Probes FD10 / D-FN-sm Data Sheet

Probe models	**FD10**	**D-FN-sm**
Part no.[1]	604-143	1006815

Measurement tasks

- **Coating thickness on steel or iron base material (FE)**; NC/FE or NF/FE
- **Coating thickness on non-ferrous metal base material (NF)**; NC/NF

Applications

Probe for measurements on virtually all metals. The probe works with two test methods and are therefore able to measure coating thicknesses on non-ferrous metals as well as on ferrous metals.

Note

Valid for all DUALSCOPE® instruments of the FMP series and FISCHERSCOPE® MMS® PC and FISCHERSCOPE® MMS® PC2: If the Dual mode with automatic base material recognition and automatic measurement method selection is switched off in the connected instrument, you can use either only the magnetic induction method or only the Eddy current method. This fixed method setting enables an increased measuring range.

Examples

Steel or iron base material (FE)

- Paint, varnish or plastic coatings on steel or iron (NC/FE)
- Copper, brass, zinc, tin and chrome coatings on steel or iron (NF/FE)
- Both electro-galvanized and hot galvanized coatings on steel or iron (NF/FE)

Non-ferromagnetic metal base materials (NF)

- Paint, varnish or plastic coatings on aluminium, copper or brass (NC/NF)

Features

- Preferably for measurements on smooth or polish surfaces
- No edge influence outside the touchdown area
- Wear resistant probe pole extends the operational readiness of the probe
- Probe model FD10 also available as digital probe (D-FN-sm), in which the measurement signal is already converted into the measured value directly in the probe
- Probe D-FN-sm: Humidity protection

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Non-ferromagnetic metal base materials (NF)

- The probes measure with a high-precision conductivity compensation developed by Helmut Fischer, so different electrical conductivities of the base material (particularly various aluminium alloys) have no effect on the coating thickness measurement.

Restriction

- Not suitable for measurements on rough (blasted) surfaces, in these cases use the probes FD13H and D-FN

Measuring ranges*

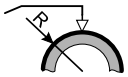
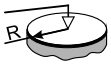
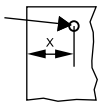
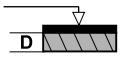
Steel or iron base material (FE)	**Non-ferromagnetic metal base materials (NF)**
0 ... 1300 µm (0 ... 51.18 mils) (DUAL mode)	0 ... 800 µm (0 ... 31.50 mils) (DUAL mode)
0 ... 1500 µm (0 ... 59.06 mils) (magnetic inductive method only)	0 ... 1200 µm (0 ... 47.24 mils) (Eddy current method only)

*

The values for measurement range, trueness, repeatability precision and measurement deviations are valid for electrically non-conductive coating materials on steel or iron (NC/FE). The values may differ for measurements on non-ferromagnetic coating materials (NF).	-

The specifications for trueness) and repeatability precision apply to ambient and specimen temperatures at the time of calibration. The values for trueness and repeatability may increase compared to the values specified here if the temperature during measurement differs from the temperature during calibration.

