

## Instruction Manual TF / TG

### DIGITAL COATING THICKNESS GAUGE

**Model: TF, F and NF, with sensor inside**



**Model: TG, F and NF, with sensor outside**



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**Annotation: It is strongly recommended to calibrate the new instrument before the first use, as described in paragraph 9. By doing this it will be achieved a much better measurement result right from the start.**

#### 1. Features

\* This instrument meets the standards of both, ISO 2178 and ISO 2361, and DIN as well as ASTM und BS.

It is suitable for the laboratory and for use in harsh field conditions.

\* The F mode measures the thickness of nonmagnetic materials, e.g. paint, plastic, porcelain enamel, copper, zinc, aluminium, chrome, laquer layers etc. These layers are located on magnetic materials e.g. steel, iron, nickle etc. It is often used to measure the thickness of galvanizing layer, laquer layer, porcelain enamel layer, phosphide layer, copper tile, aluminium tile, some alloy tile, paper etc. Those layers are to be found on magnetic base materials like iron, steel, nickel etc.

\* The N mode measures the thickness of nonmagnetic coatings, e.g. anodizing, varnish, paint, enamel, plastic coatings, powder etc. These layers are located on non-magnetic metals e.g. aluminium, brass, non magnetic stainless steel etc.

\* Automatically substrate recognition

\* Manually or automatically "auto power off" to conserve batteries.

\* Two measurement modes: - single and continuous

\* Wide measuring range and high resolution

\* Metric/ imperial conversion

\* Digital backlight display enables exact reading with no guessing or errors

\* Can communicate with PC for statistics and printing by the optional cable.

\* Can store up to 99 measurements

\* Statistics available

#### 1. Specifications

Display: 4 digits LCD, with backlight

Range: 0 up to 1250  $\mu\text{m}$ / 0 up to 50 mil  
(another range may be specified)

Resolution: 0.1  $\mu\text{m}$  (0 up to 99.9  $\mu\text{m}$ )  
1  $\mu\text{m}$  (over 100  $\mu\text{m}$ )

Accuracy:

- Standard: 3% of the measured value or min.  $\pm 2.5 \mu\text{m}$   
Is valid within a tolerance range of  $\pm 100 \mu\text{m}$  around the individually measured range, if a two-point calibration was performed within this tolerance range.

- Off-Set Accur Mode: 1% of the measured value  
or min.  $\pm 1.0 \mu\text{m}$   
Is valid within  $\pm 50 \mu\text{m}$  around the *Off-Set Accur* point.

PC interface: mit RS-232C interface

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Power supply: 2 x 1.5V AAA(UM-4) batteries

#### Operating conditions

Temperatures	0 up to 50°C
Humidity	< 95 %

Dimensions: 126 x 65 x 35 mm (5.0 x 2.6 x 1.6 inch)

Weight: ca.81g (without batteries)

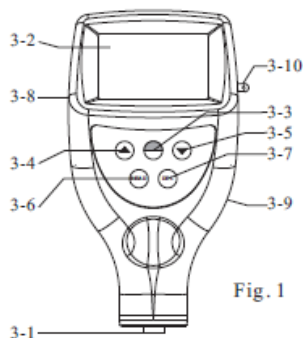
#### Accessories: - Carrying case

- Operation manual
- F-sensor, (inbuilt at TF, at **TG one sensor** for F and FN is extern, it has to be plugged in)
- NF-sensor, (inbuilt at TF)
- Calibration foils
- Base plate (iron)
- Base plate (aluminium)

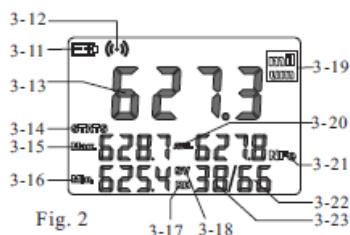
Optional accessories: Cable & software for RS-232C

USB adapter for RS-232C Software

### 3. Front panel description



- 3- 1 Sensor, inbuilt at model TF
- 3- 2 Display
- 3- 3 Power-key/Zero- key
- 3- 4 Plus- key
- 3- 5 Minus- key
- 3- 6 Reading key
- 3- 7 Deleting key
- 3- 8 Jack for RS-232C interface
- 3- 9 Battery cover
- 3-10 Wrist ring



- 3-11 Low battery indicator
- 3-12 Measuring symbol
- 3-13 Last reading/browsing value
- 3-14 Single measurement mode
- 3-15 Max. indicator value

3-16 Min. indicator value

3-17 Browsing state

3-18 Measuring state

3-19 Unit

3-20 Average indicator

3-21 Substrate indicator

3-22 Counter for storing

3-23 Counter for statistics

### 4. Measuring procedure

At model TG, the F-/NF- sensor (automatically recognition) has to be plugged in, to get into the F- or NF- mode.

