Standard Probe Program
for Coating Thickness Measurements

Catalog 2012

High-Precision Probes

The heart of any electromagnetic measurement system is the probe; the quality of its signal ultimately determines the overall quality of the metrological solution. The probe is a very complex system, which performs the conversion of the appropriate measuring method: In this case the coating thickness is transformed into an electrical signal (count rate, frequency, voltage) in order to display the value of the coating thickness in the instrument display.

Note

This document describes probes with electromagnetic measuring methods, which are most frequently used for coating thickness measurement. FISCHER also offers probes for material testing, e.g. for measuring the electrical conductivity or for the determination of the ferrite content. You can find a description of these probes for material testing in the documents of the corresponding measuring instruments.

Quality monitoring on engine pistons after the manufacturing process using the FTA3.3H probe

Solutions for individual measurement tasks

We offer the ideal probe for each individual measurement task. FISCHER engineers develop customer-specific probe constructions on demand, like the cavity probe V3FGA06H. This probe was specially designed for non-destructive measurements of EPD coatings within the box section of auto bodies - without having to cut the auto body itself.

Auto body in section to show how the probe measures the EPD coating within the auto body

Measuring with the internal probe FAI3.3-150

The extensive selection of FISCHER probes is as versatile as the measurement applications of our customers. After years of continuous development and innovation, the FISCHER probe program now encompasses some 100 probes designed to ensure optimal results for the widest range of measurement applications.

Probe selection based on several criteria

- Material combination of coating and base material
- Thickness of coating and base material
- Dimension of the measurement area
- Shape of the specimen
- Surface condition of the measurement area

Call us.

We are happy to consult you on the matter of choosing the right probe for your individual application.

ISO 9001

In keeping highest standards of quality and customer satisfaction, all members of the FISCHER Group are certified according to ISO 9001.

FISCHER Germany is accredited as a DAkkS calibration lab for the measured quantity "mass per unit area" according to DIN EN ISO/IEC 17025.

Content

Features

- ☐ Robust
  FISCHER probes are extremely robust and wear-resistant – they deliver precise measurements over a long period of time even on hard surfaces and after millions of uses.
- ☐ In-house development and manufacturing
  All probes are developed and manufactured in-house to strict quality standards.
- ☐ Factory-calibration
  Each individual probe is factory-calibrated at several reference points with the greatest care to ensure the highest possible degree of trueness.
- ☐ Electrical conductivity compensation
  FISCHER's patented conductivity compensation – used in all eddy current probes – makes it possible to adjust for different conductivities of the base material, e. g. different aluminum alloys, eliminating time-consuming on-site calibration on the actual base material while simultaneously achieving very high levels of trueness.
- ☐ Curvature compensation
  Special probes for the eddy current method are available that automatically compensate for the influence of curvature on rounded specimens.
- ☐ Reduction of measurement errors
  A spring-loaded system ensures that the probe is always placed on the surface with the same pressure. This reduces measurement errors and increases the repeatability precision. Many of our probes are equipped with this spring-loaded system. As a result, soft surfaces can also be measured.

Versatile Probe Program

A probe needs specific properties for each field of application for achieving best results with a high accuracy. The following list gives you an overview of the probe features.

Various measurement areas
- Diameter from 2 mm (78.7 mils)
- Areas from 30 mm x 30 mm (1.18 " x 1.18 ")

Various measuring sites
- Flat, even surfaces
- Easily reachable
- In boreholes
- In grooves and cavities
- On curved surfaces and on cylinders
- High specimen temperatures up to + 80 °C (+ 176 °F)
- Humidity ambients

Manual or automated measurements
- Hand-held probes
- Built-in probes for automated measuring systems

Various coating hardnesses
- Hard coating materials (metallic coatings like chrome etc.)
- Softly coated materials (paint, lacquer, textiles etc.)

Various base materials
- Iron and steel
- Non-ferrous metals
- Various metals
- Steel under Duplex coating systems
- Epoxy and plastic

Various probe tip designs
For different surface characteristics such as rough surface, soft coating material etc:
- Single probe tip or double probe tips
- Round or even pole tips
- Different probe tip sizes
- Different probe tip materials, e.g. hard metal, jewel, TiN/TiC, PVD, hard plastic

Versatile Fields of Applications

Measurement of the corrosion protection coating in plastics on steel pipes with the probe FKB10

Measurements of anodized coatings with the curvature-compensating probe FTD3.3

Measurement of zinc powder coating with the two-pole probe V7FKB4

Measuring of duplex coatings with the probe FDX13H

Automated measurement of the chrome coating on piston rods with the probe V2FGA06H

Measurement of auto body paint thickness using the Dual probe FD10

The Best-Selling Standard Probes

Base material iron/steel (magnetic inductive test method)

Probes showed in comparison size	Type	Meas. range	Features
	FGAB1.3	0 ... 2000 µm 0 ... 78.74 mils	Measurements on smooth surfaces
	FGABI1.3-	0 ... 1000 µm 0 ... 39.37 mils	• Measurements in bore holes, pipes or grooves. • Available insertion depths from 150 to 400 mm (5.9 to 15.8 ") • no edge influence
	F20H	0 ... 2500 µm 0 ... 98.43 mils	• Replaces probe FGA2H (no longer available) • Applicable for measurements both on smooth and rough surfaces • Wear-resistant probe tip
	FKB10	0 ... 8 mm 0 ... 314.96 mils	• Higher measurement precision on rough surfaces than single tip probes
	FGB2	0 ... 5 mm 0 ... 196.85 mils	• Large geometric influence • Applicable temporary up to + 80 °C (+ 176 °F)

Base material non-ferrous metals (amplitude sensitive eddy current test method)

All listed probes feature a patented conductivity compensation.

Probes showed in comparison size	Type	Meas. range	Features
	FTA3.3H	0 ... 1200 µm 0 ... 47.24 mils	• High precision for thin coatings • Wear-resistant probe tip • Small edge influence
	FTA3.3	0 ... 1200 µm 0 ... 47.24 mils	• Small edge influence
	FAI3.3-	0 ... 800 µm 0 ... 31.5 mils	• Measurements in bore holes, pipes or grooves. • Available insertion depths from 150 to 400 mm (5.9 to 15.8 ") • No edge influence
	FTD3.3	0 ... 800 µm 0 ... 31.5 mils	• Excellent curvature compensation (patented) in a diameter > 2 mm (80 mils)
	FA9	0 ... 3.5 mm 0 ... 137.8 mils	• Measurements on plane specimens or in pipes, bore holes and recesses

Base material non-ferrous metals and steel/iron
(Amplitude sensitive eddy current test method or magnetic inductive test method)

All listed probes are recognize the base material under the coating. The instrument selects the appropriate measurement test method.

Probes showed in comparison size	Type	Meas. range	Features
	FD13H	0 ... 2000 µm 0 ... 78.74 mils	• Also well suited for measurements on rough surfaces • Wear-resistant probe tip • Large probe tip • Using the eddy current test method activate automatically the patented conductivity compensation
	FD10	Fe 0 ... 1300 µm 0 ... 51.18 mils NF 0 ... 800 µm 0 ... 31.5 mils	• Smooth surfaces, thin coatings • Wear-resistant probe tip • Small probe tip • Using the eddy current test method activate automatically the patented conductivity compensation

NF: non-ferromagnetic base material; Fe: magnetizable base material

Duplex coatings (paint/zinc) on steel/iron (corrosion protection sector)
(Amplitude sensitive eddy current test method or magnetic inductive test method)

The individual coating thicknesses of the duplex coating system are measured simultaneously and displayed in the instrument separately.

