SMART SENSOR®

Model: AS930

Film/Coating Thickness Gauge
User's Manual

Version number：SZ930-0-12

Preface

- Thank you for purchasing our company's product.
- This manual provides relative information on how to use this product and measurement functions of it as well as warnings on its use. To make the best use of this product's functions, read this manual thoroughly before use. Please keep this manual handy for ease of reference.
- Please be sure to do some test measurement to make sure it is performing properly before using it for real.

Warranty

1). About relative warranties please read provided warranty card.

2). We disclaim any liability due to: transportation damages; incorrect use or operation; manipulation, alterations or repair attempts; without warranty card, invoice.

Specific Declarations:

a. The product design and the manual updating, repairing by technician authorized by us, do not try any alternations or repair attempts.
b. Dispose of battery should in accordance with local laws and regulations.

Maintenance and warranty

Maintenance:

1). Replacement and maintenance of battery:

a. After power on, if a symbol ▭ appears on the LCD, you need to replace the battery immediately, for details please refer figures and contents on page 9 of this manual.

b. Remove the battery from the unit if it is not required for extended periods of time in order to avoid damage to the battery compartment and the electrode resulting from a leaking battery.

2. Do not store or use the unit in following locations where the unit may be subject to:

a. Splashes of water or high levels of dust.

b. Air with high salt or sulphur content.

c. Air with other gases or chemical materials.

d. High temperature or humidity (above50℃, 90%,) or direct sunlight.

3. Do not disassemble the unit or attempt internal alterations.

4. Never use alcohol or thinner to clean the unit casing that will especially erode the LCD surface; just clean the unit lightly as needed with little clean water.

Contents

1. Before use notice

Check-up

Carefully unpack your kit after you purchased this product and ensure that you have the following items. In the event that any item is missing or if you find any mis-match or damage or the manual appearing to lack page, etc. seriously influencing the reading, promptly contact your dealer.

➢ Digital coating thickness tester	1PCS
➢ 9- Volt alkaline battery	1PCS
➢ Chinese Instruction Manual	1PCS
➢ English Instruction Manual	1PCS
➢ Maintenance Card	1PCS
➢ Standard sheet gauge	6PCS
➢ Iron base material for calibration	1PCS
➢ Transparent leather pack	1PCS
➢ Aluminum Packing Box	1PCS

c. According to the international standard, the final measure result can expressed as the following formula:

CH=A+/-2D

CH---the thickness of the coating

A----the average value of the measure data (AVG)

D-----standard warp (dFR)

d. curvature:
You should not measured at the distorted surface.

e. the reading number:
Because the data you read will not same all the time, so you should read several value at one measurement. The part difference of the coating also request measure several time especially when the surface is rough.

f. cleanness of surface:
You should clear all the attachment before the measurement, for example, dust, ,grease, erode things and so on, but do not removed anything contained in the coating.

3. instruction about the measurement result:

a. single measurement is not credibility at statistics point. So all the value displayed by the tester are average value. The time after time measurement is complete by detect head and tester within one second.

b. To make the measurement more precision, you can measure several times, and then delete the big error one, at last use the tester's analysis function to get five statistical data: average value (AVG), MAX, MIN, standard warp (dFR), data number (NO).

Introduction

This product using magnetic induction thickness measurement method, the thickness equipment specially designed to perform small, fast, accurate and non-destructive thickness measurement of coating and plating on steel magnetic conductor. it is widely used on manufacturing, workshop, chemistry or quality measuring range.

Features and functions

- Easy- to- read LCD direct display measurement value and status.
- Using Hi- sensibility sensor for precise measure.
- 0 point, 2 point and basic, three different calibration modes for quick and easy to process the system tolerance calibration.
- Single, continually and difference, three different measure mode.
- Result data can record, check and delete into the unit memory.
- The Instruments can do some simple data analysis, like maximum, minimum, mean, standard deviation, and measure times.
- Buzzer notice function.
- Unit can convert between the metric system and British system.
- Low Battery notice function.
- Auto power off function.
- LCD backlight function.
- Simple, compact structure and portable.

