Probe_Tip_Oil.pdf

20.2 ULTRASONIC COUPLANT

For the gauge to work correctly, there must be no air gap between the probe and the test surface. This is achieved by using a small amount of couplant.

A 120ml (4fl oz) bottle of couplant is supplied as standard with each gauge, other sizes are available to purchase separately.

Description	Part Number
120ml (4fl oz)	T92015701
120ml (4fl oz) - pack of 5	T92015701-5
300ml (10fl oz)	T92024034-7
500ml (17fl oz)	T92024034-8
3.8l (1 US Gallon)	T92024034-3
High Temperature; 60ml (2fl oz)	T92024034-9
High Temperature; 60ml (2fl oz) - pack of 2	T92024034-10

Note: Material Safety Data Sheets for the ultrasonic couplant supplied by Elcometer are available to download via our website:
www.elcometer.com/images/stories/MSDS/Elcometer_Ultrasonic_Couplant_Blue.pdf
www.elcometer.com/images/stories/MSDS/elcometer_ultrasonic_couplant_hi_temp.pdf

[f] Epoxy coatings, thickness on other materials may vary.
[h] For use in warm environments.

20 SPARES & ACCESSORIES (continued)

20.3 ELCOMETER 500 COATING CALIBRATION MOULD (CCM)

The Elcometer 500 Coating Calibration Mould (CCM) is a steel mould with two chambers - a sample chamber and overflow chamber - which can be used to determine the sound-velocity of coating materials for calibration purposes. See Section 11 on page en-22 for further information.

Description	Part Number
Elcometer 500 Coating Calibration Mould (CCM)	T50027567-1

21 WARRANTY STATEMENT

Gauges are supplied with a 12 month warranty against manufacturing defects, excluding contamination and wear. The warranty can be extended to two years within 60 days of purchase via www.elcometer.com.

Probes are supplied with a 12 month warranty against manufacturing defects, excluding contamination and wear.

22 TECHNICAL SPECIFICATION

Model	Model B	Model T
Thickness Range[f]	Using C1 Probe: 0.15 - 2.50mm (6 - 98mils) Using C2 Probe: 0.75 - 9mm (30 - 355mils)	
Accuracy[i]	±2% or ±10µm (±2% or 0.4mils)	
Resolution (user selectable)	Low: 10µm, 0.01mm, 1mils or 0.001" High: 1µm, 0.001mm, 0.1mils or 0.0001"	
Measurement Rate[j]	60+ readings per minute	
Gauge Memory	None	100,000 readings in up to 1,000 batches
Operating Temperature	-10 to 50°C (14 to 122°F)	
Power Supply	2 x AA batteries (rechargeable batteries can be used)	
Battery Life[k]	Alkaline: Approximately 15 hours Lithium: Approximately 28 hours	
Gauge Weight	161g (5.68oz) including batteries, without probe	
Gauge Dimensions	141 x 73 x 37mm (5.55 x 2.87 x 1.46") without probe	
Can be used in accordance with: ASTM D6132, SSPC-PA 9, ISO 2808 Method 10		

[f] Epoxy coatings, thickness on other materials may vary.
[i] Whichever is the greater.
[j] 140+ readings per minute when using the Model T in Scan Mode.
[k] When in continuous reading mode. Rechargeable batteries may differ.

23 LEGAL NOTICES & REGULATORY INFORMATION

Declaration of Conformity:
Elcometer 500 Model B complies with the requirements of the following EU Directives:
2014/30/EU Electromagnetic Compatibility
Elcometer 500 Model T complies with the requirements of the following EU Directives:
2014/53/EU Radio Equipment
Declarations of Conformity are available to download via:
Model B: www.elcometer.com/images/stories/PDFs/Datasheets/Declaration of Conformity/English/DoC_500_B.pdf
Model T: www.elcometer.com/images/stories/PDFs/Datasheets/Declaration of Conformity/English/DoC_500_T.pdf
Operational Frequency Band: 2,402 - 2,480 MHz
Maximum Transmitted Power: <4 dBm
This product is Class B, Group 1 ISM equipment according to CISPR 11.
Class B product: Suitable for use in domestic establishments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.
Group 1 ISM product: A product in which there is intentionally generated and/or used conductively coupled radio frequency energy which is necessary for the internal functioning of the equipment itself.
The USB is for data transfer only and is not to be connected to the mains via a USB mains adapter.
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
The ACMA compliance mark can be accessed via: Menu/About/Legal/Regulatory.
Elcometer 500 Model T: The Giteki mark, its product identification code, the FCC ID and Bluetooth SIG QDID can be accessed via: Menu/About/Legal/Regulatory
NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
-- Consult the dealer or an experienced radio/TV technician for help.

To satisfy FCC RF Exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
Modifications not expressly approved by Elcometer Limited could void the user's authority to operate the equipment under FCC rules.
Elcometer 500 Model T: This device complies with Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
This Class B digital apparatus complies with CAN ICES-3 (B)/NMB-3(B).
elcometer® and ElcoMaster® are registered trademark of Elcometer Limited, Edge Lane, Manchester, M43 6BU. United Kingdom
Bluetooth® are trademarks owned by Bluetooth SIG Inc and licensed to Elcometer Limited.
Elcometer 500 Model T: Made for iPhone 6 Plus, iPhone 6, iPhone 5s, iPhone 5c, iPhone 5, iPhone 4s, iPhone 4, iPad Air 2, iPad mini 3, iPad Air, iPad mini 2, iPad (3rd and 4th generation), iPad mini, iPad 2, and iPod touch (4th and 5th generation). “Made for iPod,” ”Made for iPhone,” and “Made for iPad” mean that an electronic accessory has been designed to connect specifically to iPod, iPhone, or iPad, respectively, and has been certified by the developer to meet Apple performance standards. Apple is not responsible for the operation of this device or its compliance with safety and regulatory standards. Please note that the use of this accessory with iPod, iPhone, or iPad may affect wireless performance.
iPad, iPhone, and iPod touch are trademarks of Apple Inc., registered in the U.S. and other countries.
App Store is a trademark of Apple Inc., registered in the U.S. and other countries.
Google Play is a trademark of Google Inc.
All other trademarks acknowledged.

The Elcometer 500 is packed in a cardboard package. Please ensure that this packaging is disposed of in an environmentally sensitive manner. Consult your local Environmental Authority for further guidance.

Head-Office: Elcometer Limited, Edge Lane, Manchester, M43 6BU, United Kingdom.

elcometer®

PROMAT

用户手册

Elcometer 500

涂层测厚仪

(在混凝土及其他类似基材)

目录

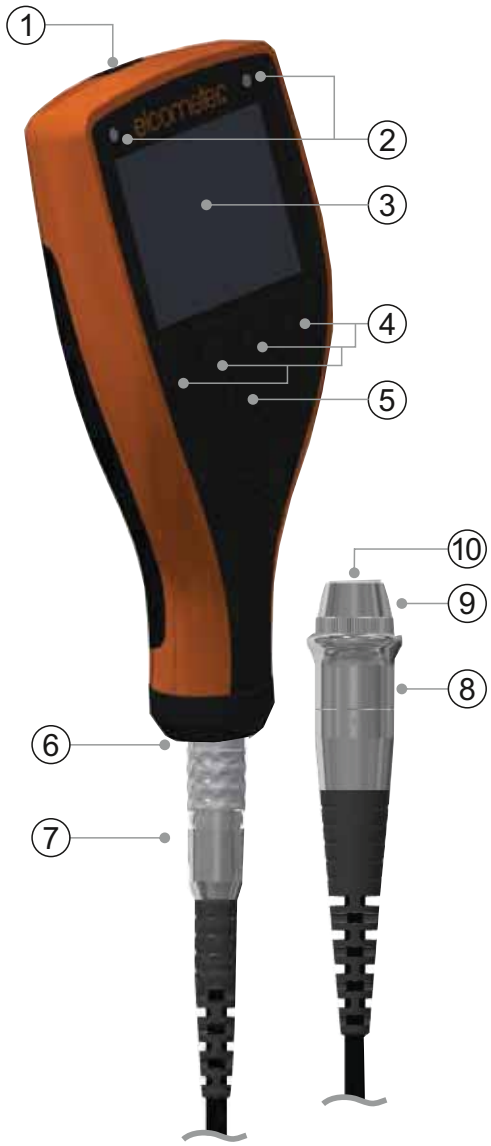
目录（续前节）

Android™

Made for iPod iPhone iPad

避免疑议, 请参考英文版本.
由易高提供的超声波耦合剂和探头端部油材料安全数据表,都可以通过我们的网站下载：
Elcometer 超声波耦合剂材料安全数据表:
www.elcometer.com/images/stories/MSDS/Elcometer_Ultrasonic_Couplant_Blue.pdf
Elcometer 超声波耦合剂(高温)材料安全数据表:
www.elcometer.com/images/stories/MSDS/elcometer_ultrasonic_couplant_hi_temp.pdf
Elcometer Probe Tip Oil Material Safety Data Sheet:
www.elcometer.com/images/stories/MSDS/Elcometer_Probe_Tip_Oil.pdf

1 仪器概览



1 USB数据输出插孔 (在机盖下方)
2 LED指示灯 - 红灯（左边），绿灯（右边）
3 液晶显示屏
4 按键
5 开/关按键
6 探头插口
7 探头插头
8 探头
9 探头端部领
10 可更换探头端部
11 腕带连接
12 电池舱（¼转开/关）

