ELECTROMAGNETIC TYPE
DIGITAL COATING THICKNESS METER

UNIBOY-M

INSTRUCTION MANUAL

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.

SANKO ELECTRONIC LABORATORY CO., LTD.
(株式会社 サンコウ電子研究所)

CONTENTS

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.

1. PRINCIPLE

When iron is moved toward or away from a steel core coil which carries electric current, self-inductance increases or decreases in accordance with distance.
This change in inductance can be read as a deflection of needle of an ammeter, or a digital indicating signal connected as shown in Fig.1 below.
This principle is utilized to measure the thickness of non-magnetic surface treated film (D) on iron substrate.

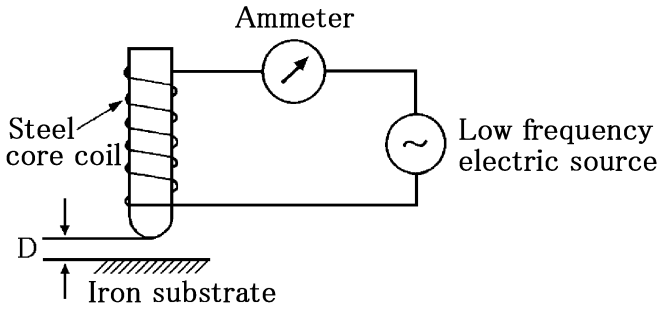


Fig.1

2. APPLICATIONS

The Meter is applicable to non-destructive measurement of the thickness of a non-magnetic coatings, linings and platings 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.

- Paint films ---------- Machines, appliances, automobiles, furniture, bridges, ships, steel tubes, cast iron tubes, structures, etc.
- Lining films ---------- Resin, tar epoxy, rubber and enamel film etc.
- Non-magnetic plating ---------- Chrome-, zinc-, copper-, tin-, electroless nickel-, (excluding of electrolysis nickel-) etc.
- Metalikon, phosphoric acid films, oxide films, spray deposit films, etc.
- Resin films and non-magnetic metal sheets(on iron substrate)

3. SPECIFICATIONS

Name	UNIBOY-M
Measuring method	Electromagnetic induction
Applications	Non-conductive films and non-magnetic films applied to iron substrate including steel and ferritic stainless steel such as SUS430 etc.
Measuring range	0 to 3.00 mm
Resolution	1μm : within the range of 0 to 999μm 0.01mm : within the range of 1.00 to 3.00mm
Accuracy	±1μm on uniform surface or ±3% of reading
Calibration range	10μm to 3.00mm
Indication	Digital on Liquid Crystal Display(LCD) with display hold function
Probe	One point contact constant pressure type with V-groove, φ 17, Built-in Electrode treated with CVD(Chemical Vapor Deposion) material of super abrasion resistance
Power source	Dry batteries R03 (1.5V) × 2 pcs. With automatic power off function
Operating temperature	0 to 40 ℃ (except dew condensing condition)
Additional function	Conversion of resolution 0.1μm : under 100μm (by conversion)
Dimensions	56 (W) × 109 (H) × 34 (D)mm, Tallboy type
Weight	140g (including batteries)
Accessaries	Standard thickness plate × 2 pcs, Zero plate for testing

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

4. PARTS IDENTIFICATION AND FUNCTION

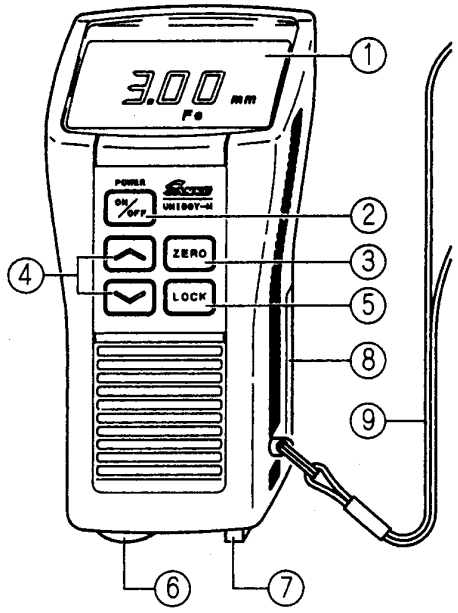


Fig.2

① LCD display
Indicates film thickness in μm's or mm's.
If the battery is consumed, LOBAT (Low battery) is displayed.

