SANKO Coating Thickness Meter

SWT－7000Ⅱ／7100Ⅱ

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 (Japanese) is to be final authority.

SANKO ELECTRONIC LABORATORY CO., LTD.

Tokyo・ Osaka・ Nagoya・ Fukuoka・ Kawasaki

Contents Pages

Attention for safety (to use in correct ways)

To prevent you and your properties from damaging please take some time to read thoroughly this "Attention for Safety" and correct uses keep these instructions attentive to read when necessary.

Warning

Keep off water ● Do not dump nor wet the gauge unit in water, otherwise it may cause damages.
Please contact our distributor or sales office should submerged water into the unit.

Prohibition ● Keep metals or foreign substances from the unit, otherwise it may cause damages.
Please contact our distributor or sales office should put any materials or foreign substances in the unit.

Prohibition ● Do not insert a screwdriver into the connector, otherwise that it may cause damages.

Prohibition ● Do not throw, smash, drop the unit, otherwise it may cause damages.

Dismantling prohibited ● Never dismantle or modify the gauge unit by yourself, otherwise it may cause errors or damages.

Prohibition ● Do not use AC adaptors other than an exclusive adaptor for this unit, (SWT-7100Ⅱ only)
otherwise it may cause damages, electric shocks, fires.

Prohibition ● Please use the exclusive adaptor with a designated Voltage only, otherwise it may cause
damages, electric shocks, fires.

Prohibition ● Keep the terminals of the adaptor free from metal pieces or dust, otherwise it may cause short circuit,
electric shocks, fires.

Prohibition ● Do not handle the AC adaptor with wet hands, otherwise it may cause electric shocks.

Prohibition ● Do not damage, brake, modify, forcefully bend or twist the cord of the AC adaptor. Or, do not load it
with heavy staff or pinch it forcefully, otherwise it may cause breaking wires, short circuit, fires.

Attention For Safety(to use safely and correctly)

Warning

Must ● Never fail to remove batteries from the unit when not in use for a long time.
Leakages occurred from deterioration of batteries may cause erroneous reactions or damages.

Must ● Be sure to read this book on the item of「How to fit batteries」to replace batteries.

Must ● Store batteries in a place where children and pets are incapable of handling them.
Please call a doctor like in a case that a battery is swallowed.

Must ● Do not put batteries into fire or water. Store them in a cool, dry and dark place avoiding flames, high temperature and moisture.

Must ● Do not get batteries shocked and dismantled, and soldered for processing

Must ● Do not short or recharge batteries and handle with metallic tools like pliers.

Must ● Replace with new(unused) batteries according to the procedure of this Operating Instructions.

Must ● Be sure of paying attention on battery polarity marks,（＋、－） to place the batteries.

Must ● In case a battery has leakage please clean up the place with clothes to replace batteries.
And do not touch the leaked liquid and wash skins or clothes in case they are contaminated.

Must ● Comply to regulations and laws in your neighbors when disposing of them.

Must ● Insert a plug of the AC adaptor to the full end, otherwise it may cause electric shocks and fires with burns. And do not use faulty or loose receptacles.

Must ● Switch to OFF and unplug the AC adaptor from the receptacle to avoid electric shocks and damages when inspecting or cleaning the gauge.

Attention For Safety(to use safely and correctly)

Attention

Prohibition ● Do not use Benzene or Thinner for cleaning and spray pesticides on the meter, otherwise it may cause cracks or malfunctions.

Prohibition ● Do not store the meter in places getting high in temperatures such as in a car in strong sunlight or near heaters, otherwise it will be hazardous to the meter and may cause malfunctions.

Prohibition ● Do not step, trample down nor put anything on the meter.

Prohibition ● Keep the meter away off rubber-made articles or vinyl articles. A lengthy contact between meter and them may cause stickiness and it may be difficult to get rid of them.

Notes:

- Please read this manual thoroughly for correct operations before getting started.
- This meter is a precision gauge. Please handle with care.
- Do not tug, bend, fold or curl up forcefully the cables of probes.
- Do not knock or scratch objects with the tip of a probe.
- Keep the tip of a probe clean. A slight amount of dust may cause errors in measurements.
- Clean the meter and store it in free from dust and moisture after operation.
- To keep precision with a gauge please contact our distributor or our sales office once a year for inspection
- Keep the meter away off electric noises, shocks or magnetic fields when in a use.

Get started

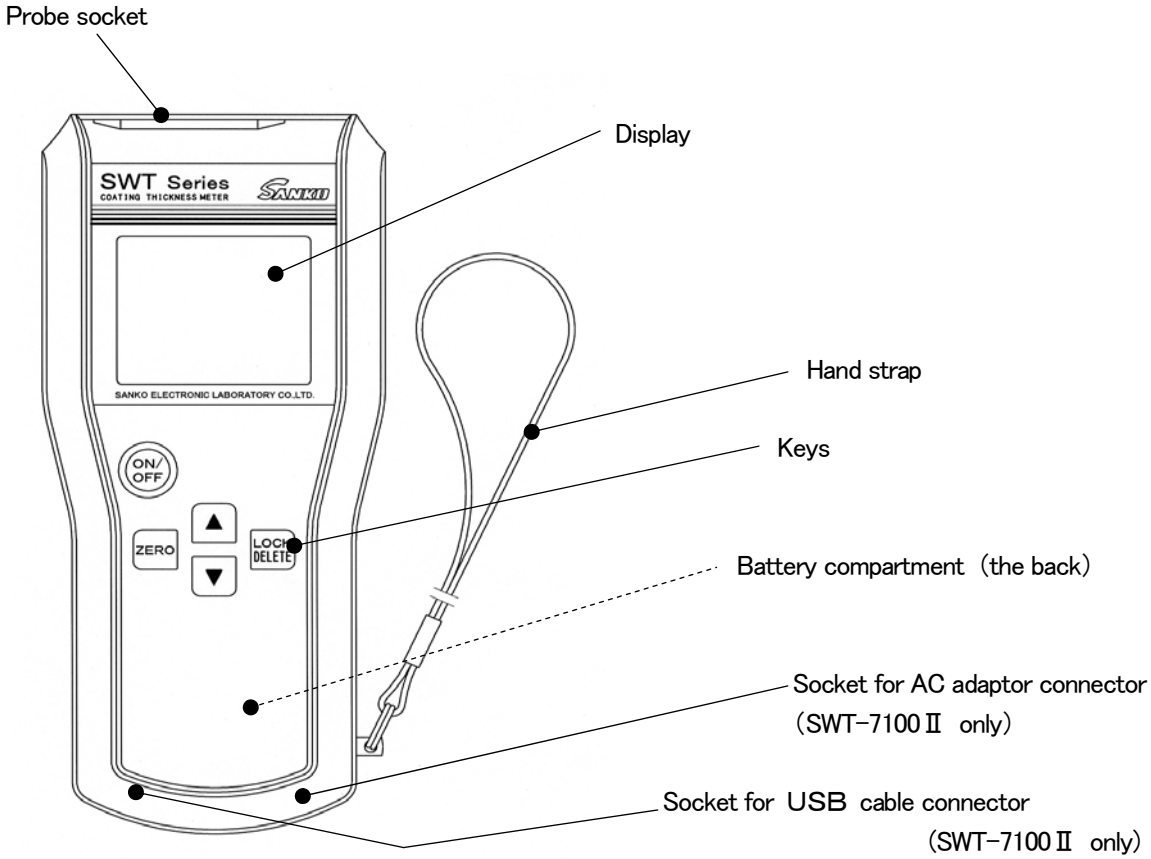
◆ Contents in a package

- Main unit
  SWT－7000Ⅱ, or SWT－7100Ⅱ
- Dry batteries R6P/AA（2 pieces）
- Carrying case
- Instruction manual（this manual）
- Warranty／User resistor sheet （Available only in Japan）
- AC adaptor （SWT－7100Ⅱ only）
- USB cable（2. 0m）（SWT－7100Ⅱ only）
- USB driver（CD）（SWT－7100Ⅱ only）

● In case of an optional probe

- Probe
  For ferrous(Fe), or non-ferrous(NFe)
- Zero boards for testing（for Fe:ferrous substrates／for NFe:non-ferrous substrates）
- Thickness standards(films :2 sheets、bake:1 sheet)

◆ Names of part



● Probe socket

Connect an optional-exclusive SWT probe to the probe socket.

（1） To measure a film thickness of coated, plated, lining layer on substrates made of ferrous material please use a probe of (Fe) series for the connection.

（2） To measure a film thickness of coated, plated, lining layer on substrates made of non-ferrous materials such as Aluminum, Copper, etc. please use a probe of (NFe) series for the connection

● Display

It indicates measurement results, operation guides, or malfunction status.

● Keys

（1） Power On/Off key

It switches On or Off.

（2）「ZERO」key、「▲」key、「▼」key

They are adjusting keys to be pre-used before measuring to obtain correct results.

（3）「LOCK/DELETE」key

LOCK: Protects against inadvertent key-operation.

DELETE: Deletes incorrect or unnecessary measuring results for adjustment.

(works only when「ZERO」、「CAILIBRATION」 is processed.)

● Battery compartment

It contains 2 pieces of dry battery (R06, AA).

● Hand strap

Hang the meter through a strap over your wrist never to drop it.

● Socket for AC adaptor (SWT-7100Ⅱ only)

This is a socket connected to the exclusive AC adaptor (accessory).