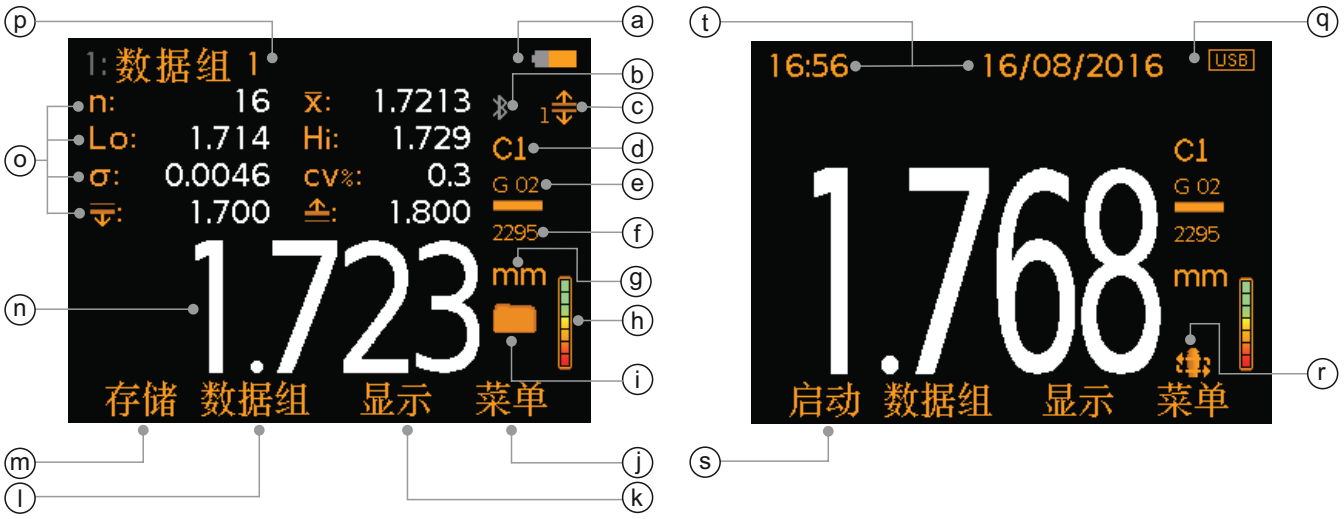
2 包装清单

- Elcometer 500 涂层测厚仪
- 探头端部油 - 4ml (0.14fl oz 瓶)
- 超声波耦合剂 - 120ml (4fl oz 瓶装)
- AA电池; x2
- 保护套
- 手提箱（型号T）
- 手腕线
- 屏幕保护贴; x3
- ElcoMaster® 软件（型号T）
- USB线（型号T）
- 检验证书
- 用户手册

注: Elcometer 500只作为仪器供应 - 探头必须分开订购, 请参阅第zh-31页20.1节“探头”.

PROMAT

3 显示



		型号
a	电源 : 电池 - 包括电池使用寿命指示图标	B, T
b	蓝牙开启 - 灰色 - 未连接;橙色: 连接	T
c	限值启用(有限值索引编号) - 红色: 超限	T
d	探头类型连接 - C1或C2	B, T
e	校准方法	B, T
f	校准: 声速	B, T
g	测量单位 - µm, mm, mils, inch	B, T
h	信号强度指示器 - 绿色:有效和稳定的读数	B, T
i	数据组开启功能	T
j	菜单按键	B, T
k	显示按键	B, T
l	数据组按键	T
m	保存当前读数值	B, T
n	读数值 - 白色: 有效和稳定的读数; 灰色:探头在空气中;红色: 超限	B, T
o	用户可选统计 - 最多8个	T
p	数据组名称 - 在数据组时	T
q	电源: USB	B, T
r	扫描模式开启 - 在扫描过程中图标闪烁	T
s	启动/停止扫描 - 在扫描模式下时	T
t	日期和时间 - 启用中和不在数据组	T

4 启动

4.1 确保您的仪器具有最新的固件

为确保您的仪器拥有最新的固件，让您从最新的特性和功能中受益，我们建议仪器定期连接到ElcoMaster®和第一次使用前.

只需使用“连接仪器”功能,通过USB连接仪器至ElcoMaster®互联网连接的电脑。如果仪器固件的后续版本可以提供, “更新仪器”将显示在仪器详细资料右侧。点击“更新仪器”来安装最新的固件.

4.2 装配电池

每个仪器提供了2 x AA碱性电池.

要插入或更换电池:

1 提起在电池舱的锁存,逆时针旋转，取下盖板.
2 插入2块电池,同时确保极性正确.
3 重新装上盖，旋转锁存顺时针关闭.

电池状态是由在显示屏的右上方电池符号 () 表示:

- 满符号（橙色）=电池满
- 空符号（红色，闪烁）=电池以最低的可持续水平

注: 电池必须谨慎处置以防止污染环境. 请咨询您所在地区当地环境局关于处置信息. 不要丢弃任何电池在火中.

4.3 切换仪器开/关

要打开: 按开/关键超过0.5秒时间.

要关闭: 按住开/关机键直到屏幕变为空白.

4 启动（续前节）

通 过在菜单/设定/仪器自动关闭, 设置用户定义的不活动时间后, 仪器会自动关机. 默认设置为5分钟.

4.4 连接探头

两个探头可供选择,C1和C2. 使用的探头由被测量的涂层厚度确定,见第zh-31页20.1节“探头”获取更多信息.

要连接探头:

1 对准探头插头的红点与仪器的底座上的红点.

2 推探头进仪器,确保连接器完全啮合.

Elcometer 500探头将通过仪器连接时自动被识别,并且可以在通过菜单/关于/传感器信息 随时查看信息.

4.5 安装/更换一个探头端部

探头由一个探头主体,探头端部领和探头端部 (已经安装[a])组成. 探头端部随着时间磨损和探头端部的任何损害, 如划痕,碎屑或凹痕会影响读数的准确性.

每次开机并连接了探头的时候,该仪器会自动检查探头端部磨损.

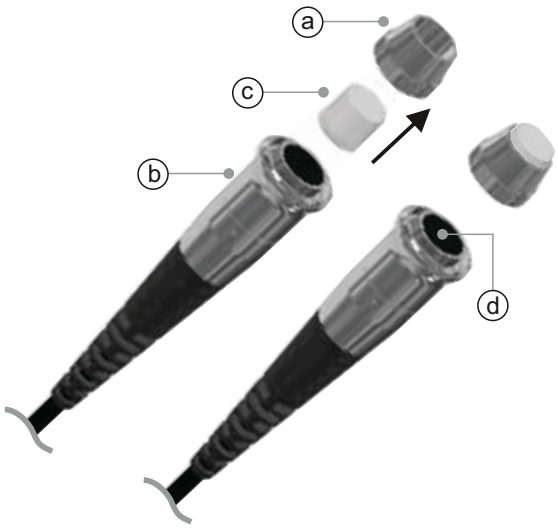
如果探头端部磨损大于0.7mm但小于1mm：用户将被提示检查探头端部是否磨损或损坏.检查之后,用户可以选择继续当前的探头端部或安装一个新的端部.

如果探头端部磨损大于1mm: 用户将被提示更换探头端部.

[a] 额外的探头端部和探头端部油可以从易高或当地易高供应商购买，见zh-31页20.1节“探头”.

要安装/更换探头端部:

1 从探头体(b)拧开探头端部领(a).
2 取下磨损或损坏探头端部.
3 通过滑入探头端部领安装新的探头端部 (c).
4 施加一小滴的探头端部油到传感器板(d).
5 重新装上探头端部领到探头体.



4.6 上油传感器板

如需探头能够正确地使用, 探头端部和传感器板之间必须没有空气间隙. 这是通过使用少量探头端部油实现(每个仪器提供[a]). 仪器会通知用户何时需要油.

要上油传感器板:

1 从探头体(b)拧开探头端部领(a)并从传感器板(d)取下探头端部(c).
2 施加一小滴的探头端部油到传感器板(d).
3 重新装上探头端部和探头端部领到探头体.

注: 不推荐使用正常的油, 因为它可能会损坏探头和影响仪器的准确性. 超声耦合剂可以被用来作为一种替代但是,探头端部和传感器板将需要更多的定期清洗和更频繁重新施加耦合剂.

注: 探头端部油的材料安全数据表可由易高提供,通过我们的网站下载：
www.elcometer.com/images/stories/MSDS/Elcometer_Probe_Tip_Oil.pdf

[a] 额外的探头端部和探头端部油可以从易高或当地易高供应商购买，见zh-31页20.1节“探头”.

5 测量读数

5.1 开始使用之前

1 打开仪器 - 见zh-5页第4.3节.

2 连接探头 - 见zh-6页第4.4节.

3 上油传感器板或更换探头端部如果需要的话 - 见第 zh-6和zh-7页4.5和4.6节.

- 仪器会通知用户何时需要油,何时探头端部被磨损或损坏应更换.

4 建立仪器参数 - 见第zh-10页第7节.

5 校准仪器 - 见第zh-15页和zh-16页的第9节和10节.

5.2 在标准模式取得读数

1 施加少量的耦合剂到涂层表面.

2 按探头到耦合剂,确保探头对表面平坦.

3 显示屏将显示一个值, 它是不断更新的(图1).

