

Probes FD10 / D-FN-sm

Data Sheet



Probe models	FD10	D-FN-sm
Part no. ¹	604-143	1006815
Measurement tasks	<ul style="list-style-type: none"> ■ 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) <ul style="list-style-type: none"> ■ 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-ferrous metal base materials (NF) <ul style="list-style-type: none"> ■ Paint, varnish or plastic coatings on aluminium, copper or brass (NC/NF)
Features	<ul style="list-style-type: none"> ■ 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 	Non-ferrous metal base materials (NF) <ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ 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) 0 ... 1300 µm (0 ... 51.18 mils) (DUAL mode) 0 ... 1500 µm (0 ... 59.06 mils) (magnetic inductive method only)	Non-ferrous metal base materials (NF) 0 ... 800 µm (0 ... 31.50 mils) (DUAL mode) 0 ... 1200 µm (0 ... 47.24 mils) (Eddy current method only)
*	<p>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-ferrous coating materials (NF).</p> <p>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.</p>	

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Trueness*

based on Fischer factory calibration standards at 20 °C (68 °F) for specimen and ambient temperature

Steel or iron base material (FE)

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)

Non-ferrous metal base materials (NF)

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*

based on Fischer factory calibration standards at 20 °C (68 °F) for specimen and ambient temperature

Steel or iron base material (FE)

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)

Non-ferrous metal base materials (NF)

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*

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



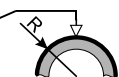
Measurement deviation ≥ 10 % for
 R ≤ 19 mm (R ≤ 0.75 ")

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 ")

Measurement deviation ≥ 10 % for
 R ≤ 41 mm (R ≤ 1.61 ")

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 ")

Probe needs a minimum of R = 1 mm (support stand necessary) (R = 0.04 ")

Measurement deviation ≥ 10 % for
 R ≤ 40 mm (R ≤ 1.57 ")

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 ")

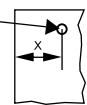
FD10 probe require a minimum of R = 7 mm (support stand necessary) (R = 0.28 ")
 D-FN probe requires a minimum of R = 8 mm (support stand necessary) (R = 0.32 ")

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 ")

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-ferrous 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.

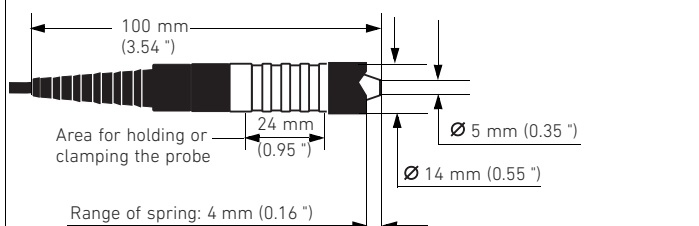
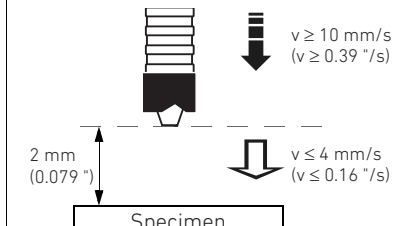
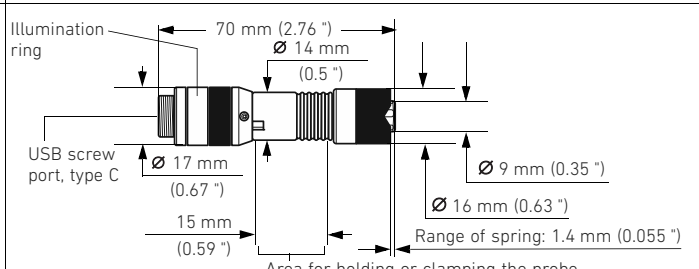
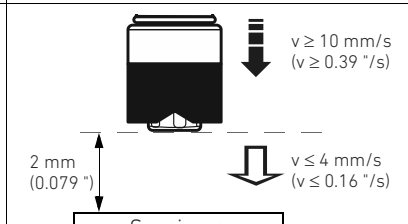
Admissible ambient temperature at operation

-10 °C ... +40 °C (+14 °F ... +104 °F)

Admissible specimen temperature

max. +40 °C (+104 °F)

Probes FD10 / D-FN-sm

<p>Probe design</p> <p>FD10 probe Single pole axial probes with spring-loaded measuring system</p> <p>Probe pole tip</p> <ul style="list-style-type: none"> wear-resistant material: hard metal radius: 0.6 mm (0.024 ") not replaceable 	<p>Dimensions</p>  <p>Probe cable length: 1.5 m (59.06 "), other cable lengths on request¹ Bending radius: ≥ 30 mm (1.18 ")</p>	<p>Approach and touchdown speed for automated measurement</p>  <p>Lift-off distance between 2 measurements $\geq 4,5$ mm (≥ 0.18 ")</p>
<p>D-FN-sm probe</p> <ul style="list-style-type: none"> Single pole axial probes with spring-loaded measuring system Humidity protection <p>Probe pole tip</p> <ul style="list-style-type: none"> wear-resistant material: hard metal radius: 2 mm (0.079 ") not replaceable 	<p>Dimensions</p>  <p>Probe cable length: 1.5 m (59.06 "), other cable lengths on request¹ Bending radius: ≥ 30 mm (1.18 ")</p>	 <p>Lift-off distance between 2 measurements $\geq 4,5$ mm (≥ 0.18 ")</p>
<p>Measuring method</p>	<p>Steel or iron base material (FE)</p> <p>Magnetic induction test method according to ISO 2178, ASTM D7091</p>	<p>Non-ferrous metal base materials (NF)</p> <p>Amplitude-sensitive eddy current test method according to ISO 2360, ASTM D7091</p>
<p>Calibration – Calibration foils</p> <p>1-Point calibration</p> <p>Use following foil thickness for calibration</p>	<p>Steel or iron base material (FE)</p> <p><i>The 1-Point-Calibration is practicably in the lower measuring range only. This calibration method provides the best measuring accuracy in a small coating thickness range close by the stated foil thickness.</i></p> <p>max. 600 μm (32.6 mils)</p>	<p>Non-ferrous metal base materials (NF)</p> <p>max. 600 μm (32.6 mils)</p>
<p>2-Point calibration</p> <p>Use following foil thickness pairings for calibration</p>	<p><i>The calibration using two calibration foils provides on the one hand the best measuring accuracy in the coating thickness range limited by the two foil thicknesses and on the other hand two calibration foils are necessary for calibrating the upper measurement range.</i></p> <p>Foil 1: ≤ 350 μm (13.9 mils); Foil 2: ≥ 600 μm (32.6 mils)</p>	<p>Foil 1: ≤ 450 μm (17.7 mils); Foil 2: ≥ 600 μm (32.6 mils)</p>
<p>Probes work with</p> <p>FD10 (analog probe)</p>	<ul style="list-style-type: none"> 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) 	
<p>D-FN-sm (digital probe)</p>	<ul style="list-style-type: none"> Hand-held instruments: all DUALSCOPE[®] instruments of the DMP series 	
<p>Scope of delivery</p>	<ul style="list-style-type: none"> 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 	

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Probes FD10 / D-FN-sm

Options

- Calibration foils: various foil thickness are available up to 1200 μm (47.24 mils); 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 not allowed to use a USB connection cable to connect probe to instrument!

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