

SEALEY Professional
TOOLS
Auto Service Line

TA090
PAINT
THICKNESS
GAUGE



Thank you for purchasing a Sealey product. Manufactured to a high standard this product will, if used according to these instructions and properly maintained, give you years of trouble free performance.



IMPORTANT: PLEASE READ THESE INSTRUCTIONS CAREFULLY. NOTE THE SAFE OPERATIONAL REQUIREMENTS, WARNINGS & CAUTIONS. USE THE PRODUCT CORRECTLY AND WITH CARE FOR THE PURPOSE FOR WHICH IT IS INTENDED. FAILURE TO DO SO MAY CAUSE DAMAGE AND/OR PERSONAL INJURY AND WILL INVALIDATE THE WARRANTY. PLEASE KEEP INSTRUCTIONS SAFE FOR FUTURE USE.

1. SAFETY INSTRUCTIONS

1.1. GENERAL SAFETY

- WARNING!** *Ensure Health & Safety, local authority, and general workshop practice regulations are adhered to when using this gauge in workshop or bodyshop environments.*
- Take extra care if the vehicle is jacked up or on a raised ramp/hoist.
- Maintain correct balance and footing at all times. Ensure floor/road surface is not slippery and wear non-slip shoes.
- If the vehicle is parked on a road, observe normal pedestrian precautions before working in the road, especially on the offside of the vehicle.
- DO NOT** use when you are tired, under the influence of alcohol, drugs or intoxicating medication.

2. INTRODUCTION & SPECIFICATIONS

For the professional bodyshop or valeting bay to accurately verify the thickness of paint and check for accident damage. Uses magnetic induction to provide accurate and consistent readings to 0.1µm. Suitable for steel and aluminium panels. Easy to calibrate with test plates and precision standards. USB Interface for downloading data to PC. Powered by two 1.5V batteries (supplied).

Model **TA090** Range:.....0-1250µm
Accuracy:.....±3% PC Compatibility:.....Windows 2000, XP, Win7, Vista
Minimum unit of thickness:.....0.1µm

3. SOFTWARE INTRODUCTION

The supplied software program allows the Thickness gauge to communicate with a Desktop or Notebook PC. The software displays thickness data graphically and in list form. The software also provides statistical analysis data. The data can be saved in text document form for exporting to spreadsheet programs.

PC Operating Systems Supported

Windows 2000, Windows XP, Windows Vista and Windows 7.

Minimum Hardware Required

- Desktop or NoteBook Personal Computer (PC) with 90MHz processor speed
- 32 MB RAM
- 7 MB hard disk space
- Display pixel resolution of 1024 x 768 with high color setting (16 bit minimum)

4. SOFTWARE INSTALLATION

Install the supplied Windows PC Software by placing the supplied program disc in the PC CD-ROM drive. If the installation program does not automatically open and provide on-screen prompts, double click the SETUP.EXE file included on the program disc. Follow the on-screen prompts to complete the installation. Before running the software please connect the gauge to the PC and install the USB Driver software as described in the next section.

5. INSTALL USB DRIVER

Run the CP210xVCPInstaller.exe in the driver folder to finish the driver installation.

6. MAIN MENU

With the gauge connected to the PC, switch the gauge ON. With the software application and driver installed, launch the supplied program by double clicking its icon. The screen to the right will appear. If the CONNECT button is greyed, the gauge is now communicating with the PC normally. If the CONNECT button is black, click on it to start communication. If communication is not successful, ensure that the software driver is installed. The driver is located on the supplied CD-ROM in the driver folder.

The buttons available on the Main Menu are shown on the right and listed below:

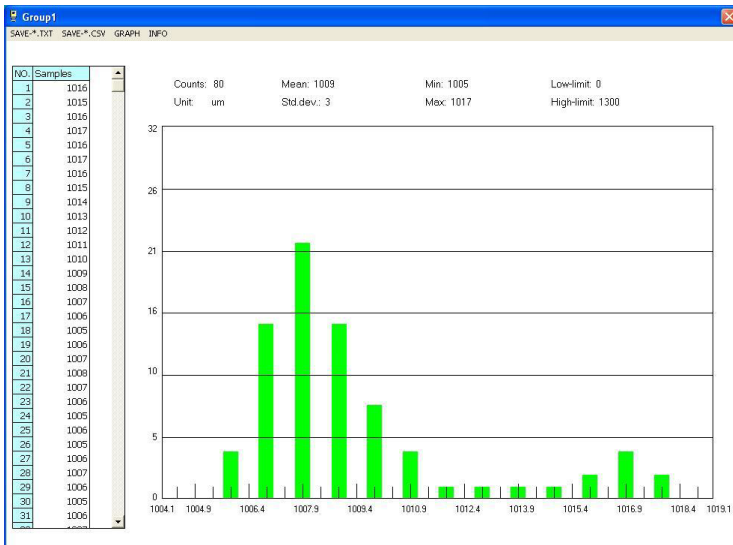
- CONNECT: If black, press it to initiate gauge-to-PC communications. If grey, communication is already active.
- GROUP 1...4: Open one of the four data group x-y graphs .
- ALL_Grps: Opens all four Group graph windows at once.
- CurrentGrp: With the gauge connected to the PC, readings can be taken and shown on an x-y graph.
- $\mu\text{m} < - > \text{mils}$: Toggle the unit of measurement for the data graphs.
- Exit: Close the program.