Probes showed in comparison size	Type	Meas. range	Features
	FDX13H	Total paint/zinc coating ≥ 70 µm ≥ 3.54 ... 31.5 mils Zinc coating ≥ 70 µm ≥ 2.76 mils Paint coating ≥ 20 µm ≥ 0.79 mils	• Replaces probe FDX10 (no longer available) • Wear-resistant probe tip • Using the eddy current test method activate automatically the patented conductivity compensation

Standard Probe Program Overview

Base material iron/steel

- **Paint, varnish or plastic coatings** on steel or iron (**NC/Fe**)
- **Copper, brass, zinc, tin and chrome coatings** on steel or iron (**NF/Fe**)
- **NiP coatings** on steel or iron (**NiP/Fe**; only non-magnetizable NiP coatings with P content > 10 %)

Probes work with the magnetic inductive test method. The measurement is influenced by the permeability of the base material.

Type [1]	**Part No.**	**Measurement range**	**Features/application areas**	
FGAB1.3	604-141	0 ... 2000 µm / *0 ... 78.7 mils*	Suited for smooth surfaces; electroplated coatings	14
FGAB1.3-SD	604-227	0 ... 2000 µm / *0 ... 78.7 mils*	Especially suited for measurements on screen printing material, soft plastic material, etc.	18
FGAB1.3T	604-182	0 ... 2000 µm / *0 ... 78.7 mils*	Smooth surfaces; temporary up to + 80 °C (+ 176 °F) applicable; suited for electroplated surfaces	14
FGABI1.3-150	604-175	0 ... 1000 µm / *0 ... 39.4 mils*	No edge influence; for pipes, bore holes, etc with Ø > 9 mm (0.35 "), max. insertion depth 150 mm (5.9 ")	16
FGABI1.3-260	604-339	0 ... 1000 µm / *0 ... 39.4 mils*	No edge influence; for pipes, bore holes, etc with Ø > 9 mm (0.35 "), max. insertion depth 260 mm (10.2 ")	16
FGABI1.3-400	604-468	0 ... 1000 µm / *0 ... 39.4 mils*	No edge influence; for pipes, bore holes, etc with Ø > 9 mm (0.35 "), max. insertion depth 400 mm (15.7 ")	16
FGABW1.3	604-178	0 ... 2000 µm / *0 ... 78.7 mils*	Angle probe for plane specimens as well as in pipes, bore holes and recesses	19
FGA06H	604-176	0 ... 700 µm / *0 ... 27.6 mils*	Small measuring area; lower influence of curvature	20
FGA06H-SC	604-344	0 ... 700 µm / *0 ... 27.6 mils*	Suited for measurements on plane surfaces and smooth coatings	21
FGA06H-MC	604-181	0 ... 700 µm / *0 ... 27.6 mils*	As FGA06H; Micro-Cartouche probe tip; well suited for integration in automated measuring systems	22
FGAW2H	604-212	0 ... 1500 µm / *0 ... 59.1 mils*	Angle probe for plane specimens as well as in pipes, bore holes and recesses	23
FGB2	604-179	0 ... 5 mm / *0 ... 196.9 mils*	Large influence of curvature; temporary up to + 80 °C (+ 176 °F) applicable; suited for thick coatings	26
FGBW2	604-252	0 ... 5 mm / *0 ... 196.9 mils*	Angle probe; large influence of curvature; temp. up to + 80 °C (176 °F) applicable; for plane specimens as well as in pipes, bore holes and recesses	27
			Probes also suited for measurements on rough surfaces (blasted surfaces)	
FGA1.3H	604-550	0 ... 2000 µm / *0 ...78.7 mils*	Wear-resistant, large probe tip (no customer data sheet)	
FGA2HF	604-226	0 ... 1500 µm / *0 ... 59.1 mils*	Damp protected	24
F20H	604-535	0 ... 2500 µm / *0 ... 98.4 mils*	Replaces probe FGA2H; wear resistant, large probe tip	28
FK50	604-185	0 ... 30 mm / *0 ... 1181.1 mils*	Double-tip angle probe for very thick insulation coatings	30
FKB4	604-284	0 ... 2000 µm / *0 ... 78.7 mils*	Double-tip angle probe; higher measurement precision on rough surfaces than single-tip probes	31
FKB10	604-177	0 ... 8 mm / *0 ... 314.9 mils*	Double-tip angle probe for thick coatings	32
FKB10-OD	604-219	0 ... 8 mm / *0 ... 314.9 mils*	Double-tip angle probe for plane surfaces with soft and thick coatings	34
FKB25	604-266	0 ... 15 mm / *0 ... 590.6 mils*	Double-tip angle probe for thick insulation coatings	35
V1FGA1HR34	604-183	0 ... 1000 µm / *0 ... 39.4 mils*	Double-tip probe; for pipes, etc with Ø > 7 mm (0.28 "), max. insertion depth 60 mm (2.4 ")	36
V1FKB4-150	604-366	0 ... 2000 µm / *0 ... 78.7 mils*	Double-tip probe for thin coatings in pipes, etc with Ø > 10 mm (0.39 "), max. insertion depth 150 mm (5.9 ") (no customer data sheet)	
V1FKB10	604-338	0 ... 8 mm / *0 ... 314.9 mils*	Double-tip probe for thick coatings in pipes, etc with Ø > 13 mm (0.51 "), max. insertion depth 260 mm (10.2 ") (no customer data sheet)	
V7FKB4	604-180	0 ... 2000 µm / *0 ... 78.7 mils*	Double-tip probe; well suited for measurements of thin coatings with high precision	38
			Probes for specific applications	
V3FGA06H	604-517	0 ... 350 µm / *0 ... 13.8 mils*	in cavities; EPD coatings within box sections of auto bodies - without having to cut the auto body itself	37
V4FKB4	604-571	0 ... 2000 µm / *0 ... 78.7 mils*	Piston ring measuring stage; stage with integrated double-tip probe for measurements on piston and oil scraper rings; ring-Ø 35 ... 200 mm (1.4 ... 8.3 ") (no customer data sheet)	

1: Connectable to all DUALSCOPE®, DUALSCOPE® H and DELTASCOPE® of the FMP instruments and to the FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®

• **Nickel coatings** on steel or iron (**Ni/Fe**; nickel coating must be magnetizable)

Probe works with the phase sensitive eddy current test method. Electrical conductive coating materials (NF) are needed for measurement. Therefor the measurement is strongly influenced by the temperature. Lower influencing of curvature. Irrespective of the surface roughness (e.g. casting) and protective lacquers.

Type[2]	**Part No.**	**Measurement range**	**Features/application areas**	
ESD20 Ni	603-418	60 kHz: 2 ... 100 µm / *0.08 ... 3.94 mils* 240 kHz: 2 ... 150 µm / *0.08 ... 5.91 mils*	The magnetic permeability of the coating and substrate materials significantly influences the measurement. • Distance compensation (Lift-off) up to 400 µm (*15.75 mils*) lacquer or air	70

2: Connectable to the hand-held instrument PHASCOPE® PMP10 and to the FISCHERSCOPE® MMS® PC2 with module SIGMASCOPE®/PHASCOPE® 1

• **Copper or zinc coatings** on steel or iron (**NF/Fe**)

Probes work with the phase sensitive eddy current test method. Electrical conductive coating materials (NF) are needed for measurement. Therefor the measurement is strongly influenced by the temperature. Lower influencing of curvature. Irrespective of the surface roughness (e.g. casting) and protective lacquers.

Type[3]	**Part No.**	**Measurement range**	**Features/application areas**	
ESD20 Zn	603-419	Cu/Fe: 1 ... 200 µm / *0.039 ... 7.87 mils* Zn/Fe: 2 ... 200 µm / *0.079 ... 7.87 mils*	Cu/Fe; Zn/Fe; Zinc alloy coatings such as ZnNi or ZnFe cannot be measured due to their low conductivity • Default pre-calibrated for copper and zinc coatings. The measuring system must be master-calibrated in the Fischer factory for other coating/substrate material combinations • NF/NF, only if the electrical conductivity of the coating material is twice higher as the electrical conductivity of the base material, e.g. Cu/CuZn • Distance compensation (Lift-off) up to 400 µm (*15.75 mils*) lacquer or air	68
ESD2.4	603-416	1 ... 50 µm / *0.0039 ... 1.97 mils*	Well suited for small parts of Zn/Fe or Cu/Fe, e.g., screws • Same features as probe ESD20 Zn but smaller probe dimensions and lower distance compensation • Distance compensation (Lift-off) up to 200 µm (*7.87 mils*) lacquer or air	69

3: Connectable to the hand-held instrument PHASCOPE® PMP10 and to the FISCHERSCOPE® MMS® PC2 with module SIGMASCOPE®/PHASCOPE® 1

Standard Probe Program Overview

Base material non-ferrous metals

• **Paint, varnish or plastic coatings** on aluminum, copper or brass (**NC/NF**)

Probes work with the **amplitude sensitive eddy current test method** and feature a patented conductivity compensation.

