

Multi-Probe Coating Thickness Gauge

Code: 86227

User Manual V1.00

Please read this manual carefully before using and reserve it for reference.

I、Product Introduction

The 86227 Multi-Probe Coating Thickness Gauge consists of a main unit and interchangeable digital probes. Depending on the connected probe, it can measure non-magnetic coatings on ferromagnetic metal substrates and non-conductive coatings on non-ferromagnetic metal substrates. The probe collects and processes the measurement data, while the main unit automatically identifies the probe model and displays, calculates statistics for, and stores the measurement results. Eight probes are currently available to meet different substrate, measurement range, and space requirements.

No.	Probe Model	Range	Features
1	F600-X0	0-600μm	Fe substrate, straight probe, ultra-small tip, suitable for measuring thin coatings and plating on small workpieces
2	NF1600-X0	0-1600μm	NFe substrate, straight probe, ultra-small tip, suitable for measuring anodized layers on small workpieces
3	FNF2000-X0	0-2000μm	Dual-substrate, straight probe, standard range, suitable for measuring coatings and paint
4	FNF5000-X0	0-5000μm	Dual-substrate, straight probe, extended range, suitable for measuring coatings and paint
5	FNF20000-X0	10-20000μm	Dual-substrate, straight probe, ultra-wide range, suitable for measuring fireproof coatings and paint
6	FNF2000-X1	0-2000μm	Dual-substrate, 90° right-angle probe, suitable for measuring coatings and plating in holes and narrow gaps
7	F2000-X2	0-2000μm	Fe substrate, 90° long-rod probe, suitable for measuring coatings and plating on inner pipe walls and in narrow grooves
8	NF2000-X2	0-2000μm	NFe substrate, 90° long-rod probe, suitable for measuring coatings and plating on inner pipe walls and in narrow grooves

The product complies with the following standards:

GB/T 4956-2025 *Non-magnetic coatings on magnetic substrates - Measurement of coating thickness - Magnetic method*

GB/T 4957-2025 *Non-conductive coatings on non-magnetic electrically conductive base metals—Measurement of coating thickness - Amplitude-sensitive eddy-current method*

DIN EN ISO 2808 *Paints and varnishes - Determination of film thickness*

JJG 818-2018 *Magnetic and Eddy Current Measuring Instrument for Coating Thickness*

II、 Probe Specifications

1. F600-X0 Probe

- 1) Probe type: Standard straight probe
- 2) Measurement principle: Magnetic induction
- 3) Substrate material: Ferromagnetic metal
- 4) Measurement range: 0.0–600 μm
- 5) Resolution: 0.1 μm : (0 μm –99.9 μm), 1 μm : (100 μm –600 μm)
- 6) Accuracy: $\pm(2\%H + 0.3 \mu\text{m})$ with five-point calibration, where H is the reference value
- 7) Measurement interval: 1.5 s (Single Measurement mode), 0.4 s (Continuous Measurement mode)
- 8) Minimum radius of curvature: Convex 1.5 mm
- 9) Minimum substrate thickness: 0.1 mm
- 10) Probe dimensions: Length 105 mm $\times$ diameter 15 mm (excluding cable)
- 11) Probe weight: Approx. 55 g

2. NF1600-X0 Probe

- 1) Probe type: Standard straight probe
- 2) Measurement principle: Eddy current
- 3) Substrate material: Non-ferromagnetic metal
- 4) Measurement range: 0.0–1600 μm
- 5) Resolution: 0.1 μm : (0 μm –99.9 μm), 1 μm : (100 μm –1600 μm)
- 6) Accuracy: $\pm(2\%H + 0.3 \mu\text{m})$ with five-point calibration, where H is the reference value
- 7) Measurement interval: 0.4 s
- 8) Minimum radius of curvature: Convex 1.5 mm

- 9) Minimum substrate thickness: 0.03 mm
- 10) Probe dimensions: Length 105 mm × diameter 15 mm (excluding cable)
- 11) Probe weight: Approx. 55 g