- 读数的稳定性是在显示的右侧信号强度指示器被指示.如果信号强度指示器为绿色,这是一个有效的和稳定的读数。如果不绿,确保探头下方有足够的耦合剂膜并探头座落平贴表面.或者定位探头在不同区的测试表面附近直到接收到强信号.
- '<0.15mm' 或 '>2.50mm' ('<6mils' 或 '>98mils') 表示探头范围外的读数当使用C1探头时 或 '<0.75mm' 或 '>9.00mm' ('<30mils' 或 '>355mils') 当使用C2探头时.

图1

4 按“存储”以存储当前的读数在仪器或数据组(T型)内存.

5 从表面上除去探头.

- 当探头表面上除去(图2)读数值变为灰色.

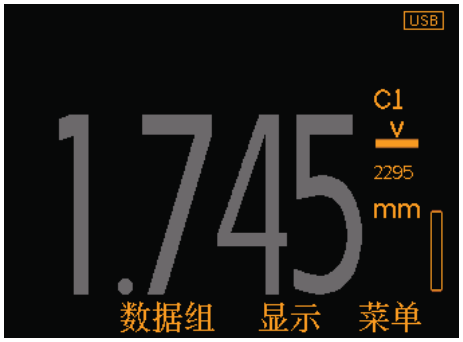


图2

5.3 扫描模式下采取读数- 型号T

扫描模式通过探头在涂层表面滑动允许在大的表面积快速测量.在扫描模式中,仪器以增加的测量速率读取读数,并且在每次扫描结束时,将显示平均,最低和最高读数和所有三个值被保存在仪器或数据组记忆.

1 通过 菜单/设定/读数/扫描模式,启用“扫描模式".

2 施加少量的耦合剂到涂层表面.

3 按探头到耦合剂,确保探头对表面平坦.

5 测量读数（续前节）

4 按“启动”开始扫描和探头在涂层的表面上滑动(图3).

5 显示屏将显示一个值, 它是不断更新的.

- 读数的稳定性是在显示的右侧信号强度指示器被指示.如果信号强度指示器为绿色,这是一个有效的和稳定的读数。如果不绿,确保探头下方有足够的耦合剂膜并探头座落平贴表面.或者定位探头在不同区的测试表面附近直到接收到强信号.

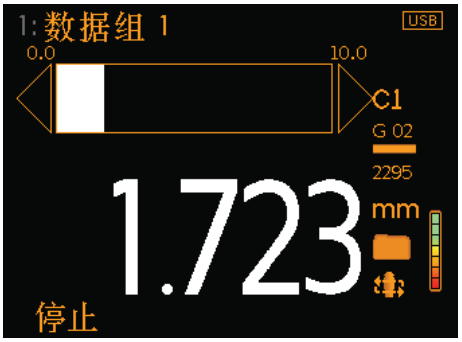


图3

- '<0.15mm' 或 '>2.50mm' ('<6mils' 或 '>98mils') 表示探头范围外的读数当使用C1探头时 或 '<0.75mm' 或 '>9.00mm' ('<30mils' 或 '>355mils') 当使用C2探头时.

6 按“停止”停止读取读数和完成扫描.

- 如果扫描由于探头下面缺乏耦合剂中断, 扫描暂停直到接收到良好信号或按“停止”.

7 扫描的最低，平均和最大读数将被显示在屏幕上(图4).按“存储”保存扫描的读数在仪器或数据组内存. 按“清除”忽略上次扫描并重新开始.

8 从表面上除去探头.

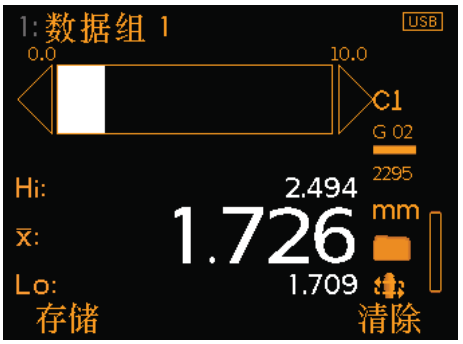


图4

6 验证仪器和探头性能

探头端部在使用一段时间后磨损,可影响读数的准确性. 探头端部的任何损害,例如划痕,碎屑或凹痕也将影响准确度. 虽然当探头端部需要更换,仪器会通知用户, 但最好做法是定期检查仪器/探头的性能.

用户可以使用与每个探头提供的测量膜,在现场验证仪器和探头的性能.

验证仪器和探头性能:

1 按菜单/校准/校准方法/涂层材料 然后从“通用材料”列表中选择测量膜.

2 出现提示时,施加耦合剂到测量膜并采取读数.

6 验证仪器和探头性能（续前节）

3 与打印在测量膜标签上的厚度值比较读数.

读数应在±2% 或10µm (0.4mils)[b] 测量膜厚度值范围内. 如果超出这个范围,调零探头(见zh-24页12节'探头调零"), 重复这个过程. 如果仪器还在范围外 - 联系易高或当地供应商进一步咨询.

7 设定仪器参数

7.1 选择语言

1 按住开/关按键，直到显示Elcometer图标.
2 按菜单/设定/语言,用↑↓键选择语言.
3 根据屏幕菜单操作.

当选用外语时，进入语言菜单:

1 关闭仪器.
2 按下左边的按键并持续一段时间，打开仪器.
3 ↑↓键选择语言.

7.2 设立屏幕

一些画面设置定义可以由用户通过菜单/设定/屏幕设定,包括：

- 屏幕亮度;这可以被设置为"手动"或"自动" - 仪器的环境光传感器会自动调整亮度.
- 屏幕超时;如果不活动的时间超过15秒，显示屏将变暗.如果设置不活动的时间,显示屏将变'黑'. 按任何键或点击仪器来唤醒它.

7.3 设置读数显示

彩色液晶显示屏被分成两半; 顶部和底部显示. 用户可以定义哪些信息可显示在顶部和底部包括: 读数, 统计, 趋势图, 柱状图, 读数与差值[c].

[b] 以较大值为准
[c] 不在"扫描模式"提供 - 见zh-8页第5.3节"扫描模式下采取读数 - -型号T"

7 设定仪器参数 (续前节)

- 无;不显示任何信息.
- 读数(图5); 使用由用户定义的分辨率显示读数值,见zh-13页7.7节.
- 统计-型号 B(图6); 每个测量时将显示以下统计值 :

  读数数目 , 平均值 , 最低值 , 最高值 , 标准偏差, 变异系数

  要清除当前的统计值,按显示 / 清除统计数据.
- 选定统计数据-型号 T(图7);用户可通过显示/ 统计/选择 统计数据, 定义最多8个统计值 可以显示. 从以下选择 :

  读数数目 , 平均值 , 最低值 , 最高值 , 标准偏差, 变异系数, 低限制值, 低于低限值的读数, 高限值, 高于高限值 的读数, 范围, NDFT (名义干膜厚度)值.

  要查看当前的统计值, 按显示/统计/查看选定的数据或查看所有数据.

  要清除当前的统计值,按显示 /统计/ 清除统计数据.
- 趋势图-型号 T(图8);最后20个测量值的趋势图, 每次读取后自动更新.
- 柱状图-型号 T(图9); 显示一个模拟的当前测量值与测量最高(Hi) , 最低(Lo)和平均 (x̄)读数. 每次 读取后自动更新.

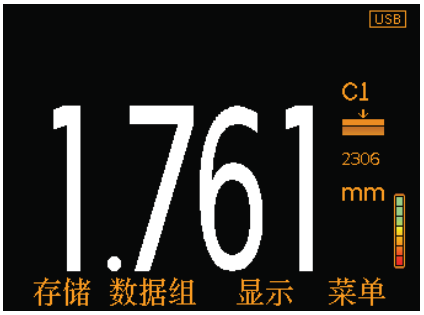


图5: 读数

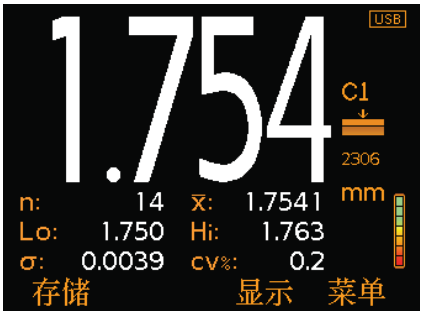


图6: 统计和读数 (型号 B)

图7: 选定统计数据和读数 (型号 T)

图8: 趋势图和读数

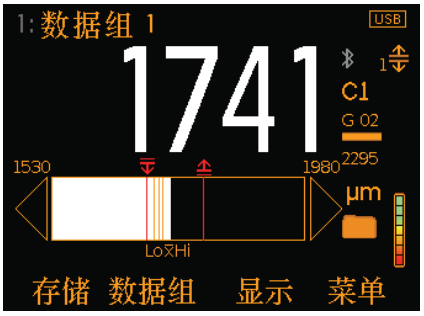


图9: 读数和柱状图

7 设定仪器参数（续前节）

- 读数与差值(Δ)[c]-型号 T(图10); 最后的读数与来自通过菜单/限值内存/创建限值内存/设置NDFT 的NDFT (名义干膜厚度)值的变动一起显示.

图10: 读数与差值

要设置显示：

1 按显示/显示设定/最上方显示（或根据需要底部显示）.

2 使用↑↓键凸显需要的选项，然后按“选择”.

注: 如果'无'被选择了一半，“读数 ”或“趋势图”选择另一半, 读数或趋势图将充满整个屏幕. 如果选择任何其他组合, 该 数据将在最上方或底部规定中显示.

