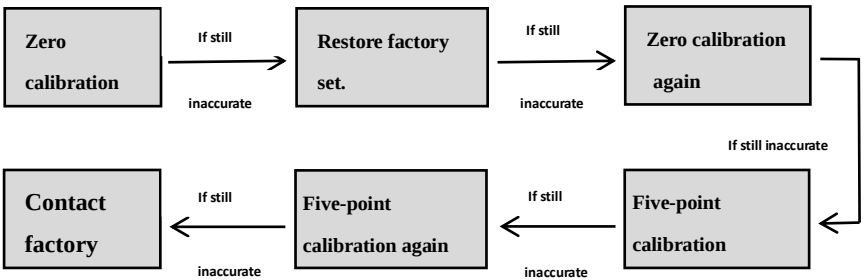
Quick guide

1. If the data is not accurate or there is no response to the measurement, enter the menu interface, select "calibration", then operate according to the following steps:



2. When the instrument is measuring interface, long press the "▲/FLIP " button to FLIP the screen to 180°;Long press "▼/CAL " to quickly enter the "zero calibration" interface.

Notice

- To avoid leakage of the battery and instrument damage. Please take out the battery from the instrument, when not using it for a long time.
- Do not make the measuring head of the instrument close to or touch magnetic objects (such as magnets, iron plates with magnetic force, etc.) to prevent the measuring head from being magnetized and affecting the measurement results.
- Do not rotate the measuring head 360° to avoid breaking the electronic connecting wire inside the measuring head and causing damage. The way of the measuring head placing effects the measurement. In the measurement, the head should be kept perpendicular to the surface of the specimen.
- Please take care of the instrument and keep the measuring head clean and free of stains on the surface of the probe.

1.Overview

This instrument is a portable meter. It is capable of measuring coating thickness quickly, precisely and without injury, both for the laboratory and engineering environment. It is currently widely used in manufacturing, metal processing industry, chemical industry, commodity inspection and testing fields; and is essential for material protection major. This instrument meets the following criteria:

GB/T 4956 – 1985 non-magnetic coating thickness measurement on magnetic metal substrate, Magnetic Method

GB/T 4957 – 1985 non-conductive coating thickness measurement on non-magnetic metal substrate, Eddy Current Method

JB/T 8393-1996 Magnetic &Eddy Current coating thickness measurement Features

JJG 889 -- 95 《Magnetoresistance thickness gauge》

JJG 818 -- 93 《Eddy current thickness gauge》

1.1 Feature

- Thickness measurement using both Magnetic Method to measure the non-magnetic coating on a magnetic metal substrate and Eddy Current Method to measure the non-conductive coating on a non-magnetic metal substrate.
- Zero calibration and five-point calibration can be used to calibrate the instrument to ensure the accuracy of the instrument in the measurement process.
- Automatic identify ferrous (Fe) and non-ferrous (NFe) substrate quickly.
- The screen can be displayed 180° flip.
- The detected coating thickness can be set to cross the boundary alarm.
- Units of measurement (μm/mil) and system language (simplified Chinese/English) can be set.
- Two ways of shutdown: manual shutdown and automatic shutdown.
- Negative display function to ensure the accuracy of zero-point calibration.
- Showing average, max, min value [*]

[*] Double base- advanced version

1.2 Principle

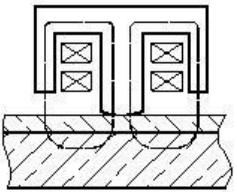
The instrument uses magnetic thickness measurement method, which non-destructively measures thickness of non-magnetic coating (such as: aluminum, chromium, copper, enamel, rubber, paint, etc.) on magnetic metal substrates (such as steel, iron, alloy and hard magnetic steel, etc.).

Magnetic Method (Fe-type probe)

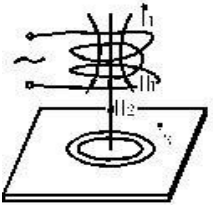
When the probe contacts the cover layer, the probe and magnetic substrate forms a closed magnetic circuit; Due to the presence of non-magnetic coating, magnetic resistance changes. The thickness of the cover layer can be derived by measuring the change.

Eddy Current Method (NFe-type probe)

When the probe contacts the cover layer, the probe and non-magnetic substrate forms Eddy Current and gives feedback to the coil inside the probe. The thickness of the cover layer can be derived by measuring the feedback.