Specifications

1. Measurement range and tolerance:

Range	Resolution	Tolerance
0~1999μm	0.1um/1μm	±(3%H+1)

Remark: H=Nominal transformation ratio

2. Condition of Objective material:

- Suitable for measure about non magnetic coating on magnetic conductor base material.
- The base material minimum curvature radius.
  Protruding: 2mm Concave =11mm
- Base material minimum diameter: 12mm
- Base material limit thickness : 0.5mm

3. Other Specification:

Technical parameter	Technical index
LCD display	3 digits half number display
Power supply	9V alkaline battery
Operation current	Around 14mA
Battery life	Continuously 20 hour usage.
Auto off	After 1 min. haven't manipulated
LCD backlight function	After 7 sec. haven't manipulated
Operation temperature	0~40℃
Operation humidity.	10~95% RH
Low battery indication	7.0V ± 0.2V
Product size	67x 30x 183mm
Weight	147G (without battery)

h. the detect head's pressure:
The pressure on the target piece can affect the measurement value, so the tester use spring to generate a steady pressure.

i. Detect head's placement:
How the detect head placed can affect the measurement. You should be sure the detect head and the target piece's is vertical.

j. the target piece's distortion
The detect head can make the target piece of soft coating distort, if the distortion is too big, the measurement value will not correct.

2. the regulation when you are using the tester:

a. the basic metal property
The standard piece's metal magnetism and surface roughness should similar with the target one.

b. the thickness of the substrate:
Check whether the substrate's thickness go beyond the critical thickness or not.

c. verge effect:
You should not measured at the distortion, for example, verge, hole or inner turn angle and so on.

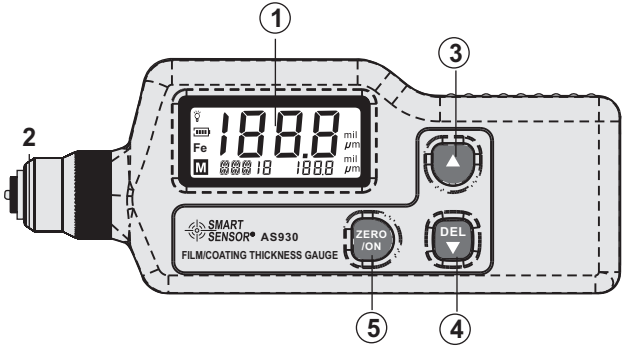
d. Curvature:
The curvature of the target piece can affect the measurement result. This effect will increased as the curvature's radius reduced.

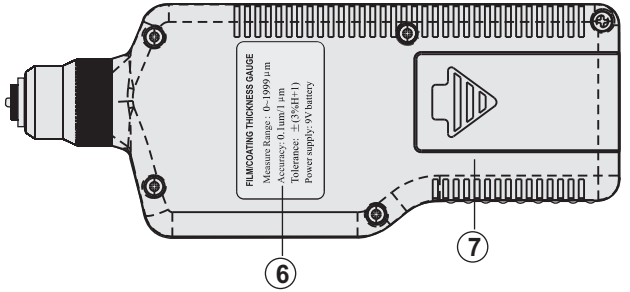
e. Roughness degree of the surface:
The roughness degree of substrate metal and coating can affect the measurement. The bigger the roughness degree is, the bigger the effect is. Rough surface will cause system error and incidental error. You should increase the measurement number at different place to reduce incidental error. If the substrate metal is rough, you must adjust ZERO point on the substrate metal which is not coated and has similar roughness with the target one; or you can use impregnant which can not erode the substrate metal to dissolve the coating, and then to adjust the ZERO point.

f. magnetic field:
The strong magnetic which generated by wiring can badly affect the measurement precision of magnetism method.

g. Attachment:
The tester is sensitive to the attachment which can prevent the test head contact the coating, so you must clear the attachment to sure the tester's head contact the surface target piece closely.

Main parts explanations





1. LCD display

2. Sensor

3. (▲) Menu (single measure SNG, Continuously measure CTN, Average measure AVG, Maximum measure MAX) Search upward and basic calibration key.

4. (DEL ▼) Menu(single measure SNG, Continuously measure CTN, Average measure AVG, Maximum measure MAX) Search upward and delete all data key.

5. (ZERO /ON) Power on/ set zero

6. Simple function indication

7. Battery door.

Note:
Above key function descriptions just are simply introduction, for details please read operation instructions part in this manual.

3. Other items

Attentions

1. Factors which affect the measurement precision and some instruction:

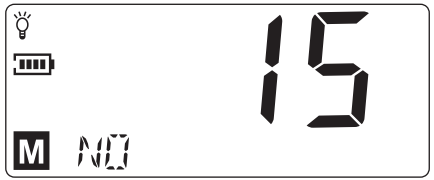
a. magnetism of substrate metal:
The magnetism change of substrate metal affect the measure result of magnetism method (the magnetism change of low carbon steel can be considered lightly in real life), to avoid the effect of heat treatment and cold process, you should choose a standard piece which have the same property as the target substrate to adjust the tester, you also can use a piece which is not coated to adjust.

b. thickness of substrate metal:
Erevy instrument has a substrate metal critical thickness. Bigger than the thickness, the measurement will not be affected by substrate metal thickness. This tester's critical thickness is less than 0.5mm according to the production specification.

c. verge effect:
The tester is sensitive to the steep change of the target piece you want to measure. So the measurement which near the verge or inner turn angle of the piece is not trustiness.