7.4 测量范围

Elcometer 500使用“脉冲回波”测量技术(从探头的底边到材料密度边界的总厚度被测量),以非破坏性测量涂层达9mm(355mils)厚度在混凝土和其它类似基材.

虽然易高500可以测量达9mm典型的环氧树脂涂层(355mils),根据所使用的探头,更吸音涂料如橡胶可减少仪器的测量范围. 联系易高以获得更多信息.

7.5 测量基材

Elcometer 500已被设计用于测量在混凝土和其他类似基材上的涂层厚度. 这些包括干墙, 石膏板, 混凝土砌块, 砖,石,煤渣块等胶凝材料.

Elcometer 500是理想于在粗糙和光滑基材测量涂料.由于超声波技术的性质,由于粗糙度的增加读数的稳定性 - 通过右侧的信号强度指示器显示 - 可能恶化。如果信号强度指示器为绿色,这是一个有效的和稳定的读数,不然定位探头在不同区的测试表面附近直到接收到强信号.

[c] 不在“扫描模式”提供 - 见zh-8页第5.3节“扫描模式下采取读数 - -型号T".

7 SETTING THE GAUGE PARAMETERS（续前节）

7.6 选择测量单位

Elcometer 500可以在µm, mm, mils 和inch 测量. 要选择测量单位，按菜单/设定/单位.

7.7 选择测量分辨率

Elcometer 500有用户可选择的测量分辨率：

- 低: 10µm, 0.01mm, 1mils 或 0.001"
- 高: 1µm, 0.001mm, 0.1mils 或 0.0001"
  (更精确的读数当测量更薄的涂层时）

要选择分辨率,请按菜单/设定/读数/分辨率,并按要求选择“低”或“高”.

8 设定限度-型号 T

限值是由用户定义可接受的公差水平,允许读数与预定义值相比较. Elcometer 500 T型最多可存储40个预编程的限值.

限值可以在仪器上创建或通过电脑使用ElcoMaster®, 并保存到仪器内存为未来选择. 使用ElcoMaster®, 存储限值可以转移到其他仪器.

每个限值可以由一个NDFT(名义干膜厚度)值(x:) - 需要“读数和差值” - 低(▽:)和/或高(△:)限值.

如果测量时落在外面设定的限值,适当限制图标和读数值变为红色,红色LED闪烁并发出警告(图11).

图11

限值既可以创建个别读数或新的数据组被打开时, 见第8.1和8.2节. 不同数据组可以有不同的限制值.

当创建时, 限值存储在仪器限值内存, 并且可供未来选择, 参见8.3节.

存储的限值可以重命名和在任何时候值是可以修改的, 见第8.4和8.5节.

8 设定限度-型号 T (续前节)

8.1 创建限值给个别读数

1 按菜单/限值内存/创建限值内存/设定上限值 (或 “设置下限值) .
2 使用↑↓键设置所需的值，然后按“设定”.
3 如果需要，重复“设置下限值”的第2步骤(或“设定上限值”) 和“设置NDFT”.
4 当所有数值已经确定, 使用↑↓键突出显示'存储限值内存n'然后按'选择'保存.

8.2 创建限值给新的数据组

1 按数据组/ 新建数据组/数据组限值/创建限值内存/设定上限值 (或 “设 置下限值"按要求).
2 使用↑↓键设置所需的值，然后按“设定”.
3 如果需要，重复“设置下限值”的第2步骤(或“设定上限值”) 和“设置NDFT”.
4 当所有数值已经确定, 使用↑↓键突出显示'存储限值内存n'然后按'选择'保存.

数据组限值可以在任何时候通过 数据组/回顾 数据组/ 数据组信息 进行查看.

8.3 选择存储限值

1 按菜单/限值内存/选择限值内存或在数据组时, 按 数据组/新建数据组/数据组限值/选择限值内存.
2 使用↑↓键突出显示所需的限值内存, 然后按'选择'.

当限值内存在使用时, (n⇳) 被显示在测量屏幕的右侧, 其中n =限值索引号.

8.4 重命名限值

1 按菜单/限值内存/编辑限值内存/重命名限值内存.
2 使用↑↓键突出显示要重命名的限值内存, 然后按“选择”.
3 使用←→重命名限值内存.
4 选择“OK”以保存更改，或“退出”退出并忽略所做的任何修改.

8 设定限度-型号 T (续前节)

8.5 修改限值

1 按菜单/限值内存/编辑限值内存/修改限值内存.

2 使用↑↓键突出显示要修改的限值内存, 然后按“选择”.

3 使用↑↓键突出显示 ‘设定上限值’ (或 ‘设置下限值’)然后按“选择”.

4 使用↑↓键设置所需的值 , 然后按“设定”.

5 如果需要, 重复步骤3-4 的‘设置下限值’(或‘设定上限值’)和'设置NDFT'.

6 当所有数值已经修改, 使用↑↓键突出显示'存储限值内存n', 然后按'选择'保存更改.

9 校准方法

校准是设置仪器到已知的涂层厚度值的过程,以确保在不同的涂层材料准确和可重复的读数.

校准方法的选择可供,见图表2：校准方法. 要选择校准方法 , 按 菜单/校准/校准方法.

当前选择的校准方法是通过测量屏幕右侧的校准方法图标所示.

图表2：校准方法

校准方法	图标	描述
单点		读数在已知厚度的涂层基材上采取,并相应地调整.见zh-16页10.2节'使用单点校准“和zh-22页第11节“使用涂层校准模具”.
涂层材料		该涂层材料是由一个预先定义清单的通用或用户定义的涂层材料,存储在仪器中选择.见zh-19页10.5节“使用涂层材料校准"和zh-22页11节“使用涂层校准模具”.

9 校准方法（续前节）

图表2：校准方法（续前节）		
校准方法	图标	描述
声速输入		如果该涂层的声速是已知的,简单地输入值.见zh-18页10.3节“使用声速输入"和zh-22页11节“使用涂层校准模具”.

10 校准您的仪器

每次不同的探头被用或不同类型的涂层测定,仪器应校准.

10.1 开始使用之前

1 打开仪器 - 见zh-5页第4.3节.

2 连接探头 - 见zh-6页第4.4节.

3 上油传感器板或更换探头端部如果需要的话 - 见第 zh-6和zh-7页4.5节和4.6节.

- 仪器会通知用户何时需要油,何时探头端部被磨损或损坏应更换.

10.2 使用单点校准

这个过程需要用已知厚度的涂层样品, 通过一些其它仪器测量,例如干膜厚度仪.

如果样品是不容易获得的,可以使用易高500涂层校准模具(CCM)创建,见zh-22页第11节.

1 按菜单/校准/校准方法 并选择“单点”. 如果“单点”已被选定,只需按菜单/校准/校准.

- 当前选择的校准方法是由右边显示的图标表示.

2 为了确保精确和可重复的读数和检查探头磨损,用户将被提示归零探头;清洁探头表面,拿探头在空气中,然后按'零'.

- “调零探头”的程序不仅是校准过程的一部分,它也可以在任何时间进行,检查是否有足够探头端部油在传感器板上和探头端部的状况. 见zh-24页第12节“探头调零”获取更多信息.

3 在出现提示时,施加耦合剂到涂层样本.

- 如果已知厚度的涂层样品是不容易获得的,可以使用易高500涂层校准模具(CCM)创建,见zh-22页第11节.

10 校准您的仪器（续前节）

4 把探头放到涂层的样品,确保探头是对表面平坦(图12).显示屏将显示不断更新的厚度值.

- 读数的稳定性是在显示的右侧信号强度指示器被指示.如果信号强度指示器为绿色,这是一个有效的和稳定的读数.如果不绿,确保探头下方有足够的耦合剂膜并探头座落平贴表面.或者定位探头在不同区的测试表面附近直到接收到强信号.

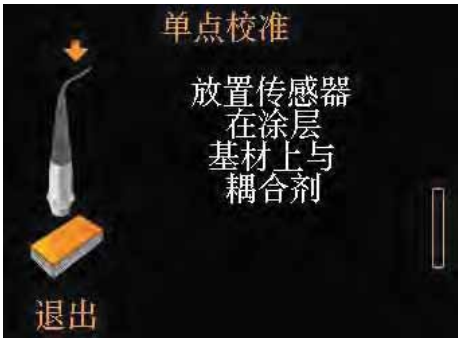


图12

5 从表面上除去探头.最后读数被保持在屏幕上(图13).如果不具有代表性,重复步骤3-4.

- 过量使用耦合剂可导致扭曲读数,当探头从表面除去。如果发生这种情况,清洁探头尖端和涂层的表面,然后重复步骤3-4.

图13

6 按“调整”并使用 ↑↓键,调整读数至已知厚度值, 然后按“设置”设置值(图14).

图14

在校准过程结束时, 用户被给予保存涂层校准在仪器内存选项以供将来使用，见第zh-19页10.4节“保存涂层校准”进一步的信息的.

该仪器使用输入的涂层厚度值校准,并且衍生声速,显示在测量屏幕的右侧,下方所述校准方法图标(图15).

任何时候按下“退出”将退出校准程序而不校准仪器.