3. FNF2000-X0 Probe

- 1) Probe type: Standard straight probe
- 2) Measurement principle: Magnetic induction/eddy current
- 3) Substrate material: Ferromagnetic metal/non-ferromagnetic metal
- 4) Measurement range: 0.0–2000 µm
- 5) Resolution: 0.1 µm: (0 µm–99.9 µm), 1 µm: (100 µm–2000 µm)
- 6) Accuracy: $H < 1000 \mu\text{m}$: $\pm(2\%H + 1 \mu\text{m})$; $H \geq 1000 \mu\text{m}$: $\pm 3\%H$ (five-point calibration, where H is the reference value)
- 7) Measurement interval: 0.8 s
- 8) Minimum radius of curvature: Convex 3 mm
- 9) Minimum substrate thickness: Fe: 0.2 mm/NFe: 0.05 mm
- 10) Probe dimensions: Length 105 mm × diameter 15 mm (excluding cable)
- 11) Probe weight: Approx. 52 g

4. FNF5000-X0 Probe

- 1) Probe type: Standard straight probe
- 2) Measurement principle: Magnetic induction/eddy current
- 3) Substrate material: Ferromagnetic metal/non-ferromagnetic metal
- 4) Measurement range: 0.0–5000 µm
- 5) Resolution: 0.1 µm: (0 µm–99.9 µm), 1 µm: (100 µm–5000 µm)
- 6) Accuracy: $H < 1000 \mu\text{m}$: $\pm(2\%H + 1 \mu\text{m})$; $1000 \mu\text{m} \leq H < 3000 \mu\text{m}$: $\pm 3\%H$; $H \geq 3000 \mu\text{m}$: $\pm 5\%H$ (five-point calibration, where H is the reference value)
- 7) Measurement interval: 0.8 s
- 8) Minimum radius of curvature: Convex 3 mm
- 9) Minimum substrate thickness: Fe: 0.2 mm/NFe: 0.05 mm

- 10) Probe dimensions: Length 105 mm × diameter 15 mm (excluding cable)
- 11) Probe weight: Approx. 52 g

5. FNF20000-X0 Probe

- 1) Probe type: Ultra-wide-range straight probe
- 2) Measurement principle: Magnetic induction/eddy current
- 3) Substrate material: Ferromagnetic metal/non-ferromagnetic metal
- 4) Measurement range: 10.0–20000 µm
- 5) Resolution: 0.1 µm: (10 µm–99.9 µm), 1 µm: (100 µm–20000 µm)
- 6) Accuracy: $H < 15000 \mu\text{m}$: $\pm(3\%H + 2 \mu\text{m})$; $H \geq 15000 \mu\text{m}$: $\pm 5\%H$ (five-point calibration, where H is the reference value)
- 7) Measurement interval: 0.8 s
- 8) Minimum radius of curvature: Convex 30 mm
- 9) Minimum substrate thickness: Fe: 2 mm/NFe: 1 mm
- 10) Probe dimensions: Length 71 mm × diameter 50.5 mm (excluding cable)
- 11) Probe weight: Approx. 216 g

6. FNF2000-X1 Probe

- 1) Probe type: 90° right-angle probe
- 2) Measurement principle: Magnetic induction/eddy current
- 3) Substrate material: Ferromagnetic metal/non-ferromagnetic metal
- 4) Measurement range: 0.0–2000 µm
- 5) Resolution: 0.1 µm: (0 µm–99.9 µm), 1 µm: (100 µm–2000 µm)
- 6) Accuracy: $H < 1000 \mu\text{m}$: $\pm(2\%H + 1 \mu\text{m})$; $H \geq 1000 \mu\text{m}$: $\pm 3\%H$ (five-point calibration, where H is the reference value)
- 7) Measurement interval: 0.8 s
- 8) Minimum radius of curvature: Convex 3 mm
- 9) Minimum substrate thickness: Fe: 0.2 mm/NFe: 0.05 mm
- 10) Probe dimensions: Length 86 mm × width 11.5 mm × height 22 mm (excluding cable)

- 11) Probe weight: Approx. 80 g

7. F2000-X2 Probe

- 1) Probe type: 90° long-rod probe
- 2) Measurement principle: Magnetic induction
- 3) Substrate material: Ferromagnetic metal
- 4) Measurement range: 0.0–2000 μm
- 5) Resolution: 0.1 μm : (0 μm –99.9 μm), 1 μm : (100 μm –2000 μm)
- 6) Accuracy: $H < 1000 \mu\text{m}$: $\pm(2\%H + 1 \mu\text{m})$; $H \geq 1000 \mu\text{m}$: $\pm 3\%H$ (five-point calibration, where H is the reference value)
- 7) Measurement interval: 0.6 s
- 8) Minimum radius of curvature: Straightness
- 9) Minimum substrate thickness: Fe: 0.2 mm
- 10) Probe dimensions: Length 167 mm $\times$ width 8 mm $\times$ height 10.8 mm (excluding cable)
- 11) Probe weight: Approx. 46 g