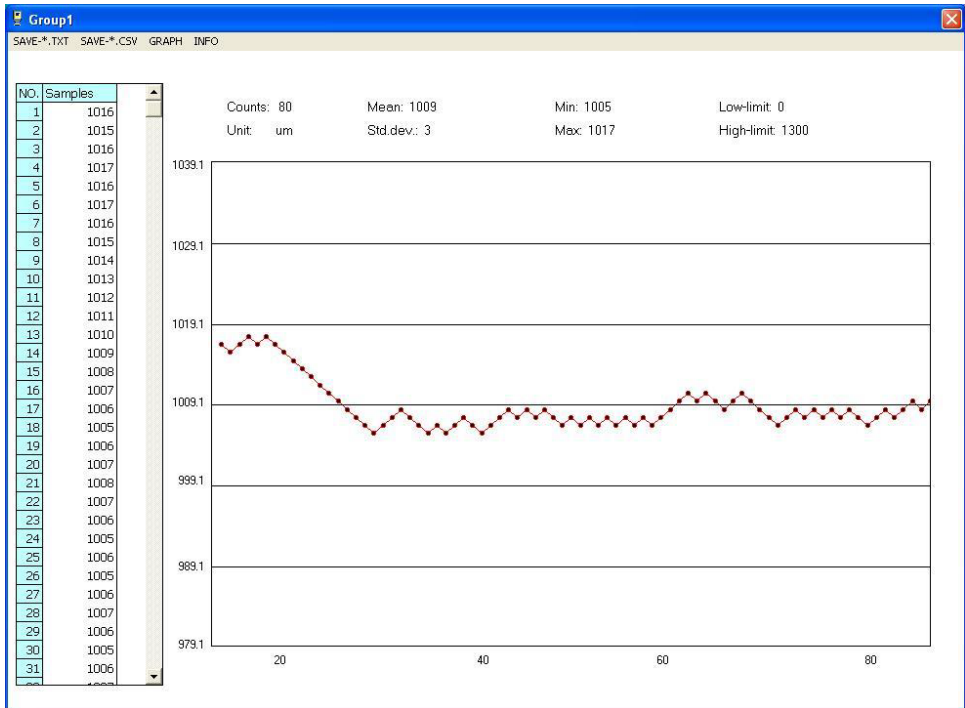
7. OPERATION

'GROUP' DATA GRAPHS

Collect data into one or more of the data groups on the gauge (refer to the gauge's user guide for details on the GROUP function). After collecting data to a gauge group, click a GROUP button from the MAIN MENU to open an x-y graph as shown in the diagram below. (Click the ALL_Grps buttons to open all four groups)



The MENU items at the top of the graph window are SAVE *.TXT, SAVE *.CSV, GRAPH, and INFO. The SAVE items allow the data to be saved as a text file with a TXT or CSV extension for exporting to spreadsheet programs. The GRAPH selection offers TREND or HISTOGRAM graph styles; a TREND graph is shown on the next page and a HISTOGRAM above.



The INFO menu selection allows the user to access this HELP utility and to view the software's revision level.

The x-y graph offers the following information in addition to the readings shown directly on the graph:

- Sample number and readings in list form (on the left side of graph)
- Counts (number of samples) and unit of measurement (at the top left of the graph)
- Mean, standard deviation, MIN/MAX statistical data (at the top centre of graph)
- Low/High Alarm limit values (at the top right of the graph)
- Trend or Histogram style graph (selectable from the GRAPH menu)

8. CURRENT GROUP DATA GRAPHS

CURRENT GROUP (CurrentGrp) DATA GRAPHS

Collect data while the gauge is connected to the PC and then click on CurrentGrp to open the fresh data on an x-y graph in similar fashion as the standard groups described above.