Type[4]	Part No.	Measuring range	Features/application areas	
FA9	604-188	0 ... 3.5 mm / *10 ... 137.8 mils*	Angle probe with Ø 14 mm (0.55 "); thick insulation coatings with rough (blasted) surfaces	42
FA14	604-589	0 ... 5 mm / *0 ... 196.9 mils*	Angle probe with Ø 14 mm (0.55 "); thick insulation coatings with rough surfaces (e.g., acoustic absorption coatings in car bodies) • With specific calibration possible to measure on steel/iron	40
FA30	604-213	0 ... 30 mm / *0 ... 118.1 mils*	Angle probe with Ø 34 mm (1.34 "); plane surfaces with thick insulation coatings • With specific calibration possible to measure on steel/iron	43
FA70	604-191	0 ... 50 mm / *0 ... 196.9 mils*	Angle probe with Ø 74 mm (2.91 "); plane surface with thick insulation coatings • With specific calibration possible to measure on steel/iron	44
FAI3.3-150	604-187	0 ... 800 µm / *0 ... 31.5 mils*	No edge influence; specially for pipes, bore holes, etc with Ø > 9 mm (0.35 "); max. insertion depth 150 mm (5.9 ")	45
FAI3.3-260	604-336	0 ... 800 µm / *0 ... 3.15 mils*	No edge influence; specially for pipes, bore holes, etc with Ø > 9 mm (0.35 "); max. insertion depth 260 mm (10.2 ")	45
FAW3.3	604-193	0 ... 1200 µm / *0 ... 47.2 mils*	Angle probe for plane specimens as well as in pipes, bore holes and recesses	46
FAW3.3-5.6	604-223	0 ... 1200 µm / *0 ... 47.2 mils*	Angle probe for plane specimens as well as in pipes, bore holes and recesses; large probe tip; probe also suited for measurements on rough (blasted) surfaces	48
FAW3.3-5.6HF	604-224	0 ... 1200 µm / *0 ... 47.2 mils*	Angle probe for plane specimens as well as in pipes, bore holes and recesses; large probe tip; probe also suited for measurements on rough (blasted) surfaces; well suited for insulation coatings on thin base materials	49
FTA2.4-MC	604-192	0 ... 700 µm / *0 ... 27.6 mils*	Small measurement area; Micro-Cartouche probe tip; well suited for integration in automated measuring systems	50
FTA2.4-SC	604-228	0 ... 700 µm / *0 ... 27.6 mils*	Touch area 20 x 60 mm (0.79 x 2.4 "); plane surfaces with soft coatings; well suited for integration in automated measuring systems	51
FTA3.3	604-186	0 ... 1200 µm / *0 ... 47.2 mils*	Low edge influence; also suited for anodized coatings	52
FTA3.3D	604-399	0 ... 1200 µm / *0 ... 47.2 mils*	Diamond as probe tip (no customer data sheet)	
FTA3.3-5.6	604-200	0 ... 1200 µm / *0 ... 47.2 mils*	Low edge influence; large pole tip; probe also suited for measurements on rough (blasted) surfaces	53
FTA3.3-5.6HF	604-229	0 ... 1200 µm / *0 ... 47.2 mils*	Low edge influence; large probe tip; probe also suited for measurements on rough (blasted) surfaces; well suited for insulation coatings on thin base materials (> 0.3 mm (11.8 mils))	54
FTA3.3FG	604-190	0 ... 1200 µm / *0 ... 47.2 mils*	Damp protected; specially suited to measure wet anodized coatings on aluminum	55
FTA3.3H	604-142	0 ... 1200 µm / *0 ... 47.2 mils*	Wear-resistant probe tip; also suited for anodized coatings	56
FTD3.3	604-189	0 ... 800 µm / *0 ... 31.5 mils*	Curvature-compensated measurement; but calibration only on plane parts; well suited for measurements of anodized coatings	58
			Probes for special applications	
TM85A*	602-546	0 ... 1000 µm / *0 ... 39.4 mils*	For measuring the coating thickness of paint on the inside and the outside of cylindrical aluminum food and beverage containers (tubes, cans). (No customer data sheet)	

4: Connectable to all DUALSCOPE®, DUALSCOPE® H and ISOSCOPE® FMP instruments and to the FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
**: TM85A only connectable to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®*

• **NiP coatings** on aluminum and other non-ferrous metals (**NiP/NF**)

Probe works with the **amplitude sensitive eddy current test method and** features a patented conductivity compensation. Enabled only for NiP coatings with P content > 10 %.

Type[5]	Part No.	Measurement range	Features/application areas	
FTA3.3F-Cr	604-342	0 ... 500 µm / *0 ... 19.7 mils*	Damp protected (no customer data sheet) (no customer data sheet)	

5: Connectable to all DUALSCOPE®, DUALSCOPE® H and ISOSCOPE® FMP instruments and to the FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®

• **Nickel coatings** on aluminum, copper, brass or pc-boards (**Ni/NF, Iso**)

Probes work with the magnetic induction test method. The measurement is influenced by the permeability of the coating material.

Type[6]	**Part No.**	**Measurement range**	**Features/application areas**	
FGAB1.3-Ni	604-371	0 ... 200 µm / *0 ... 7.8 mils*	Small probe with Ø 10 mm (0.39 mils) (no customer data sheet)	
FGA5/6-Ni	604-364	0 ... 3 mm / *0 ... 118.1 mils*	Angle probe for thick Nickel coatings (no customer data sheet)	
FKB4-Ni	604-372		Angle double-tip probe (no customer data sheet)	

6: Connectable to all DUALSCOPE®, DUALSCOPE® H and DELTASCOPE® FMP instruments and to the FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®

Type[7]	**Part No.**	**Measurement range**	**Features/application areas**	
FN4D	604-417	Ni/NF, Iso: 1 ... 150 µm / *0.04 ... 5.9 mils* Iso/NF: 0 ... 2.5 mm / *0 ... 98.4 mils* Iso, NF/Fe: 0 ... 7 mm / *0 ... 275.6 mils*	• Nickel coatings on non-ferrous metals or insulation materials • Electrical non-conductive coatings on non-ferrous metals • Thick metal or protection coatings on steel/iron	64

7: Connectable only to hand-held instrument DUALSCOPE® H FMP150 and to the FISCHERSCOPE® MMS® PC2 with module NICKELSCOPE®

• **Chrome coatings** on aluminum, copper or brass (**Cr/NF**)

Probes work with the **amplitude sensitive eddy current test method and** feature a patented conductivity compensation.

Type[8]	**Part No.**	**Measurement range**	**Features/application areas**	
FAW3.3-Cr	604-340	0 ... 500 µm / *0 ... 19.7 mils*	Angle probe for plane specimens as well as in pipes, bore holes and recesses (no customer data sheet)	
FTA3.3F-Cr	604-342	0 ... 500 µm / *0 ... 19.7 mils*	Damp protected (no customer data sheet)	
FTA3.3F-Cr-D	604-505	0 ... 500 µm / *0 ... 19.7 mils*	Damp protected; diamond as probe tip (no customer data sheet)	

8: Connectable to all DUALSCOPE®, DUALSCOPE® H and ISOSCOPE® FMP instruments and to the FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®

Base material pc-boards

• **Copper coatings** on pc-boards (**Cu/Iso**)

Probes work with the **amplitude sensitive eddy current test method and** feature a patented conductivity compensation.

