



Probe model	FD13H	
Part no. ¹	604-508	
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. Because of the large pole tip the probe is also well suited for measurements on rough (blasted) surfaces.	
Examples	Steel or iron base materials (Fe) • Paint, varnish, rubber or plastic coatings on steel, iron or cast iron (Iso/Fe) • Chrome or copper coatings on steel or iron (NF/Fe) • Both electro-galvanized and hot galvanized coatings on steel, iron or cast iron (NF/Fe)	Non-ferrous metal base materials (NF) • Paint, varnish or plastic coatings on aluminium, copper or brass (NC/NF) <i>The probes feature a patented conductivity compensation. So that the different electrical conductivities of e.g. various aluminium alloys have no effect of the coating thickness measurement.</i>
Probe design	• Axial single tip probe with spring-loaded measuring system • Robust probe design with wear-resistant probe tip	
Applications	Steel or iron base materials (Fe) NC/Fe or NF/Fe	Non-ferrous metal base materials (NF) NC/NF
*	<i>The values for measurement range, trueness, repeatability precision and measurement errors 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).</i>	
Measurement ranges*	Steel or iron base materials (Fe) 0 ... 2000 µm / 0 ... 78.74 mils	Non-ferrous metal base materials (NF) 0 ... 2000 µm / 0 ... 78.74 mils
Trueness*	Steel or iron base materials (Fe) 0 ... 75 µm: ≤ 1.5 µm 75 ... 1000 µm: ≤ 2 % of nominal value 1000 ... 2000 µm: ≤ 3 % of nominal value 0 ... 2.95 mils: ≤ 0.06 mils 2.95 ... 39.37 mils: ≤ 2 % of nominal value 39.37 ... 78.74 mils: ≤ 3 % of nominal value	Non-ferrous metal base materials (NF) 0 ... 50 µm: ≤ 1 µm 50 ... 1000 µm: ≤ 2 % of nominal value 1000 ... 2000 µm: ≤ 3 % of nominal value 0 ... 1.97 mils: ≤ 0.039 mils 1.97 ... 39.37 mils: ≤ 2 % of nominal value 39.37 ... 78.74 mils: ≤ 3 % of nominal value
Repeatability precision*	Steel or iron base materials (Fe) based on factory calibration standards of the Helmut Fischer GmbH, 5 single readings per standard 0 ... 50 µm: ≤ 0.25 µm 50 ... 2000 µm: ≤ 0.5 % of reading 0 ... 1.97 mils: ≤ 0.0098 mils 1.97 ... 78.74 mils: ≤ 0.5 % of reading	Non-ferrous metal base materials (NF) 0 ... 100 µm: ≤ 0.5 µm 100 ... 2000 µm: ≤ 0.5 % of reading 0 ... 3.94 mils: ≤ 0.02 mils 3.94 ... 78.74 mils: ≤ 0.5 % of reading
Influences*	Steel or iron base materials (Fe) The following values are valid for a reference coating thickness of 75 µm / 2.95 mils. The measurement errors 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 DIN V ENV 13005 "Leitfaden zur Angabe der Unsicherheit beim Messen" (Guide to the expression of uncertainty in measurement).	Non-ferrous metal base materials (NF)
Curvature (R), measurement with reference to master calibration on flat surface	 Measurement error of 10 % for R = 28 mm ± 1.6 mm / R = 1.10 " ± 0.063 " Probe needs a minimum of R = 25 mm (support stand necessary) / R = 0.98 "	Measurement error of 10 % for R = 110 mm ± 5.6 mm / R = 4.33 " ± 0.22 " Probe needs a minimum of R = 25 mm (support stand necessary) / R = 0.98 "

Influences*

Steel or iron base materials (Fe)

Non-ferrous metal base materials (NF)

The following values are valid for a reference coating thickness of 75 μm / 2.95 mils.

The measurement errors 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 DIN V ENV 13005 "Leitfaden zur Angabe der Unsicherheit beim Messen" (Guide to the expression of uncertainty in measurement).

Curvature (R), measurement with reference to master calibration on flat surface

Measuring spot

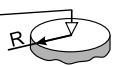


Measurement error of 10 % for
 $R = 16 \text{ mm} \pm 1.2 \text{ mm}$ / $R = 0.63 \text{ "} \pm 0.047 \text{ "}$
 Probe needs a minimum of $R = 1.5 \text{ mm}$ (support stand necessary) / $R = 0.06 \text{ "}$

Measurement error of 10 % for
 $R = 92 \text{ mm} \pm 3.4 \text{ mm}$ / $R = 3.62 \text{ "} \pm 0.13 \text{ "}$
 Probe needs a minimum of $R = 1.5 \text{ mm}$ (support stand necessary) / $R = 0.06 \text{ "}$

