iCoat-200 Coating Thickness Gauge

Instruction Manual

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I Overview

This compact, handy pocket gauge is designed for non-destructive, fast and precise coating thickness measurement. The principal applications lie in the field of corrosion protection. It is ideal for manufactures and their customers, for offices and specialist advisers, for paint shops and electroplaters, for the chemical, automobile, shipbuilding and aircraft industries and for light and heavy engineering.

Features:

1. With different external probes, the gauge can be applied to measuring thickness of non-magnetic coating on magnetic metal substrate, as well as non-conductive coating on non-magnetic metal substrate.
2. Two measuring modes: single or continuous, changeable.
3. Two work modes: direct or group, changeable.
4. High precision mode: multiple measurements and automatically data filtering method to reduce disturbance of measure results
5. Temperature compensation: compensate the measurement distortion caused by the drifting of temperature.
6. Give five statistical values: average(MEAN), maximum(MAX), minimum(MIN), measure number(No.), and standard deviation(S.DEV).
7. Two calibration methods can be applied to the gauge; And the system error of the probe can be corrected with the basic probe calibration method.
8. Data storage: up to 500 measurements storage.
9. Set boundary: alarm while measurements out of boundary.
10. Battery information indicates the rest capacity of the battery.

1.1 Measuring Principles

The gauge adopts two thickness-measuring methods: magnetic induction method and eddy current method.

Magnetic Induction method: The probe and the magnetic metal substrate will form a closed magnetic circuit when probe contacting with the coating; the magnetic resistance of closed magnetic circuit varies due to the existing of non-magnetic coating. The thickness of the coating can be measured through the variation of magnetic resistance.

Eddy current method: The high frequency alternating current generates an electromagnetic field in the probe coil; eddy current will be formed on metal substrate when the probe contacting with the coating, and the eddy current has an effect of feedback on the coil in probe. The thickness of the coating can be calculated through measuring the effect of feedback.

1 Overview

The range of applications is indicated by the probes available.

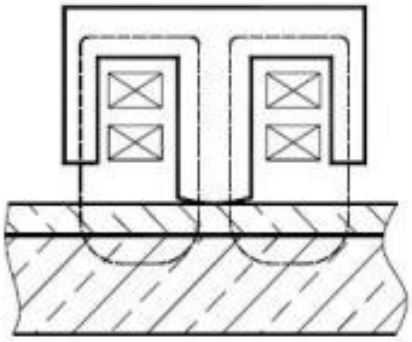

Figure1.1 Principle of magnetic induction

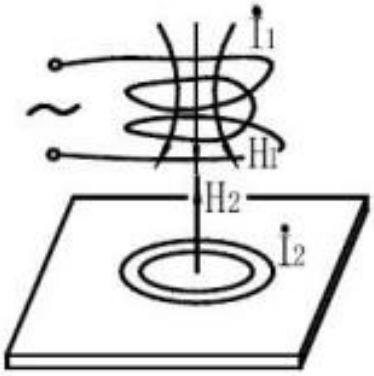

Figure1.2 Principle of eddy current method

-F probes work on the magnetic induction principle and should be used for non-magnetic coatings such as aluminum, chrome, copper, zinc, paint and varnish, enamel, rubber etc., on an iron or steel substrate; they are also suitable.

for alloyed and hardened magnetic steel.

- N probes work on the eddy-current principle and should be used for insulating coatings on all non-ferrous metals and on austenit ic stainless steels, e.g. paint, anodiz ing coatings, ceramics, etc. applied on aluminum, copper, zinc

die-casting, brass, etc.

1.2 Configuration

Table1-1 Configuration

Item	Quantity	Remarks
Main Unit	1	
Probe	1	F or N or FN
Calibration Foils	5 PCS	
Zero plate	1	Iron or Aluminum
Battery	1	2 x AA Alkaline Batteries
User Manual	1	
Certificate	1	
Warranty card	1	
Feedback submission	1	

1 Overview

1.3 Introduction

Power

Delete

Statistics

Menu

Zero calibration

Confirm

Down

Up

Return

Fig 1.3 The main unit

1.4 Technical Parameters

1.4.1 Measuring range and Accuracy (see Appendix table 1)

1.4.2 Working environment

Temperature:0℃ ~ 40℃

Humidity:20%RH~90%RH

Without strong magnetic field

1.4.3 Power

2*AA Alkaline batteries

1.4.4 Size and weight

Size:151mm×76mm×38mm Weight:about 240g

II Operation

Main LCD display:

