
Coating Thickness Gauge

User's Manual



Contents

1	Introduction	1	4.3.3	Beep	10
2	Structures	2	4.3.4	Power off	10
3	Operation	3	4.3.5	Time/Date	10
	3.1 Preparation		4.3.6	Unit	10
	3.2 Procedure		4.3.7	Default curve	11
4	Setup	4	4.3.8	Default system	11
	4.1 Measuring	4	5. Maintenance	12	
	4.1.1 Measuring mode	4	5.1	Calibration	12
	4.1.2 Limits of tolerance	5	5.1.1	Zero-calibration	12
	4.1.3 Calibration curve	6	5.1.2	One-point	13
	4.1.4 Test groups	6	5.1.3	Two-points	14
	4.2 Data	7	5.2	Influence factors	15
	4.2.1 Browse	7	5.3	Maintenance	16
	4.2.2 Print	7	Appendix		
	4.2.3 Delete	8	A-1	Packing List	17
	4.2.4 Upload	8	A-2	Specifications	17
	4.3 System	9	Warranty		18
	4.3.1 Auto printing	9			
	4.3.2 Backlight	9			

1 Introduction

Designed for non-destructive coating thickness measurement, it is with built-in sensor, and works on the magnetic induction principle and conforms to the following industrial norms and standards:

GB/T 4956, JB/T 8393, DIN EN ISO 2178, ASTM B499

The instrument is ideal for uncomplicated reliable on-site applications. With its integrated measurement probe, measures the thicknesses of coatings quickly and non-destructively utilizing the magnetic induction.

It is suitable for non-destructive, quick and precise coating thickness measurement. Easy to handle they are the ideal instrument for the finishing industry, electroplating, ship and bridge building, aircraft construction and the engineering and chemical industry.

1.1 Principle

The coating thickness gauge work on the magnetic-induction principle for measuring the thickness of non-magnetic coatings(such as paint, enamel, rubber, aluminium, chrome, copper, tin etc.) on magnetic metal substrates(ferrous bases and steel,also on alloyed steel or on hardened magnetic steel, but not on austenitic steel or weak magnetic steel).

When an alternating current electromagnet is brought near iron (or the other magnetic metals) the number of magnetic flux lines passing through the coil changes in proportion to the distance, thereby causing a change in the voltage at the ends of the coil. This change in voltage is determined from the current value and this is used to compute the thickness of the coating.

2 Description of structure

2.1 Gauge

The structure and appearance are shown as Fig.2-1 and Fig.2-2.

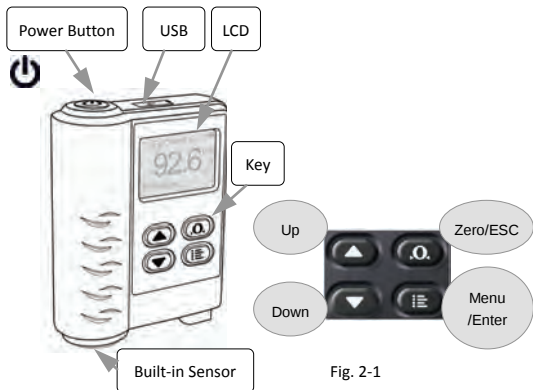


Fig. 2-1

2.1 LCD display

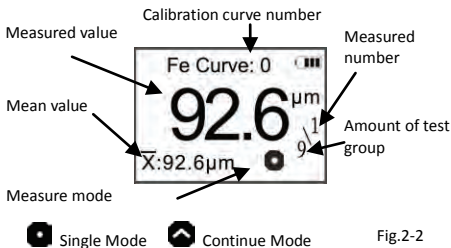


Fig.2-2

3 Operation

3.1 Preparation

1 Batteries

- Slide and open the battery compartment cover.
- Insert the batteries into the battery compartment. Respect polarities as shown in Fig3-1. .
- Close and fix the battery compartment cover.

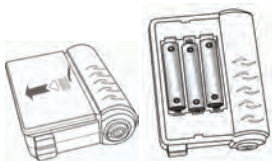


Fig.3-1

2 Switch on/ off

Press Power Button  to turn on/ off..

Note:

If there are magnetic metals near the probe at the moment of switch on, the gauge will display a alarm "Detect Error: Surround Error!". Should take gauge far from magnetic metals and wait few seconds it can go normal.



Fig.3-2

3.2 Measuring Procedure

- Ready the test piece;
- Switch on the gauge , "0.0μm/ mil" is displayed.
- Calibrate the gauge if necessary.
- Measurement:

Press gauge on the measured surface lightly and vertically. Or place the gauge on measured surface of specimen directly.

After the buzzer, can lift the gauge and readout the measured value, or measure the next point.