8. NF2000-X2 Probe

- 1) Probe type: 90° long-rod probe
- 2) Measurement principle: Eddy current
- 3) Substrate material: Non-ferromagnetic metal
- 4) Measurement range: 0.0–2000 μm
- 5) Resolution: 0.1 μm : (0 μm –99.9 μm), 1 μm : (100 μm –2000 μm)
- 6) Accuracy: $H < 1000 \mu\text{m}$: $\pm(2\%H + 1 \mu\text{m})$; $H \geq 1000 \mu\text{m}$: $\pm 3\%H$ (five-point calibration, where H is the reference value)
- 7) Measurement interval: 0.4 s
- 8) Minimum radius of curvature: Straightness
- 9) Minimum substrate thickness: NFe: 0.05 mm
- 10) Probe dimensions: Length 167 mm $\times$ width 8 mm $\times$ height 10.8 mm (excluding cable)
- 11) Probe weight: Approx. 46 g

III、 Main Unit Specifications

1. Display: 480 × 320-dot IPS color display
2. Battery: Rechargeable lithium battery, 3.7 V @ 4000 mAh
3. Operating temperature range: 0°C–50°C
4. Storage temperature range: -20°C–60°C
5. Units: μm / mm / mil / g/m^2 (Note: The unit g/m^2 refers to the "galvanizing weight" (zinc coating mass per unit area); the density of zinc is $7.13 \text{ g}/\text{cm}^3$. This option is available only when the F600-X0 or F2000-X2 probe is connected.)
6. User calibration: Supports zero adjustment and one- to five-point calibration
7. Main unit dimensions: 141 × 71 × 22 mm
8. Weight (including battery): Approx. 200 g
9. Supply voltage: DC 5 V
10. Operating current: 160 mA
11. Power consumption: 800 mW

IV、 Product Features

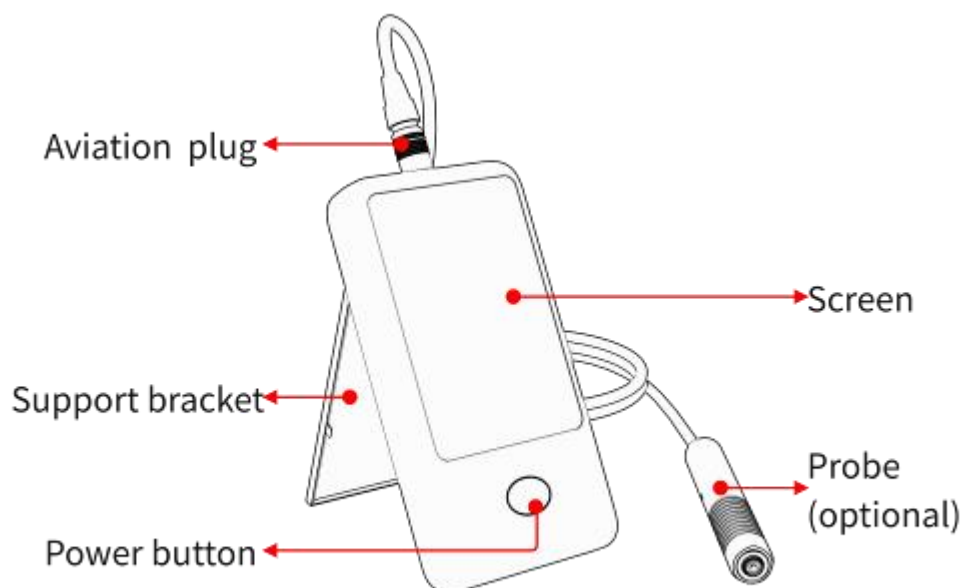
1. The interchangeable probe design allows one main unit to support multiple probes.
2. Advanced digital probe technology performs digital signal processing directly in the probe, making the probe resistant to interference and providing excellent measurement accuracy.
3. A dedicated hand-press test stand is available as an option to improve the consistency of probe pressure and reduce measurement variations caused by manual operation.
4. The high-hardness probe tip ensures reliable long-term use.
5. The multipoint calibration function corrects the calibration curve according to the actual workpiece for more accurate measurements.
6. The main unit features a 3.5-inch capacitive touchscreen with an intuitive user interface for easy operation.
7. The QC inspection function allows thickness limits to be set.
8. The grouping function makes it easy to test different samples, store data, and organize different

workpieces or batches by category.

