SANKO Coating Thickness Meter

SWT－7200Ⅳ

Instruction Manual

Caution

- Read the manual thoroughly and use the meter correctly.
- Keep the manual with care and refer to it when necessary.

SANKO ELECTRONIC LABORATORY CO., LTD.

Tokyo・Osaka・Sendai・Nagoya・Fukuoka・Kawasaki

August 2023

Contents Pages

Attention for safety (to use safely and correctly)

To prevent you and your properties from damaging please take some time to read thoroughly this "Attention for Safety" and use this main unit correctly.

And keep these instructions attentive to read when necessary.

⚠ Warning

Prohibition ● Do not dump nor wet the main unit in water, otherwise it may cause malfunctions.
Please contact our distributor or sales office should submerged water into the main unit.

Prohibition ● Do not insert metals or foreign substances into the main unit, otherwise it may cause malfunctions.
Please contact our distributor or sales office should put any metals or foreign substances in the main unit.

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

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

Prohibition ● Never dismantle or modify the main unit by yourself, otherwise it may cause errors reactions or damages.

Prohibition ● Do not use AC adaptors other than an exclusive adaptor for this main unit.
※ And do not use volatage other than the specified voltage, otherwise it may cause damages, electric shocks, fires.

Prohibition ● Keep the terminal of AC adaptor from conductive substances or dirt, otherwise it may cause short circuits, electric shocks, ignitions and 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 damages, breaking wires, short circuits, electric shocks, fires.

Attention for safety （to use safely and correctly）

⚠ Warning

Must ● Never fail to remove batteries from the main 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 pets and children 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 specified, new batterie (watch: battery life).
Some special dry batteries (nickel batteries) may not work properly.

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 cloths 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.
And do not use faulty or loose receptacles, otherwise it may cause electric shocks and fires.

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

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, otherwise it may cause malfunctions or injuries.

Prohibition ● Keep the meter away off rubber-made articles or vinyl articles. A lengthy contact between the 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 us for a periodical inspection.
- Keep the meter away off electric noises, shocks or magnetic fields when in a use, otherwise it may cause malfunctions.

Get started

◆ Contents in a package

Please make sure if the following items sre included.

- Main unit
  SWT-7200Ⅳ

- Dry batteries LR6 (2 pieces)

- SWT／SAMAC series CD
  - ◆ SWT-7200Ⅳ Instruction Manual (this manual)
  - ◆ USB driver
  - ◆ Instllation of USB transfer driver

- Inspection certificate (warranty)-cum-user registration sheet
  (This warranty is valid only in Japan)

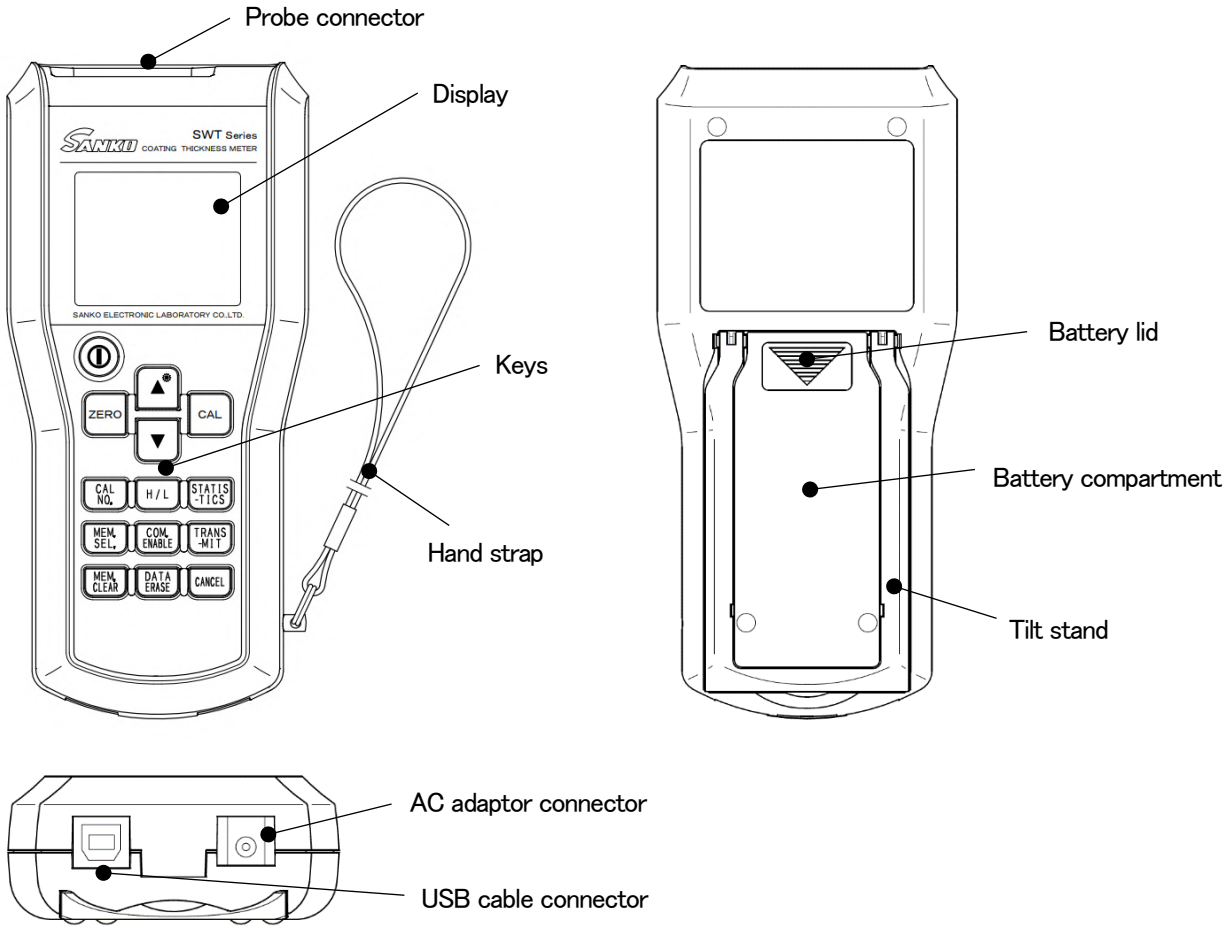
- Hand strap cord (attach directly to main unit)

- Carrying case for main unit

- AC adaptor

- USB cable

◆ Names of part



● Probe connector

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

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

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

(3) To measure a film thickness on a coated metal substrate made of either ferrous or non-ferrous please use a Dual type probe 「SFN-325」.

● Display

It indicates measurement results, operation guides, or malfunction status. With a backlight.

● Keys

(1) 「⏻」 (Power source) key

It switches ON or OFF.

(2) 「ZERO」key

To set a ZERO point of substrate before measuring.

(3) 「▲☼」key、「▼」key

They area Backlight key / an adjusting key to set a neumericall value for standard adjustments.

(4) 「CAL」 key

This is to start up and finish the Calibration standard, and delete an abnormal value taken during adjustment process.

(activates only when 「Zeroing」, 「Calibration standard」 is processed with combination with 「▼」 key)

※ Power source key /operation keys activate setting of various kinds of functions in combination with other keys.

(5)「CAL No.」key

It is a key to select a Calibration curves.

(6)「H/L」key

It is a key to set High/Low limit values.

(7)「STATISTICS」key

It is a key to process statistics of data stored in memory.

(8)「MEM. SEL.」key

It is a key to select memory area to store memory.

(9)「COM. ENABLE」key

It is a key to select a method for data transfe.r.

(10)「TRANSMIT」key

It is a key to activate transferring process of data process.

(11)「MEM. CLEAR」key

It is a key to delete data stored in memory.

(12)「DATA ERASE」key

It is a key to erase one of data displayed on the screen.

(13)「CANCEL」key

It is a key to interrupt the operation in progress and take an immediate step back to measuring process.

- Hand strap

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

- AC adaptor connctor

  A conector to connect the exclusive AC adaptor (accessory).

- USB cable connctor

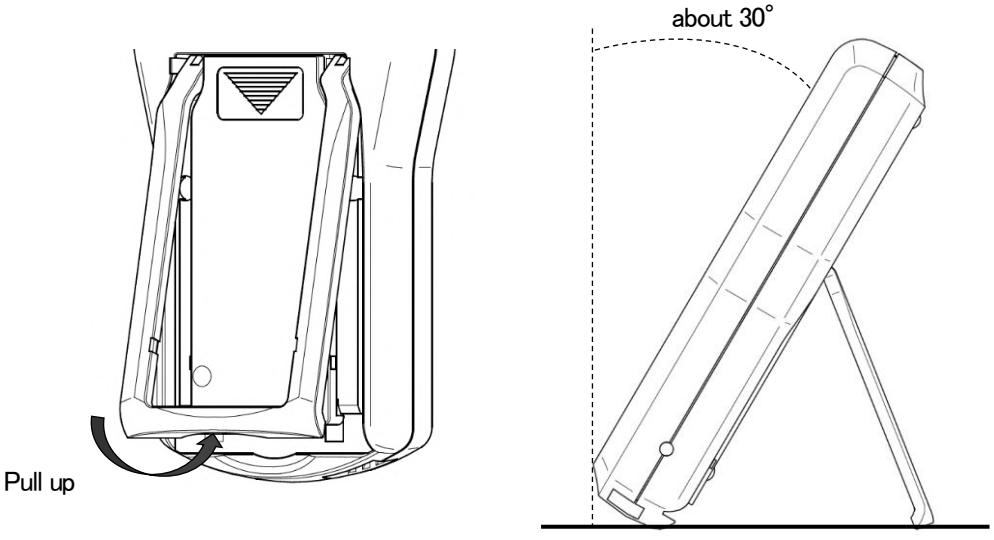
  A conector to connect the USB cable for data transfer.

- Battery compartment

  It contains 2 pieces of dry battery (LR6).

- Tilt stand

  Set up the tilt stand to use this meter in a raised position.

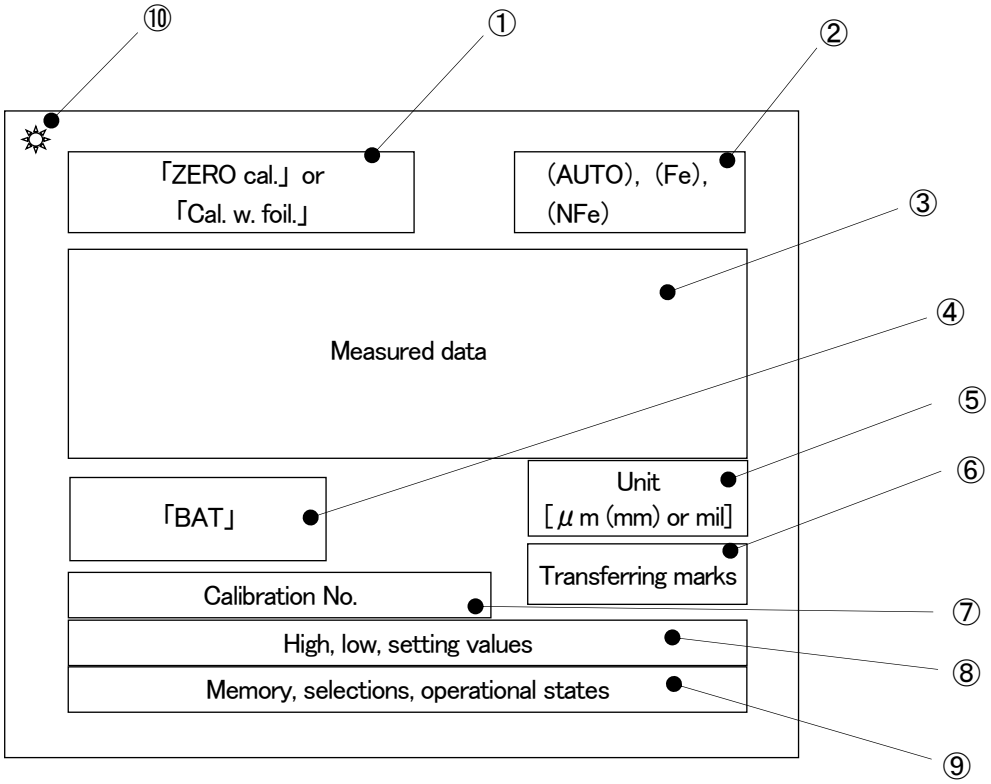


Caution

- The tilt stand does not come off. Do not remove it forcibly.
- The tilt stand cannot be used when AC adaptor or USB cable are connected.

◆ Items displayed on LCD

(Main)



① Indicates「ZERO cal.」(Zeroing) or「Cal. w. foil」(Calibration Standard),「2-foil's cal」when in process.
It never appears on the reading except when in process of these adjustments.

② At Auto Selection mode, one of the three (AUTO), (Fe), and (NFe) is displayed.
At Corresponding mode to substrate, Fe is displayed when being setting for exclusively Ferrous substrate, NFe for exclusively Non-ferrous substrste.

③ Measured data is displayed.

④ BAT mark is displayed with 2 steps when battery has runn out for replacement.

⑤ Setted unit is displayed.
"μm" display automatically switches to "mm" display when it exceeds 999μm.

⑥ USB mark is displayed when data is transferred by USB to PC.

⑦ Ajusted values stored in the calibration number and calibration are displayed.

「Cal. No. X ＊」 ＊When mark is【Blank】,
Calibration data is not entered (as calibrated at Ex-factory).
＊When mark is【F__】
Zero adjustment value, Calibration standard value of Ferrous are stored.
＊When mark is【__N】
Zero adjustment value, Calibraton standard value of Non-ferrous are stored.
＊when mark is【F N】
Zero adjustment value, Calibration standard value of both Ferrous and Non-ferrous are storded.

※ Either case indicates Zero adjustment value or Calibration standard only as wel.

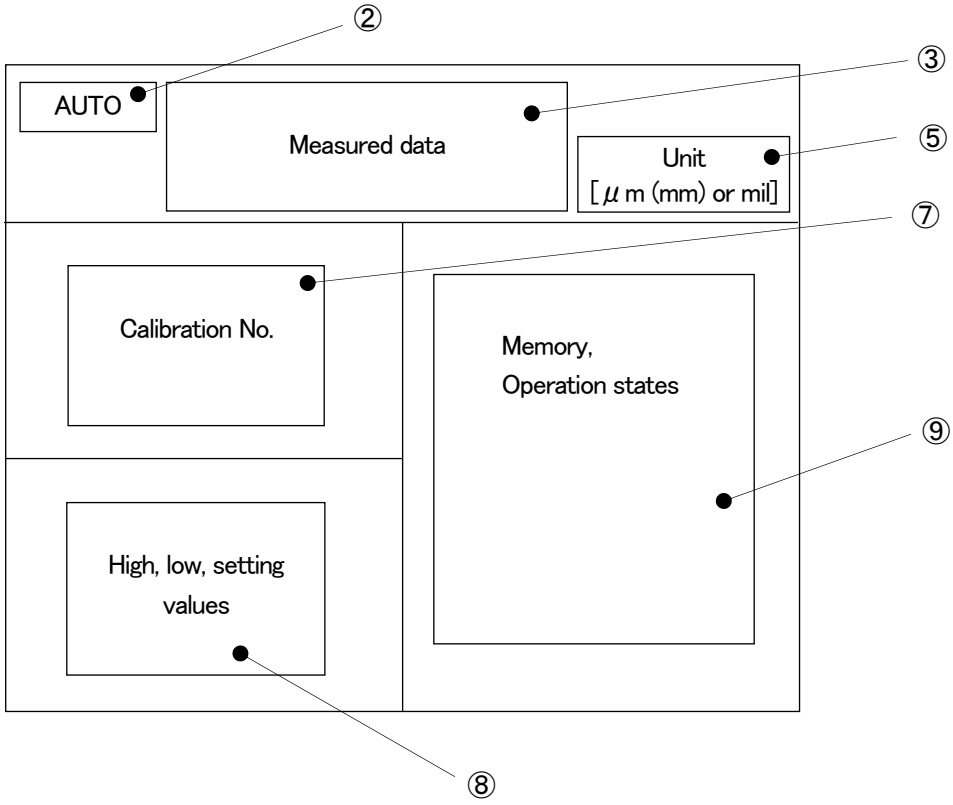
⑧「High limit film thickness value」,「Low limit film thickness value」 is displayed when the High/Low limit values is set. It flashes when a reading value goes beyond a setting limited value.

⑨ It displays various items of information in memory storing measuring data.
When measuring while storing data into memory, the number of a storing place is displayed.

⑩ Backlight: The light goes on when Backlight is set to ON.

(Sub)

When measuring and watching「Calibration」,「High/Low limit values」,「Memory information ofmeasuring data」, it is possible to enlarge these items on display.



Note: 1. Each number is the same as the forementioed ones of (Main) in its explanation.
2. Items in the ② indicates AUTO, Fe, NFe, Fe , NFe in English letters.

(Switching of Display Type)

- When outgoing from the factory, the (Main screen) is set in the unit.

- Switching from (Main) to (Sub) screen.
  Press [CAL No.] key and [H/L] key together and hold them for 3 seconds or over.
  The buzzer beeps「Beep」,「Beep」 two times and the (Main) changes to (Sub) screen.

- Switching from (Sub) to (Main) screen.
  Press [CAL No.] key and [H/L] key together and hold them for 3 seconds or over.
  The buzzer beeps「Beep」,「Beep」 two times and the (Sub) changes to (Main).

◆ How to fit batteries

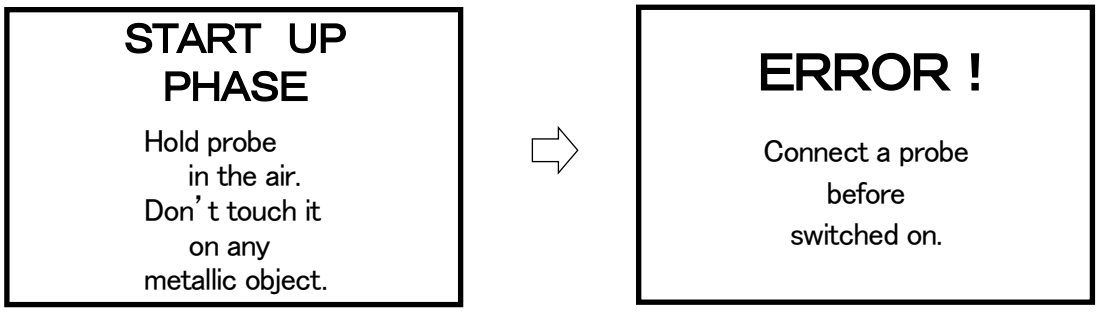
① Raise the tilt stand.
② Open the battery lid on the rear of the main unit.
Press「▽」mark on the top of the lid and slide it down.
③ Insert batteries.
Ensure correct battery polarity ⊕, ⊖ for placement.
④ Close the battery lid and put the tilt stand back.
※ When changing batteries and inadvently switch ing ON, but that is not defective at all.

Caution

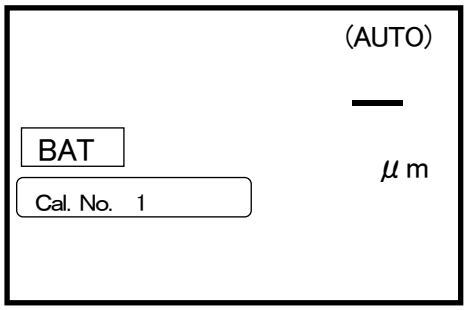
- Use specified and new (check battery-life) batrries or ones supplied in this package.
- An incorrect use of batteries may cause leakages, bursts. Do not intermingle new ones with different tyepss of batteries.
- Take out batteries to store when not in use for a long absence, or that may cause Leakages to breakdown.
- Keep batteries away off pets and children.
- Comply to the regulations and laws in your Local Authorities when disposing of batteries.

◎ About reading display

When placing batteries in the main unit, the messages and warning below on the screen may be displayed.
And these are not breakdowns, wait until the reading disappears with a beeping sound.
※ When connecting or disconnecting probe please switch Power source to OFF.



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



【In case of SFN-325 probe connected】
After Power source switched to ON at Auto mode, (AUTO) is displayed on the screen and when setting exculively for Fe substrate, or NFe substrate, Fe for a ferrous substrate, NFe for a non-ferrous substrate is displayed.

Also, displayed (Fe) when SFe-probe is connected, and (NFe) when SNFe-probe is connected.

◆ How to connect, disconnect probes

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

Select one of the probes suited for your application.

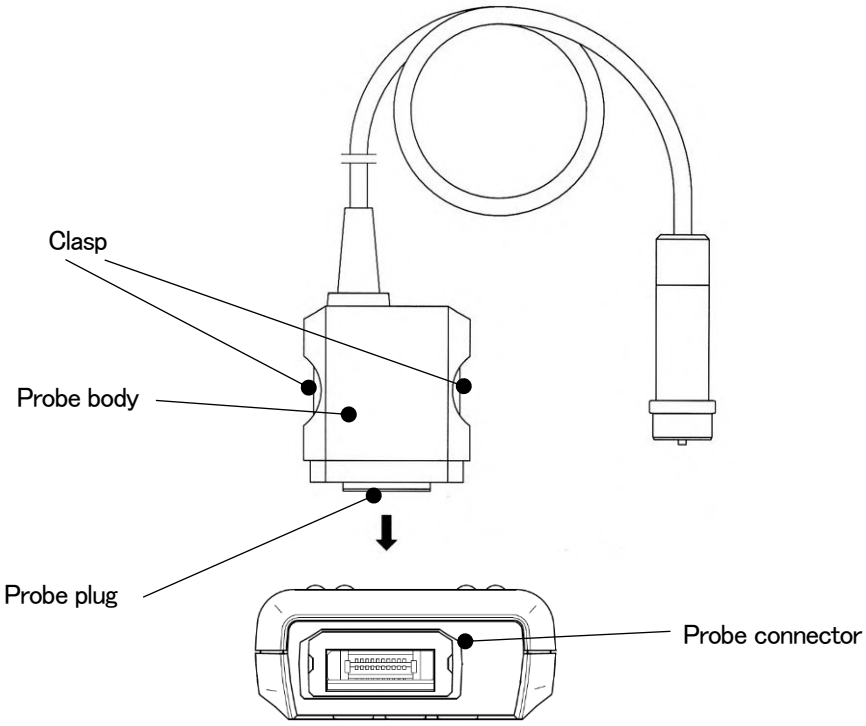
◇ If the substrates made of ferrous material, please use a probe of「SFe」series or a Dual type probe「SFN-325」.

◇ If the substrates made of non-ferrous materials such as Aluminum, please use a probe of「SNFe」series or a Dual type probe「SFN-325」.

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

Make sure of aligning the keyway, push the connector into place until the claps are locked.

※ If the direction is reversed, it will not enter.



◆ Remove the exclusive probe from the main unit.

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

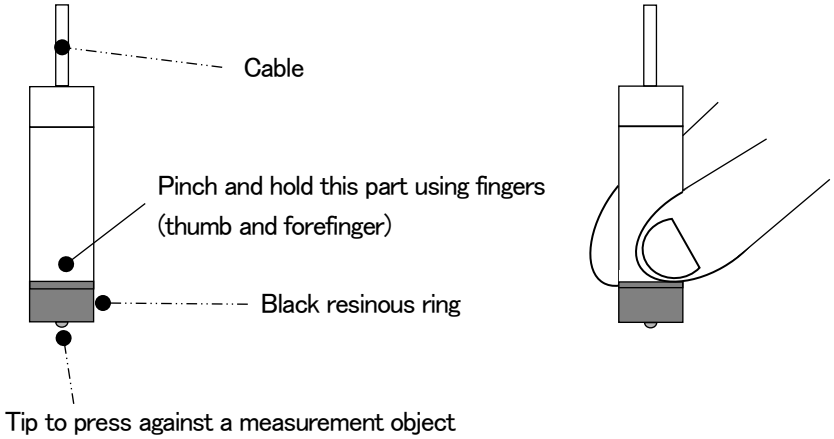
※ Do not pull off by force or it may cause damages.

⚠ 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.

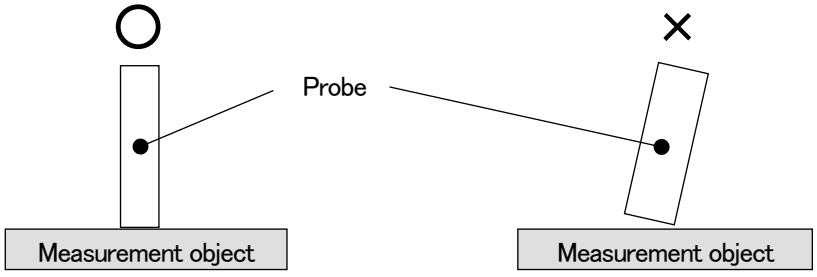
◆ How to hold probes



Quickly and calmly press perpendiculary against the object by grabing the probe as illustrated.
It beeps and the reading screen shows the measuring result.
When it does not beep, lift it 5～7 cm above the object and try again to take measurements.

◆ 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.



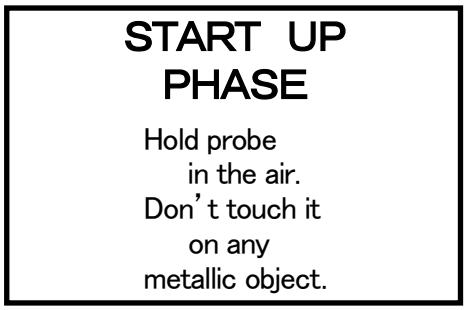
Caution

- 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 ⏻ key.

