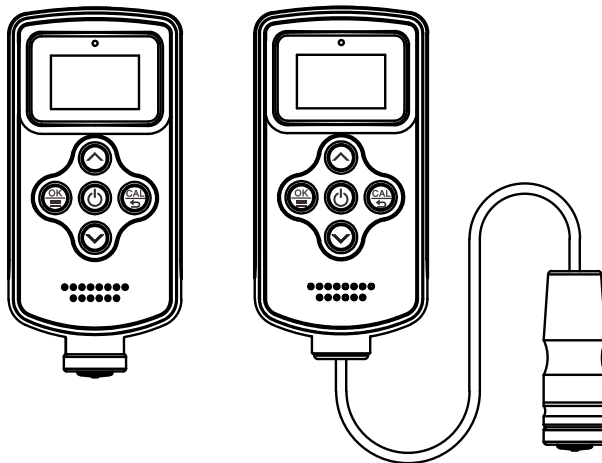


# COATING THICKNESS GAUGE

## OPERATION MANUAL



V1.0

# Content

Overview	1
Features	2
Notes	3
1. System Layout	4
2. Power	5
2.1 Power on	5
2.2 Power off	5
3. Basic operation	5
3.1 Menu operation	5
3.2 Enter the Main Menu	6
3.3 Operation Confirm	7
3.4 Rename the record's Name	8
3.5 Editing Record	9
3.6 Caption Details	10

## Content

4. Calibration .....	11
4.1 Zero Calibration .....	11
4.2 1 Dot calibration .....	12
4.3 5 dots calibration .....	13
5. Measure type .....	16
6. Measure Mode .....	17
6.1 Basic Mode .....	17
6.2 QA Mode .....	18
6.3 Statistical Mode .....	19
6.4 Continuous Mode .....	21
7. Standard Management .....	22
7.1 Check Standards .....	22
7.2 Measure Standard .....	24

## Content

7.3 Input Standards .....	24
7.4 Tolerance settings.....	25
7.5 Clear Standards.....	26
8. Date Management .....	26
8.1 Check records .....	27
8.2 Delete all.....	28
9. System settings .....	29
10. Technical specifications .....	31
11. Q & A .....	34

## Overview

This Series thickness gauge can quickly and accurately detect the thickness of various coatings coated on metal substrates. It complies with ISO 2178, ISO 2360, GB/T 4956, GB/T 4957, ASTM B499, widely used in surface engineering inspection fields such as manufacturing, metal processing, chemical industry, etc. It is the basic equipment of coating surface treatment industry.

The Fe-based probe can detect the thickness of various non-magnetic coatings sprayed on various magnetic metal substrates (such as steel), such as paint layer, powder coating layer, porcelain coating layer, chrome plating layer, copper plating layer, galvanizing layer of iron plate layer etc.

The Non-Fe probe can detect the thickness of all insulating coatings sprayed on non-magnetic metal substrates (such as aluminum, copper, brass, stainless steel, etc.), such as paint layer, powder coating, porcelain coating, etc.

Basic working principle: Magnetic method Figure 1-1; F & NF Figure 1-2.

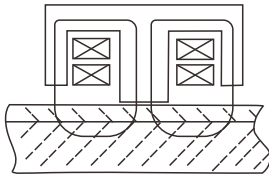


Figure 1-1 Magnetic

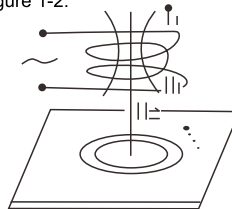


Figure 1-2 F & NF

## Features

- Quickly & accurately detect the coating thickness on magnetic substrate and Non Magnetic substrate;
- Compact design for one hand operation;
- Automatic substrate recognition, one-key test (no manual operation required);
- Single and multi point calibrations;
- LCD Display, buzzer, auto stand-by;
- High wear-resistant probe, no less than 800,000 measurements;
- Test reaction speed: Fe mode 10 times per second, NFe mode 1~ 2 times per second, automatic mode 1-2 times per second;
- Easy 0 Calibration: as long as the probe touches the substrate, lightly press the menu button to reset to 0;
- $\pm$  numbers show the test value, and clear to check the 0 Cal. which improves the test accuracy;
- With temperature control system and high-end chip control system, Good linearity, stability and repeatability;
- The basic calibration correction method can be used to update and correct the system error of the probe to ensure the accuracy of the instrument during the measurement process;
- Negative number display function to ensure the accuracy of the 0 cal. of the instrument and improve the test accuracy;
- Buzzer selection prompt during operation;
- Manual power off and auto power off;
- Low battery alarm;
- Low power design, stand-by current  $< 10 \mu\text{A}$ ;
- Fast Measuring
- Detachable double probe
- High precision
- High stability