Type[9]	**Part No.**	**Measurement range**	**Features/application areas**	
FTA3.3-Cu-HF	604-362	0 ... 9 µm / *0 ... .35 .0 mils*	Thin copper coatings on pc boards (no customer data sheet)	
FTA3.3F-Cu	604-194	3 ... 150 µm / *0 ... 59.1 mils*	Damp protected (no customer data sheet)	

9: Connectable to all DUALSCOPE®, DUALSCOPE® H and ISOSCOPE® FMP instruments and to the FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®

Probes work with the phase sensitive eddy current test method. Electrical conductive coating materials (NF) are needed for measurement. Therefor the measurement is strongly influenced by the temperature.

Type[10]	**Part No.**	**Measurement range**	**Features/application areas**	
ESD20 Cu	603-417	60 kHz: 1 ... 270 µm / *0.04 ... 10.63 mils* 240 kHz: 1 ... 100 µm / *0.04 ... 3.94 mils*	• Default pre-calibrated for copper coatings. The measuring system must be master-calibrated in the Fischer factory for other coating materials (Al, CuZn) • Distance compensation (Lift-off) up to 300 µm lacquer or air	71
ESL080B	603-802	5 ... 100 µm / *0.2 ... 3.94 mils*	• Copper coatings in pc-board bore holes (0.8 ... 2 mm / *31.5 ... 78.7 mils*); • Fix insertion depth of 0.8 mm / 31.5 mils; • Board thicknesses of 0.5 ... 1.6 mm / *19.7 ... 63.0 mils*	72
ESL080V	603-968	5 ... 100 µm / *0.2 ... 3.94 mils*	• Copper coatings in pc-board bore holes (0.8 ... 2 mm / *31.5 ... 78.7 mils*); • Variable insertion depth of 0.8 mm ... 4.4 mm / *31.5 ... 173.2 mils*; • Board thicknesses of 0.5 ... 1.6 mm / *19.7 ... 63.0 mils*	73

10: Connectable to the hand-held instrument PHASCOPE® PMP10 and to the FISCHERSCOPE® MMS® PC2 with module SIGMASCOPE®/PHASCOPE® 1

Standard Probe Program Overview

Base material non-ferrous metals and steel/iron (Dual probes)

- **Paint, varnish or plastic coatings** on aluminum, copper or brass (**NC/NF**)
- **Paint, varnish or plastic coatings** on steel or iron (**NC/Fe**)
- **Copper, brass, zinc, tin and chrome coatings** on steel or iron (**NF/Fe**)

The listed probes are recognize the base material under the coating and use either the amplitude sensitive eddy current test method or the magnetic inductive test method for measurement. The electrical conductive compensation will be active for measurements using the amplitude sensitive eddy current test method.

Type [11]	**Part No.**	**Measurement range**	**Features/application areas**	
FD10	604-143	Fe: 0 ... 1300 µm / *0 ... 51.2 mils* NF: 0 ... 800 µm / *0 ... 31.5 mils*	Wear-resistant probe tip; small probe tip; smooth surfaces; thin coatings	61
FD13H	604-508	0 ... 2000 µm / *0 ... 78.7 mils*	Wear-resistant probe tip; large pole tip; also suited for rough surfaces	62

11: Connectable to all DUALSCOPE® and DUALSCOPE® H FMP instruments and to the FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®

The listed probe recognizes the base material under the coating and uses either the amplitude sensitive eddy current test method or the magnetic test method for measurement. The electrical conductive compensation will be active for measurements using the amplitude sensitive eddy current test method.

Type [12]	**Part No.**	**Measurement range**	**Features/application areas**	
FN4D	604-417	Iso, NF/Fe: 0 ... 7 mm / *0 ... 275.6 mils* NF: 0 ... 2.5 mm / *0 ... 98.4 mils* Ni coating: 1 ... 150 µm / *0.04 ... 5.9 mils*	• Thick metal or protection coatings on steel/iron • Electrical non-conductive coatings on non-ferrous metals; also suited for anodized coatings • Nickel coatings on non-ferrous metals or insulation materials	64

12: Connectable to the DUALSCOPE® H FMP150 and to the FISCHERSCOPE® MMS® PC2 with module NICKELSCOPE®

Duplex coatings on steel/iron (Duplex probes)

• Measurement and display of the **paint and zinc coating** simultaneous.

Probe work with the amplitude sensitive eddy current test method and the magnetic inductive test method simultaneously. The electrical conductive compensation are always active by using the amplitude sensitive eddy current test method.

Type[13]	**Part No.**	**Measurement range**	**Features/application areas**	
FDX13H	604-596	90 ... 800 µm / *3.5 ... 31.5 mils*	• Wear-resistant, large probe tip • Corrosion protection sector (paint, zinc coatings, Zn ≥ 70 µm (2.76 mils), paint ≥ 20 µm (0.79 mils))	66

13: Connectable to all DUALSCOPE® and DUALSCOPE® H of the FMP instruments and to the FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®

Probe work with the phase sensitive eddy current test method and the magnetic inductive test method simultaneously.

Type[14]	**Part No.**	**Measurement range**	**Features/application areas**	
ESG20	603-690	Duplex Paint: 0 ... 550 µm / *0 ... 21.7 mils* Zn: 0 ... 150 µm *0 ... 5.9 mils* Dual NC/NF: 0 ... 2000 µm / *0 ... 78.7 mils* NF/Fe: 0 ... 700 µm / *0 ... 27.6 mils*	• Simultaneous measurement of paint and Zn coatings on sheet metal with electrolytically or slight hot-dip galvanized coatings; typical Zn coatings between 5 and 20 µm respectively 0.2 to 0.79 mils (duplex mode) • Also usable as dual probe with automatically base material recognition under the coating (in this case either the amplitude eddy current test method or the magnetic induction test method is used); typical application is paint/Al in the automobile manufactories	74

14: Connectable to the PHASCOPE® PMP10 DUPLEX and to the FISCHERSCOPE® MMS® PC2 with module PHASCOPE®/DUPLEX

Probe models	FGAB1.3	FGAB1.3L5	FGAB1.3T	FGAB1.3TL5
Part no.	604-141	604-544	604-182	604-418

Applications

Measurement of electrically non-conductive and non-ferrous metal coatings on steel or iron base material (NC/Fe and NF/Fe). The probes are well suited for measurements of electroplated metal coating thicknesses. However, measurement data variation is relatively high on rough (e.g., sand-blasted) surfaces. For such cases we recommend special probes for measurements on rough surfaces from our probe program.

Probes including a T in the model designation be equipped with a temperature-resistant plastic cover for measurements on specimens with surface temperature up to + 80 °C (176 °F).

Examples

Steel or iron base materials (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)

Probe design

Axial single tip probe with spring-loaded measuring system

Applications

NC/Fe or NF/Fe

*****

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).

Measurement range*

Steel or iron base materials (Fe)

0 ... 2000 µm / *0 ... 78.74 mils*

Trueness*

Steel or iron base materials (Fe)

based on Fischer standards

0 ... 100 µm: ≤ 1 µm
100 ... 1000 µm: ≤ 1 % of reading
1000 ... 2000 µm: ≤ 3 % of reading

0 ... 3.94 mils: ≤ 0.039 mils
3.94 ... 39.37 mils: ≤ 1 % of reading
39.37 ... 78.74 mils: ≤ 3 % of reading

Repeatability precision*

Steel or iron base materials (Fe)

based on Fischer standards

0 ... 100 µm: ≤ 0.3 µm
100 ... 2000 µm: ≤ 0.3 % of reading

0 ... 3.94 mils: ≤ 0.012 mils
3.94 ... 78.74 mils: ≤ 0.3 % of reading

Influences*

Probe models FGAB1.3 and FGAB1.3L5	Probe models FGAB1.3T and FGAB1.3TL5

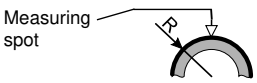
The following values are valid for a reference coating thickness of 75 µm / 2.95 mils and steel or iron base material.