● Socket for USB cable (SWT-7100Ⅱ only)

It is a socket connected to a USB cable (accessory)

◆ How to fit batteries

① Open the battery lid on the back of the unit.
Press down and slide the lid in direction of arrow to open.

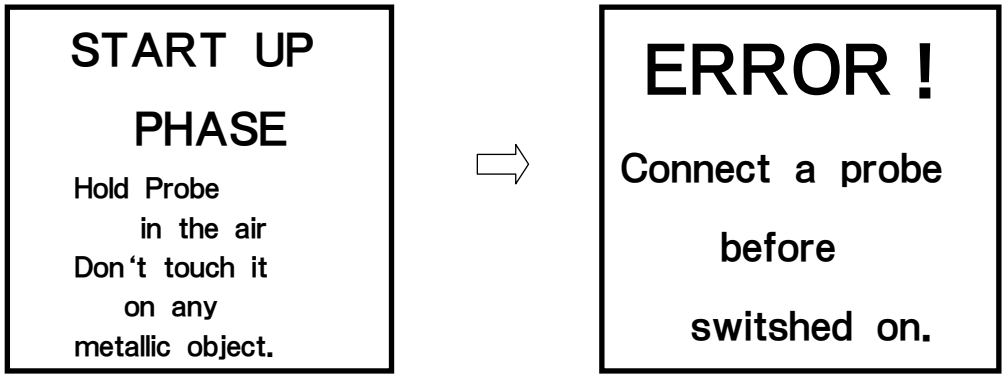
② Insert batteries.
Ensure correct battery polarity ⊕、 ⊖ for placement.

③ Close the lid.

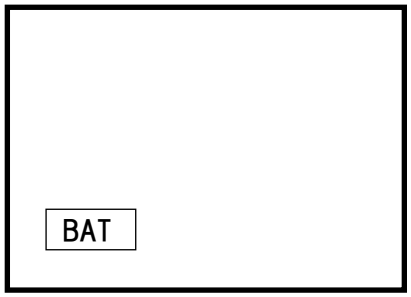
Caution

- Use designated and new (unused) batteries or ones supplied in this package.
- An incorrect use of batteries may cause leakages, bursts. Do not intermingle new ones with old ones.
- Take out batteries to store when not in use for a long absence, and that may avoid Leakages.
- Keep batteries off children and pets.
- Comply to the laws and rules in your Local Authorities when disposing of batteries.

When placing batteries in the unit, the messages and warning below on the screen may be indicated.
And these are not breakdowns, wait until the reading disappears with a beeping sound.



Batteries have run out when the display on the unit indicates the mark listed below.
Replace with new batteries.



◆ How to connect or disconnect a probe

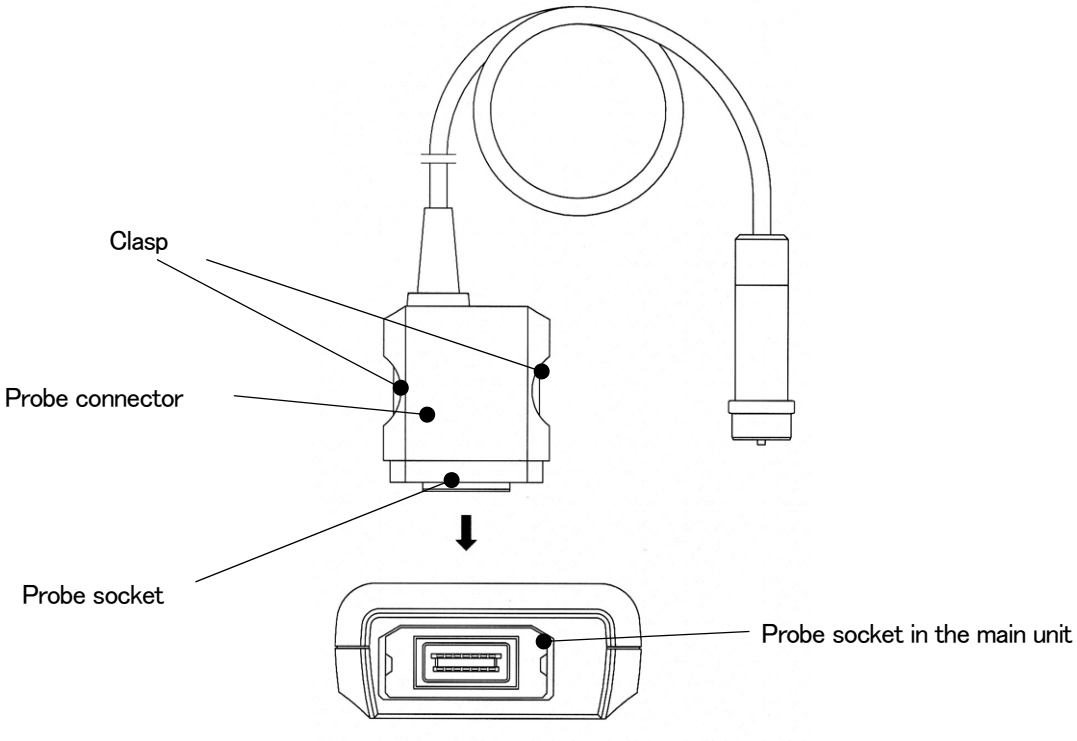
◎ Connect an optional, exclusive SWT probe to the main unit

Select one of the probes suited for your application.

Insert a probe connector into the probe socket of the main unit.

Make sure of aligning the keyway leading to a smooth joint without doing by force.

Insert and push it untill it is locked.



◎ Remove the exclusive probe from the unit.

Pull off the probe carefully by bending inward clasp springs at the both ends of the probe connector to release the clasps.

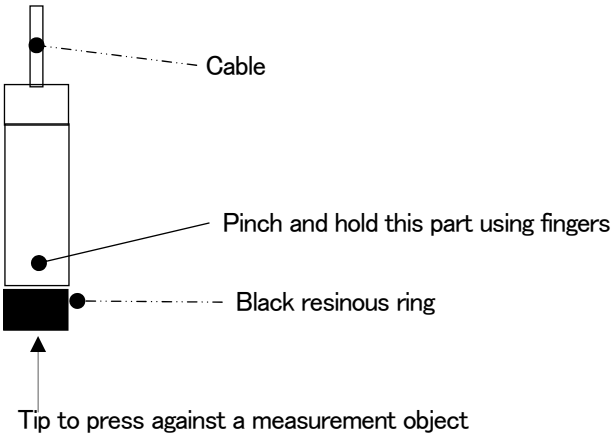
Do not pull off by force or it may cause damages.

⚠ Caution

Make sure that Power switches to off when connecting or disconnecting the exclusive SWT probes.

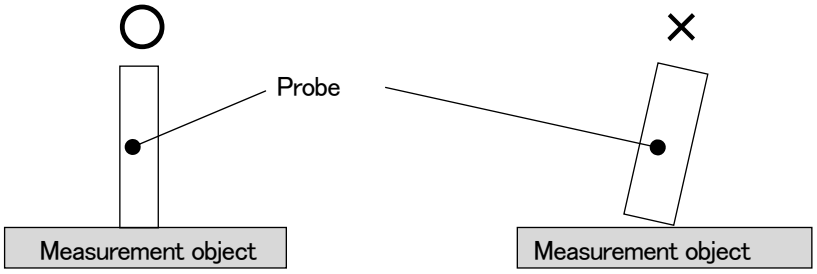
Or else, it may cause damages to connect or disconnect while Power is on.

◆ How to hold probes

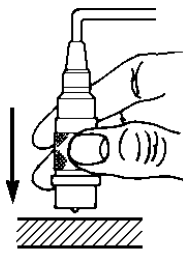


◆ How to press a probe to an object

- Keep the probe 5 cm or over away off metallic objects when not in use of measuring.
- Press the tip of the probe perpendicularly against a measurement object.
  Tilting may cause large errors.



※ Press the probe quickly and smoothly to objects.
A slow-acting press may cause large errors.



Quickly and calmly press perpendiculary against the object by grabing the probe as illustrated.
It beeps and the screen shows the measuring result.
When it does not beep, lift it 5～7 cm above the object and try again to take measurements.
＊use the Key-LOCK mode in taking measurements to prevent from inadvertent operations.

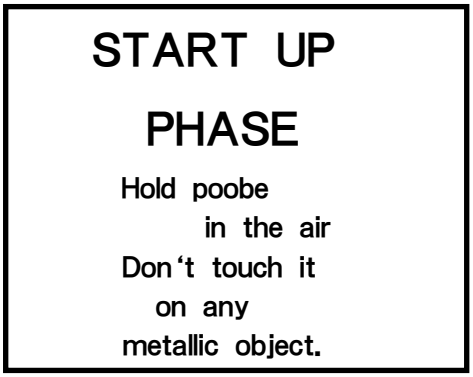
Caution

- ◆ Do not smash or hit the probe against objects, or it may cause damages to probes and to objects
- ◆ Do not scrape, scrub objects with the probe except in a special measurement.
  Or it may break the tip of the probe and cause damages to the tip and surface of objects

How to operate

（1） How to switch Power source

Press [ON／OFF] key.

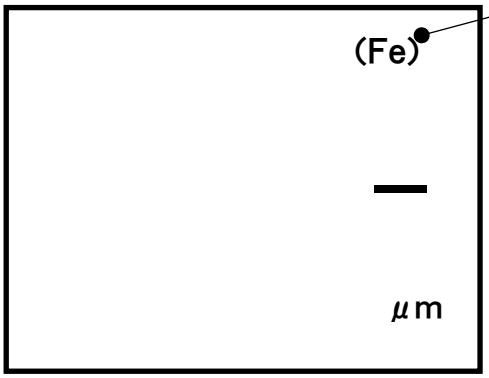


This message lasts for about 3 seconds.