Probes FD10 / D-FN-sm

Trueness*	**Steel or iron base material (FE)**	**Non-ferromagnetic metal base materials (NF)**
based on Fischer factory calibration standards at 20 °C (68 °F) for specimen and ambient temperature(	0 ... 100 µm: ≤ 2 µm 100 ... 1000 µm: ≤ 2 % of nominal value 1000 ... 1500 µm: ≤ 3 % of nominal value (0 ... 3.94 mils: ≤ 0.08 mils) (3.94 ... 39.37 mils: ≤ 2 % of nominal value) (39.37 ... 59.06 mils: ≤ 3 % of nominal value)	0 ... 100 µm: ≤ 2 µm 100 ... 1000 µm: ≤ 2 % of nominal value 1000 ... 1200 µm: ≤ 3 % of nominal value (0 ... 3.94 mils: ≤ 0.08 mils) (3.94 ... 39.37 mils: ≤ 2 % of nominal value) (39.37 ... 47.24 mils: ≤ 3 % of nominal value)
Repeatability precision*	**Steel or iron base material (FE)**	**Non-ferromagnetic metal base materials (NF)**
based on Fischer factory calibration standards at 20 °C (68 °F) for specimen and ambient temperature	0 ... 60 µm: ≤ 0.3 µm 60 ... 1500 µm: ≤ 0.5 % of reading (0 ... 2.36 mils: ≤ 0.01 mils) (2.36 ... 59.06 mils: ≤ 0.5 % of reading)	0 ... 100 µm: ≤ 0.4 µm 100 ... 1200 µm: ≤ 0.4 % of reading (0 ... 3.94 mils: ≤ 0.02 mils) (3.94 ... 47.24 mils: ≤ 0.4 % of reading)
Influence*	**Steel or iron base material (FE)**	**Non-ferromagnetic metal base materials (NF)**
The following values are valid for a coating thickness with a nominal value of 75 µm (2.95 mils).		
Curvature (R), measurement deviation from nominal value with reference to a calibration on flat surface		
Measuring spot 	Measurement deviation ≥ 10 % for R ≤ 19 mm (R ≤ 0.75 ")	Measurement deviation ≥ 10 % for R ≤ 41 mm (R ≤ 1.61 ")
	FD10 probe needs a minimum of R = 25 mm (support stand necessary) (R = 0.98 ") D-FN probe needs a minimum of R = 29 mm (support stand necessary) (R = 1.14 ")	
Curvature (R), measurement deviation from nominal value with reference to a calibration on flat surface		
Measuring spot 	Measurement deviation ≥ 10 % for R ≤ 5 mm (R ≤ 0.2 ")	Measurement deviation ≥ 10 % for R ≤ 40 mm (R ≤ 1.57 ")
	Probe needs a minimum of R = 1 mm (support stand necessary) (R = 0.04 ")	
Edge distance (R), specification from probe tip center, measurement deviation from nominal value		
Measuring spot in the center of the circular surface 	No influence within the scope of trueness for R > 30 mm (R > 1.18 ") Measurement deviation ≥ 10 % for R ≤ 9 mm (R ≤ 0.35 ")	No influence within the scope of trueness for R > 6 mm (R > 0.24 ") Measurement deviation ≥ 10 % for R ≤ 1.6 mm (R ≤ 0.06 ")
	FD10 probe require a minimum of R = 7 mm (support stand necessary) (R = 0.28 ") D-FN probe requires a minimum of R = 8 mm (support stand necessary) (R = 0.32 ")	
Edge distance (X), specification from probe tip center, measurement deviation from nominal value		
Measuring spot = Probe pole center 	No influence within the scope of trueness for X > 6 mm (X > 0.24 ") Measurement deviation ≥ 10 % for X ≤ 0.6 mm (X ≤ 0.024 ")	No influence within the scope of trueness for X > 2 mm (X > 0.08 ") Measurement deviation ≥ 10 % for X ≤ 1 mm (X ≤ 0.39 ")
Base material thickness (D), measurement deviation from nominal value		
Measuring spot 	Measurement deviation ≥ 10 % for D ≤ 0.4 mm (D ≤ 0.016 ")	**Base material Aluminium** Measurement deviation ≥ 10 % for D ≤ 0.1 mm (D ≤ 0.039 ")
Base material	-	**Non-ferromagnetic metal base materials (NF)** Influence of the el. conductivity of the base material (NF) in the range from 30 to 100 % IACS: Measurement deviation ≤ 3 % valid for the total measurement range.
Admissible ambient temperature at operation	-10 °C ... +40 °C (+14 °F ... +104 °F)	
Admissible specimen temperature	max. +40 °C (+104 °F)	

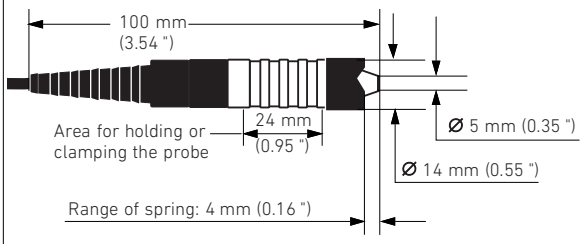
Probes FD10 / D-FN-sm

Probe design

FD10 probe
Single pole axial probes with spring-loaded measuring system

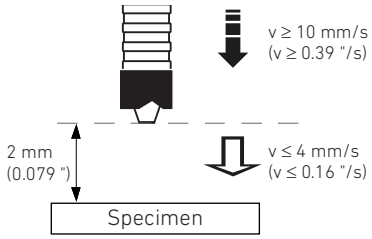
Probe pole tip
- Wear-resistant
- Material: hard metal
- Radius: 0.6 mm (0.024 ")
- Not replaceable

Dimensions



Probe cable length: 1.5 m (59.06 "), other cable lengths on request[1]
Bending radius: ≥ 30 mm (1.18 ")

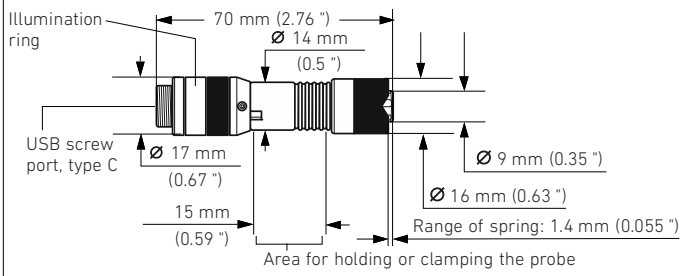
Approach and touchdown speed for automated measurement