## Notes

- Before measuring, please stay away from other electrical equipment (such as strong magnet, speakers, transformer and induction cooker with strong electromagnetic field) to ensure that the instrument will not be affected by the surrounding magnetic field, otherwise the measurement result will be inaccurate ;
- Before measuring, please clean any attached substances on the measured surface, such as dust, grease and rusts etc ;
- Before measuring, please check the critical thickness of the base metal, if it is bigger than it, the thickness gauge will not respond, the data is inaccurate ;
- Before measuring, please be noted that the roughness of the standard sheet should be similar as the sample which to be tested ;
- Before measuring, please pay attention to the influence of the radius of curvature of the surface, it may be unreliable to measure the surface with the radius of curvature  $< 3\text{mm}$  ;
- Before measuring, please carry on the zero calibration ;
- When measuring, please do not to measure at the inner corner and near the edge of the sample. Generally, it is very sensitive to the abrupt change of the surface shape of the sample ;
- When measuring, please press the probe vertically to keep the pressure constant, otherwise the measuring data will be inaccurate ;
- Since each data is not exactly the same, please take several more measurement in each measured area, especially for rough surface ;
- When “Low battery” displayed, it will automatically shut down to protect the battery. It needs to be charged.

## 1. System Layout

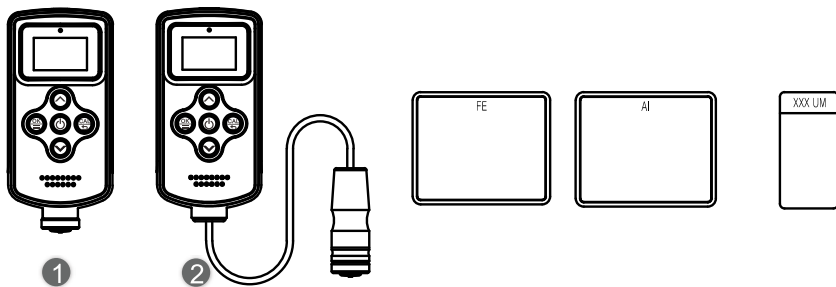


Figure 2 Thickness Gauge Layout

Note: 1. The thickness gauge is classified into ① integral type and ② split type according to the probe;  
2. ① Fe-Based, ② Non Fe (AL ect), according to the probe.



## 2. Power

### 2.1 Power on

The instrument can be powered by lithium battery and USB. As long as the battery is a live or inserted into USB, briefly press the power key for 0.5s to start up.


### 2.2 Power off


When powered by the lithium battery, the instrument will automatically shut down if there is no operation for a certain period of time (60 seconds by default, which can be changed in the Settings). It can also be shut down by pressing the power button for more than 3 seconds.

When using USB power supply, it cannot be shut down automatically, but it can be shut down manually to continue charging.

## 3. Basic operation

### 3.1 Menu operation

 indicates that it's selected or there are sub-menu items;

 indicates that there are other options to continue to flipping, and indicates the current position of the sub-menu option displayed, in Figure 3 "Main Menu".

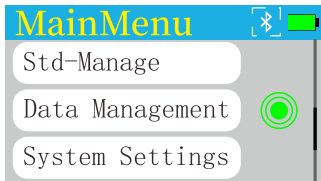


Figure 3 Main Menu

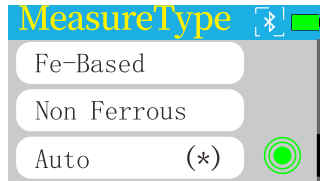


Figure 4 Measurement Type

### 3.2 Enter the Main Menu

Press the "OK" key in the measurement interface to enter the main menu, and press the up key or down key in the main menu interface to switch the sub-menu options to be entered.

