



ELECTROMAGNETIC TYPE
DIGITAL COATING THICKNESS METER

S M - 1 5 0 0 D

I N S T R U C T I O N M A N U A L

CAUTIONS:

Before using the Meter, read this INSTRUCTION MANUAL thoroughly and use the Meter correctly.

Keep this INSTRUCTION MANUAL carefully and refer to this, when necessary.

In the event of any doubt arising, the original INSTRUCTION MANUAL in Japanese is to be final authority.

Sensitivity of the probe of this Meter has been adjusted so as to deal with the measurement of a thicker film thickness.

When the probe is left on a metal e.g. steel desk etc. the Meter may indicate a certain value or 「HHH」 occasionally.

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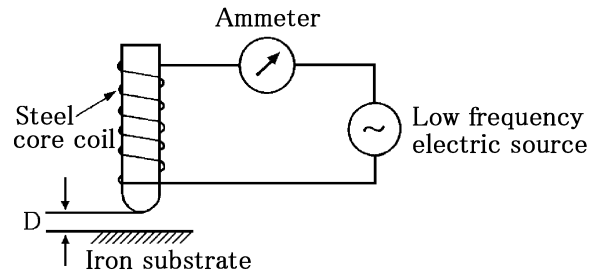
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1 . PRINCIPLE

When an iron is moved toward or away from a steel core coil, self-inductance of the coil changes in accordance with a slight changes of its distance.

This principle is utilized to measure the thickness (D) of non-magnetic surface treated coating on iron substrate.



2 . APPLICATIONS

The Meter is used for non-destructive measurement of the thickness of a non-conductive film such as spray deposit, lining, etc. applied to iron substrate including steel and ferritic stainless steel (SUS 430 etc).

The Meter can be applicable for various domestic and foreign standards and rules.

Linings ----- Resin, Tar epoxy, Rubber, Asphalt, Mortar, etc.

Metallikon, Phosphoric acid film, Oxidation acid film, Spray deposit, etc.

Glass, paper sheet, FRP product, etc.

(Thickness is measured on the basis of a steel plate placed underneath of the film or foil.)