4.1 The power key 3-3 has to be pressed to switch on the instrument. `0` appears on the display 3-2.

With the Auto- Mode, the instrument recognizes the mode itself by the symbol `Fe` (= F) or `NFe` (= N) which is indicated on the display.

4.2 The sensor 3-1 is to be placed onto a coating layer to be measured. The reading on the display is the thickness of the coating layer. This can be corrected by pressing the Plus- key 3-4 or the Minus- key 3-5. For doing this the sensor should be away from the measured object or the base plate.

4.3 For the next measurement the sensor 3-1 has to be lifted for more than 1cm and step 4.2 is to be repeated. The instrument memorizes the continuous measured value automatically with statistic measurement times. Meanwhile, the Max, Min and average value will be displayed.

4.4 To change the measurement unit from „µm“ to “mil” or vice verse, the Power-key just has to be pressed and not released until “UNIT” is shown on the display. Then the same key 3-3 (this time Zero-key) has to be pressed.

4.5 To change the measuring mode from `single` to `continuous` or vice verse, the Power-key 3-3 has to be pressed and not released until `SC` appears on the display. Then the Zero- key 3-3 has to be pressed. The symbol “STATS” represents the continuous mode and `S` represents the single mode.

### 5. Statistics

This instrument calculates and displays a statistical analysis of readings while the measurements are taken.

The statistics available are:

- Last value
- Mean value
- Highest reading marked by Max
- Lowest reading marked by Min
- Number of readings taken

To clear the statistical data before starting a new set of data, the Zero-key just has to be pressed and released. In measurement mode, which is marked by SV, the last value can be deleted by pressing the DEL-key. Restatistics is calculated and displayed itself.

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#### 6. How to store and recall readings

- 6.1 The measurements taken are automatically saved in the memory of the instrument. The memorized data can be browsed by pressing and releasing the READ-key to enter into the browsing state, marked by "READ" on the display.
- 6.2 In browsing state, all the readings memorized can be recalled on the display by pressing the Plus-key 3-4 or the Minus-key 3-5.
- 6.3 To delete only one memorized value in the memory, the reading to be deleted just has to be located on the display by the Plus-key or the Minus-key. Then the DEL-key has to be pressed and released. If there appears "Err0" on the display, it is indicated that there is no reading to delete any more.
- 6.4 The Zero-key 3-3 has to be pressed to quit the measurement state.

#### 7. How to delete readings

- 7.1 To delete a reading on the display, the DEL-key has to be pressed, no matter whether you are located in the measurement state marked "SV" or in browsing state marked "RD". Browsing state can be entered by pressing the READ-key and measurement state is entered by pressing the Zero-key.
- 7.2 To delete all readings in the memory, the DEL-key has to be pressed in measurement state marked by "SV" on the display for about 4 seconds until the number of readings memorized becomes 0.

#### 8. Transfer of readings to a PC

- 8.1 RS-232 software has to be installed on the PC. During the installing process the "continue"-button always has to be clicked.
- 8.2 The instrument has to be connected to the PC using the optional cable.
- 8.3 The Thickness Gauge has to be switched on to ensure that the reading screen is displayed.
- 8.4 The software has to be started and the instructions included with the software Demo. EXE. have to be followed.

#### 9. Calibration

- 9.1 Zero adjustment:  
Zero adjustment for "F" and "NF" should be carried out separately. The iron base plate is to be used if "F" is shown on the display. The base plate of aluminium is to be used if "NF" is shown on the display. The sensor 3-1 is to be placed carefully onto the base plate and the Zero- key is to be pressed without lifting the sensor. "0" appears on the display.

**Attention: The calibration is invalid if the sensor is not directly placed onto the base plate or another uncoated material.**

- 9.2 An appropriate calibration foil is to be selected according to the measurement range.

- 9.3 The selected standard foil has to be placed onto the base plate or the uncoated material.

- 9.4 The sensor 3-1 is to be pressed carefully onto the calibration foil and then lifted.  
The reading on the display is the value measured. This can be corrected by pressing the Plus- key 3-4 or the Minus- key 3-5 while the sensor is removed from the base plate or the measured object.

- 9.5 Repeat step 9.4 until the accuracy is achieved.

#### 10. Battery replacement

- 10.1 If the battery symbol "+/-" appears on the display, the batteries should be replaced.

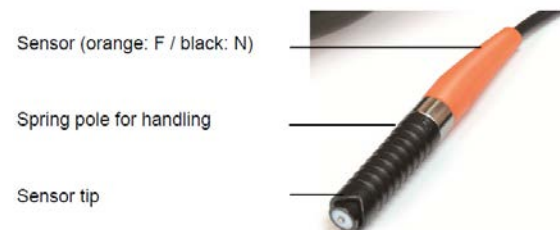
- 10.2 The battery cover 3-9 has to be removed and the batteries are to be taken off.