The Main Menu including following sub-menu items:

1. Calibration: Calibrating or modify the Cal. Value;
2. Measurement Type: Fe-Based, Non-Fe, Auto, please select the right one for measurement;

**Caution:** Some models only have a single measurement type.

3. Measurement Mode: Basic Mode, QA Mode, Statistical Mod, Continuous Mode;
4. Standard Management: Check Standard, Measure Standard, Input Standard, Tolerance Settings, Empty Standard;
5. Data Management: User can check the records (Basic Records, Quality Records, Statistical Records) here, and Delete All;
6. System Settings: Auto Save, Buzzer, Bluetooth, Inch/ $\mu\text{m}$ , Auto Print, Pass/Fail, Language , Standby Time, Backlight Time, Restore, Instrument Info...

### 3.3 Operation Confirm

It's used to confirm the operation which you want to do, such as the delete records shown as figure 5.

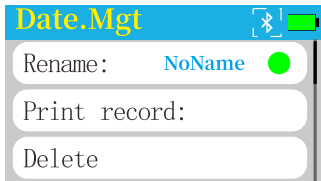


Figure 5 Delete Records confirm

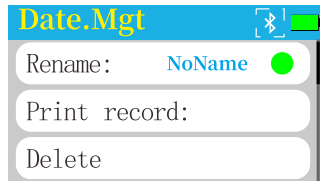


Figure 6 Rename the record's name

Press "OK" to execute the selected operation, press "CAL" cancel .

### 3.4 Rename the record's Name

The record's name can be renamed here with alphabet and Arabic numerals, shown as Figure 6.

Press "UP" or "DOWN" to select letter;

Press "OK" to change the position;

Press "POWER" to confirm;

Press "CAL" to cancel the operation.

### 3.5 Editing Record

User can input the "Average No." in "Statistical Mode" measurement.

Press "OK" , to call out Figure 7; Press "OK" again, to select the input area, Press "UP" or "DOWN" to change the number; press "CAL" to save the setting, press "CAL" again to return previous interface.

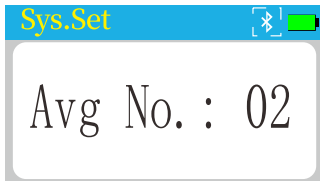


Figure 7 Input Average No.



Figure 8 Caption

### 3.6 Caption Details

Following information is shown in the caption:

- ① In Measurement interface: Measure Type / Measure Mode / Units / Bluetooth on(off) / USB / Battery Icon, as the figure 8 shown.
- ② In System Setting interface: "MainMenu" / Bluetooth on(off) / USB / Battery Icon

## 4. Calibration

Press “OK” in measuring interface into the “Main Menu”, press “OK” again into the “Calibration”, press “UP” or “DOWN” to select the calibration type, as the Figure 9 shown.

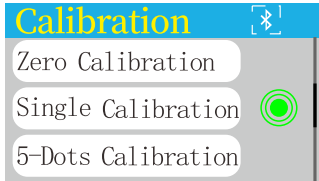


Figure 9 Calibration

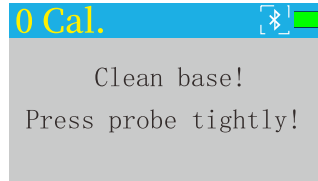


Figure 10 Zero Calibration

### 4.1 Zero Calibration

Press “OK” to carry on the calibration, the screen will show “Clean base! Press probe tightly!”.

Press the probe vertically and stably on the uncoated base until a drop sounds buzzer on) and the ADC value displayed, then the calibration is completed. Press the “OK” to confirm, and press the “CAL” to cancel the calibration.

Note: 1. The data should be 0, when measured the base, otherwise measure again,  
2. There is a shortcut for the 0 cal.: In the case of normal measurement, keep the probe pressed, press the “OK” key, and hear the buzzer beep or prompt that the zero calibration is completed, that is, the zero calibration is completed.

## 4.2 1 Dot calibration

When figure 11 shown on the screen, you may carry on 1 dot calibration.

