

# Starrett®

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## Digital Coating Thickness Gauge Model No. 3813



## Features:

The 3813 coating thickness gauges are capable of measuring the thickness of non-magnetic materials (e.g. Paint, Plastic, enamel, copper, zinc, aluminum, chrome, etc) on magnetic materials (e.g. Iron, Nickel, etc.) It is often used to measure the thickness of a galvanized layer, lacquer, porcelain, phosphide, copper tile, aluminum tile and some alloy tiles, paper, etc.

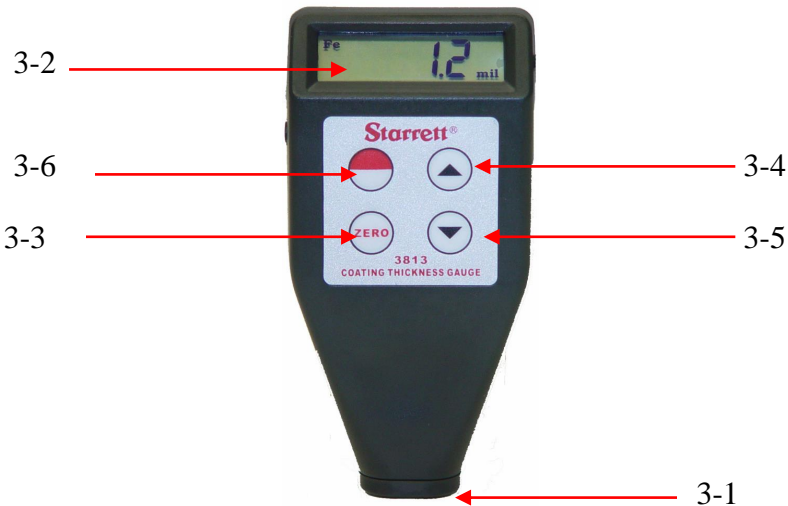
The 3813 is also capable of measuring the thickness of non-magnetic coatings on non-magnetic metals. It is used on anodizing, varnish, paint, enamel, plastic coatings, powder, etc. applied to aluminum, brass, and non-magnetic stainless steel, etc.

- This unit is suitable for laboratories or out in harsh field conditions.
- Utilizing a state of the art micro computer circuitry, this gage will deliver high accuracy measurements along with quick reading response time.
- This model has a wide measuring range coupled with high resolution
- Digital display eliminates guessing and /or errors
- The 3813 is made of a durable light weight ABS plastic housing assuring maintenance free performance for many years.

## Specifications:

- Display: 4 digits, 10mm LCD
- Range: 0-1000 $\mu$ m / 0-40 mil
- Resolution: 0.1 $\mu$ m / 3.93 $\mu$ in (0-99.9 $\mu$ m)  
1 $\mu$ m / 39.37 $\mu$ in (over 100 $\mu$ m)
- Accuracy: +/- 1-3% $\pm$  or 2 $\mu$ m (whichever is greater)
- Power Supply: 2- AAA Batteries
- Operating Condition: 0-50 $^{\circ}$ c Humidity < 80%
- Size: 161 x 69 x 32mm (6.3" x 2.7" x 1.2")
- Weight: approx 9oz. (260g)

**The 3813 comes complete with set of calibration foils, 2 substrates, AAA battery set and a carry case.**



### 3813

- 3-1 Sensor
- 3-2 Display
- 3-3 Zero Key
- 3-4 Plus (up)Key
- 3-5 Minus (down)Key
- 3-6 Power Key (Multi-Functional)

## Measuring Procedure:

- 1) Press the power key 3-6 to turn on the unit. The display will show "0".

Note: the gage will automatically calibrate itself when turning the power on. Be sure to keep the probe away from any metallic material for 2 seconds immediately after power up.

- 2) Select the measurement unit **Mil** or **µm** by pressing and holding (approx. 6 seconds) the 3-6 Power key. The display will show "Unit". Press the "Zero" button to change from Mil to µm or µm to Mil. The new value will be shown on the display
- 3) Place the probe 3-1 on the coating layer to be measured. The reading on the display is the thickness of the coating layer. The reading can be corrected by pressing the plus key 3-4 or the minus key 3-5 while the probe is away from the substrate or measured item.
- 4) To take the next measurement, lift the probe 3-1 off the test object and then repeat step 4.
- 5) To change measurement mode from **Single** to **Continuous**, press the 3-6 Power key (approx. 9 seconds) and do not release until "SC" is shown on the display. Then immediately press the 3-3 Zero key to confirm. The "S" symbol stands for single measurement mode and the (( )) symbol means Continuous mode is activated.
- 6) If you suspect the accuracy of the measurement is questionable, you should calibrate the unit before taking your next measurement. Please see Calibration for procedure.
- 7) The gage can be switched off by pressing the power key 3-6. Also shuts off automatically after approx. 1 minute.