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

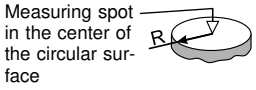
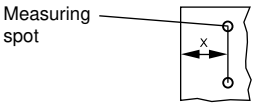
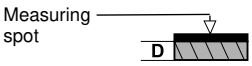
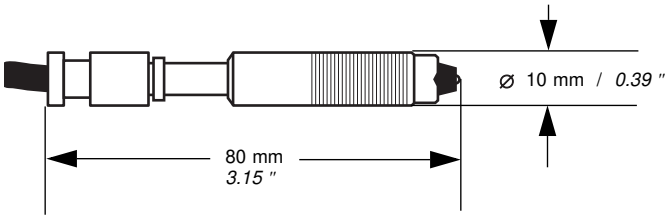
Measurement error ≥ 10 % for R ≤ 15 mm / *R ≤ 0.6 "*	Measurement error ≥ 10 % for R ≤ 14,5 mm / *R ≤ 0.57 "*

Probe needs a minimum of R = 5 mm (support stand necessary) / *R = 0.2 "*

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



Measurement error ≥ 10 % for R ≤ 8 mm / *R ≤ 0.32 "*
Probe needs a minimum of R = 1 mm (support stand necessary) / *R = 0.039 "*

Influences*	**Probe models FGAB1.3 and FGAB1.3L5**	**Probe models FGAB1.3T and FGAB1.3TL5**
The following values are valid for a reference coating thickness of 75 µm / 2.95 mils and steel or iron base material.		
Edge distance (R), specification from probe pole center 	No measurement error for R > 10 mm / *R > 0.39 "* Measurement error ≥ 10 % for R ≤ 5 mm / *R ≤ 0.2 "* Probe needs a minimum of R = 1.75 mm (support stand necessary) / *R = 0.069 "*	
Edge distance (X), specification from probe pole center 	No measurement error for X > 6 mm / *X > 0.24 "* Measurement error ≥ 10 % for X ≤ 0.3 mm / *X ≤ 0.012 "*	No measurement error for X > 4 mm / *X > 0.16 "* Measurement error ≥ 10 % for X ≤ 0.9 mm / *X ≤ 0.035 "*
Base material thickness (D) 	Measurement error ≥ 10 % for D ≤ 0.4 mm / *D ≤ 0.016 "*	
Admissible ambient temperature at operation	- 10 °C ... + 40 °C / *+ 14 °F ... + 104 °F*	
Admissible specimen temperature	**Probe models FGAB1.3 and FGAB1.3L5** max. + 40 °C / *max. + 104 °F*	**Probe models FGAB1.3T and FGAB1.3TL5** temporary max. + 80 °C / *max. + 176 °F*
Probe tip material	PVD coated steel	
Probe tip replaceable	Yes	
Probe tip radius	0.75 mm / *29.53 mils*	
Measuring method	Magnetic induction method according to ISO 2178, ASTM D7091, Non-magnetic coatings on magnetic substrates; Measurement of coating thickness; Magnetic method	
Scope of supply	Probe, metal plate NF/FE for instrument check, calibration foils	
Works with instruments	All DUALSCOPE® and DELTASCOPE® hand-held instruments of the series FMP and FISCHERSCOPE® MMS® PC2 with F-Module PERMASCOPE®	
Dimensions  FGAB1.3 and FGAB1.3T: cable length 1.50 m / *59.06 "* FGAB1.3L5 and FGAB1.3TL5: cable length 5 m / *196.85 "*		

FE06.1 doc03/12

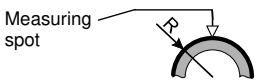
	FGABI1.3-150	FGABI1.3-260	FGABI1.3L5-260	FGABI1.3-400
Probe model	**604-175**	**604-339**	**604-590**	**604-468**
Applications	Measurement of electrically non-conductive and non-ferrous metal coatings on steel or iron base material (NC/Fe and NF/Fe). Suited for measurements in bore holes, pipes or grooves. To achieve a very small measurement uncertainty, externally triggered measurement acquisition should be used when measuring small inside diameters. Smallest permissible inside diameter: 9 mm *(0.35 ")*.			
Examples	**Steel or iron base materials (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)			
Probe design	Single tip inside probe with spring-loaded measuring system			
Applications	NC/Fe or NF/Fe			
*	*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).*			
Measurement range*	**Steel or iron base materials (Fe)**			
	0 ... 1000 µm / *0 ... 39.37 mils*			
Trueness*	**Steel or iron base materials (Fe)**			
based on Fischer standards	0 ... 50 µm: ≤ 0.5 µm 50 ... 1000 µm: ≤ 1 % of reading		*0 ... 1.97 mils: ≤ 0.02 mils* *1.97 ... 39.37 mils: ≤ 1 % of reading*	
Repeatability precision*	**Steel or iron base materials (Fe)**			
based on Fischer standards	0 ... 50 µm: ≤ 0.15 µm 50 ... 1000 µm: ≤ 0.3 % of reading		*0 ... 1.97 mils: ≤ 0.006 mils* *1.97 ... 39.37 mils: ≤ 0.3 % of value*	
Influences*	**Steel or iron base materials (Fe)**			

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

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

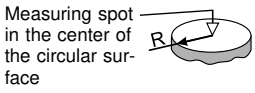
Measurement error ≥ 10 % for R ≤ 17.5 mm / *R ≤ 0.69 "*
Probe needs a minimum of R = 4.5 mm (support stand necessary) / *R = 0.18 "*

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



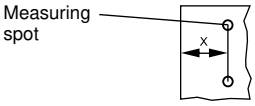
Measurement error ≥ 10 % for R ≤ 8 mm / *R ≤ 0.31 "*
Probe needs a minimum of R = 1 mm (support stand necessary) / *R = 0.04 "*

Edge distance (R), specification from probe pole center

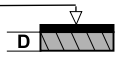
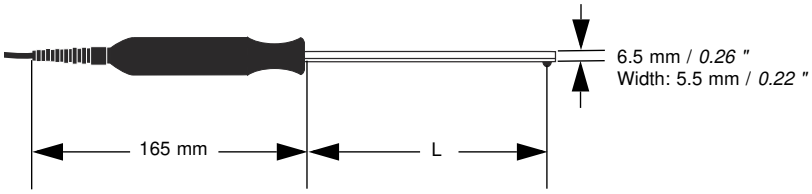


Measurement error ≥ 10 % for R ≤ 4 mm / *R = 0.16 "*
Probe needs a minimum of R = 1 mm (support stand necessary) / *R = 0.04 "*

Edge distance (X), specification from probe pole center



No influence

Influences*	**Steel or iron base materials (Fe)**
The following values are valid for a reference coating thickness of 75 µm / 2.95 mils.	
Base material thickness (D) Measuring spot 	Measurement error ≥ 10 % for D ≤ 0.2 mm / *D ≤ 7.87 mils*
Admissible ambient temperature at operation	- 10 °C ... + 40 °C / *+ 14 °F ... + 104 °F*
Probe tip material	PVD-coated steel
Probe tip replaceable	Yes
Probe tip radius	0.75 mm / *29.53 mils*
Measuring method	Magnetic induction method according to ISO 2178, ASTM D7091, Non-magnetic coatings on magnetic substrates; Measurement of coating thickness; Magnetic method
Scope of supply	Probe, metal plate NF/FE for instrument check, calibration foils
Works with instruments	All DUALSCOPE® and DELTASCOPE® hand-held instruments of the series FMP and FISCHERSCOPE® MMS® PC2 with F-Module PERMASCOPE®
Dimensions	

Insertion depth L	**FGABI1.3-150**	**FGABI1.3-260**	**FGABI1.3L5-260**	**FGABI1.3-400**
	max. 150 mm / *5.91 "*	max. 260 mm / *10.24 "*	max. 260 mm / *10.24 "*	max. 400 mm / *15.75 "*
Cable length	1.50 m / *59.06 "*	1.50 m / *59.06 "*	5 m / *196.85 "*	1.50 m / *59.06 "*