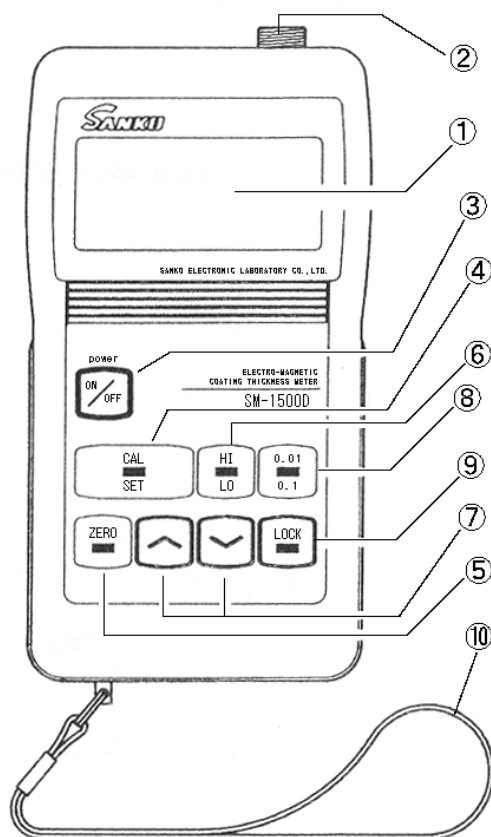
3 . SPECIFICATIONS

• Name and type	Electromagnetic type digital coating thickness Meter SM-1500D
• Measuring method	Electromagnetic induction type
• An object to be measured	Non-conductive film and non-magnetic metallic film applied to iron substrate including steel, ferritic stainless (SUS 430 etc.)
• Measuring range	0 to 15.0 mm
• Accuracy	±0.01mm on uniform surface or ±2 % of reading
• Indication	Digital display on large size Liquid Crystal Display (LCD) With hold function
• Resolution	0.01/0.1mm by conversion of the resolution mode
• Probe	One point contact constant pressure type with V-groove 50 × 45 mm Super abrasion resistance CVD treated electrode
• Additional functions	1) Conversion of the key lock mode 2) Setting of the upper/lower limit values with the alarm (1 value only of these 2 values is also available.)
• Minimum measuring area	More than plane: 50, convex face: R50mm, substrate th.: 1mm Use in more than plane: 300, substrate th.: 3mm is recommendable.
• Power source	Dry batteries R03 (1.5V) × 4 pcs. With automatic power off function
• Operating temp.	0 to 40 (except dew condensing condition)
• Dimensions	80(W) × 35(H) × 150(D) mm
• Weight	Approx. 460g (including batteries)
• Accessories	Standard thickness plate × 4pcs (around 0.5, 3, 5, and 10mm), Dry battery, Carrying bag

Specifications and appearance are subject to modify for improvement without prior notice.

4 . PARTS IDENTIFICATION

4-1. Main body



4-2. Parts name and functions

LCD display	Indicating part of the measured values, mm, LOBAT
Probe connector	Connector for connecting the probe
ON/OFF key	Key for power ON/OFF
CAL/SET key	(1)Key for standard calibration(CAL) with the standard thickness plate (2)Key for decision setting of upper/lower limit values When cancellation is needed, press the and keys simultaneously
ZERO key	Key for zero adjustment
HI/LO key	Key for setting the upper/lower limit values When cancellation is needed, press the and keys simultaneously
• key	Key for standard calibration(CAL) and setting the upper/lower limit values Figures increase by pressing the [] key and decrease by the [] key Figures traverse quickly by keeping on the keys pressing
Converting key of resolution	Resolution 0.01mm and 0.1mm are converted by each press of the key
LOCK key	Key for locking all keys except ON/OFF key to prevent mis-operation All keys are released by pressing power ON/OFF key
Hand strap	



Be sure to pass the hand strap around the wrist to prevent the Meter from dropping.

5 . PREPARATION

5-1 . Preparation of the zero plate



Prepare the substrate which is the same kind, thickness and shape with an object to be measured.

Prepare the substrate of an actual object to be measured as follows:

- Same kind ----- The same kind of material as the substrate of an object to be measured
- Same thickness ----- Nearly the same thickness as the substrate of an object to be measured
- Same shape ----- The same shape in pipe diameter, curvature, geometrical shape, etc. as the substrate of an object to be measured
- Size ----- When an object to be measured is a large size, use the large-sized plate more than 30cm × 30cm
Minimum area for the measurement is more than about 5cm × 5cm
In this case, use the same-sized zero plate as an object to be measured
- Surface condition --- Untreated (unoxidized etc.) substrate having smooth surface
Remove rust, dirt or dust, if any.

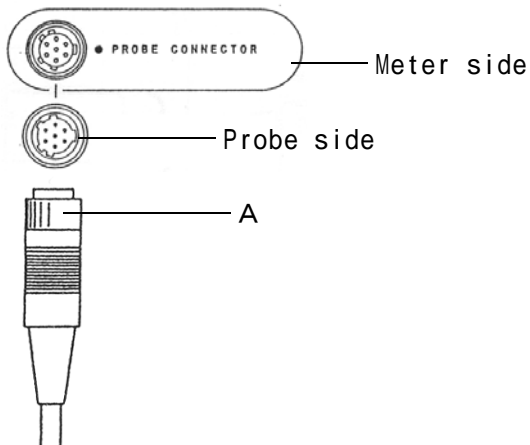
5-2 . Connecting(Disconnecting) the probe

Carry out the connection (disconnection) of the probe by the following procedures.



- Be sure to keep the Power OFF.
- The probe cannot be substituted with other probe.

Use the probe which is the same number with the Meter number.



◎ Connecting method

Insert the probe into the probe connector keeping the wide cut right ward and tighten it by turning A clockwise.

◎ Disconnecting method

Release by turning A counter-clockwise and calmly pull the probe out of the connector.

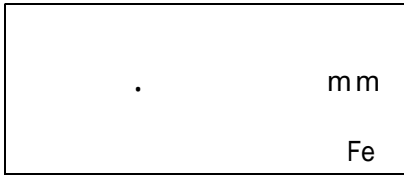


Don't pull the cord as it causes breaking of cord.

