User Manual

Coating Thickness Gauge

V1.7



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1. Introductions

This compact gauge can be used for non-destructive coating thickness measurement of non-magnetic coatings, e.g. paint, enamel, chrome on steel, and insulating coatings, e.g. paint and anodizing coatings on non-ferrous metals.

1. 1 Features

- 128*128 dot matrix LCD display, standard menu operations;
- Two measure mode: single and continuous;
- Two group mode:direct(DIR) and general(GEN), readings will be lost when power off in direct mode, and not be lost in general mode. Readings can be stored for each group;
- Zero point calibration and multi-point calibration(up to 4 points) for each group;
- User can recall, delete specified readings, or delete group readings;
- Statistics display: mean, minimum, maximum and standard deviation;
- Three probe mode:auto, magnetic and eddy current;
- User can set high or low limit alarm for each group;
- Power off automatically;
- USB interface to data transmission;
- Low battery and error indication ;

1.2 Application

This gauge is designed for non-destructive, fast and precise coating thickness measurement. The principal applications lie in the field of corrosion protection. It is ideal for manufacturers and their customers, for offices and specialist advisers, for paint shops and electroplaters, for the chemical, automobile, ship building and aircraft industries and for heavy engineering. It is suitable for laboratory, workshop and outdoor use.

1.3 Principle of Measurement

The coating thickness gauge work either on the magnetic induction principle or on the eddy current principle, depending on the type of probe used. This gauge has internal F probe and N probe.

F probe work on magnetic induction principle and should be used for non-magnetic coatings such as aluminium, chrome, copper, zinc, paint and varnish,enamel, rubber etc., on an iron or steel substrate; It is also suitable for alloyed and hardened magnetic steel(however, not suitable for austenic steel).

N Probe work on the eddy current principle and should be used for insulating coatings e.g. paint, anodizing, ceramics, etc., on all non-ferrous metals such as aluminium, copper, zinc die casting, brass etc. and on austenitic stainless steels.

1. 4 Supply Information

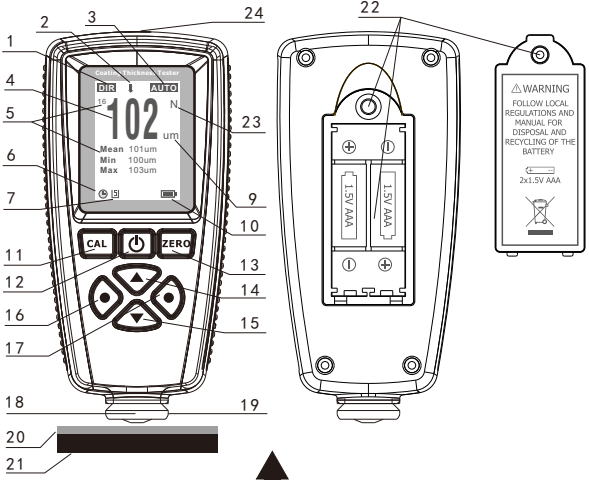
The package include:

- Coating Thickness gauge
- Substrate(Optional)
- Standard foil(Optional)
- CD and USB cable(Optional)
- Two 1. 5V AAA battery
- User manual

1. 5 View

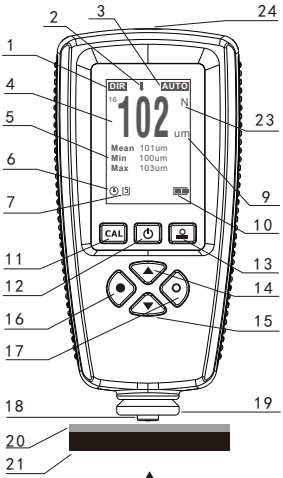
1.5.1 Applied to P1 and P1S

1. Current work group（DIR and GENn,n=1-4)
2. High and low limit alarm ⬆⬇
3. Probe mode:AUTO, MAG, EDDY
4. Measuring readings display
5. Statistics display
6. Auto-power off indication
7. USB connecting indication
8. Reserved
9. Unit(um、mm、mils)
10. Low battery indication
11. **CAL**-Calibration key
12. **POWER** on/off key
13. **ZERO** calibration key
14. **UP** key
15. **DOWN** key
16. **LEFT** key(menu、select、sure)
17. **RIGHT** key(cancel, exit, back, backlight switch)
18. Probe
19. V groove
20. Standard foil
21. Substrate
22. Battery compartment
23. Substrate type(F: ferrous；N：non-ferrous)
24. USB interface

