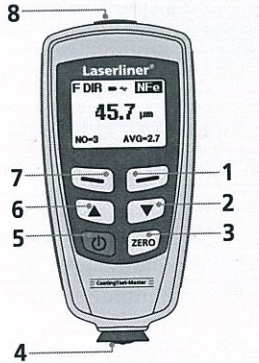
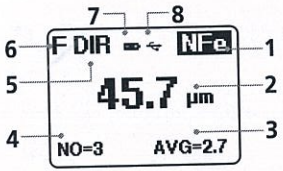
! Read the operating instructions and the enclosed brochure „Guarantee and additional notices" completely. Follow the instructions they contain. Safely keep these documents for future reference.

Function/Application

The coating thickness measurement device is used for the non-destructive measurement of coating thicknesses based on the magnetic induction principle or eddy current principle. Main applications: Quality control in paint shops, in the automotive industry and for the inspection of material coating qualities to ensure corrosion protection of metal components. Integrated memory and statistics evaluation for measurement analysis.



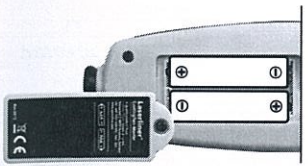
1. Menu mode: Cancel (ESC), back LCD illumination on/off
2. Navigation key down/right
3. Zero calibration
4. Measuring head / sensor
5. ON/OFF
6. Navigation key up/left
7. Menu; Selection, confirm
8. USB interface



1. NFe display: non-ferrous metals Fe display: ferrous metals
2. Measurement / unit
3. Statistical display AVG, MAX, MIN, SDEV
4. Statistical number of measured values
5. Work mode: Direct (DIR), Group (GRO)
6. Measuring principle: N (eddy current principle), F (magnetic induction principle)
7. Low battery charge
8. USB connection active

1 Inserting the batteries

Open battery compartment and insert batteries corresponding to installation symbols. Ensure correct polarity.



2 x AAA, 1,5 V

2 ON/OFF

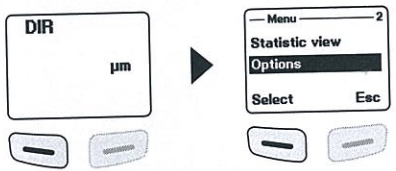
3 Menu control

The functions and settings of the measuring device must be controlled through the menu. The menu is activated by pressing the "Menu" key. The same key is also used to select the individual menu options. Use the keys "▲" and "▼" to navigate within the menu. Use the "Esc" key to leave the menu or to go back to the previous submenu.

Based on this means of operation, the following settings and menu options can be selected.

We recommend familiarising yourself with the device and its style of operation before starting.

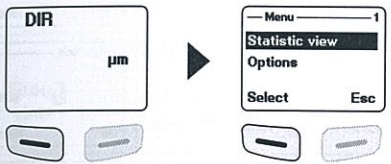
4 Options



Measure mode	**Measuring mode** Individual mode: each measurement is confirmed by an acoustic signal and stored temporarily. Permanent mode: continuous measuring and storing	Measure mode 1 Single mode * Continiuous mode Select Back
Working mode	**Working mode** Direct: for quick measurements. Can save 80 measurements. However, the measurements are deleted when the device is turned off or switched to group mode. Group 1-4: for specific series of measurements A total of 80 measurements can be saved per group. Individual adjustment of calibration and limits per group.	Working mode 1 Direct * Group 1 Select Back Working mode 5 Group 3 Group 4 Select Back
Used probe	**Used probe** Auto: Automatic sensor adjustment Fe: Magnetic induction principle No Fe: Eddy current principle	Used probe 1 Auto * Fe Select Back
Unit setting	**Units** µm, mils, mm	Unit setting 2 um * mils Select Back

Backlight	**Display lighting** ON/OFF	Backlight 2 OFF ON Select Back
LCD Statistic	LCD statistic display (display measuring mode) Average Maximum Minimum Standard deviation	Stat. show 1 Average * Maximum Select Back
Auto power off	**Auto Power Off** Activate: Auto switch-off after 2 minutes of inactivity. Deactivate	Auto poweroff 1 Enable * Disable Select Back

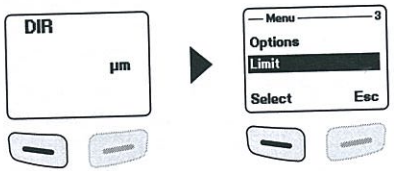
5 Statistical display

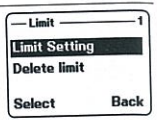
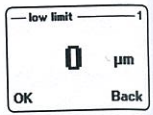
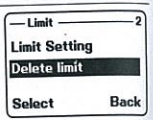