9. The instrument provides extensive storage capacity. Up to 100 data groups can be created, with a total capacity of 10,000 measurement records. A maximum number of measurements can be set for each data group, but the total number of records across all groups must not exceed the instrument's total storage capacity.
10. The instrument can connect to an app for viewing and exporting measurement data.
11. When used with the PC software, the instrument supports thickness measurement, measurement record retrieval, and saving data to Excel.
12. The built-in rechargeable lithium battery provides up to 24 hours of continuous measurement on a full charge.

V、 Instrument Operation

1. Instrument Structure



2. Measurement

(1) Measurement Procedure

- Hold the probe at the designated position. When using a straight probe, hold the anti-slip grooves on the probe body. When using a right-angle or long-rod probe, hold the probe between three

fingers and gently press it from above with your index finger.

- Press the probe vertically against the surface being measured. Keep the probe steady and do not tilt or move it.
- When the buzzer sounds, the measurement result appears on the screen. Lift the probe and move it away from the workpiece before taking the next measurement.

Note: When measuring small workpieces or curved surfaces, make sure the probe tip is in full contact with the measurement surface and that the outer edge of the probe does not overhang the surface.

(2) Measurement Screen

The measurement screen displays information about the current data group, the most recent measurement, the substrate type, the pass/fail result, and the statistical results. The display areas are shown below.



(3) Error Messages

The following messages may appear during measurement. Measurement results corresponding to +INF and -INF are excluded from the statistics:

- **+INF:** The measurement exceeds the valid range of the current probe, or the current probe cannot identify the substrate being measured.
- **-INF:** The measurement is below -20 μm . Perform zero adjustment again.

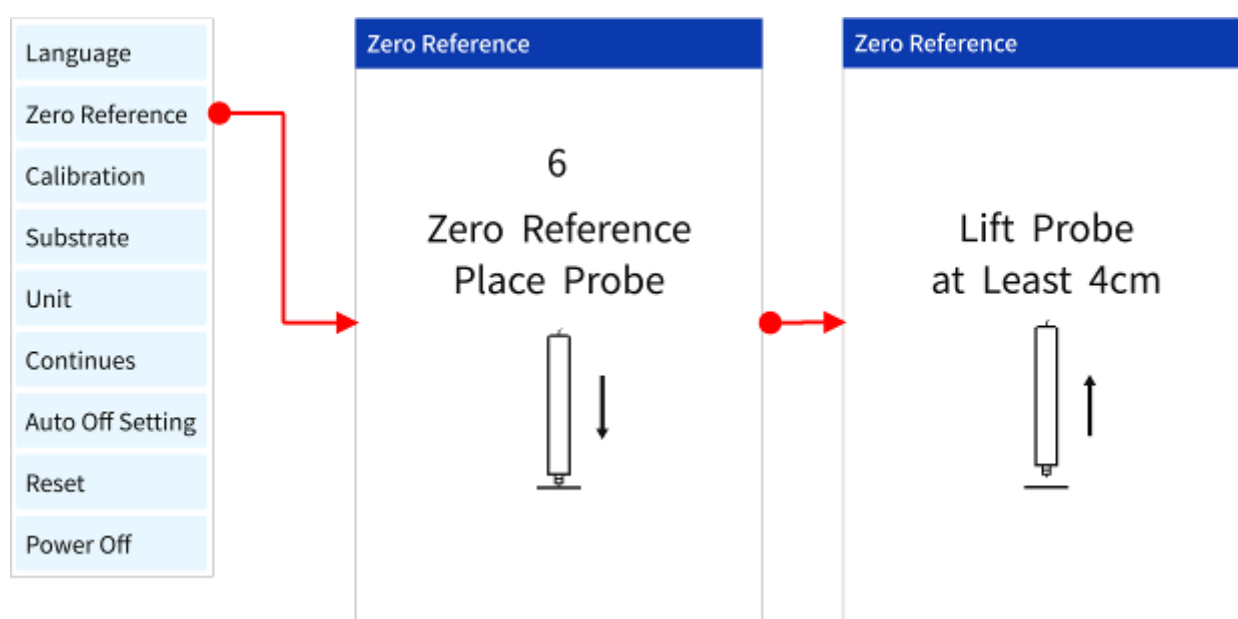
3. Settings

On the measurement screen, tap the “” icon in the upper-left corner to open the Settings menu.

