



MODEL: GM211

## Film/Coating Thickness Gauge Instruction manual



Version:GM211-EN-00

— 1 —

## I. Product Description

This unit can make a quick and effective measurement of the thickness of the non-magnetic metal film on the nonmagnetic metal substrate and the non magnetic film of the magnetic metal substrate, be able to identify the magnetic or nonmagnetic metal substrate automatically, widely be applied in manufacturing industry, metal process, chemical industry, and business inspection.

### Product Specifications:

Measurement ranges	0~1500μm/0~59mil/0~1.5mm
Resolution	(0.1μm(<100μm), 1μm(≥100μm))/0.1mil/0.001mm
Measuring error	≤150μm ±5μm >150μm ±(3%H+1μm)
Minimum diameter of magnetic substrate	12mm
Minimum thickness of magnetic substrate	0.5mm
Minimum curvature radius of convex magnetic substrate	2mm
Minimum curvature radius of concave magnetic substrate	11mm
Minimum diameter of non-magnetic substrate	50mm
Minimum thickness of non-magnetic substrate	0.5mm
Operating temperature range	0~40°C
Operating humidity range	10~95%RH
Power supply	2*1.5V AAA batteries
Overall dimensions	61.98*30.57*107.99mm
Weight	63.98g(excluding of batteries)

## II. Product Functions

- 1.Measuring the non-magnetic film on the magnetic metal substrate.
- 2.Thickness measurement of non-magnetic surface coatings on magnetic metal substrates.
- 3.Automatically identifying the non-magnetic metal substrate or magnetic metal substrate.
- 4.Single measurement, continuous measurement and differential measurement available.
- 5.Zero-point calibration, 2-point calibration and basic calibration available.

— 2 —

- 6.Metric and imperial units of measurement optional.
- 7.LCD backlight.
- 8.Automatic shutdown.

## III. Buttons

1. Key: Power on/off, zero-point calibration and backlight control
2. Key: Measurement mode switching and calibration data increment
3. Key: Measurement unit switching and calibration data decrement

## IV. Measurement of Coating Thickness

1. Press the power-on button in the air to activate the LCD screen. You can hear a "BI" sound, indicating that the gauge is ready for measurement. Upon each power-on, the gauge is under single measurement mode by default.
2. The unit beeps when pressing the detector on the magnetic metal substrate with film, and the LCD displays the reading and the character **Fe** appears on the left upper corner of the LCD.
3. The unit beeps when pressing the detector on the non-magnetic metal substrate with film, and the LCD displays the reading and the character **nFe** appears on the left upper corner of the LCD.
4. Take away the detector after measurement until the **Fe** or **nFe** disappears, then take the next measurement.
5. You can press MODE to select measurement mode. Single measurement, continuous measurement and differential measurement are selectable.
6. Single measurement means only one data is measured in each measurement. Under the mode of continuous measurement, the gauge measures thickness incessantly until the probe leaves the substrate surface. In differential measurement, the difference between current measurement and the last measurement is measured.
7. Press UNIT to select the units of measurement. **μm**, **mil**, **mm** can be selected.
8. In case that the detector is activated on the iron substrate, the **Err** appears indicating a wrong activation and turns off after a full-screen display on the LCD. The unit is designed to be activated in the air.
9. Backlight: the backlight is defaulted as being deactivated, short press on the ON/OFF key to activate the function of backlight.
10. turn-off: ① Long press on the ON/OFF key to turn it off. ② The unit will turn off automatically if there is no further operation on the key within 3 minutes.

— 3 —

## V. Calibration Procedures

This thickness gauge has three ways of calibration:

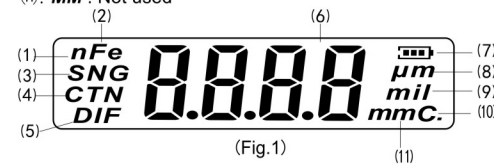
1. Basic calibration: A basic calibration should be performed in cases that it is the first use or using it after a long time or the environment changes dramatically or the measured substance is changed. There are 7 points for performing such a calibration, these points are Zero Point (press the detector directly on the substrate) and 6 calibration pieces. The calibration unit is on the basis of  $\mu\text{m}$ .
  - a. Prepare 6 standards with respectively 45~55, 95~105, 220~280, 450~550, 900~1050 and 1470~1520 in thickness( $\mu\text{m}$ ).
  - b. There are two parts of the calibration for magnetic metal substrate or the non-magnetic metal substrate, and there will be character **Fe** or **nFe** appears in the process of calibration.
  - c. Lightly press the probe onto the ferrous substrate surface without coating. The LCD displays 0.0 and then beeps twice. Carry out 0.0 calibrations.
  - d. Remove the probe from the surface. The LCD displays a value about 50 $\mu\text{m}$ . Carry out the second calibration by adjust the value displayed on the LCD via the increment or decrement key until it is same to the thickness of the calibration film. Then lightly press the probe onto the ferrous substrate where the calibration film locates. Beeping twice indicates that calibration of the second point finishes.
  - e. Take away the detector, a datum about 50 $\mu\text{m}$  will appears on LCD indicating the second calibration point, take a calibration piece of 45 to 55 $\mu\text{m}$  on the substrate then adjust the reading on the LCD with the up key or down key until it equals the thickness of the calibration piece. Then slightly press the detector on the substrate of the calibration piece until the unit beeps indicating that the second calibration point has been completed.
  - f. Take away the detector, and put the third calibration piece of 95~105 $\mu\text{m}$  on the substrate, repeat the steps as above until the last calibration piece is used for calibration, and the **OVER** appears on LCD with the unit beeps indicating the basic calibration is done.
  - g. Repeat the steps specified in d/e/f for a calibration on the other substrate.
2. Zero-point calibration:
  - a. Turn on power of the gauge in the air, lightly press the probe onto the substrate surface and press the ZERO key. The LCD displays 0.0. Then carry out zero-point calibration.
3. Two-point calibration:
  - a. First carry out zero-point calibration.
  - b. Take a calibration film (1000 $\mu\text{m}$ ) and get a measured value of 1005 $\mu\text{m}$ . Without loosening the probe, press the calibration data increment or decrement key until the LCD displays 1000 $\mu\text{m}$ . Then loosen the probe. Zero-point calibration finishes.