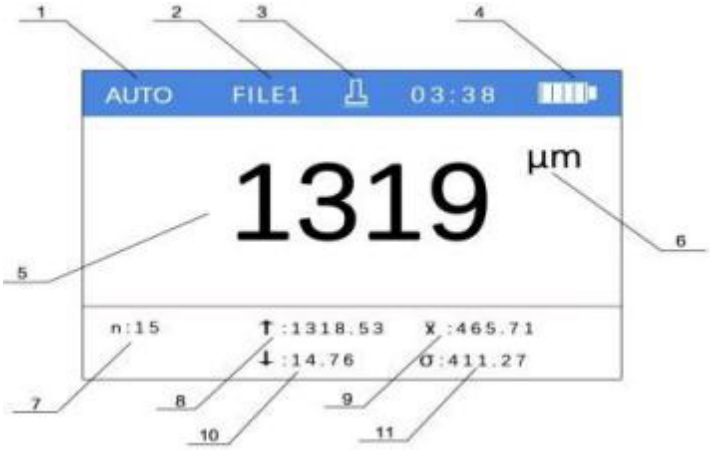

Figure 2-1 Main LCD display

1. Probe Type
2. File Number
3. Probe Connection Status
4. Battery info
5. Current Measurement
6. Unit
7. Count
8. Maximum(MAX)
9. Average(MEAN)
10. Minimum(MIN)
11. Standard Deviation

2.1 Measuring steps

a) Preparing the measuring material (see Part 4).
b) Power on: Put the probe into an open space, and press the key  .
c) Check the battery information, and change the battery if necessary.
d) Calibrate the gauge if necessary according to the calibration method shownin Part 3.
e) Measuring: Put the probe close to the measuring material perpendicularlyand rapidly, and press the protecting jacket lightly to keep the contact 12closely. Then the thickness will be shown on the LCD screen accompany witha beep indication, and the measurement can be repeat after bringing up theprobe.
f) Power off: Press the key to shutdown immediately or the gauge will be power off automatically in about 2 minutes, and the standby time can be set according to section 2.3.2 "Function setup steps".

Note:

1) If the temperature calibration mode is turned on, the temperature compensation indicator "C" will disappear accompany with the measurement, and the measurement could not be processed until the indicator "C" appears.
2) If the probe is not stable during the measurement, an error result maybe shown which can be deleted.

3) After more than two measurements being saved, five statistical data can be achieved: Measurement numbers (NO.), Average value (MEAN), Maximum Measurement (MAX), Minimum Measurement (MIN), and standard deviation.
4) Indicator "INF" will be disappeared when the probe is prepared for the next measurement in single measurement mode.

2.2 Functions and operation method

This section introduces the main functions of the gauge and the detailed operation method.

2.2.1 Press the key MENU the enter the sub-menus of t he "Menu",and press the key ↑ ↓ and ↵ to select and change the selected item.

Figure 2-2 Menu

2.2.2 Press the key ZERO the enter "Calibration".

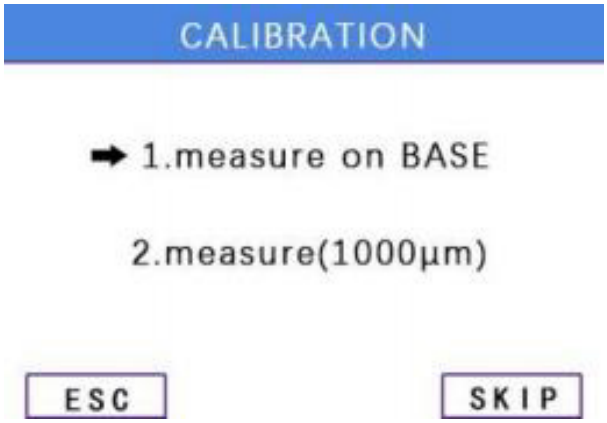

Figure 2-3 Calibration

2.2.3 Press the key the enter the sub-menus of t he " Delete", and press the key and to select and change the selected item.

