Advancing with Technology

ElektroPhysik

Messgeräte für Oberflächentechnik • Surface Testing Instruments

High precision thickness measurement

MiniTest FH

Rugged wall thickness gauge

- Measurement of non-ferrous materials up to 24mm thickness
- Suitable for all types of packaging such as bottles and containers made of glass and plastic
- As well as for composite materials, aluminium and titanium parts with complex geometries in aerospace and automotive production
- Exceptional accuracy through digital signal processing
- Direct data import into evaluation software
- AI-based quick calibration function



Precision gauges »Made in Germany« since 1947

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MiniTest FH

Wall thickness measurement made with precision

MiniTest FH is a portable measuring instrument for measurements up to 24 mm wall thickness. The ergonomic housing shape as well as the easy handling make the MiniTest FH the ideal measuring tool in production and in any quality lab.
The non-destructive gauge is intuitive to operate and achieves precise measurement results on all non-magnetic materials, regardless of size and shape. Even measurements on sharp edges, narrow diameters and / or complex geometries can be carried out easily with the FH gauge. Measurements with MiniTest FH provide information on wall thicknesses within a very short time and are thus indispensable for optimizing production. For example, in the production of PET bottles, adjusting a wall thickness that is too high to the target specification can lead to savings of several tons of material per year. Furthermore, compliance with minimum wall thicknesses to avoid rejects and possible complaints can also be improved with MiniTest FH as part of quality control.

Wide range of sensors for numerous applications

A selection of sensors with various measuring ranges, reference balls and wires and different designs is available to cover a wide range of measuring tasks.
All available sensors work with the SIDSP® method (sensor-integrated digital signal processing) and offer the highest accuracy by transmitting the already digitally processed measured values from the sensor to the evaluation unit.

Using the innovative quick calibration, a zero calibration for each sensor and ball diameter can be carried out within seconds by pressing one key in order to increase the accuracy of the measured values.

Data transfer

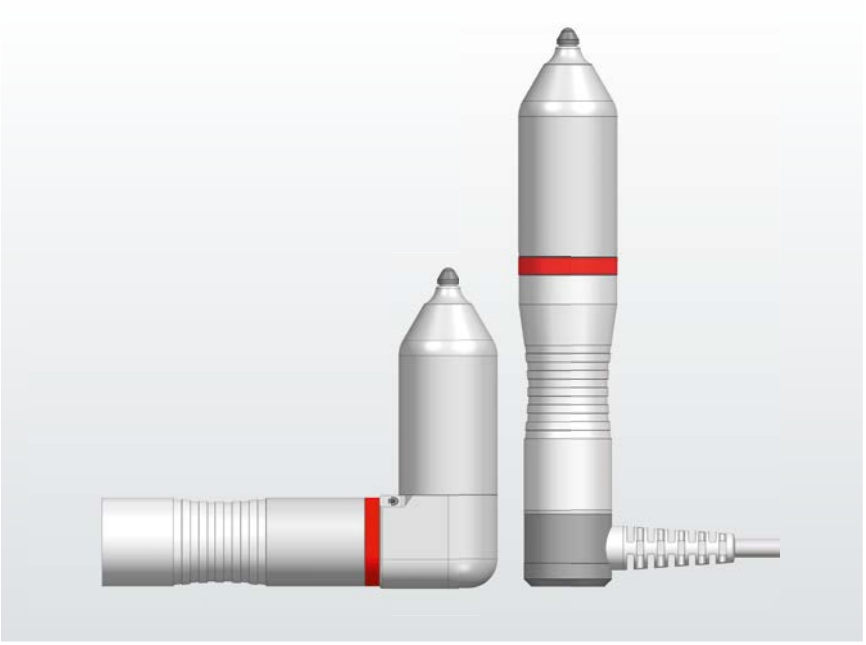
MiniTest FH offers various interfaces for data transfer to a PC or directly into a CAQ system: individual measured values as well as the entire statistics can be transferred via USB, RS232C or Bluetooth. As a special feature, MiniTest FH allows direct transfer of measured values to an Excel spreadsheet or other evaluation software via USB keyboard emulation.



MiniTest FH

Sensor FH4 / FH4-M

The FH4 sensor is the standard sensor for a wide range of applications in production and quality control: Wall thickness measurement of hollow bodies of all kinds, such as bottles, canisters, cosmetics containers, food packaging, non-ferritic components in the interior of automobiles or aircraft, tubes and hoses, composite components and much more. For wall thicknesses exceeding 6 mm, magnetic reference balls can be used, which increase the measuring range up to 9 mm.
In addition, the sensor is also available in a 90° angled version, in order to be able to measure points that are difficult to access or in the area of corners and angles and edges.



