ElektroPhysik

Operating Instructions

for

MiniTest
70F

MiniTest
70FN

Coating Thickness
Gauges

Operating Instructions
MiniTest 70F
MiniTest 70FN

The gauges conform to the following norms and standards:
DIN EN ISO 1461, 2064, 2178, 2360, 2808, 3882
ASTM B 244, B 499, D7091, E 376

A. Start-up
B. How to operate the gauge
C. Initial functions
D. Error messages
E. Technical specifications

Application
Designed for quick and precise non-desctrucitve measurement, the coating thickness gauges of the MiniTest 70 Series feature ElektroPhysik's SIDSP® digital sensor technology. This technology stands for high precision and interference immunity.

The MiniTest 70 Series is available in two models:

The **MiniTest 70 F** model works on the **magnetic induction principle (F)** allowing to measure any non-magnetic coatings such as paint, enamls, rubber, aluminium, chrome, copper, zinc, etc. applied on iron and steel (also on alloyed or tempered magnetic steel, except on austenitic or weakly magnetic steel).

MiniTest 70 FN incorporates a dual sensor for automatic identification of the substrate material. The gauge upon contact with the surface automatically switches to

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the suitable measuring principle based on your application: magnetic induction or eddy currents.

The **N**-part of this dual probe works on the **eddy currents principle** allowing to measure any insulating coatings such as paint, plastics, Eloxal, ceramics etc. applied on any non-ferrous metal bases (such as aluminium, copper, zinc die-cast, brass, etc.) or applied on austenitic steel.

Scope of delivery

- MiniTest 70 (F or FN model)
- 1 zero plates (for F model)
- 2 zero plates (for FN model)
- 2 precision standards
- 1 AA battey
- Gauge tether
- Operating instructions in German / English
- Storage case

A. Start-up
Remove battery protection strip
The gauge is supplied with a battery inside the battery compartment. Before switching on, remove the battery protection strip. Push battery lid in the direction of arrow to remove it.

➜
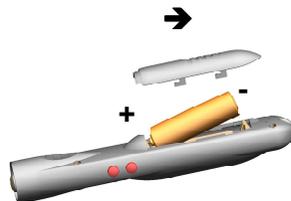
Remove the battery protection strip and close lid.

Changing batteries:

If the BAT-symbol appears, the battery is exhausted and no reading can be taken. Insert fresh battery of the same type into the battery compartment respecting +/- polarities. Close battery lid.

B. How to operate the Gauge

Control Buttons
Four buttons are available to operate the gauge:

(CAL-)   (CAL+)

(ON/ZERO)   (STAT)
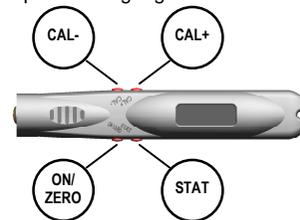
1. Switch on

Button   Display

(ON/ZERO) Press briefly   [µm]

2. Switch off

(ON/ZERO) Press for a second. Wait for the signal to sound and release key.
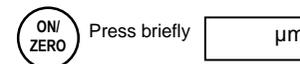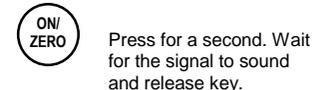
3. One-point Calibration

Gauge is switched on.

(ON/ZERO) Press briefly   [µm]

µm flashing

Put the sensor on an uncoated calibration

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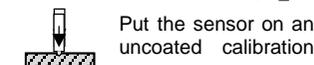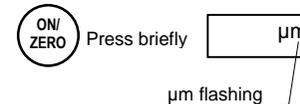
sample. The sample should be of the same shape as the coated substrate. Wait for the bleep to sound and lift sensor. Repeat this procedure several times. The gauge will calculate and display the mean value $\bar{x}$.
The mean value will improve the calibration precision.

(ON/ZERO) Press button briefly to store the calibration point.
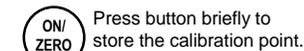
4. Two-point Calibration
This calibration method is more precise than the one-point calibration and is essential for measuring curved surfaces. To ensure most accurate results, choose a precision standard with a thickness close to the sample thickness to be expected.

(ON/ZERO) Press briefly   [µm]

µm flashing
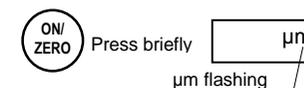
Put the sensor on an uncoated calibration sample. The sample must have the same shape as the coated substrate. Wait for the bleep to sound and lift sensor. Repeat this procedure several times. The gauge will calculate and display the mean value $\bar{x}$. The mean value will improve the calibration precision.

(ON/ZERO) Press button briefly to store the calibration point.
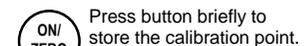
Put a calibration standard on the uncoated sample. Put the sensor on the calibration standard. Wait for the bleep to sound and remove sensor.

(CAL+)
(CAL-)   Use CAL+ and CAL- keys to adjust to the thickness of the precision standard.
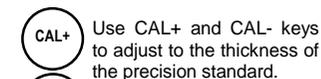
Now you can take readings !

5. Recalibrate
If measuring conditions have changed, it may become necessary to change an existing calibration. This can be done at any time.

If you start recalibation with the one-point calibration, you also have to recalibrate for the second calibration point as previously taken with the precision standard.

If you do not start with the one-point calibration, it will be sufficient to recalibrate for the precision standard only.

6. MiniTest 70 FN
The FN model incorporates a dual sensor for automatic identification of the substrate material. It switches to the suitable meauring principle based on your application.