9. UM < - > MILS BUTTON

Click this button to toggle the units of measurement used on the data graphs.

10. GENERAL INFORMATION

The TA090 coating thickness gauge works either on the magnetic induction principle or on the eddy current principle. You can select either probe function via the MENU system. There is also an option to choose the probe function automatically.

This gauge conforms to the following industrial standards:

GB/T 4956—1985

GB/T 4957—1985

JB/T 8393—1996

JJG 889—95

JJG 818—93

Features

- Measured Coatings: Non-magnetic coatings (e.g. paint, zinc) on steel; Insulating coatings (e.g. paint, anodizing coatings) on non-ferrous metals
- Easy MENU operation
- Two measuring modes: CONTINUE and SINGLE mode
- Two working mode: DIRECT and GROUP mode(4 groups)
- Statistic Display: AVG, MAX, MIN, NO., S.DEV
- One point calibrating and two points calibrating independently for each working mode
- Easy Zero calibration
- Memory for 320 readings(80 for each group)
- Delete single readings and all group readings easily
- High alarm and Low alarm for all working modes
- Low battery, error indication
- USB interface for connecting to PC analysis software
- Disable Auto-Power-off function via MENU setting

10.1 APPLICATION

This compact and handy 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, shipbuilding and aircraft industries and for light and heavy engineering.

The TA090 gauge is suitable for laboratory, workshop and outdoor use.

The probe can work on two principles, either magnetic induction or the eddy current principle. One probe only is required for coating measurement both on ferrous and non-ferrous metal substrates. It is adaptable to specific tasks: i.e. they can be used on special geometries or on materials with special properties.

10.2 Description of the gauge

For measurement on steel substrates, the gauge will work on the magnetic induction principle. For measurement on non-ferrous metal substrates, it works on the eddy current principle.

Measurement values and user information are shown on LCD. A display back light ensures easy reading of screen data in dark conditions.

Two different operating modes are available: DIRECT mode and GROUP mode.

DIRECT mode is recommended for simple, quick, occasional measurements. It provides statistical analysis. Single values are not saved. The statistical analysis program can evaluate 80 readings. GROUP mode permits measurement and storage of readings in a free programmable memory. A maximum of 400 readings and 4 series of measurements can be analyzed according to various statistical criteria.

10.3 Product package contents

Gauge with two 1.5V batteries, plastics carrying case, operating instructions (English), steel and aluminium sample plates. USB connecting cable and program disc for Windows 98/2000/XP/Vista/7.

10.4 Probe description

The probe at the bottom of the gauge is spring-mounted in the probe sleeve. This ensures safe and stable positioning of the probe and constant contact pressure. A V-groove in the collar around the probe facilitates reliable readings on small cylindrical parts. The hemispherical tip of the probe is made of hard and durable material. Keep probe collar level and stable on object to be measured.

10.5 Detailed Specification

Sensor probe	F	N
Working principle	Magnetic induction	Eddy current principle
Measuring range	0~1250um	0~1250um
	0~49.21mils	0~49.21mils
Guaranteed tolerance (of reading)	0~850 um (+/- 3%+1um)	0~850 um(+/- 3%+1.5um)
	850um~1250 um (+/- 5%)	850um~1250um (+/- 5%)
	0~33.46 mils (+/- 3%+0.039mils)	0~33.46mils (+/- 3%+0.059mils)
	33.46um~49.21mils (+/- 5%)	33.46um~49.21mils (+/- 5%)
Precision	0~50um (0.1um)	0~50um (0.1um)
	50um~850um(1um)	50um~850um(1um)
	850um~1250um(0.01mm)	850um~1250um(0.01mm)
	0~1.968mils (0.001mils)	0~1.968mils (0.001mils)
	1.968mils~33.46mils(0.01mils)	1.968mils~33.46mils(0.01mils)
	33.46mils~49.21mils(0.1mils)	33.46mils~49.21mils(0.1mils)
Minimum curvature radius	1.5mm	3mm
Diameter of Minimum area	7mm	5mm
Basic critical thickness	0.5mm	0.3mm
Working temperature	0°C~40°C(32°F~104°F)	
Working relative humidity	20%~90%	
Size	(H×D×W): 110×50×23mm	
Weight:	100g	

