ELECTROMAGNETIC COATING THICKNESS METER

Pro-S　　Pro-W

INSTRUCTION MANUAL

⚠ Caution

●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.

SANKO ELECTRONIC LABORATORY CO., LTD

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Attention for safety (for safe and correct use)

Before use, in order to prevent users or others from risks or property damage, please make sure of reading this 「Attention for safety」and use the meter correctly. And after reading it, please keep it ready whenever necessary.

⚠ Warning

- Do not dump or wet the meter unit in water, otherwise that may cause erroneous measurement, fire or malfunctions.
- Please contact our local distributor should submerged water into the unit.
- Do not put metals or foreign substances into the unit, otherwise that may cause erroneous measurement, fire or malfunctions.
- Please contact our distributor should be stuck metals or foreign substances into the unit and difficult to remove out of it.
- Do not insert a screw driver or stick-shaped object into the connector, otherwise a probe cannot be connected to and may cause damage.
- Do not throw, smash or drop the meter, otherwise that may cause injuries, breakdown or malfunctions.
- Never dismantle or modify the unit, otherwise that may cause erroneous measurement, fire or malfunctions.
- When not in use for a while, remove the battery from the unit, otherwise that may cause leakage and malfunctions, damage and erroneous reactions.
- when replacing batteries, please make sure of reading 「Battery replacement」 on the MANUAL.
- Keep and store batteries away from children or pets.
- In case a battery is swallowed into a human body, please go to the doctor.

- Do not dump batteries into fire or water. Store them in cool and dry places avoiding flames, high temperature and moisture.
- Do not get batteries shocked, damaged. And do not dismantle and solder them for processing.
- Do not short or recharge batteries and handle with metallic tools like tweezers and pliers and so on.
- Use specified new batteries (check expiry date) for replacement.
- Be sure of paying attention on battery polarity (+,-).
- In case a battery has leakage please clean up the battery compartment and fittings and replace with a new one. In case cleaning is difficult please contact a repair facility for inspections.
- Do not touch the leaked liquid and wash skins and clothes with running water.
- Comply to regulations and laws in your local offices when disposing of them

Watch out for quality

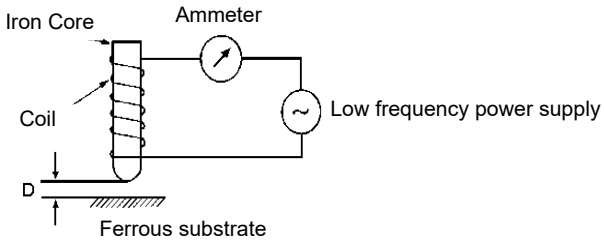
- Do not use Benzene or Thinner for cleaning and spray pesticides on the meter, otherwise that cause cracks or malfunctions.
- Do not store the meter in places getting high temperature such as in a car under strong sunlight or near heaters, otherwise that that will be hazardous to the meter and may cause malfunctions.
- Do not step, tramp down or put anything on the meter, otherwise that may cause breakdowns or injuries.
- Keep the meter away off rubber-made or vinyl articles. A lengthy contact between the meter and them may cause their stickiness that may be difficult to get rid of.

- Before getting started , please read the manual thoroughly and operate it correctly.
- This meter is a precision gauge. Please handle it with care, otherwise that may cause not only the wrong measurement but malfunctions.
- Do not pull off, twist, or wrap the probe cable around the unit, or that may cause breaking or damage of the cable.
- ,Do not move or transfer with a bare probe or probe cable being held by hand, otherwise that may cause breaking of the cable or damage of the unit.
- Do not knock or scratch with the tip of the probe, otherwise that may cause the wrong measurement or malfunctions.
- Keep the tip of a probe clean. The probe adhered to with dust, rubbish, paint and so on may not make the precise, and exact measurement.
- Clean the meter and store it in free from moisture, rubbish or dust after operation.
- To ensure accurate measurement please take a ※periodical inspection.
- Keep the meter away off electric noises or strong magnetic fields while in use or on stock, otherwise that may cause abnormal measurement or malfunctions.
- While taking measurement, keep the meter away off condensation, wetting, dust, high temperature or vibration.