Edge distance (R), specification from probe pole center

Measuring spot in the center of the circular surface



No measurement error as of
 $R = 11.5 \text{ mm} \pm 0.3 \text{ mm}$ / $R = 0.45 \text{ "} \pm 0.012 \text{ "}$
 Measurement error of 10 % for $R = 6.4 \text{ mm} \pm 0.3 \text{ mm}$ / $R = 0.25 \text{ "} \pm 0.012 \text{ "}$
 Probe needs a minimum of $R = 2.5 \text{ mm}$ (support stand necessary) / $R = 0.098 \text{ "}$

No measurement error as of $R = 3.2 \text{ mm} \pm 0.2 \text{ mm}$ / $R = 0.13 \text{ "} \pm 0.0079 \text{ "}$
 Measurement error of 10 % for $R = 2.4 \text{ mm} \pm 0.04 \text{ mm}$ / $R = 0.094 \text{ "} \pm 0.0016 \text{ "}$
 Probe needs a minimum of $R = 1.7 \text{ mm}$ (support stand necessary) / $R = 0.067 \text{ "}$

Edge distance (X), specification from probe pole center

Measuring spot



No measurement error as of
 $X = 3.6 \text{ mm} \pm 0.3 \text{ mm}$ / $X = 0.14 \text{ "} \pm 0.012 \text{ "}$
 Measurement error of 10 % for $X = 1.0 \text{ mm} \pm 0.05 \text{ mm}$ / $X = 0.039 \text{ "} \pm 0.002 \text{ "}$

No measurement error as of
 $X = 2.2 \text{ mm} \pm 0.05 \text{ mm}$ / $X = 0.087 \text{ "} \pm 0.002 \text{ "}$
 Measurement error of 10 % for $X = 1.9 \text{ mm} \pm 0.04 \text{ mm}$ / $X = 0.075 \text{ "} \pm 0.0016 \text{ "}$

Base material thickness (D)

Measuring spot



No measurement error as of
 $D = 1.0 \text{ mm} \pm 0.1 \text{ mm}$ / $D = 39.4 \text{ mils} \pm 3.94 \text{ mils}$
 Measurement error of 10 % for
 $D = 0.5 \text{ mm} \pm 0.03 \text{ mm}$ / $D = 19.7 \text{ mils} \pm 1.18 \text{ mils}$

Base material Aluminium

No measurement error as of
 $D = 0.1 \text{ mm} \pm 0.01 \text{ mm}$ / $D = 3.94 \text{ mils} \pm 0.39 \text{ mils}$
 Measurement error of 10 % for
 $D = 0.02 \text{ mm} \pm 0.001 \text{ mm}$ / $D = 0.79 \text{ mils} \pm 0.039 \text{ mils}$

Base material

Steel or iron base materials (Fe)

Influence of the permeability of the base material (Fe) with reference to Fischer calibration standards (master calibration): No measurement error for a ferrite content from 137 FN $\pm$ 0.2 FN onwards. Measurement error of 10 % for ferrite content of 123 FN $\pm$ 0.8 FN.

Non-ferrous metal base materials (NF)

Influence of the el. conductivity of the base material (NF) in the range from 30 to 100 % IACS: deviation of the coating thickness is $\leq 2 \%$, valid for the total measurement range.

Admissible ambient temperature at operation

-10 $^{\circ}\text{C}$... +40 $^{\circ}\text{C}$ / +14 $^{\circ}\text{F}$... +104 $^{\circ}\text{F}$

Admissible specimen temperature

max +40 $^{\circ}\text{C}$ / +104 $^{\circ}\text{F}$

Probe tip material

Hard metal

Probe tip replaceable

No

Probe tip radius

2 mm / 0.079 "

Measuring methods

Magnetic induction method according to ISO 2178, ASTM D7091

Amplitude sensitive eddy current method according to ISO 2360, ASTM D7091

Scope of supply

Probe, metal plates ISO/NF and NF/FE for instrument check, calibration foil sets 605-413 and 605-415, prism adapter for measurements on pipes and bars

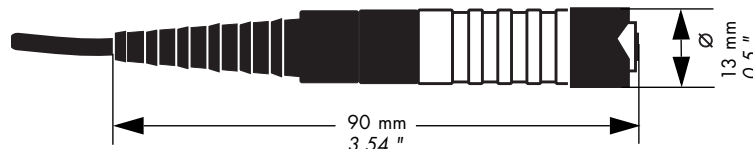
Option

Adapter for support stand: 600-173, is supplied by default with the support stand

Instruments

All DUALSCOPE[®] hand-held instruments of the series FMP and FISCHERSCOPE[®] MMS[®] PC2 with F-Module PERMASCOPE[®]

Dimensions



Cable length: 1.5 m / 59.06 ", other cable lengths on request¹

¹ FD13H probes with special cable lengths have own part no. and probe model names. This data sheet is also valid for these probes.