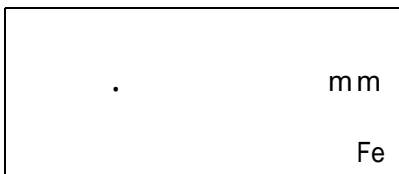
6 . OPERATING INSTRUCTIONS

6-1. Power ON

Press the 「 ON/OFF 」 key after connecting the probe.
[Indication on the LCD changes as follows.]



When the indications change, the buzzer emits a beeping sound and the Meter is ready for measurement.



Inside of the Meter is being initialized.
Keep the probe more than 30cm away from an object to be measured or metal products and turn towards the air during this period.

6-2. Power OFF

Press the 「 ON/OFF 」 key.

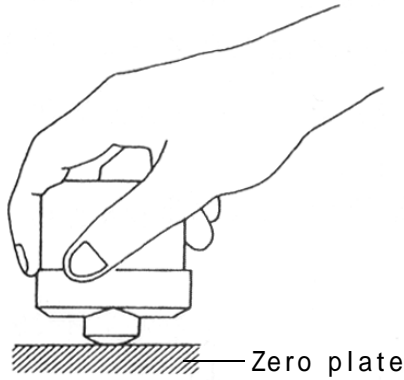
The buzzer emits a beeping sound and [- mm] is indicated.

After few seconds, the buzzer emits a beeping sound again and the indication is disappeared.

Disconnect the probe in accordance with the clause 5-2 . Connecting (Disconnecting) the probe on page 5.

- Auto power OFF ----- Provided with Auto power Off function(about 5 minutes later) so as to prevent consumption of the battery due to forget turning the power to off.
- Memory/Resume ----- Working curve(characteristic of substrate) completed Zero adjustment and Standard calibration(CAL) is memorized even after turning the power to off. The Meter is provided with the convenient resume function with which the measurement can be started immediately after succeeding power ON.

6-3. Handling the probe



Hold the mid-part of the probe as shown in figure and press it against the surface of an object to be measured vertically, quickly and calmly.

The Meter emits a beeping sound and measured value is indicated on the LCD.

If no sound is emitted, press again after removing the probe about 30cm from the surface for about 3 seconds.

More than 3 seconds are needed before indicating measured values.

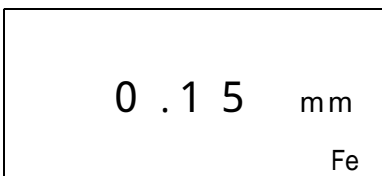
Don't remove the probe until a beeping sound is emitted.

Incorrect Usage		
<p>Don't tilt the probe against an object to be measured. The accurate measured value can not be obtained.</p>	<p>Don't slide the probe side ways while pressing. Both the probe and an object to be measured will be damaged.</p>	<p>Don't press the probe against an object to be measured too slowly. Measurement error will cause to be enlarged.</p>

6-4 . Zero adjustment

Press the probe against the substrate for adjustment (zero plate).

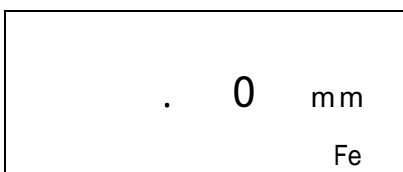
[Indication on the LCD changes as follows.]



The buzzer emits a beeping sound.

A certain measured value is indicated on the LCD.

Press the 「ZERO」 key.



Remove the probe from the zero plate and press the [ZERO] key.

[0] move from 1st digit to 2nd digit, the buzzer emits 3 beeping sounds and zero adjustment is completed.

When the power is turned to ON, the resolution is [0.1mm].

But resolution is automatically converted from [0.1mm] to [0.01mm] while executing zero adjustment and standard calibration(CAL).

For the operation, refer to 9-1 . Converting the resolution on page 13.

6-5 . Standard calibration (CAL)

Select a little thicker standard thickness plate than a film thickness to be measured.

[- -] is indicated blinking with a beeping sound by pressing the [CAL/SET] key.

Place the standard thickness plate on the zero plate.
(Ex. place 5.13mm plate)

Press the probe against the standard thickness plate, measured value is indicated with a beeping sound.