11. PREPARATION

11.1 Power supply

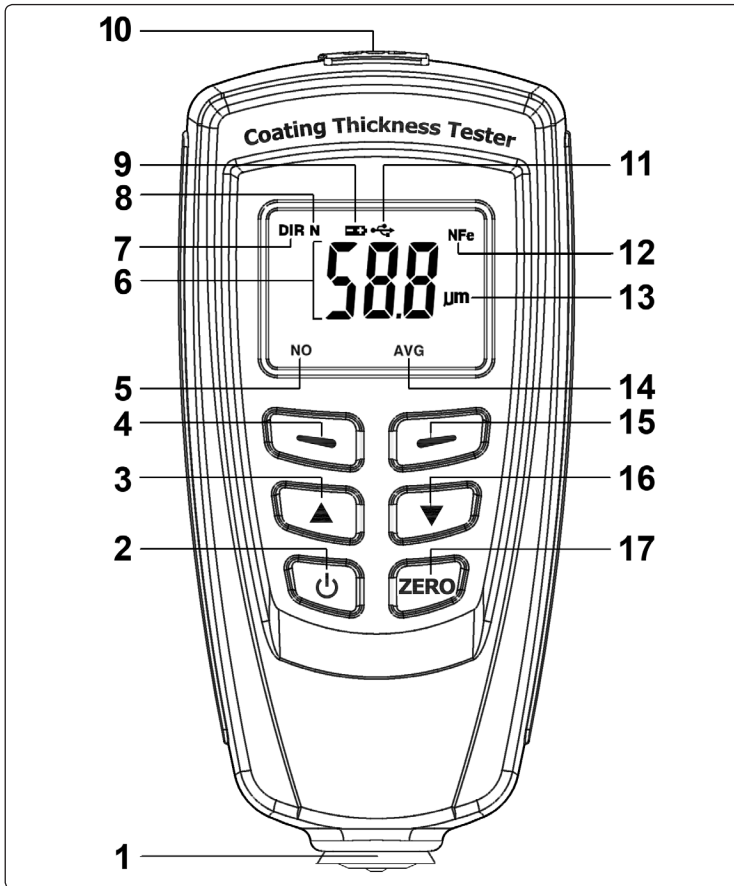
To check the battery's state of charge please press the On/Off key. If the LC display is not lit the battery may be missing or the battery charge too low to illuminate display.

If the display lights then the gauge switches off after about one second, immediately replace the battery. Note that the gauge will make faulty measurements if the voltage is very low.

11.2 Replacing the battery

1. Place the gauge upside down on a suitable surface.
2. Remove the screws from the battery compartment with a cross tipped screwdriver.
3. Raise the lid of the compartment.
4. Remove battery.
5. Insert new battery.
6. Close the lid and refasten with screw.

Caution: Ensure the polarity is correct when placing the batteries.



CONTROLS / FEATURES

- | | |
|--|---|
| 1. Probe. | 10. USB connecting port. |
| 2. Power ON/OFF key. | 11. Indicates that the gauge is currently connected to a PC |
| 3. Up/Left key. | 12. NFe: indicates readings on non-ferrous metals; Fe: indicates readings on ferrous metals |
| 4. Left 'bar' key for OK/YES/MENU/SELECT in menu mode. | 13. Unit of measurement. |
| 5. The number of statistical measurement readings. | 14. Statistic display type: AVG, MAX, MIN, SDEV |
| 6. Main display indicating coating thickness. | 15. Right 'bar' key for ESC/NO/BACK function in menu mode, or backlight ON/OFF In working mode. |
| 7. Working mode indication: DIRECT or GROUP. | 16. Down/Right key. |
| 8. Indicates the probe working mode i.e. AUTO, Magnetic induction or Eddy current. | 17. Zero Calibration key. |
| 9. Low battery. | |

12. MENU SYSTEM

12.1 MENU SYSTEM

NOTE: Prior to using the gauge we suggest you familiarise yourself with the MENU system referring to the Menu System Map to the right and the Menu descriptions below. Press the red power button to turn on the gauge which will start up in DIRECT mode, ready to take a measurement. To access **MENU** mode, press the left 'bar' key directly below the display.

Level One of the MENU System offers the following six alternative selections:
MENU - Statistic View / Options / Limit / Delete / Measure View / Calibration

12.2 MULTIFUNCTION 'BAR' KEYS.

There are two keys directly below the display, each having a horizontal bar printed on it. These keys have a number of different functions depending on where you are in the menu system. In most cases the key function will appear on the display directly above each key. In general the left 'bar' key will select the following operations, OK/YES/MENU/SELECT. In general the right 'bar' key will select, ESC/NO/BACK. Where the menu system presents a number of options to choose from, use the UP/DOWN buttons to move to the desired option.

12.3 MENU / Statistic View / Average View - Minimum View - Maximum View - Number View - Sdev. View. (Use the UP/DOWN buttons to move to the desired view).

