



ELECTROMAGNETIC SCREEN PROCESS TYPE
DIGITAL COATING THICKNESS METER

SP-1100D

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)

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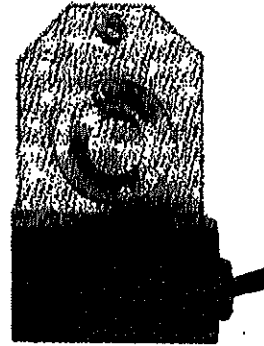


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1. UNIQUE PROBE

The SP-1100D is provided with not only the general characteristics as the electromagnetic type but also the unique construction with which perfect constant pressure contact can be obtained to measure the thickness of plasticity film such as resist and screen etc. in screen process, specially.

1. The tip of the electrode has a gentle curvature.
2. The arm of the probe can be loaded with the weights.
3. The probe unit can stand independently with 2 electrodes and 1 support leg.

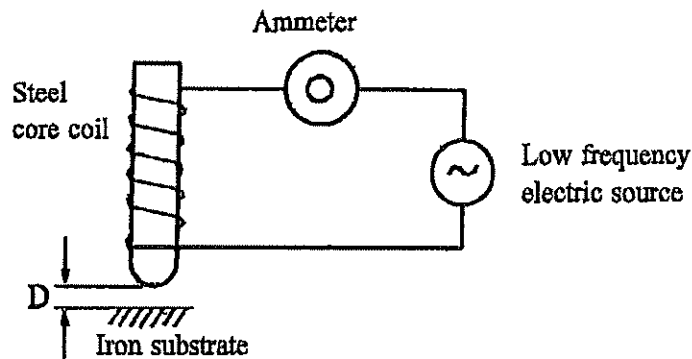


2. PRINCIPLE

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 utilized to measure the thickness of non-magnetic surface treated film (D) on iron substrate.

The thickness of non-magnetic film, non-conductive film and resist film etc. applied or placed on iron substrate can be measured.



3. APPLICATIONS

The Meter is applicable to non-destructive measurement of the thickness of a non-magnetic or non-conductive following objects placed on a iron plate simply and speedily.

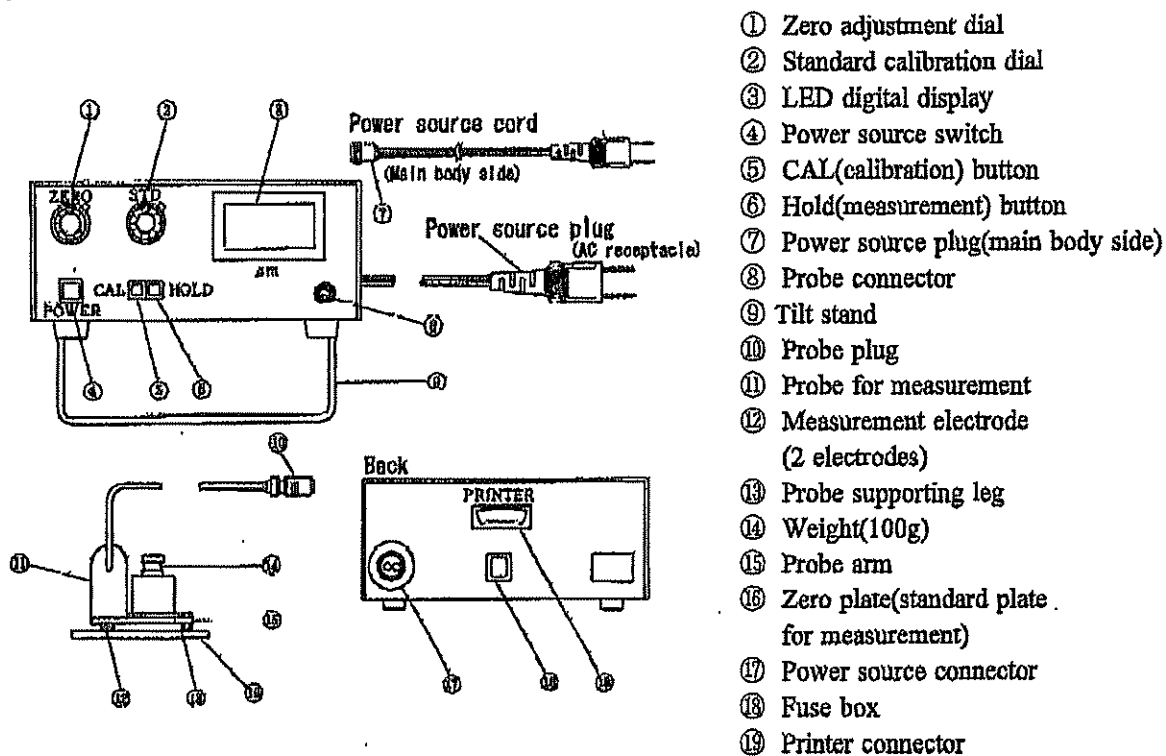
1. Measurement of the thickness of various kinds of screen such as silk, nylon, tetoron, stainless steel, etc. in screen process print.
2. Measurement of the thickness of resist, film on printing block, on the above mentioned screen.
3. Measurement of the thickness of soft film such as rubber sheet, resin sheet, metal foil, paper, cellophane, etc. or kinds of sheets.
4. Examination and analysis of the thickness of elastic film and wet coating film.