(1) Zero Reference

Zero reference is recommended after changing the material being measured, after a significant change in ambient temperature, or when the instrument has not been used for an extended period.

The zero adjustment procedure is shown below:



Note: Whenever possible, zero the gauge on a clean, flat, uncoated sample made of the same material as the workpiece. If no suitable sample is available, use the supplied iron or aluminum zero plate that matches the substrate.

After zeroing, repeated measurements at the same point may not read exactly 0 μm due to surface roughness, dust, scratches, or probe placement. Clean the surface before measurement, and hold the probe perpendicular and firmly against it.

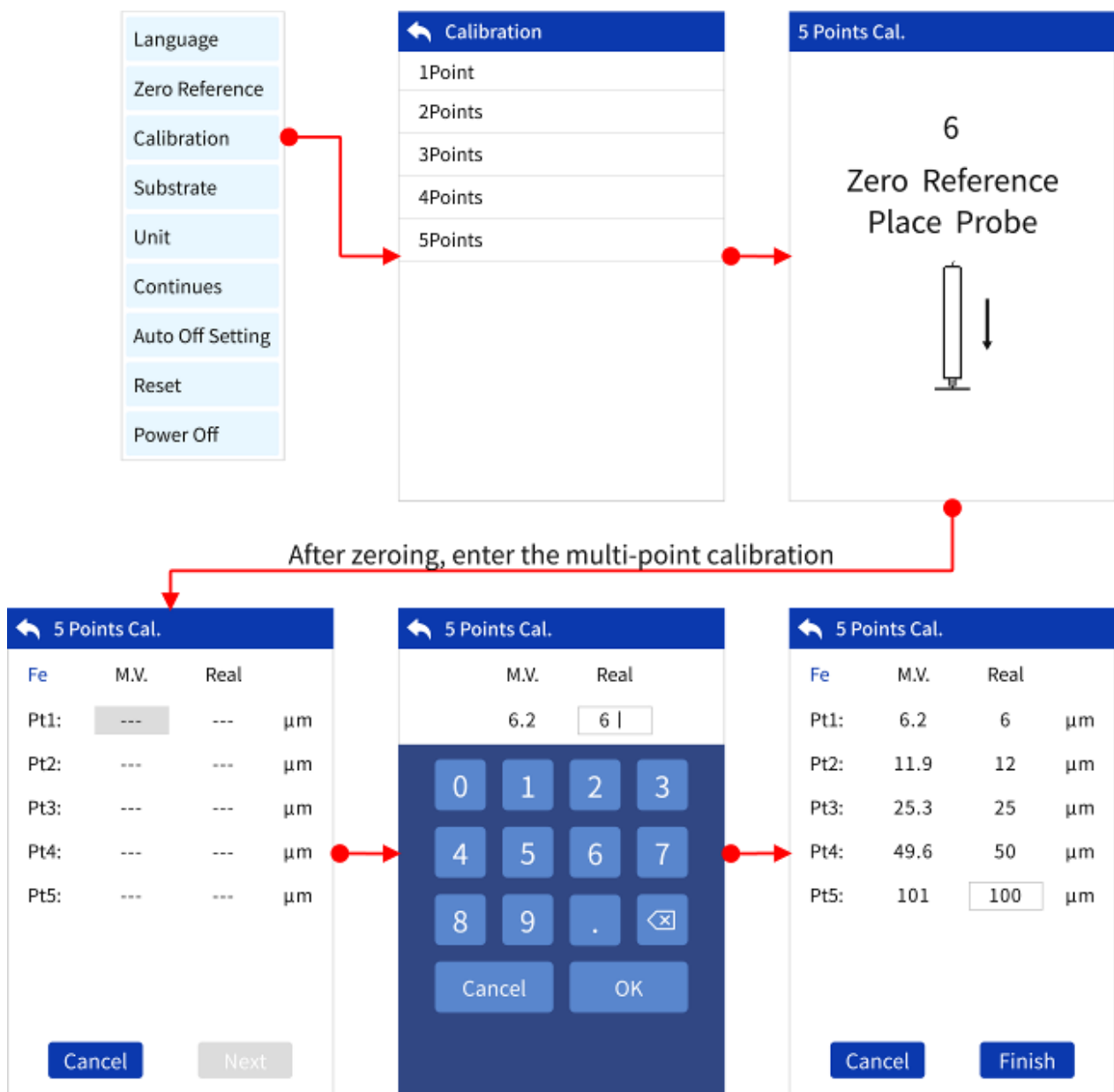
(2) Calibration

The instrument supports one- to five-point calibration. Select the appropriate number of calibration points according to the actual measurement range.

Observe the following during calibration:

- After one- to five-point calibration is selected, the instrument enters the zero reference screen. When zero adjustment is complete, it automatically enters the calibration screen.
- Whenever possible, use an uncoated workpiece made of the same material as the workpiece being measured as the substrate.
- For multipoint calibration, calibrate the foils sequentially from the thinnest to the thickest.
- After calibration, remeasure the calibration foils to confirm that the measurement results are normal.

The calibration procedure is shown below:



(3) Other Settings

The diagram illustrates the navigation path for 'Other Settings' from a main menu to various sub-menus. Red arrows connect the menu items to their respective settings screens.

Main Menu:

- Language
- Zero Reference
- Calibration
- Substrate
- Unit
- Continues
- Auto Off Setting
- Reset
- Power Off

Sub-menus and Settings:

- Language:** 中文, English
- Substrate Setting:** Fe, NFe, Fe/NFe
- Unit Setting:** μm , mil, mm
- Continues Setting:** ON, OFF
- Auto Off Setting:** Auto Off (checked), Auto Off Time(1-30Minutes) 3
- Reset to Defaults?:** Yes, No

Note: Dual-substrate probes offer 3 substrate options. Ferrous probes only show "Fe" . Non-ferrous probes only show "NFe" .

4. Modify Current Group Information

On the measurement screen, tap the box for the corresponding field to modify the following information: group name, current group measurement count, current group upper limit, and current group lower limit.

Note: The upper limit for the current group must not exceed the maximum range of the current probe. The minimum lower-limit setting is 0. The lower limit must be lower than the upper limit.