Caution

Hold the probe in air without operation when the reading is on display. Or it may indicate 「ERROR」 and automatically switch off Power.

The buzzer emits a beeping sound.



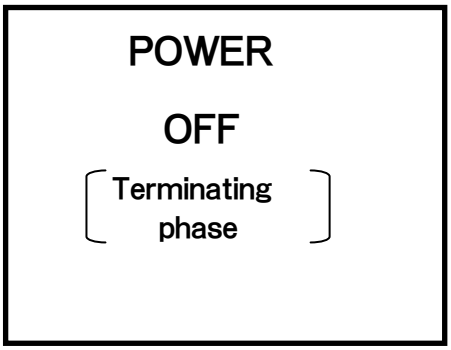
「Fe」shows that a SWT exclusive probe in Fe series is connected
「NFe」shows that a SWT exclusive probe in NFe series is connected

The display shows that it becomes possible to take measuring and adjusting procedures of this unit.

（2） How to switch off

Press [ON／OFF] key.

The buzzer beeps, beeps. (twice)



The message lasts for about 2 seconds.

Caution

Never remove probe from a unit when Power is ON. Or the electric shocks may damage the probe and the unit

This unit switched off.

(3) Zeroing

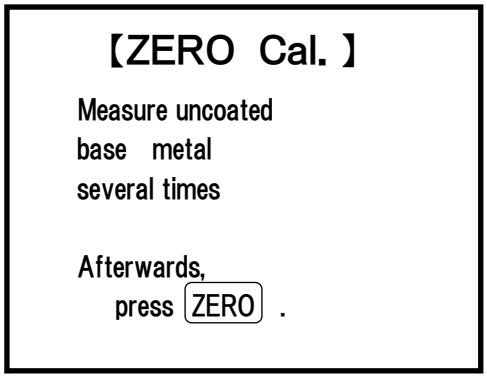
It is capable of getting started on measurements immediately after the message of「START UP PHASE」has disappeared as described on page 9.
However, it makes errors depending on material formation and shapes to be measured. To minimize measurement errors and obtain as accurate results as possible please be sure of carrying out 2 points of adjustments of「Zeroing」and「Calibration standard」before measuring process.

※ Please prepare for a Substrate plate the identical material, quality and size to a measuring object.
(This substrate plate should be designated as a「Zero Plate」)

◆ Press [ZERO] key.

The buzzer emits a beep sound.

It stopes its LOCK function of [LOCK/DELETE] key and changes to one data "deletion".

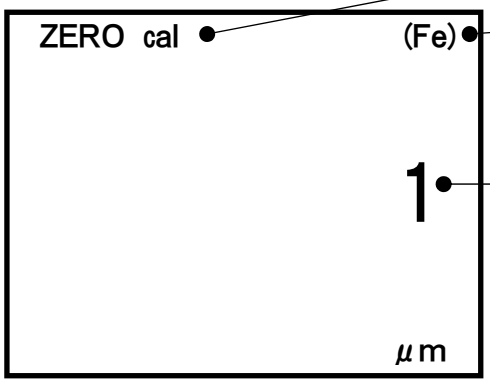


Press the probe on the above「Zero Plate」while the message is indicated on the screen. (about 20 second)

⇩

The buzzer beeps.

⇩



Zeroing is in process.

The reading shows that the unit is set to measure on substrate material of Ferrous by connecting a probe of the「Fe」series.

Measured numerical value
When the measuring value results in largely off the "0", press [LOCK/DELETE] key to delete the latest data out of measured values.
It indicates "—"to delete all data.

● Repeat a measuring process 2～10 times by pressing the probe to「Zero plate」. (A measurement value is displayed whenever a probe is pressed)

◆ When a measuring process reaches the 10th time, the buzzer beeps and zeroing automatically finishes without pressing [ZERO] key.

⇩

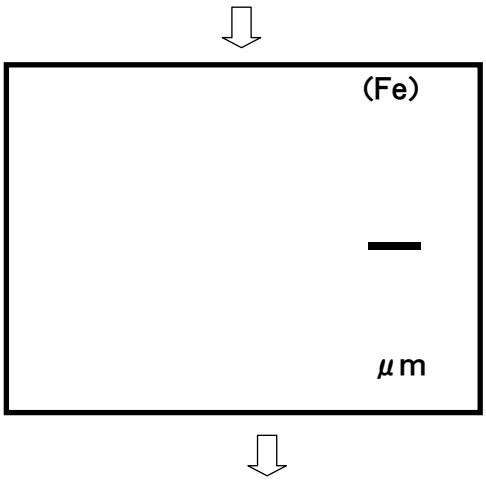
Remove the probe from「Zero plate」

⇩

Press [ZERO] key in case of pressing the plate less than 10 times.

⇩

The buzzer beeps.



It stopes its DELETION function of LOCK/DELETE key and returns to the "LOCK" function.

The reading shows that「Zeroing」has completed and it becomes possible to take measuring and adjusting operations of this unit.

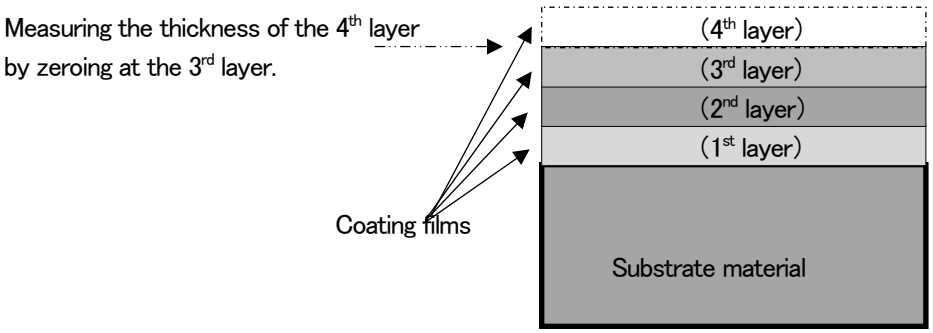
- It is correct that numerical values measured by pressing the probe to the「Zero Plate」indicates「0」or in the neighborhood of「0」.
  When the measured value results in largely off「0」μm, please try again zeroing from the beginning.

- [LLL] indicated on display during a time of zeroing means that the calibration point heavily deviates from the standard please make sure that the material is not in process of being built with others and repeat the zeroing in 2～4 times until a stable「0」is obtained.

Caution

The message of「ZERO cal.」described on the previous page is indicated on the screen for about 20 seconds. Without pressing the probe to the「Zero Plate」during the period of the reading on display, it automatically returns to the beginning. Try again zeroing procedures from the beginning if necessary.

(4) Zeroing in special cases (Multi-layers)



In case of being painted as shown with multi-layers on the substrate there may be needs to measure thicknesses of each layer. For example, measuring only the thickness of the 4th layer please zero as an assumed ZERO at the surface of the 3rd layer stacked on the substrate.

◆ Releasing of special-case zeroing

When zeroing again on the substrate after having finished the above measurements and if the combined thickness of 3 coating layers from 1st to 3rd exceeds 50 μm, please zero the meter on the following procedures.
If the thickness of 3 combined layers is bellow 50 μm, take the same procedure as usual zeroing to release.

● Prepare the identical material quality, plate size to a measuring object.
(This is a designated as a Zero Plate)

Press [ZERO] key.
The buzzer emits a beeping sound.

It stopes the LOCK function of [LOCK/DELETE] key and changes to one data "DELETE" function.

⇩

【ZERO Cal.】

Measure uncoated base metal several times.

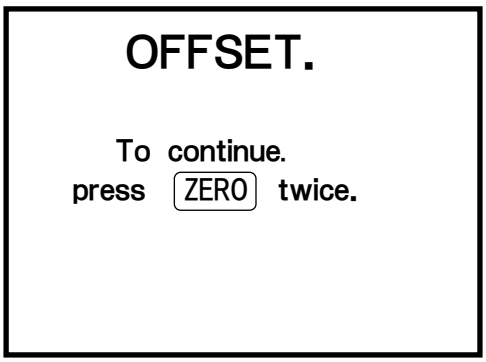
Afterwards, press [ZERO].

Press probe on the above「Zero Plate」 while the message is indicated on the screen. (for about 20 seconds)

⇩

The buzzer beeps, beeps, beeps.

⇩



Press ZERO key twice while this message on the reading

Caution

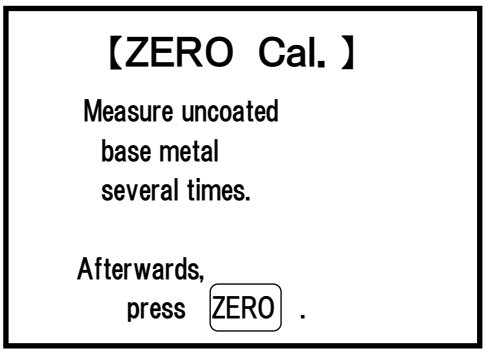
This message is indicated on display for about 20 seconds. If no ZERO key is pressed when the reading is on display,「Zeroing」is automatically interrupted and returns to the beginning of the process Try again zeroing from the beginning if necessary.

Press ZERO key . —— ①
The buzzer beeps.

⇩

Press ZERO key. —— ②
The buzzer beeps.