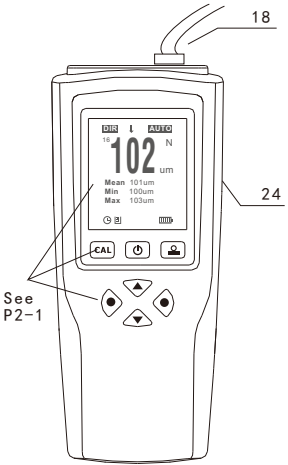


1.5.2 Applied to P2

1. Current work group（DIR and GENn,n=1-4)
2. High and low limit alarm ⬆⬇
3. Probe mode:AUTO, MAG, EDDY
4. Measuring readings display
5. Statistics display
6. Auto-power off indication
7. USB connecting indication
8. Reserved
9. Unit(um、mm、mils)
10. Low battery indication
11. **CAL**-Calibration key
12. **POWER** on/off key
13. **ZERO** calibration key
14. **UP** key
15. **DOWN** key
16. **LEFT** key(menu、select、sure）
17. **RIGHT** key(cancel, exit, back, backlight switch)
18. Probe
19. V groove
20. Standard foil
21. Substrate
22. Battery compartment
23. Substrate type(F: ferrous；N：non-ferrous)
24. USB interface



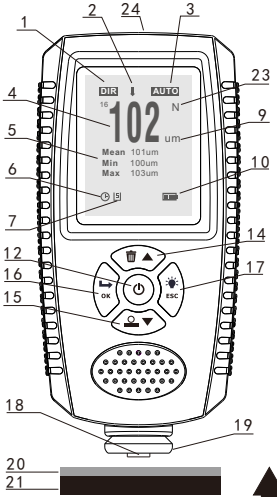
P2-1



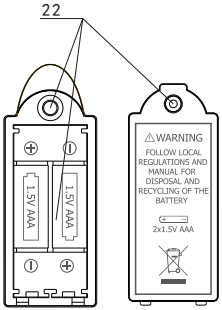
P2-2

1.5.3 Applied to P3 and P4

1. Current work group（DIR and GENn,n=1-4)
2. High and low limit alarm ⬆⬇
3. Probe mode:AUTO, MAG, EDDY
4. Measuring readings display
5. Statistics display
6. Auto-power off indication
7. USB connecting indication
8. Reserved
9. Unit(um、mm、mils)
10. Low battery indication
11. Reserved
12. **POWER** on/off key
13. Reserved
14. **UP** key(or delete function)
15. **DOWN** key(or zero calibration)
16. **LEFT** key(menu、select、sure）
17. **RIGHT** key(cancel, exit, back, backlight switch)
18. Probe
19. V groove
20. Standard foil
21. Substrate
22. Battery compartment
23. Substrate type(F: ferrous；N：non-ferrous)
24. USB interface