Magnetic Method



Eddy Current Method

1.3 Technical Data

- Measuring range: 0-1250um/0-1500um [*]
- Power supply: 2 * AA batteries
- Accuracy：±1.5%
- Ambient temperature: -10-40 ℃
- Relative humidity: ≤85%
- Minimum substrate: 10 * 10mm

[*] Double base- advanced version

- Minimum curvature: 5mm convex; 5mm concave
- Thinnest substrate:0.4mm
- Weight: 99g (withbattery)
- Size: 102mm * 66mm * 24mm

1.4 Item Checklist

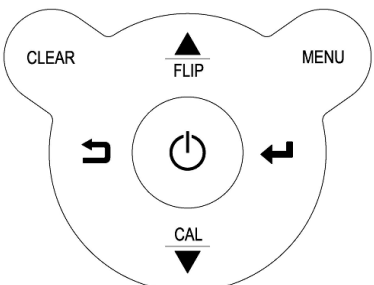
Name	Quantity
Instrument	1
Standard films	5
Base substrate	1 （Single base）/ 2（Double base）
AA dry cell	2
Packing box	1
User Manual	1

2.Button & Display Description

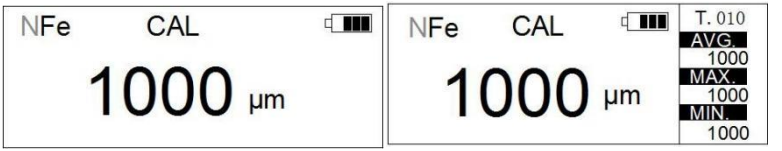
2.1 Button Description

- “CLEAR”：Clear measurement data of display
- “MENU”：Enter the menu operation
- ：Back
- ：Confirm
- ▲/FLIP: Short press -Up/ Long press – Flip the screen.
- ▼/CAL: Short press -Down/

  Long press – Enter zer-point calibration
- ：On/Off button by long press



2.2 Display Description



Basic version Advanced version

- µm/mil: units of measurement
- Fe: Magnetic measuring state; NFe:Non-Magnetic measuring state
- 1000: Thickness data
- T010 means the 10th measurements, AVG means average value of 10 times measurements, MAX means max value of 10 times measurements, MIN means min value of 10 times measurement.
- : supply voltage low indicator.

3.Operation

3.1 ON/OFF

Put 2 No. AA dry batteries into the instrument (note the positive and negative terminals of the battery and make sure the battery is fully charged)

a) Power on: When the instrument is off, press and hold the " ⏻ " power button for 2 seconds.

b) Shutdown: When the instrument is powered on, press and hold the " ⏻ " power button for 2 seconds.

3.2 Calibration

There are two calibration methods: zero calibration, five-point calibration. For more accurate measurements, it is recommended that the instrument be calibrated each time used.

Note: When the measurement result of the instrument is not accurate, the zero-point calibration can be performed first. After the zero calibration, if the data is still not correct, do another five-point calibration.

3.2.1 Zero Calibration

Zero calibration is one of the most basic calibrations. To improve the accuracy of the instrument during the measurement process, it is recommended to perform a zero calibration before each use of the instrument. The specific steps are as follows:

Hold down the "▼" button (or through the "MENU" button to calibration interface) Into the "Zero point "interface. Put the instrument on the substrate (Fe or NFe) **vertically**, there will be a beep when the test is finished, then quickly raise the instrument to more than 30cm above the

substrate .Until the instrument makes another beep sound, then the display "calibration completed".

3.2.2 Five-point Calibration

When the probe of the instrument is worn, oxidized, magnetized, etc., the performance of the probe will change, and the measurement result of the instrument will be affected. At this time, we can perform the <five-point calibration> operation on the instrument. The specific steps are as follows:

a)Press “MENU” to enter the “Main Menu” interface, press “▲”, “▼” to select “Calibration” item, press “↵” to enter “Calibration” interface, then select “Restore factory setting”.

b)The current interface of the instrument after factory setting is restored is the "calibration" , press “▲”, “▼” to select “Five-point calibration” item, Put the instrument on the substrate (Fe or NFe) **vertically**, there will be a beep when the test is finished, then quickly raise the instrument to more than 30cm above the substrate .Until the instrument makes another beep sound, the

calibration of substrate (Fe or NFe) is completed.

c) Put the 50μm standard film on the substrate (Fe or NFe), and press "▲", "▼" to adjust the same value in the display. Put the 50μm standard film on the substrate (Fe or NFe)**, then vertically** measure. There will be a beep when the test is finished, then quickly raise the instrument to more than 30cm above the substrate. Until the instrument makes another beep sound, the calibration of first point is completed.

d) Same operation of other four points: Through 100μm/250μm/500μm/1000μm standard films.

3.3 Settings

The instrument can set the illumination time of the display, the automatic shutdown time of the instrument, the alarm of the measured coating exceeding the threshold value, the system language of the instrument and the unit of the thickness value obtained by the measurement.