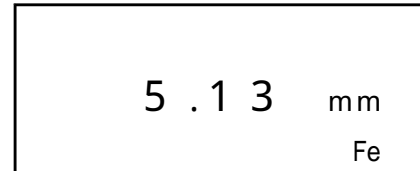
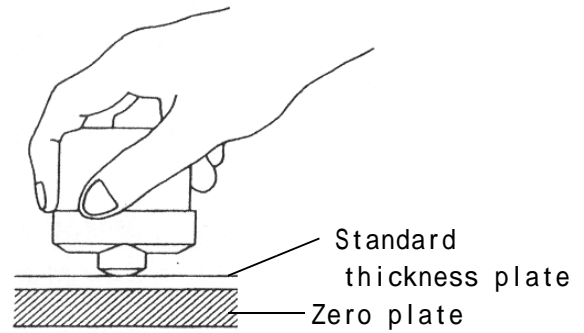
Remove the probe from the standard thickness plate.

Match the indicated value on the LCD to the thickness of the standard thickness plate by pressing the 「 ← 」 · 「 → 」 key.

The values traverse quickly keeping on the key pressing.

Press the probe against the standard thickness plate.
Standard calibration(CAL) is decided with a beeping sound.

When the zero adjustment and standard calibration are completed, the Meter is ready for the measurement.



(Ex.: Standard thickness plate of 5.13 mm th.)



Possible range of the standard calibration(CAL) is between 0.5mm and 15.0mm.
When the calibration is carried out at 0.49mm or less, [EEEmm] showing error is indicated.

Carry out the standard calibration(CAL) with a little thicker standard thickness plate than a film thickness of an object to be measured.

It will cause an erroneous measurement to use a too thicker or to thinner standard thickness plate than a film thickness of an object to be measured.

In case the standard thickness plates other than the attached plates are necessary, please contact us.

(Plates of 1mm th. and 2mm th. are optionally provided for the Meter.)

6-6. Resetting the working curve

When the batteries were replaced, indication was locked or measurement, zero adjustment, standard calibration(CAL) became impossible for operation, reset the Meter by following method.

5 . 1 3 mm
 Fe

The Meter is in power ON condition.

. 0 mm
 Fe

Press the 「ZERO」 key continuously 5 times while keeping on the 「ZERO」 key pressing. [0] is indicated blinking. The buzzer emits a beeping sound for every press of the 「ZERO」 key.

. E mm
 Fe

The buzzer emits beeping sounds.

[- E -] is indicated for 3 seconds.

. mm
 Fe

The Meter is restored to the possible condition of the measurement.

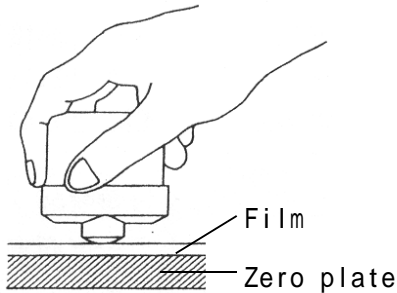
Carry out the zero adjustment and standard calibration again, if necessary.

7 . MEASUREMENT



Be sure to pass the hand strap around the wrist to prevent the Meter from dropping.

When the above mentioned zero adjustment and standard calibration are completed, the Meter is ready for the measurement.



Hold the mid-part of the probe as shown in left figure and press it against the surface of an object to be measured vertically, quickly and calmly. The Meter emits a beeping sound and the measured value is indicated on the LCD.

If no sound is emitted, press again after removing the probe about 30 cm from the surface for about 3 seconds.

Unit is indicated in [mm].

Make use of the key lock mode function to prevent the mis-operation while measuring.



When the Meter is used near a running motor and machines generating electric noises such as arc welding machines, [LLL] or [HHH] is occasionally indicated.

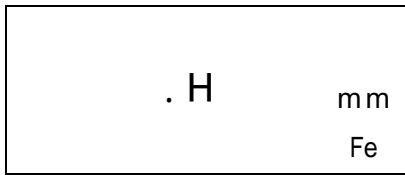
When the probe is placed on iron products (such as desk, shelf, etc.), [HHH] is indicated by reacting to iron.

