

ED-400
COATING THICKNESS GAUGE
FOR NON-FERROUS METALS



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READ THE USER' S MANUAL BEFORE USING THE GAUGE.

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1. APPLICATION

The ED-400 coating thickness gauge is suitable for measuring the thickness of the non-conductive coating on non-ferrous metal. The typical application is to measure the thickness of the anodic oxide coating of the aluminium alloy. It can also be used to measure the thickness of plastic foil and paper.

The ED-400 coating thickness gauge conforms to international standard ISO 2360-2003.

2. TECHNICAL PARAMETERS

Measuring range:	0–500 μm ;
Accuracy:	0–50 μm : $\pm 1 \mu\text{m}$; 50–500 μm : $\pm 2\%$;
Resolution :	0–50 μm : 0.1 μm ; 50–500 μm : 1 μm ; 0–500 μm : 1 μm ; (Optional)
Operating temperature:	5–45°C;
Power supply:	9V battery
Power consumption:	80mw
Dimensions:	150mm \times 80mm \times 30mm
Weight:	260g

3. STANDARD PACKAGE

- Gauge
 - Probe
 - Plastic cover
 - Standard substrate (6063 aluminum alloy)
 - Calibration foil with inspection report
 - User' s manual
 - Certificate of conformity
 - Certificate of warranty
 - Carrying case
- Spare Parts
- Spare probe
 - Standard substrate (6063 aluminum alloy)
 - Calibration foil with inspection report

4. OPERATION

Press the “ON/OFF” button and wait until "0" or "0.0" is shown on the display.

4.1 Measurement

Hold the plastic part of the probe and place it vertically onto the clean and dry workpiece surface. Hold it steadily and wait for the measurement to appear in the LCD and a beep is heard (unless the beeping is disabled). Lift the probe for at least 10 mm from the workpiece and for at least two seconds.

4.2 Statistics

Press the “STAT” button after several measurements, and the following data will show in turn:

MEAN – average value

Max – maximum value

MIN – minimum value

S – Standard deviation

N – Number of measurements

4.3 Delete

During measurement, if an obvious error value appears, it can be deleted by pressing the “DEL” button.

5. CALIBRATION

The gauge should be calibrated under the following circumstances: it has not been used or calibrated for a long period of time; it is found obviously inaccurate; it is reset; or the probe is changed.

In calibration mode, each measurement should be made in the same area. If an erroneous measurement result appears, it can be deleted by pressing the “DEL” button. Press once to delete the last result, and press twice to delete all measuring results in the current calibration sequence.

5.1 Single point calibration

The standard substrate or an uncoated workpiece is used in single point calibration, and the existing zero point will be adjusted.

5.1.1 Press the “CAL” button, then the gauge enters calibration mode. The LCD will display “ZERO” and “0.0” .

5.1.2 Measure on the uncoated substrate for at least 10 times. The LCD will display the average measuring result.

5.1.3 Press the “CAL” button twice to complete the calibration. The LCD will display “---” and then “0” or “0.0” , then the gauge is back to measuring Mode.

5.2 Dual point calibration

The calibration foil and the standard substrate or an uncoated workpiece are used in single point calibration, and the full measuring range will be adjusted.

5.2.1 Press the “CAL” button, then the gauge enters calibration mode. The LCD will display “ZERO” and “0.0” .

5.2.2 Measure on the uncoated substrate for at least 10 times. The LCD will display the average measuring result.

5.2.3 Press the “CAL” button, then the instrument will come to the next calibration stage. The LCD will display “STD1” and “0.0” .

5.2.4 Put the foil onto the uncoated substrate then measure it above ten times. The LCD will display the average measuring result.

5.2.5 Press the “▼” or “▲” button to adjust the display value from 50.0 to the foil thickness marked.

5.2.6 Press the “CAL” button to finish the calibration. After “---”, LCD will display “0” or “0.0”. Then you can make the measurement.