P3 and P4



1. 6 Specifications for P1 and P2

Product Code	P1		P1S		P2 ①	
Probe	Probe F	Probe N	Probe F	Probe N	Probe F	Probe N
Measuring principle	Magnetic induction	Eddy Currents	Magnetic induction	Eddy Currents	Magnetic induction	Eddy Currents
Measuring range	0 to 2000um (0 to 78.7mils)		0 to 2000um (0 to 78.7mils)		0 to 5000um (0 to 196.8mils)	0 to 3000um (0 to 118.1mils)
Accuracy	±(2.5%+1um) ±(2.5%+0.039mils)		±(2%+1um) ±(2%+0.039mils)		±(2%+1um) ±(2%+0.039mils)	±(2%+1um) ±(2%+0.039mils)
Resolution	0um~99.9um(0.1um) 100um~999um(1um) >1000um(0.01mm)		0um~99.9um(0.1um) 100um~999um(1um) >1000um(0.01mm)		0um~99.9um(0.1um) 100um~999um(1um) >1000um(0.01mm)	0um~99.9um(0.1um) 100um~999um(1um) >1000um(0.01mm)
Calibration	One point to four point calibration, zero point calibration				One point to four point calibration, zero point calibration	
Data group	One direct group(readings not be stored to memory) Four general groups(max. 320 readings for P1 and max. 2000 readings for P1S be stored). NOTE: each group have individual statistics, alarm limit settings and calibration				One direct group(readings not be stored to memory) Four general groups(max. 2000 readings will be stored automatically) NOTE: each group have individual statistics, alarm limit settings and calibration	
Statistics	No. of readings, mean, minimum, maximum and standard deviation				No. of readings, mean, minimum, maximum and standard deviation	
Units	um , mm, mils				um , mm, mils	
Alarm	User can set the high/low alarm limit Alarm icon displayed on LCD when over the limit				User can set the high/low alarm limit Alarm icon displayed on LCD when over the limit	
Minimum curvature radius convex	5mm				5mm	
Minimum curvature radius concave	25mm				25mm	
Minimum measuring area	Diameter 20mm				Diameter 20mm	
Minimum thickness of substrate	0.2mm	0.05mm	0.2mm	0.05mm	0.2mm	0.05mm
Maximum measuring rate	Two readings per second				Two readings per second	
Computer interface	Download data via USB				Download data via USB	
Power supply	Two 1.5V AAA battery				Two 1.5V AAA battery	
Operation environment	Temperature: 0 to 50℃(32 to122℉); humidity: 20% to 90%rh				Temperature: 0 to 50℃(32 to122℉); humidity: 20% to 90%rh	
Storage environment	Temperature: -10 to 60℃(14 to 140℉)				Temperature: -10 to 60℃(14 to 140℉)	
Standard Compliance	CE ROHS FCC ISO2178 ISO2360				CE ROHS FCC ISO2178 ISO2360	
Size	110mm×53mm×24mm(4.33"×2.09"×0.94")				110mm×53mm×24mm(4.33"×2.09"×0.94")	
Case Material	ABS; 92g(3.24oz)				ABS; 92g(3.24oz)	

① ***User can choose different measure range from 2500um to 10000um***

Note:

The final specifications may be upgraded without notifying. For more details, please consult with yoursupplier.

1. 7 Specifications for P3 and P4

Product Code	P3		P4	
Probe	Probe F	Probe N	Probe F	Probe N
Measuring principle	Magnetic induction	Eddy Currents	Magnetic induction	Eddy Currents
Measuring range	0 to 1500um (0 to 59mils)	0 to 1500um (0 to 59mils)	0 to 500um (0 to 19.68mils)	0 to 500um (0 to 19.68mils)
Accuracy	±(2%+1um) ±(2%+0.039mils)	±(2%+1um) ±(2%+0.039mils)	±(1%+1um) ±(1%+0.039mils)	±(1%+1um) ±(1%+0.039mils)
Resolution	0um~99.9um(0.1um) 100um~999um(1um) >1000um(0.01mm)	0um~99.9um(0.1um) 100um~999um(1um) >1000um(0.01mm)	0um~99.9um(0.1um) 100um~999um(1um)	0um~99.9um(0.1um) 100um~999um(1um)
Calibration	One point to four point calibration, zero point calibration		One point to four point calibration, zero point calibration	
Data group	One direct group(readings not be stored to memory) Four general groups(max. 200 readings will be stored automatically) NOTE: each group have individual statistics, alarm limit settings and calibration.		One direct group(readings not be stored to memory) Four general groups(max. 2000 readings will be stored automatically) NOTE: each group have individual statistics, alarm limit settings and calibration	
Statistics	No. of readings, mean, minimum, maximum and standard deviation		No. of readings, mean, minimum, maximum and standard deviation	
Units	um , mm, mils		um , mm, mils	
Alarm	User can set the high/low alarm limit Alarm icon displayed on LCD when over the limit		User can set the high/low alarm limit Alarm icon displayed on LCD when over the limit	
Minimum curvature radius convex	5mm		5mm	
Minimum curvature radius concave	25mm		25mm	
Minimum measuring area	Diameter 20mm		Diameter 10mm	
Minimum thickness of substrate	0.2mm	0.05mm	0.2mm	0.05mm
Maximum measuring rate	Two readings per second		Two readings per second	
Computer interface	Download data via USB		Download data via USB	
Power supply	Two 1.5V AAA battery		Two 1.5V AAA battery	
Operation environment	Temperature: 0 to 50℃(32 to122℉); humidity: 20% to 90%rh		Temperature: 0 to 50℃(32 to122℉); humidity: 20% to 90%rh	
Storage environment	Temperature: -10 to 60℃(14 to 140℉)		Temperature: -10 to 60℃(14 to 140℉)	
Standard Compliance	CE ROHS FCC ISO2178 ISO2360		CE ROHS FCC ISO2178 ISO2360	
Size	114mm×54mm×25mm(4.49"×2.13"×0.98")		114mm×54mm×25mm(4.49"×2.13"×0.98")	
Case Material	ABS; 96g(3.78oz)		ABS; 96g(3.78oz)	