⇩

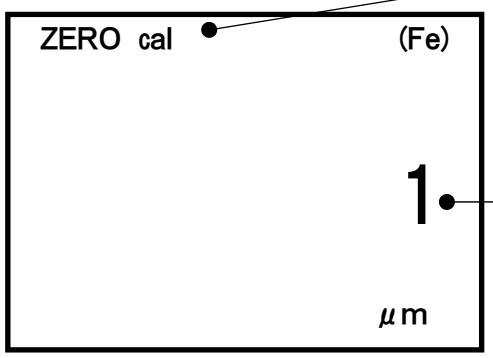


Press the probe to「Zero Plate」when on the reading for 20 seconds.

⇩

The buzzer beeps.

⇩



The reading shows that it is process of zeroing adjustments

Measured numerical value

Remove the probe from the「Zero Plate」

⇩

- Repeat a measuring process 2～10 times by pressing the probe to「Zero plate」.
  (A measurement value is displayed whenever a probe is pressed)
- ◆ When a measuring process reaches the 10th time, the buzzer beeps and zeroing automatically finishes without pressing ZERO key.

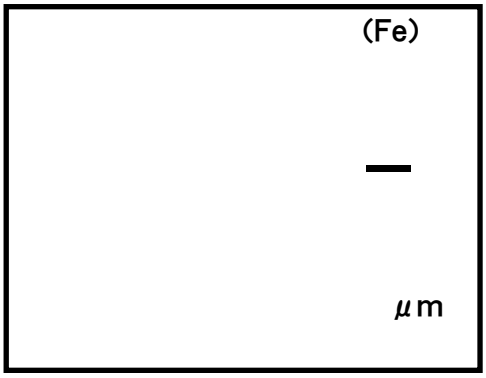
Press [ZERO] key in case of pressing the plate less than 10 times.

⇩

The buzzer beeps.

It stopes the LOCK function of [LOCK/DELETE] key and returns to the "LOCK" function.

⇩



「Zeroing」 has completed and it becomes possible to take measuring and adjusting operations of this unit.

- It is correct that numerical values measured by pressing the probe to the「Zero Plate」indicates「0」or in the neighborhood of「0」.
  When the measured value results in largely off「0」μm, please try again zeroing from the beginning.

- [LLL] indicated on display during a time of zeroing means that the calibration point heavily deviates from the standard please make sure that the material is not in process of being built with others and repeat the zeroing in 2～4 times until a stable「0」is obtained.

Note:

The latest measured value replaces the previous one and the new value of「Zeroing」is stored.

(5) 2-foil calibration when "Zeroing " is difficult to perform.

In case zeroing is difficult to perform such as measuring the thickness of the film on the rough surface of Blast-steel plates, a calibration method using 2 different thicknesses of standard plates pinching a thickness of the object is defined as 「JIS K5600」Standard. This calibration method complies to the regulations.

⚠ Caution

It is not possible to use both this calibration method and other calibration ones together, or mixing them together. Should were the methods taken, measuring results could be the wrong values.

- Prepare the same blast-steel-plate in material as the objective base or, a rough face on non-ferrous base like aluminum and 2 different thicknesses of Thickness standards.
  Please choose the suitable difference of thickness standards from the list below.

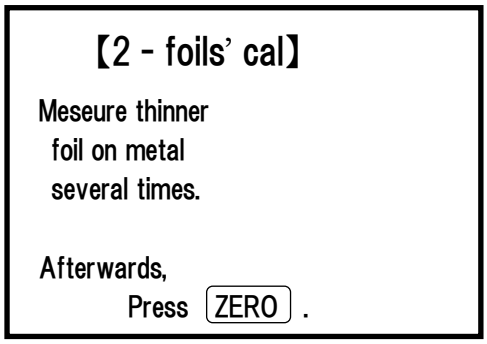
Predicting film thickness	Difference of thickness standard
～ 49. 9μm	10μm or over
50. 0 ～ 99. 9μm	25μm or over
100. 0 ～ 499. 9 μm	50μm or over
500 ～ 999 μm	199μm or over
1. 00 ～ 3. 00 mm	0. 5mm or over
3. 01mm ～	2. 0mm or over

Press and hold the [ZERO] key for 5 seconds.

⇩

The buzzer beeps.

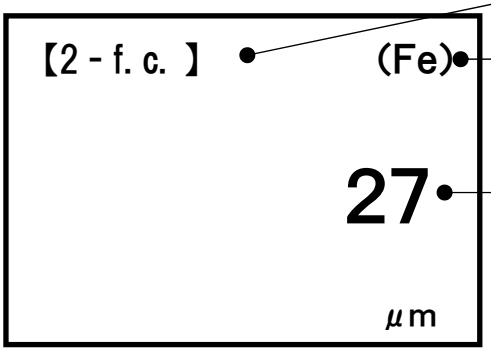
It stops the LOCK function of [LOCK/DELETE] key and changes to one data "DELETE" function.



Press and hold the probe on the thinner thickness standard chosen above, stacked on [ZERO plate] while this message being on display (approx. 20 seconds).

The buzzer beeps whenever pressing the probe.

⇩



It reads that 2-foil calibration is under process.

It reads that a probe of (Fe) series is connected to measure on a ferrous substrate.

Measured value
In case a measured value abnormally deviates, a press of [LOCK/DELETE] key deletes the latest entry and displays the second latest.
All deletion indicates " - " on the reading.

⇩

⇩

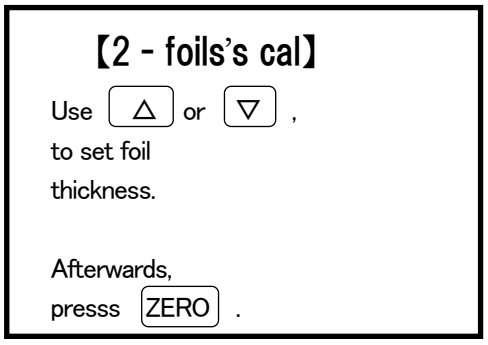
Press [ZERO] key afterwards.

⇩

The buzzer beeps, beeps.

⇩

＊Try measuring plural times in range of 2—10 times by pressiing the probe on a thinner「Thickness Standard」.
(a measuring result is indicated whenever the probe is pressed)
＊When repeating measurements 10 times, the buzzer beeps, beeps and changes automatically to the next adjusting process on the reading.

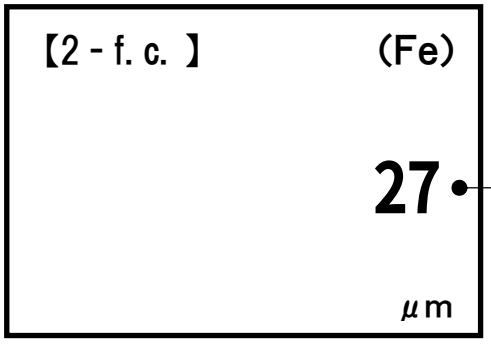


Caution

This message is indicated for approx. 20 sec. Without new entry during this period by prfessing [△] or [▽] key, the unit automatically returnato the begging from where to start again for calibration.

A press o f [△] or [▽] key makes the buzzer beep and mesuaring result appears on the reading.

⇩

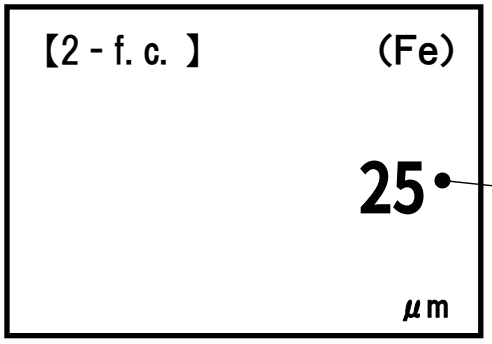


Last measureing value

Equate this reading value with thickness Standard (in this example, 25 μm) by pressing [▽] key.

A press of [△] key increase a reading value.

A press of [▽] key decreases a reading value.



Equate this value with the Thickness Standard.

After equating the reading value with the thickness standard , take the following procedures from ① to ②.

① press [ZERO] key

② waite for 5 seconds.

⇩

The buzzer beeps.

⇩

```
【2 - foils' cal】
Measure thicker
foil on metal
several times.

Afterwards,
      press [ZERO]
```

Press the probe on the thicker「Thickness Standard」stacked on the aforementioned「Zero plate」during this message being on the display (about 20 seconds).

The buzzer beeps whenever pressing the probe.

⇩

```
【2 - f. c. 】          (Fe)

                198•

                      μm
```

Measured value

In case the measured value abnormally deviates from the thickness standard, a press of [LOCK/DELETE] key deletes the latest entry and show s the second latest value on the reading.

⇩

＊ Try measuring plural times in a range of 2～10 times by pressing the probe on the thicker「Thickness Standard.
(a mesasured value is indicated whenever the probe is pressed)

Press [ZERO] key after completion of measuring processes.
The buzzer beeps, beeps.

⇩

＊ When repeating measurements 10 times, the buzzer beeps, beeps and change automatically to the next adjustment on the reading.