FE02.3 doc03/12

Probe model	**FGAB1.3-SD**	
Part no.	FGAB1.3-SD	604-227

Applications	Measures nonmetallic and nonferrous coatings on steel or iron substrates (NC/Fe or NF/Fe). The flat surface probe tip is especially suited for soft coatings (screen printing material, soft plastic material, etc.). The surface to be measured must be completely clean. Grease coatings or dirt particles will lead to measurement errors. *The values for accuracy 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).*
Probe design	Axial single tip probe with spring-loaded measuring system
Measuring application	NC/Fe or NF/Fe
Measuring range	0 - 2000 µm
Accuracy	0 - 60 µm: ± 1.5 µm 60 - 1000 µm: ≤ 2.5 % of value 1000 - 2000 µm: ≤ 5 % of value
Precision	0 - 60 µm: ± 0.6 µm 60 - 2000 µm: ≤ 1 % of value

The following values for measurement errors are valid for a substrate thickness of 75 µm

	Measurement error ≥ 10% for Ø ≤ for flat specimens only probe needs a minimum of Ø
	Measurement error ≥ 10% for Ø ≤ For flat specimens only probe needs a minimum of Ø
	Measurement error ≥ 10% for Ø ≤ 12 mm probe needs a minimum of Ø 4 mm
	Meas. error ≥ 10% for edge distance ≤ 4 mm
	Meas. error ≥ 10% for substrate thickness ≤ 0.4 mm

Temperature	- 10 °C ... +40 °C ambient temperature
Probe tip material	Hard plastics
Probe tip replaceable	No
Height	-
Diameter / width	18 mm
Length	100 mm
Works with the instruments	FMP10/20/30/40/100, MMS® PC2 & F-Module PERMASCOPE®

FE06.1 doc12/09

Probe model	**FGABW1.3**	
Part no.	FGABW1.3	604-178

Applications	Measures nonmetallic and nonferrous coatings on steel or iron substrates (NC/Fe or NF/Fe). Most popular probe for the measurement of electroplated or paint and lacquer coatings in pipes, bore holes, recesses etc. We recommend the use of a dual-tip probe for measurements on rough (e.g. sandblasted) surfaces. *The values for accuracy 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).*
Probe design	Single tip probe for angular measurements with spring-loaded measuring system
Measuring application	NC/Fe or NF/Fe
Measuring range	0 - 2000 µm
Accuracy	0 - 100 µm: ± 1 µm 100 - 1000 µm: ± 1 % of value 1000 - 2000 µm: ≤ 3 % of value
Precision	0 - 100 µm: ≤ 0.3 µm 100 - 2000 µm: ≤ 0.3 % of value

The following values for measurement errors are valid for a substrate thickness of 75 µm

	Measurement error ≥ 10% for Ø ≤ 30 mm probe needs a minimum of Ø 30 mm
	Measurement error ≥ 10% for Ø ≤ 16 mm probe needs a minimum of Ø 2 mm
	Measurement error ≥ 10% for Ø ≤ 10 mm probe needs a minimum of Ø 3.5 mm
	Meas. error ≥ 10% for edge distance ≤ 0.7 mm
	Meas. error ≥ 10% for substrate thickness ≤ 0.4 mm

Temperature	- 10 °C ... +40 °C ambient temperature
Probe tip material	PVD-coated steel
Probe tip replaceable	Yes
Height	23 mm
Diameter / width	14 mm
Length	72 mm
Works with the instruments	FMP10/20/30/40/100, MMS® PC2 & Module PERMASCOPE®

FE06.1 doc12/09

Probe model	**FGA06H**	
Part no.	FGA06H	604-176

Applications	Measures nonmetallic and nonferrous coatings on steel or iron substrates (NC/Fe or NF/Fe). Especially suited for small test areas and surfaces with a pronounced curvature. High wear resistance of the tungsten carbide tip. Not suited for very rough surfaces. *The values for accuracy 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).*
Probe design	Axial single tip probe with spring-loaded measuring system
Measuring application	NC/Fe or NF/Fe
Measuring range	0 - 700 µm
Accuracy	0 - 25 µm: ± 0.5 µm 25 - 500 µm: ≤ 2 % of value 500 - 700 µm: ≤ 3 % of value
Precision	0 - 70 µm: ≤ 0.2 µm 70 - 500 µm: ≤ 0.3 % of value 500 - 700 µm: ≤ 0.5 % of value

The following values for measurement errors are valid for a substrate thickness of 75 µm

	Measurement error ≥ 10% for Ø ≤ 22 mm probe needs a minimum of Ø 22 mm
	Measurement error ≥ 10% for Ø ≤ 7 mm probe needs a minimum of Ø 2 mm
	Measurement error ≥ 10% for Ø ≤ 4 mm probe needs a minimum of Ø 2 mm
	Meas. error ≥ 10% for edge distance ≤ 0.25 mm
	Meas. error ≥ 10% for substrate thickness ≤ 0.2 mm

Temperature	- 10 °C ... +40 °C ambient temperature
Probe tip material	Hard metal
Probe tip replaceable	No
Height	-
Diameter / width	10 mm
Length	110 mm
Works with the instruments	FMP10/20/30/40/100, MMS® PC2 & F-Module PERMASCOPE®

FE05 doc12/09

Probe model	**FGA06H-SC**	
Part no.	FGA06H-SC	604-344

Applications	Measures nonmetallic and nonferrous coatings on steel or iron substrates (NC/Fe or NF/Fe). Due to the large contact surface and spring-loaded measuring element with very little mass and low contact pressure, especially suited for soft coatings or for automated measuring systems. No measurement tip wear even after several million measurement cycles when used properly. For flat specimens only. *The values for accuracy 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).* *For measurements using support stand.*
Probe design	Single tip probe with spring-loaded measuring system, integrated in flat contact surface
Measuring application	NC/Fe or NF/Fe
Measuring range	0 - 700 µm
Accuracy (using stand)	0 - 50 µm: ± 0.5 µm 50 - 700 µm: ≤ 1 % of value
Precision (using stand)	0 - 100 µm: ≤ 0.08 µm 100 - 700 µm: ≤ 0.08 % of value

The following values for measurement errors are valid for a substrate thickness of 0.25 mm

	Measurement error ≥ 10% for Ø ≤ Not possible probe needs a minimum of Ø
	Measurement error ≥ 10% for Ø ≤ Not possible probe needs a minimum of Ø
	Measurement error ≥ 10% for Ø ≤ - probe needs a minimum of Ø Smallest test area 20 mm x 60 mm
	-
	Meas. error ≥ 10% for substrate thickness ≤ 0.25 mm
Temperature	- 10 °C ... +40 °C ambient temperature
Probe tip material	Hard metal
Probe tip replaceable	No
Height	95 mm
Diameter / width	20 mm
Length	60 mm
Works with the instruments	FMP10/20/30/40(E), MMS® PC2 F-Module PERMASCOPE®

FE01.1 doc11/09

Probe model	**FGA06H-MC**	
Part no.	FGA06H-MC	604-181

Applications	Measures nonmetallic and nonferrous coatings on steel or iron substrates (NC/Fe or NF/Fe). Mechanical design especially suited for installation in customer specific probe fixtures or guide devices for precise probe positioning. *The values for accuracy 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).* *For measurements using support stand.*
Probe design	Axial single tip probe with spring-loaded measuring system
Measuring application	NC/Fe or NF/Fe
Measuring range	0 - 700 µm
Accuracy (using stand)	0 - 50 µm: ± 0.5 µm 50 - 500 µm: ≤ 1 % of value 500 - 700 µm: ≤ 3 % of value
Precision (using stand)	0 - 100 µm: ≤ 0.3 µm 100 - 700 µm: ≤ 0.3 % of value

The following values for measurement errors are valid for a substrate thickness of 75 µm