4. SPECIFICATIONS

Name	Digital Coating Thickness Meter SP-1100D
Measuring method	Electromagnetic induction
Measuring range	0 to 300 μ m (special order : 0 to 500 μ m)
Indication	Digital on Light Emitting Diode(LED) with display hold function Minimum unit : 1 μ m
Resolution	1 μ m
Accuracy	\pm 1 μ m on uniform surface or \pm 2% of reading
Probe	2 Electrodes with 1 support leg 3 points contact, arbitrary loaded perfect constant pressure type Size : 42 \times 50 \times 62mm Dia : ϕ 8 Distance between electrode : 16mm
Power source	AC V 50 / 60 Hz
Operating temperature	0 to 40 $^{\circ}$ C (except dew condensing condition)
Accessories	Zero plate for testing (Standard plate for the measurement) 150 \times 150 \times 3mm 1 pc Standard thickness plate 2 pcs Power source cord 1 pc Weight (100g) 1 pc Cover of the main body 1 pc Storage case of accessories 1 pc
Dimensions & Weight	200 (W) \times 80 (H) \times 250 (D)mm, Approx. 3 kg

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

5. PARTS IDENTIFICATION



6. PREPARATION

Take out the accessories from the storage case.

● Accessories: 1. Probe 2. Zero plate 3. Weight 4. Power source cord 5. Standard thickness plate

6 - 1 Connecting the power source cord

Connect the power source plug ⑦ to the power source connector ⑱ on the back side of the main body and fix it by turning the collar screw.

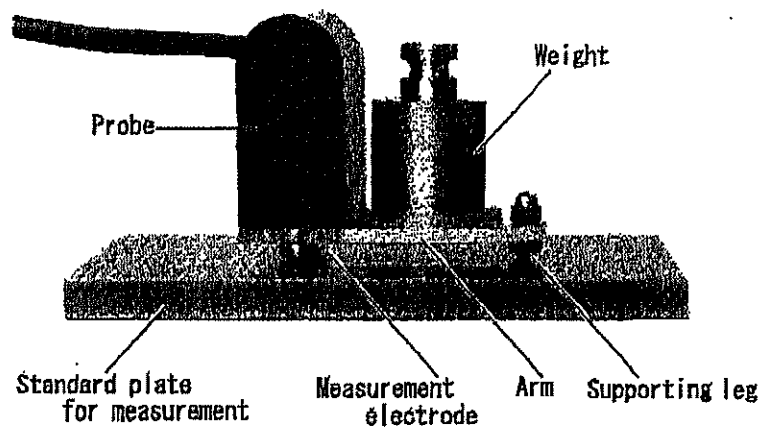
6 - 2 Connecting the probe

6-2-1 Load the attached weight ⑭ on the arm ⑮ of the probe for measurement ⑩.

When the 100g weight is usually used, fix it on the arm with an adhesive etc.

6-2-2 Insert the probe plug ⑲ of the probe for measurement ⑩ in the probe receptacle ③ on the front of the main body till it makes clicking sound.

● How to load the probe



It is characterized that the thickness can be measured under the perfect constant pressure condition by burdening with the weight placed on the arm of the probe.

7. OPERATING INSTRUCTIONS

7 - 1 Power ON

Connect the other end plug of the power source cord to the receptacle AC V.

Press the power source switch ④ and the lamp goes on.

Wait for stabilizing the circuit leaving as it is for about 3 minutes after power ON, and proceed to the next calibration/adjustment after that.

7 - 2 Power OFF

Power OFF by pressing the button of the power source switch ④ after completing the measurement.

★ Be sure to pull the power source plug out of a receptacle while the Meter is not in use.

7 - 3 Handling the probe

7-3-1 The probe independently stands with 2 measurement electrodes(magnetic poles) and a supporting leg.

Place the measurement electrodes so as to contact evenly on the place to be measured.

7-3-2 Place the weight on the arm of the probe and use with burdening the load.