② Power ON/OFF key
Switches power ON and OFF each press

③ Zero point set key

④ Standard calibration(CAL) keys
Press the [∧] key, and the number displayed will increase.
Press the [∨] key, and the number displayed will decrease.
When keep on the key pressing, the number will traverse quickly.

⑤ LOCK key
Locks all keys except the power ON/OFF key to prevent mis-operations. All keys are released by switching the power OFF.

⑥ Probe

⑦ Supporting leg

⑧ Battery compartment cover

⑨ Hand strap

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

5. PREPARATION

Preparation of the zero plate

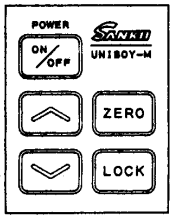
Prepare the substrate which is the same kind, thickness and shape with an object to be measured.

The attached zero plate for testing, SUS 430 ferritic stainless steel, is used for the operation check of the Meter.
Prepare the substrate of an actual object to be measured.

- 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 ---------- Substrate with an area on which the probe and the supporting leg can be easily set and operated
- Surface condition ------ Untreated, unoxidized substrate having smooth surface
  Remove rust, dirt or dust, if any.

6. OPERATING INSTRUCTIONS

6-1 Power ON



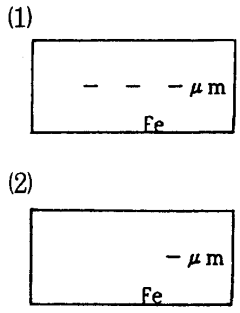


Fig.3

Press the Power ON/OFF key ②.
When display (1) shifts to display (2) as shown in Fig.3, the buzzer emits a beeping sound.
Then the Meter is ready for measurement.

※[LOBAT] is occasionally indicated for a moment, but this is not an abnormal condition.

※ When the power ON, keep the probe away 5cm or more from an object to be measured and a metal product until the Meter will be ready for measurement.

6-2 Handling the probe

Correct usage

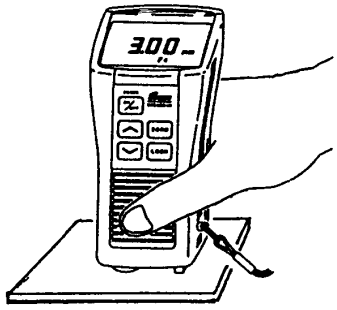


Fig.4

Hold the Meter as shown in Fig.4 and press it vertically, quickly and lightly against the surface of an object to be measured.

The buzzer emits a beeping sound and the thickness is indicated on the LCD.
If no sound is emitted, remove the Meter 4 to 5cm or more from the surface and measure again after waiting for a little while.

【NOTICES】

The attached zero plate for testing, SUS 430 ferritic stainless steel, is used for the operation check of the Meter.
Prepare the substrate of an actual object to be measured.

Incorrect usage

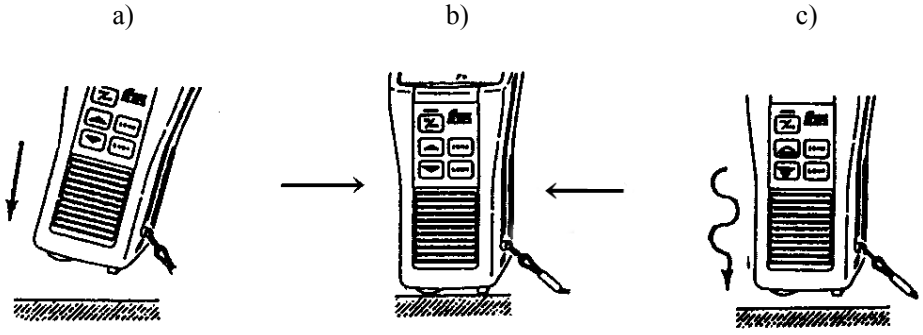


Fig.5

a) Tilting the Meter will result in an inaccurate measurement.
Hold it vertically to ensure an accurate reading.

b) Moving the Meter sideways will damage both the probe and an object to be measured.
Avoid any sideways movement of the Meter while pressing against an object.

c) Pressing the Meter too slowly will cause a very large measurement error.
Press the Meter lightly but quickly.