Press the probe vertically and stably on the film until the “Observed Value” is appeared. The “Observed Value” should be same as the thickness of the film, if not, you can modify the “Observed Value” via input the right data in “Actual Value” . After input the right data, press “CAL” to verify, press “OK” to confirm , Pres “CAL” to cancel the input.



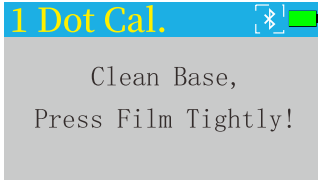


Figure 11 1 Dot Calibration

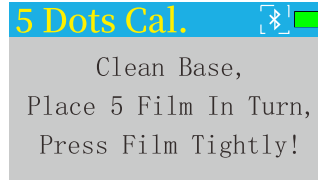


Figure 12 5 dots calibration 1/4

Note: When measure the std film, the value should be same as the actual thickness, if not re-calibrate again.

### 4.3 5 dots calibration

When figure 12 shown on the screen, you may carry on 5 dots calibration.

Following steps show you how to take the five dots calibration of Fe-based.

Figure 13 indicates that now it's measuring the 1st film, put the 1st std film on the base, and then press the probe vertically and stably on the film until the "Observed Value" and the "Actual Value" are appeared, when the data are same as the thickness of the STD film then then measure the 2nd STD film, otherwise input the right thickness of the film, and the gauge will automatically save it; then measure the next film until the 5 PCS film are all tested, and figure 15 will be shown, press "CAL" to verify the calibration, press "OK" to confirm to save, press "CAL" to cancel the calibration,

During the calibrating process, press "CAL" to cancel this calibration, figure 14 will be shown, press "OK" to confirm to cancel this calibration, or this calibration will be continue .....

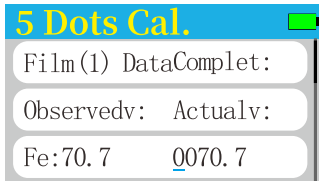


Figure 13 5 dots calibration 2/4

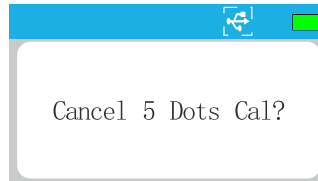


Figure 14 5 dots calibration 3/4

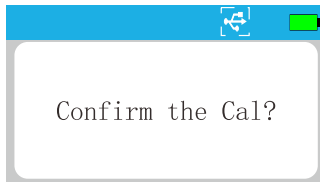


Figure 15 5 dots calibration 4/4

Notes:

- The material for calibration should be same as the DUT, if you can not find the same material, the attached standard material plate could be used for calibration, but there will be some errors with the difference between the DUT and the attached standard material plate;
- After calibration on the material to be measured, the reading on the DUT is accurate; however, if the properties of the material to be measured and the standard material plate are inconsistent, the measurement reading on the standard plate will be inaccurate, which is determined by the principle and nature of the instrument , not a malfunction;
- 5-Dots calibration includes Fe mode and NFe mode. If the first film is Fe mode, then the current five-dots calibration is based on Fe mode, otherwise it is NFe mode;
- 5-Dots calibration: needs to measure the film with a gradient from small to large;

## 5. Measure type

Measure type include: Fe, NFe, Auto;

Fe: Only iron-based coating thickness can be measured;

NFe: Only non-ferrous coating thickness can be measured;

Auto: Automatic identify the currently measured material and display of current Fe/NFe data.

## 6. Measure Mode

There are four measurement modes of the instrument: basic mode, QA mode, statistics mode and continuous mode.

If auto save is on, the system will name the currently displayed data: "s000 \*\*" , and save the value with the name, and will automatically increment the serial number on the original basis.

### 6.1 Basic Mode

The basic mode is to display the Fe/NFe thickness data according to the setting of the measurement type.

The basic mode measurement interface is shown in Figure 16. Press “up” and “down” keys to check the data records, as shown in Figure 17.

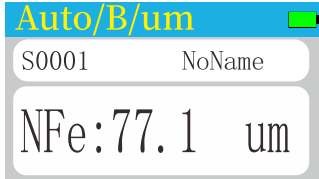


Figure 16 Basic Mode

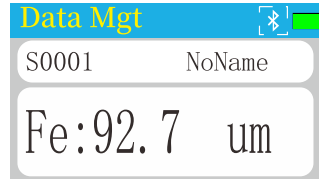


Figure 17 Check the basic record

## 6.2 QA Mode

QA Mode: In this mode it will compare the current data with STD data, and show you the difference, as figure18 shown.