Display dFR:

Display NO:



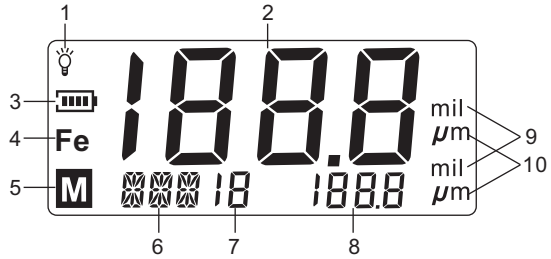
Caution:

a. when the measurement number is flashing, please press ZERO/ON key to stop it, and then press UP / DOWN key to change mode.

b. The displayed value in the operation instruction is merely a example to explain the operate method, you should follow the practice measured value.

c. If there is nothing operation for 1 min, the tester will power off automatically.

Displays functions



1. : Backlight indication, the backlight will off after 7 sec. haven't operation when measure.
2. Measurement value display area.
3. Battery mark shows current residual battery power. Has following 5 grades:
   - :battery is sufficient
   - :battery is comparative sufficient
   - :battery is nearly deficient
   - :battery is nearly exhausted, need to have a replacement
   - :battery is exhausted completely.
4. Fe : Measurements on steel or iron substrate.
5. M : Memory recordation status.
6. Measurement mode, Data analysis indication.
7. Number of recorded data
8. Recorded data display.
9. mil : Imperial system unit (1mil= 0.0254mm = 25.4μm)
10. μm: Metric system unit (1mm = 1000μm)

2. Operation instructions

Substrate and standard piece

➢ Standard piece:

a. All the measured sample you can choose for standard calibration piece. Shortened form standard piece.

b. The coated standard piece
The coated standard piece must choose inform thickness, uniformity and have a strong bonding non-magnetic coating.

➢ Substrate:

a. The standard substrate's roughness and magnetism, must as close as the target testing material. For identification the substrate suitability, can compare standard substrate with the target testing piece substrate's measured data.

b. If the target testing piece substrate's thickness under the regulated thickness range, you can take two methods to adjust as following.

1). adjust on the standard piece which has the same thickness with the target testing piece.

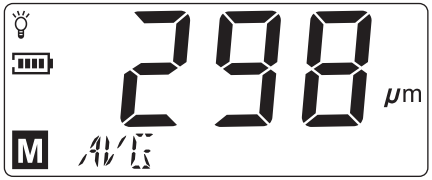
2). use a standard metal gasket piece which have enough thickness and similar magnetic and electricity property or a testing piece, but must be sure that there is not spacing between substrate metal and gasket metal.

c. If the curvature is too big to adjust on plane, the coating standard piece's curvature should the same as the target testing piece's curvature.

Data analysis

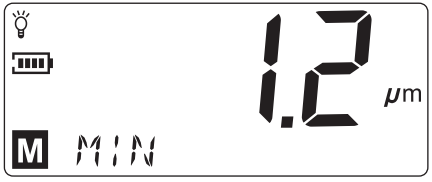
The tester can analyze data automatically after have measured several group data, press DOWN/ UP key to change mode, LCD will display average value (AVG), MAX, MIN, standard warp (dFR), data number (NO), LCD displayed as following picture at this time:

Display Average:



Display MAX:

Display MIN:



Memory data record/check and delete

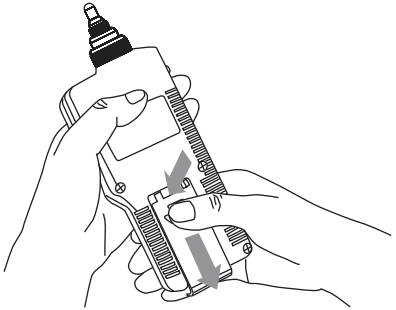
1. Record:
   The tester will record the measurement result automatically and the measurement quantity will plus 1 after every measurement, the quantity will increased until it up to 15. If the measurement is go ahead at this time, LCD will merely display the measurement value, but not record it.