12.4 MENU / Options / Measure mode / Single mode - Continuous mode

Continuous measurement mode: It can sometimes be advantageous if the probe does not need to be raised between each measurement so that there is a running display of readings. In continuous mode, readings are not accompanied by a bleep. All readings taken in this mode will automatically be entered into the statistics program as long as sufficient memory is available.
Single mode: In Single mode, readings are accompanied by a bleep.

12.5 MENU / Options / Working mode / Direct - Group 1 - Group 2 - Group 3 - Group 4
(Use the UP/DOWN buttons to move to required working mode and press 'select').

12.6 MENU / Options / Used Probe / Auto or Fe or No Fe

The probe can work in three modes.

AUTO: The probe can automatically select the working mode. When placed on steel (magnetic substrates), it will work in magnetic induction principle. When placed on non-ferrous metals, it will work in eddy current principle.

Fe: The probe works in magnetic induction principle.

No-Fe: The probe works in eddy current principle.

12.7 MENU / Options / Unit settings / um - mils - mm

You can switch from Metric units (**um, mm**) to imperial units (**mils**).

In "um" mode, the unit will switch to "mm" automatically when value of reading exceeds 850um, see the specification section for more details.

12.8 MENU / Options / Backlight / ON - OFF

You can select **ON/OFF** in MENU system. Also, in measuring mode, press the righthand 'bar' key once to switch the backlight ON or OFF.

12.9 MENU / Options / LCD Statistic / Average View - Maximum View - Minimum View - Sdev. View.

Use the UP/DOWN buttons to move to the desired view. When you return to the measurement screen, the 'view' setting will be displayed on the lower right of LCD. At the same time, the number of statistical measurements taken is displayed on the lower left of LCD. Via the "statistic view" item in MENU system, you can look through all the statistical readings for the current group.

Press lefthand 'bar' key under display to access **MENU SYSTEM**

	Level One	Level Two	Level Three
MENU	>Statistic view	>>Average view	
		>>Minimum view	
		>>Maximum view	
		>>Number view	
		>>Sdev. view	
MENU	>Options	>>Measure mode	>>>Single mode
			>>>Continuous mode
		>>Working mode	>>>Direct
			>>>Group 1
			>>>Group 2
			>>>Group 3
			>>>Group 4
		>>Used probe	>>>AUTO
			>>>Fe
			>>>No Fe
		>>Unit settings	>>>um
			>>>mils
			>>>mm
		>>Backlight	>>>ON
			>>>OFF
		>>LCD Statistic	>>>Average
			>>>Maximum
			>>>Minimum
			>>>Sdev.
		>>Auto power off	>>>Enable
			>>>Disable
MENU	>Limit	>>Limit settings	>>>High limit
			>>>Low limit
		>>Delete limit	
MENU	>Delete	>>Current data	
		>>All data	
		>>Group data	
MENU	>Measurement view		
MENU	>Calibration	>>Enable	
		>>Disable	
		>>Delete Zero N	
		>>Delete Zero F	

12.10 MENU / Options / Auto power off / Enable - Disable

You can **enable/disable** Auto-power-off via the MENU system or the gauge will power off automatically after about 3 minutes.

12.11 MENU / Limit / Limit settings / High Limit - Low Limit

Set high and/or low limit using the up/down keys and select OK to confirm/set limit.

12.12 MENU / Limit / Delete limit / Yes - No Move to 'Delete limit' using the up/down buttons and select it. Select 'Yes' to confirm deletion or 'No' to cancel operation.

12.13 MENU / Delete / Current data / All data / Group data / Yes - No

Move to data type to be deleted using up/down buttons and select it. Select 'Yes' to confirm deletion or 'No' to cancel operation.

12.14 TOTAL RESET

A total reset erases data from all memories. This includes all sets of readings of all work modes plus their associated statistics, calibration values and tolerance limits. To perform a total reset, do the following:

- a) Switch OFF gauge
- b) Switch the gauge on whilst holding down the 'ZERO' key. Do not release the 'ZERO' key until the words "Sure to reset?" appear on the screen.
- c) Select 'Yes' to perform the reset. Select 'No' to cancel the operation.

12.15 MEASURE VIEW

Via "Measure view" in the MENU system, you can look through all measurement readings for the currently selected group of readings.

12.16 MENU / Calibration / Enable / Disable / Delete Zero N - Yes - No / Delete Zero F - Yes - No

Select desired option by using the up/down buttons and the right or left hand 'bar' keys.