Note:

The final specifications may be upgraded without notifying. For more details, please consult with yoursupplier.

2. Use the Gauge

If you use the gauge for the first time, please read the chapter 3(factors of affecting measurement accuracy).

2. 1 Replacing the Battery

Place the gauge upside down on a suitable surface, remove the screws from the battery compartment with a crosstip screwdriver, raise the lid of the compartment, remove battery, insert new battery according to the positive and negative poles and close the lid and fasten with screws.

2.2 Basic Measurement Step

Step 1. Prepare the sample to be measured.

Step 2. Press ⏻ key to power on.

Note: 1. If displayed, the battery is OK. Or if displayed, the battery capacity is low, and measurement will be not reliable, and you need to replace the battery.

2. The gauge will work in factory default settings for the first time, including single measure mode, AUTO probe mode, direct group mode(DIR) etc..

3. When power on, if in direct group mode(DIR), the readings display area is empty, or if in general group mode (GENn, n=1 to 4), it will display the last readings and statistics value measured before power off last time.

Step 3. Reference to the chapter 3 to decide whether need to calibrate the gauge.

Step 4. Start measuring. Place the probe on the sample vertically and rapidly, and after one beep(for single measure mode), raise the probe rapidly. Readings will be display on LCD, meanwhile statistics value are upgraded and displayed.

Step 5. Do next measurement according to step 4.

Step 6. Press ⏻ to power off. If not any operations within 3 min., the gauge will power off automatically.

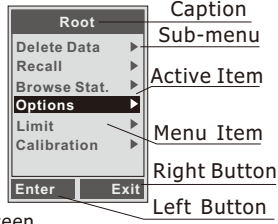
Note:

1. If a suspicious readings is measured, user can delete it through pressing the UP key once.

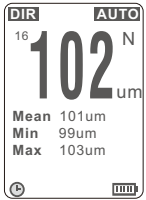
2. 3 Key and User Interface

The gauge have a standard user interface, user can use it easily.

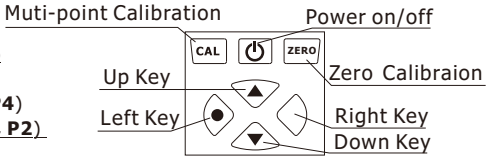
- Left Key
  - a. To enter into menu mode from measure mode;
  - b. Left button operations in menu mode(Including "Sure", "Select", "Delete");
- Right Key
  - a. Right button operations in menu mode(Including "Cancel", "Back", "Exit"); b. Press and hold to rotate screen
  - c. Switch on/off the backlight in measure mode;
- Up Key
  - a. Move up or roll up;
  - b. Increasing; c. Delete the last readings or whole group
- Down Key
  - a. Move down or roll down; c. Zero calibration(**For P3, P4**)
  - b. Decreasing; d. Refresh LCD in measure mode(**For P1, P2**)
- Zero Calibration Key(**For P1, P2**)
  - a. Press and hold to do zero calibration;
  - c. Press once to back measure mode in menu mode;
  - d. Press and hold when power on to make system reset. This will restore factory settings;
- Calibration Key(**For P1, P2**)
  - a. Enter into calibration mode and back measure mode;