## Calibration:

- 1) Zero Adjustment: Place the probe 3-1 on the one of the supplied substrates or on an **uncoated** standard. Press the zero key 3-3 and "0" will be on the display BEFORE lifting the probe.
- 2) Select an appropriate calibration foil that is similar in thickness to your application.
- 3) Place the foil on top of the supplied substrate or uncoated standard.
- 4) Place the sensor 3-1 lightly on the foil and hold until measured value is shown on display. The displayed reading can be corrected with the plus 3-4 key or the minus key 3-5 while the probe is away from the substrate or measured item.
- 5) Repeat step 4 until result is correct.

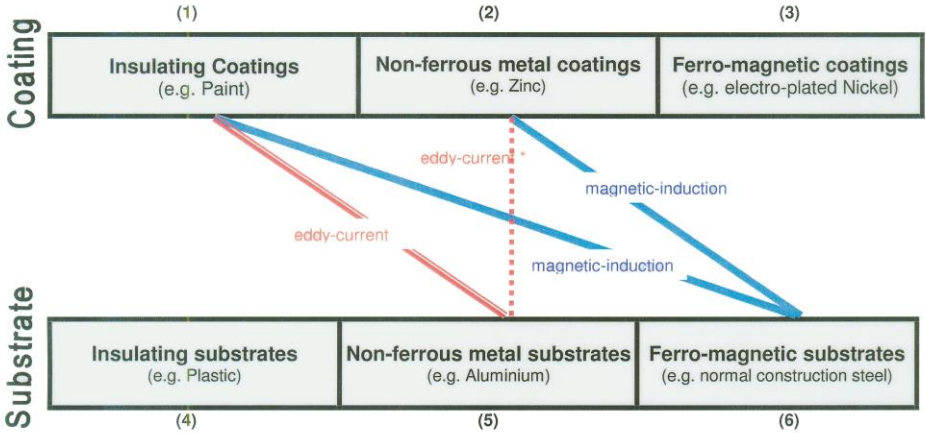
## Battery Replacement:

- 1) When the battery symbol appears on the display, it is time to replace the battery
- 2) Slide the battery cover away from the instrument and remove the batteries.
- 3) Install 2 AAA batteries paying careful attention to polarity.

## Typical application for coating thickness measurements using the magnetic-induction and the eddy-current principle

The picture below shows the various Coating / Substrate – combinations and the necessary measuring principle.

The lines between the upper and lower boxes indicate the measuring principles to be used.



**REMARKS:**

eddy-current \*

**: Restricted application!**

With the eddy current principle

Coating / Substrate – combinations are measurable only:

- Chromium on copper, maximum coating thickness 40µm / 1.6mils
- Chromium on aluminium, maximum coating thickness 40µm / 1.6mils
- Tin on copper, maximum coating thickness 40µm / 1.6mils

NOTE: for the above Coating / Substrate – combinations special marked calibration foils are necessary. Please specify the required Coating / Substrate – combination.

## Typical coating materials:

### (1) Insulating coatings

- Paint
- Plastic
- Enamel
- Anodising (on Alum.)
- Ceramic

### (2) non-ferrous coatings

- Brass
- Bronze
- Chromium
- Copper
- Lead
- electroless Nickel (with more than 10% phosphor)
- Tin
- Zinc

### (3) ferro-magnetic coatings

- Electro-plated Nickel

## Typical substrate materials:

### (4) Insulating substrates

- Plastic
- Ceramic
- Epoxy
- Glass

### (5) Non-ferrous substrates

- Aluminium
- Brass
- Bronze
- Copper
- Lead
- Titan
- Zinc

### (6) Ferro-magnetic substrates

- Steel (St33 – St60 or C15 - C45)
- some kind of stainless steel, which are ferrous

## Special Coating / Substrate – combinations

- Chromium on copper or on aluminium: see remarks under the picture on page 1.
- Tin over copper: see footnote under the picture on page 1
- Micaceous iron ore coatings (ferromagnetic) over steel: see “Compendium to Coating thickness measurement”

### **cannot measure:**

- Electro-plated Nickel on steel or on non-ferrous metal substrates or on insulating substrates
- insulating coatings (as paint) on insulating substrates (as plastic)
- non-ferrous metal coatings on non-ferrous metal substrates, exceptions see remarks on page 1
- non-ferrous metal coatings (as copper) on insulating substrate (as epoxy)