These phenomenon are due to affect of electric noises and iron products nearby. As it is not in trouble, measure again.

Carry out zero adjustment and standard calibration (CAL) again while measuring as the need arises.

8 . SETTING THE UPPER AND LOWER LIMIT VALUES

8-1. Setting only the upper limit value



Press the 「 HI/LO 」 key.

The buzzer emits a beeping sound. [H] is indicated blinking.

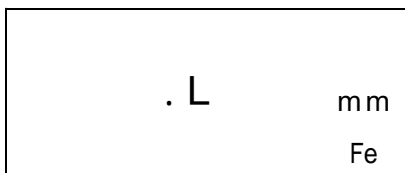
Place the standard thickness plate which close to the upper limit value on the zero plate. Press the probe against the standard thickness plate, measured value is indicated blinking.

Match the indication on the LCD to the upper limit value by pressing the 「 」 or 「 」 key.

Press the 「 CAL/SET 」 key.

The buzzer emits 2 beeping sounds and setting is completed.

8-2. Setting only the lower limit value



Press the 「 HI/LO 」 key 2 times.

The buzzer emits a beeping sound. [L] is indicated blinking.

Place the standard thickness plate which close to the lower limit value on the zero plate. Press the probe against the standard thickness plate, measured value is indicated blinking.

Match the indication on the LCD to the lower limit value by pressing the 「 」 or 「 」 key.

Press the 「 CAL/SET 」 key.

The buzzer emits 2 beeping sounds and setting is completed.

8-3. Setting both of the upper and lower limit values

Press the 「 HI/LO 」 key.

The buzzer emits a beeping sound. [H] is indicated blinking.

Place the standard thickness plate which close to the upper limit value on the zero plate. Press the probe against the standard thickness plate, measured value is indicated blinking.

Match the indication on the LCD to the upper limit value by pressing the 「 」 or 「 」 key.

Press the 「 HI/LO 」 key.

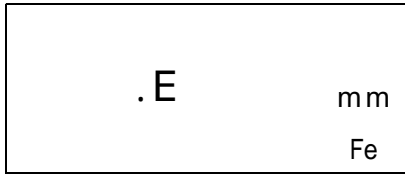
The buzzer emits a beeping sound. [L] is indicated blinking.

Place the standard thickness plate which close to the lower limit value on the zero plate. Press the probe against the standard thickness plate, measured value is indicated blinking.

Match the indication on the LCD to the lower limit value by pressing the 「 」 or 「 」 key.

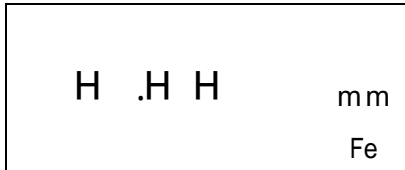
Press the 「 CAL/SET 」 key. The buzzer emits 2 beeping sounds and setting is completed.

8-4. Cancelling the setting of the upper and lower limit values



Press the 「HI/LO」 key keeping on the 「CAL/SET」 key pressing. The buzzer emits 2 beeping sounds and [- E -] is indicated. Then the last measured value is indicated. ([- E -] is keeping on indicating occasionally.)

8-5. Indication when the measured values exceed above set limit values



When the measured value is over the upper limit value, the buzzer emits 3 beeping sounds . [H H H] and the measured value are indicated alternately.



When the measured value is under the lower limit value, the buzzer emits 3 beeping sounds. [L L L] and the measured value are indicated alternately.

9 . OTHER FUNCTIONS

9-1. Converting the resolution

The Meter emits 2 beeping sounds by pressing [0.01/0.1] key and the measured values are indicated in unit [0.01 mm].

13.06	mm
	Fe

Example for

Indication 0.01mm and 0.1mm are converted by each press of the [0.01/0.1] key.

13.1	mm
	Fe

Example for



When the resolution is in 0.1mm, 2nd decimal place of the measured values are rounded off.

9-2. Lock key function

Press the 「 LOCK 」 key in power ON condition.

Then the buzzer emits 3 beeping sounds.