13. OPERATING MODES

13.1 Measuring, Storage and Data processing in DIRECT and GROUP mode

This gauge offers two operating modes: DIRECT and GROUP mode. The GROUP mode includes GROUPS 1 to 4.

13.2 DIRECT mode is intended for quick occasional readings. In this mode, individual readings are logged to memory provisionally. When the gauge is turned OFF or switched to GROUP mode, all readings will be lost. But the statistic values won't be changed until logging new measurement readings. The readings and statistical values can be shown on the LCD display. The statistical analysis program can evaluate 80 readings. When the memory is full, new readings will replace old readings. In this mode, it has individual calibration values and limit values.

13.3 In GROUP mode, every group memory can store a maximum of 80 single readings, and 5 Statistic values. Calibration values and limit values can individually be set and stored for every group. When the memory is full, measuring will proceed sequentially, but will not be stored and statistic values won't be changed. If required, you can delete group data and statistic values, and reset calibrate values and limit values.

13.4 You can select **DIRECT** or **GROUP** mode in the **MENU** system using the following 'path':

(MENU / Options / Working mode / Direct - Group 1 - Group 2 - Group 3 - Group 4)

When group mode has been selected via the MENU system the group chosen will appear on the LCD display in abbreviated form i.e. GRO1, GRO2, GRO3, GRO4.

13.5 If the gauge is switched on whilst holding the probe away from the test object, it will initiate in DIRECT mode and the last reading will be shown (if available).

14. CALIBRATION & MEASUREMENT

14.1 CALIBRATION METHODS (General Hints for Calibration).

There are four different methods available for calibration:

14.1.1 **Basic calibration:** recommended for measurement on even surfaces and if the measuring object has the same material, size and curvature as the zero plate attached in the casing.

14.1.2 **Zero-point calibration:** recommended if measurement errors of up to $\pm 3\%$ of reading plus constant error of probe, are permitted. (Example for constant of probe showing error: Fe 1 μ m; no-Fe 1.5 μ m)

14.1.3 **One-point calibration** (calibrating using a calibration foil): recommended if readings are expected to be close to the calibration value and if the permitted error of the probe will be a maximum of $\pm 1\% \dots 3\%$ of reading plus constant probe error.

14.1.4 **Two-point calibration** (using a set of two calibration foils):

- Recommended for measurements on rough surfaces.
- Recommended for precise measurements on smooth surfaces if the thickness to be expected lies between that of the two calibration foils.

14.2 Storing Calibration Values

If the gauge is calibrated for a particular purpose, the calibration values will be stored in memory until changed.

NOTE: The calibration procedure should be restarted from the beginning if

- An incorrect reading has been taken.
- An incorrect command has been entered.
- The gauge has switched off.

14.3 Calibration Example

Calibration is the most important requirement for accurate measurement. The more closely the calibration sample matches the product sample, the more accurate the calibration, and therefore the more accurate the reading will be.

If for instance, a product is to be measured on a steel cylinder, quality ST37(mild steel), diameter 6mm, the calibration of the uncoated sample must take place on a steel cylinder of similar quality with the same diameter. The calibration sample must correspond to the product sample in the following ways:

- Curvature radius
- Substrate material properties
- Substrate thickness
- Size of measuring area
- The point at which the calibration is made on the calibration sample must always be identical with the point of measurement on the product itself, especially in the case of corners and edges of small parts.

14.4 High-Accuracy Calibration

To achieve high-accuracy readings, it is advisable to log calibration values (both zero values and calibration foil values) several times in succession. In this way, the gauge will automatically establish a mean calibration value. For more details see 14.6 'Special hints for calibration'. The high-accuracy calibration is an obvious advantage when calibrating on uneven, e.g. shot-blasted, surfaces.

14.5 Cleaning the Measuring Point

Before calibration of the measuring point, the probe tip must be free from grease, oil, scraps of metal, etc. The slightest impurity will affect measurement and distort readings.

14.6 Special Hints for Calibration

The basic calibration stored in the gauge should only be used for measurements on even surfaces, i.e. on steel components made of conventional steel (mild steel) or on aluminium components. Firstly, enter into Calibration Mode via the following 'path' (Menu - Calibration - Enable). Then the LCD display will show "Cal n(or 1~2) Zero n(or y)". The "n" means "not any point calibration and Zero calibration, and "y" means "there is Zero calibration". "Cal 1~2" means "There is One or Two point Calibration". After finishing all Calibration tasks, we advise that you disable calibration via the MENU system.

14.6.1 Preparing for calibration:

- a) Switch the gauge on (keep it away from any metal by at least 10cm).
- b) Have substrate sample and necessary foils (calibration standard) to hand.
- c) Set work mode i.e. continuous or single via MENU system.

