Probes FGB2 / D-F-t5ro Data Sheet

Probe models	**FGB2**	**D-F-t5ro**
Part no.[1]	604-179	1007025
Measurement task	**Coating thickness on steel or iron base material (FE)**; NC/FE or NF/FE	
Applications	Measuring the thickness of electrically non-conductive as well as of non-ferromagnetic metallic coatings on steel or iron base material (NC/FE and NF/FE).	
Examples	■ Paint, varnish or plastic coatings on steel or iron (NC/FE) ■ Copper, brass, zinc, tin and chrome coatings on steel or iron (NF/FE) ■ Non-steel cladding coatings on steel or iron (NF/Fe)	
Features	■ Well suited for measuring thick coatings on flat surfaces ■ Excellently suited for measurements on rough surfaces, measurements on smooth surfaces are of course also possible ■ Temperature-resistant design, thus excellently suited for alternating measurements on specimens with surface temperature up to +80 °C (+176 °F); minimal temperature drift, ca. 1 µm at +80 °C (0.039 mils at +176 °F). ■ Probe model FGB2 also available as digital probe (D-F-t5ro)	
Restriction	■ Less suitable for measurements on convex curved surfaces ■ Strong edge influence	
*	*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).* *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.*	
Measuring range*	0 ... 5 mm (0 ... 0.2 ")	
Trueness*	**Steel or iron base material (FE)**	
based on Fischer factory calibration standards at 20 °C (68 °F) for specimen and ambient temperature	0 ... 0.1 mm: ≤ 0.0015 mm (≤ 1.5 µm) 0.1 ... 3.0 mm: ≤ 1.5 % of nominal value 3.0 ... 5.0 mm: ≤ 5 % of nominal value	(0 ... 0.0039 ": ≤ 0.00006 " (≤ 0.059 mils)) (0.0039 ... 0.118 ": ≤ 1.5 % of nominal value) (0.118 ... 0.197 ": ≤ 5 % of nominal value)
Repeatability precision*	**Steel or iron base material (FE)**	
based on Fischer factory calibration standards at 20 °C (68 °F) for specimen and ambient temperature	0 ... 0.1 mm: ≤ 0.0003 mm (≤ 0.3 µm) 0.1 ... 3.0 mm: ≤ 0.3 % of reading 3.0 ... 5.0 mm: ≤ 0.5 % of reading	(0 ... 0.0039 ": ≤ 0.00006 " (≤ 0.059 mils)) (0.0039 ... 0.118 ": ≤ 1.5 % of reading) (0.118 ... 0.197 ": ≤ 5 % of reading)
Influence*	**Steel or iron base material (FE)**	

The following values are valid for a coating thickness with a nominal value of 0.2 mm (0.0079 ").
The quantity of influences are stated with the expanded measurement uncertainty U with the expanded factor of k = 2 (defines an interval with the confidence level of 95.45 %) – according to ISO/IEC Guide 98-3:2008-09 "Guide to the expression of uncertainty in measurement"

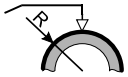
Curvature (R), measurement deviation from nominal value with reference to a calibration on flat surface

Measuring spot

No influence within the scope of trueness from R = 123 mm ± 9 mm (R = 4.84 " ± 0.35 ")
Measurement deviation of 10 % for R = 18 mm ± 1.2 mm (R = 0.71 " ± 0.047 ")
Probe needs a minimum of R = 15 mm (support stand necessary) (R = 0.59 ")

Curvature (R), measurement deviation from nominal value with reference to a calibration on flat surface

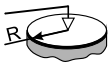
Measuring spot



No influence within the scope of trueness from R = 73 mm ± 4.3 mm (R = 2.87 " ± 0.17 ")
Measurement deviation of 10 % for R = 11 mm ± 0.6 mm (R = 0.43 " ± 0.024 ")
Probe needs a minimum of R = 1 mm (support stand necessary) (R = 0.039 ")

Edge distance (R), specification from probe tip center, measurement deviation from nominal value

Measuring spot in the center of the circular surface



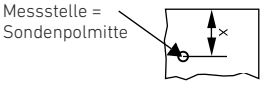
No influence within the scope of trueness from R = 15.6 mm ± 0.24 mm (R = 0.61" ± 0.0094 ")
Measurement deviation of 10 % for R = 9.4 mm ± 0.15 mm (R = 0.37 " ± 0.006 ")
Probe needs a minimum of R = 5 mm (support stand necessary) (R = 0.07 ")