※ An inspection cycle changes depending on condition and frequency in use, which can be determined by a user side.

1. Principle of measurement

As the iron core coil comes close to iron, Inductance is generated in the coil varies upon changes of the distances between them. The use of changes of the Inductance makes it possible to take measurement for coating thicknesses(D) of Nonmagnetic films on the ferrous substrate.



2. Features/applications

■ Features

- Traditional analog meter type ・・ Thickness is intuitively readable.
- Compact body・・・・ Even more small sized is made.
  (volume ratio 90% suitable for on-site)
- 0～5mm wide range ・・・ Available widely to measurement from thin films to linings.
- Special electrode probe・・Anti-abrasive CVD treatment is performed.
- Dial cover provided as a standard item・・Avoid misalignment of adjustment points caused by accidental contacts.
  ※This is not for the purpose of protecting drifts of the meter pointer caused by temperature differences or surroundings.

■ Applications

This is an electromagnetic coating thickness meter used for non-destructive measurement of thicknesses of non-conductive films such as paintings, linings and non-magnetic metallic films like plating on the ferrous substrate.

2 point-adjustment system is adopted, conforming to the rules, standards and criteria of the Domestic public organizations, Group organizations, Government and municipal offices, Research institutes and foundations and overseas standards such as ASTM and ISO.
※Including steel, Ferritic stainless steel (SUS430 etc.)

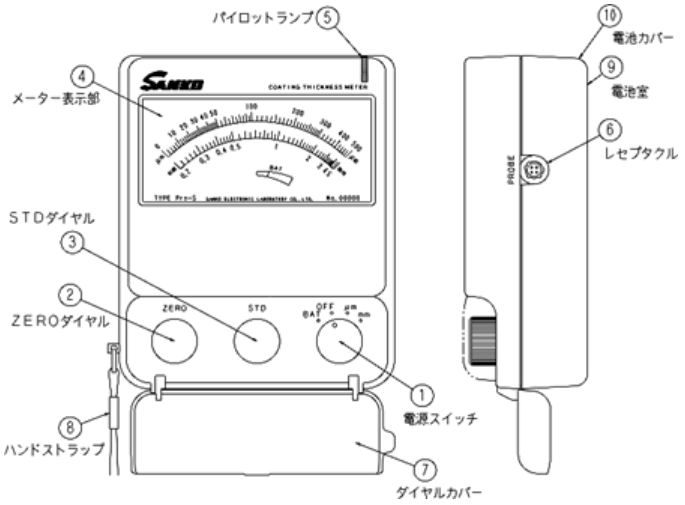
- Paintings (steel structures such as bridges, ships and steel pipes. and automobiles, home steel appliances [refrigerator, washing machine], steel furniture and fixtures.)
- Linings (resin, tar epoxy, rubber, enamel etc.)
- Plating※ (nonmagnetic plating such as Chrome, Zinc, Copper and Tin.)

※ Excluding electrolysis nickel plating

- Metallikon, Parkerizing, Oxide films, Spray deposit films etc.)
- Measurement of resin films/non-magnetic foils (measured on a ferrous basis)