	Measurement error ≥ 10% for Ø ≤ 11.5 mm probe needs a minimum of Ø 10 mm
	Measurement error ≥ 10% for Ø ≤ 6.2 mm probe needs a minimum of Ø 2 mm
	Measurement error ≥ 10% for Ø ≤ 5 mm probe needs a minimum of Ø 3 mm
	Meas. error ≥ 10% for edge distance ≤ 0.35 mm
	Meas. error ≥ 10% for substrate thickness ≤ 0.2 mm

Temperature	- 10 °C ... +40 °C ambient temperature
Probe tip material	Hard metal
Probe tip replaceable	No
Height	-
Diameter / width	13 mm
Length	110 mm
Works with the instruments	FMP10/20/30/40/100, MMS® PC2 & F-Module PERMASCOPE®

FE06.1 doc12/09

Probe model	**FGAW2H**	
Part no.	FGAW2H	604-212

Applications	Measures nonmetallic and nonferrous coatings on steel or iron substrates (NC/Fe or NF/Fe). Good suited for rough surfaces. *The values for accuracy 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).*
Probe design	Single tip probe for angular measurements with spring-loaded measuring system
Measuring application	NC/Fe or NF/Fe
Measuring range	0 - 1500 µm
Accuracy	0 - 100 µm: ± 1 µm 100 - 1000 µm: ± 1 % of value 1000 - 1500 µm: ≤ 3 % of value
Precision	0 - 100 µm: ≤ 0.3 µm 100 - 1500 µm: ≤ 0.3 % of value

The following values for measurement errors are valid for a substrate thickness of 75 µm

	Measurement error ≥ 10% for Ø ≤ 32 mm probe needs a minimum of Ø 18 mm
	Measurement error ≥ 10% for Ø ≤ 23 mm probe needs a minimum of Ø 2 mm
	Measurement error ≥ 10% for Ø ≤ 20 mm probe needs a minimum of Ø 4 mm
	Meas. error ≥ 10% for edge distance ≤ 0.5 mm
	Meas. error ≥ 10% for substrate thickness ≤ 0.6 mm

Temperature	- 10 °C ... +40 °C ambient temperature
Probe tip material	Hard metal
Probe tip replaceable	Yes
Height	23 mm
Diameter / width	14 mm
Length	72 mm
Works with the instruments	FMP10/20/30/40/100, MMS® PC2 mit F-Module PERMASCOPE®

FE06.1 doc12/09

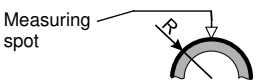
Probe model	**FGA2HF**
Part no.	**604-226**
Applications	Measurement of electrically non-conductive and non-ferrous metal coatings on steel or iron base material (NC/Fe and NF/Fe). The probes are well suited for measurements of electroplated metal and organic coating thicknesses. Because of the large pole tip the probes are also well suited for measurements on rough surfaces. Probe FGA2HF is a damp protected probe.
Examples	**Steel or iron base materials (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)
Probe design	• Axial single tip probe with spring-loaded measuring system • Robust probe design with wear-resistant probe tip
Applications	NC/Fe or NF/Fe
*	*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).*
Measurement range*	**Steel or iron base materials (Fe)** 0 ... 1500 µm / *0 ... 59.06 mils*
Trueness*	**Steel or iron base materials (Fe)**
based on Fischer standards	0 ... 100 µm: ≤ ± 1 µm 100 ... 1000 µm: ≤ ± 1 % of reading 1000 ... 1500 µm: ≤ ± 3 % of reading *0 ... 3.94 mils: ± 0.04 mils* *3.94 ... 39.37 mils: ± 1 % of reading* *39.37 ... 59.06 mils: ± 3 % of reading*
Repeatability precision*	**Steel or iron base materials (Fe)**
based on Fischer standards	0 ... 100 µm: ≤ 0,3 µm 100 ... 1500 µm: ≤ 0,3 % of reading *0 ... 3.94 mils: ≤ 0.01 mils* *3.94 ... 39.37 mils: ≤ 0.2 % 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.

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

Measurement error ≥ 10 % for R ≤ 20 mm / *R ≤ 0.79 "*
Probe needs a minimum of R = 19 mm (support stand necessary) / *R = 0.75 "*

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

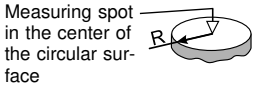


Measurement error ≥ 10 % for R ≤ 9 mm / *R ≤ 0.35 "*
Probe needs a minimum of R = 1 mm (support stand necessary) / *R = 0.04 "*

Influences*	**Steel or iron base materials (Fe)**

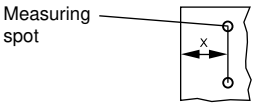
The following values are valid for a reference coating thickness of 75 µm / 2.95 mils.

Edge distance (R), specification from probe pole center



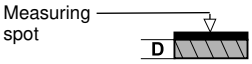
No measurement error as of R = 30 mm / *R = 1.18 "*
Measurement error ≥ 10 % for R ≤ 10 mm / *R ≤ 0.39 "*
Probe needs a minimum of R = 2 mm (support stand necessary) / *R = 0.08 "*

Edge distance (X), specification from probe pole center



No measurement error as of X = 14 mm / *X = 0.55 "*
Measurement error ≥ 10 % for X ≤ 0.1 mm / *X ≤ 3.94 mils*

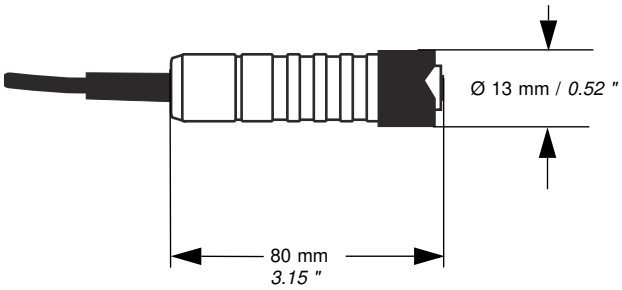
Base material thickness (D)



Measurement error ≥ 10 % for D ≤ 0.6 mm / *D ≤ 23.62 mils*

Admissible ambient temperature at operation	- 10 °C ... + 40 °C / *+ 14 °F ... + 104 °F*
Probe tip material	Hard metal
Probe tip replaceable	Yes
Probe tip radius	2,25 mm / *0.09 "*
Measuring method	Magnetic induction method according to ISO 2178, ASTM D7091, Non-magnetic coatings on magnetic substrates; Measurement of coating thickness; Magnetic method
Scope of supply	Probe, metal plate NF/FE for instrument check, calibration foils
Works with instruments	All DUALSCOPE® and DELTASCOPE® hand-held instruments of the series FMP and FISCHERSCOPE® MMS® PC2 with F-Module PERMASCOPE®

Dimensions



Cable length 1.50 m / *59.06 "*

FE06.1 doc04/12-1

Probe model	**FGB2**	
Part no.	FGB2; standard version	604-179
	FGB2L; cable 5 m	604-265

Applications	Measures nonmetallic and nonferrous coatings on steel or iron substrates (NC/Fe or NF/Fe). Widest measurement range of all single tip probes. Large geometric influence due to unshielded magnetic field, but small tilting effect. Probe is supplied in a temperature-stable design by default, suitable for alternating measurements with specimen temperatures up to 80°C. Dwell time on heated specimen: max. 1 sec, dwell time in air: min. 5 seconds. *The values for accuracy 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).*
Probe design	Axial single tip probe with spring-loaded measuring system
Measuring application	NC/Fe or NF/Fe
Measuring range	0 - 5 mm
Accuracy	0 - 0.1 mm: ± 1.5 µm 0.1 - 3 mm: ≤ 1.5 % of value 3 - 5 mm: ≤ 5 % of value
Precision	0 - 0.1 mm: ≤ 0.3 µm 0,1 - 3 mm: ≤ 0.3 % of value 3 - 5 mm: ≤ 0.5 % of value

The following values for measurement errors are valid for a substrate thickness of 0.2 mm