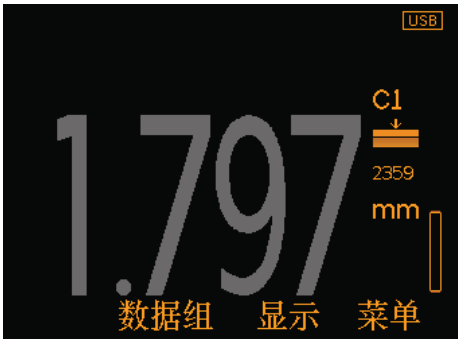


图15

10 校准您的仪器（续前节）

10.3 使用声速输入

使用此方法校准仪器,用户必须知道该涂层材料的声速.如果声速是未知的,“单点”或“涂层材料”校准可以使用或声速可以通过使用易高500涂层校准模具(CCM)来确定,见第zh-22页11节.

1 按菜单/校准/校准方法, 并选择“声速输入”. 如果“声速输入"被选定,只需按菜单/校准/校准.

- 当前选择的校准方法是由右边显示的图标表示.

2 使用 ↑↓ 键输入已知的声速,选择0到9,其次是 ➔ 键移动到下一位数字,其次是“设置”使用输入的值(图16).

- 如果测试涂层的声速是未知的,可以通过使用易高500涂层校准模具(CCM)来确定,见第zh-22页11节.

图16

3 为了确保准确和可重复的读数和检查探头磨损,用户将被提示归零探头;清洁探头表面,拿在空气中,然后按'零'探头.

- “调零探头”的程序不仅是校准过程的一部分,它也可以在任何时间进行,检查是否有足够探头端部油在传感器板上和探头端部的状况. 见zh-24页第12节“探头调零”获取更多信息.

在校准过程结束时, 用户被给予保存涂层校准在仪器内存选项以供将来使用 , 见第zh-19页10.4节“保存涂层校准”进一步的信息的.

该仪器使用输入的声速校准,并且显示在测量屏幕的右侧,下方所述校准方法图标(图17).

任何时候按下“退出”将退出校准程序而不校准仪器.

图17

10.4 保存涂层校准

在“单点”和“声速输入'校准结束时,用户被给予保存涂层校准在仪器内存的选项以供将来使用的.

提示时,选择“是”(图18),以保存并命名校准为适合特殊涂层或工作为例.

使用'涂层材料'校准方法,涂层校准然后保存在“用户材料”列表中以供未来选择,见10.5节“使用涂层材料校准”.

使用ElcoMaster®, 保存“用户材料"名单,在任何时间,可以转移到其他Elcometer 500仪器.

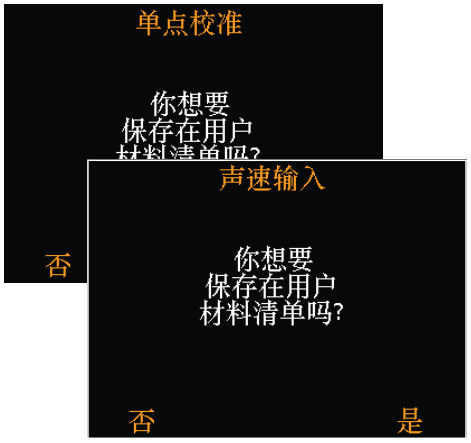


图18

10.5 使用涂层材料校准

使用已知声速涂布材料校准仪器, 如从存储在仪器两个预先定义的列表中的一个由用户选择.

- “通用材料”:从环氧树脂,PVC,橡胶,聚氨酯,沥青选择
- "用户材料”:多达60个用户定义的涂层材料清单,以独特的声速和名称,任一通过创建:
    - 保存“单点”或“声速输入”校准 - 见zh-16页10.2节“使用单点校准”和第zh-18页10.3节的“使用声速输入”;
    - 使用Elcometer 500涂层校准模具(CCM)来确定涂层材料的声速 - 见第zh-22页11节获取更多信息.

使用ElcoMaster®, 保存“用户材料"名单,在任何时间,可以转移到其他Elcometer 500仪器.

注意:小心 - 相同材料但不同的颜色可以具有不同的声音速度.

10 校准您的仪器（续前节）

1 按菜单/校准/校准方法,并选择“涂层材料”其次是“用户材料”或“通用材料”.如果已选择所需的涂层材料,只需按 菜单/校准/校准

- 当前选择的校准方法是通过测量屏幕右侧的校准方法图标所示.

2 使用↑↓键突出显示所需的涂层材料其次是“选择”(图19).

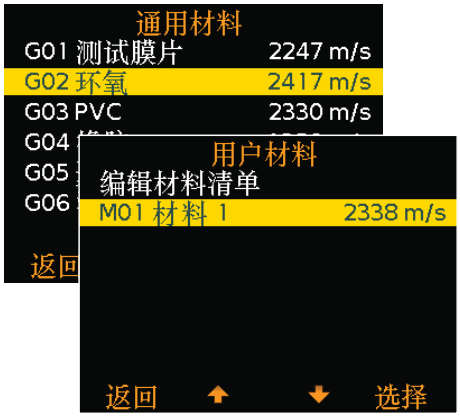


图19

该仪器使用显示测量屏幕的右侧,选择涂层材料的声速,然后校准,下面的校准方法图标,与上面的涂层材料列表索引编号(图20).

任何时候按下“退出”将退出校准程序而不校准仪器.

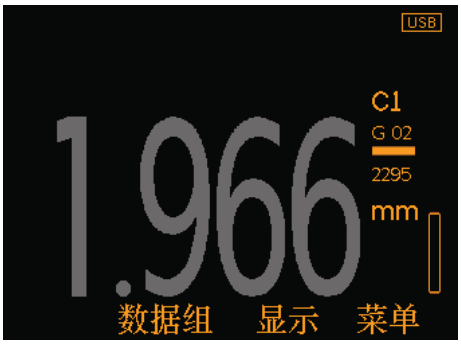


图20

10.6 使用工厂校准

按 菜单/校准/工厂校准 恢复2390m/s(约0.0941in/µs)的默认出厂校准声速设置,一个典型的环氧涂料的声速.

10.7 测试和验证仪器校准

该功能允许用户测试和验证仪器校准,通过读取已知涂层厚度的样品,而读数不被保存.

要测试和验证仪器校准:

1 按 菜单/校准/检验校准值.

2 在出现提示时,施加耦合剂到涂层样本.

- 如果已知厚度的涂层样品是不容易获得的,可以使用易高500涂层校准模具(CCM)创建,见zh-22页第11节.

10 校准您的仪器（续前节）

3 把探头放到涂层的样品,确保探头是对表面平坦.显示屏将显示不断更新的厚度值(图21).

- 读数的稳定性是在显示的右侧信号强度指示器被指示.如果信号强度指示器为绿色,这是一个有效的和稳定的读数。如果不绿,确保探头下方有足够的耦合剂膜并探头座落平贴表面.或者定位探头在不同区的测试表面附近直到接收到强信号.

图21

4 从涂层的样品上除去探头.最后读数被保持在屏幕上.如果不具有代表性,重复步骤2-3.

- 过量使用耦合剂可导致扭曲读数,当探头从表面除去。如果发生这种情况,清洁探头尖端和涂层的表面,然后重复步骤3-4.

5 按“有效期”保留现有校准但刷新相关的时间和校准的日期到当前时间和日期,“校准”重新校准仪器或“OK”退出测试校准过程.

10.8 校准锁定-型号 T

使用“PIN锁定”功能, 校准设置可以“锁定”, 阻止用户进行任何更改校准,除非先解除PIN锁.

用户仍然可以通过菜单/校准/验证校准值 测试校准,当”PIN 锁定'已启用,但无法验证或重新校准仪器.

有关“PIN锁定”的更多信息,请参见第zh-25页13节“PIN锁 - 型号T”.

11 使用涂层校准模具

除了测量对混凝土和其它类似基材的涂层(见zh-12页第7.5节“测量基材"),Elcometer 500 C1和C2涂层厚度探头已被设计来测量在钢的涂层,Elcometer 500涂层校准模具(CCM)为校准目的.

Elcometer 500涂层校准模具(CCM)是一个钢模两个腔室 - 一个样品室和溢流室 - 其可以被用于确定涂层材料用于校准目的的声音速度.

通过使用Elcometer 500 CCM按照下面介绍的步骤, Elcometer 500仪器校准会溯源到国家和国际标准.

要使用Elcometer 500 CCM:

1 将Elcometer 500 CCM放到平坦的平面上.

2 用测试涂料完全填满样品室(a),确保有轻微的圆顶或弯月面(图22).

3 使用塑料刮板(b), 刮过涂料允许过量涂料落入溢流室(c)(图23).

4 允许该涂层变干, 确Elcometer 500 CCM在任何时候持平.

图22

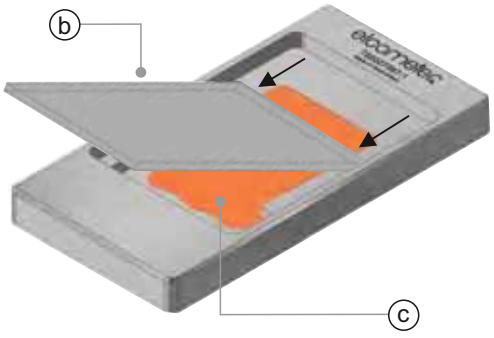
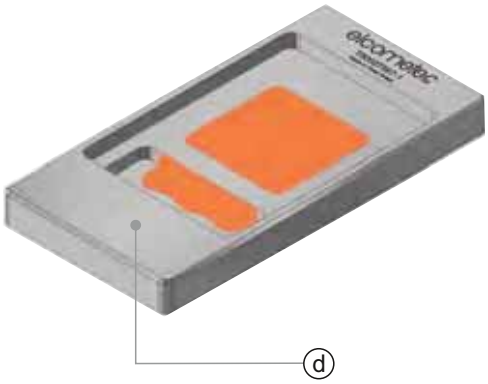


图23

11 使用涂层校准模具（续前节）

5 当完全固化后,使用Elcometer 456铁基涂层测厚仪,测量并记录在样品室该涂层的中心干膜厚度. 该值可以写在溢流室的干燥涂层.