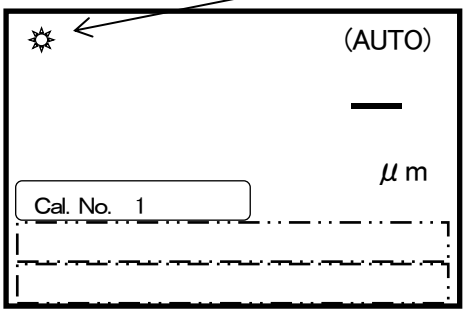


This message lasts for about 3 seconds.

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 beeps.



The Backlight mark is displayed when ON.

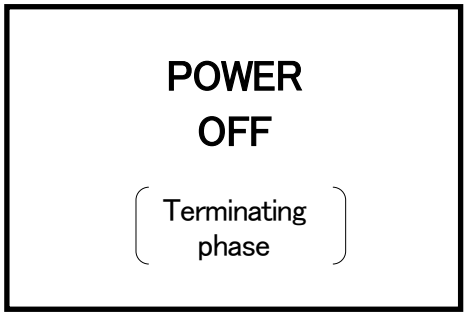
【In case of SFN-325 probe connected】
After Power source switched to ON at Auto mode, (AUTO) is displayed on the screen and when setting exculively for Fe substrate, or NFe substrate, Fe for a ferrous substrate, NFe for a non-ferrous substrate is displayed.

Also, displayed (Fe) when SFe-probe is connected, and (NFe) when SNFe-probe is connected.

Note: 「Cal. No. 」 ← A number 「1」 is displayed at the firstly switched ON.
From the 2nd on, the last set entry is displayed.
And when 「High limit value」, 「Low limit value」 is set, or when memory is used, the setting values and Nos. are displayed on each colum (chained line section).

(2) How to switch off

Press ⏻ key.
The buzzer beeps.



The message lasts for about 2 seconds.

Caution

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

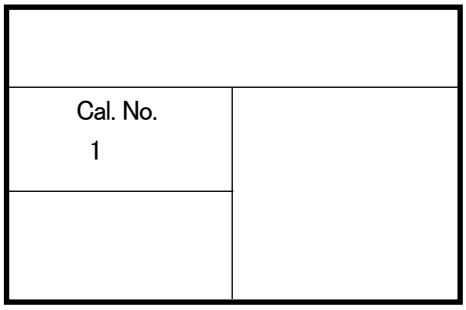
The buzzer beeps and this main unit is switched to OFF.

(3) How to select「Cal. No. 」(Calibration curve)

After switching ON, it is capable of getting started on measurements and adjutments when the reading 「START UP PHASE …」 disapeared.

※ Generally, thickness meters make errors depending on material formation and shapes to be measured. To minimize measurement errors and obtain as accurate resutls,【Zeroing】and【Calibration standard】 are imeratively adujusted before measuring operation.
Those adjustment is called「Calibration curve」.

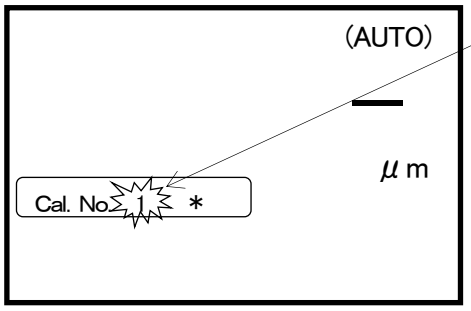
SWT－7200Ⅳ is capable of storing up to 10 sets of calibration data and these data can be called and used when necessary. (the storing place is displayed by a calibration No.)



Indicating positions of (Sub)

Press [CAL No.] Key.
The buzzer beeps.

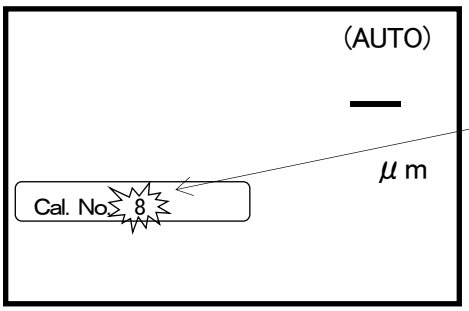
⇩



A number on the display flashes.

Press [▲] key or [▼] key to select your calibration number to use.

⇩

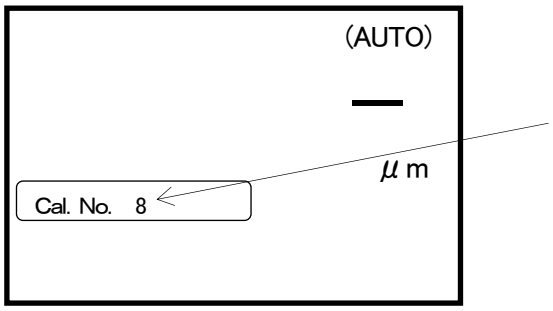


A selectd number flashes.

Caution

F, N, FN displayed on the「＊」marked place indicates state of adjusted value stored in the Calibration curve (refer to page 7).
When that value is no more necessary, take「Zeroing」,「Calibration Standard」.
Stored data can be erased and new data is stored.

Press [CAL No.] key.
The buzzer beeps.



The flashing of the selected number stops
「Cal. No. 8」 is settled.

After settling 「Cal. No. X 」, it becomes possible to take measurements and adjustments.

(4) Zeroing

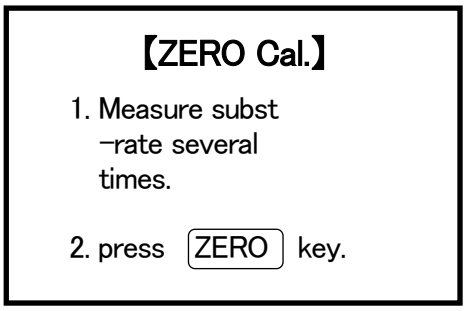
After switching ON, it is capable of getting started on measurements and adjutments when the reading 「START UP PHASE･･･」 disapeared.

※ Generally, the meter 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 kinds of adjustments of【Zeroing】and【Calibration standard】before measuring process.

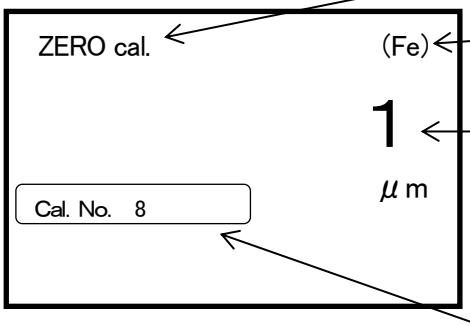
※ Prepare the identical material and shape to a measuring object.
(This is designated as a 「Zero plate」.)

Press [ZERO] key.
The buzzer beeps.

[CAL] key changes to one data "deletion" function.



Press the probe to the Zero plate.
The buzzer beeps.



Zeroing is in process.

The measuring object is set for ferrous metal substrate.

Measured a mean value
When the measured value results in largely off the "0", press [CAL] + [▼] key to delete the latest data out of measured values.
It indicates "—" to delete all data.

Calibration No. storing「Zeroing」and「Calibration srandard」.

Remove the probe from「Zero plate」.

⇩

● Repeat a measuring processes, 1～20 times by pressing the probe to the「Zero plate」.
(A mean value is displayed whenever a probe is pressed)

After pressing certain times or 20 times, press [ZERO] key.

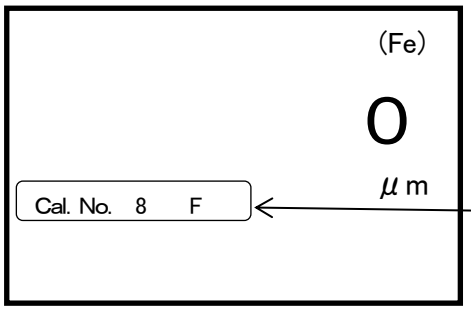
⇩

◆ When a measuring process reaches the 20th time, the buzzer beeps, beeps 2 times and afterward new entry is no more accepted.

The buzzer beeps.

It stops the "deletion" function of [CAL] key.

⇩



The reading【ZERO cal.】in the upper left disappears.
Zeroing completed and the main unit becomes possible to take measuring and adjusting operations.

Data is stored in「Cal. No. 8」and「F」is displayed.
(refer to page 7)

● Press the probe to the「Zero plate」several times and make sure the measuring result indicates in the neighborhood of "0".
When the measured value results in largely off "0", please try again zeroing from the beginning.
There is a case when calibration is not correctly made.

● "LLLL" displayed on the screen during a time of zeroing means that the calibration point heavily deviates from the standard.
Please make sure that the metal substrate is not processed with other materials such as plating and repeat the zeroing until a stable in the neighborhood of "0" is obtained.

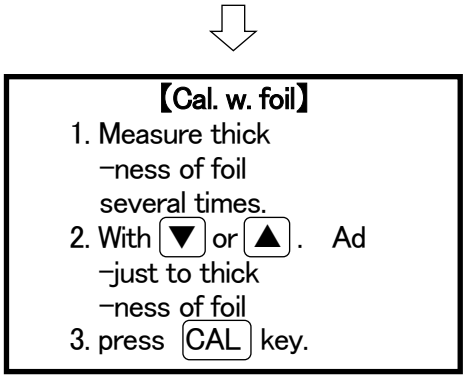
※ After performing Zeroing, the previous「Zeroing value」is deleted, and the last entry of「Zeroing value」is stored.

(5) Calibration standard (CAL)

- Prepare the「Zero Plate」 used for「Zeroing」.
- Prepare the「Thickness standard」 that are the same thick as the measuring film or thicker than that.
- Place the「Thickness standard」 on the「Zero Plate」.
- Press [CAL] key.

The buzzer beeps.

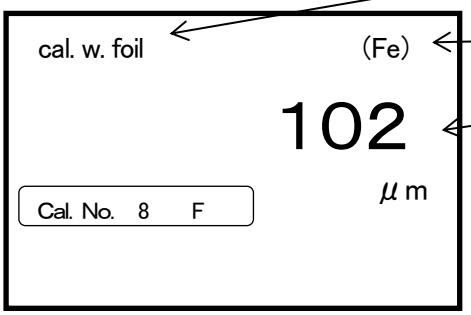
[CAL] key changes to one data "deletion" function.



Press again [CANCEL] key to interrupt Calibration standard (CAL).

Press the probe to the Thikness standard on the Zero plate.
It beeps whenever pressing.

Calibration standard is in process.



The measuring object is set for ferrous metal substrate.

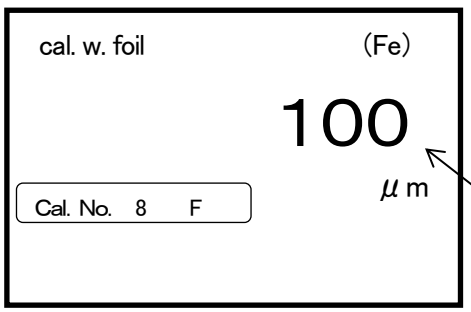
Measured a mean value
When the measured value results in largely off the "Thickness standard", press [CAL] + [▼] key to delete the latest data out of measured values.
It indicates "—" to delete all data.

- Repeat a measuring processes, 1～20 times by pressing the probe to the「Thickness standard」 on the「Zero plate」. (A mean value is displayed whenever a probe is pressed)

◆ When a measuring process reaches the 20th time, the buzzer beeps, beeps 2 times and afterward new entry is no more accepted.

Adjust the reading value to the Thickness standard (in this case, 100 μm) by pressing [▲] or [▼] key.

Pressing [▲] or [▼] key interrupt the "deletion" function of [CAL] key.



Pressing [▲] key increases the reading value.

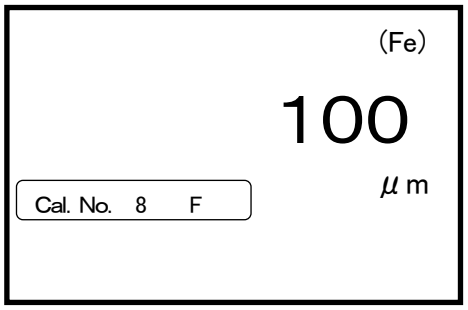
Pressing [▼] key decreases the reading value.
(Press and holding key turns to fast forwarding.)

Adjust the reading value to the Thickness standard.

After adjusting the reading value to the Thickness standard,
press [CAL] key.

The buzzer beeps,【cal. w. foil】on the upper left disappears
and it returns to a measuring mode.

⇩



This is a measusring mode.

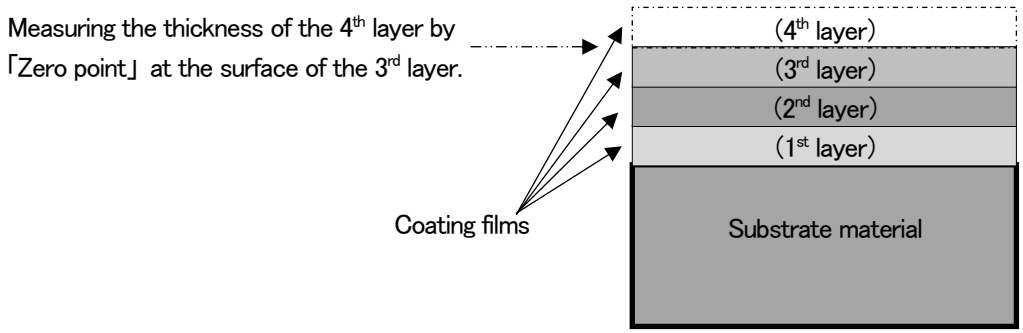
- It is correct that numerical values measured by pressing the probe a few times to the「Thickness standard」on the「Zero plate」indicates the thickness in the neighborhood of the「Thickness standard」.

- When the measured value results in largely off the「Thickness standard」please try again「Calibration standard」from the beginning.

※ After performing Calibration standard , the previous「Calibration standard value」is deleted, and the last entry of「Calibration standard value」is stored.

(6) Zeroing — in special cases —

◎ 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 point」 at the surface of the 3rd layer stacked on the substrate and take 「Zeroing」, 「Calibration standard」 as the aforementioned (3), (4).



◆ 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 and shape to a measuring object.
(This is designated as a 「Zero plate」.)

Press [ZERO] key.
The buzzer beeps.

[CAL] key changes to one data "deletion" function.

⇩

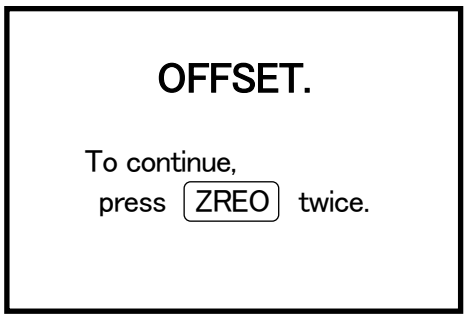
【ZERO Cal.】

1. Measure subst
-rate several
times.

2. press [ZERO] key.

Press the probe to the Zero plate.
The buzzer beeps, beeps, beeps 3 times.

⇩

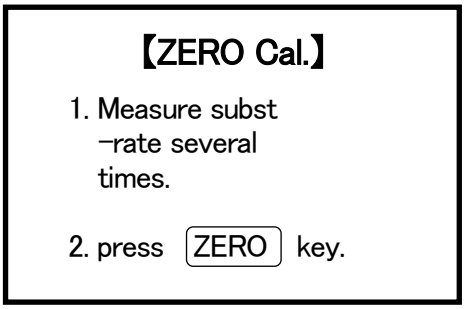


Press [ZERO] key.
The buzzer beeps.

⇩

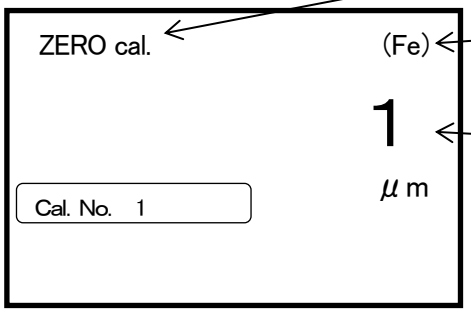
Press [ZERO] key again.
The buzzer beeps.

⇩



Press the probe to the Zero plate.
The buzzer beeps.

⇩



Zeroing is in process.

The measuring object is set for ferrous metal substrate.

Measured a mean value
When the measured value results in largely off the "0", press [CAL] + [▼] key to delete the latest data out of measured values.
It indicates "—" to delete all data.

Remove the probe from 「Zero plate」.

⇩

After pressing certain times or 20 times, press [ZERO] key.

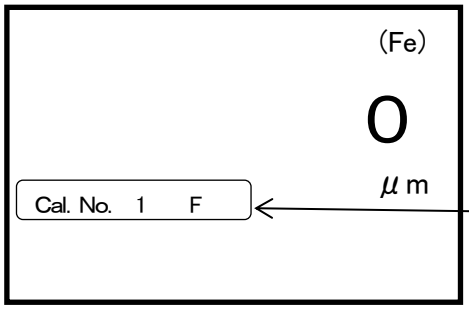
⇩

● Repeat a measuring processes, 1～20 times by pressing the probe to the 「Zero plate」.
(A mean value is displayed whenever a probe is pressed)

◆ When a measuring process reaches the 20th time, the buzzer beeps, beeps 2 times and afterward new entry is no more accepted.

The buzzer beeps.

It stops the "deletion" function of [CAL] key.



The reading【ZERO cal.】in the upper left disappears.
Zeroing completed and the main unit becomes possible to take measuring and adjusting operations.

Data is stored in「Cal. No. 1」and「F」is displayed.
(refer to page 7)

● Press the probe to the「Zero plate」several times and make sure the measuring result indicates in the neighborhood of "0".
When the measured value results in largely off "0", please try again zeroing from the beginning.
There is a case when calibration is not correctly made.

● "LLLL" displayed on the screen during a time of zeroing means that the calibration point heavily deviates from the standard.
Please make sure that the metal substrate is not processed with other materials such as plating and repeat the zeroing until a stable in the neighborhood of "0" is obtained.

※ After performing Zeroing, the previous「Zeroing value」is deleted, and the last entry of「Zeroing value」is stored.

(7) 2-point calibration in case it is difficult to perform 「Zeroing」

When it is difficult to adjust「Zeroing」in a usual method on a rough surface such as the Blast steel plate, it is effective also to adjust by using 『two pieces of different thickness of the Thicknesses standard』.

> ⚠ 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 and two pieces of different thicknesses of the Thickness standards.
Please choose the suitable difference of thickness standards from the list below.

Predicting film thickness	Difference of thickness standard
～49.9 μm	10 μm or over
50.0～99.9 μm	25 μm or over
100.0～499.9 μm	50 μm or over
500～999 μm	199 μm or over
1.0～2.5 mm	0.5 mm or over

Press and hold the [ZERO] key for 3 seconds.
The buzzer beeps.

⇩

[CAL] key changes to one data "deletion" function.

【2-foil's cal】
Measure thinner foil on metal several times.

Afterward, press [ZERO] key.

Stack the thinner「Thickness standard」on the substrate and press the probe on it.

The buzzer beeps whenever pressing the probe.

⇩

2-foil calibration in process.

【 2-f. c. 】 (Fe)

The measuring object is set for ferrous metal substrate.

27 μm

Measured a mean value

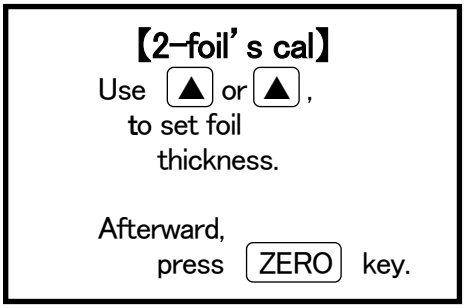
Cal. No. 1

When the measured value results in largely off the "Thickness standard", press [CAL] + [▼] key to delete the latest data out of measured values.
It indicates "—" to delete all data.

After pressing certain times or 20 times,
press [ZERO] key.

The buzzer beeps, beeps 2 times.

⇩

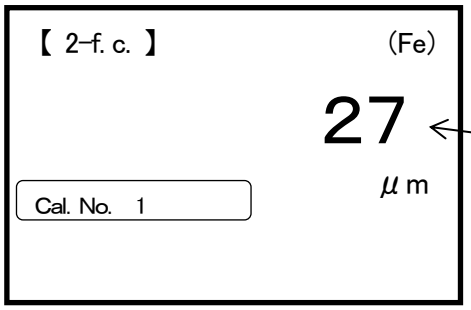


● Repeat a measuring processes, 1～20 times by pressing the probe to the thinner「Thickness standard」.
(A mean value is displayed whenever a probe is pressed)

◆ When a measuring process reaches the 20th time, the buzzer beeps, beeps 2 times and afterward new entry is no more accepted.

A press of [▲] or [▼] key makes the buzzer beep and
a mean value to the last measurement appears on the reading.

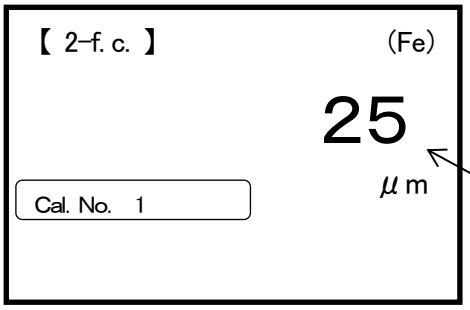
⇩



Mean value

Adjust the reading value to the Thickness standard (in this case, 25 μm)
by pressing [▲] or [▼] key.

⇩



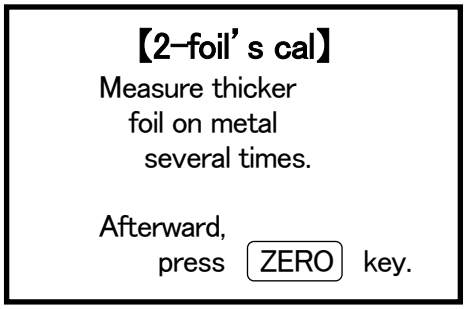
Pressing [▲] key increases the reading value.

Pressing [▼] key decreases the reading value.
(Press and holding key turns to fast forwarding.)

Adjust the reading value to the Thickness standard.

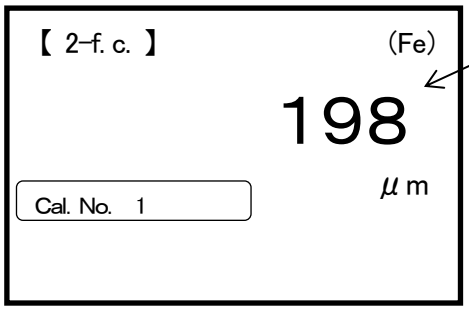
After adjusting the reading value to the Thickness standard,
press [ZERO] key.
The buzzer beeps.

⇩



Stack the thicker「Thickness standard」on the substrate and press the probe on it.

The buzzer beeps whenever pressing the probe.

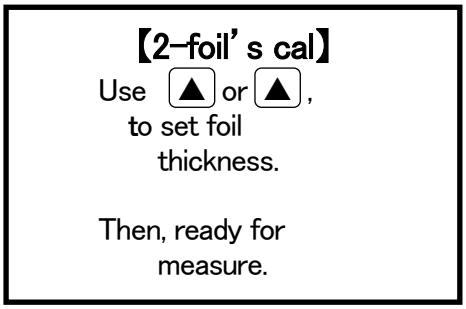


Measured a mean value
When the measured value results in largely off the "Thickness standard", press CAL + ▼ key to delete the latest data out of measured values.
It indicates "—" to delete all data.

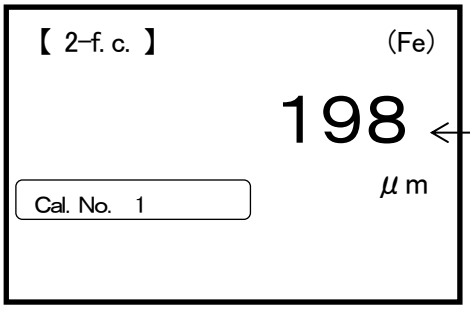
After pressing certain times or 20 times, press ZERO key.
The buzzer beeps, beeps 2 times.

● Repeat a measuring processes, 1～20 times by pressing the probe to the thicker「Thickness standard」.
(A mean value is displayed whenever a probe is pressed)

◆ When a measuring process reaches the 20th time, the buzzer beeps, beeps 2 times and afterward new entry is no more accepted.

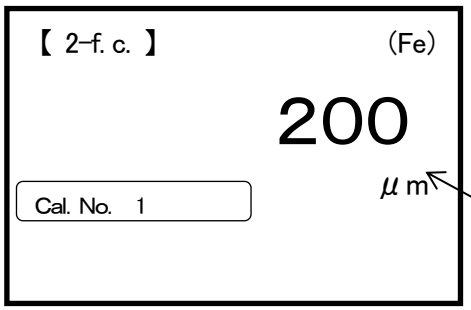


A press of ▲ or ▼ key makes the buzzer beep and a mean value to the last measurement appears on the reading.



Mean value

Adjust the reading value to the Thickness standard (in this case, 200 μm)
by pressing [▲] or [▼] key.