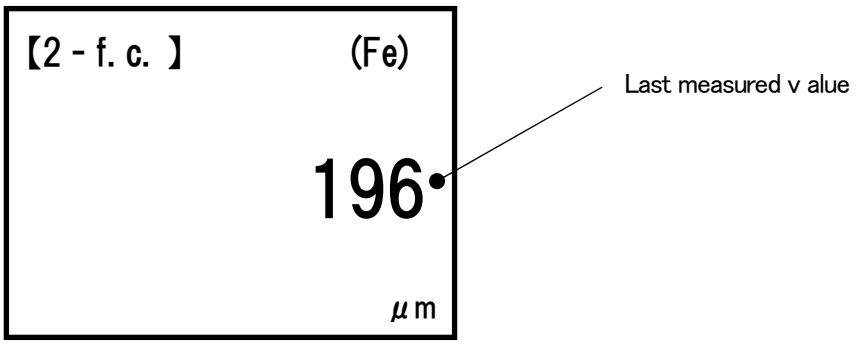
```
【2 - foil's cal】
Use [△] or [▽] ,
to set foil
thickness.

Then, ready for
          measure.
```

Press [△] or [▽] keys to match with Thickness Standard during this message being on display (about 20 seconds).

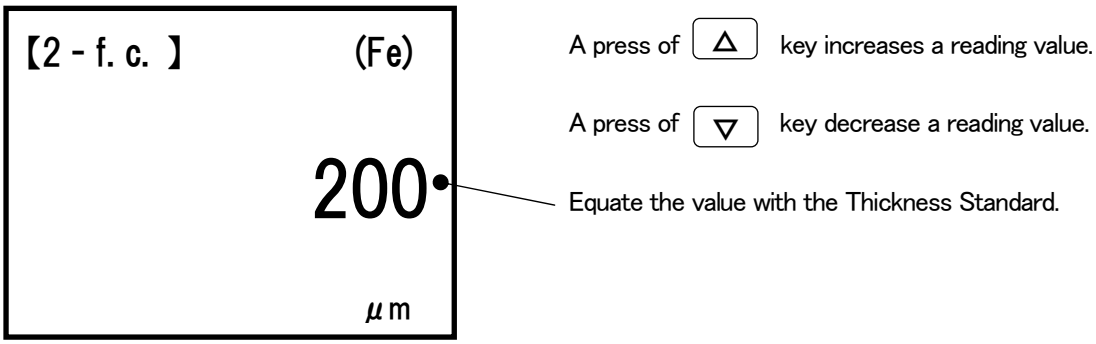
⚠ Caution

The letters of「2 – foil' s cal 」is indicated on the reading for about 20 seconds, Press [△] or [▽] key during this 20 sec. period, or this unit interrupts「2 foil' s cal」operation and automatically returns to the beginning., from where you start again for 2–foils calibration.

A press of [△] or [▽] key makes the buzzer beeps,
Indicating the last measured value on the reading.

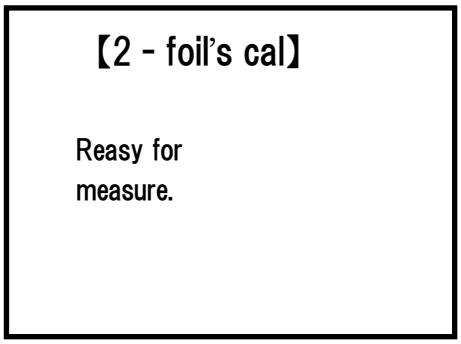


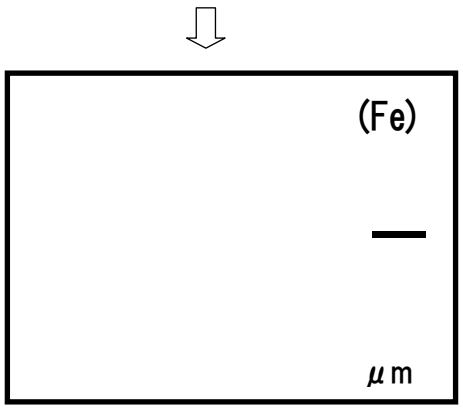
Equate the displayed value with the thickness of Thickness Standard
(in this example 200 μm) by pressing [△] key.



After matching with the thickness of the Thickness Standard,
choose one of the following ① or ②.

In case of ①:
Waite for about 5 seconds.
Then the buzzer beeps, beeps.



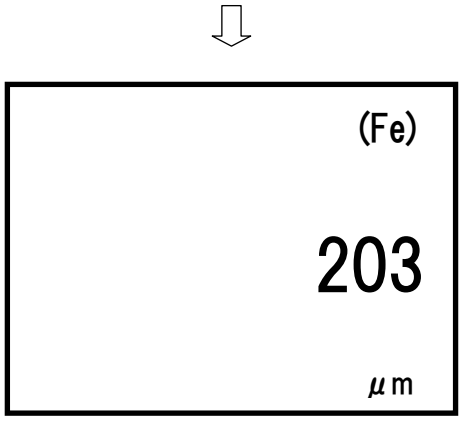


The unit is now ready to take mesurements and adjustments.

In case of ②:

Press the probe on Thickness Standard or measuring objects placed on a base.

The buzzer beeps and indicates a measuring value on the reading.. (The unbit return s to the 「measuring mode」.



Measuring mode

- It is correct that numerical values measured by pressing the probe to the 「Thickness Standard」 placed on the base like a blast steel plate ndicate 「O」 or in the neighborhood of 「O」.
- When the measured value results deviate largely from 「Thickness Standard」, please try again performing 2-folils calibration from the beginning.

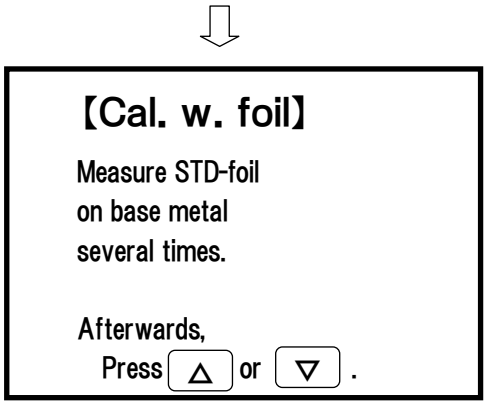
Note:

The new entry replaces the previous one and the last data measured with 「2-foils calibration」 is stored.

(6) Calibration standard (CAL)

- Prepare「Zero Plate」used in「Zeroing」.
- Prepare「Thickness Standard」which thicknesses is thicker or as thick as a measuring film.
- Place「Thickness Standard」on「Zero Plate」.
- Press △ key or ▽ key.

The buzzer emits a beeping sound.

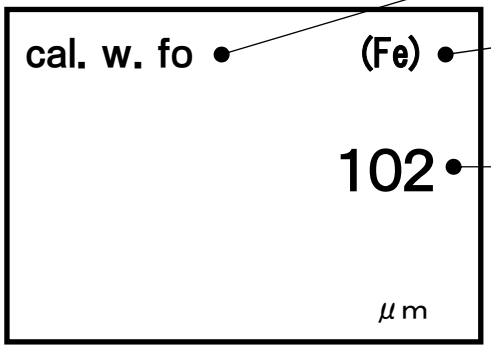


It stops the LOCK function of LOCK/DELETE key and changes to one data "deletion" function.

Caution

This message is indicated for approx. 20 sec. Without new entry during this period by prfessing △ or ▽ key, the unit automatically returnato the begging from where to start again for calibration.

The buzzer beeps whenever the probe is pressed.



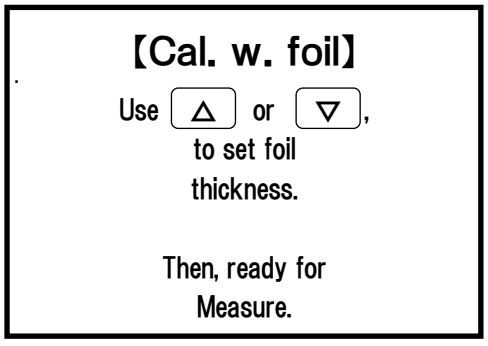
The reading shows that it is in process of Calibration standard.

The reading shows that the unit is set to measure on the substrate material of Ferrous by connecting a probe of the「Fe」series.

Measured numerical value

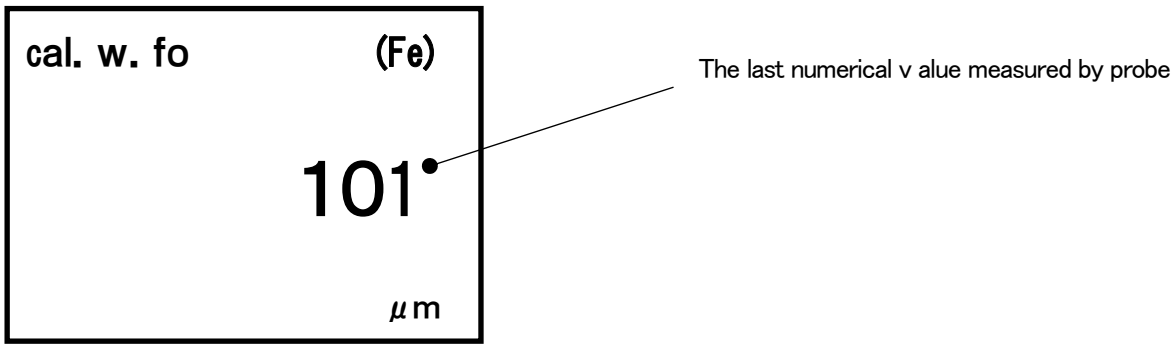
In case the measured value abnormally deviates from the thickness standard, a press of LOCK/DELETE key deletes the latest entry and shows "—" when all data were deleted.

Press △ or ▽ key after finsihing key operation.
The buzzer beeps, beeps.