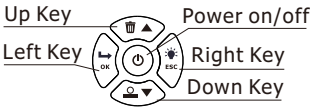
a. Menu Mode



b. Measure Mode



c. Key Define(**For P1, P2**)



d. Key Define(**For P3, P4**)

2. 4 Measure Mode

Single measure mode - Place the probe on sample vertically and rapidly, and after one beep, raise it rapidly.
Continuous measure mode - Place the probe on sample, and don't raise the probe, the measurement will be done continuously in a certain cycle.

2. 5 Group Mode

- Direct Group(DIR)-Be intended for quick occasional readings. In this mode, data are temporarily stored in RAM, it will be lost when power off. The readings and statistics can be shown on the LCD. When the RAM is full, measuring will continue, the oldest readings will be deleted mean while the new readings is stored. Each new readings is stored, the statistics will be upgraded and shown.
- General Group(GENn, n=1 to 4)-In this mode, data are stored in memory and not lost when power off. When the memory is full, measuring will continue, a "fl" will be shown on the left of readings, the new readings will not be stored, and statistics will not be upgraded.

NOTE: Each group(DIR or GEN) has individual high/low limit alarm, zero calibration and multi-point calibration, and these settings will stored in memory when user changes them.

- Method of switch group mode
  a. Press "Left Key" once to enter into menu mode("Root" directory);
  b. Press "Up Key" or "Down Key" to activate "Options" item, and press "Left Key" once to enter in;
  c. Press "Up Key" or "Down Key" to activate "Group Mode" item, and press "Left Key" once to enter in;
  d. Press "Up Key" or "Down Key" to activate your intended item, and press "Left Key" once to select the item and go back. Press "ZERO Key" to back measure mode.

2. 6 Statistics

The gauge calculates the statistics for stored readings of each group independently, including mean, minimum, maximum and standard deviation. In direct group mode, when RAM is full, the oldest readings will be deleted meanwhile the new readings will be stored, and the statistics will be upgraded. In general group mode, when memory is full, new readings will not be stored and the statistics will not be upgraded. If user deletes the specified readings or whole group readings, the statistics will also be upgraded.

- Browse the statistics through menu
  a. Press "Left Key" once to enter into menu mode("Root" directory);
  b. Press "Up Key" or "Down Key" to activate "Browse Stat." item, and press "Left Key" once to enter in;
  c. Press "Right Key" once to go back. Press "ZERO Key" to back measure mode.

2.7 Probe Mode

There are three probe modes: AUTO, MAG and EDDY. In AUTO mode, the probe can automatically determine the type of substrate measured. In MAG mode, the probe can only measure on magnetic substrates. In EDDY mode, the probe can only measure on non-ferrous metal substrates. When a magnetic substrate detected, an "F" will be shown on the right of readings, and when a non-ferrous metal detected, a "N" will be shown. User can switch probe mode as below.

a. Press "Left Key" once to enter into menu mode("Root" directory);
b. Press "Up Key" or "Down Key" to activate "Options" item, and press "Left Key" once to enter in;
c. Press "Up Key" or "Down Key" to activate "Probe Mode" item, and press "Left Key" once to enter in;
d. Press "Up Key" or "Down Key" to activate your intended item, and press "Left Key" once to select the item and go back. Press "ZERO Key" to back measure mode.

2. 8 Storage

In general group mode(GENn), readings and statistics will be stored and not be lost when power off. In direct group mode(DIR), readings and statistics will be lost when power off.

Each group has individual high/low limit alarm, zero calibration and multi-point calibration, user can change these settings, and they will be stored.

In addition, user can set the system settings(e.g.: Measure Mode,Group Mode,Probe Mode etc.), these settings will also be stored.