2. Check
   you can press UP and DOWN key to look over the measurement value when the measurement quantity is flashing.

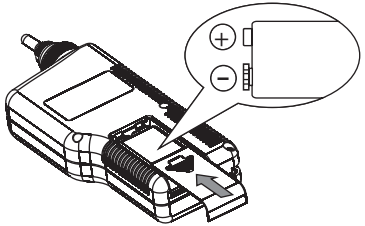
3. Delete
   a. delete the current data: when the measurement value is apparently error, you do not want it is recorded, you can press the 'down' key to make the measurement value back to the above one when the measurement quantity is flashing, and then you can measure for another time.
   B. delete all the data: you can delete all the data by press the ZERO/ON key for 2 second when the measurement quantity is flashing.

Battery installment

1). Grip tightly the unit body with your left hand; hold down the battery door with your right hand thumb to open it according to the arrow referring direction, as shown in following figure:

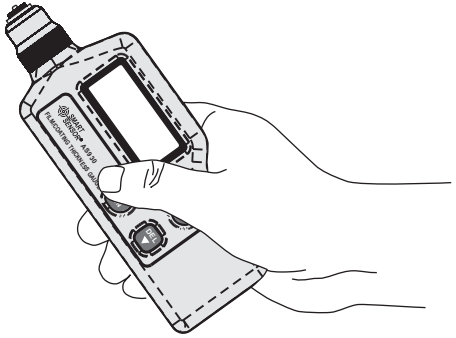


2). Insert the 9V battery into battery compartment, note the battery polarity, and then close the battery door, as shown in following figure:



3). Starting the unit and check-up battery

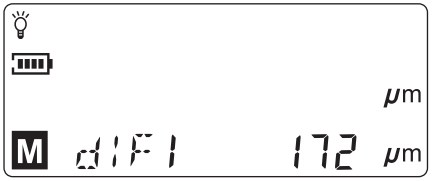
a. Press the ZERO /ON key to start the unit, as shown in following figure:



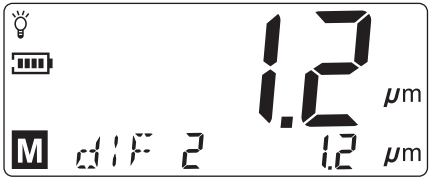
b. After the entire screen displays for 1 second, the default state is acceleration mode, if this time on the LCD screen displays the symbol or , please promptly replace the battery, as shown in following figure:

Coating tolerance measurement

➢ Press ZERO/ON key to open the tester, and then press UP /DOWN key to change the test mode, when LCD display DIF, that is to say you have into Coating tolerance measurement mode.
LCD displayed as following picture at this time:



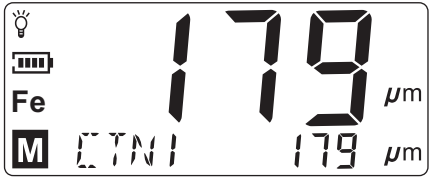
➢ Place the detect head to the target piece you want to measure, and then press the detect head lightly to measure, the buzzer will sounded, LCD will display the absolute value which is the before value subtract the current value, LCD displayed as following picture at this time:



Continuous measurement

➢ Press ZERO/ON key to open the tester, and then press UP / DOWN key to change the test mode, when LCD display CTN, that is to say you have into Continuous measurement mode.
LCD displayed as following picture at this time:

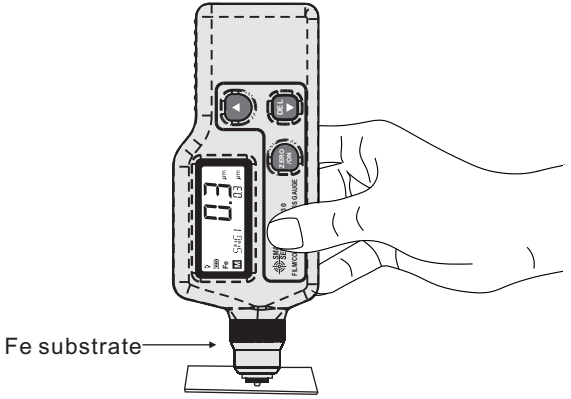
➢ Place the detect head to the target piece you want to measure, and then press the detect head lightly to measure, the buzzer will not sounded during the measurement, LCD will display the measurement result continuously until the detect is lifted, the last measure value will be saved in the test automatically, the quantity of the data are also be memorized, LCD display 1 at the same time.
(when the second measurement is finished, the quantity will increased to '2', like this,), LCD displayed as following picture at this time:



Instrument calibration

To increase the test result is more correct; please calibrate the instrument at the test place. The instrument has three different calibrations to suit the needs of the user. : zero point calibration, two point calibration, basic calibration.