Probes FGB2 / D-F-t5ro

Influence*	**Steel or iron base material (FE)**

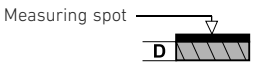
The following values are valid for a coating thickness with a nominal value of 0.2 mm (0.0079 ").
The quantity of influences are stated with the expanded measurement uncertainty U with the expanded factor of k = 2 (defines an interval with the confidence level of 95.45 %) – according to ISO/IEC Guide 98-3:2008-09 "Guide to the expression of uncertainty in measurement"

Edge distance (X), specification from probe tip center, measurement deviation from nominal value



No influence within the scope of trueness from X = 6.8 mm ± 1 mm (X = 0.268 " ± 0.039 ")
Measurement deviation of 10 % for X = 1.2 mm ± 0.1 mm (X = 0.0472 " ± 0.0039 ")

Base material thickness (D), measurement deviation from nominal value



No influence within the scope of trueness from D = 1.3 mm ± 0.2 mm (D = 0.051 " ± 0.0079 ")
Measurement deviation of 10 % for D = 0.56 mm ± 0.016 mm (D = 0.022 " ± 0.0006 ")

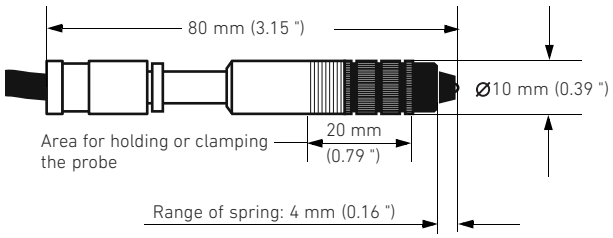
Base material	Influence on base material (FE) permeability in regard to Fischer calibration standards (master calibration): No influence within the scope of trueness from ferrite content of 135.5 FN ± 0.1 FN Measurement deviation of 10 % for ferrite content of 109.8 FN ± 0.3 FN
Admissible ambient temperature at operation	-10 °C ... +40 °C (+14 °F ... +104 °F)
Specimen temperature	Temporary max. +80 °C (max. +176 °F); dwell time on heated surface: max.1 s and dwell time in air: min. 5 s

Probe design

Single pole axial probes with spring-loaded measuring system

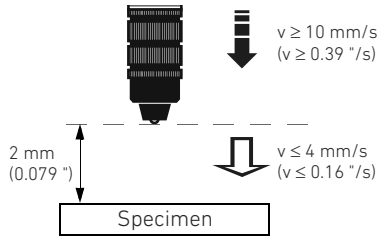
Probe pole tip
- wear-resistant
- material: CVD coated steel
- radius: 1 mm (39.37 mils)
- replaceable by Fischer service center

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 ≥ 20 mm (≥ 0.79 ")

Measuring method	Magnetic induction test method according to ISO 2178, ASTM D7091	
Calibration – Calibration foils	1-Point calibration *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.*	2-Point calibration *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.*
Use following foil thickness (pairings) for calibration	max. 1200 µm (47.2 mils)	Foil 1: ≤ 800 µm (31.5 mils); Foil 2: ≥ 1500 µm (59.1 mils)

Probes work with following instruments

FGB2 (analog probe)	■ Hand-held instruments: all DUALSCOPE® and DELTASCOPE® instruments of the FMP series and also all DUALSCOPE® and DELTASCOPE® 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-F-t5ro (digital probe)	■ Hand-held instruments: all DUALSCOPE® and DELTASCOPE® instruments of the DMP series
Scope of delivery	Probe with connecting cable, prism adapter for measurements on pipes and bars, calibration foil set 602-446 (metal plate NF/FE for instrument check, 2 calibration foils with thicknesses of approx. 0.75 mm (0.03 ") and 1 mm (0.039 "))
Options	■ Calibration foils: various foil thickness are available up to 3000 µm (118.1 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; suitable probe clamp 602-370 included in support stand delivery ■ Support stand V12 MOT, 604-374, with motorized probe lowering device for highest repeatability; suitable probe clamp 602-370 included in support stand delivery

[1] *Probes with special cable lengths have own part no. and probe model names. This data sheet also applies to these probes.*
Probe D-F-t5ro: max. cable length 3 m (118 "), it not allowed to use a USB connection cable to connect probe to instrument!