In order to more convenient and precise operation, may need to make the necessary settings selection. Can be set by a menu.

4 Setup

The gauge uses a menu for setting the parameters or the functions. The structure of setup menu is shown in Fig 4-1.

In the measurement mode, press the "Menu"  to enter the setup menu. Press the "Up"  or "Down"  ("Up" or "Down"  ) can select a item, press "OK"  to enter the selected item.

In the menu settings, press  to exit or return to the previous menu. You can also press  to exit setup and return to the measurement mode.

In value input, Press  to move digit, press   to increase or decrease value.

4.1 Measuring

4.1.1 Measuring mode

1) Single

In single mode the sensor of gauge touch the surface of specimen , measure one thickness value.

For measuring the another point , must lift up the gauge from surface of specimen no less than 10cm and the interval should be greater than 1 second.

2) Continue

Measurement and display continuously ,no need to lift the gauge

from the surface of specimen. Select the mode as Fig.4-2.

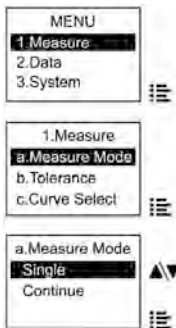


Fig.4-2

4.1.2 Limits of tolerance

As the limits of tolerance are set, once the measured value exceeds these limits the gauge will sound alarm.

In **b.Tolerance**:

Can set to **On** (turn limit alarm on) or **Off** (turn off limit alarm);

Or can select **Upper Limit** or **Lower Limit**, to input the value.

Note: The upper limit should be greater than the lower limit, otherwise this alarm function is invalid.

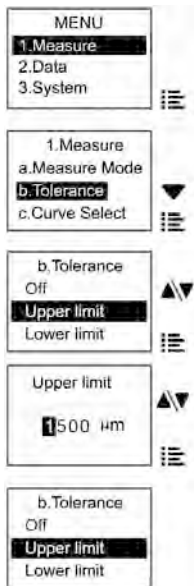


Fig4-3

4.1.3 Calibration curve

The gauge can memory 6 calibration curves for difference kinds of substrate.

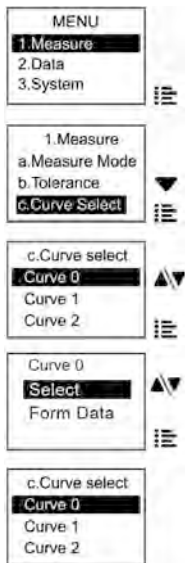


Fig.4-4

Choice a appropriate calibration curve can ensure precision of measurements.

if selected **Form Data** , Press  the certificated time and date will be displayed.

if a curve which not certificated is selected, "
--/--/---- --:--"
will display.



Fig.4-5

4.1.4 Amount of the test groups

The gauge saves the measured data in test groups, the statistical evaluation is in one group too.

Each group can be 1 to 9 data.(Fig.4-5)

4.2 Data

In this item, data measured can be browse, print and upload to PC.

4.2.1 Browse

In Single measurement mode, mean value is saved when finished a group. You can browse or print them.

Select data then press , can display some information of selected group.

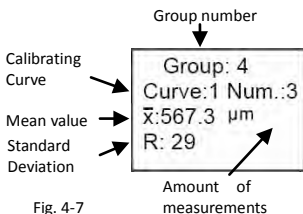


Fig. 4-7

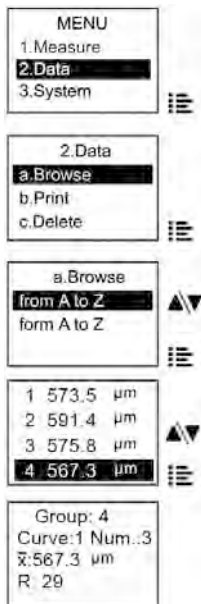


Fig.4-6

4.2.2 Print

The gauge can connect to wireless printer for printing data in memory.

First of all, turn on the printer, and make sure nearer than 3m around the gauge.

Then select data to print, "Current group", "Select group" or "All".

if "Selected group " is selected, press  enter the group selection.

When selected, press the key , begin to print.

4.2.3 Delete

With this function, you can delete current measured value, current measured group or all data in memory.

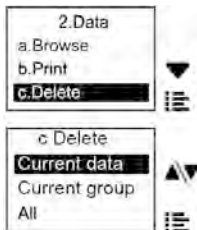


Fig.4-9

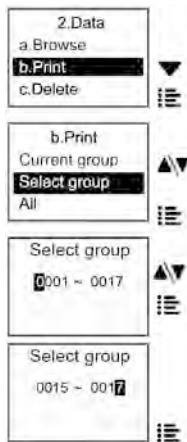


Fig.4-8

NOTE:

It couldn't restore again once you deleted the data.