Technical data

Sensor type	FH4 and FH4-M			FH4-M additionnally	
Diameter of reference ball	1,5 mm	2,5 mm	4,0 mm	1,5 mm magnetic ball	3,0 mm magnetic ball
Measuring uncertainty* in range	0 … 2,0 mm	0 … 3,5 mm	0 … 6,0 mm	0 … 5,0 mm	0 … 9,0 mm
Factory calibration	± 10 µm + 3 %)*	± (15 µm + 3 %)*	± (30 µm + 3 %)*	Magnetic balls require at least a zero calibration.	
Zero calibration	± (5 µm + 1.5 %)*	± (8 µm + 1.5 %)*	± (15 µm + 1.5 %)*	± (30 µm + 3 %)*	± (20 µm + 2 %)*
Multiple point calibration	± (3 µm + 1 %)*	± (5 µm + 1 %)*	± (10 µm + 1 %)*	± (60 µm + 3 %)*	± (40 µm + 2 %)*
Dimensions	Sensor length 95.4 mm / Diameter 16.9 mm				

*referring to calibration using ElektroPhysik precision standards

Supply scope

Sensor type	FH4 and FH4-M			FH4-M additionnally	
Part no.	80-174-0600			80-174-0500	
Reference balls	100 target balls ø 1.5 mm	100 target balls ø 2.5 mm	50 target balls ø 4.0 mm	20 magnetic balls ø 1.5 mm	20 magnetic balls ø 3.0 mm
Zero calibration standard for ball diameter	1.5 mm	2.5 mm	4.0 mm	1.5 mm magnetic balls	3.0 mm magnetic balls
Precision standard with calibration values (approx.)	0.25 mm	1.0 mm	3.0 mm	8.0 mm	

Also see detailed information on delivery scope on last page.

MiniTest FH

Sensor FH4-1/FH4-Wire

Beyond the standard applications, the FH4 sensor is available in special versions that have been modified for special measuring tasks.
Especially in the medical sector, the measurement of small parts with often very narrow passage for the measuring balls is a frequent task, e.g. for the wall thickness measurement of tubes, artificial organs, stents, infusion sets etc. In these cases, the FH4-1 sensor type offers the possibility to measure wall thicknesses against a target ball of only 1 mm diameter.
Other applications exclude the use of measuring balls due to the risk of non-recoverability in the object to be measured - here the FH sensor offers a special variant that measures against a measuring wire instead of a ball. The FH4-Wire sensor is indispensable for testing turbine blades where the wall thickness can be determined against a wire inserted into the cooling holes.



FH4-1: Measuring in tight spots



FH4-WIRE: Measuring turbine components

Technical data

Sensor type	FH4-1		FH4-WIRE	
Diameter of reference ball	1.0 mm	For the use of the target balls 1.5 mm, 2.5 mm and 4.0 mm, the technical specifications of the standard sensor FH4 apply.	Target wire ø 0.66 mm	Target wire ø 1.15 mm
Measuring uncertainty* in range	0 … 1.3 mm		0 … 7.0 mm	0 … 13.0 mm
Factory calibration	± (10 µm + 3 %)*		± (10 µm + 3 %)*	± (15 µm + 3 %)*
Zero calibration	± (5 µm + 1.5 %)*		± (5 µm + 1.5 %)*	± (8 µm + 1.5 %)*
Multiple point calibration	± (3 µm + 1 %)*		± (3 µm + 1 %)*	± (5 µm + 1 %)*
Dimensions	Sensorlänge 95,4 mm / Durchmesser 16,9 mm			