The current data in the tolerance will be black small words, out of tolerance, will be red small words. And you may press "UP" and "Down" key to check the records.

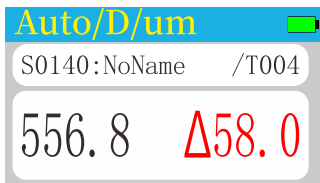


Figure 18 QA Mode

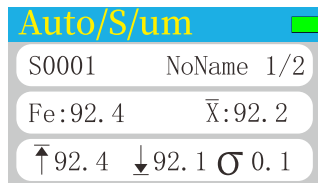


Figure 19 Statistical Mode

### 6.3 Statistical Mode

The statistical mode carries out multiple average measurements, makes basic statistics on the data of multiple measurements, and compares it with the standard data. The measurement interface is shown in Figure 19.

Symbols in statistical mode:

1. "Fe:" : Observed Value
2. " $\bar{X}$ " : Avg;
3. " $\downarrow$ " : Min;
4. " $\uparrow$ " : Max;
5. " $\sigma$ " : Std Dev;

In the top left corner (such as S0001) of the screen in Statistical Mode measuring interface is the name of the current of measurement, and the top right corner (such as 1/2) is times of the current round measurement, 1 indicate that it's the 1st time of current round, 2 indicates that total 2 times in this round. When the current round run out, the following interface will be show. Press "UP" and "DOWN" to check the measured data.

Average Times: Select "Statistical mode" to set how many times in the current round of measurement. Press "OK" to enter edit mode, press "UP" or "DOWN" to select the times from 2~99, as figure 20 shown.



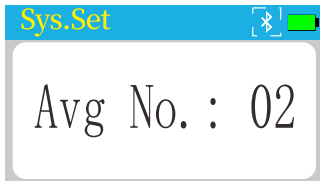


Figure 20 Average Times

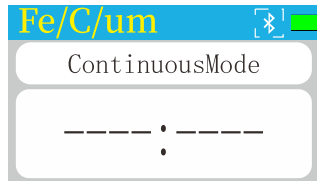


Figure 21 Continuous Mode

## 6.4 Continuous Mode

In Continuous Mode, press the probe down and without releasing and moving the probe, it will continuously to measure the thickness data of the path, and releasing the probe to end the measurement, as shown in figure 21.

## 7. Standard Management

Select “Std-Manage” in “Main Menu” by press “OK”, to enter the “STD-Manage” interface as Figure 22 shown.

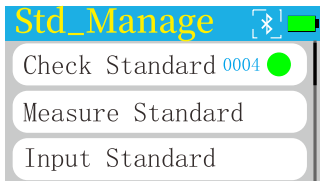


Figure 22 Std Management

### 7.1 Check Standards

Select “Check Standard” in “Std Manage” by press “OK” to enter the check standard interface, as Figure 23 shown. The standard’s name ((\*) STD 0001) will be displayed in the top right corner, and a star (\*) will be ahead the name when the data is current standard for measurement.

“value” indicates the nominal value; “Lower” indicates the min value; “upper” indicates the max value; Press “UP” and “DOWN” to check the standard records.

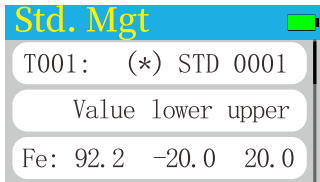


Figure 23 check standard record

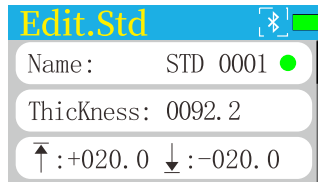


Figure 24 Modify Standard Record

Select a standard record, and press "OK" to edit it. You can set it as current standard, print and delete.

- Delete: delete the current standard record.

## 7.2 Measure Standard

Select the "Measure STD" in "Standard Management", and then press the probe to set the measured value as a standard.

## 7.3 Input Standards

Select "Input standards" under the Standard Management menu and press OK to input a new standard. On the "Input Standards" interface, modify the standard name and set the target value and upper and lower limits, as shown in Figure 25.