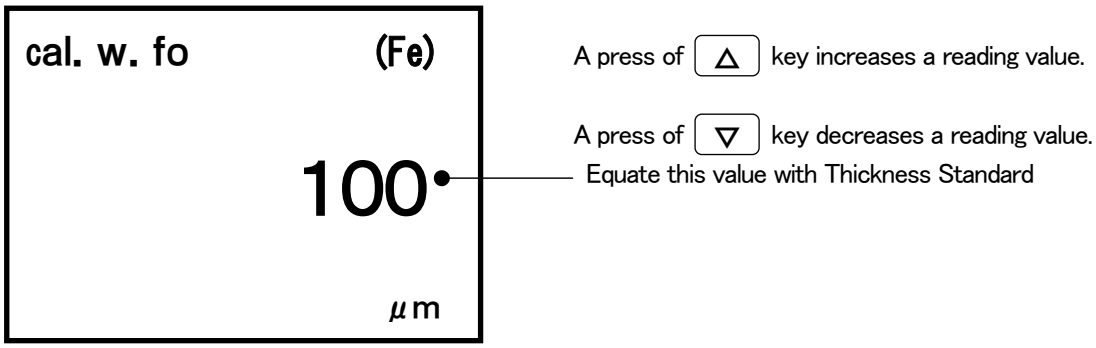
- ● Repeat measuring operations 2～10 times by pressing probe to「Thickness standard」on the「Zero plate」.
  (The measured value is indicated whenever the probe is pressed.)
- ◆ When the measuring process reaches the 10th time, the buzzer beeps to take the next page screen.

A press of [△] or [▽] key makes the buzzer beep
and the last measured value is indicated on the reading..



Equate a displayed value with the the Thickness Standard
by pressing [▽] key. (in this exampke, 100 μm)

⇩



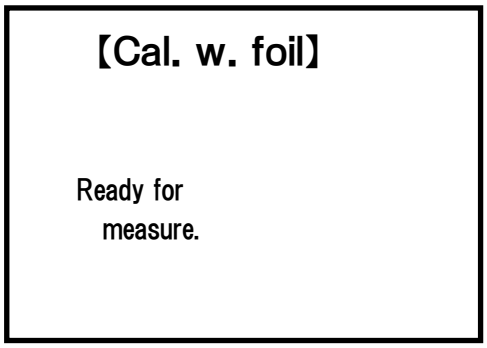
After matching with the thickness of the Thickness Standard,
choose one of the following ① or ②.

① Waite for about 5 seconds.
② Press probe to the measuring object.

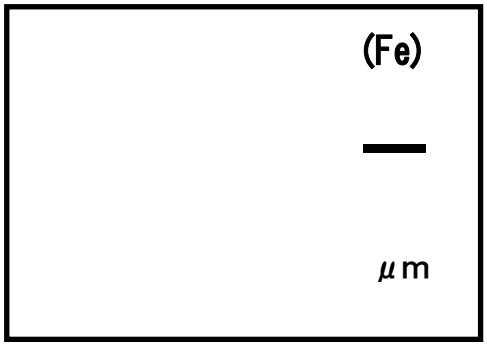
⇩

In case of ①:
The buzzer beeps, beeps.

⇩

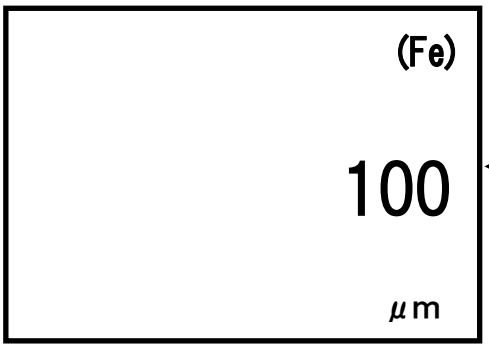


⇩



This uni is now ready for taking mesurements and adjustments.

In case of ②:
Press the probe to the object for measurements.



Measuring mode

- It is correct that numerical values measured by pressing the probe to the「Thickness Standard」on the「Zero Plate」indicates in the neighborhood of「Thickness standard」.
- When the measured value results in largely off the thickness of「Thickness Standard」 please try again calibration standard from the beginning.

Note:
The latest measured value replaces the previous one and the newly measured value with「Calibration standard」 is stored.

(7) How to delete calibration

Take the following procedures to delete calibration when the reading on the screen is locked or after batteries replaced or when it becomes impossible to process 「Zeroing」、「Calibration Standard」(CAL).

When holding [ZERO] key , press [▼] key.
The buzzer beeps, beeps.

⇩

ERASE?

(ZREO cal.)
&
(Cal. w. foil)

Press [▼] key during this message on the reading (about 20 seconds)

⚠ Caution

This message is indicated for about 20 seconds.
If [▼] key is pressed during 20 seconds the unit interrupts deleting and returns to the beginning . Try again from the beginning if deleting is necessary.

The buzzer beeps, beeps.

⇩

ERASE

(Cal. data)

The buzzer beeps, beeps.

⇩

(Fe)

—

μm

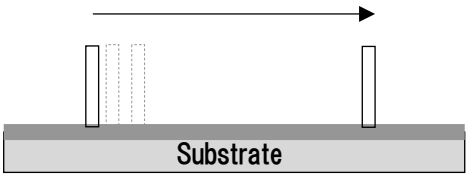
It becomes possible for this unit to take measurementsandadjustments procedures.

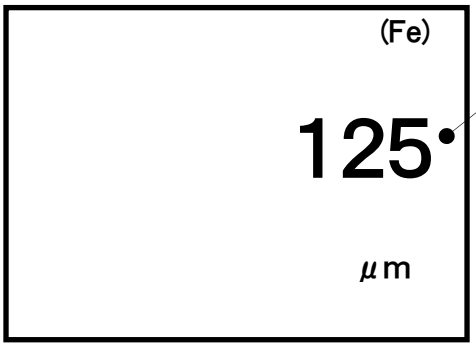
After deleting, take 「Zeroing」,「Calibration standard」 procedures proceeding to measuring.

Function switching

(1) Switching to Non-Interrupt Measurement Mode

Switch to「non-interrupt measurement mode」when it is necessary to slide a probe along the measuring surface of a substrate as illustrated on the right figure for continuous measurements of films.





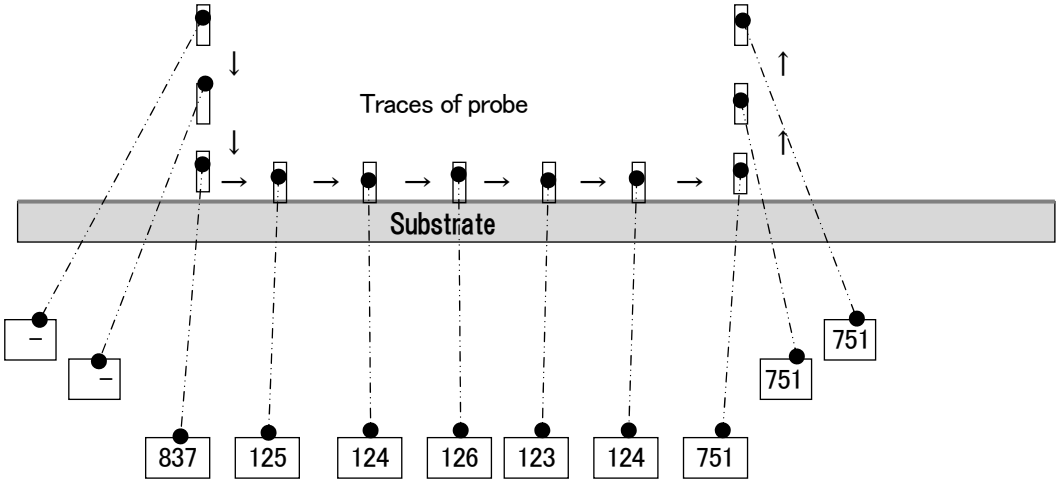
A measuring value is indicated and stored each time a probe is pressed in a normal state.

Hold [ZERO] key and press [▲] key.

The buzzer beeps, beeps.

⇩

This unit has turned into 「non-interrupt measurement mode」. Measurements can be made about in 0.5 seconds intervals and the data is indicated with a beeping sound.



Measuring values on display (indicated successively each 0.5 seconds interval)

※ The non-interrupt function is stored when switching Power to OFF, and can be maintained until re-activating to switch to ON.

Caution

Note that this measuring method may damage the measuring surface or the probe tip due to sliding frictions. Please try fewer to take this method to minimize the frictions.

《Returning to the beginning》

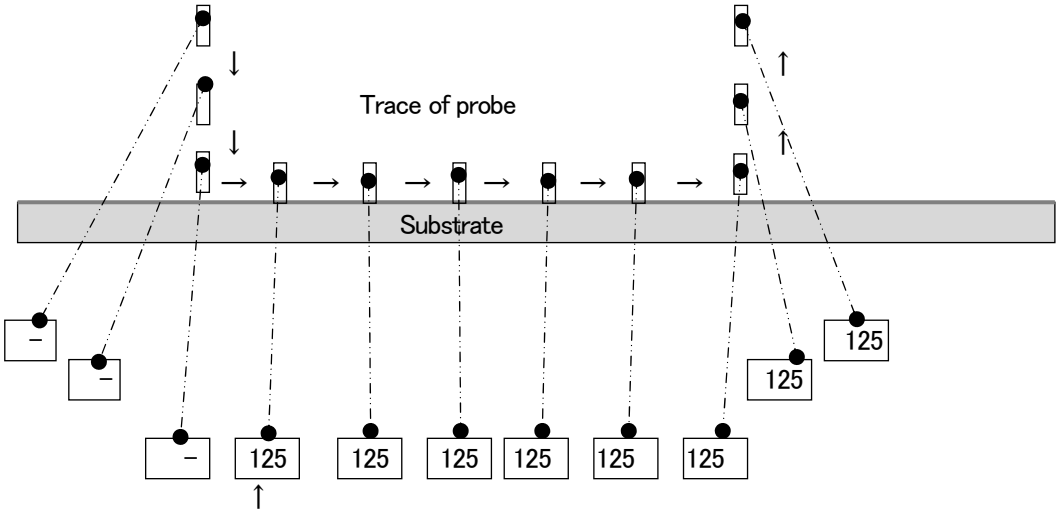
To return 「non-interrupt measurement mode」 to the beginning take the same procedures as at the initial setting.