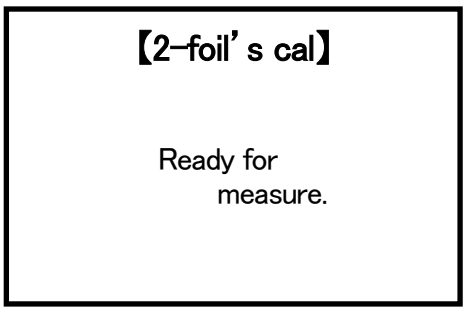


Pressing [▲] key increases the reading value.

Pressing [▼] key decreases the reading value.
(Press and holding key turns to fast forwarding.)

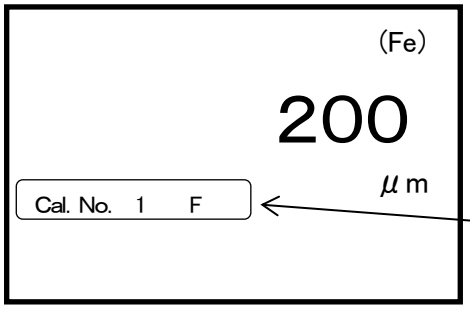
Adjust the reading value to the Thickness standard.

After adjusting the reading value to the Thickness standard,
press [ZERO] key.
Then the buzzer beeps, beeps, beeps 3 times.



This is on display for about 0.5 seconds.

The buzzer beeps.



This is a measusring mode.

Data is stored in「Cal. No. 1」and「F」is displayed.
(refer to page 7)

- It is correct that numerical values measured by pressing the probe a few times to the「Thickness standard」on the「Zero plate」indicates the thickness in the neighborhood of the「Thickness standard」.
  Take the procedure with each 2 sheets of the「Thickness standard」.

- When the measured value results in largely off the「Thickness standard」please try again 「2-foils calibration」from the beginning.

※ After performing 2-foils calibration, the previous「Calibration value」is deleted, and the lastentry of 「2-foils calibration value」is stored.

(8) 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).

※ This operation procedures are taken when SWT-7200Ⅳ is faulty.
If "All cal. → ▲" is mistakenly selected, be careful that adjusted values of all calibration data are deleted.

※ When a store place is full , adjust a new data with the old data kept in th e place.
Automatically the old data is deleted and the new data is stored.

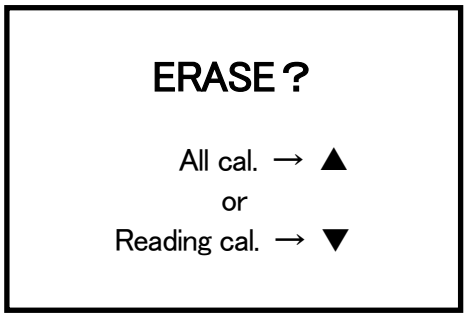
《Collective deletion》

● Delete collectively all adjustec values of all calibration data.

Hold [ZERO] key and press [▼] key.

The buzzer beeps, beeps 2 times.

⇩

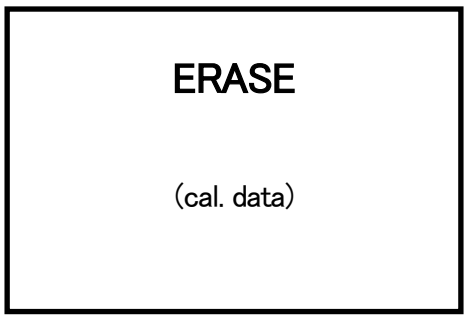


※ When interrupting deletion, press [CANCEL] key.

Press [▲] key.

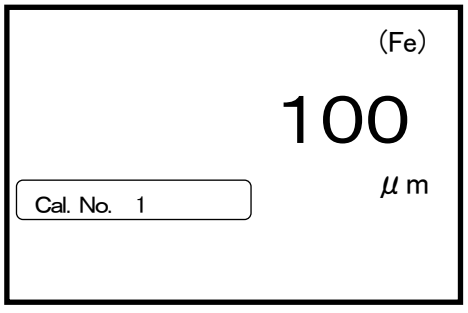
The buzzer beeps, beeps 2 times.

⇩



Deletion of calibration data is over and the buzzer beeps, beeps 2 times.

⇩



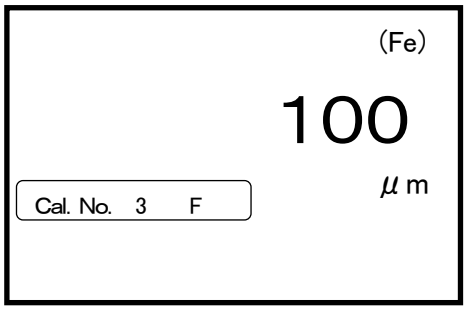
The last measured substrate and value are displayed.

It becomes possible to take measurements and adjustment procedures of this main unit.

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

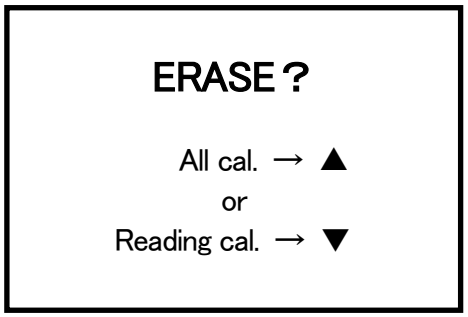
《Selective deletion》

● Delete adjusted value of calibration data being selected now.
Dislay calibration data to be deleted. (refer to page 12)



Hold [ZERO] key and press [▼] key.
The buzzer beeps, beeps 2 times.

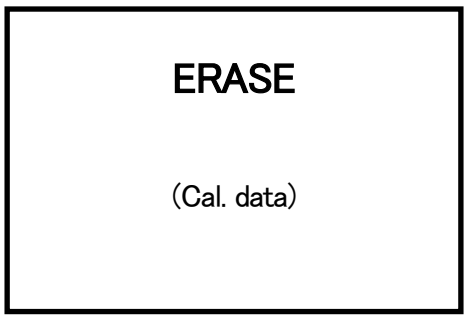
⇩



※ When interrupting deletion, press [CANCEL] key.

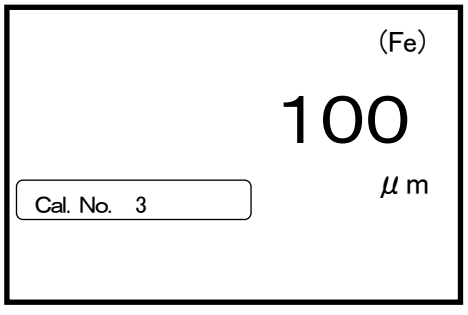
Press [▼] key.
The buzzer beeps, beeps 2 times.

⇩



Deletion of calibration data is over and
the buzzer beeps, beeps 2 times.

⇩



The last measured substrate and value are displayed.

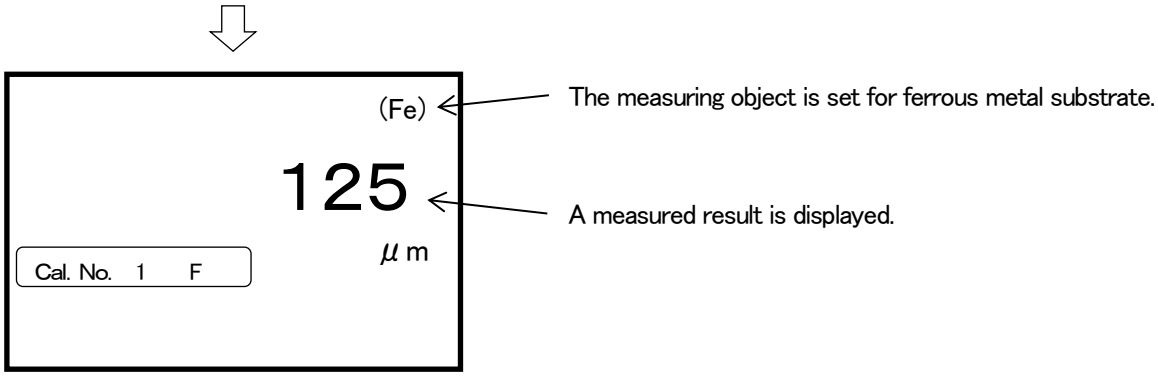
It becomes possible to take measurements and adjustment procedures of this main unit.

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

Measuring

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

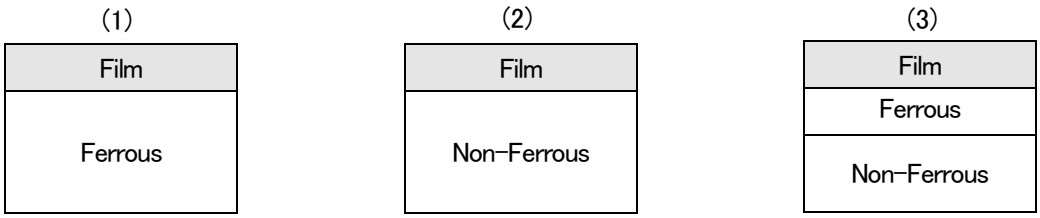
When pressing the probe against the object with Power ON,
the buzzer beeps.



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

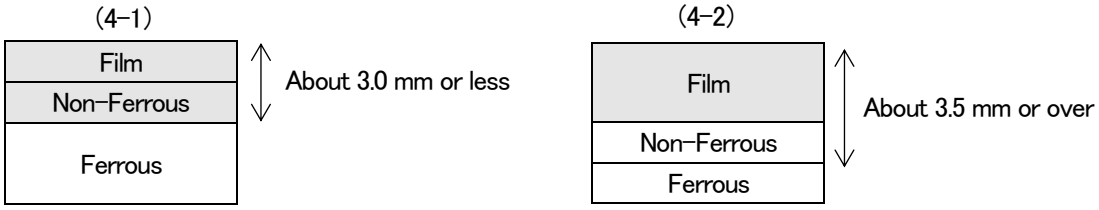
◆ Measuring of Auto-selection by「SFN-325」

(1) Ferrous substarate ····· measuring of film thickness at Fe mode.
(2) Non-ferrrous substarate ····· measuring of film thickness at NFe mode.
(3) Ferrous on Non-ferrous layered substarate ····· measuring at Fe mode regadress of Fe thickness.



(4) Non-ferrous on ferrous layered substrate

(4-1) Layered thickness Non-Ferrous and Film, 3.0 mm or less※ ···· measure thickness of layered Non-Ferrous and Film in Fe mode.
(4-2) Layered thickness Non-Ferrous and Film, 3.5 mm or over※ ···· measure Film thickness in NFe mode.



Note:

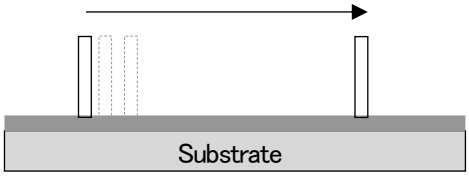
- "HHHH" is displayed in a between area of 2 different layers and when special metals unidentified by Auto-selection.
- In case of adjusting by「Calibration standard」on Fe-substrate,「Calibration standard」foils made of Non-Ferrous metals such as BeCu can be used.
- In case substrates are not identified by Auto-selection mode, change to exclusive mode by『corresponding mode to a metal substrate』.
  In case of an example of (4-1), thickness of Film only can be measured at「Non-Ferrous」exclusive mode.

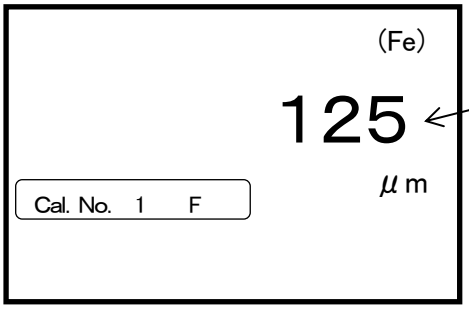
※ They may vary in compositions, characteristics, thicknesses of materials.

Function setting

(1) Setting of Non-Interrupt Measurement mode

As illustrated on the right figure, this mode is used when taking non-interrupt measurements for painting surfaces etc.
Film thickness values are taken/displayed while press/holding probe on the object.





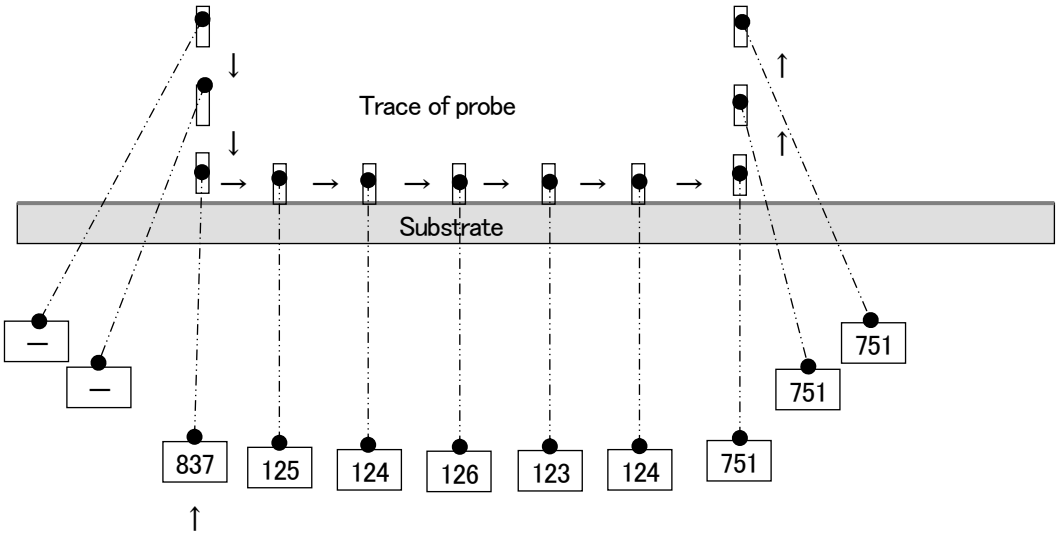
A measured value is held (displayed) when pressing a probe at standard mode, but in Non-Interrupt Measurement mode measured values are taken/displayed about every 0.5 seconds interval while pressing a probe.

Hold [ZERO] key and press [▲] key.

The buzzer beeps, beeps 2 times.

⇩

This main unit has turned into 「Non-Interrupt Measurement mode」.
Data can be successively measured about 0.5 second intervals and the data is displayed with a beeping sound.



Reaching to a measurable distance, the probe indicates the distance/thickness at the spot.

Display of measured values (displayed successively each 0.5 second interval).

※ The Non-Interrupt function is stored when switching Power to OFF.
To return to the beginning, take the procedure of "Returning to the beginning" listed on the following page.

Caution

The moving measuring method at "Non-Interrupt Measuring Mode" may damage the measuring surface or the probe tip because of frictions made by sliding the probe on the surface.
Please try fewer to take this method to minimize the frictions.

《Returning to the beginning》

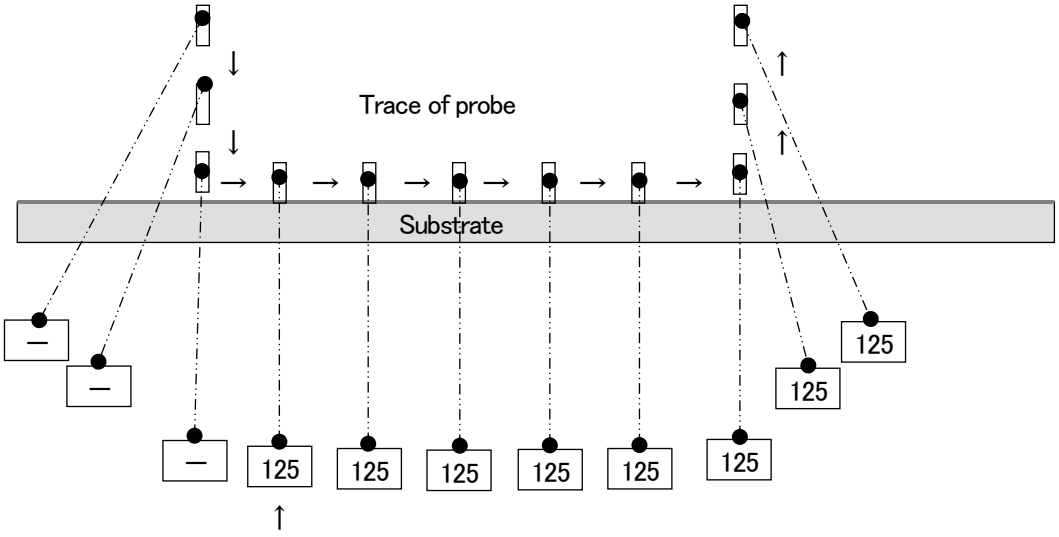
To return 「Non-Interrupt Measurement mode」 to the beginning take the same procedures as at the initial setting.

Hold [ZERO] key and press [▲] key.

The buzzer beeps, beeps 2 times.

⇩

「Non-Interrupt Measurement mode」 has been released and returned to the beginning.



Measured values are stored until a next measurement is taken.

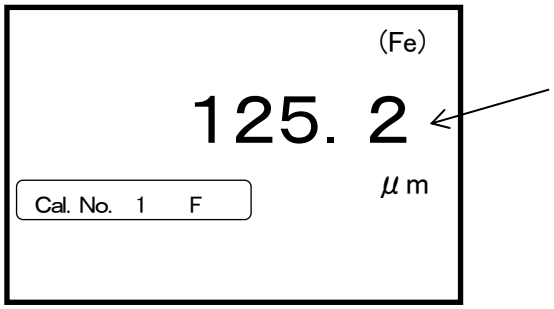
(2) Setting of resolutions

The reading values up to 500 μm can be switched in resolutions as below.
It is possible to read resolution measurement results by the 0.1 μm unit in the thickness of (0～400 μm), and by the 0.5 μm unit in the thickness of (400～500 μm).

● Switch Power to OFF when Power is ON.

Hold [CAL] key and press [⏻] key for 3 seconds or over.
The buzzer beeps, beeps 2 times.

⇩



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

※ This function is not released even if the Power source is switched to OFF.
When returning, take the operation procedures of "Returning to the beginning" as below.

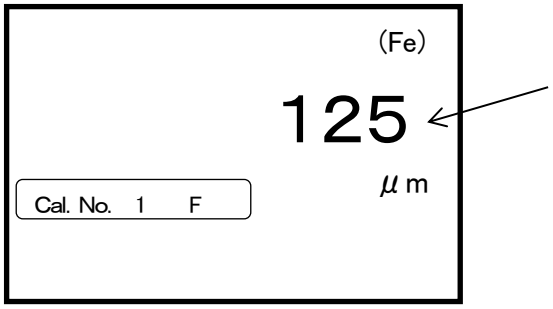
《Returning to the beginning》

To return 「0.1 μm, 0.5 μm」 displayed resolutions to the beginning, take the same procedures as the above.

● Switch Power to OFF when Power is ON.

Hold [CAL] key and press [⏻] key for 3 seconds or over.
The buzzer beeps, beeps 2 times.

⇩

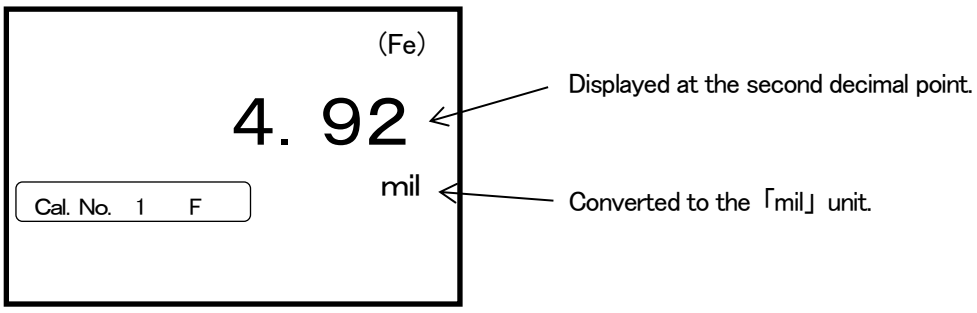


No display under a decimal place.
(The data is rounded off to nearest whole digit.)

(3) Setting of units

This main unit is equipped with a function converting the unit to 「mil」.

- Switch Power to OFF when Power is ON.
- Press and hold ⏻ key for 10 seconds or over until the buzzer beeps, beeps 2 times.

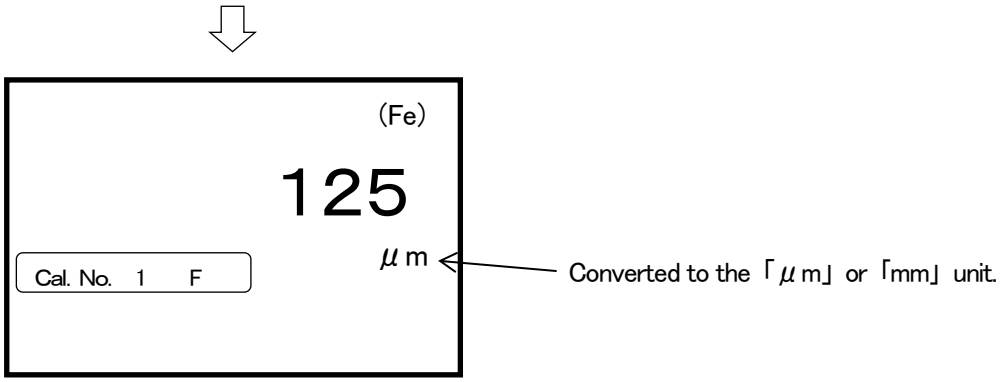


※ This function is not released even if the Power source is switched to OFF.
When returning, take the operation procedures of "Returning to the beginning" as below.

《Returning to the beginning》

To return 「mil」 unit to the beginning, take the same procedures as the above.

- Switch Power to OFF when Power is ON.
- Press and hold ⏻ key for 10 seconds or over until the buzzer beeps, beeps 2 times.

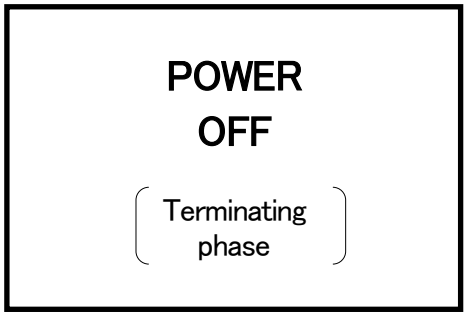


(4) Setting of Auto-Power-OFF function

When no entry of key operations and measuring procedures for 3 minutes, the main unit switcehes automatically to OFF to save battery. This function can be released by yhe following operations.

No entry for 3 minutes lasts, and then the buzzer beeps.

⇩



The message is displayed for about 5 seconds.

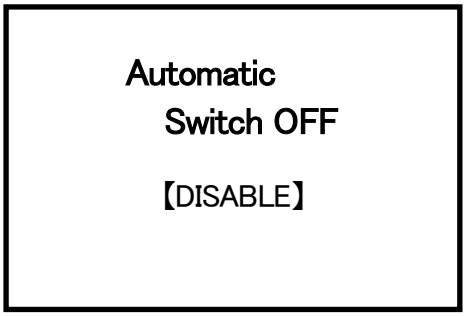
The buzzer beeps, and the main unit is switched to OFF.

《To Disable Auto-Power-OFF function》

● Switch Power to OFF when Power is ON.

Hold [▲] key and press [⏻] key for 5 seconds or over.
The buzzer beeps., beeps 2 times.

⇩



It indicates 5 seconds.

⇩

It returns to a measurable mode.
Power switches to OFF when [⏻] key is pressed.

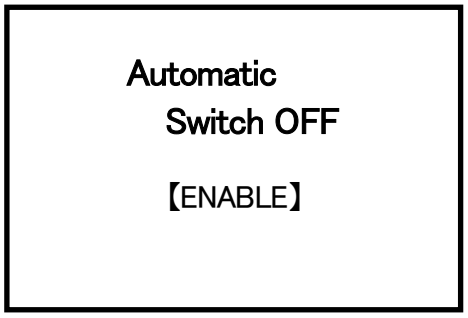
※ This function is not released even if the Power source is switched to OFF.
To enable it, take the operation procedures of "To Enable Auto-Power-OFF function".

《To Enable Auto-Power-OFF function》

● Switch Power to OFF when Power is ON.

Hold [▼] key and press [⏻] key for 5 seconds or over.
The buzzer beeps., beeps 2 times.

⇩



It indicates 5 seconds.

⇩

It returns to a measurable mode.
Auto-Power-OFF function can be functioned.

When no entry of key operations and measuring procedures lasts about for 3 minutes,
the buzzer beeps and the power is switched to OFF.

※ This function is not released even if the Power source is switched to OFF.
To disable it, take the operation procedures of "To Disable Auto-Power-OFF function".

(5) Setting of corresponding mode to substrate with SFN-325 probe

When the SFN-325 probe is connected, the main unit automatically select a substrate for measuring objects, but in addition to the Auto-selection mode 『Fe substrate exclusive mode』, 『NFe substrate exclusive mode』 are ready to use.

In case it is not possible to identify the substrate by Auto-selection mode, change the mode on the following steps to take measurements with procedure as shown below.

※ When on Ex-factory, the unit is set to 「AUTO mode」.