- 易高456铁基涂层测厚仪必须在Elcometer500 CCM进行校准,采取干膜厚度测量之前, 使用校准膜或垫片和在CCM基部作为零板(d).请参阅易高456的用户手册了解如何做到这一点的说明。



6 使用带有探头连接的Elcometer 500仪器,选择 菜单/校准/校准方法/单点,并在样品室中测量涂层.

- 测量应采取在大致相同的位置,在步骤5中所采取的干膜厚度测量.

7 按“调整”并使用↑↓键,调整读数至易高456测量的干膜厚度值,然后按“设置”设置值.

8 按“是”保存到“用户材料”清单为未来的选择和输入一个合适的涂料名称.

易高500仪器现在可以使用'涂层材料'校准方法进行校准(见zh-19页10.5节),然后从“用户材料”列表中选择用户定义的涂层.

多达60个用户定义的涂层可以被存储在仪器记忆. 使用ElcoMaster®, 保存的“用户材料"名单在任何时间,可以转移到其他易高500仪器

描述	部件编号
Elcometer 500涂层校准模具(CCM)	T50027567-1

12 探头调零

“探头调零'程序是校准过程的一部分,然而探头调零可以在任何时候来执行,以检查是否有足够探头端部油在传感器板和探头端部的状况.

12.1 开始使用之前

1 清洁任何探头表面的耦合剂残渣.
2 连接探头 - 见zh-6页4.4节.
3 打开仪器-见zh-5页4.3节.

12.2 要调零探头

1 按 菜单/校准/归零传感器.
2 保持探头(干净)在空气中,按“零”(图24).

图24

如果信号强度指示不绿色：将提示用户敷探头端油.上油到传感器板,见zh-7页4.6节,按”OK“并重复上述步骤2.

如果信号强度指示是绿色和探头端部磨损小于0.7毫米:零探头程序将完成和仪器将恢复到读数屏幕(或校准屏幕如果归零作为校准程序的一部分).

如果信号强度指示为绿色和探头端部磨损大于0.7mm但小于1mm:用户将被提示检查是否磨损或损坏的探头端部.检查结束后,用户可以选择继续与当前的探头端部或安装一个新的端部(推荐),请参见第zh-6页4.5节.按“OK"即可完成零探头程序,恢复到阅读屏幕(或校准屏幕如果归零作为校准程序的一部分）.

如果信号强度指示为绿色和探头端部磨损大于1mm.用户将被提示更换探头端部.更换探头端部,请参见第zh-6页4.5节,按“OK”,然后重复上述步骤2.

PROMAT

13 PIN锁

在“PIN锁定”功能可以防止用户意外调整仪器设置.

要设置PIN码:

1 按 菜单/设定/PIN锁定.

2 使用↑↓键选择0到9,设置四位数的PIN码,用➔键移动到下一个数字[d] (图25).

3 按下“OK”来设置，“退出”取消或“调整”修改PIN码.

图25

当启用时，以下功能被解除，并且不能调整：

型号B

菜单/校准/校准
菜单/重设置
菜单/校准/校准方法
菜单/校准/工厂校准

型号T

菜单/校准/校准
菜单/重设置
菜单/限值内存/创建限值内存
菜单/限值内存/编辑限值内存
数据组/新建数据组/数据组限值/创建限值内存
菜单/校准/校准方法
菜单/校准/工厂校准
数据组/编辑批组/删除数据组
数据组/被删除的读数

要解锁PIN码:

1 按 菜单/设定/PIN锁定.

2 使用↑↓键选择0到9,输入四位数的PIN码,用➔键移动到下一个数字[d].

3 按下“OK”或“退出”取消.

注：如果用户忘记或遗失了PIN码，它可以通过ElcoMaster®解锁. 使用附带的USB线，只需将仪器连接到电脑有ElcoMaster®版本2.0.57或更高版本, 然后选择编辑/清除密码.

14 数据组-型号 T

Elcometer 500 T型可以存储多达1,000个数据组10万个读数.下面的数据组功能：

- 数据组/新建数据组; 创建新的数据组.
- 数据组/新建数据组/固定数据组容量; 预先定义被存储在一个数据组读数的数目. 该指数将通知用户, 当一个数据组完成, 并询问是否另一数据组是要打开. 当转移到ElcoMaster®这些数据组然后链接.

[d] 当第一个“X”被改变为一个数字, ➔ 键就会出现.

14 数据组-型号 T (续前节)

- 数据组/打开现有数据组; 打开现有数据组.
- 数据组/回顾数据组: 查看读数,统计,数据组信息,校准和限制信息和所有的读数图 - 见第15节“回顾批组数据 - 型号T”.
- 数据组/复制数据组; 复制了一批包括数据组头信息, 校准和限制的信息.
- 数据组/编辑批组/重新命名数据组; 重新命名现有的数据组.
- 数据组/编辑批组/清除数据组; 清除了一批数据组中的所有读数 - 但留下的所有数据组标题的信息.
- 数据组/编辑批组/删除数据组; 从仪器中删除一个或所有数据组.
- 数据组/删除读数/删除不带标签; 完全删除最后一个读数.
- 数据组/删除读数/删除带标签; 删除最后一个读数, 但将其在数据组内存中标记删除.

15 回顾批组数据-型号 T

15.1 数据组统计(数据组/回顾数据组/统计)

显示该数据组统计信息包括(图26):

图26

- 数据组内的读数数目 (n:)
- 数据组平均读数[e] (x̄:)
- 数据组内最小读数[e] (Lo:)
- 数据组内的最高读数[e] (Hi:)
- 标准偏差[e] (σ:)
- 变异系数[e] (cv%:)
- 低限值 (x̄L:) - 如果设置 - 和低于低限的读数数目 (nL:)
- 高限值 (x̄H:) - 如果设置 - 和高于高限的读数数目 (nH:)
- 范围 (R); 数据组内的最高和最低读数之间的差异
- NDFT(名义干膜厚度)值 (NDFT:)

[e] 对于超过一个读数的数据组.

15.2 数据组读数(数据组/回顾数据组/读数)
显示带有日期和时间标记为每个单独读数中一起批读数值.

按↑↓键浏览读数,按➔键移动到下一个信息屏幕(图27).

读数在任何启用了的限制以外显示为红色,以适当的限制图标到读数的左侧, ( ) 如果读数低于下限和 ( ) 如果高于上限.

图27

15.3 批组图(数据组/回顾数据组/批组图)
允许用户在数据组内列条形图中查看读数. 多达五个水平轴为显示代表不同的值/统计如下 :

- 数据组内的最高读数[e] (Hi:)
- 数据组内最小读数[e] (Lo:)
- 数据组平均读数[e] ($\bar{X}$:)
- 低限 (:); 设置并启用
- 高限 (:); 设置并启用

如果限制未设置并启用, 读数显示为白色柱状. 如果限制被设置并启用, 读数显示为 白色柱状如果在设定的限制或红色如果以外设限 (图28).

如果在该数据组的详细读数可以在一个屏幕显示, 多个读数将被合并在一个栏. 如若单个读数在“合并栏”内超出设定的限制, 整个栏会是红色的.

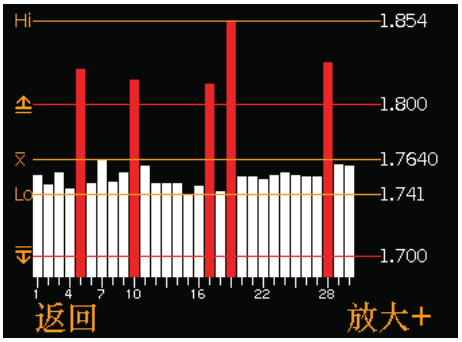


图28

[e] 对于超过一个读数的数据组.

15 回顾批组数据-型号 T (续前节)

按”放大“键, 可以让每个读数显示, 从而显示出以外设定限制的单个读数(图29).

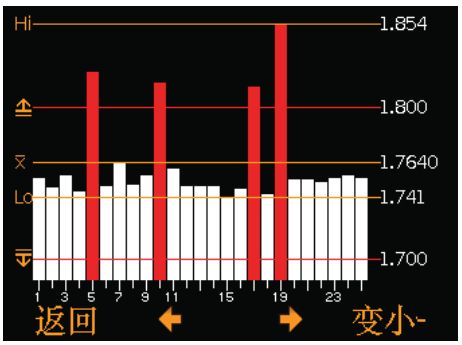


图29

放大时,图形将始终显示前25个读数.按下➔ 键,就会显示该数据组中的下一个25的读数(图30).

随后按➔ 键会透过读数向前滚动,25读数一次. 按🡐 键向后滚动.