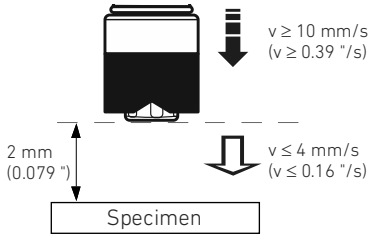
Lift-off distance between 2 measurements ≥ 4,5 mm (≥ 0.18 ")

D-FN-sm probe
- Single pole axial probes with spring-loaded measuring system
- Humidity protection

Probe pole tip
- Wear-resistant
- Material: hard metal
- Radius: 2 mm (0.079 ")
- Not replaceable



Probe cable length: 1.5 m (59.06 "), other cable lengths on request[1]
Bending radius: ≥ 30 mm (1.18 ")



Lift-off distance between 2 measurements ≥ 4,5 mm (≥ 0.18 ")

	Steel or iron base material (FE)	**Non-ferromagnetic metal base materials (NF)**
Measuring method	Magnetic induction test method according to ISO 2178, ASTM D7091	Amplitude-sensitive eddy current test method according to ISO 2360, ASTM D7091
Calibration – Calibration foils	**Steel or iron base material (FE)**	**Non-ferromagnetic metal base materials (NF)**

The specifications for trueness and repeatability precision only apply to a very narrow coating thickness range around the specified foil thickness for a 1-point calibration and for a 2-point calibration only for the coating thickness range limited by the thicknesses of the two calibration foils.

Lower measurement range	0 ... 600 µm (0 ... 23.6 mils)	0 ... 600 µm (0 ... 23.6 mils)
Use following foil thickness(es) for calibration	1-point calibration: 1 foil up to ca. 600 µm (23.6 mils) 2-point calibration: 2 foils up to ca. 600 µm (23.6 mils)	1-point calibration: 1 foil up to ca. 600 µm (23.6 mils) 2-point calibration: 2 foils up to ca. 600 µm (23.6 mils)
Upper measurement range	as from 400 µm (15.75 mils)	as from 400 µm (15.75 mils)
Use following foil thickness(es) for calibration	1-point calibration: not recommended 2-point calibration: foil 1 ca. 400 µm (15.75 mils); foil 2 ca. 1000 µm (39.37 mils)	1-point calibration: not recommended 2-point calibration: foil 1 ca. 400 µm (15.75 mils); foil 2 ca. 800 µm (31.5 mils)

Probes work with

FD10 (analog probe)
- Hand-held instruments: all DUALSCOPE® instruments of the FMP series and also all DUALSCOPE® instruments of the DMP series by using DMP-F-Probe-Adapter (1007336)
- Bench top instruments: FISCHERSCOPE® MMS® PC and FISCHERSCOPE® MMS® PC2 both with PERMASCOPE® F-Probe module (604-293, 12-pin connecting socket)

D-FN-sm (digital probe)
- Hand-held instruments: all DUALSCOPE® instruments of the DMP series

Scope of delivery
- All: Probe with connecting cable, calibration foil sets 605-413 (metal plate NF/FE for instrument check, 2 calibration foils with thicknesses of approx. 9 µm (0.35 mils) (CuBe) and 125 µm (4.92 mils)) and 605-415 (metal plate NC/NF for instrument check, 2 calibration foils with thicknesses of approx. 24 µm (0.95 mils) and 250 µm (9.84 mils))
- FD10, additional: prism adapter for measurements on pipes and bars
- D-FN-sm: probe connecting cable with screwable USB C plugs

Probes FD10 / D-FN-sm

Options	■ Calibration foils: various foil thicknesses are available up to 1000 µm ((47.24 mils) for steel or iron base material (FE)) and up to 800 µm ((31.5 mils) for non-ferromagnetic metal base materials (NF)); suitable calibration foil thicknesses are specified in section Calibration – Calibration foils ■ Manufacturer Certificate M according to DIN 55350-18 (only in connection with measuring instrument) ■ Support stand V12 BASE, 604-420, with mechanical probe lowering device; FD10: suitable probe clamp 602-370 included in support stand delivery D-FN-sm: suitable probe clamp 600-213 ■ Support stand V12 MOT, 604-374, with motorized probe lowering device for highest repeatability; FD10: suitable probe clamp 602-370 included in support stand delivery D-FN-sm: suitable probe clamp 600-213

[1] *Probes with special cable lengths have own part no. and probe model names. This data sheet also applies to these probes.*
Probe D-FN-sm: max. cable length 3 m (118 "), it is not allowed to use a USB extension cable to connect probe to instrument!

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