All keys except the 「 ON/OFF 」 key can not be operated to prevent mis-operation.

To release the key lock mode, power OFF once and power ON again.

1 0 . REPLACING THE BATTERY

When the battery closes to the limit of use due to consumption, 「 LOBAT 」 is indicated on the lower left of the LCD.

As it causes malfunction under this condition, replace the batteries earlier.

Replace the batteries after surely power OFF.

When the batteries are replaced under power ON, it causes out of order of the Meter.

Replace all 4 batteries with fresh specified dry batteries.

(Battery : Dry battery R03(1.5V) × 4 pcs)

LOBAT

(Indication of battery's voltage drop)

1 1 . MAINTENANCE AND INSPECTION

Use the meter within the range of 0 to 40 .

Avoid to expose the meter to dew condensation, wet with water, dust, intense heat, vibration, etc. in use.

Handle the probe cautiously not to damage on its tip.

Avoid to close a magnet etc. to the probe to prevent from magnetizing.

- Keep the Meter in a dust-free place where high temperature and high humidity can be avoided.

In case the Meter is left on no use for 1 month or more, take the batteries out of the Meter.

To ensure an accurate measurement, regular inspection of the Meter at least once a year is recommended.

1 2 . CARES TO RAISE AN ACCURACY OF THE MEASUREMENT

Zero plate

For use in the zero adjustment and standard calibration(CAL), prepare the zero plate which is same kind, thickness and shape as the substrate of an object to be measured.

It will result in an inaccurate measurement to use the zero plate which is different specifications from an object to be measured.

Standard thickness plate

Carry out the standard calibration (CAL) with a little thicker standard thickness plate than a film thickness of an object to be measured.

It will cause an erroneous measurement to use a too thicker or too thinner standard thickness plate than a film thickness of an object to be measured.

When the standard thickness plate has been damaged or bent, renew with a new plate.

In case the standard thickness plates other than the attached plates are necessary, please contact us.

Characters of a film

The measurement of the film having a magnetic metal substance causes a measurement error.

When extremely a large quantity of carbon is included, it can not be measured occasionally.

With respect to an elastic film, place a standard thickness plate with about 0.5 mm on it and subtract the thickness of the standard thickness plate from the total thickness, then the measurement error due to film dent can be prevented.

Effect of edge and corner

The edges, corners and their surroundings of an object to be measured are the places where the condition of a magnetic flux is not uniform.

Generally, measure inside taking 60 mm or more away from the edges.

The same care is needed for a projection, bend, sharp deformed portion and surrounding.

Effect of surface roughness

The surface roughness of both substrate and film of an object to be measured affects the measurement results. Take several spots to measure and calculate the mean value.

Effect of rolling

In some cases, rolling strains exist in a substrate and it causes an incorrect measurement depending on the spots to be measured. Then take several spots to measure and calculate the mean value.

Effect of the temperature

The range of the operating temperature is within 0 to 40 .

Especially, when the temperature of the probe much differs from the Meter, it causes an erroneous measurement.

Effect of residual magnetism and stray magnetic field

Residual magnetism in a substrate produced by an electromagnet type conveyer or a strong magnetic field created by an arc welding may cause an incorrect measurement.

Show rooms:

You are welcomed to the show rooms located at the following places.

- Tokyo show room near the Otemachi station of the subway
- Osaka show room at Tenjinbashi-kitazume
- Nagoya show room near the Kurokawa station of the subway
- Fukuoka show room near the Gofukucho station of the subway

Products sold:

Sales of Coating thickness meter, Pinhole detector, Condensator, Viscosity cup, Moisture meter, Needle detector, Iron piece detector

Manufacturer:

Sanko Electronic Laboratory Co., Ltd.

Tokyo branch Shibata Bldg., 2-6-4, Uchikanda, Chiyoda-ku,
Tokyo 101-0047, Japan

Tel 81-3-3254-5031 Fax 81-3-3254-5038

Osaka branch Konishi Bldg., 2-3, Sugawara-cho
Kita-ku, Osaka 530-0046, Japan

Tel 81-6-6362-7805 Fax 81-6-6365-7381

Nagoya branch Meihoku Bldg., 3-11-27, Kinjo,
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