6-3 Zero adjustment

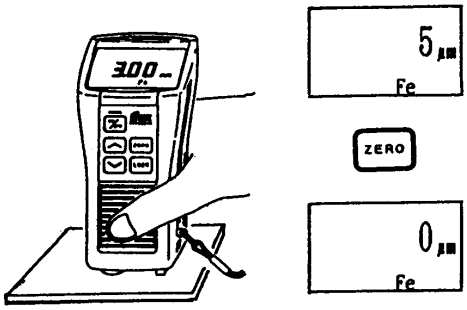


Fig.6

Press the probe against the zero plate and the buzzer emits a beeping sound and a certain figure is indicated on the LCD.
Remove the probe from the zero plate and press the [ZERO] key ③.
Zero [0] which is indicated in the 2nd digit place moves to the 1st digit and the buzzer emits 3 beeping sounds.
Then the zero adjustment is completed.

Make sure of the zero adjustment by repeating the above mentioned steps. When [0µm] is indicated on the LCD, the adjustment is acceptable. When the indicated number is away from 0µm, repeat above zero adjustment 2 or 3 times.

6-4 Standard calibration(CAL)

① Prepare a little thicker standard thickness plate than a film thickness to be measured.

② Place the prepared standard thickness plate (ex. 102µm) on the zero plate.
Press the probe against the standard thickness plate, and the buzzer emits a beeping sound and the figure is indicated on the LCD.
Refer to Fig.7

③ Remove the probe from the standard thickness plate.

④ Be sure that the indicated figure matches with the same figure as thickness of the standard thickness plate by pressing the [∧] key or the [∨] key ④.
"CAL" is indicated while pressing the key.
The numbers traverse quickly keep on the key pressing.

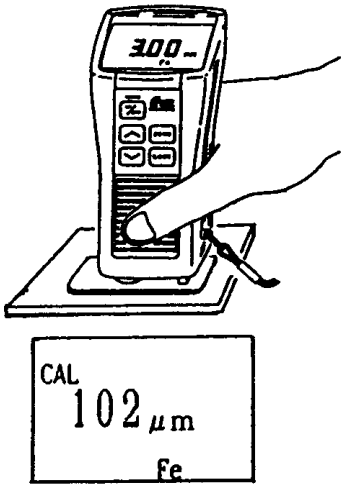


Fig.7

⑤ Release the [∧] key or the[∨] key ④ and the buzzer emits a beeping sound.
Then the standard calibration is completed.

⑥ Follow the above steps ① to ⑤, when the standard calibration(CAL) is needed again.

⑦ When the zero adjustment and standard calibration are completed, the Meter is ready for measurement.

【NOTICES】

- Applicable range of the standard calibration(CAL) is 10µm to 3.00 mm.
- For the standard thickness plate to do the standard calibration(CAL), use a little thicker standard thickness plate than a film thickness of an object to be measured.
  Calibration with a quite different standard thickness plate from a film thickness to be measured causes an inaccurate measuring result.
- Some standard thickness plates other than the standard thickness plates attached to the Meter are available. When necessary, please contact us.

7. MEASUREMENT

◎ **Be sure to pass the hand strap around the wrist to prevent the Meter from dropping.**
◎ **Press the LOCK key⑤ during the measurement to avoid mis-operations.**

7-1 Measurement

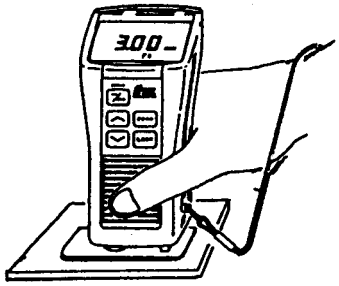


Fig.8

Press the probe against an object to be measured and the buzzer emits a beeping sound and the measured value is indicated on the LCD. When no beeping sound is emitted, measure again after removing the Meter 4 to 5cm or more from the object and wait for a little while.

7-2 Indication of measured value

① When a figure appears as one of 0 to 999, it reads in μm's.
Unit of the measured value is μm(1/1000mm).
ex. 0.2mm is 200μm.

② When a figure appears as 1μm, fractions of .5 and over are counted as a unit and the rest are cut away.

③ When a figure appears as one of 1.00 to 3.00, it reads in mm's.

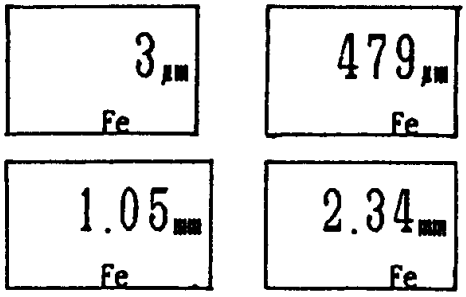


Fig.9

7-3 Measurement of round bars, curved surface, etc.