Statistical display and display of measurements within the selected measuring mode (direct mode or group mode 1-4)	Average view 19.7 µm Back	Minimum view 18.1 µm Back
Average Minimum Maximum Number of measurements Standard deviation	Maximum view 21.6 µm Back	Number view 42 Back

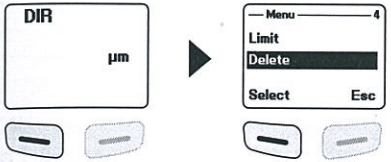
For more information about "Average" and "Standard deviation", see item 14.

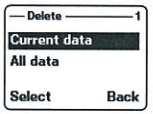
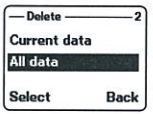
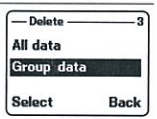
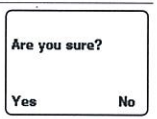
6 Limit function



Limit setting	**Limit setting** Setting for exceeding or falling below measured values. Measurements outside of the limits are indicated by an acoustic warning signal. This setting can be adjusted for both measuring modes (direct or group mode) before, during or after a series of measurements.	
	Upper limit: Alarm for exceeding limit Lower limit: Alarm for falling below limit	 
Delete limit	**Delete limits** With this setting, the previously set limits are deleted or reset to factory settings. (high: 1250 µm, low: 0 µm)	
	Confirm the subsequent prompt either with "Yes" or "No".	

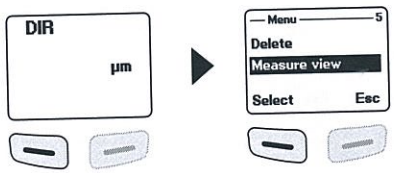
7 Delete / reset memory



Current data	**Current data** This option deletes the last measurement. The statistics are updated.	
All data	**Delete all data** This option deletes all data in the current work mode.	
Group data	**Delete group data** In addition to the "Delete all data" function, this option deletes the set limits and the one-point and two-point calibration values.	
	Confirm the subsequent prompt either with "Yes" or "No".	

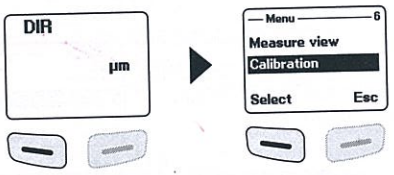
! Memory location occupied in direct mode: additional measurements are possible. The data recorded first is overwritten and the statistics are updated accordingly.
Memory location occupied in group mode: additional measurements are possible. The display shows the message "Full". Measurement data is not overwritten and the statistics are not updated.

8 Measured value display



Measure view	**Measured value display** All measurements of the respective mode (direct or group mode) can be retrieved here.	Measure view 1 45.7 µm Back

9 Start calibration mode

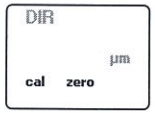


Calibration	**Calibration** This function activates the calibration mode.	
	Disable calibration mode	Calibration 1 Enable Disable Select Esc
	Enable calibration mode	
	Delete zero calibration NFe	Calibration 4 Delete zero N Delete zero F Select Esc
	Delete zero calibration Fe	

10 Zero calibration

Switch the device to calibration mode as described in step 9 and keep the "ESC" key pressed until the display shows the measuring mode. The display may show the following messages regarding calibration:

cal	no one-point or two-point calibration available
cal 1~2	one-point or two-point calibration available
zero	no zero calibration available
zero Y	zero calibration available



Take the following steps to perform a zero calibration:

1. Turn on the measuring device without allowing the measuring head to contact any metal objects.
2. Activate "individual measurement" mode (item 4 Options)
3. Place the measuring head vertically onto the provided uncoated base pattern (always calibrate on clean uncoated surfaces)
4. Put down the measuring device after measuring.
5. Keep the "zero" key pressed for 2 seconds
6. Repeat steps 3 to 5 several times.
7. Zero calibration is complete. Disable the calibration mode again.

! The measuring device determines the average of the last 5 zero calibrations and overwrites the oldest value. Zero calibrations are recommended before each new measurement.