※ This function is effective only when 「SFN-325」 probe is connected.

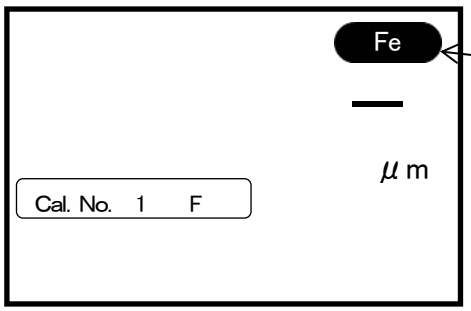
※ This finction is kept live even if the Power is switched to OFF.

【EX-factory setting】

Displays of Ferrous/Nonferrous Auto-selection mode are displayed by one of (AUTO), (Fe), (NFe) respectively.

Press and hold [CAL] key for 3 seconds or over.
The buzzer beeps, beeps 2 times.

⇩



When moving to a Fe substrate exclusive mode, Fe is displayed.

Press and hold [CAL] key for 3 seconds or over.
The buzzer beeps, beeps 2 times.

⇩

When moving to a NFe substrate exclusive mode, NFe is displayed.

By press and holding [CAL] key for 3 seconds or over,
it switches: AUTO → Fe → NFe → AUTO → Fe ・・・・・

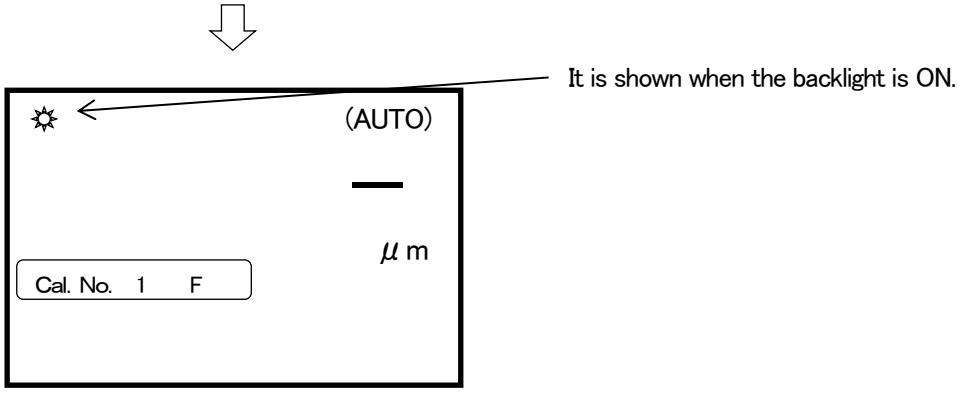
(6) Setting of Backlight

The LCD of this unit has a backlight function.
The bcklight can be used at the place which is dark and difficult to read messages on display.

《Lighting the Backlight》

Press and hold [▲☼] key for 3 seconds or over.

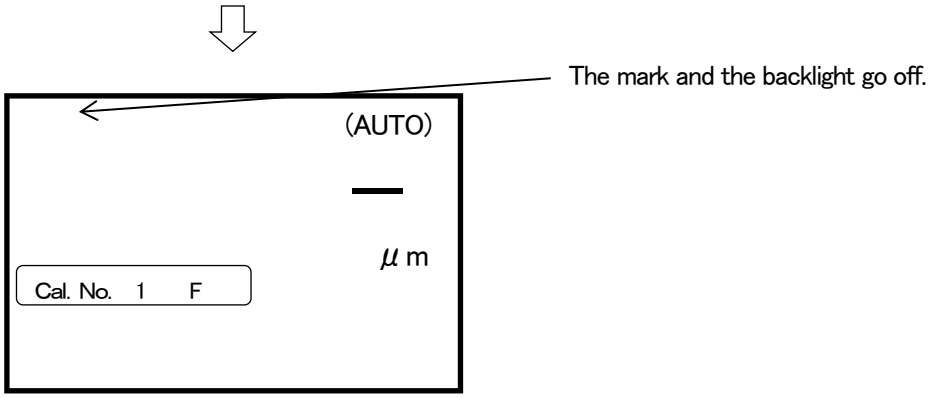
The buzzer beeps, beeps 2 times
and the backlight goes on.



《Lighting out the Backlight》

Press and hold [▲☼] key for 3 seconds or over.

The buzzer beeps, beeps 2 times
and the backlight goes off.



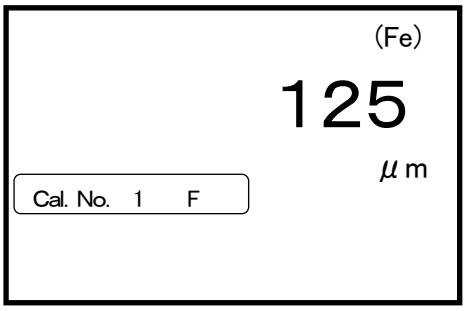
※ This function is kept even if Power source switched to OFF.

Setting of High/Low limit values

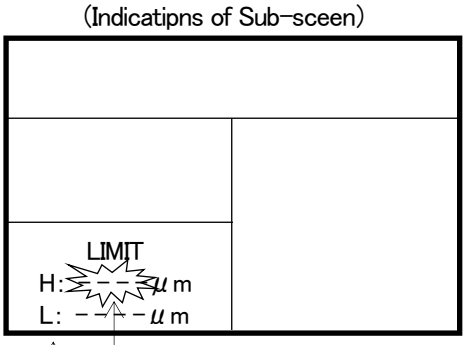
To judge quickly if the coated film thickness of a product stays within a range of thicknesses corresponding to management standards and controls, it is necessary to set high/low limits beforehand and if the numerical value on display exceeds the limits, the number flashes and emits a warning sound.

※ A set of both limit values can be set to a 「Cal. No. 」(Calibration curve).

(1) Setting of High limit value

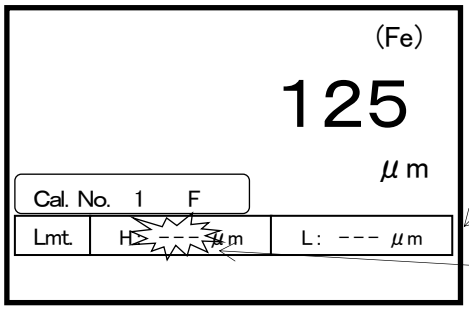


Press [H/L] key.
The buzzer beeps.



A High limit value flashes.

Data for setting High/Low limit values is displayed.



A High limit value flashes.

Press [▲] or [▼] key to enter a High limt value into the flashing colum 「———」.

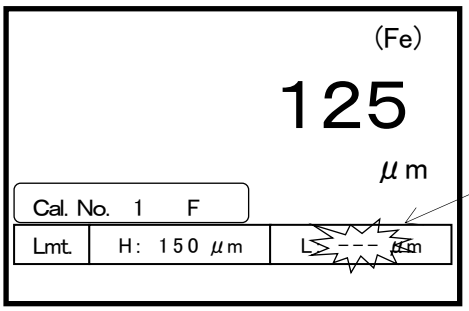
Press [H/L] key.
The buzzer beeps to set the High limit value.

Then setting of a Low limit value follows.

Note: When no High limit value setting is needed, press [H/L] key without pressing [▲], [▼] key. Flashing 「H: – – – μm」 stops and it moves a next to set Low limit value.

(2) Setting of Low limit value

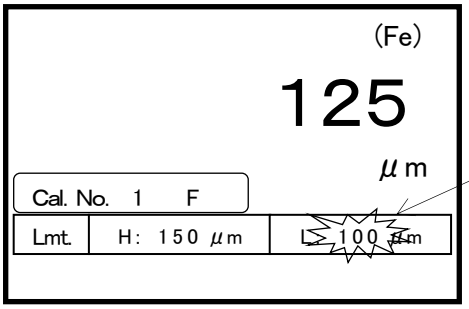
(following a High limit value setting without interruption)



A Low limit value flashes.

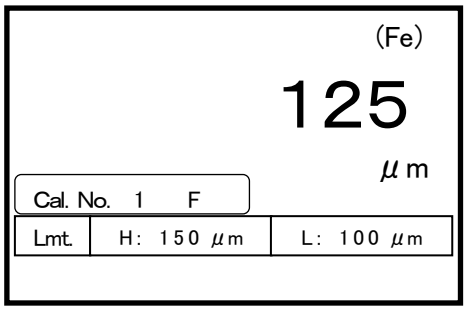
Press ▲ or ▼ key to enter a Low limet value to the flashing colum 「– – –」.

Note: When no Low limit value setting is needed, press H/L key without pressing ▲, ▼ key. Flashing 「L: – – – μm」 stops and a High limit value only is set, and it becomes possible to take measurements and adjustments.



A Low limit value flashes.

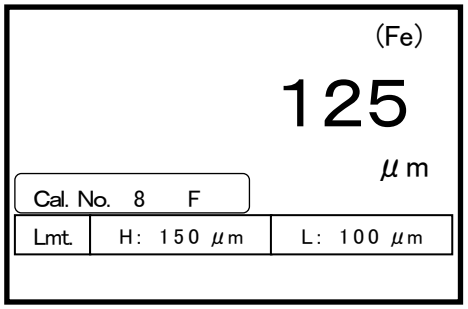
Press H/L key.
The buzzer beeps.



The flashing Low limit value stops and the High/Low limit values are set. It becomes possible to take measurements and adjustments.

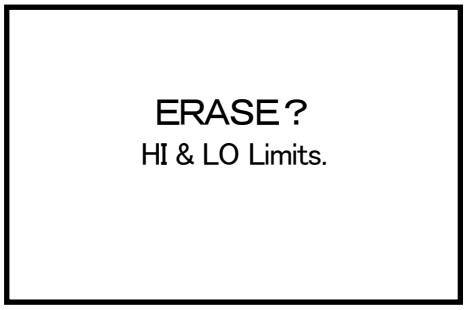
(3) Delection of set High/Low limit values.

Select a「Cal. No. 」(Calibration curve) storing limit values to be deleted.



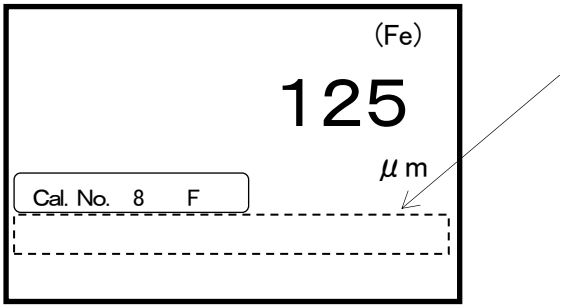
Hold [H/L] key and press [DATA ERASE] key.
The buzzer beeps, beeps 2 times.

⇩



Press [DATA ERASE] key.
The buzzer beeps, beeps 2 times.

⇩

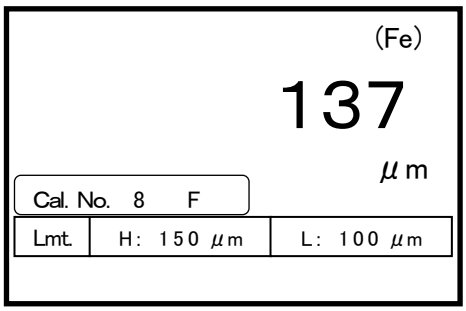


A set limited value is deleted and at the same time a displayed column of the limit value also disappears.

Measurements with High/Low limit values

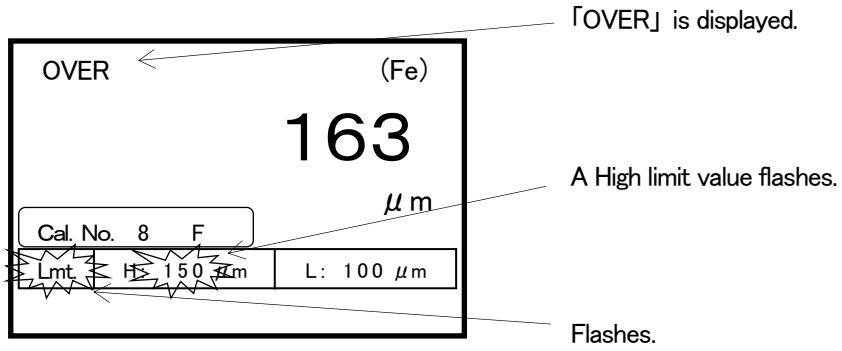
(1) When measured value within a range of limit value (including a setting value)

The buzzer beeps and indicates the measured value.



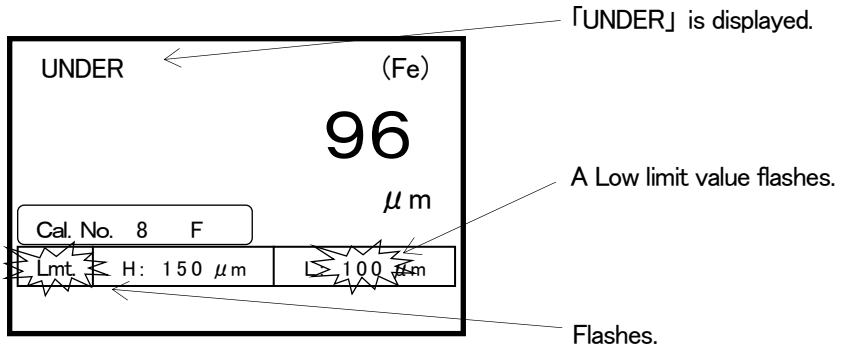
(2) When measured value over a High limit value

The buzzer 「beeps」「beep」「beep」, 「beep」「beep」「beep」 2 times with 3 sucessive sounds.



(3) When measured value below a Low limit value

The buzzer 「beeps」「beep」「beep」, 「beep」「beep」「beep」 2 times with 3 sucessive sounds.



Storing of measured data

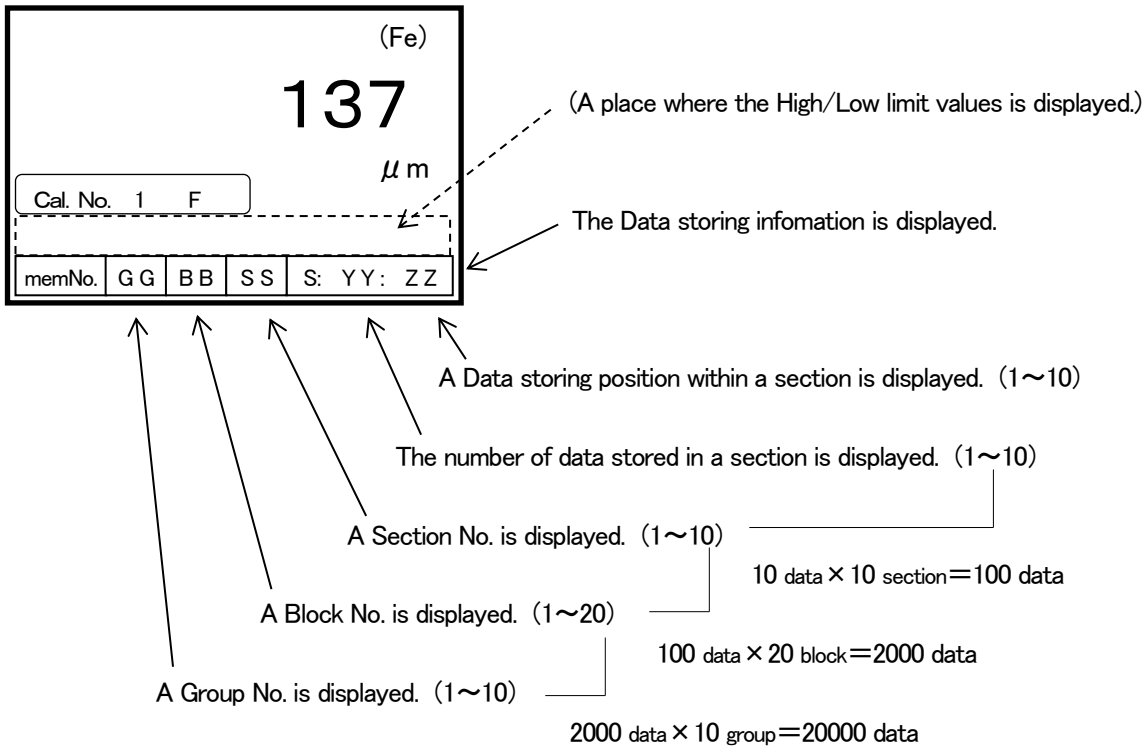
SWT-7200Ⅳ can store Max. 20,000 data.
Places to store are listed as below.

Sections: A section stores 10 data. Each「Data storing position」within a section has each independent number.

Blocks: A block contains 10「Sections」. Each「Section」within a block has each independent number.

Groups: A group contains 20「Blocks」. Each「Block」within a group has each independent number.
SWT-7200Ⅳ has 10 groups.

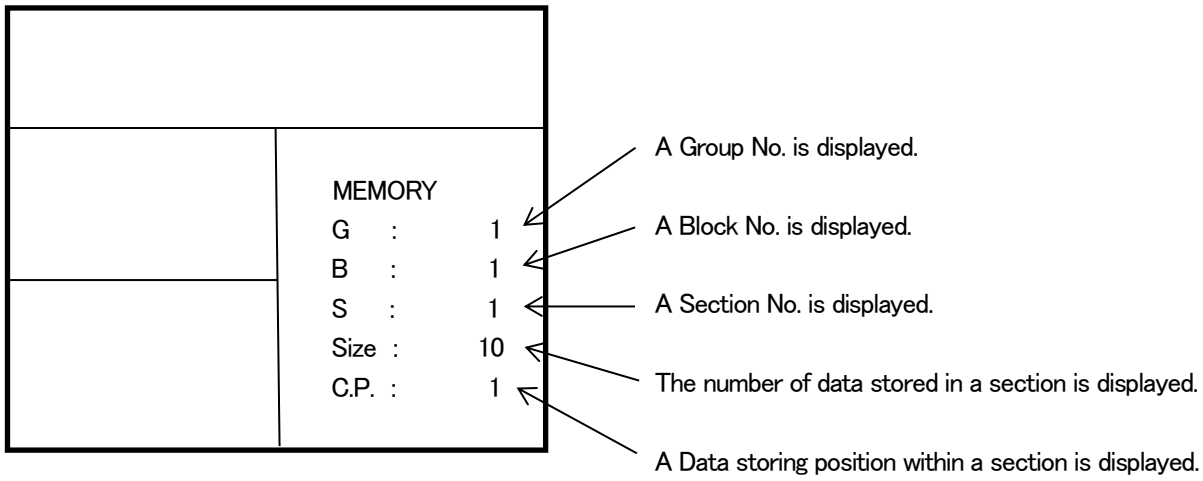
■ Data-Memory information displayed. on LCD



※ When delivered at EX-Factory. The indictions are as follows.

memNo.	1	1	1	s: 10 : 1

The displays of memory position of (Sub-screen)

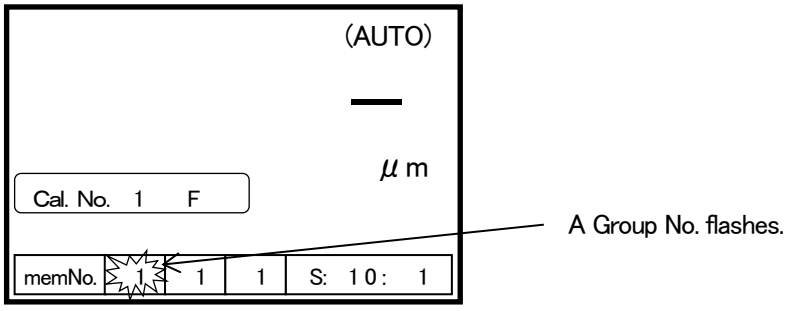


(1) Select a Data storing place

● For operation example, settings are made as follows:
Group No.「3」, Block No.「12」, Section No.「1」, Data storing number per section「8」.

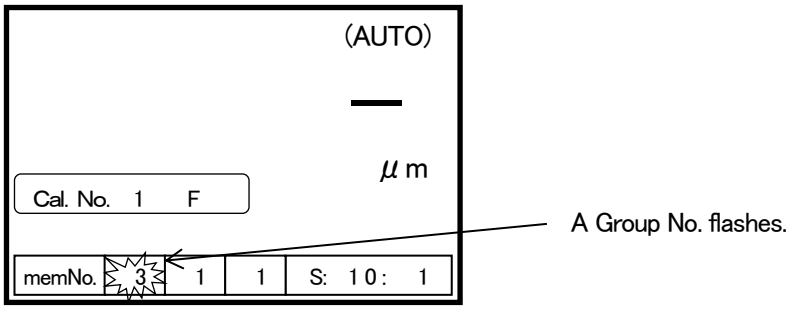
Press [MEM. SEL.] key.
The buzzer beeps.

⇩



Press [▲] or [▼] key.
Select a Group No.「3」.

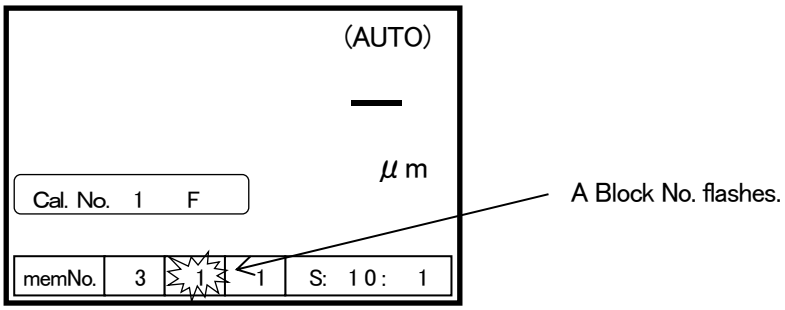
⇩



Press [MEM. SEL.] key.
The buzzer beeps.

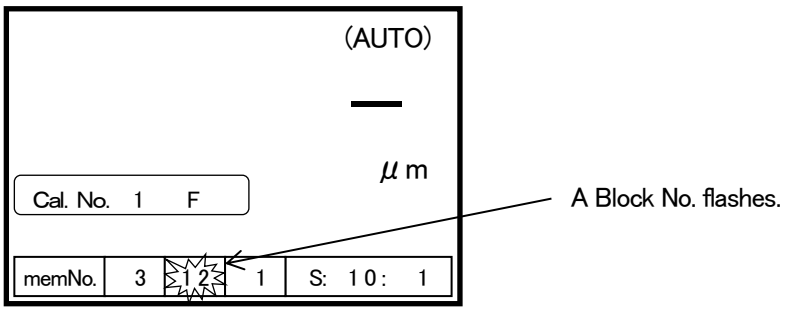
⇩

※ A Group No.「3」 is set.
Then moving on to setting a Block No.



Press ▲ or ▼ key to select a Block No.「12」.

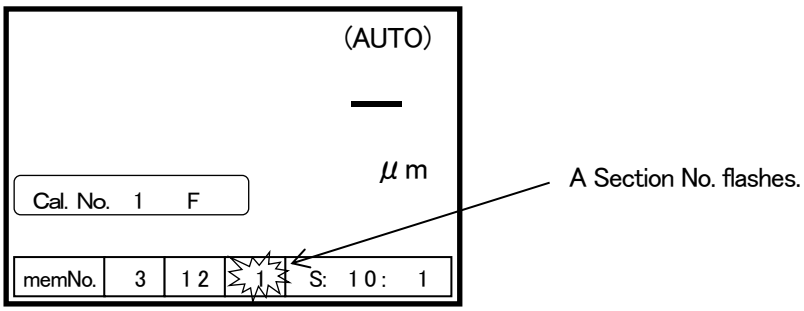
⇩



Press MEM. SEL. key.
The buzzer beeps.

⇩

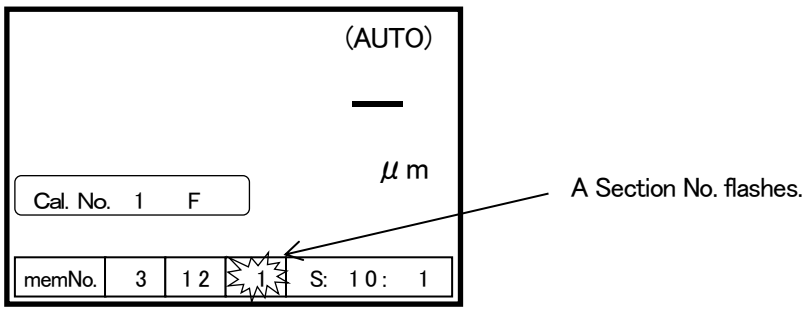
※ A Block No.「12」 is set.
Then moving on to setting a Section No.



Press ▲ or ▼ key to select a Section No.「1」.

(In this example, as Section No. is「1」 So it moves on to the next as it is)

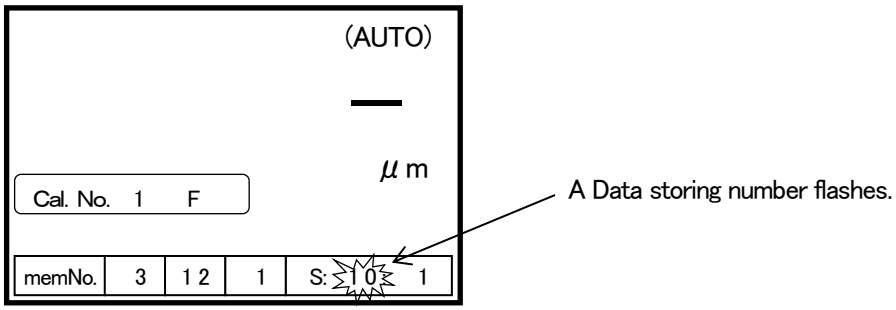
⇩



Press [MEM. SEL.] key.
The buzzer beeps.