At the first measurement, the activated measuring principle will be indicated once the gauge is switched on. It will also be indicated if the meauring principle is automatically changed. Before any reading is shown, **F** will be indicated if the magnetic-induction principle is active, **N** will be indicated for the eddy currents principle.

[**F**]   [**⊓**]

The two prinicples require separate calibrations, either one-point or two-point calibration.

The statistics will always be calculated for the measuring principle the gauge has switched to when taking the first reading of a measuring series.

7. Statistics Overview

If you are in measuring mode, press STAT-key to call the statistics of your current measuring series.

Press STAT-key each time to display the values in the followig order: $n, \bar{x}, s, Min, Max$

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1.	STAT	n = number of readings, 999 max.
2.	STAT	$\bar{x}$ mean
3.	STAT	S standard deviation
4.	STAT	Min
5.	STAT	Max

There are 3 options to quit the statistics:
- Take a reading
- Start one-point calibration
- Swich off the gauge

8. Delete Statistics

The gauge must be switched on.

STAT Press for about 3 sec.

All statistical values will be deleted.

- - - µm appears on display
Calibration will remain in memory.

C. Initial Functions

For all initial funcitons proceed as follows:

a) The gauge is switched off.
b) Press key combination according to the requested initial function (Auto-Off, Measuring system, Reset or Info) and keep pressed down.
c) Then release ON/ZERO first.
d) Adjust setting as described below under section 1. to 4. according to the requested initial function. Your setting will be kept stored in memory even after the gauge is switched off.

1. Auto-OFF (Initial function)

ON/ZERO + CAL-

The gauge is switched off. Press ON/ZERO and CAL- simutaneously, the realease ON/ZERO first.

The automatic switch-off can be set to the following options:
0 (OFF), 1 min., 3 min., 10 min., 30 min
Press CAL- each time to adjust the requested option,
Wait for about 3 seconds until the gauge will switch to measuring mode. Your setting is stored.

2. Measuring system (metric / imperial) (Initial function)

ON/ZERO + CAL+

Press CAL+ to switch from metric to imperial and vice versa.
Wait for about 3 seconds until the gauge will switch to measuring mode. Your setting is stored.

3. RESET (Initial function)

ON/ZERO + STAT

Any existing calibration will be deleted, the factory calibration will be restored. Any existing statistics will be deleted.

Wait for about 3 seconds until the gauge will switch to measuring mode. Your setting is stored.

4. Info (Initial function)

ON/ZERO + CAL- + CAL+

Turns all segments on so you can verify at once that all display segments are working.

The following data will be displayed:

Serial number of gauge (displayed in two steps):

e.g. "100" followed by "284" to give you the serial "100284".

In addition, the following data will be shown subsequently:

Software version: e.g. "1.01"

Gauge type: e.g. "Fn"

Serial of sensor in two steps:
e.g "100" followed by "856" to give you the serial "100856".

Software version of sensor:
e.g. "1.07"

Wait for about 3 seconds until the gauge will switch to measuring mode.

D. Error Messages

E01 Communication failure between sensor and display unit.

E02 Insufficient number of readings for creating a statistics.

E03 Type of reading inappropriate for calibration. The substrate material and thus the measuring principle have been changed during the calibration procedure.

E04 Two-point calibration: no reading available. CAL- or CAL+ key has been pressed before any reading has been taken.

BAT Battery exhausted.

⊔⊔⊔ mm During a 2-point-calibration, the displayed value has been adjusted below 0 µm using the CAL- key. Remedy: Make a RESET (initial function).

E. Technical Specification

Model / Properties	MiniTest 70 F	MiniTest 70 FN
Measuring range	0... 3 mm/ 120 mils	F- range: 0...3 mm/ 120 mils N- range: 0...2.5 mm / 100 mils
Measuring principle	Magnetic induction	Magnetic induction / eddy currents
Signal processing	sensor-integrated digital 32-Bit-signal processing (SIDSP®)	
Accuracy*1	± (1.5 µm + 3 % of reading) for one point-calibration*2 ± (0.06 mis + 3 % of reading) for one point-calibration*2 ± (1.5 µm + 2 % of reading) for two-point calibration*3 ± (0.06 mils + 2 % of reading) for two-point calibration*3	
Repeatability*1	± (1 µm + 1 % of reading) / ± (0.04 mils + 1 % of reading)	
Low range resolution	0.5 µm / 0.02 mils	
Minimum curvature radius, convex	5 mm / 0.2"	
Minimum curvature radius, concave	40 mm / 1.60"	
Min. substrate thickness	F: 0.5 mm / 0.02" N: 0.04 mm / 0.0016"	
Measuring systems	metric /mils (switchable)	
Statistics	$n, \bar{x}, s, Min, Max$	
Calibration modes	one-point calibration, two-point-calibration	
Operating temperature range	-10℃ ...+60℃ / 14℉ ...140℉	
Storage temperature range	-20℃...+70℃ / -4℉...158℉	
Power supply	1 x AA battery / rechargeable battery	
Norms and standards	DIN EN ISO 1461, 2064, 2178, 2360,2808, 3882 ASTM B 244, B 499, D7091, E 376	
Dimensions	Approx. 157 mm / 5.2" length, Ø 27 mm / 1.06"	
Weight including battery	Approx. 80 g / 2.8 oz	

*1 according to DIN 55350, part 13
*2 when measuring on even surfaces
*3 related to ElektroPhysik precision standards and if calibration is done close to the thickness to be expected.