Film thickness on external surface of fine round bars, pipes, curved surface etc. can be measured by using the V-grooved parts of the both probe and supporting leg.

【NOTICES】

- Carry out the zero adjustment and standard calibration(CAL) again during measurement, if necessary.
- When the figure changed by touching the key accidentally, carry out the zero adjustment and standard calibration(CAL) again. Press the [LOCK] key during the measurement to avoid mis-operations.
- For use in the zero adjustment and standard calibration(CAL), prepare the zero plate which is the same kind, thickness and shape as the substrate of an object to be measured.
- The attached zero plate for testing, SUS 430 ferritic stainless steel, is used for the operation check of the Meter. Prepare the substrate of an actual object to be measured.

8. OTHER FUNCTIONS

8-1 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.

8-2 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.

8-3 LOCK key function

When the LOCK key ⑤ is pressed during measurement, the buzzer emits 3 beeping sounds and all the keys except the power ON/OFF key will be locked to prevent mis-operations.
Switch power OFF and the lock will be released.

8-4 Converting the resolution. (add. function)

Display of 0.1μm can be applicable for the measurement of the films less than 100μm thickness.
Insert a thin bar with a point into the small hole on the back face of the Meter and press the bottom, and the buzzer emits 2 beeping sounds. Then the resolution on the LCD is converted from 1μm to 0.1μm.
The resolution is converted alternately to 0.1μm and 1μm each press.

8-5 Resetting the working curve

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

① Press the [∨] key ④ continuously 5 times while keep on the [ZERO] key ③ pressing in power ON condition. [- E -] is indicated for 3 seconds with a longish beeping sound and reset is completed.

② After resetting, carry out the zero adjustment and standard calibration again, if necessary.

9. POWER OFF

Press the「ON/OFF」key ②.
The buzzer emits a beeping sound and [— μm] is indicated.
After few seconds, the buzzer emits a beeping sound again and the indication is disappeared.

10. REPLACING THE BATTERY

- When LOBAT(Low battery) is displayed on the lower left of the LCD as shown in Fig.10, replace the old batteries with fresh specified dry batteries R03 (1.5V) × 2pcs (notice usable limits).
  Be sure to switch the power OFF before replacing.

- Even if the old batteries are taken out of the Meter, "Calibration condition" is able to be kept without any change.

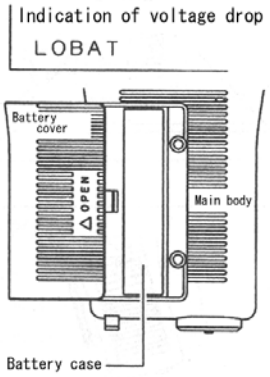


Fig.10

11. 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.
- Keep the Meter in a dust-free place where high temperature and high humidity can be avoided.
- In case the Meter is left on not in 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.

12. CARES TO RAISE AN ACCURACY OF THE MEASUREMENT

①Zero 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 different specifications from an object to be measured.

②Standard 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 thinner standard thickness plate than a film thickness of an object.
When the standard thickness plate has been damaged or bent, renew with a new plate.
In case the standard thickness plates other than the plates attached is necessary, please contact us.

③Characters of a film

A film having a magnetic metal substance causes a measurement error.
In some cases, the thickness of a film containing carbon excessively can not be measured. With respect to an elastic film, place a standard thickness plate with 30 to 50μm 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 avoided.

④Effect 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 inequality. Generally, measure inside taking 15 to 20mm away from the edges.
The same care is needed for a project, bend, sharp deformed portion and surroundings.

⑤ Effect of surface roughness

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

⑥ Effect of rolling strain in steel plates

In some cases, rolling strain exists 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.

⑦ Residual magnetism

Residual magnetism in a substrate produced by an electromagnet type conveyor or a strong magnetic field created by an arc welding may result in 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,
Kita-ku, Nagoya 462-0847, Japan
Tel 81-52-915-2650 Fax 81-52-915-7238

Fukuoka branch 11-11 Naraya-cho, Hakata-ku
Fukuoka 812-0023, Japan
Tel 81-92-282-6801 Fax 81-92-282-6803

Head office 1677 Hisasue, Takatsu-ku,
Kawasaki 213-0026, Japan
Tel 81-44-751-7121 Fax 81-44-755-3212