Hold [ZERO] key and press [▲] key.

The buzzer beeps, beeps.

⇩

「non-interrupt measurement mode」 has been released and returned to the beginning.



Measured values are stored until a next measurement is taken.

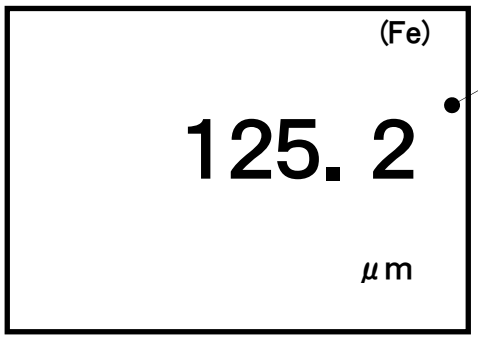
(2) Switching to Resolution

To inspect precisely a thickness up to 500 μm it is possible to take solution measurements by switching to a 0.1 μm (0～400 μm) unit , to a 0.5 μm (400 ～ 500 μm) unit.
In this case it changes resolution units by taking the following procedures.

- Switch Power to Off.
- Hold [LOCK] key and press [ON/OFF] key until the buzzer beeps in the following.

The buzzer beeps, beeps.

⇩



Indicated :
0～400 μm by the 0.1 μm unit,
400 μm～500 μm by the 0.5 μm unit.

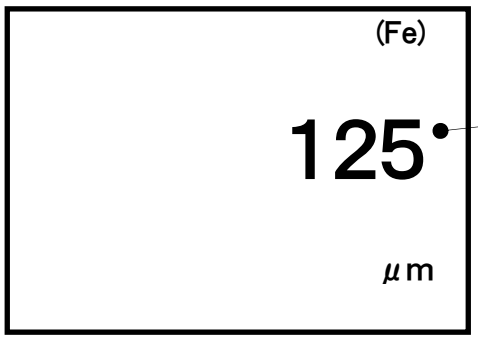
《Returning to the beginning》

To return 「0.1 μm」 display resolution to the beginning take the same procedures as the above.

- Switch power to OFF.
- Hold [LOCK] key and press [ON/OFF] key until the buzzer beeps in the following.

The buzzer beeps, beeps.

⇩

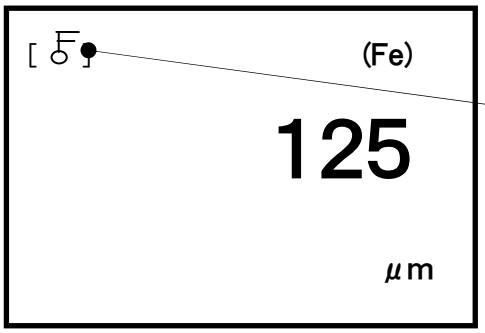


No indication under a decimal point

（3） Switching to Key Lock Mode

This is to prevent this unit from making errors by inadvertently fingering a key in taking measures.

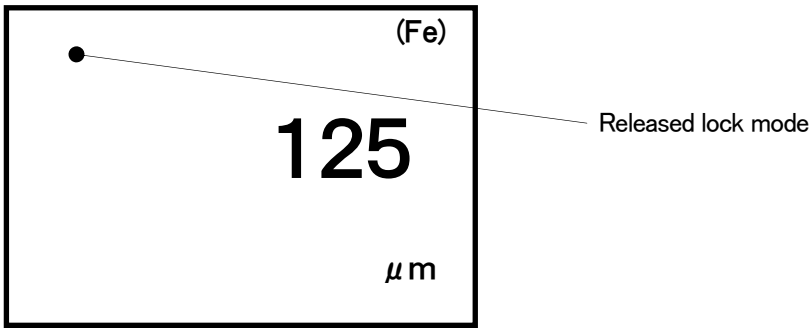
- Press LOCK/DELETE key when Power is On.
  The buzzer beeps.



Any presses of keys except ON/OFF key locks the operation to be non-operational to avoid errors.

《Releasing lock》

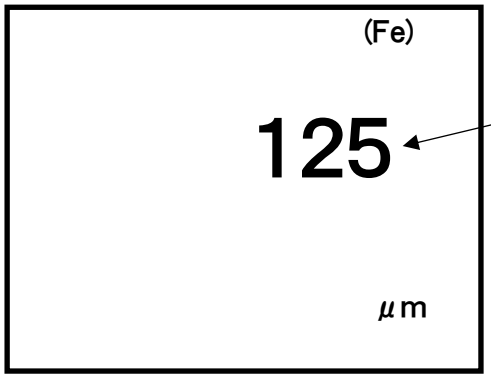
- Press ON/OFF key and switch Power off.
- Press ON/OFF key and switch Power on.
  The lock has been released and all keys can be activated.



Measuring

● According to explanations on page 8 hold a probe and quickly press it to a measuring object.

The buzzer beeps.



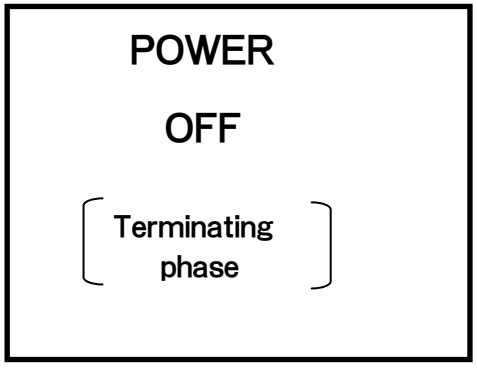
A measured result is indicated.

Each time a probe is pressed to an object the buzzer beeps and the measuring result is indicated.

《Auto-Power-OFF》

Power will automatically be switched off 3 minutes after the last entry to save batteries.

The buzzer beeps.



The message lasts for about 5 seconds.

The buzzer beeps.
This unit switches Power off.

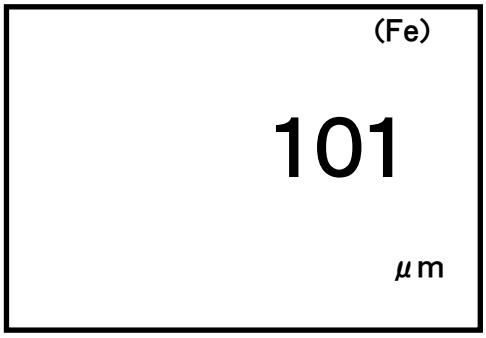
※ SWT－7100Ⅱ equip AC-adaptor as one of accessories. and Auto-Power-Off functions also works with AC-adaptor connected.

Transferring data （SWT-7100Ⅱ）

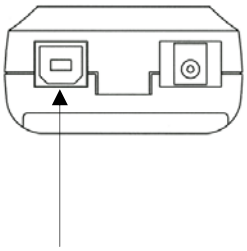
Transfer data to a PC (personal computer) by using a USB cable
Refer to separately attached information for arrangements to install a driver into a PC side.

Outright transferring measured data

- Prepare for a PC side.
- Connect a USB cable to a PC.



- Data is sent out with a beeping sound whenever a measurement is taken.



Connect USB cable to this outlet. The other part is connected to PC.

Note to improve measuring accuracy

① Zero plate

Prepare the same material, thick and sized plate as the measuring object for zeroing and calibration standard (CAL). Different materials may not bring about correct measuring results.

＊ As accessories to probe, "zero plates for zeroing"「for electromagnetic: SUS-430」(ferrite stainless), 「for eddy current: AL1050 (aluminum)」 for testing purpose only.
Select a substrate to meet actually measuring objects.

② Thickness standard (plates)

Take calibration standard measurements using a Thickness standard which is thicker or as thick as the measuring films.

＊ Use of a calibration standard with a deviant thickness may cause errors.
Replace worn-out or bent plates with new ones. In case non-accessorized plates are necessary (over 15 μ m), contact a local sales office.

③ Quality of films to be measured

Magnetic metal contained films can not correctly be measured. In case of measuring elastic films, place a standard plate of 30～50 μ m thick on the object and subtract the thickness from the measuring value to avoid errors to becaused by elastic dents.

④ Measurements of edges or angles

Magnetic fields in the neighborhood of the edges/the angles of a measuring object become uneven.
15～20 mm closer part to the center of the object shall generally be measured.
Pay attention to protruded part, curved part or unexpectedly deformed part.

⑤ Measurements of rough faces

Roughness of a substrate, a measuring face affects measuring results.
Take a mean value by measuring several places at a time.

⑥ Measurements of stretched part on faces

In some case stretched, rolled part occurred on a substrate, which may cause measuring errors.
Take a mean value by measuring several places at a time.