Note: When battery low, user must replace the battery timely. Before replacing the battery, you need to power off the gauge firstly.

2.9 Recall and Delete Readings

● Delete the last readings(Tips: If in measure mode, press the "UP Key" once by one beep).

a. Press "Left Key" once to enter into menu mode("Root" directory);

b. Press "Up Key" or "Down Key" to activate "Delete Data" item, and press "Left Key" once to enter in;
c. Press "Up Key" or "Down Key" to activate "Current Data" item, and press "Left Key" once. A dialog box will be displayed.
d. Press "Left Key" once to confirm the selection and go back, or "Right Key" to cancel and back. Press "ZERO Key" to back measure mode.

- Delete whole group readings(Tips: If in measure mode, hold the "UP Key" by one beep)

a. Press "Left Key" once to enter into menu mode("Root" directory);
b. Press "Up Key" or "Down Key" to activate "Delete Data" item, and press "Left Key" once to enter in;
c. Press "Up Key" or "Down Key" to activate "Current Group" item, and press "Left Key" once. A dialog box will be displayed.
d. Press "Left Key" once to confirm the selection and go back, or "Right Key" to cancel and back. Press "ZERO Key" to back measure mode.

- Recall and delete specified readings

a. Press "Left Key" once to enter into menu mode("Root" directory);
b. Press "Up Key" or "Down Key" to activate "Recall" item, and press "Left Key" once to enter in;
c. Press "Up Key" or "Down Key" to recall the readings(n/Total number, "n" indicates the index of current shown readings). User can press "Left Key" to delete current shown readings.
d. Press "Right Key" to go back. Press "ZERO Key" to back measure mode.

Note: While readings deleted, the statistics will be upgraded automatically.

2.10 High and Low Limit Alarm

Each group has individual high/low limit alarm settings. When switch the work group, the applied alarm settings will also be switched automatically.

- Set high/low limit for the current work group as below.

a. Press "Left Key" once to enter into menu mode("Root" directory);

b. Press "Up Key" or "Down Key" to activate "Limit" item, and press "Left Key" once to enter in;
c. Press "Up Key" or "Down Key" to activate "Settings" item, and press "Left Key" once to enter in;
d. Press "Up Key" or "Down Key" to activate your intended item, and press "Left Key" once to enter in;
e. Press "Up Key" or "Down Key" to increase or decrease the limit value. If hold the key, the limit value will be increased or decreased continuously.
f. Press "Left Key" to confirm new limit value, or "Right Key" to cancel and back. Press "ZERO Key" to back measure mode.

● Clear high/low limit

a. Press "Left Key" once to enter into menu mode("Root" directory);
b. Press "Up Key" or "Down Key" to activate "Limit" item, and press "Left Key" once to enter in;
c. Press "Up Key" or "Down Key" to activate "Clear" item, and press "Left Key" once. A dialog box will be displayed.
d. Press "Left Key" once to confirm the selection and go back, or "Right Key" to cancel and back. Press "ZERO Key" to back measure mode.

Note: While readings exceed high limit, the alarm symbol ⬆ will be shown on the LCD, and while readings exceed low limit, the alarm symbol ⬇ will be shown. Meanwhile, the red led backlight will be on.

2.11 Unit

User can select the shown unit(Including um,mm and mils) for the readings. Switch the unit as below.

a. Press "Left Key" once to enter into menu mode("Root" directory);
b. Press "Up Key" or "Down Key" to activate "Options" item, and press "Left Key" once to enter in;
c. Press "Up Key" or "Down Key" to activate "Unit Settings" item, and press "Left Key" once to enter in;
d. Press "Up Key" or "Down Key" to select intended item. Press "Left Key" to confirm it.

2.12 Speed

Generally, The faster the measuring speed for probe, the worse accuracy. User can select different measuring speed for probe according to user's application fields as below:

a. Press “Left Key” once to enter into menu mode(”Root” directory);
b. Press “Up Key” or “Down Key” to activate “Options” item, and press “Left Key” once to enter in;
c. Press “Up Key” or “Down Key” to activate ”Speed” item, and press “Left Key” once to enter in;
d. Press “Up Key” or “Down Key” to select intended item. Press “Left Key” to confirm it.