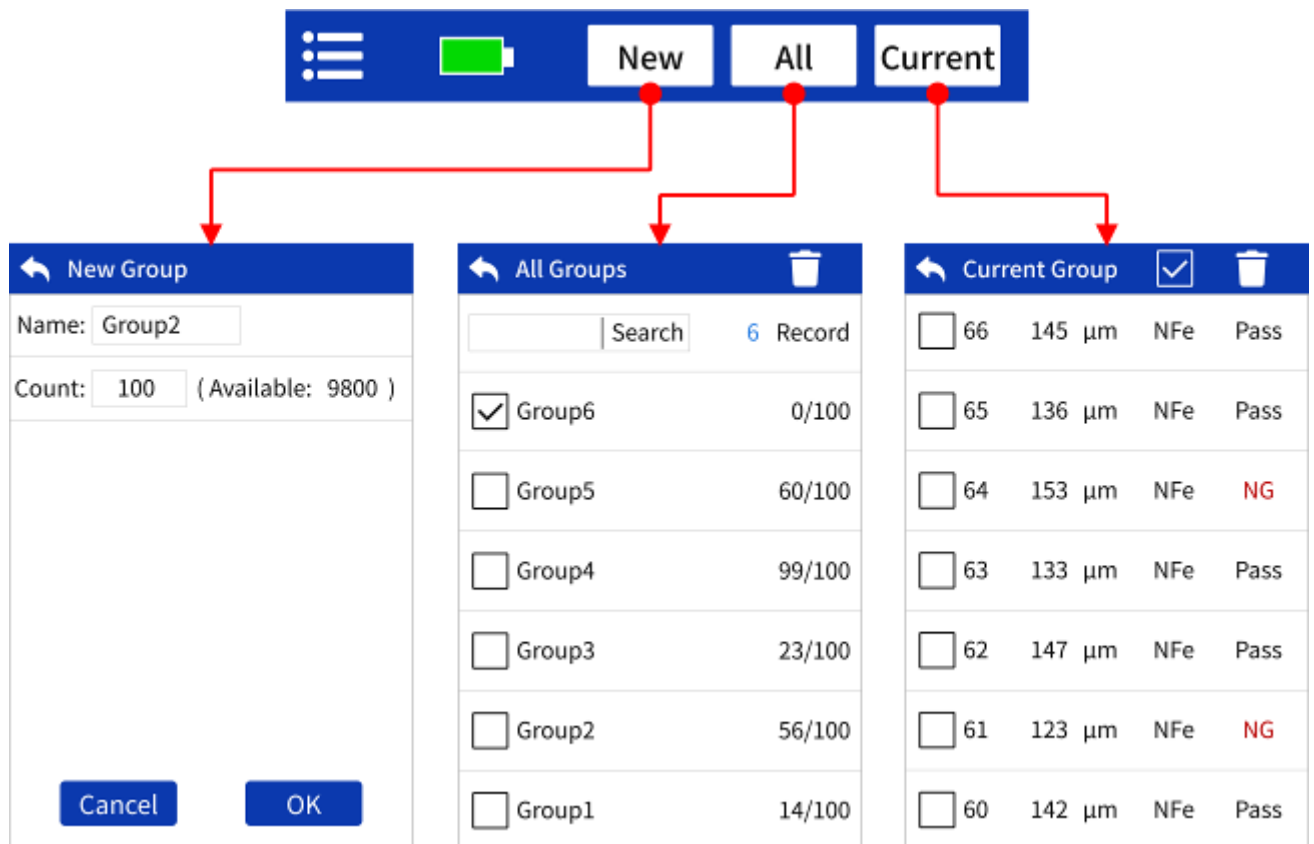


5. Group Management

Tap **New** (New Group), **All** (All Groups), or **Current** (Current Group) in the top status bar to manage measurement data by group.

- When creating a data group, set the count and a unique group name. Then tap "OK". The new group automatically becomes the current group, and subsequent measurements are saved to it.
- On the "All Groups" screen, you can view, switch, or delete groups. The selected group becomes the current group when you return to the measurement screen. Deleting