3.3.1 Backlight time setting

The screen backlight time can be set to 5-999 seconds. In the standby state, press the “MENU” button to enter the main menu interface, press the “▲” or “▼” button to select the “Settings” item, press the “↵” button to enter the setting interface, and then select the “Backlight time item”, press the “↵” button to enter the screen backlight time setting interface.

In the screen backlight time setting interface, press the “▲”, “▼” key to adjust the size of the selected digital value, press the “↵” key to cycle through the numbers. When the backlight time is set, press “↩”, the instrument display will prompt “Save the changes?”, press “▲”, “▼” to select “Yes”, then press “↵” to save the changes.

3.3.2 Automatic shutdown time setting

The automatic shutdown time can be set to 2-99 minutes. In the standby state, press the “MENU” button to enter the main menu interface, press the “▲” and “▼” keys to select the “Settings” item, press the “↵” button to enter the setting interface, and then select “Power off

time" press "↵" button to enter the automatic shutdown time setting interface.

In the power off time setting interface, press the "▲", "▼" key to adjust the size of the selected digital value, press the "↵" key to cycle through the numbers. When the auto power off time is set, press "↩", the instrument display will prompt "Save the changes?", press "▲", "▼" to select "Yes", then press "↵" to save changes.

3.3.3 Alarm Threshold Setting

Press "MENU" in the standby mode to enter the main menu interface, press "▲", "▼" to select "Settings" item, press "↵" to enter the setting interface, then select "Alarm setting" item, press "↵" button You can enter the alarm threshold setting interface.

In the alarm threshold setting interface, press the "▲", "▼" key to adjust the content of the selected item, press the "↵" key to cycle through the setting items. When the alarm threshold is set, press "↩", the instrument display will prompt "Save the changes?", press "▲", "▼" to select "Yes", then press "↵" to save the changes.

When the alarm threshold switch is turned on, if the coating thickness value of the measured object are more or less than the upper or lowest limit value of the alarm threshold, the instrument will issue "Di Di Di" three times when the measurement is completed.

3.3.4 Language Setting

This instrument supports both Simplified Chinese and English.

Press “MENU” in the standby mode to enter the main menu interface, press “▲”, “▼” to select “Settings” item, press “↵” to enter the setting interface, then select “Language” item, press “↵” button Enter the system language setting interface. Press the "▲", "▼" button in the system language setting interface to switch between "Simplified Chinese" and "English". Press “⮌” after the setting is completed, “Save the changes?” will be displayed on the instrument display, press “▲”, “▼” to select “Yes”, then press “↵” to save the changes.

3.3.5 Measurement unit setting

For different application requirements, the instrument is available in metric (μm) and imperial (mil) measurement units.

Press the “MENU” button in the standby mode to enter the main menu interface, press the “▲”, “▼” button to select the “Settings” item, press the “↵” button to enter the setting interface, then select the “ Unit setting” item, press the “↵” button Enter the measurement unit setting interface. Press the “▲” or “▼” key in the measurement unit setting interface to switch between “μm” and “mil”. Press “⮌” after the setting is completed, “Save the changes?” will be displayed on the instrument display, press “▲”, “▼” to select “Yes”, then press “↵” to save the changes.

4. Accuracy Effecting Factors

a) Magnetic properties of the substrate metal

Base metal magnetic changes will affect the magnetic method accuracy. (In practical use, the magnetic change of low carbon steel can be considered mild.) To avoid the influence of heat and cold treatment, standard films with the same magnetic properties as specimen should be used to calibrate the instrument; specimen without coating could also be used.

b) Electrical properties of the substrate metal

Conductivity of the base metal affects the measurement, which depends on its material composition and heat treatment method. Standard films with the same electrical properties as specimen should be used to calibrate the instrument.

c)Thickness of substrate metal

Each instrument has a critical thickness of substrate metal. Beyond the limitation, the base metal thickness does not affect the measurement.

d)Edge effect

This instrument is sensitive to shape transition so such measurement is not reliable.

e) Curvature

Specimen curvature affects the measurement. This effect increases clearly with the curved radius reduction. Measurement on bending specimens is not reliable.

f) Deformation of the specimen

Probe makes soft coating deformation, so measurement on these is not reliable.

g) Surface roughness

The roughness of substrate and coating effect measurement. Influence increases with roughness. Rough surface will cause system deviation and accidental deviation, so several measurements should be done for single point. If the substrate metal is rough, zero calibration should be done on un-coating surface.

h) Magnetic field

Strong magnetic fields generated by electrical equipment around would seriously interfere

magnetic thickness measurement method to work.

i)Attached material

Material attached to the probe affect the accuracy. Thus, attached material must be removed to ensure that the probe contacts with the specimen directly.

j) Probe pressure

Pressure on the probe will affect the reading. Please keep the pressure stable.

k) Probe pressure

During operation, probe should be kept vertical to specimen surface.