ElektroPhysik

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# Coating thickness measurement

# MiniTest 2500/4500

### Classic Design

- All functions directly accessible
- Large selection of interchangeable sensors
- High-contrast display and illuminated keypad
- Memory and Statistics
- Bluetooth and USB Output
- IP 65 Rated Rugged housing


Precision gauges »Made in Germany« since 1947

## MiniTest 2500/4500

# All-rounders for quality assurance

Height: 91, Ø 19 mm

Height: 194, Ø 10,9 mm

Height: 79, Ø 16 mm

Height: 91, Ø 19 mm

| Type of sensor | FN 1.6 | FN 1.6/90 | F 05 | F 3 |
|---|---|---|---|---|
| **Application:** | Non-magnetic coatings on steel and insulating coatings on non-ferrous metal.<br><br>The multi-talent for standard applications.<br><br>Also available as version F 1.6 only for measuring on magnetic substrate or version N 1.6 only for measuring on non-ferrous metals. | Non-magnetic coatings on steel and insulating coatings on non-ferrous metal.<br><br>Especially appropriate for measurements in tubes and pipes or objects which are difficult to access.<br><br>Also available as version F 1.6/90 only for measuring on magnetic substrate or version N 1.6/90 only for measuring on non-ferrous metals. | Extremely thin non-ferrous metal, oxide or paint coatings on small steel objects.<br><br>Highest precision for thin coatings. | Non-magnetic coatings on steel, thick paint and enamel coatings.<br><br>A true classic of coating thickness measurement. |

## Technical Data

| | | | | |
|---|---|---|---|---|
| **Measuring range:** | 0…1600 µm/65 mils | 0…1600 µm/65 mils | 0…500 µm/20 mils | 0…3000 µm/120 mils |
| **Low range resolution:** | 0.1 µm/0.004 mils | 0.1 µm/0.004 mils | 0.1 µm/0.004 mils | 0.2 µm/0.008 mils |
| **Guaranteed tolerance (of reading):** | ± (1%+1 µm/0.04 mils) * | ± (1%+1 µm/0.04 mils) * | ± (1%+0.7 µm) * | ± (1%+1 µm/0.04 mils) * |
| **Minimum radius of curvature (convex/concave):** | 1.5 mm/0.06 in convex/<br>10 mm/0.4 in concave | flat convex/<br>6 mm/0.2 in concave | 0.75 mm/0.03 in convex/<br>5 mm/0.2 in concave | 1.5 mm/0.06 in convex/<br>10 mm/0.4 in concave |
| **Minimum area for measurement:** | Ø 5 mm/0.2 in | Ø 5 mm/0.2 in | Ø 3 mm/0.1 in | Ø 5 mm/0.2 in |
| **Minimum substrate thickness:** | F 0.5 mm/N 50 µm<br>F 20 mils/N 2 mils | F 0.5 mm/N 50 µm<br>F 20 mils/N 2 mils | 0.1 mm/4 mils | 0.5 mm/20 mils |

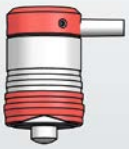
*(of measurement value referring to ElektroPhysik calibration foils)
All illustrations are not true to scale
All Sensors of MiniTest series 1100-4100 are compatible with MiniTest 2500 / 4500

## MiniTest 2500/4500

# Specialists for more complexe me

Height: 99, Ø 19 mm

Height: 99, Ø 19 mm



Height: 47, Ø 28 mm

Height: 64, Ø 46 mm

| Type of sensor | N 02 | N 08.Cr | F 10 | F 20 |
|---|---|---|---|---|
| **Application:** | The precise solution for very thin insulating layers like lacquer, enamel or anodized layers on non-ferrous metals with high measurement resolution, (0.1 µm) and defined tracking force of just 25 g. | Special version to measure chrome layers up to 80 µm on copper substrate with minimum thickness of 100 µm. | Thick coatings like plastic in tank, pipeline and container construction. | Thick plastic, rubber or concrete layers in pipeline construction as well as corrosion-resistant layers. |