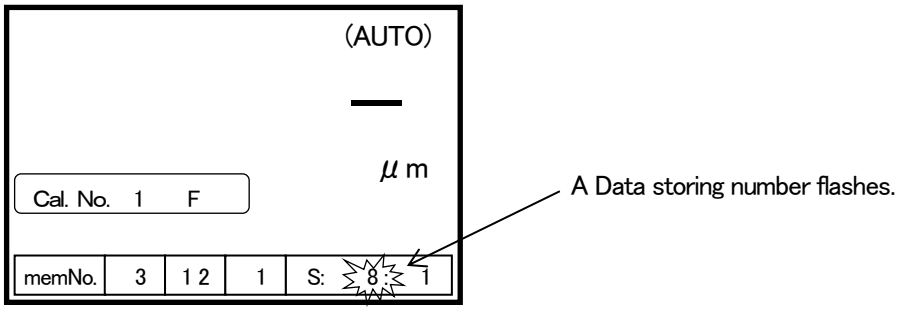
⇩

※ A Section No.「1」is set.
Then moving on to setting a Data storing number per section.



Press [▲] or [▼] key to select a Data storing number「8」.

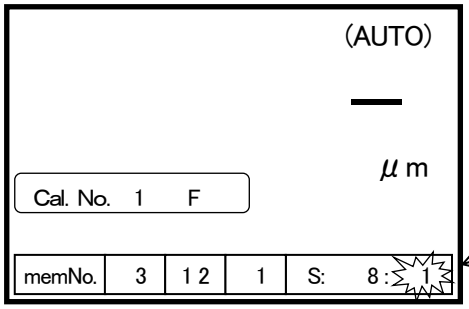
⇩



Press [MEM. SEL.] key.
The buzzer beeps.

⇩

※ A Data storing number「8」is set.
Lastly, specify a Data storing position within a Section.



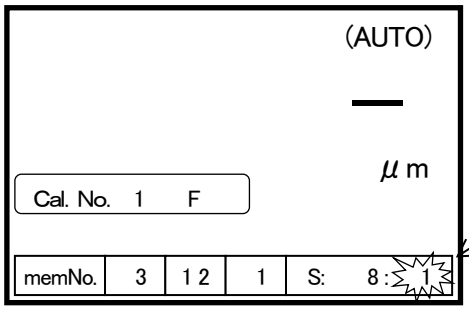
In this example, start storing from
a Data storing position「1」within a Section.

A Data storing position flashes.

Press ▲ or ▼ key to select a Data storing position「1」.

(In this example, as Data storing position is「1」. So it moves on to next as it is)

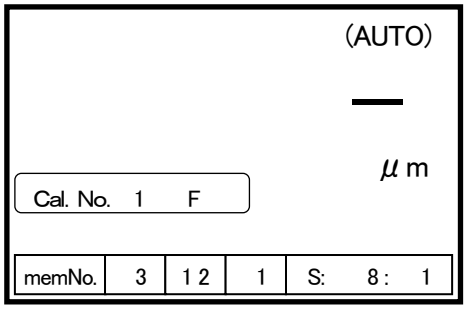
⇩



A Data storing position flshes.

Press MEM. SEL. key.※
The buzzer beeps.

⇩

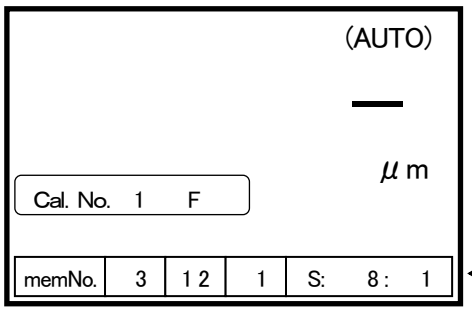


※ Note:
Pressing twice MEM. SEL. key turns the screen to a state of「Data is not stored」and then「Data storing place」disappears on the screen.
To store measured data press MEM. SEL. key 6 times successively so that it turn to a state of「Data storing place is displayed and all setting data do not flash」.

Flashing of all numbers stopped and setting of「Data storing place」has completed.
It becomes possible to take measurements and adjustments.

(2) Keep data from being stored

※ It is in a state of 「Storing data」.



← A state of Non-Flashing of all items.

Press [MEM. SEL.] key.
The buzzer beeps.

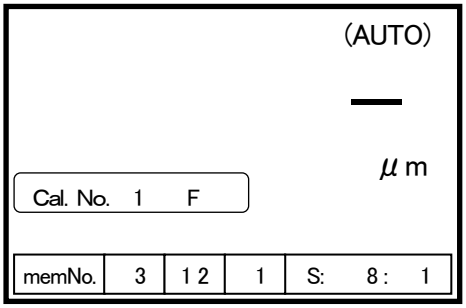
⇩

← The screen disappeares and turns to a state of 「Data is not stored」.

Measurements in storing data

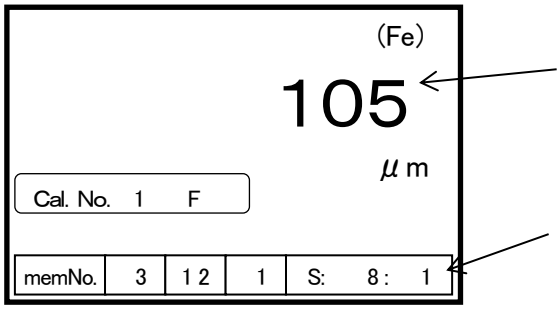
※ Select a place to store data as described in 「(1) Select a Data storing place」 at page 42.

● For operation example, store 8 pcs of measuring data in order from a Data Stroing position 「1」 in a Group No. 「3」, a Block No. 「12」, a Section No. 「1」.



※ According to explanations on page 11, quickly press a probe to a measuring object.

A measurement is taken.
The buzzer beeps.

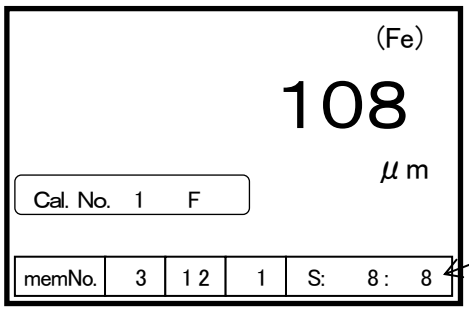


A measured result is displayed.

A data measured now is stored in a Data storing position 「1」.
(a number advances by one each time measured)

⋮

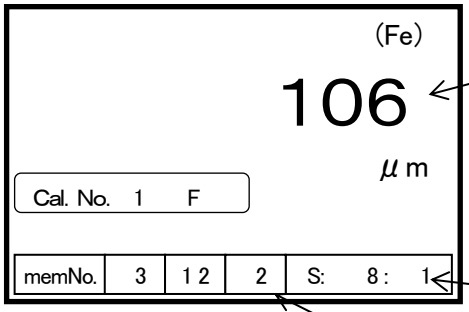
● When the measurement progresses and the data is stored in the last end of a Section No. 「1」 in the 8th measurement, the buzzer beeps, beeps 2 times and warnig that it advances to 「New Section」 in the following measurement.



A screen when the 8th measurement was finished.

A number in a storing place advances to 「8」.
8 pieces of data measured are stored in the places from the numbers of 「1」 to 「8」.

A measurement is taken.
The buzzer beeps.

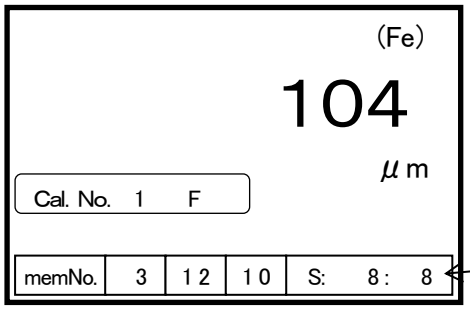


The 9th measured result is displayed.
The 9th measured data is stored in a Data storing position 「1」 in a Section No. 「2」.

A Data storing position returns to 「1」.

A Section No. advances by one to 「2」.

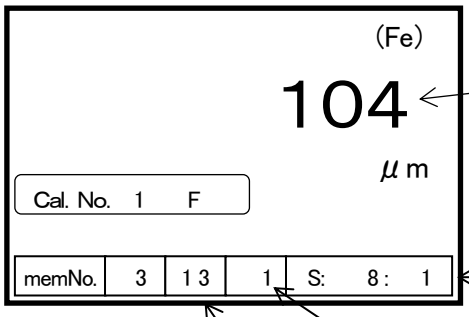
● When the measurement progresses and the data is stored in the last end of a Block No. 「12」, a Section No. 「10」, the buzzer beeps, beeps 2 times and warnig that it advances to 「New Block」 in the following measurement.



This is a scrren when the data is stored in the last end of a Block No. 「12」, a Section No. 「10」.

A Data storing position 「8」 is displayed.

A measurement is taken.
The buzzer beeps.



A measured result is displayed.
This measuring data is stored in a Data storing position 「1」 of a Block No. 「13」, a Section No. 「1」.

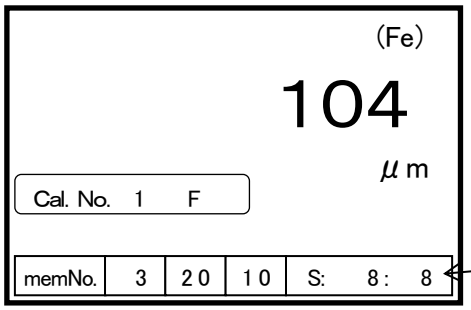
A Data storing position returns to 「1」.

A Section No. returns to 「1」.

A Block No. advances by one to 「13」.

※ In a Block No. 「12」, 8 data/section × 10 section, total 80 of measuring data are stored.

● When the measurement progresses and the data is stored in the last end of a Block No.「20」, a Section No.「10」, the buzzer beeps, beeps 2 times and warnig that it advances to「New Group」in the following measurement.

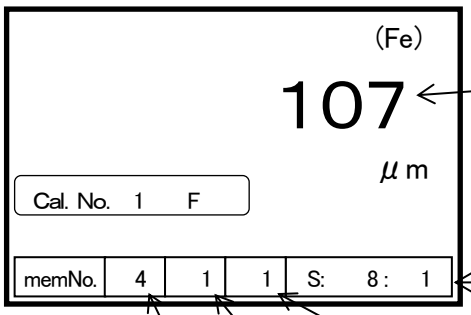


This is a scrren when the data is stored in the last end of a Block No.「20」, a Section No.「10」.

A Data storing position「8」is displayed.

A measurement is taken.
The buzzer beeps.

⇩



A measured result is displayed.
This measuring data is stored in a Data storing position「1」of a Group No.「4」, a Block No.「1」, a Section No.「1」.

A Data storing position returns to「1」.

A Section No. returns to「1」.

A Block No. returns to「1」.

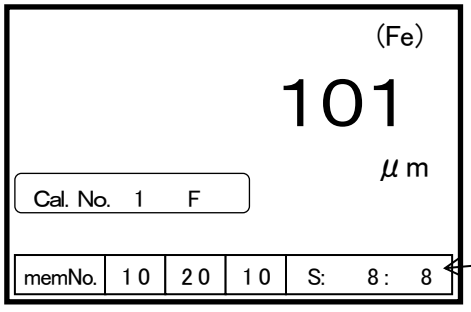
A Group No. advances by one to「4」.

※ In a Group No.「3」, 8 data/section × 10 section/block × 9 block, total 720 of measuring data are stored.

※ It becomes 9 block as started storing from 12 block.

⋮

● When the measurement progresses and the data is stored in the last end of a Group No.「10」, a Block No.「20」, a Section No.「10」, the buzzer beeps, beeps 2 times and warnig that no more data can be stored.



This is a scrren when the data is stored in the last end of a Group No.「10」, a Block No.「20」, a Section No.「10」.

A Data storing position「8」is displayed.

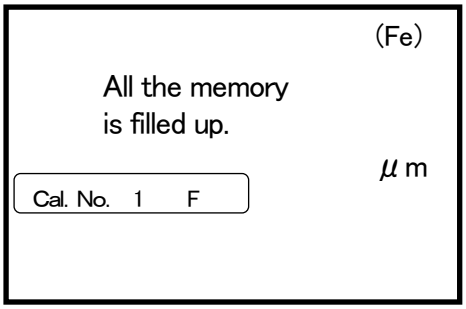
A measurement is taken.
The buzzer beeps.

※ This time the mesurering data is not displayed.

⇩

The buzzer beep, beeps.

⇩

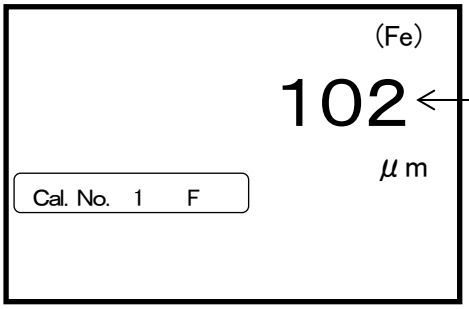


Storing data has been completed.

● It is possible to continue measurements , but measuring data only is displayed.

A measurement is taken.
The buzzer beeps.

⇩



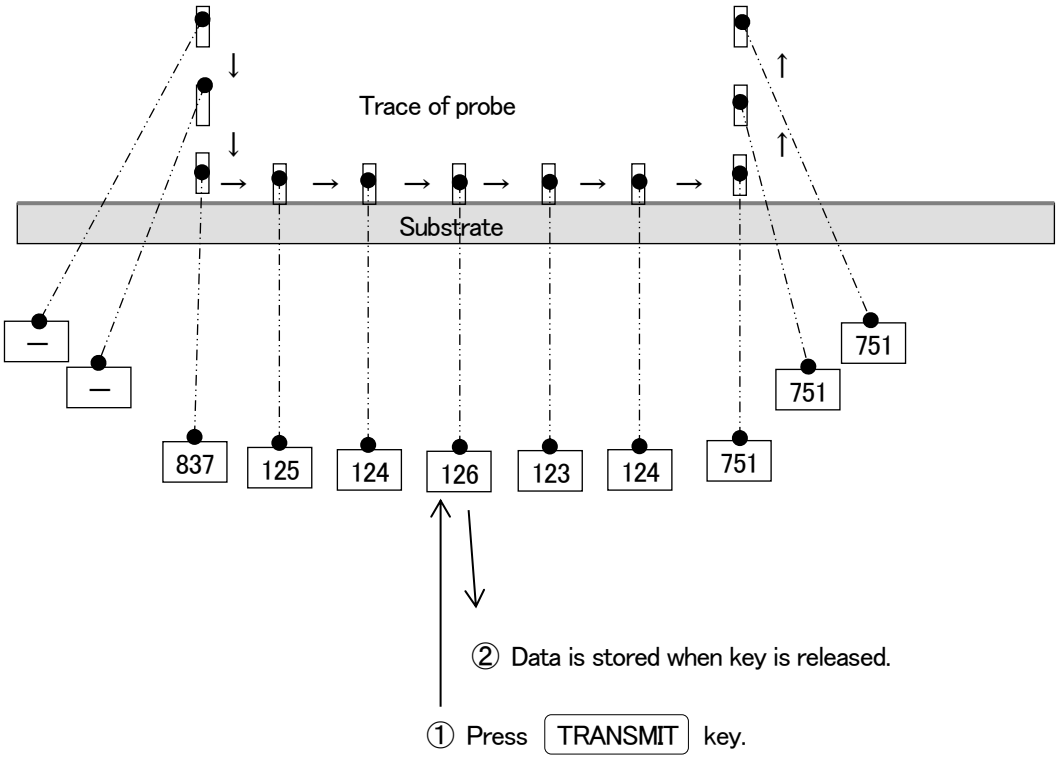
A measured result is displayed.

The screen disappeares and turns
to a state of 「Data is not stored」.

Storing of measured data at Non-Inturrupt Measurement Mode

When this unit is set at 「Storing of measured data」 and mesurements are taken at 「Non-Intrrupt Measurement Mode」, it is capable of storing data on the following procedures.

- Select a place to store data as described in 「(1) Select a Data storing place」 at page 42.
- Start Non-Interrupt measuring.



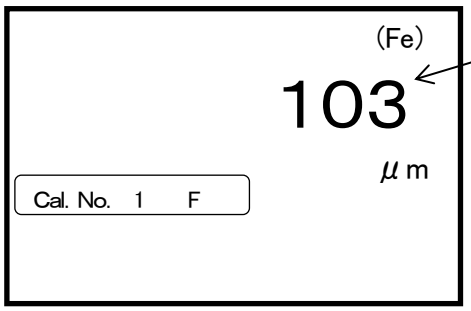
※ Only 「1 data」 is stored when the transfer key is released.

Three kinds of measuring methods in case of「No memory space」

(1) Keep on measuring

- Measuring.

The buzzer beeps.



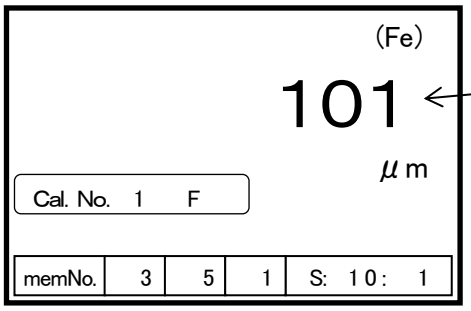
A measured result is displayed.

Caution

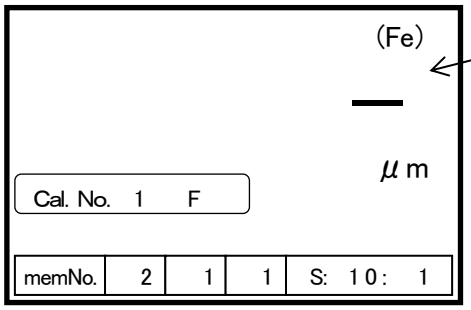
Measuring can be continued but data can not be stored.

(2) Looking for an empty storing place

- Interrupt measuring.
- Select a place to store data as described in 「(1) Select a Data storing place」 at page 42.



In case data is stored in a selected place, the value is displayed.



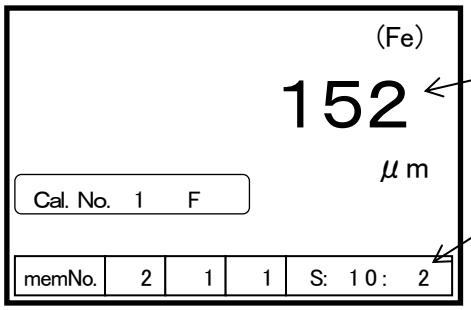
In case a selected place is unoccupied,「—」mark is displayed.

Caution

Depending on measurement quantities, 5～6 blocks (500～600 : storing quantity) recommended for selecting as empty places to store successively.

Measuring is resumed.

The buzzer beeps.



A measured value is displayed.

A measured value is stored and advances the number of a Data storing position by one.

(3) Deletion of unnecessary data

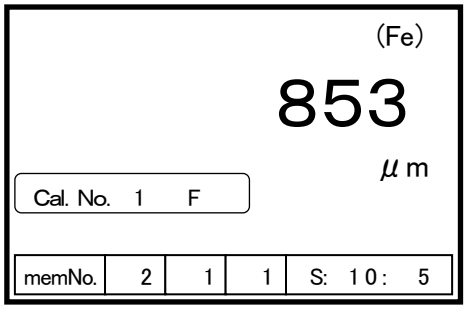
- Delete an unnecessary data in a storing place and store there new data which is to be taken.
- Delete all of unnecdcesary data afterward, referring to each knid of deletion methods.
- Resume「Measurements while storing data」after deleting data.

Deletion of data

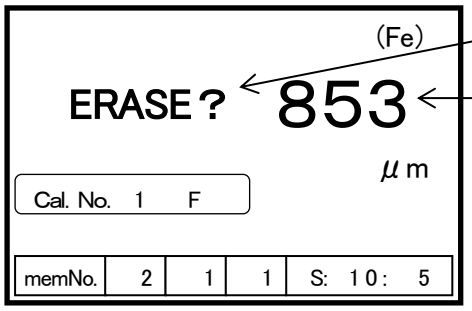
(1) Deletion of one data

※ Data inadvertently by pressing a probe against objectives、poor and unstable pressing on objects and erroneous data which are stored can be deleted.

Erroneous value is displayed.



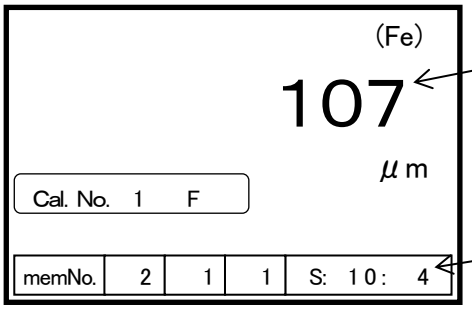
Press [DATA ERASE] key.
The buzzer beeps.



「ERASE？」appears on the screen and flashes.

The measured value flashes.

Press [DATA ERASE] key.
The buzzer beeps.



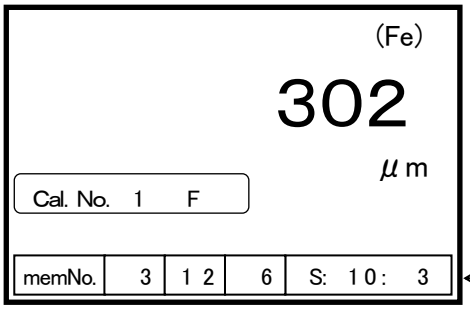
The measured value is deleted.
The previous stored data is displayed.

A Data storing position returns by one.

When data storing places are running short and sotred data is no more necessary, it is possible to dellete all data collectively and delete data of each storing place.

(2) Deletion of all data

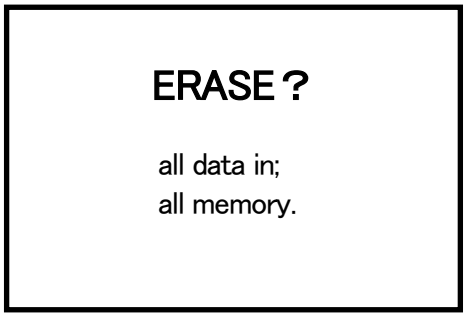
※『all data』stored are collectively deleted.



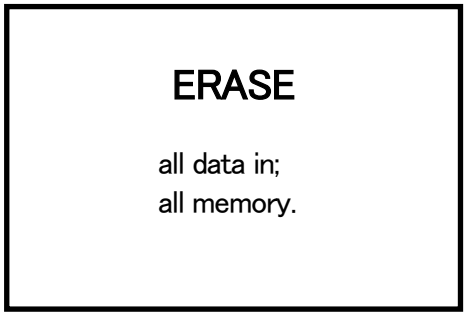
Caution

This operation can not be activated when data colum of data storing place is not displayed. When it is not displayed, press MEM. SEL. key 6 times to activate the colum with all the numbers displayed.

Press MEM. CLEAR key.
The buzzer beeps, beeps 2 times.

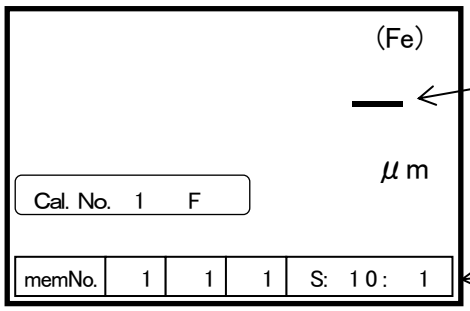


Press MEM. CLEAR key.
The buzzer beeps, beeps 2 times.



All stored data are deleted.

The buzzer beeps.



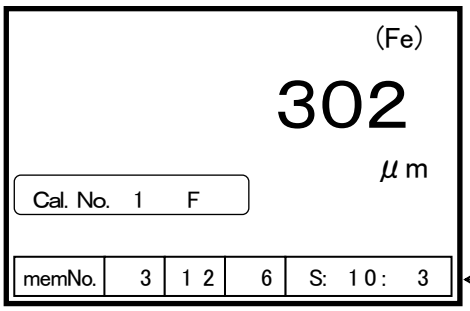
「—」mark is displayed.

In the Data storing infomation, a Data storing number per section「10」and all others are「1」.

(3) Deletion of group data

※ Data stored in arbitrary group with Group No. 1～10 is deleted.

● For operation example, data stored in a Group No.「5」 is deleted.

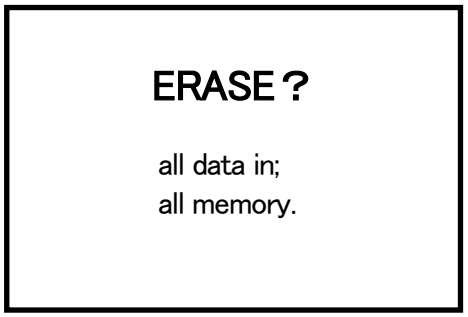


Caution

This operation can not be activated when data colum of data storing place is not displayed. When it is not displayed, press [MEM. SEL.] key 6 times to activate the colum with all the numbers displayed.