Press the “CAL” button to complete the calibration. The LCD will display “---” and then “0” or “0.0”, then the gauge is back to measuring mode.

6. ADDITIONAL FUNCTIONS

6.1 Button combinations

By pressing two buttons at the same time, the additional functions shown in Table 1 can be used. The LCD will display “---” and then “0” or “0.0”, then the corresponding function is set.

Table 1

Combination button	Function description
DEL+STAT	Reset (see Section 6.2)
STAT+ “▲”	Activate beeping
STAT+ “▼”	Inactivate beeping
CAL+ “▲”	Show decimal (0–50 μm)
CAL+ “▼”	Show integer (0–500 μm)

6.2 Reset

The reset operation will reload the factory settings and calibration data. It can be completed by pressing the “DEL” and “STAT” buttons at the same time. The LCD will display “---”, then “0” or “0.0”. After the reset operation, a dual point calibration must be completed.

6.3 Low Battery

When the battery is low, the LCD will display “LOBAT”. When the gauge run out of battery, it will shut down automatically.

6.4 Power saving

If no measurement is detected within one minute, the gauge will turn off automatically.

7. NOTICE

7.1 Before using the gauge, it should be checked for accuracy. Normally it can be checked by measuring on the uncoated substrate. For further assurance, measure with the calibration foil and check if the measuring result matches the marked thickness.

7.2 When measurements are repeated on the same workpiece, the results may vary. Take the average value for better accuracy.

8. ERROR FACTORS

According to ISO 2360–2003, the following factors will influence the accuracy of measurement.

8.1 Thickness of coating

If the coating thickness is less than 5 μm , the average value should be taken. If the coating thickness is less than 3 μm , it cannot be measured accurately with this gauge.

8.2 Edge effect

When the measuring area less than 150mm² or the width is less than 12mm, the gauge should be re-calibrated on the same uncoated workpiece. 8.3 Curvature

If the diameter of the workpiece is less than 50mm, the gauge should be re-calibrated on the same uncoated workpiece.

8.4 Surface roughness

Measure at different spots of the workpiece to reduce the influence of the rough surface.

8.5 Conductivity of the workpiece

8.6 Thickness of the workpiece

8.7 Gap between probe and workpiece surface

8.8 Pressing force on the probe

8.9 Perpendicularity of probe

8.10 Temperature of probe

9. TROUBLESHOOTING

9.1 Failures, reasons and solutions

Table 2

Failure	Reason	Solution
No display or immediate shutdown	Power saving	Press ON/OFF button
	No battery or incorrect battery installation	Reinstall the battery
	Empty battery	Change battery
	Broken battery connector	Contact manufacturer
No response on LCD to measurement	Thickness over range	Check workpiece
	Probe failure	Change probe
All characters displayed	Probe or circuit board failure	Change probe or Contact manufacturer
Obviously wrong measuring result	Curving surface or small measuring area	Calibrate on uncoated same workpiece
	Calibration wrong	Re-Calibrate
	Incorrect probe handling	Press "DEL" button
	Calibration data disorder	Reset and calibrate
	Probe failure	Change probe
	Probe changed without calibration	Re-Calibrate
Unable to turn off	Circuit problem	Contact manufacturer

9.2 Error codes

Table 3

Code	Error	Solution
E4	Probe failure , connection problem or circuit board failure	Connect probe again or Contact manufacturer
E5	Probe failure	Change probe
E6	Measuring range exceeded	Re-Calibrate
E7	Faulty calibration	Re-Calibrate

10. Daily maintenance

10.1 The probe must be kept dry and clean. If the instrument was used on the assembly line, the workpiece should be wiped dry so that no water or other fluid runs into the probe. Do not add lubricant to the probe.

10.2 When not in use, the gauge should be put into the case to avoid impact and dirt.

10.3 Remove the battery if the gauge will be stored for a long period of time.