Attached weight is 100g. But by reading the difference of the indicated value placing a weight of different weight depending on the properties of an object to be measured, the Meter can be applied also to compare the hardness and hardening speed of a resist and condition of screen tension, and so on.

7-3-3 Measure at nearly center part of the zero plate

(Refer to 10 ①④ on page 7)

7-3-4 Carefully handle the probe not to damage the electrodes of the probe.

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

7 - 4 Zero adjustment

Press the probe for measurement ⑩ against the zero plate(standard plate for measurement) ⑪ keeping on the CAL button ⑤ pressing in the condition the 100g weight is loaded in the ring of the probe arm ⑬, and turn the zero adjustment dial ① so that the indicating number on the digital display ③ might become 0. When the dial is further turned counter-clockwise cross 0 point, display is indicated in - (minus).

7 - 5 Standard calibration(CAL)

Place the attached standard thickness plate on the zero plate ⑪ and place the probe for measurement ⑩ loading the weight on it.

Turn the standard calibration dial ② so that the value on the LED digital display ③ will coincide with the indicated value on the standard thickness plate.

Repeat above procedures (7 - 4 and 7 - 5) 2 to 3 times and adjust the Meter so that the each figure correctly match each other.

● When the standard thickness plate has been damaged or bent, renew with a new plate as it causes an erroneous measurement. (Refer to 10 ②)

● Regarding the loading with the weight, refer to 7-3-2.

Reference -----Unit of film thickness

1mm = 1000 μ m

0.1mm = 100 μ m

0.01mm = 10 μ m

0.001mm = 1 μ m

● 1mil is equivalent to approximately 25 μ m (0.025mm).

8. MEASUREMENT

- 8 - 1 The Meter is ready for the measurement after completing the procedures of previous article 7.
Place an object to be measured such as screen, resist, film, sheet, foil, paper, etc. on the zero plate which was used for the adjustment/calibration and place the probe ⑩ on it.
Value on LED digital display is the thickness of the object to be measured.
- 8 - 2 Measurement with hold function
Press the HOLD button ⑥ when commencing the measurement after completing adjustment/calibration.
A measured value is indicated on the display with an electronic sound and the value will be held as it is until next measurement even after removing the probe.
By next pressing of the probe, previous held measured value change to new measured value with a beeping sound.
If the thickness is same, the measured value will not change.
- 8 - 3 When calibrating the Meter, carry out after surely pressing the CAL button ⑤.
- 8 - 4 Measurement in a screen process
When measuring the thickness of the block's film(resist), measure the thickness of the screen only first and followed by the measurement of total thickness screen and resist.
The thickness of the resist can be obtained by subtracting the thickness of the screen measured at first from the total thickness.
- Example
- | | |
|--|----------------------------|
| · Thickness of screen only | 70 μ m |
| · Total thickness of screen and resist | 120 μ m |
| · Thickness of resist only | $120 - 70 = 50\mu\text{m}$ |

[NOTICES]

- ★ Carry out the zero adjustment and standard calibration(CAL) again during measurement, if necessary.
- ★ Quality of the zero plate(standard plate for measurement) is SUS 430 ferritic stainless steel.
- ★ Probe:
Carefully handle not to damage the electrode.
Avoid to close a magnet etc. to the probe to prevent from magnetizing.

9. MAINTENANCE AND INSPECTION

- Use the Meter within the range of 0 to 40 °C.
When the temperature of the Meter much differ from the probe, it causes an erroneous measurement.
Avoid to expose the Meter to dew condensing, 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.
- Inspection after completing the measurement
 - Confirm if the power source cord is not damaged, the power source plug ⑦, ⑰ and AC receptacle side are not soiled and clean them.
 - Confirm if the electrode and cord of the probe are not damaged, the probe connector ③ and probe plug ⑩ are not soiled and clean them.
 - Pull the cords out of the main body and a receptacle.
- To ensure an accurate measurement, regular inspection of the Meter at least once a year is recommended.

10. CARES TO RAISE AN ACCURACY OF THE MEASUREMENT

① 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 different specifications from an object to be measured.

Quality of the attached zero plate is SUS 430 (Ferritic stainless steel).

Large-sized zero plate(330×330×3 mm) is optionally provided.

Measure at nearly center part of the zero plate.

② 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 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 or new plates are necessary, please contact us.

③ Characters 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 50 μ m 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.

④ 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 inequality. Generally, measure inside taking 15 to 20mm away from the edges.

The same care is needed for a projection, 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.

⑧ Note:-

When the fuse blew out:

Press the small cave on upper face of the fuse box ⑱ with a driver etc. and the glass-tubed fuse comes out. Replace with new one and push it into the hole.

Standard : 1A Glass-tubed fuse