2.13 Data Download

User can use the USB cable to connect the gauge with PC and download stored readings . If USB connected, the symbol will be shown on the bottom of the LCD. When USB connected firstly, the PC need to install driver and software for this application. User can get the driver and software from supplier or download them from specified website. For more details, user can consult with the supplier.

2. 14 Auto Power off

User can power off via key manually. In addition, for save power, the gauge will turn off automatically in default if not any operations. Before turn off automatically, user will hear several beeps, and then user can press timely any key to let the gauge restart timing and continue working. Enable or Disable this function as below.
a. Press “Left Key” once to enter into menu mode(”Root” directory);
b. Press “Up Key” or “Down Key” to activate “Options” item, and press “Left Key” once to enter in;
c. Press “Up Key” or “Down Key” to activate “Auto Poweroff” item, and press “Left Key” once to enter in;
d. Press “Up Key” or “Down Key” to select intended item. Press “Left Key” to confirm it.

2. 15 Measurement Accuracy

Factors of affecting measurement accuracy, please reference the chapter 3. Under normal use and careful calibration, all subsequent measurements will lie within the guaranteed measuring tolerance.
When using the statistics programmer for obtaining a mean value it is advisable to place the probe several times at a typical measuring spot or at fixed measuring spot. Any false readings or outliers can be deleted

immediately. The final reading derives from the statistical calculation and from the guaranteed tolerance levels of the gauge. T(coating thickness)=M(mean value)±S(standard deviation)±A(measuring accuracy).

3. Factors of Affecting Measurement Accuracy

User needs to know the factors of affecting measurement accuracy before using the gauge. The factors are listed as below.

Factors \ Principle	Magnetic	Eddy Current	Recommendations
Magnetic properties	√		Need to calibrate
Electrical properties		√	Need to calibrate
Curvature radius	√	√	Reference the chapter 1.6, and need to calibrate
Substrate thickness	√	√	Reference the chapter 1.6, and need to calibrate
Size of measuring area	√	√	Reference the chapter 1.6, and need to calibrate
Surface roughness	√	√	
Position and shape	√	√	
Sample deformed	√	√	Avoid to measure on too soft or too thin material
Adhesive substances	√	√	Clean probe and sample
Strong magnetic field	√		Be away from strong magnetic field
Temperature and humidity	√	√	Recalibrate at the same environment conditions
Measuring operations	√	√	Read the chapter 2.2
Low battery	√	√	Replace the battery
Probe wear	√	√	Consult with suppler

The measured sample must correspond to the calibration sample in substrate material properties, curvature radius, or the more closely the measured sample matches the calibration sample, the more accurate the measuring. In addition, curvature radius should meet the minimum value as specified in chapter 1.6.

The minimum substrate thickness and the minimum measuring areas as specified in chapter 1.6 should be taken into account. Need to recalibrate(Zero/Multi-point) for different measured sample for higher accuracy.

To achieve high-accuracy readings, it is advisable to log calibration values several times. In this way, the gauge will automatically establish a mean calibration value. The high-accuracy calibration is an obvious advantage when calibrating on uneven and rough surfaces.

The point at which measurement is made should always be similar with the calibration point, especially in the case of corners and edges of small parts.

Important Note: The enclosed substrates are intended for checking accuracy only and not for calibration purposes.

User must recalibrate the gauge according to practical applications.

4. Calibration

User should read the chapter 3 firstly, and must recalibrate the gauge according to measured product sample. The gauge provides zero calibration and multi-point calibration.

- Zero calibration: Recommended if measuring errors up to ± (2%+1um).
- Multi-point calibration: The permitted measuring errors will be max. ± (1~2%+1um). If only one point calibration, it is recommended if readings to be expected will be close to the calibration value. If more than one point calibration, it is recommended for measurements on rough surfaces or for precise measurements on smooth surfaces if thickness to be expected lies between that of calibration point.