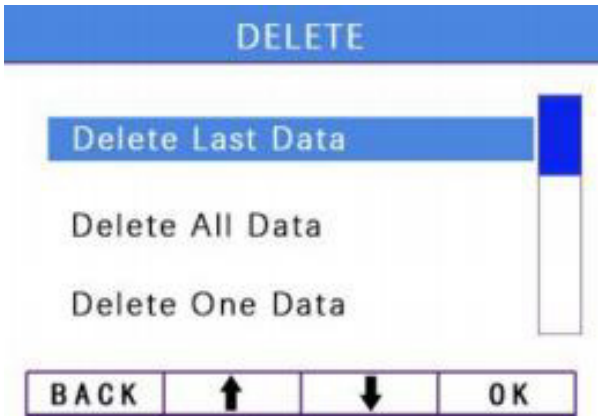

Figure 2-4 Delete

2.2.4 Press the key he enter the sub-menus of t he "Statistics", and press the key , and to select and change the selected item.

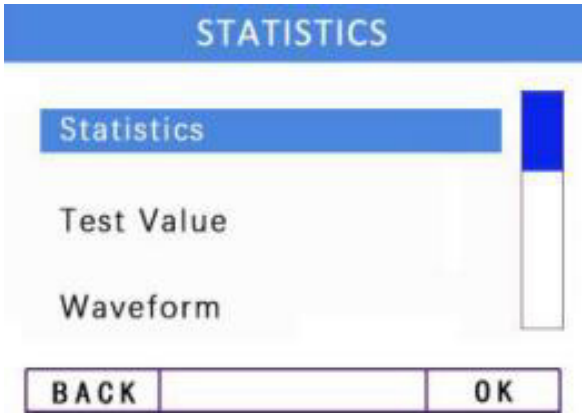

Figure 2-5 Statistics

III Calibration Of The Gauge

Calibration should be performed in the measuring environment for higher accuracy.

3.1 Calibration block

Known thickness foil and known thickness coating slice can be considered as calibration block.

a) Foil

For magnetic induction method, foil indicates non-magnetic metal or non-metal foil. And for eddy current method, foil usually indicates plastic foil. Foil is easier for calibration on curved surface.

b) Coating slice

Coating slice is a known thickness and even coating which is solid combined with the plate. For magnetic induction method, the coating is non-magnetic. And for eddy current method, the coating is non-electric.

3.2 Calibration Plate

a) For magnetic induction method, the magnetic and roughness of the plate should be the same as the measuring material. For eddy current method, the electric of the plate should be the same as the measuring material.

b) For the measuring material that the plate is over the critical thickness list in "Appendix table 1", two kinds of calibration could be used: i. Calibrate on a metal foil which has the same thickness as the measuring material plate. ii. Calibrate with a metal mat which has the similar electric and enough thickness. The metal mat and the metal plate should close to each other. And this method is not suit for the material which has coating on both sides.

c) For the measuring material which cannot be calibrated on the plane, the curve of the calibration plate should be the same as the measuring material.

3.3 Calibration method

The gauge has two calibration methods: zero calibration and two-point calibration. And the gauge also has a calibration method for the probe: basic calibration.

3.3.1 Zero calibration

For the measurement on different plate, zero calibration must be performed.

Deviation will appear if the feature of calibration plate and measuring material is different.

One of the following two methods could be used for zero calibration:

III Calibration Of The Gauge

Calibrate on the plate （shortcut way）

a) Measure on the plate, and the screen display <××μm>.

b) Long press the key ZERO until the screen display <0 μm>.

l Calibrate on plate（normal way）

a) Press the key ZERO in main interface to enter calibration menu.

b) Measure on a plate, and the screen display <×××μm>.

c) Press the key ↵ to skip, and zero calibration is completed. Repeat step b~c will achieve higher accuracy.

3.3.2 Two-point calibration

a) Press the key ZERO in main interface to enter calibration menu.

b) Measure on a plate (BASE) , and the screen display <×××μm>.

c) Press the key ↵ to confirm.

d) Press the key ↑ to enter the value SET menu.

e) Press ↑ or ↓ to adjust the display value to the real foil thickness.f) Press ↩ (BACK) to return to main display.

g Measure on a foil, and the screen display <×××μm>.

h) Press the key ↵ to confirm, and two-point calibration is completed. Repeat step a~h will achieve higher accuracy.

Note:Two-point calibration information will be auto-cleared after zero calibration.