4.2.4 Upload

The data in memory can be uploaded to computer, you can use the EDLS software to receive data. And manage, transform or analyse these data with computer.

EDLS software must be set up in your computer (See manual of EDLS

for detail).

Connect the gauge and computer with the cable (standard accessories) then run EDLS in the computer.

Similarly, there are 3 options: Current group , Selected group and All .

4.3 System

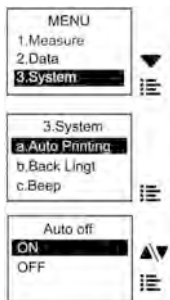


Fig.4-10

4.3.1 Auto printing

If "Auto printing" is turned on, print measured value of a group as the measuring end automatically.

When the gauge is restarted, "Auto

Printing" is defaulted to "OFF".

4.3.2 Backlight

You can set Backlight to "Off", "15s", "30s" and "On". Set to "Off", shut the backlight down. Set to "On", the backlight will be lit

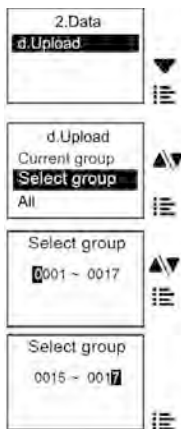


Fig.4-10

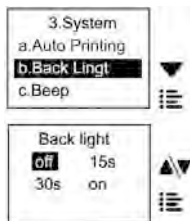


Fig.4-11

always.

"15s" means the backlight will be shutted down at 15 seconds after no any operation.

Note: Set the backlight to "On" isn't recommended for battery power save.

4.3.3 Beep

(Fig.4-12)

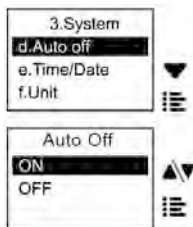


Fig.4-13

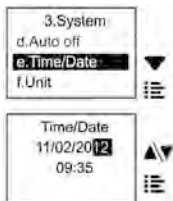


Fig.4-14

4.3.4

Power off

If the auto power off is set to "On" power will be shutted down at 3 minutes after no any operation.

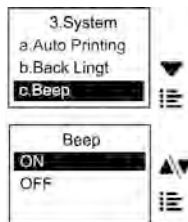


Fig.4-12

4.3.5 Time/Date

(Fig.4-14)

4.3.6 Unit

(Fig.4-15)

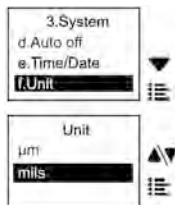


Fig.4-15

4.3.7 Default curve

"Default curve" function may recall the default calibration curve and delete all of custom calibration curves.

On the other hand , the zero calibration and one-point calibration and two-points calibration are all deleted.

! So make sure you want to set to the default curve.

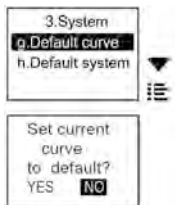


Fig.4-16

4.3.8 Default system

Perform this function, all factory settings are restored.

Calibration curves, measured value in memory and settings by custom are all deleted.

! So be careful to use this function.

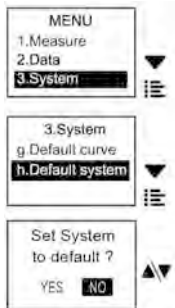


Fig.4-17

5. Maintenance

5.1 Calibration

Due to mechanical wear in use, changes in the test environment, with a different calibration of substrate material will be to the gauge to bring a certain error, appropriate calibration can improve its accuracy of measurement.

The gauge is designed with three levels of calibration methods, zero-calibration one-point calibration and two-point calibration.

5.1.1 Zero-calibration

There are two ways for zero-calibration:



Fig.5-1

measuring calibration and menus calibration.

1) Measuring zero calibration

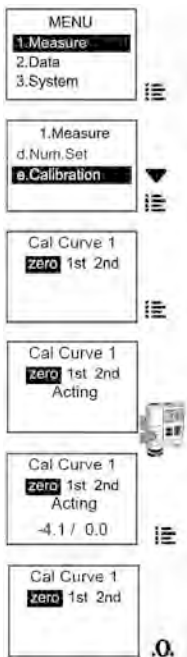


Fig.5-2

a) In single mode, measuring on substrate directly and measured value is "x.x μm ".

b) Press **0.**, to zero the display to "0.0 μm ".

Note:

i) If "x.x μm " is greater than 80 μm , this calibration is invalid. Should use menu calibration as following.

ii) Repeat the steps a) and b) for more accuracy.

2) Menu zero calibration

a) Enter 1.Measure- e.Calibration. select Zero; press **≡** to display Acting;

b) Measuring on substrate directly. 4 or 5 times measurements should be done for more accuracy.

C) Press **≡** for save zero calibration, or press **0.** to discard calibration.