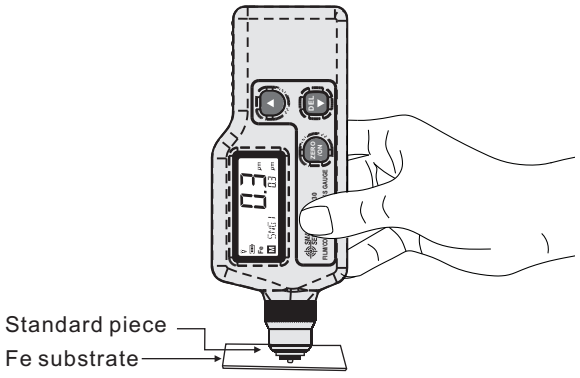
➢ Zero point calibration:
a. carry a measurement on a standard substrate or on a uncoated substrate. LCD display a data, for example ,0.3um, like the following picture:



b. do not lift the detect head and press the ZERO/ON key, the buzzer will sound, that show you have complete Zero point calibrate . LCD displayed like the following picture at this time:

c. If you want to correctly adjusted, you must repeat a and b to make basic measure value less than 1μm, this can improve measurement precision.

➢ Two point calibration:
a. calibrate zero point first.
b. carry a measurement on the standard piece which thickness approx. equal to the target piece.(like 1000μm). If the LCD display 1006μm, like the following picture:



Single measurement

➢ Prepared target piece you want to test.
➢ Press ZERO/ON key to open the tester, the buzzer will sounded, the tester into the tolerant test mode single test mode, LCD displayed as following picture at this time:

➢ Make detect head contact the test surface vertically and press the detect head lightly, LCD display a value, for example, 136 um, and buzzer sounded at this time, LCD displayed as following picture at this time:

➢ Every time detect head contact the test surface vertically, buzzer will sounded at the same time, and LCD will display test result, if you want to test for another time, you must lift the detect head, and then repeat the operation above.

Caution:
If the detect head contact the iron basic too closed when you open the tester to self-check, LCD will display ERR

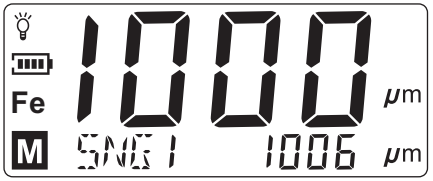
Unit change

➢ Press ZERO/ON key to open the tester, the buzzer will sounded, and then press UP / DOWN key to change the test mode, when LCD display UINT, that is to say you have into unit change mode.

The tolerant unit is μm, LCD displayed as following picture at this time:

➢ Press ZERO/ON key, you can change μm to mil or you can change mil to μm, LCD displayed as following picture at this time:

c. do not lift the detect head and press the UP and DOWN key to correct the read value, after these the adjust is complete, you can measure at this time. LCD displayed like the following picture at this time:



if you want To point calibration adjusted correctly, you can repeat b and c to improve measurement precision and reduce incidental error.

➢ Basic calibration:
It is necessary to change the basic calibration under the following conditions:
----------the top of the detect head is wear and tear
----------after the detect head is amended
----------Special use
----------the tester is not used or adjusted (zero adjustment) for a long time

If the error go beyond the regulate range during the measurement, it is necessary to adjust the detect head for another time, this is named basic calibration. Though input seven adjust value (zero and 6 thickness value)can readjust the detect head. The operation method of basic calibration is as following:

a. Prepare six standard pieces, the thickness is at 45~55, 95~105, 220~280, 450~550, 900~1050, 1900~1999, unit: μm.

b. press the UP key and ZERO/ON key when the tester is closed until LCD displayed as following:

When appear the value 0.0 μm, you can carry zero adjustment to iron basic.

c. lift the detect head, appear a value at 45~55, for example,48.0, LCD displayed as following at this time:

Choose a standard piece, its thickness is at 45~55, press UP and DOWN key to amend the display value, make the display value accord with the standard piece's thickness, and then place the standard piece on the iron basic to adjust.

d. lift the detect head for another time, appear a value at 95~105, for example, 100, LCD displayed as following picture at this time:

choose a standard piece, its thickness is at 95~105, press 'up' and 'down' key to amend the display value, make the display value accord with the standard piece's thickness, and then place the standard piece on the iron basic to adjust.

e. like this, until the last one is adjusted, the tester will closed automatically and the new adjust value has been saved in the tester. The tester will work follow the new adjust value when you use it next time.