*referring to calibration using ElektroPhysik precision standards

Supply scope

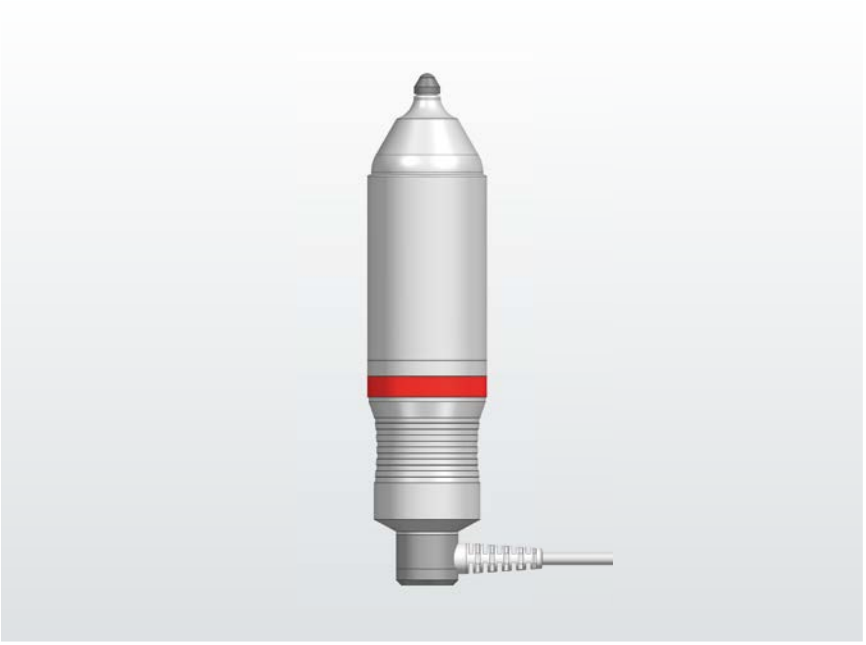
Sensor type	FH4-1				FH4-WIRE		
Part no.	80-174-0300				80-174-0300		
Reference balls	100 target balls ø 1.5 mm	100 target balls ø 2.5 mm	50 target balls ø 4.0 mm	100 target balls ø 1.0 mm	20 target wires ø 0.66 mm	10 target wires ø 1.15 mm	
Zero calibration standard for ball diameter	1.5 mm	2.5 mm	4.0 mm	1.0 mm	0.66 mm	1.15 mm	
Precision standard with calibration values (approx.)	0.25 mm	1.0 mm	3.0 mm	0.15 mm	1.0 mm	3.0 mm	8.0 mm

Also see detailed information on delivery scope on last page.

MiniTest FH

Sensor FH10 / FH10-M

Especially testing of larger lightweight components made of fibre composites such as GFRP and CFRP, which are used in mechanical engineering, automotive or aerospace, often requires the measurement of higher wall thickness. The standard version of the FH10 sensor offers a measuring range of up to 13mm, which the FH10-M sensor version can extend to 24mm using magnetic reference balls. Among others, the FH10 sensor is also indispensable for measuring the wall thickness of pipes and pipelines made of non-ferritic metals in pipeline construction as well as for the production of thick-walled glass bottles.



Technical data

Sensor type	FH10 and FH10-M			FH10-M additionally	
Diameter of reference ball	2.5 mm	4.0 mm	6.0 mm	4.0 mm magnetic ball	6.0 mm magnetic ball
Measuring uncertainty* in range	0 … 4.0 mm	0 … 7.0 mm	0 … 7.0 mm	0 … 16.0 mm	0 … 24.0 mm
Factory calibration	± 15 µm + 3 %)*	± (30 µm + 3 %)*	± (50 µm + 3 %)*	Magnetic balls require at least a zero calibration.	
Zero calibration	± (8 µm + 1.5 %)*	± (15 µm + 1.5 %)*	± (30 µm + 1.5 %)*	± (60 µm + 3 %)*	± (80 µm + 3 %)*
Multiple point calibration	± (5 µm + 1 %)*	± (10 µm + 1 %)*	± (20 µm + %)*	± (40 µm + 2 %)*	± (60 µm + 2 %)*
Dimensions	Sensor length 125.2 mm / Diameter 29.2 mm				

*referring to calibration using ElektroPhysik precision standards

Supply scope

Sensor type	FH10 and FH10-M				FH10-M additionally	
Part no.	80-175-0900				80-175-0600	
Reference balls	100 target balls ø 2.5 mm	50 target balls ø 4.0 mm	25 target balls ø 6.0 mm	10 target balls ø 9.0 mm	20 magnetic balls ø 4.0 mm	20 magnetic balls ø 6.0 mm
Zero calibration standard for ball diameter	2.5 mm	4.0 mm	6.0 mm	9.0 mm		
Precision standard with calibration values (approx.)	1.0 mm	3.0 m	8.0 mm		18.0 mm	

Also see detailed information on delivery scope on last page.

MiniTest FH

Sensor FH2 / FH2-M

With its smaller design, the FH2 sensor type has been specially designed for measurement at measuring points that are difficult to access. In particular, measurements can be taken on small components or complexly shaped components with recesses, grooves, ridges and profiles with the help of the narrow and extended sensor tip. The slim sensor shape also greatly simplifies wall thickness measurement in the production and quality control of cosmetic containers, which often feature decorative structures or embossing.