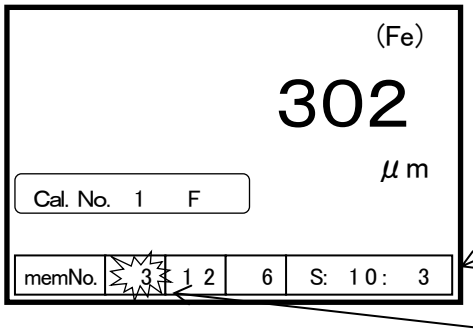
Press [MEM. CLEAR] key.
The buzzer beeps, beeps 2 times.

⇩



Press [MEM. SEL.] key.
The buzzer beeps.

⇩



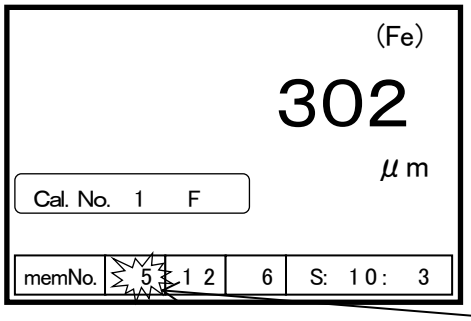
The Data storing infomation is displayed.

A Group No. flashes.

⇩

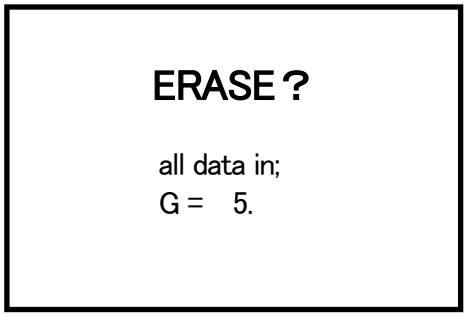
Press [▲] or [▼] key to adjust to a Group No. in which to delete data.

⇩

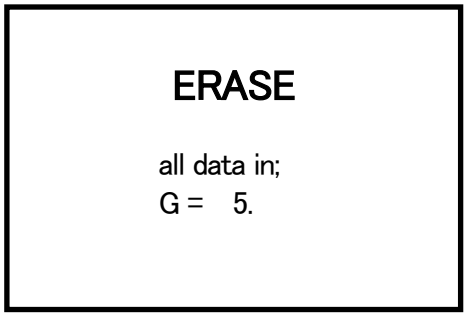


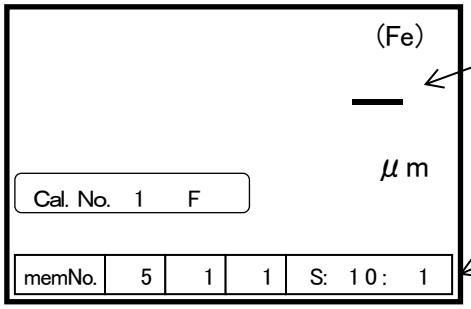
Adjust to a Group No.「5」.

Press MEM. CLEAR key.
The buzzer beeps, beeps 2 times.



Press MEM. CLEAR key.
The buzzer beeps.





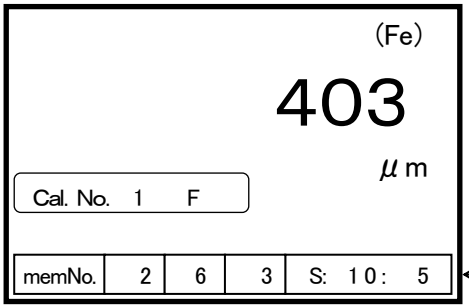
「—」 mark is displayed.

The Data storing infomation turn as follows:
Group No.「5」
Block No.「1」
Section No.「1」
Data storing number per section「10」
Data storing position「1」.

(4) Deletion of block data

※ Data stored in arbitrary block with Block No. 1～20 is deleted.

● For operation example, data stored in a Group No.「1」, a Block No.「12」 is deleted.

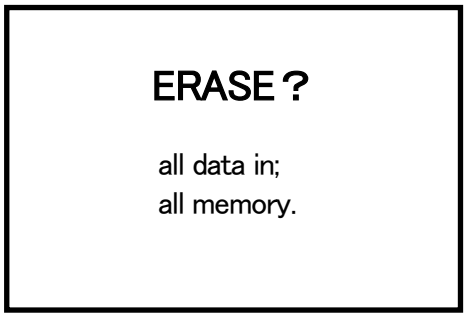


Caution

This operation can not be activated when data colum of data storing place is not displayed. When it is not displayed, press [MEM. SEL.] key 6 times to activate the colum with all the numbers displayed.

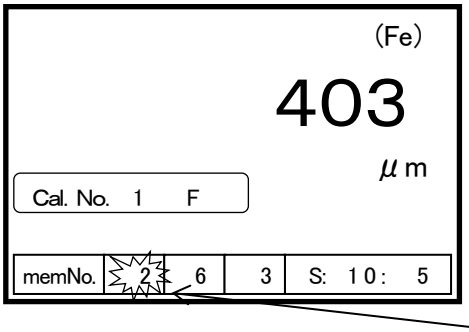
Press [MEM. CLEAR] key.
The buzzer beeps, beeps 2 times.

⇩



Press [MEM. SEL.] key.
The buzzer beeps.

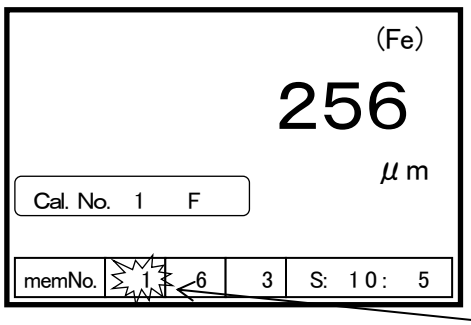
⇩



A Group No. flashes.

Press [▲] or [▼] key to adjust to a Group No. where there is a block to be aimed at.

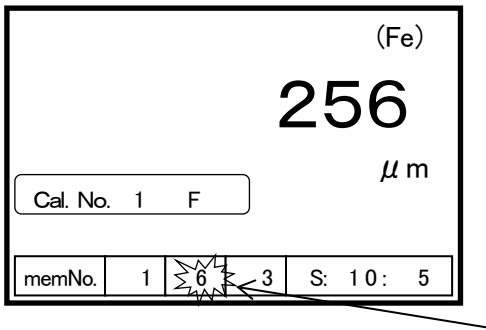
⇩



Adjust to a Group No.「1」.

Press [MEM. SEL.] key.
The buzzer beeps.

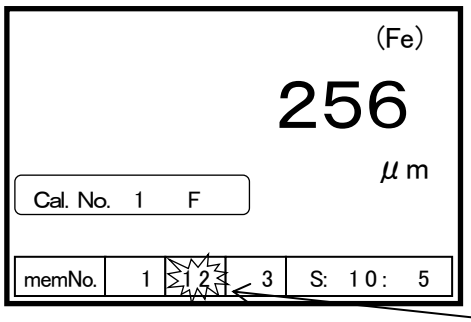
⇩



A Group No. is set at「1」, and
a Block No. flashes.

Press [▲] or [▼] key to adjust to a Block No. to be aimed at.

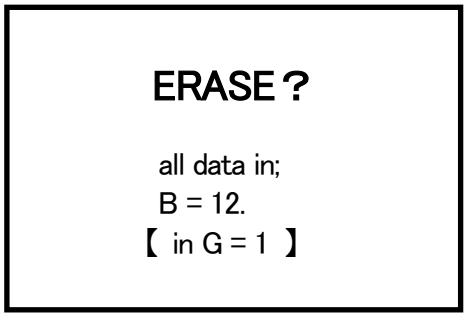
⇩



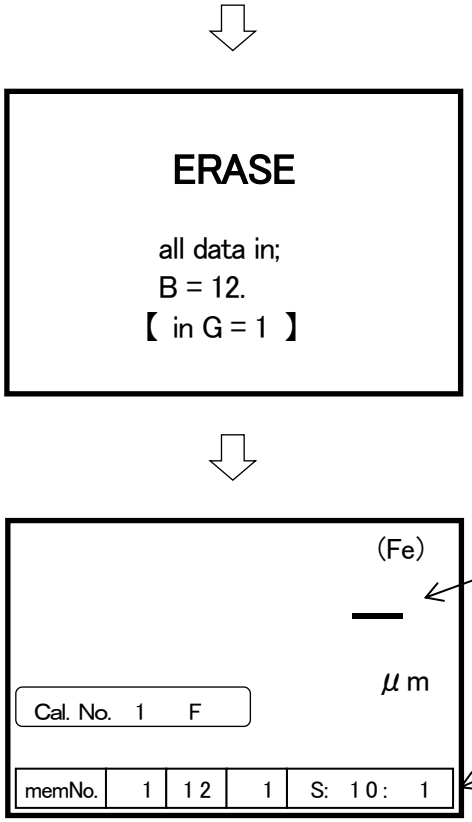
Adjust to a Block No.「12」.

Press [MEM. CLEAR] key.
The buzzer beeps, beeps 2 times.

⇩



Press [MEM. CLEAR] key.
The buzzer beeps.



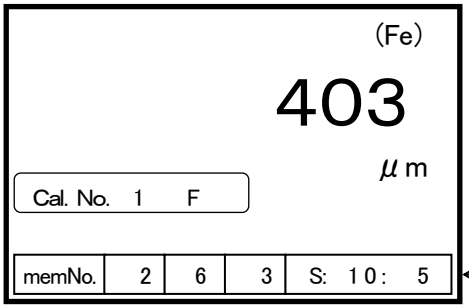
「—」 mark is displayed.

The Data storing infomation turn as follows:
Group No.「1」
Block No.「12」
Section No.「1」
Data storing number per section「10」
Data storing position「1」.

(5) Deletion of section data

※ Data stored in arbitrary section with Section No. 1～10 is deleted.

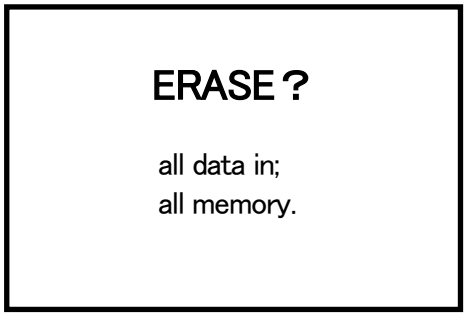
● For operation example, data stored in a Group No.「3」, a Block No.「7」, a Section No.「5」 is deleted.



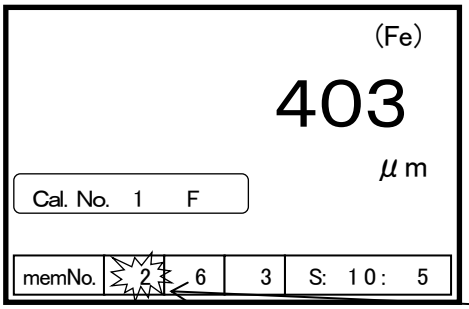
Caution

This operation can not be activated when data colum of data storing place is not displayed. When it is not displayed, press [MEM. SEL.] key 6 times to activate the colum with all the numbers displayed.

Press [MEM. CLEAR] key.
The buzzer beeps, beeps 2 times.

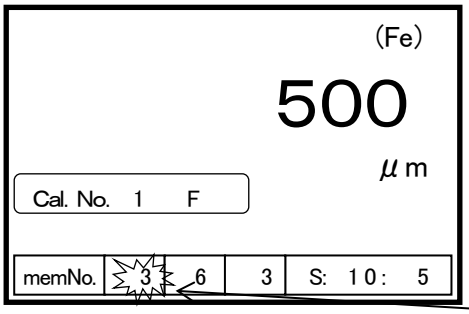


Press [MEM. SEL.] key.
The buzzer beeps.



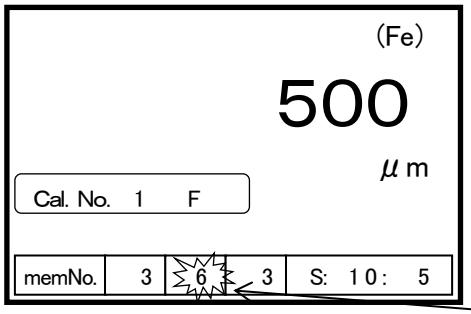
A Group No. flashes.

Press [▲] or [▼] key to adjust to a Group No. where there is a block to be aimed at.



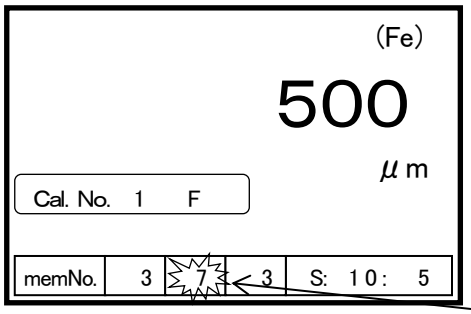
Adjust to a Group No.「3」.

Press [MEM. SEL.] key.
The buzzer beeps.



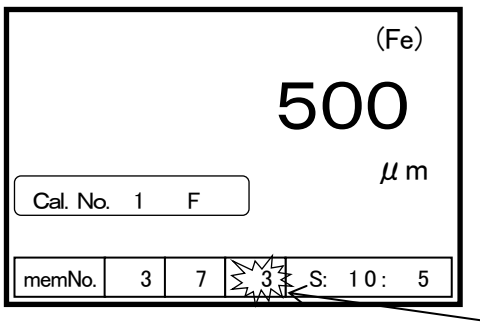
A Group No. is set at 「3」, and
a Block No. flashes.

Press [▲] or [▼] key to adjust to a Block No. where there is a section to be aimed at.



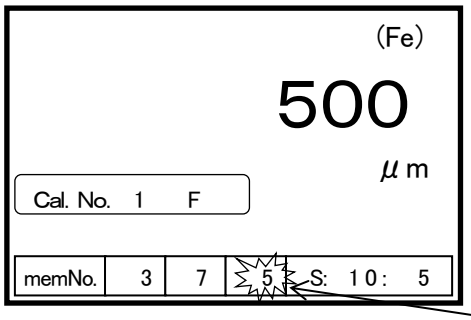
Adjust to a Block No. 「7」.

Press [MEM. SEL.] key.
The buzzer beeps.



A Block No. is set at 「7」, and
a Section No. flashes.

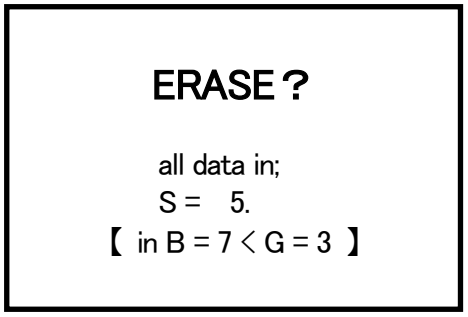
Press [▲] or [▼] key to adjust to a Section No. to be aimed at.



Adjust to a Section No.「5」.

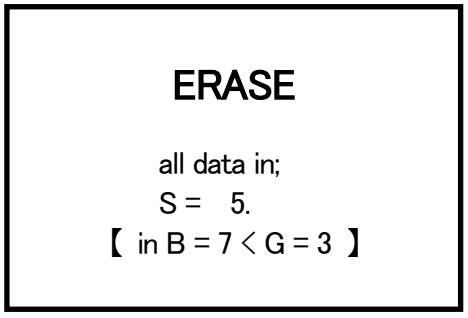
Press [MEM. CLEAR] key.
The buzzer beeps, beeps 2 times.

⇩

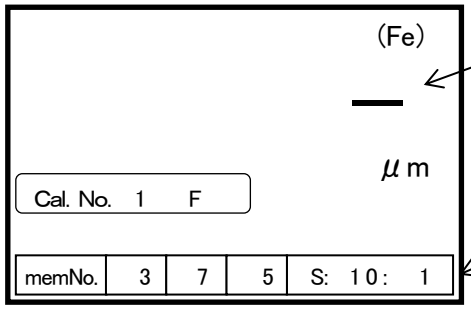


Press [MEM. CLEAR] key.
The buzzer beeps.

⇩



⇩

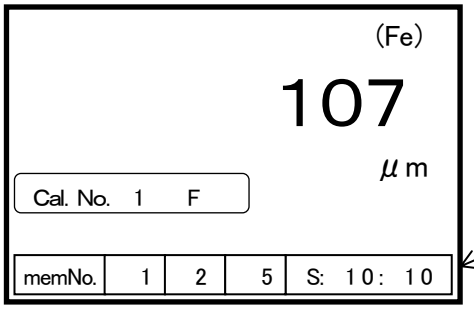


「—」 mark is displayed.

The Data storing infomation turn as follows:
Group No.「3」
Block No.「7」
Section No.「5」
Data storing number per section「10」
Data storing position「1」.

Statistics (statistical calculation value of chosen data is displayed)

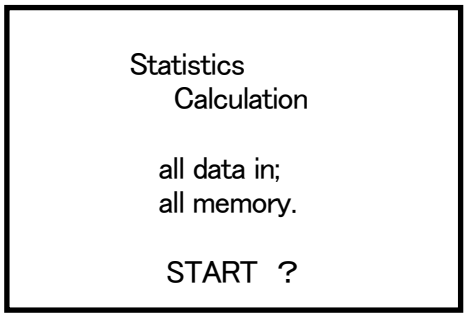
(1) Statistics of all data



The Data storing infomation is displayed.

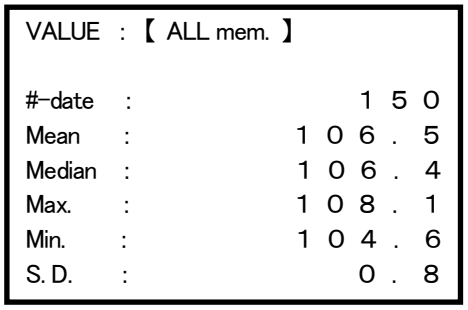
Press [STATISTICS] key.
The buzzer beeps, beeps 2 times.

⇩



Press [STATISTICS] key.
The buzzer beeps, beeps 2 times.
(displayed as being under process of calculating)
The buzzer beeps.

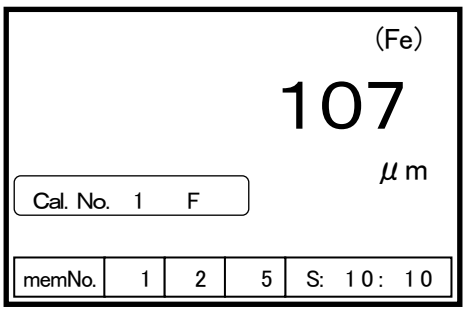
⇩



Press [STATISTICS] key.
The buzzer beeps.

Note:
If [STATISTICS] key is not pressed, this screen remains unchanged until Power switches off.

⇩

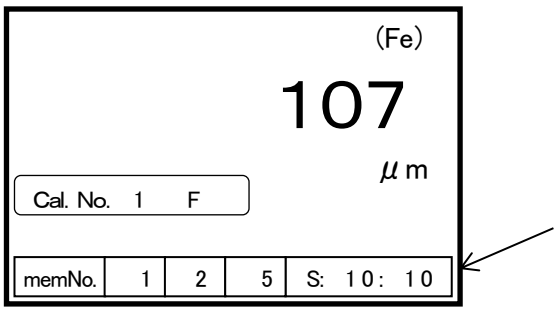


The screen returns to the state before statistical calculation.

(2) Statistics of group data

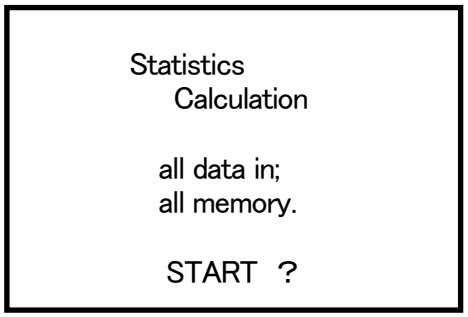
※ Statistical calculation is performed on the data stored in arbitrary group with Group No. 1～10.

● For operation example, Statistical calculation is performed on the data stored in a Group No. 「3」.

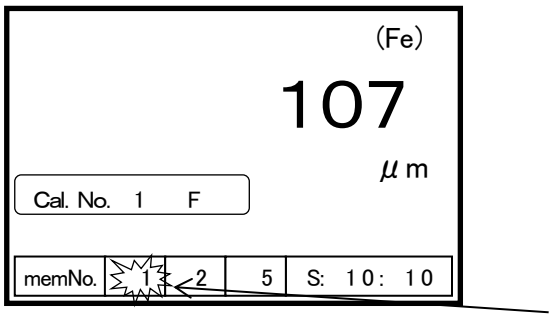


The Data storing infomation is displayed.

Press [STATISTICS] key.
The buzzer beeps, beeps 2 times.

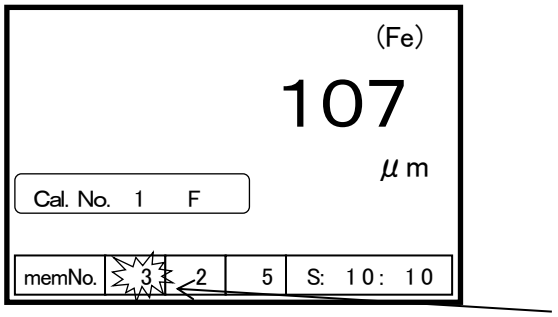


Press [MEM. SEL.] key.
The buzzer beeps.



A Group No. flashes.

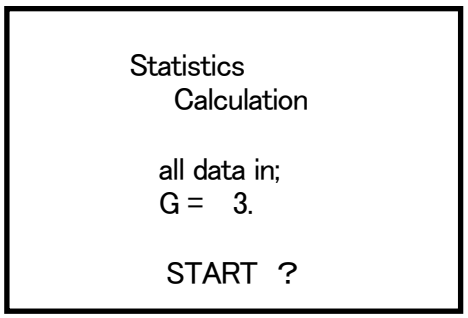
Press [▲] or [▼] key to adjust to a Group No. in which to calculate statistics.



Adjust to a Group No. 「3」.

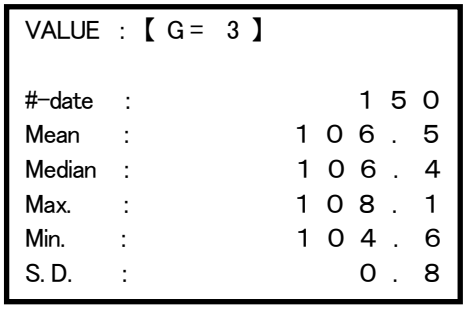
Press [STATISTICS] key while a Group No. is flashing.
The buzzer beeps, beeps 2 times.

⇩



Press [STATISTICS] key.
The buzzer beeps, beeps 2 times.
(displayed as being under process of calculating)
The buzzer beeps.

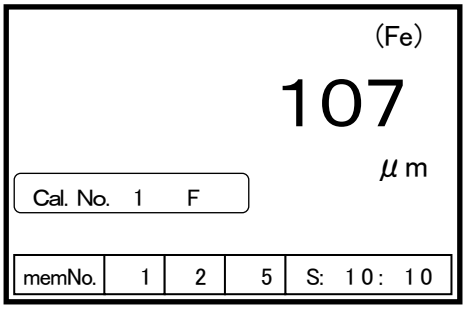
⇩



Press [STATISTICS] key.
The buzzer beeps.

Note:
If [STATISTICS] key is not pressed, this screen remains unchanged until Power switches off.

⇩

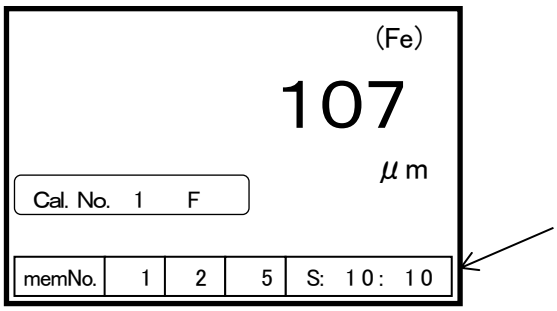


The screen returns to the state before statistical calculation.

(3) Statistics of block data

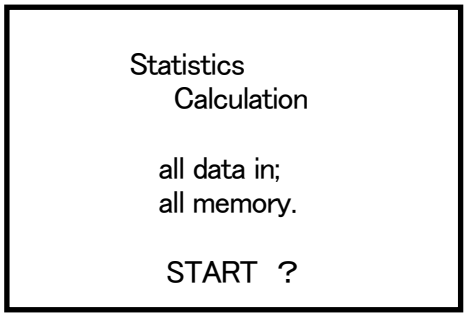
※ Statistical calculation is performed on the data stored in arbitrary block with Block No. 1～20.

● For operation example, Statistical calculation is performed on the data stored in a Group No.「1」, a Block No.「14」.

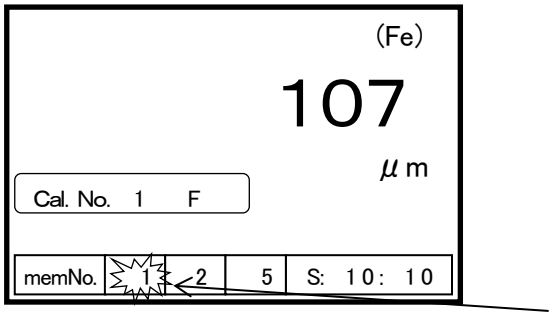


The Data storing infomation is displayed.