a group also deletes its data. At least one group must remain in the instrument.
- On the "Current Group" screen, you can view the measurement history of the current group and page through or delete records. Saved data is retained after the instrument is powered off.

- The instrument supports up to 100 data groups and can store a maximum of 10,000 measurement records across all groups.



6. APP Operation

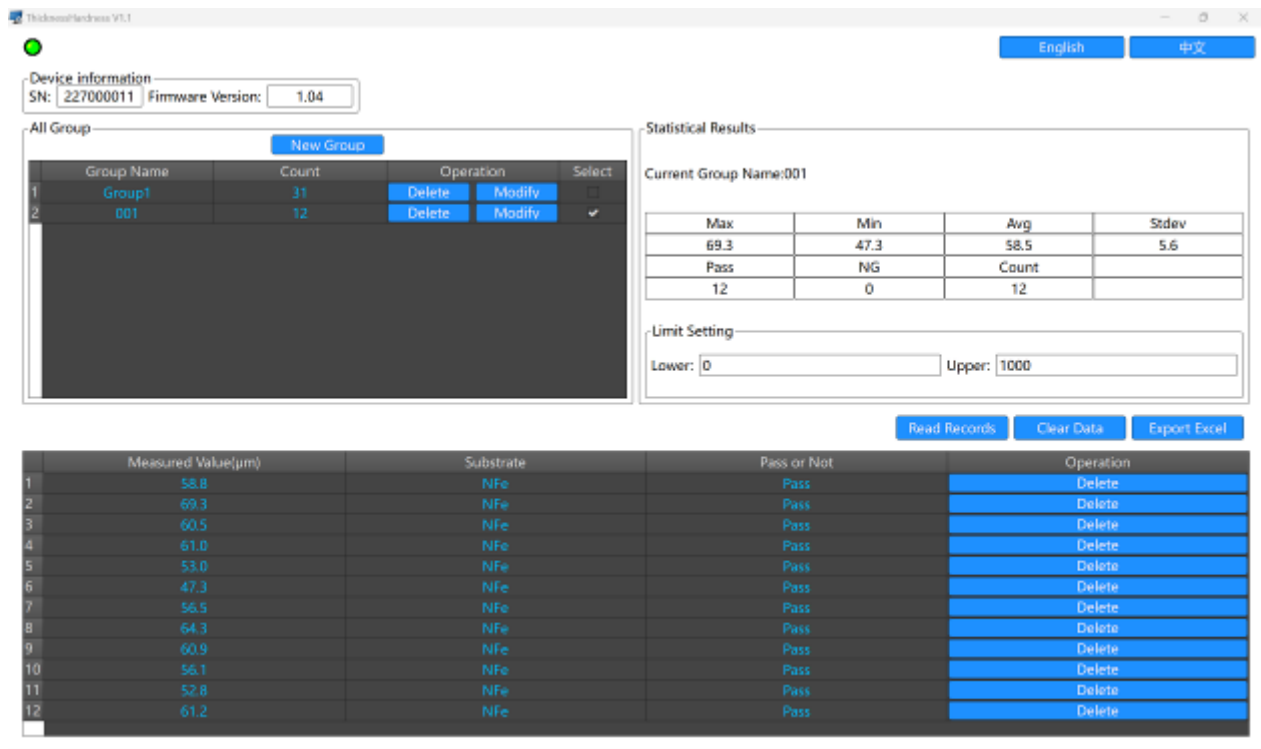
The instrument has a built-in Bluetooth communication module and can connect to a mobile app.