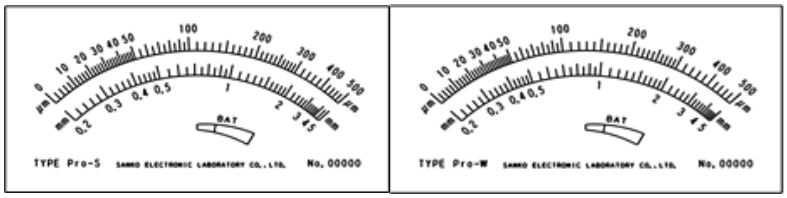
3. Name of parts

【External view of unit】



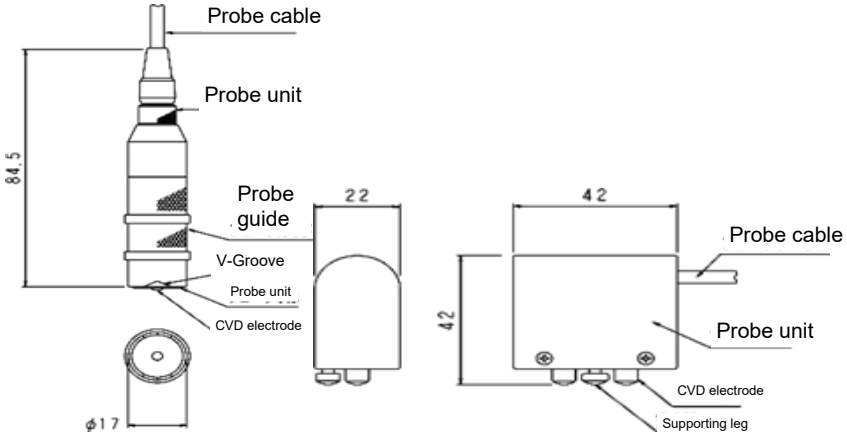
① Power source SW.
② Zero dial
③ STD dial
④ Meter display
⑤ Pilot lamp
⑥ Receptacle
⑦ Dial cover
⑧ Hand strap
⑨ Battery chamber
⑩ Battery lid

【Scale example】



Pro-S　　Pro-W

【External view of probe】



4. Preparation

4.1) Preparation of the Zero plate

Prepare the same kinds of substrate as an object to be measured on the following.

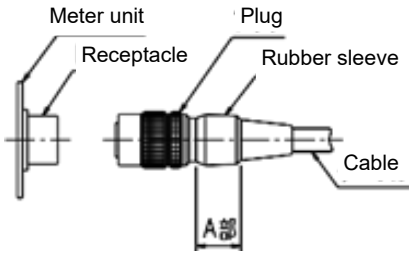
- Same material・・The same kinds of material as the substrate of an object to be measured.
- Same thickness・・Nearly the same thickness as the substrate of an object to be measured. Use exactly the same thickness when the thickness is less than 1mm.

- Same shape・・The same shape (pipe diameter, curvature, geometrical shape etc.) as the substrate of an object.
- Size・・・Enough area where the probe can be easily operated.
- Surface condition・・ As smooth a surface as possible, and untreated surface (non-plating, non-painting, un-oxidizing etc.).
  Remove rust, dirt if any.

4-2) Connection of the Probe

Connect the probe to the receptacle on the side of the main unit.

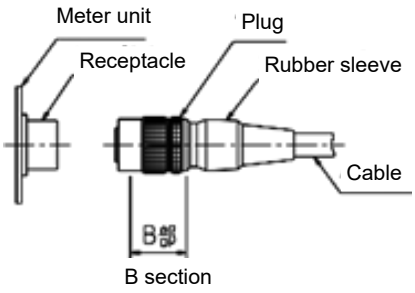
[Connection]



Holding the A section, insert the plug into the receptacle straight by matching the convex part of the plug and the concave groove of the receptacle, then the probe can be smoothly connected.

※The correct matching is necessary for insertion.

[Disconnection]



Holding the B section of the plug, pull the plug off the receptacle straight, then the probe can be smoothly disconnected.

※Do not pull off the cable by holding the A section or the cable , or that may cause the breaking of the cable with the cable being locked,

4-3) Zero adjustment and standard calibration

Turn the Power source SW. to either [μ] or [mm] to adjust an expected coating thickness of an object to be measured. Leave as it is for a few minutes until the circuit becomes stable, then move to the next adjusting process.

※The pilot lamp lights up and electricity is on unless the Power source SW. turned to [OFF] .

■ When the [μm] range scale is used:

① Turn the Power source SW. to the [μm] .

② Zero (ZERO) Adjustment

Press the probe lightly against the Zero plate so as to make a close adhesion and turn the Zero adjustment dial to set the meter pointer needle to the [0] line on the left edge of the μm scale.