Press [STATISTICS] key.
The buzzer beeps, beeps 2 times.

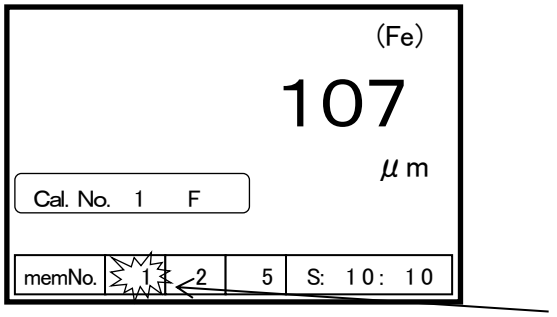


Press [MEM. SEL.] key.
The buzzer beeps.



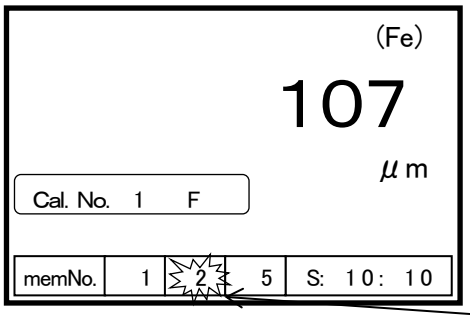
A Group No. flashes.

Press [▲] or [▼] key to adjust to a Group No. where there is a block to calculate statistics.



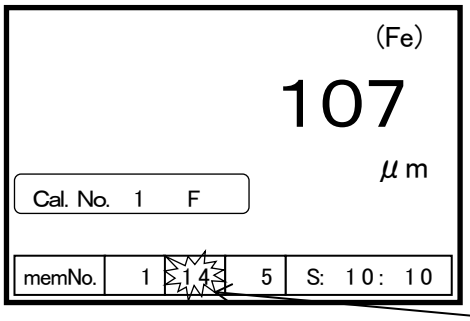
Adjust to a Group No.「1」.

Press [MEM. SEL.] key.
The buzzer beeps.



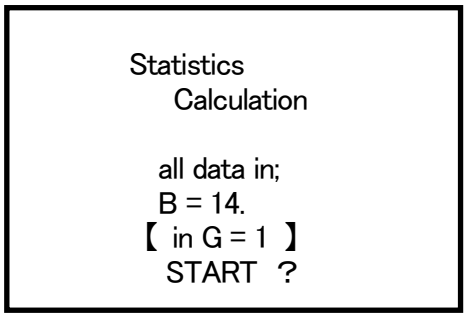
A Group No. is set at 「1」, and a Block No. flashes.

Press [▲] or [▼] key to adjust to a Block No. in which to calculate statistics.

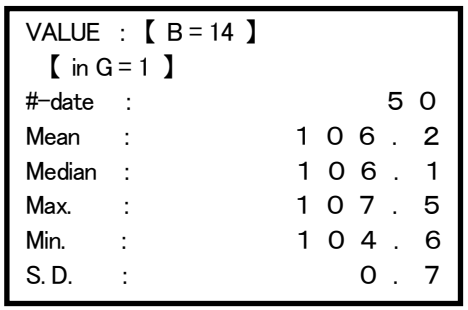


Adjust to a Block No. 「14」.

Press [STATISTICS] key while a Block No. is flashing.
The buzzer beeps, beeps 2 times.

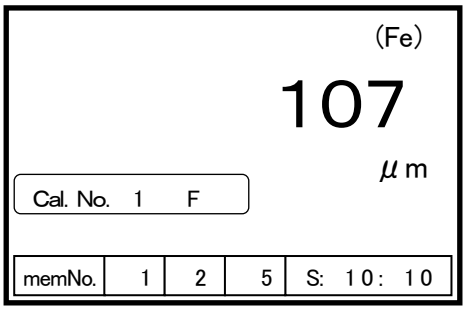


Press [STATISTICS] key.
The buzzer beeps, beeps 2 times.
(displayed as being under process of calculating)
The buzzer beeps.



Press STATISTICS key.
The buzzer beeps.

Note:
If STATISTICS key is not pressed, this screen remains unchanged until Power switches off.

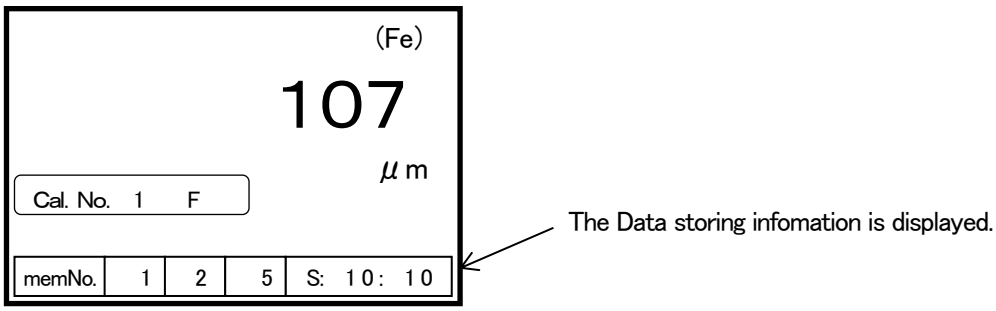


The screen returns to the state before statistical calculation.

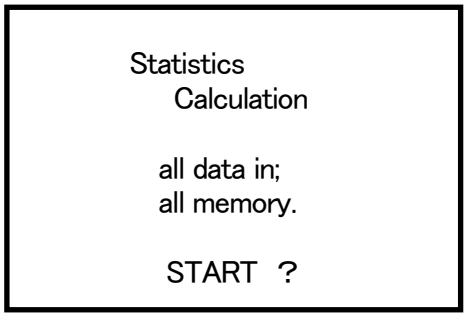
(4) Statistics of section data

※ Statistical calculation is performed on the data stored in arbitrary section with Section No. 1～10.

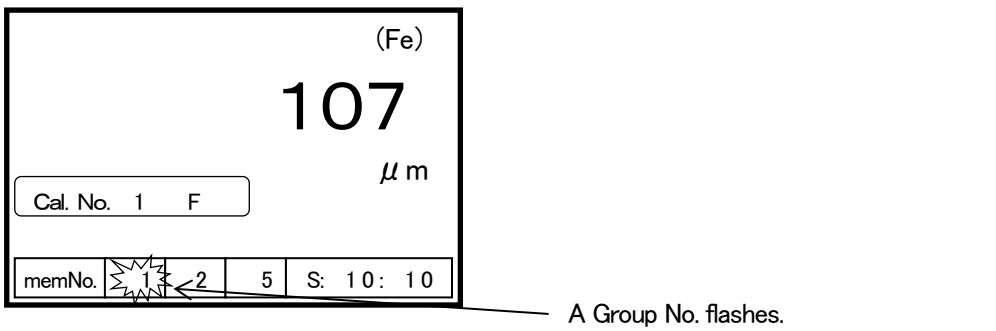
● For operation example, Statistical calculation is performed on the data stored in a Group No.「5」, a Block No.「2」, a Section No.「1」.



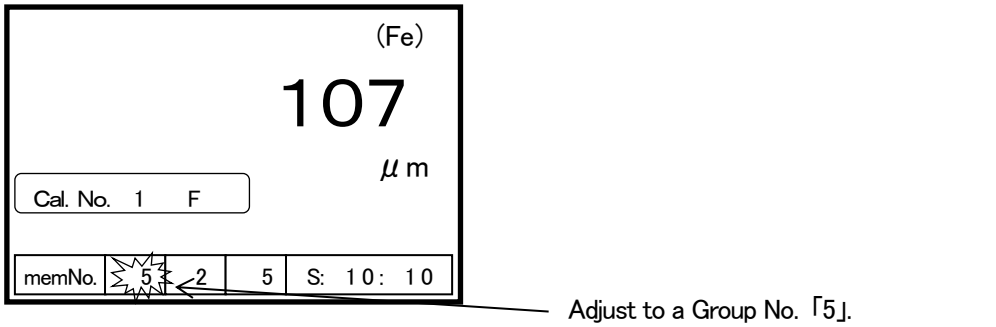
Press [STATISTICS] key.
The buzzer beeps, beeps 2 times.



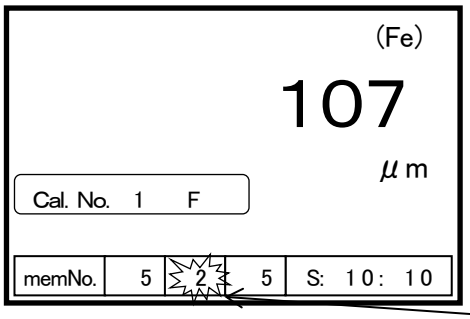
Press [MEM. SEL.] key.
The buzzer beeps.



Press [▲] or [▼] key to adjust to a Group No. where there is a block to calculate statistics.

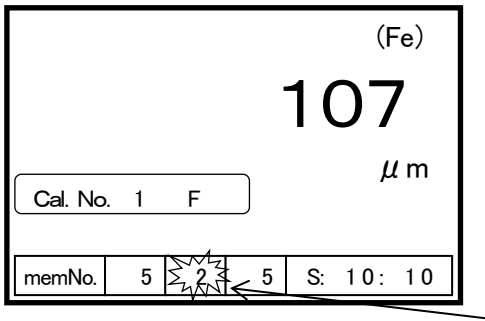


Press [MEM. SEL.] key.
The buzzer beeps.



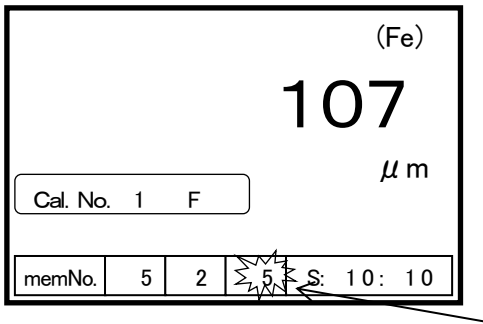
A Group No. is set at 「5」, and
a Block No. flashes.

Press [▲] or [▼] key to adjust to a Block No. where there is a section to calculate statistics.



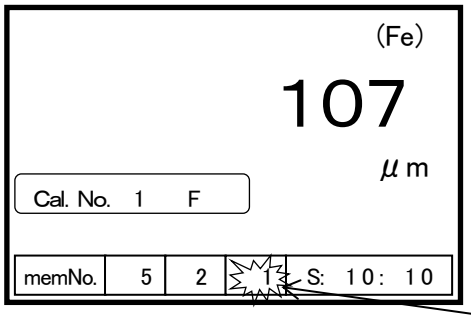
Adjust to a Block No. 「2」.

Press [MEM. SEL.] key.
The buzzer beeps.



A Block No. is set at 「2」, and
a Section No. flashes.

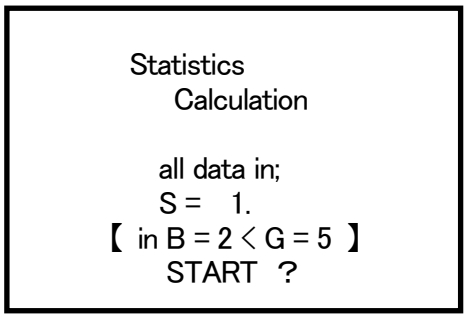
Press [▲] or [▼] key to adjust to a Section No. in which to calculate statistics.



Adjust to a Section No.「1」.

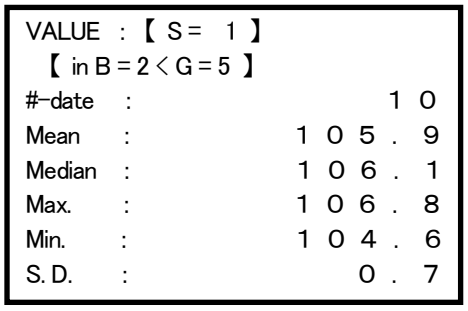
Press STATISTICS key while a Section No. is flashing.
The buzzer beeps, beeps 2 times.

⇩



Press STATISTICS key.
The buzzer beeps.

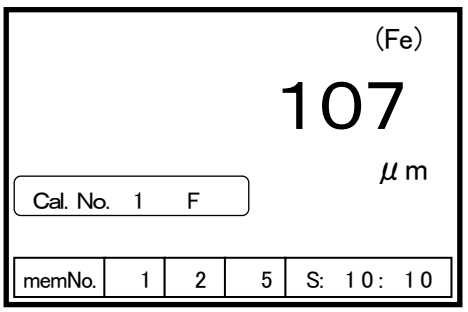
⇩



Press STATISTICS key.
The buzzer beeps.

Note:
If STATISTICS key is not pressed, this screen remains unchanged until Power switches off.

⇩



The screen returns to the state before statistical calculation.

Transferring data – USB –

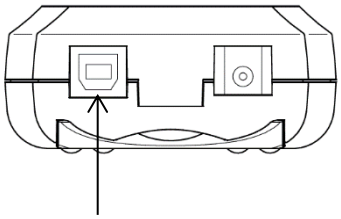
Transfer data to a PC (personal computer) by using a USB cable.
Download the USB transfer driver from the included CD or our website.

※ Data is not transferred when the main unit is set to 「Non-Intrerrupt Measuring mode」.
Make sure beforehand that this main unit is set to 「is set to Normal (hold) Measuring mode」.

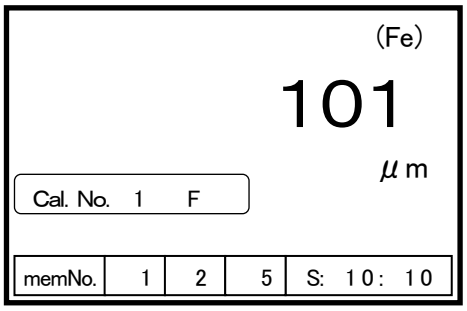
※ Even when the unit of this instrument is set to the 「mil」, the data transferred to the Transfer software is displayed with the 「μm」 unit.

(1) Outright transferring measured data (Real time transfer)

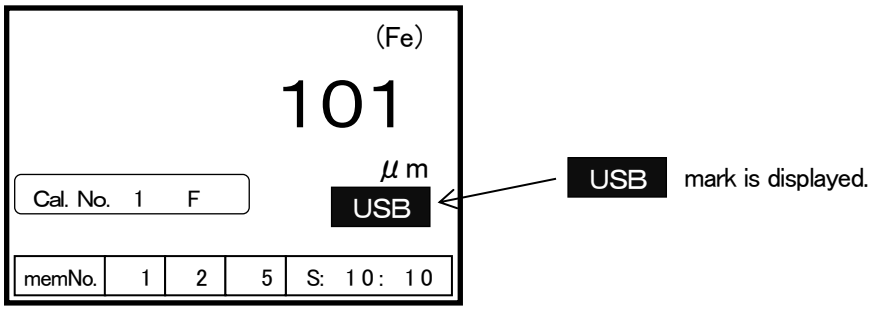
- Prepare for a PC side.
- Connect a USB cable to a PC.



This is a USB cable connector.
Hook up a UBS cable to USB cable connector and the other sode to PC.



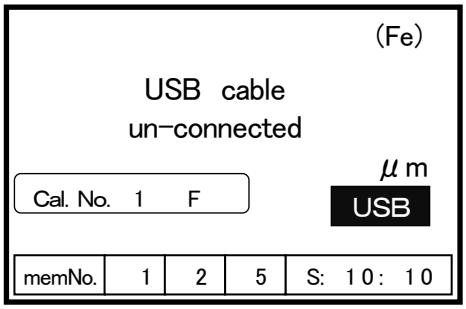
Press [COM. ENABLE] key.
The buzzer beeps.



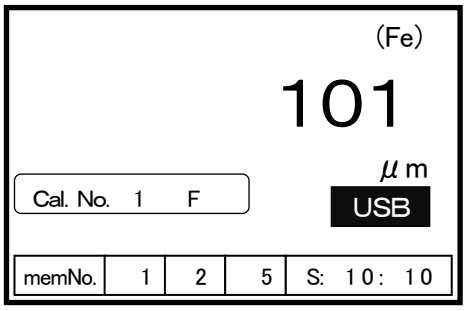
Press [TRANSMIT] key.
The buzzer beeps.
Data is sent out each time a measurement is taken.

Caution

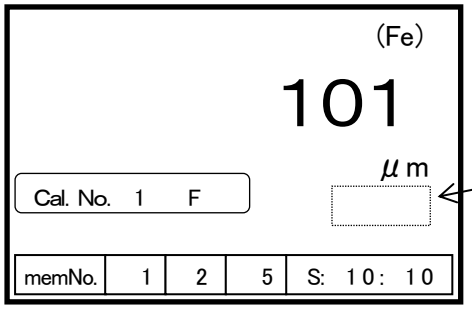
Pressing [COM. ENABLE] key without connecting USB cable, a warning「USB cable un-connected」is displayed.
Press again [COM. ENABLE] key to delete the letters and connect USB cable.



(2) Interrupt transferring data



Press [COM. ENABLE] key.
The buzzer beeps.



USB mark disappears on the screen.

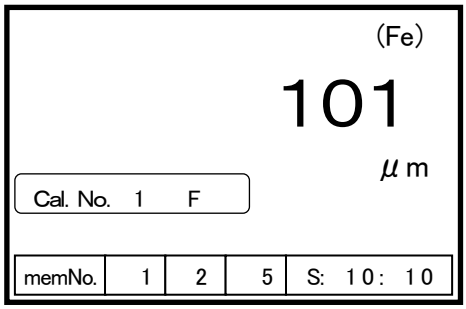
Data stops being transferred.

Transferring stored data – USB –

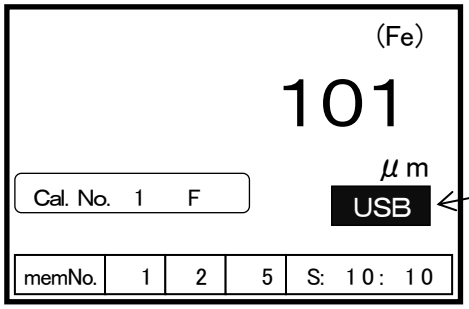
(1) Transfer of all data

※ Transferring all stored data.

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

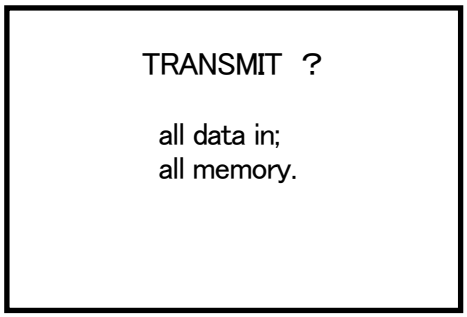


Press [COM. ENABLE] key.
The buzzer beeps.



USB mark is displayed.

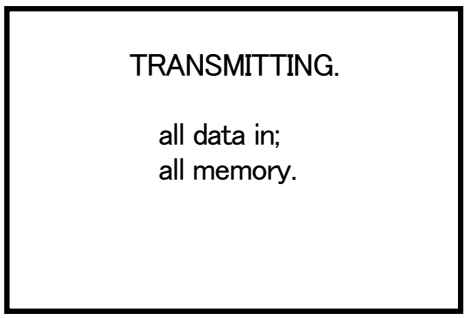
Press [MEM. SEL.] key.
The buzzer beeps, beeps 2 times.



Press [TRANSMIT] key.
The buzzer beeps, beeps 2 times.

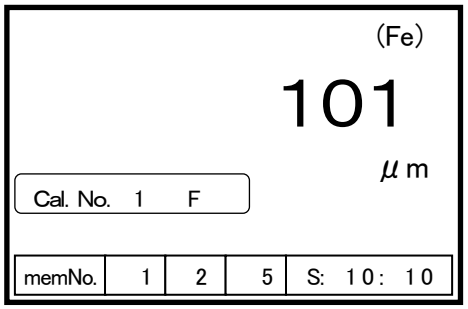
Caution

Pressing [COM. ENABLE] key without connecting USB cable, a warning 「USB cable un-connected」 is displayed.
Press again [COM. ENABLE] key to delete the letters and connect USB cable.



The buzzer beeps.

⇩

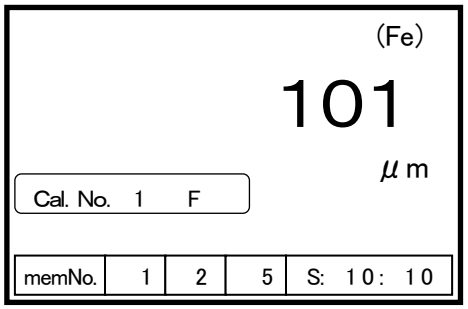


Transferring is completed, returning ns to the beginning.

(2) Transfer of group data

※ Data stored in arbitrary group with Group No. 1～10 is transferred.

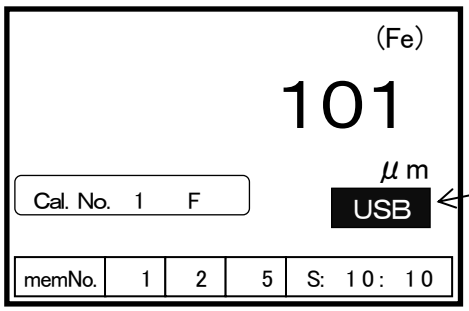
- Prepare for a PC side.
- Connect a USB cable to a PC.
- For operation example, data stored in a Group No.「3」is transferred.



Press [COM. ENABLE] key.

The buzzer beeps.

⇩

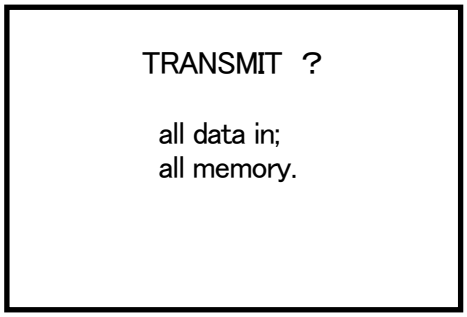


USB mark is displayed.

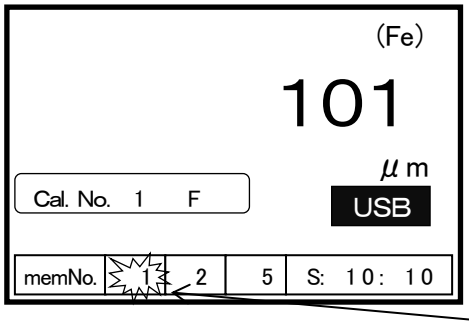
Press MEM. SEL. key.
The buzzer beeps, beeps 2 times.

⚠ Caution

Pressing COM. ENABLE key without connecting USB cable, a warning 「USB cable un-connected」 is displayed.
Press again COM. ENABLE key to delete the letters and connect USB cable.

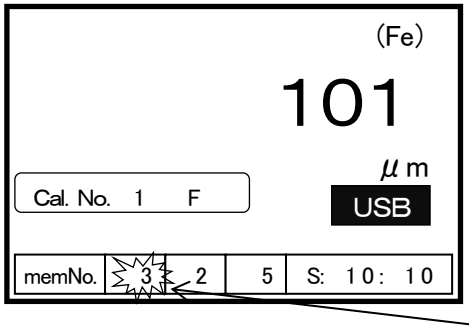


Press MEM. SEL. key.
The buzzer beeps.



A Group No. flashes.

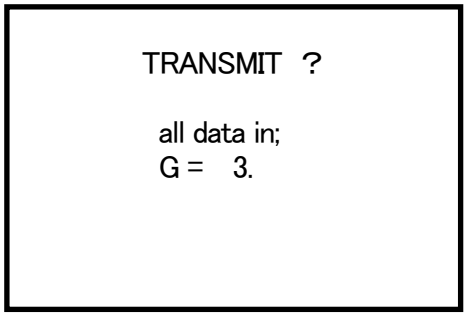
Press ▲ or ▼ key to adjust to a Group No. in which to transfer data.



Adjust to a Group No. 「3」.

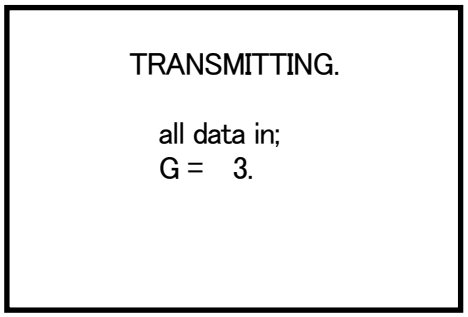
Press [TRANSMIT] key while a Group No. is flashing.
The buzzer beeps, beeps 2 times.

⇩



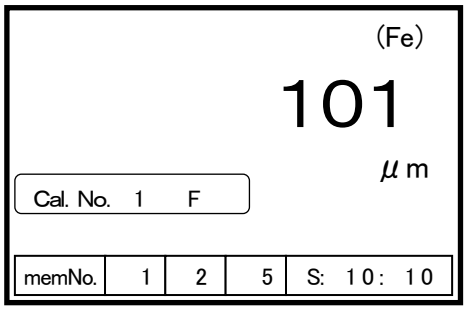
Press [TRANSMIT] key.
The buzzer beeps.

⇩



The buzzer beeps.

