



Probe model	<b>FD13H</b>	
Part no. <sup>1</sup>	<b>604-508</b>	
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	<b>Steel or iron base materials (Fe)</b> <ul style="list-style-type: none"> <li>• Paint, varnish, rubber or plastic coatings on steel, iron or cast iron (Iso/Fe)</li> <li>• Chrome or copper coatings on steel or iron (NF/Fe)</li> <li>• Both electro-galvanized and hot galvanized coatings on steel, iron or cast iron (NF/Fe)</li> </ul>	<b>Non-ferrous metal base materials (NF)</b> <ul style="list-style-type: none"> <li>• Paint, varnish or plastic coatings on aluminium, copper or brass (NC/NF)</li> </ul> <p><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></p>
Probe design	<ul style="list-style-type: none"> <li>• Axial single tip probe with spring-loaded measuring system</li> <li>• Robust probe design with wear-resistant probe tip</li> </ul>	
Applications	<b>Steel or iron base materials (Fe)</b> NC/Fe or NF/Fe	<b>Non-ferrous metal base materials (NF)</b> 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*	<b>Steel or iron base materials (Fe)</b> 0 ... 2000 µm / 0 ... 78.74 mils	<b>Non-ferrous metal base materials (NF)</b> 0 ... 2000 µm / 0 ... 78.74 mils
Trueness*	<b>Steel or iron base materials (Fe)</b> 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	<b>Non-ferrous metal base materials (NF)</b> 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*	<b>Steel or iron base materials (Fe)</b> 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	<b>Non-ferrous metal base materials (NF)</b> 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*	<b>Steel or iron base materials (Fe)</b>	<b>Non-ferrous metal base materials (NF)</b>
<p>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).</p>		
Curvature (R), measurement with reference to master calibration on flat surface		
Measuring spot	<p>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 "</p>	<p>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 "</p>

Influences*	<b>Steel or iron base materials (Fe)</b>	<b>Non-ferrous metal base materials (NF)</b>
<p>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).</p>		
Curvature (R), measurement with reference to master calibration on flat surface		
	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		
	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		
	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)		
	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 $D = 0.5 \text{ mm} \pm 0.03 \text{ mm} / D = 19.7 \text{ mils} \pm 1.18 \text{ mils}$	<b>Base material Aluminium</b> 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	<b>Steel or iron base materials (Fe)</b>	<b>Non-ferrous metal base materials (NF)</b>
	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 ± 0.2 FN onwards. Measurement error of 10 % for ferrite content of 123 FN ± 0.8 FN.	Influence of the el. conductivity of the base material (NF) in the range from 30 to 100 % IACS: deviation of the coating thickness is ≤ 2 %, 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	
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 request <sup>1</sup>

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