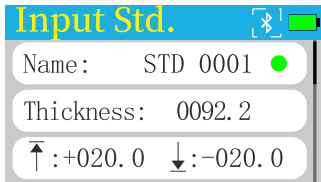


Figure 25 input Standards

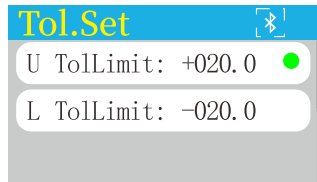


Figure 26 Tolerance settings

## 7.4 Tolerance settings

Tolerances can be set according to product requirements, as shown in Figure 26.

## 7.5 Clear Standards

Clear standards will delete all saved standards.

In the standard management menu, select "Clear Standards" and press the "OK", the system will prompt to confirm, press the "OK" to clear the standard, and press the "CAL" to cancel the emptying operation .

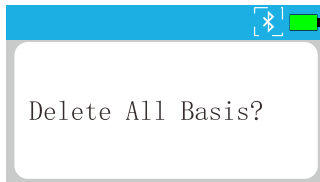


Figure 27 Empty standards

## 8. Date Management

Enter the main menu, select the "Data Management" submenu item and then press the OK key to enter the data management interface, you can check the data records in various modes, select a certain data to edit it independently, or delete all the data.

## 8.1 Check records

Record types include basic records, QA records, and statistical records, as shown in Figure 28. Among them, the QA record stores the QA measurement results, the statistical record stores the statistical measurement results, and the basic record stores the basic mode and continuous mode measurement results.

To check the corresponding records, select the corresponding records and press the “OK” to start browsing. When browsing, press the “UP” and “DOWN” to switch records; press the “CAL” to return to the data management menu; press the “OK” to enter the single data deletion, name renaming, and print this record interface.

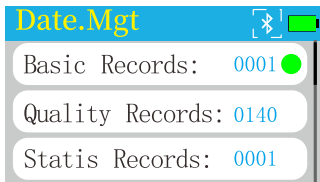


Figure 28 Data management

## 8.2 Delete all

Select "Delete All" in the data management, and press the "OK" to enter the delete all records menu, as shown in Figure 29. Then select the record type to be deleted, select and press the "OK", then a confirmation will be prompted, confirming will delete all the data of this type, canceling will keep the data.



Figure 29 Delete all



## 9. System settings

The System Settings submenu includes:

1. Auto save: turn on or turn off the storage, that is, whether to save the measurement data.

Note:

Auto save is turned on to save all measurement data and settings. When it is turned off, the measured data are temporary data, and the data will be lost when the power is turned off.

2. Buzzer: Turn on and off the buzzer , and it will remind you when the measurement data is completed.

3. Bluetooth: Turn on and off Bluetooth to communicate.

Note:

① Bluetooth will consume power even if it is not in use, so please turn off the Bluetooth when not in use.

② Some models do not have Bluetooth.

4. Automatic printing: Turn on and off the printer to print out the measurement results.

5. Result prompt: When the measured data exceeds the tolerance setting value, it will be displayed in red.

6. Unit: switch between the metric unit "um" and the imperial unit "mil".

7. Language: Choose between Chinese and English to switch.

8. Sleep time: select the sleep time of the instrument.

9. Backlight time: Select the backlight time of the instrument.

10. Factory reset: restore to the factory data settings of the instrument, and the user data will be lost.

11. Instrument information: check "software version number", "hardware version number", "product model", "SN code", etc., as shown in Figure 30.