⇩

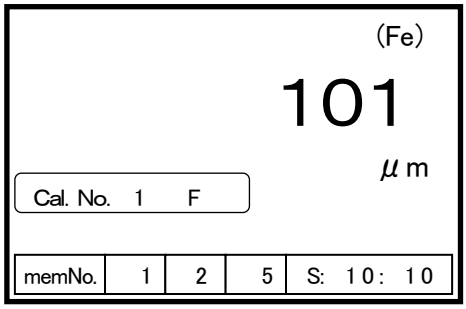


Transferring is completed, returning ns to the beginning.

(3) Transfer of block data

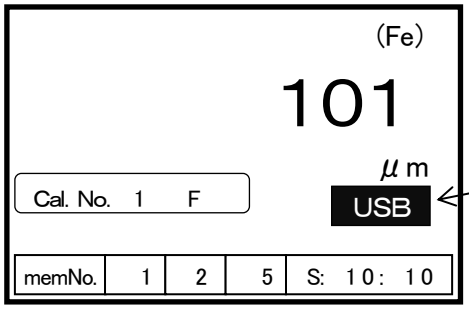
※ Data stored in arbitrary block with Block No. 1～20 is transferred.

- Prepare for a PC side.
- Connect a USB cable to a PC.
- For operation example, data stored in a Group No.「4」, a Block No.「7」 is transferred.



Press [COM. ENABLE] key.
The buzzer beeps.

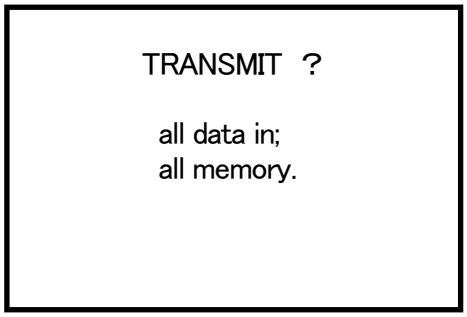
⇩



USB mark is displayed.

Press [MEM. SEL.] key.
The buzzer beeps, beeps 2 times.

⇩

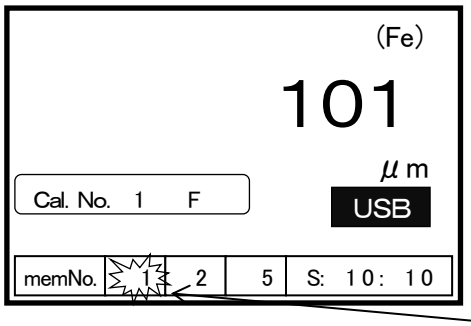


Press [MEM. SEL.] key.
The buzzer beeps.

⇩

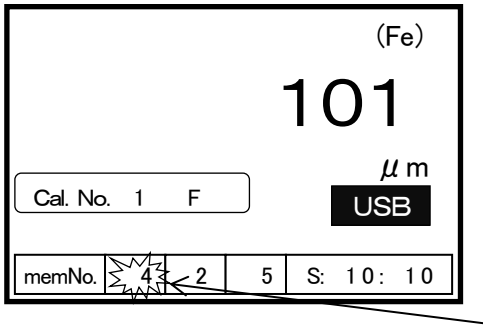
Caution

Pressing [COM. ENABLE] key without connecting USB cable, a warning「USB cable un-connected」is displayed.
Press again [COM. ENABLE] key to delete the letters and connect USB cable.



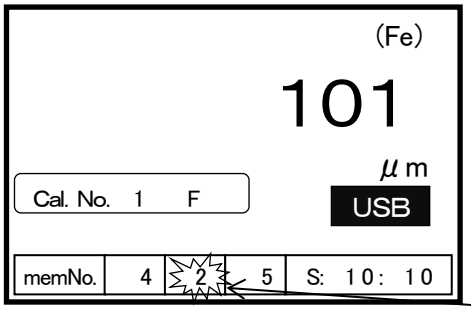
A Group No. flashes.

Press ▲ or ▼ key to adjust to a Group No. where there is a block to transfer data.



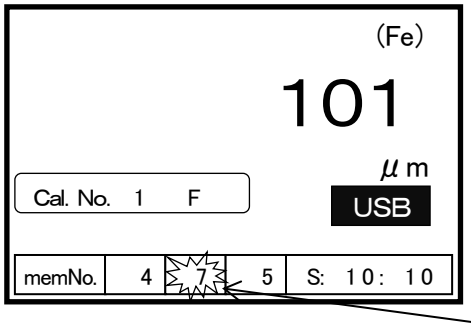
Adjust to a Group No.「4」.

Press MEM. SEL. key.
The buzzer beeps.



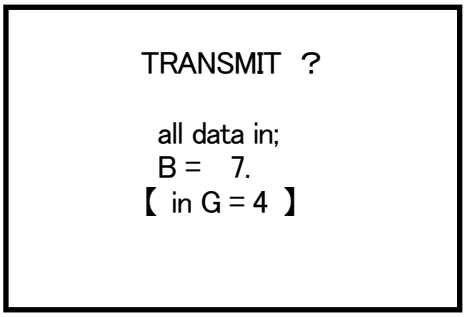
A Group No. is set at「4」, and
a Block No. flashes.

Press ▲ or ▼ key to adjust to a Block No. in which to transfer data.

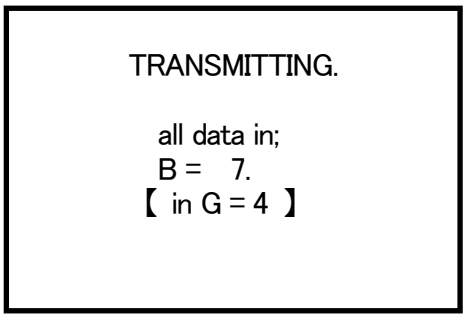


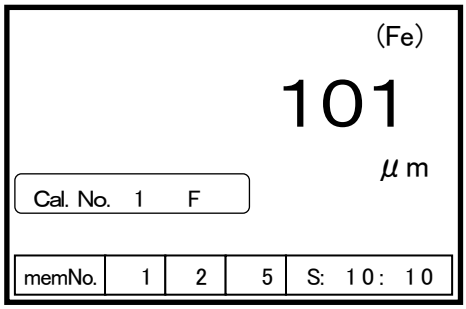
Adjust to a Block No.「7」.

Press [TRANSMIT] key while a Block No. is flashing.
The buzzer beeps, beeps 2 times.



Press [TRANSMIT] key.
The buzzer beeps.



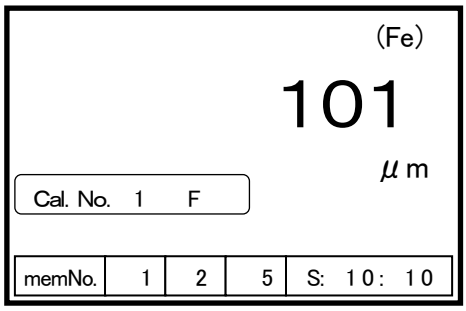


Transferring is completed, returning ns to the beginning.

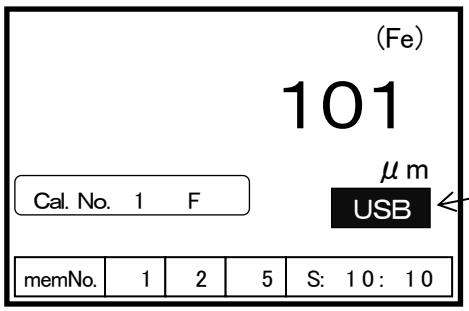
(4) Transfer of section data

※ Data stored in arbitrary section with Section No. 1～10 is transferred.

- Prepare for a PC side.
- Connect a USB cable to a PC.
- For operation example, data stored in a Group No.「5」, a Block No.「8」, Section No.「1」 is transferred.

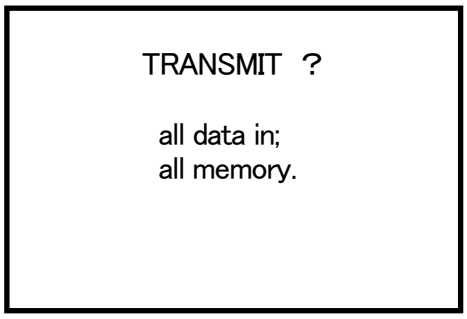


Press [COM. ENABLE] key.
The buzzer beeps.

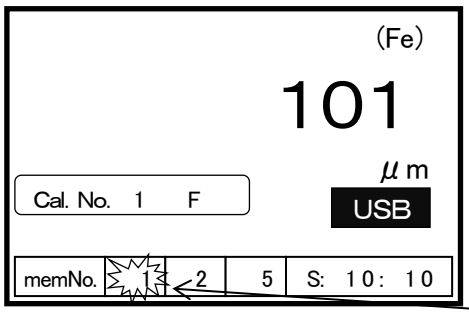


USB mark is displayed.

Press [MEM. SEL.] key.
The buzzer beeps, beeps 2 times.



Press [MEM. SEL.] key.
The buzzer beeps.

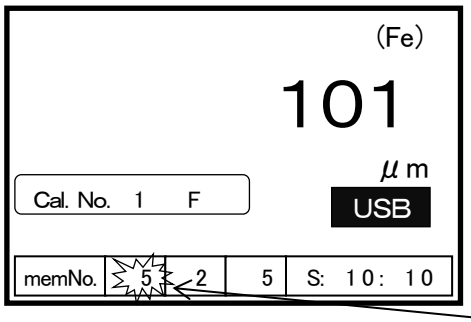


A Group No. flashes.

Caution

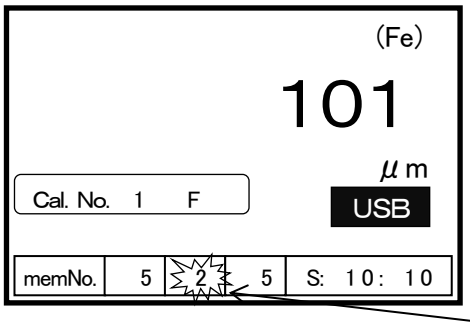
Pressing [COM. ENABLE] key without connecting USB cable, a warning「USB cable un-connected」is displayed.
Press again [COM. ENABLE] key to delete the letters and connect USB cable.

Press [▲] or [▼] key to adjust to a Group No. where there is a block to transfer data.



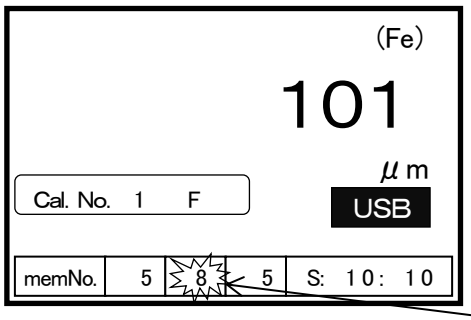
Adjust to a Group No.「5」.

Press [MEM. SEL.] key.
The buzzer beeps.



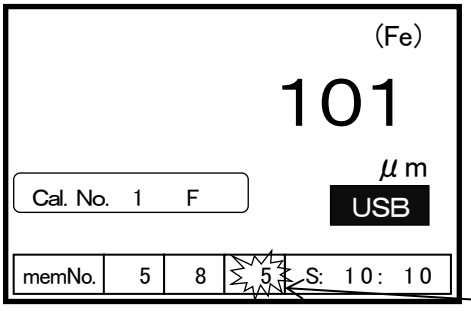
A Group No. is set at「5」, and
a Block No. flashes.

Press [▲] or [▼] key to adjust to a Block No. where there is a section to transfer data.



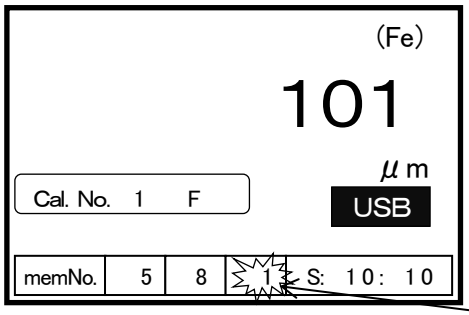
Adjust to a Block No.「8」.

Press [MEM. SEL.] key.
The buzzer beeps.



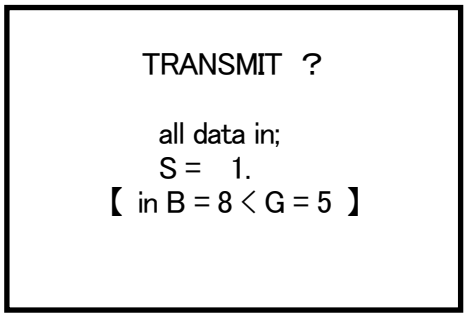
A Block No. is set at「8」, and
a Section No. flashes.

Press [▲] or [▼] key to adjust to a Section No. in which to transfer data.

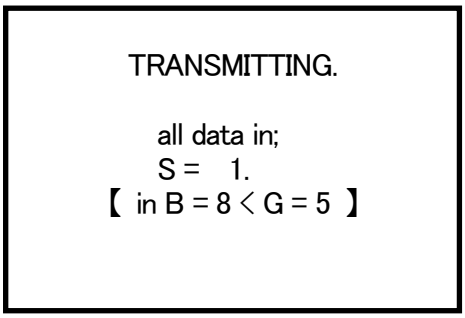


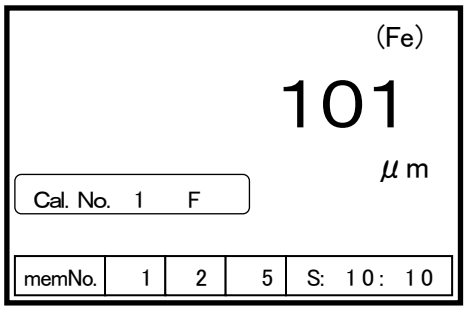
Adjust to a Section No.「1」.

Press [TRANSMIT] key while a Section No. is flashing.
The buzzer beeps, beeps 2 times.



Press [TRANSMIT] key.
The buzzer beeps.





Transferring is completed, returning ns to the beginning.

Note to improve measuring accuracy

① Zero plate

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

※ As accessories to probe (option), "Zero plates" are **for testing purpose only**.
Select a most optimal zero plate to meet actually measuring objects. (Please refer to page 14)

② Thickness standard (foils)

Take Calibration standard (CAL) using a Thickness standard which is thicker or as thick as the measuring films.

※ Use of a Thickness 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 16 μ m), contact a local sales office.

③ Quality of films to be measured

Magnetic metal contained in the films can correctly not be measured. In case of measuring elastic films, place aThickness standard 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.
15～20mm 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

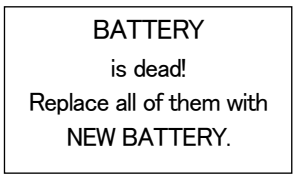
Operating temperature range is 0～40℃.
Especially, large temperature differences between a main unit and a probe causes measuring error.

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 「 ⏻ 」 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 main unit.	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 ones.
 《Power OFF》	Out of batteries.	Replace them with new ones.
 《Power OFF》	Possibly pressing probe to object too soon after pressing 「 ⏻ 」 key.	Hold probe in air, keeping it away off measuring objects, metals during a time of “START UP ・・・” on screen.
 《Power OFF》	Press 「 ⏻ 」 key without connecting probe.	Press 「 ⏻ 」 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 repair.
TROUBLE ! The probe and the main unit may have trouble. Repairing needed. 《Power OFF》	Something wrong with probe/ main unit.	Contact us for repair.
Data can not be stored in memory.	Is data stored in all memory?	Delete unnecessary data to make vacancies in memory.
	Is Measurement mode set to 『Non-Interrupt Measurement mode』?	Press 「TRANSMIT」 key and release it. Data is stored when releasing.
USB cable un-connected	Is USB cable connected correctly ?	Connect USB cable correctly.
Unable to transfer data.	① Is USB cable connected correctly ? ② Is PC side ready to operate ?	① Connect USB cable correctly. ② (1) Install driver by our home page correctly. (2) Set Comport No.correctly.
Sudden interruption of data transfer.	① Does PC operate normally? ② PC side is not faulty. → Something wrong with main unit.	① Check if something wrong with PC side. ② Contact us for repair.

Disclaimer

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

Specifications

◆ Main unit

Items	Applications
Model name	Dual (Electromagnetic/Eddy current) type coating thickness meter SWT-7200Ⅳ
Display method	Graphic LCD (data/message), Backlight
Ranges	Depending on optional probes
Calibrations (CAL)	2-point calibration Zero: metal substrate calibration Calibration standard: metal substrate and thickness standard calibration
Additional functions	① Switching measuring modes (hold/non-interrupt) ② Switching display resolutions (depending on a connecting probe) ③ Switching of units ④ Auto Power Off (about 3 min.), releasing and reactivating ⑤ Setting for exclusive substrate mode (only when SFN-325 probe is connected) ⑥ Backlight ⑦ Setting/storing of calibration curves: Max. 10 pcs ⑧ Upper/lower limt setting, alarm (setting by each calibration) ⑨ Collective/selective deletions of calibration values ⑩ Measuring data memory: 20,000 data ⑪ Statistics process, displays ⑫ Data output to PC (USB terminals) ⑬ Screen switching function (Main/Sub)
Keys	⏻ , ZERO , ▲☼ , ▼ , CAL , CAL No. , H/L , STATISTICS , MEM. SEL. , COM. ENABLE , TRANSMIT , MEM. CLEAR , DATA ERASE , CANCEL
Power	3V DC Dry Battery (LR6×2), Continuous operation hours about 25 hours※ AC adaptor ※ Maximum (may vary depending on usage conditions)
Operating Temperature	0 ～ 40℃ (Non-condensing)
Accessories	Dry battery, Carrying case, Hand strap cord, Inspection certificate, AC adaptor, USB cable, CD (Instruction manual, USB driver, etc.)
Option	For ferrous substrate probe (SFe), For nonferrous substrate probe (SNFe), Dual ferrous/nonferrus substrate probe (SFN-325),
Dimensions	72(W) × 30(H) × 156(D)mm
Weight	About 200g

◆ Probe (option)

Model	SFN－325	SFe-0. 6Pen	SFe-0. 6L
Measuring method	Dual (Electromagnetic/Eddy current) type (auto-selection for Fe/NFe)	Electromagnetic type	
Measuring range	Fe: 0～3. 00mm, NFe: 0～2. 50mm	0～600μm	
Resolutions	1μm: 0～999μm 0. 01mm: 1. 00～3. 00mm (Fe) : 1. 00～2. 50mm (NFe) by switching 0. 1μm: 0～400μm 0. 5μm: 400～500μm	1μm: 0～600μm by switching 0. 1μm: 0～400μm 0. 5μm: 400～500μm	
Accuracies (to flat, smooth face)	0～100μm: ±1μm or ±2% of reading 101μm～3. 00mm: ±2% (Fe) 101μm～2. 50mm: ±2% (NFe)	0～100μm: ±1μm or ±2% of reading 101～600μm: ±2%	
Probes	One point contact constant pressure typ V-cut about φ15×51mm	One point contact constant pressure typ V-cut about φ5.5×92.5mm	One point contact constant pressure typ about 8×13.5×119mm (Minimum measuring Diameter φ16)
Options	V type probe adaptors※	—	
Accessaries	Thickness standards, Zero plates for testing(Fe/NFe)	Thickness standards, Zero plates for testing(Fe)	
Measuring objects	Fe: coating, lining, thermal spray film, plating (except electrolyte nickel plating), etc. on magnetic metal substrate like iron, steel. NFe: relatively general use objects like insulated films on non-magnetic metal substrate like aluminum, cupper, etc.	Coating, lining, thermal spray film, plating (except electrolyte nickel plating), etc. on magnetic metal substrate like iron, steel. Small parts, narrow places, and so on.	Inside of a small diameter tubes, narrow places, and so on.

※ 3 kinds of V type probe adaptors (less φ5、φ5～10、φ10～20)

◆ Probe (option)

Model	SFe-2. 5[※1]/SFe-2. 5L	SFe-2. 5LwA	SFe-10	SFe-20
Measuring method	Electromagnetic type			
Measuring range	0～2. 50mm		0～10mm	0～20mm
Resolutions	1μm: 0～999μm 0. 01mm: 1. 00～2. 50mm by switching 0. 1μm: 0～400μm 0. 5μm: 400～500μm		1μm: 0～999μm 0. 01mm: 1～10mm	1μm: 0～999μm 0. 01mm: 1～5mm 0. 1mm: 5～20mm
Accuracies (to flat, smooth face)	0～100μm: ±1μm or ±2% of reading 101μm～2. 50mm: ±2%		0～3mm: ±(5μm+3% of reading) 3. 01mm or over: ±3%	
Probes	One point contact constant pressure type V-cut SFe-2. 5: about φ15×47mm SFe-2. 5L: about 18×22×67mm	One point contact constant pressure type Measuring part: about 24×27×56mm Full length (flexible): about 546～1530mm	One point contact constant pressure type V-cut about φ21×47mm	One point contact constant pressure type V-cut about φ35×55mm
Options	V type probe adaptors[※2] ／—	—	—	—
Accessaries	Thickness standards, Zero plates for testing (Fe)	Thickness standards, Zero plates for testing (Fe), Carring case	Thickness standards, Zero plates for testing(Fe)	
Measuring objects	Coating, lining, thermal spray film, plating (except electrolyte nickel plating), etc. on magnetic metal substrate like iron, steel.	For coating thickness on remote, unreachable place of coating, lining on magnetic metal substrate like iron, steel.	On magnetic metal substrate like iron, steel For relatively thicker objects	For thick objects

※1: Heat-resistant (about 200℃) for probe Fe-2.5

※2: 3 kinds of V type probe adaptors (less φ5、φ5～10、φ10～20)

◆ Probe (option)

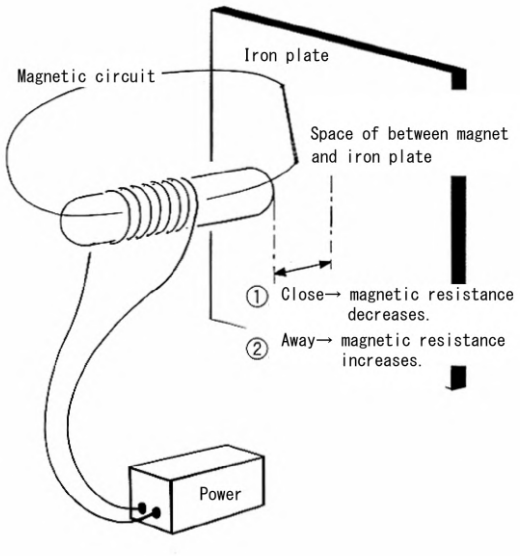
Model	SNFe-2. 0/SNFe-2. 0L	SNFe-0. 6	SNFe-5	SNFe-8
Measuring method	Eddy current type			
Measuring range	0～2. 00mm	0～600μm	0～5. 00mm	0～8. 00mm
Resolutions	1μm: 0～999μm 0. 01mm: 1. 00～2. 00mm by switching 0. 1μm: 0～400μm 0. 5μm: 400～500μm	1μm: 0～600μm by switching 0. 1μm: 0～400μm 0. 5μm: 400～500μm	1μm: 0～999μm 0. 01mm: 1～5mm	1μm: 0～999μm 0. 01mm: 1～8mm
Accuracies (to flat, smooth face)	0～100μm: ±1μm or ±2% of reading 101μm～2. 00mm: ±2%	0～100μm: ±1μm or ±2% of reading 101～600μm: ±2%	0～3mm: ±(5μm+3% of reading) 3. 01mm or over: ±3%	
Probes	One point contact constant pressure type V-cut SNFe-2. 0: about φ15×47mm SNFe-2. 0L: about 18×22×67mm	One point contact constant pressure type V-cut about φ13×45.5mm	One point contact constant pressure type V-cut about φ20.5×47mm	One point contact constant pressure type V-cut about φ35×59mm
Options	V type probe adaptors※ ／—	—	—	—
Accessaries	Thickness standards, Zero plate for testing (NFe)			
Measuring objects	Insulated films on non-magnetic substarate metal like aluminum, cupper, etc.			
	Relatively general use objects	For high stability with narrow bars, small tubes, minute pieces	For relativfely thicker objects	

※ 3 kinds of V type probe adaptors (less φ5、φ5～10、φ10～20)

Reference (measurement principles)

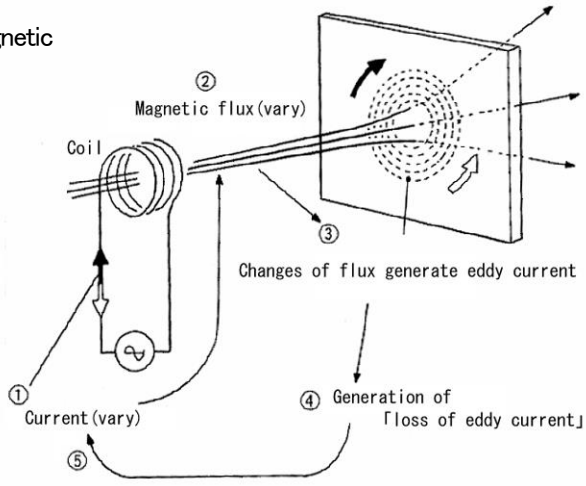
● Electromagnetic type

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.



◆ Products sold ◆

Coating thickness meter, Pinhole detector,

Moisture meter, Concrete covermeter, Condensator,

Needle detector, Iron piece detector, Viscosity cup

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