### Technische Daten

| | | | | |
|---|---|---|---|---|
| **Measuring range:** | 0…200 µm/8 mils | 0…80 µm/3 mils | 0…10000 µm/394 mils | 0…20000 µm/790 mils |
| **Low range resolution:** | 0.1 µm/0.004 mils | 0.1 µm/0.004 mils | 5 µm/0.2 mils | 10 µm/0.4 mils |
| **Guaranteed tolerance (of reading):** | ± (1%+0.5 µm/0.02 mils) * | ± (1%+ 1µm/0.04 mils) * | ± (1%+10 µm/0.4 mils) * | ± (1%+20 µm/0.8 mils) * |
| **Minimum radius of curvature (convex/concave):** | 1 mm/0.04 in convex/ 5 mm/0.2 in concave | 2,5 mm/0.1 in convex/ 10 mm/0.4 in concave | 5 mm/0.2 in convex/ 16 mm/0.6 in concave | 10 mm/0.4 in convex/ 30 mm/1.2 in concave |
| **Minimum area for measurement:** | Ø 2 mm/0.08 in | Ø 5 mm ( 0.2 in) | Ø 20 mm/0.8 in | Ø 40 mm/1.6 in |
| **Minimum substrate thickness:** | 50 µm/2 mils | 100 µm/4 mils | 1 mm/40 mils | 2 mm/80 mils |

*(of measurement value referring to ElektroPhysik calibration foils)
All illustrations are not true to scale
All Sensors of MiniTest series 1100-4100 are compatible with MiniTest 2500/4500

# asuring tasks

Height: 69, Ø 46 mm

Height: 72, Ø 50 mm

Height: 74, Ø 66 mm

Height:154,5, Ø 126 mm

Height:154,5, Ø 126 mm

| F 50 | N 10 | N 20 | N 100 | F 2 HT |
|---|---|---|---|---|
| Very thick corrosion-resistant layers and anti-drumming layers. | For measurement of insulating layers made of rubber, plastics, glass etc. on non-ferrous metals. | Insulating coatings, e. g. rubber, plastics, glass on non-ferrous metal. | Thick insulating layers and composite materials on non-ferrous metals. | Special high temperature sensors allow coating thickness measurement on hot surfaces either up to a surface temperature of 250°C / 482° F or 350° C / 662° F. |
| 0…50000 µm/1970 mils | 0…10000 µm/394 mils | 0…20000 µm/790 mils | 0…100000 µm/3940 mils | 0…2000 µm |
| 10 µm/0.4 mils | 10 µm/0.4 mils | 10 µm/0.4 mils | 100 µm/4 mils | 0.2 µm |
| ± (3%+50 µm/2 mils) * | ± (1%+25 µm/1 mils) * | ± (1%+50 µm/2 mils) * | ± (1%+0.3 µm/12 mils) * | ± (1 %+1 µm) * |
| 50 mm/2 in convex/ 200 mm/7.9 in concave | 25 mm/1 in convex/ 100 mm/3.9 in concave | 25 mm/1 in convex/ 100 mm/3.9 in concave | 100 mm/3.9 in convex/ plan | 1.5 mm in convex/ 10 mm in concave |
| Ø 300 mm/12 in | Ø 50 mm/2 in | Ø 70 mm/2.8 in | Ø 200 mm/78.8 in | Ø 5 mm |
| 2 mm/80 mils | 50 µm/2 mils | 50 µm/2 mils | 50 µm/2 mils | 0.5 mm |

## MiniTest 2500/4500

# Application

The portable coating thickness gauges MiniTest 2500 and MiniTest 4500 measure non-destructively using either magnetic induction or the eddy current principle. The gauges are useful for a wide range of applications where high precision coating thickness measurement is required including; industrial corrosion protection, decorative coatings in design sector or daily use by:

- Manufacturers and end-users of all types of coated products
- Auditors and inspectors
- Electroplating and paint shops
- Chemical industry
- Automotive production, ship building, aviation, plant and mechanical engineering

MiniTest coating thickness gauges are not only useful in the laboratory but are equally qualified for use in industrial applications thanks to their rugged housing with a IP 65 rating. Both models feature USB output for connection to notebooks and PCs. The MiniTest 4500 additionally offers a Bluetooth output for wireless data transfer to mobile devices like Smartphones and printers directly on site. All gauge functions can be triggered directly pressing a single key of the illuminated keypad. The large display with background illumination adds to a high level of user comfort and ergonomics. A broad selection of measuring sensors is available for the MiniTest 2500/4500 line of coating thickness gauges allowing it to handle standard applications as well more complex measuring tasks. The scope of application is determined by the sensor connected to the gauge:

F-type sensors work according to the magnetic induction principle and can measure non-magnetic coatings such as paint, enamel, rubber, aluminum, chrome, copper, zinc etc applied on iron and steel (including steel alloys and hardened magnetic steels).
N-type sensors work according to the eddy current principle and measure insulating coatings such as paint, anodizing, ceramics etc. applied on all non-ferrous metals (for example aluminum, copper, zinc die cast, brass etc.) including austenitic steels.

FN-type sensors combine both principles and identify the substrate underneath the coating thus automatically switching to the correct measuring principle to measure on base material steel or non-ferrous metal.


## Standard supply

**Gauge:**

- MiniTest 2500 or 4500
- Plastic transport case
- Rubber protection case
- Manual german, english, french
- 3 x AA battery
- USB connection cable

**Sensor:**

- Coating thickness sensor at choice
- Set of calibration standards including calibration foils and zero standard

## Accessories

- Manufacturers certificate (DIN 55350 M) for coating thickness gauge, sensor and calibration standards
- External trigger option for transfer of readings to the memory
- Precision support for serial measure-measurement and measurement of small objects
- Quick charger for NiMH rechargeable batteries

## Technical data

| | MiniTest 2500 | MiniTest 4500 |
|---|---|---|
| **Data memory**<br>- Total number of storable readings<br>- Max. number of batches<br>- number of application memories for batches with individual calibration<br>- number of batches per application memory for batches with identical calibration | <br>2.000.000<br>1<br>-<br><br>- | <br>2.000.000<br>more than 9500<br>99<br><br>99 |
| **Statistical functions (per batch)** | kvar, n, max., min.<br>kvar, n, max., min. | kvar, n, max., min., CP, CPK<br>kvar, n, max., min., CP, CPK |
| **Calibration** | Factory settings, zero and up to four calibration points | |
| | - | Calibration through coating if the base material is not accessible (CTC) |
| **Offset function** | - | for addition or subtraction of a constant value to / from the reading |
| **Limit settings (user definable) with monitoring function** | - | Optical and acoustical alert when a limit is exceeded |
| **Measuring units** | µm, mm, cm, mils, inch | |
| **Interface** | USB | USB and Bluetooth 4.0 |
| **Upgradeable interfaces** | - | alarm output, trigger for footswitch, RS 232 interface |
| **Power supply** | 3 x AA (LR06) batteries, USB | |
| **Operating time per battery set approx.** | 150 hours (illumination deactivated) | |
| **Norms and standards** | DIN EN ISO 1461, 2064, 2178, 2360, 2808, 3882; ISO 19840; ASTM B 244, B 499, D 7091, E376 | |
| **Display** | 53 x 46 mm, backlit | |
| **Operating temperature / Storage temperature** | –10 °C … 60 °C / –20 °C … 70 °C, 14°F … 140° C / -4° F … 158° F | |
| **Dimensions / Weight** | 153 mm x 89 mm x 36 mm (6” x 3.5” x 1.4”) / 320 g (0.7 lbs) (gauge incl. batteries), 90 g (0.2 lbs) rubber protection case | |
| **Protection class** | IP 65 | |

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163-N 05/2018 Specifications subject to change without notice