③ Standard (STD) calibration

Place the attached 200μm standard thickness plate on the Zero plate, press the probe against it so as to make a close adhesion .

Turn the STD dial to adjust the meter pointer to the [200] line of the μm scale.

④ Repeat the Zero adjustment and the STD calibration 2-3 times and finally complete with the STD calibration.

■ When the [mm] range scale is used:

① Turn the Power source SW. to the [mm] .

② Zero (ZERO) Adjustment

Place the attached 200μm (0.2 mm) standard thickness plate on the Zero plate, press the probe against it so as to make a close adhesion .

Turn the ZERO dial to set the meter pointer to the [0.2] line of the left edge of the mm scale.

③ Standard (STD) calibration

Place the attached 2 mm standard thickness plate on the Zero plate, press the probe against it so as to make a close adhesion.

Turn the STD dial to adjust the meter pointer to the [2] line of the mm scale.

④ Repeat the Zero adjustment and the STD calibration 2-3 times and finally complete with the STD calibration.

5. Measurement

- After completion of the 4-3 item Zero adjustment and STD calibration, the meter can be ready for the conditions for measurement.
- Do not forcibly press the electrode tip of the probe against the object while measuring.
- Keep the same geometrical related positions among the probe, the substrate and the object to be measured while measuring as the conditions in which the Zero adjustment and STD calibration have been made.
- The meter needle points at the film thickness to be read only by pressing the probe lightly against the film of the object to be measured.

  ※The horizontal use of the meter is the standard in operation. Vertical, inclines positions in use may cause measurement errors.
- Be sure to turn off the Power source SW. after the completion of the measurement.

※Auto-Power-Off SW, is not available with this meter.

6. Battery replacement

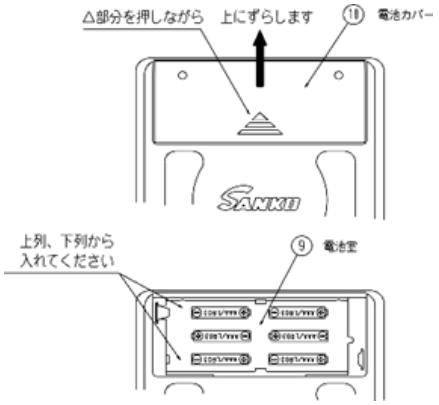
In case the meter needle points at the green zone or the more right side when the power source SW. is turned to 「BAT」, the battery is in normal condition. But when the needle points at the red zone or the more left side, the battery has run out of. In this case, replace with all 6 pieces of new batteries.

※ Replace with all 6 new batteries. Old and new mixed batteries may cause the incorrect measurement.

● How to remove the battery lid, install batteries and the cover.

While press and holding the Δ section, slide the arrow ↑ upward

⑩ Battery cover



Install batteries from the upper or the lower side.

⑨ Battery chamber

Press the cover to 「click in」.

7. Maintenance and Inspection

- Avoid exposing the meter in use to condensation, wetting, dust, high temperature, vibration or magnetic fields etc.
- Use with care the probe not to damage the electrode. Also, be careful not to magnetize the electrode (do not touch the electrode to or get it close to the magnet).
- After completing the measurement, be sure of turning off the Power SW. and store the meter in a dust-free place where high temperature and humidity can be avoided.
- When the meter is not scheduled to be used for a long period, make sure that batteries are removed from the meter.
- To ensure accurate measurement please take a periodical inspection and calibration.
  (inspection and calibration cycles change depending on condition and frequency in use, which can be determined by a user side.)

8. Improvement of measuring accuracy

● Zero plate

For use in the Zero adjustment/Standard calibration, prepare the Zero plate which is the same kind, thickness and shape as the substrate of an object to be measured.

● Standard thickness plate

Use the Standard thickness plate which is the same size as the film thickness or a little thicker one of painting or plating.

● Operating method of the probe

① 2 electrode type (Pro-W):

Press the probe lightly so as to contact 3 points, the 2 electrodes and the stabilizer leg with equal pressure against an object to be measured.