4.1 Zero Calibration

Tips: For **P3 or P4**, press and hold "DOWN Key" to start zero calibration, and press again to exit

a. Press and hold "ZERO Key" until hearing "beep...beep beep...". The LCD will flash "ZERO" symbol.
b. Place the probe on uncoated sample and raise it after one beep.
c. Repeat step b and c several times to obtain mean value.
d. Finished. Press "ZERO Key" to exit calibration mode.

Tips: For **P3 or P4**, user needs to access the menu to enable or disable multi-point cal: Press Left key->Select "Calibration"->Select "Point Cal"->Select "Enable" or "Disable"

4. 2 Multi-point Calibration

a. In measure mode, press "CAL key" once to enter into calibration mode.
b. Zero calibration according to chapter 4.1 and then lay the calibration foil on an uncoated sample.
c. Apply the probe and raise it after one beep. a readings will be shown.Press "Up Key" or "Down Key" to increase or decrease the readings or hold the key for changing continuously until the required foil thickness value shown.The LCD will show current calibration point "Ptn X ". The "X" will be flashing.
d. Apply the probe to the test sample several times, and every time raise the probe, if press "CAL Key", after "beep...beep beep...", it will establish a mean value for current calibration point.
e. Press "Left Key" to confirm and end current calibration point, and the "X" will be steady. Or press "Right Key" to cancel and end current calibration point.
f. For more calibration points, use another calibration foil and repeat the step c, d and e.
g. Finished. Press "CAL Key" to exit calibration mode.

Note:

a. Each group has individual zero calibration and multi-point calibration.
b. When calibration up to 4 points, user must clear the finished points firstly to restart.
c. Readings measured before will not be affected by new calibration.
d. In calibration mode, measuring will not be affected.
e. Recommended to work in single measure mode when calibrating.

4.3 Shot-blasted Surfaces

The physical nature of shot-blasted surfaces results in coating thickness readings that are too high. The mean thickness over the peaks can be determined as follows.

Method one:

a. The gauge should be calibrated according to 4.2(one or more points calibration). Use a smooth calibration sample with the same curvature radius and the same substrate as the later measuring sample.
b. Take approx. 10 readings on the uncoated, shot-blasted sample to produce the mean value A.
c. Take approx. 10 further readings on the coated, shot-blasted test sample to produce the mean value B.
d. The coating thickness T=(B-A)±S. The "S" is the greater standard deviation of step b and step c.

Method two:

a. The gauge should be calibrated according to 4.2(one or more points calibration) on the shot-blasted sample.
b. Take approx. 10 readings on the test sample to produce the mean value that used as final coating thickness.

4.4 Clear Calibration

User can clear calibration to start new applications. When there are incorrect calibration, User should also clear it.

a. Press "Left Key" once to enter into menu mode("Root" directory);
b. Press "Up Key" or "Down Key" to activate "Calibration" item, and press "Left Key" once to enter in;
c. Press "Up Key" or "Down Key" to activate "Clear All" item(Note: User can decide to clear only part of them, please see the menu for details), and press "Left Key" once. A dialog box will be displayed.
d. Press "Left Key" once to confirm the selection and go back, or "Right Key" to cancel and back.

Note:

All operations are limited in current work group, and the other groups will not be affected.

5. Trouble Shooting

If the instrument is no response and can't be turned on, you can remove the battery, and a few minutes later, reinstall the battery, and try again. If the problem persists, please contact with your supplier for help.

The following errors can be remedied by system reset:
-Illogical readings
-Several of the keys don't work

Reset to factory settings(For P1, P2):
1. Power off the gauge.
2. Press and hold "ZERO Key" and then power on the gauge.
3. Release the "ZERO Key" until a dialog box of system reset shown on the LCD.
4. Press "Left Key" to confirm. The gauge will restart automatically.

Reset to factory settings(For P3, P4):
1. Power off the gauge.
2. Press and hold "POWER Key" until a dialog box of system reset shown on the LCD.
4. Press "Left Key" to confirm. The gauge will restart automatically.

Errata(For P1, P2):
1. User can press the "Down Key" to refresh LCD display(Clear error display).
2. If an error shown in menu mode, user can re-enter into the menu.