(Fig.5-2)

5.1.2 One-point calibration

Before performing the one-point calibration, zero point must be calibrated.

a) Enter e.Calibration, select 1st, press **≡** to display 0000.0;

b) Press **▼** to enter values adjustment.

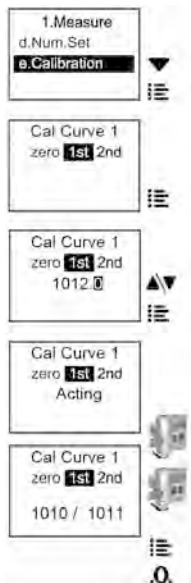


Fig.5-3

Adjust to mean value of standard thickness foil, press  to adjust the digital and press  for move to next bit. press  to display Acting;

- c) Measuring the standard thickness foil on substrate 4 or 5 times.
- d) Press  to confirm calibration, or press  to discard calibration.

5.1.3 Two-points calibration

After performing zero-calibration and one-point calibration, you can do the two-points calibration

Select 2nd, the following process is exactly the same as one-point calibration. (Fig.5-4)

Note: The standard foil used in two-points calibration should be thicker than the one used in one-point calibration.

5.2 Influence factors

1 Magnetic properties of the substrate

The gauge used magnetic induction method is affected by variations in the magnetic properties of the basis metal. In order to higher measuring accuracy, the substrate used in calibration adjustment should be the

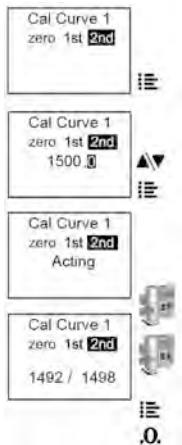


Fig.5-4

same with the specimen as far as possible.

2 Basis-metal thickness

The gauge has a critical thickness of the basis-metal, greater than it the measurement will independent of the thickness. It is about 0.5mm.

3 Roughness

Measurements are influenced by the surface topography of the basis metal and coating. Surface roughness becomes significant when the degree of roughness is greater than 10 % of the coating thickness, causing increased scatter in measurements.

Therefore, on a rough or scratched surface, to make a greater number of measurements at different positions to obtain an average value that is representative of the mean coating thickness.

4 Residual magnetism

Residual magnetism in the basis metal affects the measurements made by gauge that employ a stationary magnetic field. Its influence on measurements made by gauge employing an alternating magnetic field is much smaller.

5 Stray Magnetic Fields

Strong stray magnetic fields produced by various types of electrical equipment, can seriously interfere with the operation of the gauge.

6 Coating deform

For very soft coating, measuring probe will make deformation, so the measurements of these specimens cannot be reliable, or may be impossible.

5.3 Maintenance

- 1 Protect the gauge from dirt, dust, humidity, chemicals and corrosive vapours. And do not let the gauge drop!
- 2 After use, please store the gauge in the protective case.
- 3 Avoid direct, strong sunlight and temperature-shocks as these can have a negative influence on the measurement result.
- 4 The instrument housing is resistant to most chemical cleaners; use a soft, moist cloth for cleaning.
- 5 Exact measurements can only be taken with a clean probe. Therefore the probe has to be checked and cleaned regularly so that any paint residue and iron fragments can be removed.
- 6 When the batteries are low, "" will be displayed. The batteries should be changed immediately (Note: 3*1.5V alkaline batteries).

The calibrations and all kinds of settings are stored in a nonvolatile memory, they will not be lost even if batteries go dead completely or during the process of changing the batteries.

If the gauge is not to be used for an extended period of time, remove batteries to avoid battery acid spoilage and the resultant destruction of the electronics.

- 7 The standard thickness foils are important in the calibration procedure. If the foils are worn, broken, bent or damaged, replacements are available from your dealer.
- 8 If the gauge has a fault condition, please return it to the agent who will assist you. If possible or return it to the factory for repair.

Appendix

A-1 Packing List

Name	Quantity
Coating thickness gauge	1
Standard thickness foil	5
Calibration Substrate	1
AAA1.5V Alkaline battery	3
USB Cable	1
Operation manual	1

A-2 Specifications

Test Method:	Magnetic induction
Measuring Range:	0~1500mm (0 ~60mil)
Resolution:	0 ~ 999 μ m: 0.1 μ m, $\geq$ 1000 μ m: 1 μ m
Accuracy:	up to100 μ m: $\pm$ 1.5 μ m; 100 ~ 1500 μ m: $\leq$ 1.5 %
Data Memory:	up to 1500 readings.
Display:	Graphic LCD with backlight
Power Supply:	1.5V*3 (AAA batteries).
Environment:	0 ~ 50°C
Dimension:	88 X 67 X 30 mm
Weight:	120 gr