- Scan the QR code on the back of the instrument and follow the instructions to download and install the corresponding "UT and HL" app.
- Connecting the app to the instrument: Open the app, search for the instrument as prompted, and establish a connection.
- After the instrument successfully connects to the app, it automatically switches to the measurement screen. This screen displays only the current measurement. While the instrument is connected to the app, measurement data is not saved locally on the instrument.

Note: The app does not support iOS. Grant the permissions required by the app when prompted by the operating system.

7. PC Software

Connect the instrument to a computer via USB to use the coating thickness gauge PC software. The software supports thickness measurement, measurement record retrieval, and saving and exporting data to Excel.



8. Aviation Connector Connection

The aviation connector uses a spring-loaded locking mechanism. To disconnect the probe, hold the outer sleeve of the connector and pull it upward in the direction shown below. Once the connector is unlocked, pull it straight out. Do not rotate or forcibly pull out the connector, and do not pull directly on the probe cable.



VI、 Precautions

1. Single Measurement mode provides the best measurement stability and is recommended for precision measurements.
2. During measurement, keep the probe centered on the measurement point. Do not allow the outer edge of the probe to overhang the measurement surface.
3. Take measurements away from strong magnets, such as permanent magnets and speakers, and strong electromagnetic fields generated by equipment such as transformers, electric fans, electric ovens, and induction cookers.
4. Multipoint calibration is recommended before using the instrument.
5. Make sure the surface being measured is clean. Dust, dirt, and other contaminants on the surface may affect measurement accuracy.
6. Charge the instrument promptly when the battery is depleted.
7. When the instrument will not be used for an extended period, recharge the battery periodically to prevent damage caused by over-discharge.

VII、 Standard Package Contents

No.	Item	Quantity	Unit
1	Main Unit	1	pc
2	Probe	Quantity ordered	
3	Zero Plate	As configured for the probe	
4	Calibration Foil	5	pcs
5	User Manual	1	copy
6	Plastic Carrying Case	1	pc

VIII、 Hand-Press Test Stand (Optional for F600-X0, NF1600-X0, FNF2000-X0, and FNF5000-X0 Probes)

An optional hand-press test stand is available for the F600-X0, NF1600-X0, FNF2000-X0, and FNF5000-X0 probes. The stand maintains consistent probe pressure and contact positioning, reducing measurement variations caused by manual operation. It is suitable for measuring small workpieces such as nails and bolts, as well as relatively thin coatings and platings. Before measuring with the stand, zero adjustment and multipoint calibration are recommended on an uncoated workpiece made of the same material.

IX、 After-Sales Service

1. The instrument is covered by a one-year warranty. If the instrument malfunctions, contact the after-sales service personnel first and send the main unit, probe, and relevant accessories as instructed.
2. Spare parts are available on a long-term basis, and lifetime repair service is provided.
3. Instrument calibration services are available.
4. Free technical support is provided on a long-term basis.