11 One-point calibration

One-point calibration is recommended for measurements with very thin coating thicknesses.
Switch the device to calibration mode as described in step 9 and keep the "ESC" key pressed until the display shows the measuring mode.
Take the following steps to perform a one-point calibration:

1. Perform zero calibration as described in Step 10.
2. A calibrating foil corresponding with the estimated coating thickness to be measured is placed on the uncoated base pattern.
3. Place the measuring head vertically.
4. Put down the measuring device after measuring.
5. Adjust the thickness of the calibrating foil on the display using the keys "▲" and "▼"
6. Repeat steps 3 to 4 several times
7. Press the "zero" key to accept the calibration
8. One-point calibration is complete. Disable the calibration mode again

12 Two-point calibration

Two-point calibration is recommended for measurements on rough surfaces.
Switch the device to calibration mode as described in step 9 and keep the "ESC" key pressed until the display shows the measuring mode.
Take the following steps to perform a two-point calibration:

1. Perform zero calibration as described in Step 10.
2. Perform one-point calibration as described in step 11. However, use a calibrating foil that is thinner than the estimated coating thickness to be measured.
3. Repeat step 2 with a calibrating foil that is thicker than the estimated coating thickness to be measured.
4. Press the "zero" key to accept the calibration
5. Two-point calibration is complete. Disable the calibration mode again

13 Reset to factory settings

The measuring device can be reset to factory settings to delete all measurements, settings and calibration values. To do so, follow these steps:

1. Switch off measuring device
2. Press the keys "ON/OFF" and "ZERO" at the same time.
3. Let go of the "ON/OFF" key and keep "ZERO" pressed.
4. After starting, confirm the reset by responding either "Yes" or "No" to the prompt.

14 Average / Standard deviation

For several measurements, the average $\bar{x}$ indicates the average value, while the standard deviation (Sdev) gauges the average deviation of the individual measurements from this average value. More significant standard deviations indicate a more scattered series of measurements.

For normal measurement distributions,
68% of the measurements are within $\bar{x} \pm (1*Sdev)$,
95% of the measurements are within $\bar{x} \pm (2*Sdev)$,
99% of the measurements are within $\bar{x} \pm (3*Sdev)$

15 Error messages

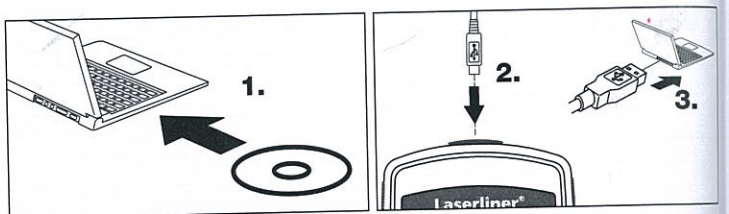
Error code	Description
Err1, Err2, Err3	Sensor not connected properly. Deviating signal.
Err 1	Error in eddy current sensor
Err 2	Error in magnetic induction sensor
Err 3	Error in both sensors
Err 4, Err 5, Err 6	reserved
Err 7	Error in coating thickness

! If errors consistently recur, please contact your specialist dealer or the Laserliner service personnel.

16 USB data transfer

With the software provided on the CD it is possible to transfer the recorded data to a PC and to use the data for further processing and documentation. Load the CD in the drive and follow the installation routine. After successful installation, start the application. Connect one end of the supplied USB cable to the mini-USB port of the device and the other end to a free USB port on your computer.

For further information on how to use the software, refer to the software manual on the DVD that contains a detailed description of the functions.



Technical data		
Sensor	**FE**	**NFe**
How it works	Magnetic induction	Eddy current
Measuring range	0…1250 µm	0…1250 µm
Accuracy	0…850 µm / ± (3% +1 µm), 850…1250 µm / (±5%)	0…850 µm / ± (3% +1 µm), 850…1250 µm / (±5%)
Minimum bending radius	1.5 mm	3 mm
Diameter of the smallest measuring surface	ø 7 mm	ø 5 mm
Operating temperature	0 °C…40 °C	
Max. relative humidity	90 %	
Power supply	2 x AAA	
Dimensions (W x H x D)	50 x 110 x 23 mm	
Weight	100 g	

Technical revisions reserved. 06.12

EU directives and disposal

This device complies with all necessary standards for the free movement of goods within the EU.

This product is an electric device and must be collected separately for disposal according to the European Directive on waste electrical and electronic equipment.

Further safety and supplementary notices at: **www.laserliner.com/info**