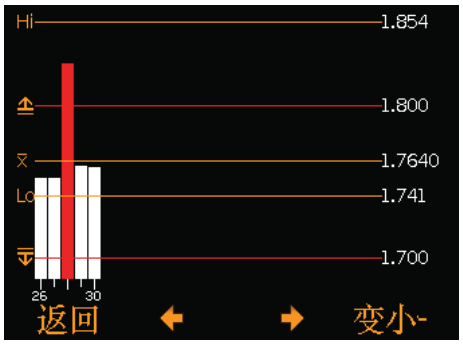
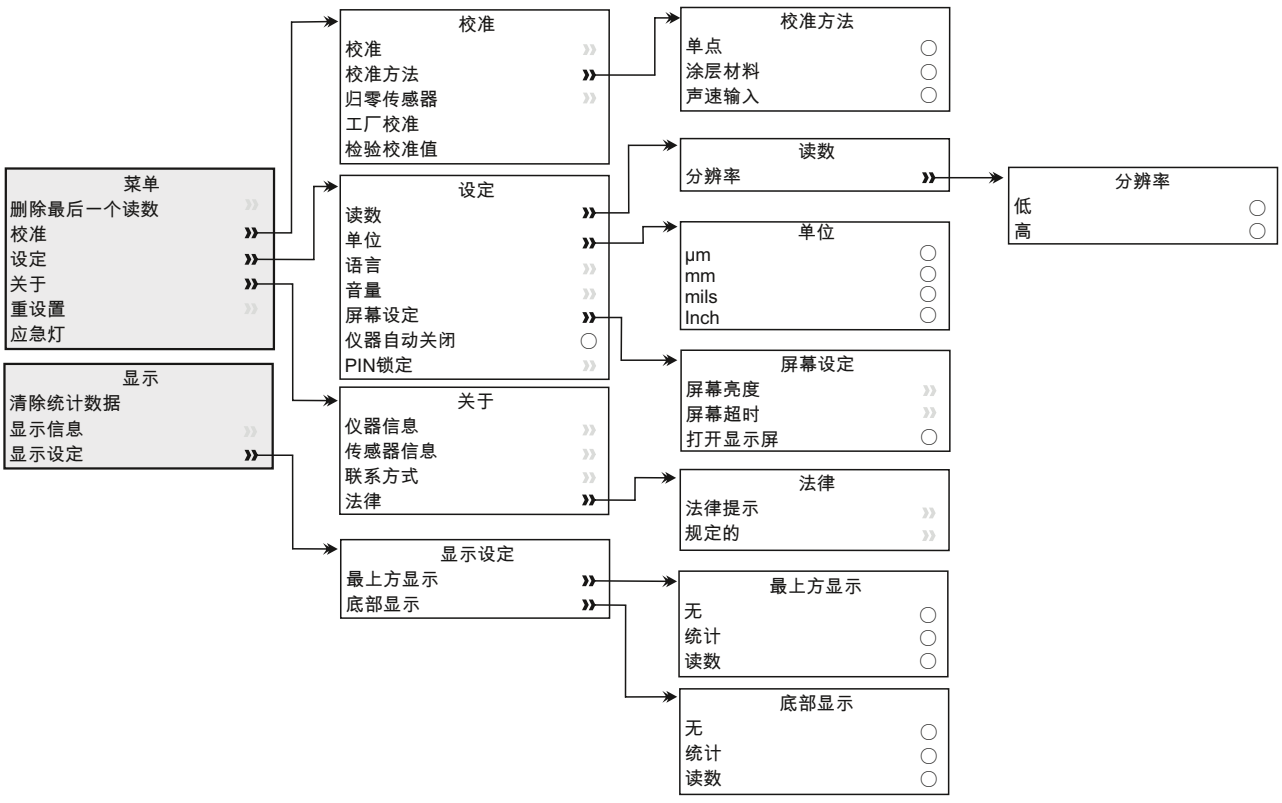


图30

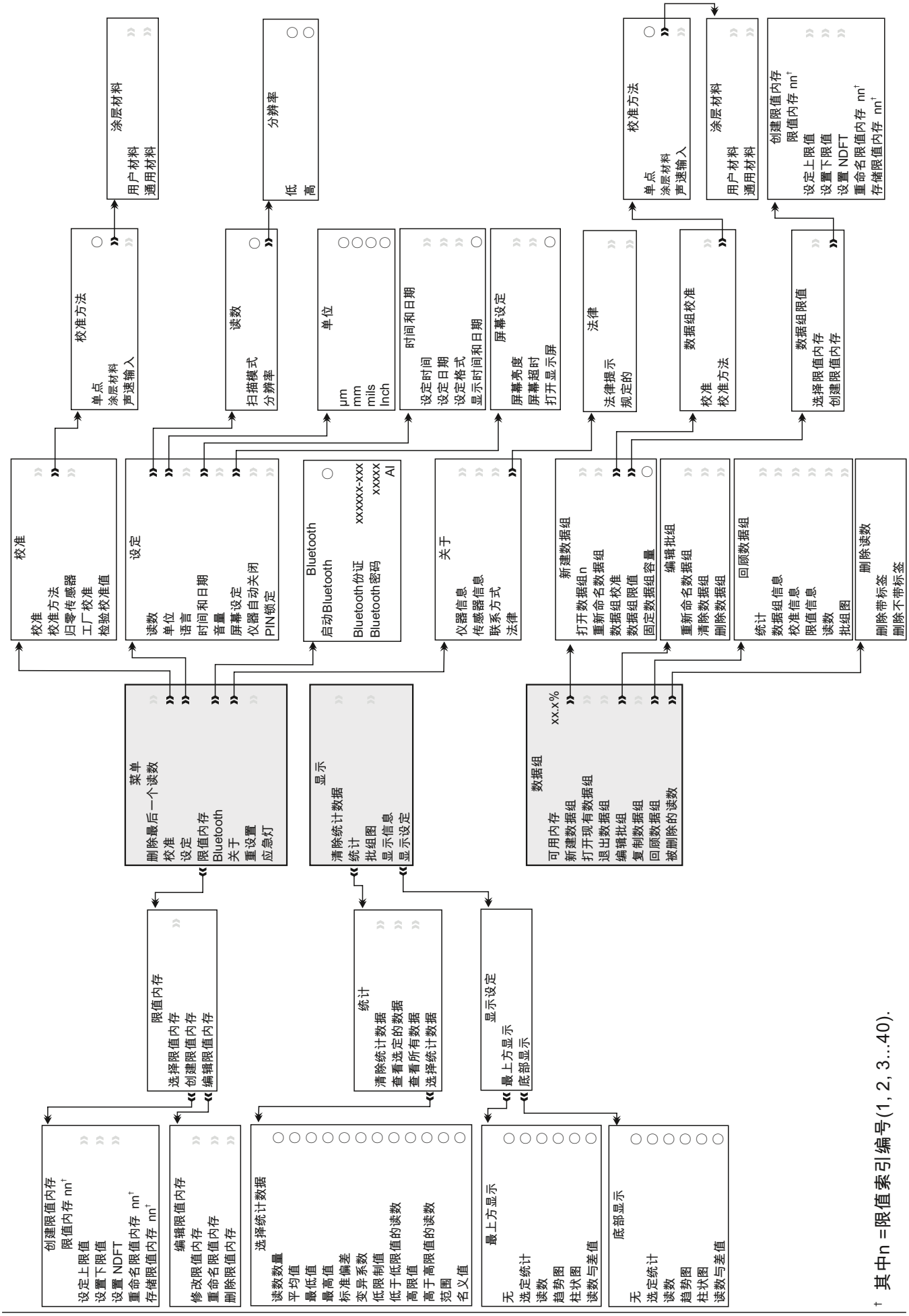
按“变小 - ”键返回在该数据组的所有读数原来概览图.

按“返回”键返回仪器的 数据组/回顾数据组菜单.

16 功能表结构- 型号B



17 功能表结构- 型号T



† 其中n =限值索引编号(1, 2, 3...40).

18 下载数据

18.1 使用ELCOMASTER® 在个人电脑上

使用ElcoMaster® - 与Elcometer500 T型提供,可在elcometer.com免费下载 - 仪器可以发送读数到个人电脑进行归档和生成报告.数据可以通过USB(B型号 & T型号)或蓝牙Bluetooth® (型号T)转移. 有关ElcoMaster®更多信息请访问www.elcometer.com

18.2 使用ELCOMASTER® 手机应用程序-型号 T

在实地或在现场的理想测试, 使用ElcoMaster® Android™或iOS 移动应用程序, 用户可以:

- 存储实时读数直接到移动设备上, 并将它们保存到批次连同全球定位系统坐标.
- 可以加入测试表面的照片.
- 地图上的读数到地图 , 照片或图表.
- 检测数据可从手机传送到电脑进行进一步的分析和报告.

有关ElcoMaster® 移动应用程序更多信息,访问www.elcometer.com

即刻获取 Google play

兼容智能手机和运行Android2.1或以上的平板电脑。使用Google Play™ Store应用程序下载安装，并按照屏幕上的说明.

App Store 供应

这是为 iPhone 6 Plus, iPhone 6, iPhone 5s, iPhone 5c, iPhone 5, iPhone 4s, iPhone 4, iPad Air 2, iPad mini 3, iPad Air, iPad mini 2, iPad（第3和第4代），iPad mini, iPad 2, 和iPod touch（第4和第5代）制成。通过www.elcometer.com下载或通过App Store下载安装，然后按照屏幕上的说明.

19 提升你的仪器

通过ElcoMaster®仪器的固件用户可以升级到最新版本. 当仪器连接到拥有互联网的电脑，ElcoMaster®将通知您任何的更新.

20 备件和附件

20.1 探头

两个探头可供选择; C1和C2, 它可以测量涂层可达2.50mm(98mils)和9mm (355mils)厚[f].