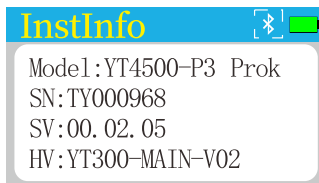


Figure 30 Instrument information

## 10. Technical specifications

Items	Specification
Name	Professional Dual-purpose Coating Thickness Gauge
Characteristic	<p>This coating thickness gauge is a domestic coating thickness gauge manufactured by our company with completely independent intellectual property rights, which can quickly and accurately measure the thickness of various coatings on metal substrates. The instrument fully complies with the testing principles of magnetic method and eddy current method stipulated by ISO 2178, ISO 2360, GB/T 4956, GB/T 4957, ASTM B499 and other standards.</p> <p>The instrument has accurate measurement, large test range, multiple calibration modes, multiple measurement modes, convenient positioning, and powerful functions. It is widely used in surface engineering inspection fields such as manufacturing, metal processing, and chemical industries, it is the basic equipment of coating surface treatment industry.</p> <p>Fe-based probes can detect the thickness of various non-magnetic coatings sprayed on various magnetic substrates (such as steel), such as paint layer, powder coating layer, porcelain coating layer, chrome plating layer, copper plating layer, galvanized layer of iron plate etc.</p> <p>NFe-based probe detects the thickness of all insulating coatings sprayed on non-magnetic metal substrates (such as aluminum, copper, brass, stainless steel, etc.), such as paint layers, powder coatings, ceramic coatings, etc.</p>

## Coating Thickness Gauge User Manual

Standards	ASTM B499, ASTM D1400, ASTM D709; ISO 2178, ISO 2360, ISO 2808; GB/T 4956, JB/T 8393
Body Type	Ferrous/non-ferrous (some models have different configurations)
Probe Form	Split type (some models have different configurations)
Resolution	0.1 $\mu$ m (some models have different configurations)
Measurement Range	0~5000 $\mu$ m (some models have different configurations)
Measurement Accuracy	Zero calibration: $\pm(3\%H+1)$ $\mu$ m; 2 dots calibration: $\pm(1\sim3\%H+1.5)$ $\mu$ m; Note: H is the thickness of the sample
display	IPS color screen, 1.14inch
Interface	Type C USB; Bluetooth 5.0; buttons (some models have different configurations)
Storage	3500 pieces, expandable mass storage through mobile APP (some models have different configurations)
Battery Power	Lithium battery, can test 10000 times continuously when fully charged
Measurement Mode	Basic Mode, qa Mode, Continuous Mode, Statistics Mode
Minimum Measurement Size	Magnetic: 10 $\times$ 10mm; Non-magnetic: 10 $\times$ 10mm
Minimum Measurement Thickness	Magnetic: 0.2mm, non-magnetic: 0.05mm (some models have different configurations)
Minimum Curvature	Convex radius 5mm; concave radius 10mm

## Coating Thickness Gauge User Manual

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Display Unit	$\mu\text{m}/\text{mil}$
Size	102×50×20mm(Probe $\varnothing$ 18x69)
Weight	80g (some models have different configurations)
Operation Temperature	0~40°C (10~90%RH non-condensing)
Storage Temperature	-10~50°C
Standard Accessories	2 bases (iron base, aluminum base), wrist strap, wiping cloth, USB data cable, a set of calibration sheets(Some models have different configurations)
Optional Accessories	Printer, 5V-2A power adapter
Note	A set of 5 calibration sheets (the thickness is slightly different), the technical parameters are only for reference, and the actual sales products shall prevail

## 11. Q & A

Question	Possible Causes	Answer
Cannot turn on	Lithium battery dead	Please insert the USB Type-C cable to charge
Measured data is unstable or inaccurate	The electromagnetic properties of the matrix are not uniform	Due to the limitation of the principle, the instrument is not suitable for measuring on the substrate with uneven electromagnetic characteristics
	Environmental electric field, magnetic field interference	Measure away from (magnets, speakers, etc.) and strong electromagnetic fields (transformers, induction cookers).
	Edge effect	During measurement, the probe should be kept in the center of the point to be measured, and the periphery of the probe should not be suspended outside the surface to be measured.

## Coating Thickness Gauge User Manual

	Probe pressure and orientation	The probe should be quickly and vertically pressed against the measuring surface, do not hit it hard or slowly approaching the DUT, It is forbidden to hang above the DUT at close range.
	The substrate is too thin and the area is too small or too bent	It is recommended to use within the recommended range of substrate thickness, area and curvature. Exceeding the recommended range will affect the accuracy of the instrument.
	Rough coating surface	This is a normal measurement
	Attachments on the surface to be tested	Please clean the surface to be measured, dust and dirt on the surface to be measured will affect the accuracy of the measurement
	Not calibrated	Zero calibration, single calibration and 5 dots calibration
Others		Please contact customer service



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