⑦ Temperature

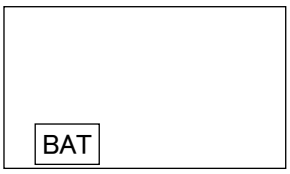
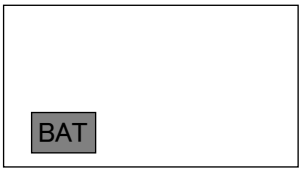
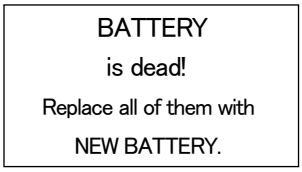
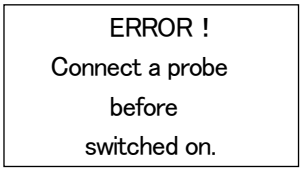
Operating temperature range is 0～40 ℃ Especially difference between a main unit and a probe causes measuring errors.

⑧ Residual magnetism, stray magnetic fields

Pay attention to transportation method of electromagnets, residual magnetism on substrates or arc welding, those of which emit strong magnetic fields to cause measuring errors.

Trouble Shooting

Before contacting us please check with the following points.

Symptoms	Points to check	Measures to be taken
No response upon press of ON/OFF key.	Are batteries worn out?	Replace them with new ones (2 ea.)
No response after replacing batteries and pressing a key	Something wrong inside a meter	Contact us for repair
	Batteries is shorting.	They can be used for a while. Prepare for new batteries.
	Batteries have worn out.	Replace them with new one
 《Power OFF》	Out of batteries	Replace new batteries
 《Power OFF》	Started pressing probe to object soon after switching on.	Hold probe in air, keeping it away off objects, metals during a time of the message on screen. .
 《Power OFF》	Press ON/OFF key without connecting probe	Press ON/OFF key after being sure of connecting probe.

Symptoms	Points to check	Measures to be taken
TROUBLE ! The probe may have trouble. Change it to the other one. 《Power OFF》	Something wrong with probe	Contact us for repairs

Specifications

◆ Unit

Items	Applications
Model names	Dual electromagnetic／eddy current（SWT－7000Ⅱ、SWT－7100Ⅱ）
Display method	Graphic LCD（data ・ message）
Ranges	Depending on optional probes
Calibrations （CAL）	2 points calibration type Zeroing : for substrate Calibration standard : for substrate and standard thicknesses
Additional functions	① Key Lock ② Auto Power Off（3 min.） ③ switching modes（hold／non interrupt） ④ Switching display resolutions ⑤ USB connections（SWT-7100Ⅱ only）
Keys	ON/OFF 、 ZERO 、 ▲ 、 ▼ 、 LOCK/DELETE
Power	3V DC（AA, R6P×2）、(exclusive AC adaptor : SWT-7100Ⅱ)
Operating Temperature	0 ～ 40 ℃（Non-condensing）
Accessories	Dry battery, Carrying case、 (7100Ⅱ) : AC adaptor、USB cable、USB driver（CD）
Optional	For ferrous substrate probe(Fe)、 for nonferrous substrate probe (NFe)
Dimensions	72(W) × 30(H) × 156(D)mm
weight	200g

Sept, 2009

◆ Probes （Optional）

<table>
<tr><td>Models</td><td>Fe－2. 5/Fe-2. 5 L</td><td>NFe－2. 0 /NFe-2. 0 L</td><td>NFe－0. 6/NFe-0. 6 L</td></tr>
<tr><td>Methods</td><td>Magnetic inducing type</td><td colspan="2">Eddy current type</td></tr>
<tr><td>Ranges</td><td>0～2. 50mm</td><td>0～2. 00mm</td><td>0～600μm</td></tr>
<tr><td>Display resolutions</td><td>1μm:0～999μm
switching to
0. 1μm:0～400μm、
0. 5μm:400～500μm

0. 01mm:1. 00～2. 50mm</td><td>1μm:0～999μm
switching to
0. 1μm:0～400μm、
0. 5μm:400～500μm

0. 01mm:1. 00～2. 00mm</td><td>1μm:0～600μm

switching to
0. 1μm:0～400μm、
0. 5μm:400～500μm</td></tr>
<tr><td>Accuracies
（on flat face）</td><td>0～100μm:±1μm
or ±2% the designated value
101μm～2. 50mm:±2%</td><td>0～100μm:±1μm
or ±2% the designated value
101μm～600μm:±2%</td><td>0～100μm:±1μm
or ±2% the designated value
101μm～2. 00mm:±2%</td></tr>
<tr><td rowspan="2">Probes</td><td>One point contact constant pressure type, V cut
φ13×48mm</td><td>One point contact constant pressure type, V cut
φ13×47mm</td><td>One point contact constant pressure type, V cut
φ11×48mm</td></tr>
<tr><td colspan="2">Option : V type probe adaptor
（3 kinds: forφ5 less、φ5～10、φ10～20）</td><td></td></tr>
<tr><td>Accessories</td><td>Standard thickness,
Zero plate fro testing（Fe）</td><td colspan="2">Standard thickness, Zero plate for testing（NFe）</td></tr>
<tr><td rowspan="2">Measuring objects</td><td rowspan="2">Coating,, lining,, thermal spray film, plating (except electrolyte nickel plating), etc. on magnetic metal substrates like ferrous, steel, etc.</td><td colspan="2">Insulated films etc. on non-magnetic metal substrates like aluminum, copper, etc.</td></tr>
<tr><td>For comparatively general measuring objects.</td><td>For high stability with bars, thin tubes, minute pieces etc.</td></tr>
</table>

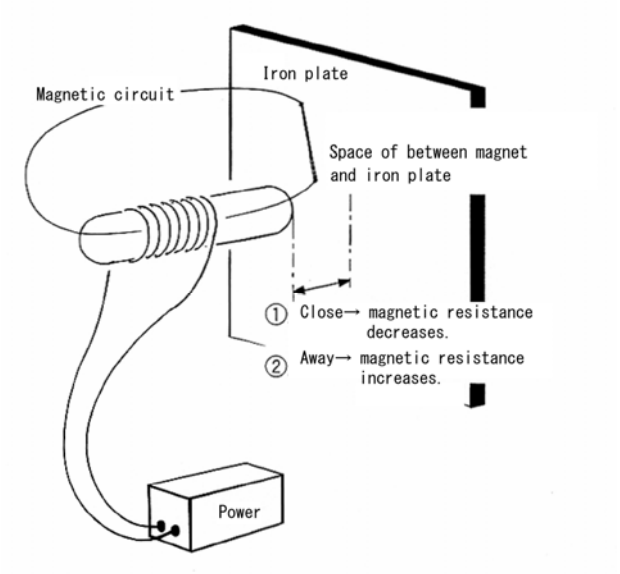
＊Probes except NFe-0.6 are heat-resistant (about 200～250℃)

＊Please contact us for inquiries about other probes.

Reference (Principle of measurements)

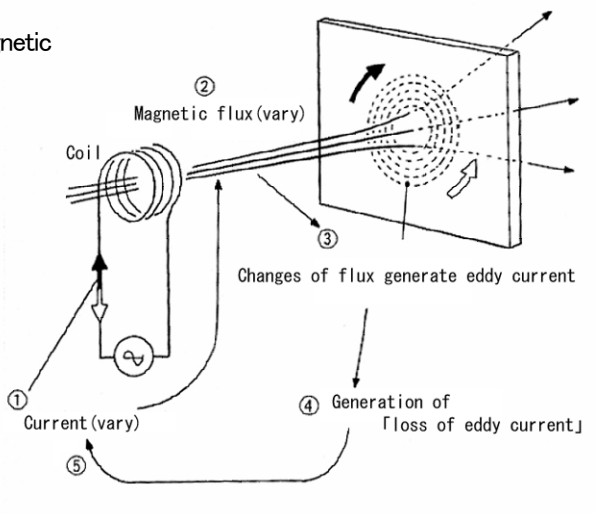
● Electro-Magnetic type

When metals approach to AC- magnetic fields emitted from probe, the metal and the magnet pull each other.
It makes the pulling force stronger as they come closer.
In other words, it makes the magnetic density higher as they come closer. On the contrary, it weakens the magnetic density as they move away from each other.
This symptom means that magnetism emitted from probe has Higher Transferability when they come closer, and lower Transferability when they move away from each other.
These levels of transferability of the magnetism co-relate with thicknesses of films coated on substrates.
By analyzing correlations of transferability/less transferability (Reluctance), and thicknesses of the films on the substrates, the correlated values can be converted to the thickness, actually by measuring the Reluctance to be processed.
Because it is difficult to observe and measure magnetic volumes, it is necessary that the Reluctance volumes be converted to electric volumes using coils and methods of the Principle of Electromagnetic Induction so that the measured values can be processed and converted to the thickness values.



● Eddy Current Type

The eddy current is induced on the surface of metals when metals approach to alternating current fields emitted from probe.
As the metal comes closer to the probe, the eddy current increases and the magnetic field density becomes high.
On the contrary, as the metal move away from the probe, the eddy current decreases and the magnetic density becomes low: Correlations of between density of magnetic field and film thicknesses on the substrate are analyzed beforehand.
It measure the thicknesses by converting to the thickness value from the magnetic density measured through the above correlations.
Because it is difficult to observe and measure the density of a magnetic field, it is necessary that a coil be put in magnetic fields and converted to electric volumes for measurements using the Principle of Electromagnetic Induction so that the measured value can be processed and converted to the thickness value. Generally in the eddy current type, it varies in measurement range on non-magnetic substrate by dividing substrates by a high-wave transferable like Alumi and Copper and non-transferable like irons to optimize the measurement methods.



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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
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