14.7 Zero-point calibration (no need to enable calibration)

14.7.1. Place the probe on an uncoated sample (zero coating thickness) ensuring it is vertical and stable .

14.7.2. The LCD display will display a value (x.x um). (The operation differs between continuous mode and single mode. See the work mode section for more details). Then, raise the probe rapidly from the metal substrate by at least 10cm.

14.7.3. Now press and hold the 'Zero' button for about 1.5seconds, the LCD displays 0.0 um. The calibration is finished.

14.7.4. Repeat this procedure several times. The calibration system always saves the mean value of the previous calibration point.

NOTE: You can delete any existing zero point calibration settings not required before making new zero point calibrations via the MENU system. The gauge always calculates the mean of the latest 5 calibration readings. When full, the newest calibration value will replace the oldest calibration value. We suggest that you make a Zero calibration when starting a measurement.

14.8 One-point calibration

This method is recommended for high precision measurements, measurements on small parts and on hardened and low-alloy steel.

14.8.1. Perform a zero-point calibration as described in 14.1.2.

14.8.2. Lay the calibration foil on an uncoated sample, apply the probe and wait for a steady reading. Remove the probe from the sample & press the UP or DOWN keys to adjust to the required foil thickness. The thickness of the foil should be roughly equivalent to the estimated coating thickness.

14.8.3. Repeat step 14.8.2 several times to achieve the mean value of previous calibration readings.

14.8.4. Now take readings by placing the probe on the coating and raise it if steady.

It may be necessary to delete calibration, e.g. after entry of a faulty calibration value: (MENU - Delete - Delete group data). (NOTE: It will delete all data, limit data, one-point and two-point calibrations except for zero-point calibration).

This will reactivate the default basic calibration for use on even surfaces.

NOTE: The meter calculates the mean of the 5 calibration latest readings. When full, the newest calibration value will replace the oldest calibration value.

Press the righthand 'bar' key to exit current calibration. Or else, after about 30 seconds, the calibration will be become effective automatically.

Press Zero button to make current calibration effective.

Even while a series of measurements is being taken, foil calibration can be carried out as often as necessary. The old calibration will be overwritten; the Zero calibration remains in memory.

14.9 Two-point calibration

We recommend that the gauge is used in single work mode. If necessary switch to this mode using the MENU system. This method requires the use of two different foils. The thicker one should be, if possible, 1.5times as thick as the thin one. For best results, the thickness to be expected should be somewhere between the two calibration values.

This method is especially suitable for taking measurements on rough shot-blasted surfaces or for high-precision readings. It is advisable to take several readings to achieve a mean value. This considerably reduces the effect of scattering which occurs during calibration of upper and lower values.

The calibration foils may be used in any order.

14.9.1 Zero-point calibration according to section 14.1.2

14.9.2 The first point calibration according to section 14.1.3

14.9.3 Repeat the above step .

14.9.4 Take readings by placing the probe on the coating to be measured and raise it after the beep. The reading is shown on the display.

NOTE:

14.9.5 Apply the probe to test sample several times.

14.9.6 The thickness of the foil should be roughly equivalent to the estimated coating thickness.

14.9.7 Even while a series of measurements is being taken, foil calibration can be carried as often as necessary. The old calibration will be overwritten; the ZERO calibration remains in memory until a new zero point calibration is made.

14.9.8 See one-point calibration for more information.

14.10 Shot-blasted surfaces

The physical nature of shot-blasted surfaces results in coating thickness reading that are too high. The mean thickness over the peaks can be determined as follows (The statistics program is not of great benefit in this procedure):

Method A:

14.10.1 The gauge should be calibrated according to 14.8 or 14.9. Use a smooth calibration sample with the same curvature radius and the same substrate as the later measuring sample.

14.10.2 Now take approx. 10 readings on the uncoated, shot-blasted sample to produce the mean value X_0

14.10.3 After this take approx. 10 further readings on coated, shot blasted test sample to produce the mean value X_m . The difference between the two mean values is the mean coating thickness X_{eff} over the peaks. The greater standard deviations of the two values X_m and X_0 should also be taken into consideration: $X_{eff}=(X_m-X_0)\pm S$

Method B:

14.10.4 Carry out a zero calibration of 10 readings on a shot-blasted, uncoated sample. Then carry out a foil calibration on the uncoated substrate. The foil set should consist of a number of individual foils of max. 50 microns thickness each and should roughly correspond to the estimated coating thickness.

14.10.5 The coating thickness can be read directly from display and should be averaged from 5 to 10 single measurements. The statistics function is useful here.