- 10.3 The batteries (2x1.5V AAA/UM-4) are to be installed correctly into the case.

- 10.4 If the instrument is not to be used for an extended period, batteries are to be extracted.

#### 11. Correct handling of coating thickness measurement with external sensors

The sensor has to be touched at the lower pole segment and it has to be pressed slightly onto the test object. The black chequered pole segment is movably seated on a spring. By means of the spring, the sensor tip presses onto the test object with a defined force. This way, measurement errors can be avoided.



It is recommendable to effect several test measurements before the first use of the instrument. This way, further measurement errors can be avoided.

#### 12. Trouble shooting

- 12.1 The instrument should always be calibrated on the uncoated base material to be measured instead of the base plate included in the delivery. Then the accuracy is more precise.

- 12.2 Sensors will eventually wear off. Life of the sensor will

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depend on the number of measurements taken and how abrasive the coating is. Replacement of the sensor should only be performed by qualified staff.

### 13. Restore factory settings

13.1 In the following cases it is recommended to restore factory settings:

- A. The instrument does not measure any more.
- B. Measurement accuracy is degraded caused by the abraded sensor or affected by environmental conditions.
- C. After the replacement of a new sensor.

13.2 How to restore?

`F` setting and `N` setting are to be done. It can be done one or both of them. The procedure is as follows:

13.2.1 On the display the symbol `F` or `NF` appears.

If `F` is shown on the display, you have to restore factory settings for `F`, as described below.

If `NF` appears, you have to follow factory settings for `NF`.

13.2.2 The Power-on/ Power-off key 3-3 has to be pressed until `CAL` appears on the display. This lasts about 12 seconds from starting pressing the Power-key.

13.2.3 If now F:H or NF:H is shown on the display, the sensor has to be lifted for more than 5 cm. Then the Zero-key has to be pressed and the instrument returns into measurement mode. With this, factory setting is restored.

Comment: This procedure should always be done within 6 seconds. Otherwise it will be automatically cancelled and the restoration is invalid.

### 14. Notes

14.1 All settings, including restoring factory setting, unit setting, S/C setting should be done within 6 seconds. Otherwise the instrument will quit and keep the status as before.

14.2 The linearization of the instrument, which is given by the calibration, can be changed with the **Ln- function**.

**Any adjustment of the value of Ln will seriously affect the accuracy. This value should only be adjusted by professional persons.**

Generally said:

The bigger the value of Ln, the smaller the reading on the display for the same (coating) thickness. Only a small change on the value of Ln causes a big change in the reading of the upper measurement range (at 500µm/20 mil).

The **value of Ln** is to adjust as follows:

Pressing the Power-key. It lasts about 14 seconds from starting depressing this key. This value can be changed by pressing the Plus- / Minus- key after `Ln` appears on the display and the Power- key is released. This value is stored and afterwards the Zero- key has to be pressed.

A. The reading at low end is to be adjusted by pressing the Plus-/ or the Minus- key.

B. The value of **Ln** is enlarged if reading at low end (e.g. 51µm) is o.k., but reading at high end (e.g. 432µm) is too large.

In contrast with this the value of Ln is to be decreased if the reading at low end (e.g. 51µm) is o.k. but at high end (e.g. 432µm) it is too small.

C. Procedures from A to B are to be repeated until the reading for every calibration foil is satisfactory in its accuracy

### 15. Declaration of conformity



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#### Konformitätserklärung

Declaration of conformity for apparatus with CE mark  
Konformitätserklärung für Geräte mit CE-Zeichen  
Déclaration de conformité pour appareils portant la marque CE  
Declaración de conformidad para aparatos con marca CE  
Dichiarazione di conformità per apparecchi contrassegnati con la marcatura CE

English: We hereby declare that the product to which this declaration refers conforms with the following standards.

Deutsch: Wir erklären hiermit, dass das Produkt, auf das sich diese Erklärung bezieht, mit den nachstehenden Normen übereinstimmt.

Français: Nous déclarons avec cette responsabilité que le produit, auquel se rapporte la présente déclaration, est conforme aux normes citées ci-après.

Español: Manifestamos en la presente que el producto al que se refiere esta declaración está a de acuerdo con las normas siguientes.

Italiano: Dichiariamo con ciò che il prodotto al quale la presente dichiarazione si riferisce è conforme alle norme di seguito citate.

#### Coating Thickness Gauge: SAUTER TF/TG

Mark applied	EU Directives	Standards
CE	EMC 2004/108/EC	EN 61325-1:2006
		EN 61000-3-2:2006
		EN 61000-3-3:2006

Date: 07.01.2010

Signature:



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Management

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