One point contact constant pressure type (Pro-S):

Press the probe holding the probe-guide by hand so as to contact the electrode and the probe guide (or V-groove) stably against an object to be measured.

② Press the probe lightly so as not to make backlash.
Forcibly handling the probe cause the following negative effect on the unit:

- Film to be measured is dented or damaged.
- The Standard thickness plate is dented or damaged.
- Electrode is deformed. The CVD processed electrode is damaged.

③ Do not slide the probe for measuring or that may cause deformation with abrasion.

- When magnetic substance is contained in the film to be measured, the correct measurement cannot be made. Also, when excessive amount of carbon is contained, the measurement cannot be made occasionally.
- Effect of edge and corner.
  Under the place near the edge or corner of iron plates and the neighbors, the condition of the magnetic flux become uneven. In this case, take a measurement spot a little away off the edge.
  The similar care should be taken for protruded, curved and welded portions.
- Effect of rolling
  Because of the effect of rolling, uneven magnetic fields occur in some part of the substrate. As measuring results change depending on each part, a mean value shall be taken by measuring several times.
- Effect of residual magnetism and strayed magnetic fields
  Residual magnetism in the substrate generated by an electromagnetic type conveyer or the strong magnetic fields caused by arc－welding may occasionally affect measuring results.
- Effect of surface roughness
  The surface roughness of the substrate and the surface to be measured Affects measuring results.
  Take measurement several times to obtain a mean value.
- Effect of temperature
  The range of the operating temperature is within 0 to 40℃. Large temperature differences of between adjusting and measuring process, and between of the meter and the probe units may cause measurement errors.

9. Specifications

Model name	Pro-S	Pro-W
Measuring method	Electromagnetic Type	
Measuring object	Non-conductive film and non-magnetic film on the ferrous substrate (including and ferritic stainless such as SUS430 etc.)	
Measuring range	0～500μm・0.2mm～5mm ±2μm against uniform surface or±5% of reading (whichever is larger)	
Probe	One point contact constant Pressure type φ17x85mm	2-pole type Electrode Dia.:φ6mm
	Electrode: Ultra anti-abrasive with CVD treatment	
Power source	Dry batteries (1.5 V) x 6 pcs	
Operating temperature	0～40 (w/o condensation)	
Dimensions and weight	137 (D) x 50 (H) x 110 (W)	
Accessories	Carrying case, standard plates, Standard plate case, Batteries, , Zero plate (ferrous) ,Zero plate case,Instruction manual	

※Specifications and appearance are subject to change without prior notice.

10. Trouble shooting (If any trouble?)

The following items show cases which are similar to malfunctions and can be misjudged. Check with items and take countermeasures according to instructions on the manual. If any trouble goes out beyond the instructions, contact our local distributor.

1. Pilot lamp does not go on.
   - ① The batteries run short of power.
   - ② The batteries are misplaced.
2. Zero adjustment cannot be functioned.
   - ① Press the probe against to the standard plate without using the Zero plate.
   - ② The Zero plate may not consist of iron material.
   - ③ The power source SW. may be misplaced.
3. The Zero adjustment can be functioned but not the Standard calibration.
   - ① The wrong scale may be used to adjust to the Standard calibration scale.
   - ② The batteries run short of power.
   - ③ The power source SW. may be misplaced.
4. The reading indication deviates extremely from the expected thickness value.
   - ① Foreign substance may stick to the electrode.
   - ② The scales may be confused for adjustment between the μm and the mm ones.
   - ③ The power source SW. may be misplaced.
   - ④ The substrate may consist of nonferrous material.
   - ⑤ The Zero plate used for adjustment is extremely different from the object to be measured in terms of the material and shape of the substrate.
   - ⑥ The object (film) to be measured may contain magnetic substance or powder.

11. Disclaimer

We are not liable for any damage to customers caused by the use, disuse or neglect of this product (including built-in software and data).

Products sold:

Coating thickness meter, Pinhole detector,
Moisture meter, Concrete covermeter, Condensator,
Needle detector, Iron piece detector, Viscosity cup

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