Method C:

This method also gives reliable results. Simply follow the two-point calibration method using two foils as described in section 14.9. For a maximum approach to the respective nature of surface, the foil value can be reached by using several foils – 50um each. The mean coating thickness should be calculated from 5 to 10 readings. The statistics program is very useful here.

NOTE:

For coatings thicker than 300 um, the influence of roughness generally is of no importance and it will not be necessary to apply above calibration methods.

14.11 General Remarks on Measurement

After careful calibration has been made, all subsequent measurements will lie within the guaranteed measuring tolerance. Strong magnetic fields near generators or live rails with strong currents can affect the reading.

When using the statistics program for obtaining a mean value it is advisable to place the probe several times at a typical measuring spot. Any false readings can be removed immediately Via the MENU system.

The final reading derives from the statistical calculation and from the guaranteed tolerance levels of the gauge. **Coating Thickness $D = X \pm s \pm u$**

Example: Readings: 150um, 156um, 153um

Mean value: $X=153um$

Standard deviation: $s=\pm 3um$

Measuring uncertainty: $u=\pm(1\% \text{ of reading} + 1um)$

$D= 153\pm 3\pm(1,53um+1um)$

$=153\pm 5,5um$

MAX: maximum reading

MIN: minimum reading

15. LIMIT FUNCTION

Limits can be entered in DIRECT and a selected GROUP memory at any time, i.e. before, during and after a series of measurements. There is practical use for limits. Any reading which falls outside the set tolerance limits will be registered by a warning indication:

H: reading above HI limit

L: reading below LO limit

Please set the limit values using the MENU system.

16. MEASUREMENT USING STATISTICS

16.1 The gauge calculates statistics from a maximum of 80 readings(GRO1 to GRO4: in total, a maximum of 320 readings can be stored). In addition, readings can't be stored in DIR mode, but it can calculate statistics as GRO1~GRO4. When power off or changing Work Mode(see MENU system for details), the DIR statistics will be lost. The following statistical values are calculated:

NO.: number of readings in Work Mode

AVG: average value

Sdev. : standard deviation

16.2 Statistical Terms (\bar{x})

Average value

The sum of readings divided by the number of readings.

$$\bar{x} = \sum x/n$$

Standard Deviation(Sdev.)

The sample standard deviation is a statistic that measures how "spread out" the sample is around the sample mean. The sample standard deviation increases with increasing spread out. The standard deviation of a set of numbers is the root mean square of the variance S^2

The variance of a list is the square of the standard deviation of the list, that is, the average of the squares of the deviations of the numbers in the list from their mean divided by the(number of readings - 1)

$$\text{Variance } S^2 = \sum (x - \bar{x})^2 / (n - 1)$$

$$\text{Standard deviation } S = \sqrt{S^2}$$

NOTE: Deletion must take place immediately after a false or erratic reading has been taken. See the Delete function in MENU system.

16.3 Storage Capacity Overflow

In GROUP mode, If the storage capacity is exceeded, statistics will not be updated, although measurement can continue. If the memory is full, subsequent readings will be omitted from the statistics. In this case the word "FULL" will be shown on the LCD in single measuring mode.

In DIRECT mode, if the memory is full. The newest reading will replace the oldest reading. And the statistics will be updated.

17. DELETE FUNCTIONS

In the MENU system, you can find the following functions:

Delete current data: If you find the last measurement reading is wrong, you can delete it via this function. At the same time, the statistics will be updated.

Delete all data: You can delete all data and statistics of the Current Work Mode.

Delete Group data: This function includes “Delete all data” function. In addition, this function will delete High alarm, Low alarm, and One & Two point calibrations.

18. GAUGE CONTROL VIA PC

All measuring readings of all work modes can be downloaded to PC via USB port for data analysis. See software guide for more details.

19. TROUBLE SHOOTING

The following list of error messages explains how to identify and eliminate faults.

Err1, Err2, Err3: Connecting of probe fault; Deviant signal

Err1: Eddy current probe

Err2: magnetic induction probe

Err3: both probes

Err4, 5, 6: reserved

Err7: Thickness fault.

BATTERY DISPOSAL / REPLACEMENT INFORMATION

See Section 11.2 regarding battery access/ replacement.

Under the Waste Batteries and Accumulators Regulations 2009, Jack Sealey Ltd are required to inform potential purchasers of products containing batteries (as defined within these regulations), that they are registered with Valpak’s registered compliance scheme. Jack Sealey Ltd’s Batteries Producer Registration Number (BPRN) is BPRN00705

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