Technical data

Sensor type	FH2 and FH2-M			FH2-M additionally	
Diameter of reference ball	1.5 mm	2.5 mm	4.0 mm	1.5 mm	3.0 mm
Measuring uncertainty* in range	0 … 0.6 mm	0 … 1.3 mm	0 … 2.3 mm	0 … 2.0 mm	0 … 4.5 mm
Factory calibration	± (10 µm + 3 %)*	± (15 µm + 3 %)*	± (30 µm + 3 %)*	Magnetic balls require at least a zero calibration.	
Zero calibration	± (5 µm + 1.5 %)*	± (8 µm + 1.5 %)*	± (15 µm + 1.5 %)*	± (30 µm + 3 %)*	± (60 µm + 3 %)*
Multiple point calibration	± (3 µm + 1 %)*	± (5 µm + 1 %)*	± (10 µm + 1 %)*	± (20 µm + 2 %)*	± (40 µm + 2 %)*
Dimensions	Sensor length 105.9 mm / Diameter 15.2 mm on the handle sleeve; 10 mm in the front area				

*referring to calibration using ElektroPhysik precision standards

Supply scope

Sensor type	FH2 and FH2-M			FH2-M additionally	
Part no.	80-178-0000			80-178-0200	
Reference balls	100 target balls ø 1.5 mm	100 target balls ø 2.5 mm	50 target balls ø 4.0 mm	20 magnetic balls ø 1.5 mm	20 magnetic balls ø 3.0 mm
Zero calibration standard for ball diameter	1.5 mm	2.5 mm	4.0 mm	1.5 mm magnetic balls	3.0 mm magnetic balls
Precision standard with calibration values (approx.)	0.25 mm	0.5 mm	1.5 mm	3.0 mm	

Also see detailed information on delivery scope on last page.

MiniTest FH

Various sensor designs: Right-angle sensors and sensors with exchangeable sensor caps

A wide range of sensors to solve numerous applications

Depending on the geometry of the object to be measured, the design of the standard sensor may not be suitable for a measurement. In particular, for measuring points in hard-to-reach places and near corners and edges, versions in an angled 90° design are available for all sensors in the FH4 and FH2 series. ElektroPhysik measuring sensors for the FH unit are equipped with an extremely wear-resistant hard metal cap as standard. However, due to the high wear protection, the material is brittle and sensitive to impacts. Alternatively, a sensor version with a replaceable metal cap is available for applications that require punctual positioning by hand. This is less sensitive to impacts and can be unscrewed and replaced with a new one in case of wear.





MiniTest FH

General information

Advantages at a glance

- Wear-resistant sensor tips made of hard metal, alternatively exchangeable sensor tips.
- Menu-driven user interface. Data storage takes place in a PC-like database structure in which up to 2 million measured values can be stored in more than 200 folders and measurement series.
- Direct data import into evaluation software
- Robust housing with rubber protection and integrated stand in IP 65 design
- Quick calibration function (AI based)

Supply scope

- MiniTest FH basic unit
- Solid plastic case for transport and storage
- Sensor at choice including target balls or wires, zero and calibration caps as well as measuring support
- USB connection and charging cable



Detailed information on supply scope

A spring-loaded measuring stand is included in the scope of delivery of all sensors except 90° version. This is used to fix the sensor in an upright position and offers comfortable guiding of the object to be measured over the sensor tip to achieve precise results. In addition, reference spheres can be safely stored in the recesses at the base of the measuring stand.

Due to the magnetism emitted by the sensor, each sensor is supplied with a special protective cap and a shielding tube for transport. To prevent damage to the sensor from the impact of magnetically attracted objects, it is recommended that the sensor is always shielded by the protective cap when not in use. For any transport, the shielding tube must be used additionally.

Technical data

Measuring principle	Magnetostatic
Repeatability	Better than ± (1 µm + 0.5 % of reading)
Initial resolution	0.1 µm (FH2)
Calibration modes	Factory calibration, zero calibration, zero + 4 calibration points
Measuring units	Metric (µm, mm), imperial (mils, inch)
Statistical evaluation	Numerical, trend and histogram
Data logging rate	1, 2, 5, 10, 20 readings per second (selectable)
Data memory	2,000,000 readings storable in more than 200 batches
Interfaces	USB, Bluetooth, RS 232 C
Ambient temperature	-10°C … + 60°C (Storage temperature -20°C … + 80°C)
Supply	8 x NiMH AA batteries – charging via USB
Dimensions / Weight	19.5 x 12 x 5 cm / 775 g

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