— 4 —

## VI. LCD and Buttons

1. LCD full screen: See Fig1.

- (1). **nFe**: Icon for non-magnetic metal substrate
- (2). **Fe**: Icon for magnetic metal substrate
- (3). **SNG**: Single measurement
- (4). **CTN**: Continuous measurement
- (5). **DIF**: Differential measurement
- (6). Indicates the measured value
- (7). : Remaining battery power
- (8). **μm**: A metric unit (1mm=1000 $\mu\text{m}$ )
- (9). **Mil**: An imperial unit (1mil=0.0254mm=25.4 $\mu\text{m}$ )
- (10). **C**: Under calibration status
- (11). **MM**: Not used



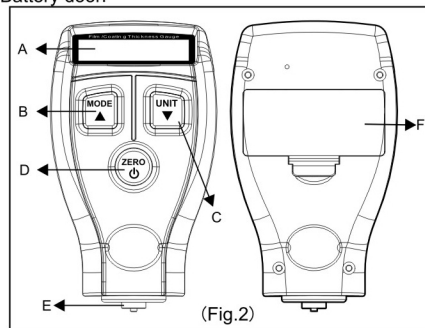
2. Components: See Fig.2.

### A. LCD screen.

- B. : Used to switch between measurement modes, or for data increment under calibration status.
- C. : Used to switch between units of measurement, or for data decrement under calibration status.
- D. : Power on/off, zero-point calibration and backlight control.

### E. Probe.

### F. Battery door.



— 5 —

## VII. Other Precautions

### Precautions:

1. Factors affecting measuring accuracy and their description:
  - a. Magnetic property of substrate metal: Thickness measurement by magnetic method is affected by magnetic variation of the substrate metal (magnetic variation of low-carbon steel may be considered as minor in actual application.). To avoid effect from thermal treatment and cold working, ferrous substrates made of a material identical to the substrate metal to be measured should be used for calibration of the thickness gauge, or the metal to be applied with coatings can be used for calibration.
  - b. Thickness of substrate metal: Each type of thickness gauge has a permissible critical thickness of substrate metal. Measurement is not affected by any thickness of substrate metal that is greater than this critical thickness. See Product Specification for the critical substrate thickness required ( $\geq 0.5\text{ mm}$ ) for this thickness gauge.
  - c. Edge effect: This gauge is sensitive to abrupt change of surface shape on the measured substrate. Therefore, measurement near the edge or inner corner of the measured substrate is unreliable.
  - d. Curvature: Curvature of the measured substrate has an effect on measurement. This effect always increases with the decrease of the radius of curvature.
  - e. Surface roughness: The surfaces of both the substrate metal and its coating have an effect on measurement. This effect rises with the increase of the roughness. Surface roughness will lead to system errors and occasional errors. Therefore in each measurement, it is needed to increase the number of measurements at each position so as to overcome these occasional errors. If the substrate metal is rough, zero-point calibration of the gauge must be carried out at several positions on the substrate metal with similar roughness which has not been coated, or a solvent without corrosion to the substrate metal should be used to dissolve the coating before zero-point calibration of the gauge.
  - f. Magnetic field: Strong magnetic field of various adjoining electrical equipment will seriously interfere with magnetism-based thickness measurement.
  - g. Surface cleanliness: Prior to measurement, clear away any substances on the surface, such as dust, grease and corrosive substances, but do not remove any coating substance.
2. If this battery volume icon shows , replace the battery immediately.



### Special Note:

We reserve the rights to change product design and contents of the User Manual without prior notice!  
Our company shall hold no any responsibility resulting from using output from this product as an direct or indirect evidence.



— 6 —