因为易高500使用超声波技术来非破坏性地测量对混凝土和其它类似基材的涂层厚度,仪器/探头的整体测量范围是由涂层的配方确定.

虽然易高500可以测量达9mm(355mils)典型的环氧树脂涂层,更吸音涂料如橡胶可减少仪器的测量范围.

相似的,由于测量技术的性质,具有高含量“聚合”的涂层可以影响仪器的性能.

Elcometer 500探头将自动通过仪器连接时被识别,可以在通过菜单/关于/传感器信息 随时查看详细信息.

Elcometer 500只作为仪器供应, 无探头- 探头必须分开订购.

探头与探头端部(安装)提供的,两个测量膜[g]用于验证仪器和探头性能,见第zh-9页第6节和测试证书.

[f] 环氧涂料, 对在其他材料的厚度可能会有所不同.

[g] C1探头与名义值1mm和2mm提供(40和80mils)
C2探头与名义值3mm和8mm提供(120和310mils)

20 备件和附件（续前节）

探头类型	测量范围[f]	精确度	部件编号
C1	0.15 - 2.50mm (6 - 98mils)	±2% 或 ±0.01mm (±2% 或 0.4mils)	T500-C1
C2	0.75 - 9mm (30 - 355mils)		T500-C2
C1	可更换探头端部;每包2个		T50027602-1
C2	可更换探头端部;每包2个		T50027602-2
C1 / C2	探头端部油;4ml (0.14fl oz)瓶		T50027604
C1	膜套: 1 & 2mm (40 & 80mils)		T99022255-13
C1	膜套 - 认证: 1 & 2mm (40 & 80mils)		T99022255-13C
C2	膜套: 3 & 8mm (120 & 310mils)		T99022255-14
C2	膜套 - 认证: 3 & 8mm (120 & 310mils)		T99022255-14C

注: 探头端部油的材料安全数据表可由易高提供,通过我们的网站下载：
www.elcometer.com/images/stories/MSDS/Elcometer_Probe_Tip_Oil.pdf

20.2 超声波耦合剂

如需仪器能够正确地使用, 探头和测试表面之间必须没有空气间隙. 这是通过使用少量耦合剂实现.

一瓶120ml(4fl oz)耦合剂是作为每台仪器的标配，其他尺寸可另行购买.

描述	部件编号
超声波耦合剂; 120ml (4fl oz)	T92015701
超声波耦合剂; 120ml (4fl oz); 一包5个	T92015701-5
超声波耦合剂; 300ml (10fl oz)	T92024034-7
超声波耦合剂; 500ml (17fl oz)	T92024034-8
超声波耦合剂; 3.8l (1 US Gallon)	T92024034-3
超声波耦合剂 - 高温; 60ml (2fl oz)	T92024034-9
超声波耦合剂 - 高温; 60ml (2fl oz); 一包2个	T92024034-10

注: 耦合剂的材料安全数据表可由易高提供,通过我们的网站下载：
www.elcometer.com/images/stories/MSDS/Elcometer_Ultrasonic_Couplant_Blue.pdf
www.elcometer.com/images/stories/MSDS/elcometer_ultrasonic_couplant_hi_temp.pdf

[f] 环氧涂料, 对在其他材料的厚度可能会有所不同.
[h] 在高温的环境中使用.

20 备件和附件（续前节）

20.3 Elcometer 500涂层校准模具(CCM)

Elcometer 500涂层校准模具(CCM)是一个钢模两个腔室 - 一个样品室和溢流室 - 其可以被用于确定涂层材料用于校准目的的声音速度.见zh-22页第11节获取更多信息.

描述	部件编号
Elcometer 500涂层校准模具(CCM)	T50027567-1

21 保修声明

仪器提供针对制造缺陷12个月的保修期, 不包括污染和磨损。保修可以通过www.elcometer.com被延长至两年在60天购买内.

探头提供对制造缺陷12个月的保修期,不包括污染和磨损.

22 技术规格

型号	型号 B	型号 T
厚度范围[f]	使用C1探头: 0.15 - 2.50mm (6 - 98mils) 使用C2探头: 0.75 - 9mm (30 - 355mils)	
精确度[i]	±2% 或 ±10µm (±2% 或 0.4mils)	
分辨率 (用户可选)	低: 10µm, 0.01mm, 1mils 或 0.001" 高: 1µm, 0.001mm, 0.1mils 或 0.0001"	
测量率[j]	每分钟读数60+	
仪器内存	无	100,000读数高达1,000数据组
操作温度	-10 至 50°C (14 至 122°F)	
电源	2 x AA电池 (可再充电电池可以使用)	
电池寿命[k]	碱性：大约15时 锂：大约28时	
仪器重量	161g (5.68oz) 包括电池,不含探头	
仪器尺寸	141 x 73 x 37mm (5.55 x 2.87 x 1.46") 不含探头	
可按照使用: ASTM D6132, SSPC-PA 9, ISO 2808 Method 10		

[f] 环氧涂料, 对在其他材料的厚度可能会有所不同.
[i] 以较大值为准
[j] 在扫描模式时使用T型,每分钟140+读数.
[k] 当在连续读数模式.可再充电电池可能会有所不同.

23 法律提示 & 法规信息

符合性声明:

Elcometer 500 型号B符合以下欧盟指令的要求

2014/30/EU　　电磁兼容性

Elcometer 500 型号T符合以下欧盟指令的要求

2014/53/EU　　无线电设备

符合性声明可通过以下网址下载：

型号B: www.elcometer.com/images/stories/PDFs/Datasheets/Declaration of Conformity/Chinese/DoC_500_B.pdf

型号T: www.elcometer.com/images/stories/PDFs/Datasheets/Declaration of Conformity/Chinese/DoC_500_T.pdf

操作频段：2,402 - 2,480 MHz

最大传输功率：<4 dBm

根据CISPR 11, 该产品是B级, 第1组ISM设备.

B级产品: 为国内机构所使用, 直接连接到为作住宅用的建筑物提供的低压供电网络.

第1组ISM产品：A类产品产生的/或使用的导电耦合射频能量, 是设备内部本身运作所必需的.

USB是用于数据传输而不可被通过USB电源适配器连接到电源.

该仪器符合FCC第15部分规定. 操作服从于以下两种情况, (1)仪器可能不会造成有害干扰, (2)仪器必须能承受任何接受到的干扰, 包括干扰可能产生不希望有的操作.

在ACMA遵守标志可以通过以下获取：功能表/关于/法律/规定.

Elcometer 500型号T: Giteki标记, 条例号码,FCC ID和 Bluetooth 蓝牙SIG QDID 可以通过以下获取: 功能表/关于/法律/规定.

注：该仪器已经被检测过并且能满足B类数字式装置的极限。依据联邦委员会第15部分规定。这些极限的设计提供了合理的保护来抵抗住宅安装中的有害干扰. 器产生,使用中的辐射无线电射频能量，如果不遵照指令安装和使用，可能会造成对无线电通讯的有害干扰。然而，也不能保证在特定的装置中不会产生干扰。如果仪器对无线电或电视器接收产生有害干扰, 可以决定关闭仪器再打开, 鼓励用户通过以下一种或者多种方法努力去排除干扰：

-- 调整或迁移接收天线.

-- 扩大仪器和接收器的间隔.

-- 仪器插进电路插座进行连接与仪器和接收器的连接是不同的.

-- 咨询经销商或者无线电技术人员来得到帮助.

为了满足移动设备和基站发射设备的FCC RF规定要求, 应保持该装置的天线和操作过程中人与人之间的20厘米以上的间距.为确保合规性, 不建议操作在比这个距离更近. 天线用于此发射器不得在同一地点或与任何其他天线或发射器一起工作.

在FCC规定下, 条款修改没有很明显地被 Elcometer有限公司支持，可能使用户操作仪器的权利失效.

Elcometer 500型号T: 此设备符合加拿大工业部豁免牌照的RSS标准(s). 操作服从于以下两种情况, (1)仪器可能不会造成有害干扰, (2)仪器必须能承受任何接受到的干扰, 包括干扰可能产生不希望有的操作.

B类数字设备符合CAN ICES-3 (B)/NMB-3(B)规定.

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Bluetooth®　　商标 所有权归Bluetooth SIG公司所有，Elcometer公司得到Bluetooth SIG公司授权使用.

Elcometer 500型号T: 这是为 iPhone 6 Plus, iPhone 6, iPhone 5s, iPhone 5c, iPhone 5, iPhone 4s, iPhone 4, iPad Air 2, iPad mini 3, iPad Air, iPad mini 2, iPad（第3和第4代），iPad mini, iPad 2, 和iPod touch（第4和第5代）制成。

“Made for iPod” ,“Made for iPhone”及“Made for iPad”的意思是一个电子附件为专门连接到iPod，iPhone或iPad设计，分别和已经由开发者认证符合Apple性能标准.Apple不负责本装置或其符合安全和监管标准的操作.

请注意, 使用此附件的iPod, iPhone或iPad可能影响无线性能.

iPad，iPhone和iPod touch是Apple Inc公司的注册商标，在美国和其他国家注册.

App Store是Apple Inc公司的注册商标，在美国和其他国家注册.

Google Play是 Google Inc 公司的商标.

所有商标也都得到注册许可.

Elcometer 500被装在一个纸箱包装.请确保此包装是在环境敏感的方式进行处理.请咨询当地的环境管理局进一步的指导.

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