III Calibration Of The Gauge

3.4 Basic calibration for the probe

Basic calibration should be performed for the following situation:
a) Change the probe.
b) The header of the probe is wear.
c) The probe has been repaired.
d) Special usage.

Operation steps:
a) Press the key MENU during power on to enter the basic calibration mode.

b) Press the key ↑ to change probe type. If the screen display the indicator " F" on the right side of the top line, the calibration will be performed for magnetic probe; And if the screen display the indicator " N" on the right side of the top line, the calibration will be performed for non-magnetic probe;

c) Calibrate infinity point: Put the probe away from the plate, and then press the key while the value is stable.

d) Calibrate zero point: Put the probe close to the plate, and then press the key ↵ while the value is stable.

e) Calibrate 5 to 10 known thickness points:

i. Press the key ↑ or the key ↓ to correct the thickness on the top line.

ii. Measure the foil, and then press the key ↵ while the value is stable, or press the key MENU to skip this point.

f) All the calibration information will be shown again after all the points completed. And the indicator " PASS" or " FAIL" can be seen from the bottom line. Press the key ↵ to turn to the main interface;

Note:Skipped point should be less than 5.
Calibration point should be gradually changed from small to large

IV The Factors Affecting The Measuring Accuracy

Factors / Method	Magnetic Induction	Eddy Current
Magnetic property of the plate	▲	
Electric property of the plate		▲
Thickness of the plate	▲	▲
Edge effect	▲	▲
Curvature	▲	▲
The deformation of material	▲	▲
Roughness or the surface	▲	▲
Magnetic field	▲	
Attachments	▲	▲
Pressure of the probe	▲	▲
Direction of the probe	▲	▲

▲ ------ have influence

V Maintenance And Repair

5.1 Work environment

Strict avoidance of collision, heavy dust, moisture, strong magnetic field, oil etc.

5.2 Battery replacement

Battery should be replaced by the following steps while the battery is low:
a) Power off.
b) Open the battery compartment cover.
c) Remove the battery, and put in the new one.
d) Close the battery compartment cover.
The battery should be removed if the gauge is not using for long time.

VI Appendix

Appendix table 1 Technical parameters

Probe type		F	N
Measuring principle		Magnetic induction	Eddy current
Measuring range		0-1500 um	0-1500 um
Low range resolution		0.1 um	0.1 um
Accuracy	Zero calibration	± (2%H+1) um	± (2%H+1) um
	Two point calibration	± [(1-2)%H+1] um	± [(1-2)%H+1] um
Measuring Condition	Min. radius of curvature	Cx. 1.5 mm	Cx.3 mm
	Min. radius of area	Φ7 mm	Φ5 mm
	Critical thickness of plate	0.5 mm	0.3 mm

Note: H–nominal value of thickness

VI Appendix

Appendix table 2 Probe selection reference

Plate \ Coating	Non-magnetic Coating of Organic material (Such as: paint, enamel, plastic, anodizing, etc.)	Non-magnetic Coating of Nonferrous metal (Such as: Chromium, zinc,aluminum, copper, tin, silver, etc.)
Magnetic metal such as iron and steel	F type probe Measure range: 0 μm -1500μm	F type probe Measure range: 0 μm-1500μm
Nonferrous metal such as Copper, aluminum, brass, zinc, tin, etc.	N type probe Measure range: 0 μm -1500μm	N type probe Measure range:0 μm-40μm (only for Chromiu on Copper)

VII User Notice

1.Please fill out the warranty registration card seriously and seal your Company Chop after you get the instrument. Then mail the copies of the warranty registration card and the invoice to our user service center or you can relegate that to the seller when buying the instrument.

2.If it go wrong for quality matter within a year after you buy our instruments, please take your warranty registration car and invoice to our repair station nearby for repairing, changing or returning. If you can’t show the warranty registration card and the invoice we would calculate the warranty period since the instruments are produced, and the warranty period is one year.

3.If it is out of the warranty period, the repair stations are response for after service and repairing and charge according to the rules of our company.

4.You need to pay for additional configuration, such as special probe and the software.

5.If transportation, installation, faulty operation problem, lead to the equipment's part damage.The damages caused by transportation, installation, faulty operation, non-professional maintenance are out of warranty service. If you alter the warranty registration car or there is no invoice, we wouldn't provide free repair.

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