	Measurement error ≥ 10% for Ø ≤ 37 mm probe needs a minimum of Ø 9 mm
	Measurement error ≥ 10% for Ø ≤ 21.5 mm probe needs a minimum of Ø 2 mm
	Measurement error ≥ 10% for Ø ≤ 20 mm probe needs a minimum of Ø 6 mm
	Meas. error ≥ 10% for edge distance ≤ 1.5 mm
	Meas. error ≥ 10% for substrate thickness ≤ 0.6 mm

Temperature	0 °C ... +80 °C specimen temperature - 10 °C ... +40 °C ambient temperature
Probe tip material	PVD-coated steel
Probe tip replaceable	Yes
Height	-
Diameter / width	10 mm
Length	110 mm
Works with the instruments	FMP10/20/30/40/100, MMS® PC PERMASCOPE®, MMS® PC2 & F-Module PERMASCOPE®

FE06.1 doc11/09

Probe model	**FGBW2**	
Part no.	FGBW2	604-252

Applications	Measures nonmetallic and nonferrous coatings on steel or iron substrates (NC/Fe or NF/Fe). Good suited for measurements in pipes, bore holes or recesses. Not suited for measurements on rough surfaces. *The values for accuracy 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).*
Probe design	Single tip probe for angular measurements with spring-loaded measuring system
Measuring application	NC/Fe or NF/Fe
Measuring range	0 - 5 mm
Accuracy	0 - 0.1 mm: ± 1.5 µm 0.1 - 3 mm: ≤ 1.5 % of value 3 - 5 mm: ≤ 5 % of value
Precision	0 - 0.1 mm: ≤ 0.3 µm 0,1 - 3 mm: ≤ 0.3 % of value 3 - 5 mm: ≤ 0.5 % of value

The following values for measurement errors are valid for a substrate thickness of 0.2 mm

	Measurement error ≥ 10% for Ø ≤ 35 mm probe needs a minimum of Ø 18 mm
	Measurement error ≥ 10% for Ø ≤ 24 mm probe needs a minimum of Ø 2 mm
	Measurement error ≥ 10% for Ø ≤ 20 mm probe needs a minimum of Ø 6 mm
	Meas. error ≥ 10% for edge distance ≤ 1 mm
	Meas. error ≥ 10% for substrate thickness ≤ 0.6 mm

Temperature	0 °C ... +80 °C specimen temperature - 10 °C ... +40 °C ambient temperature
Probe tip material	PVD-coated steel
Probe tip replaceable	Yes
Height	23 mm
Diameter / width	14 mm
Length	72 mm
Works with the instruments	FMP10/20/30/40/100, MMS® PC2 & F-Module PERMASCOPE®

FE06.1 doc12/09

Probe model	**F20H**
Part no.	**604-535**
Applications	Measurement of electrically non-conductive and non-ferrous metal coatings on steel or iron base material (NC/Fe and NF/Fe). Measurement of metal (NF) or protective coatings (Iso) on iron and steel (Fe).
Examples	**Steel or iron base materials (Fe)** • Zinc, chromium, copper, paint, varnish, vulcanized rubber or plastic on iron, steel or cast iron (Fe) The probe is applicable for measurements both on smooth and rough surfaces.
Probe design	• Axial single tip probe with spring-loaded measuring system • Robust probe design with wear-resistant probe tip
Applications	NC/Fe or NF/Fe
*	*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).*
Measurement range*	**Steel or iron base materials (Fe)** 0 ... 2500 µm / *0 ... 98.43 mils*

Trueness*	**Steel or iron base materials (Fe)**	
based on Fischer standards	0 ... 100 µm: ≤ 1.5 µm	*0 ... 3.94 mils: ≤ 0.06 mils*
	100 ... 1000 µm: ≤ 1.5 % of reading	*3.94 ... 39.37 mils: ≤ 1.5 % of reading*
	1000 ... 2500 µm: ≤ 3 % of reading	*39.37 ... 98.43 mils: ≤ 3 % of reading*
Repeatability precision*	**Steel or iron base materials (Fe)**	
based on Fischer standards	0 ... 100 µm: ≤ 0.3 µm	*0 ... 3.94 mils: ≤ 0.012 mils*
	100 ... 2500 µm: ≤ 0.3 % of reading	*3.94 ... 98.43 mils: ≤ 0.3 % 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 Measurement of Uncertainty).

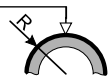
Curvature (R), measurement with reference to master calibration on flat surface

Measuring spot

Measurement error of 10 % for R = 33 mm ± 1.1 mm / *R = 1.3 " ± 0.043 "*
Probe needs a minimum of R = 20 mm (support stand necessary) / *R = 0.79 "*

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

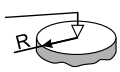
Measuring spot



Measurement error of 10 % for R = 31 mm ± 4.2 mm / *R = 1.22 " ± 0.17 "*
Probe needs a minimum of R = 1.5 mm (support stand necessary) / *R = 0.06 "*

Edge distance (R), specification from probe pole center

Measuring spot in the center of the circular surface

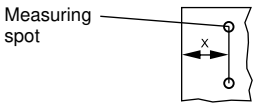


No measurement error as of R = 13.6 mm ± 0.3 mm / *R = 0.54 " ± 0.012 "*
Measurement error of 10 % for R = 6.8 mm ± 0.2 mm / *R = 0.27 " ± 0.0079 "*
Probe needs a minimum of R = 2.5 mm (support stand necessary) / *R = 0.098 "*

Influences*	**Steel or iron base materials (Fe)**

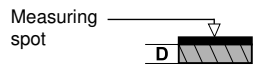
The following values are valid for a reference coating thickness of 75 µm / 2.95 mils.
The measurement errors are stated with the expanded measurement uncertainty U with the expanded factor of k = 2 (defines an interval with the confidence level of 95.45 %) - according to DIN V ENV 13005 "Leitfaden zur Angabe der Unsicherheit beim Messen" (Guide to Measurement of Uncertainty).

Edge distance (X), specification from probe pole center



No measurement error as of X = 4.4 mm ± 0.3 mm / *X = 0.17 " ± 0.012 "*
Measurement error of 10 % for X = 1.4 mm ± 0.12 mm / *X = 0.055 " ± 0.0047 "*

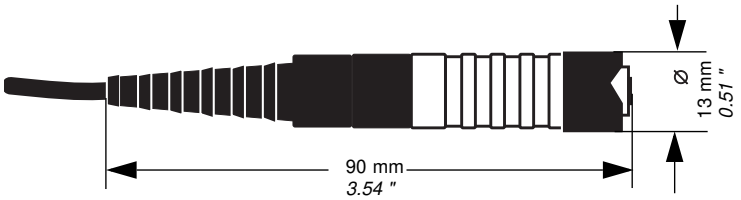
Base material thickness (D)



No measurement error as of D = 1.1 mm ± 0.12 mm / *D = 0.043 " ± 0.0047 "*
Measurement error of 10 % for D = 0.6 mm ± 0.03 mm / *D = 0.024 " ± 0.0012 "*

Base material	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 138.1 FN ± 0.05 FN onwards. Measurement error of 10 % for ferrite content of 126 FN ± 0.2 FN.
Admissible ambient temperature at operation	- 10 °C ... + 40 °C / *+ 14 °F ... + 104 °F*
Probe tip material	Hard metal
Probe tip replaceable	No
Probe tip radius	2 mm / *0.079 "*
Measuring method	Magnetic induction method according to ISO 2178, ASTM D7091, Non-magnetic coatings on magnetic substrates; Measurement of coating thickness; Magnetic method
Scope of supply	Probe, metal plate NF/FE for instrument check, calibration foils
Works with instruments	All DUALSCOPE® and DELTASCOPE® hand-held instruments of the series FMP and FISCHERSCOPE® MMS® PC2 with F module PERMASCOPE®

Dimensions



FE07.1 doc04/12

Probe model	**FK50**	
Part no.	FK50	604-185

Applications	Measures nonmetallic and nonferrous coatings on steel or iron substrates (NC/Fe or NF/Fe). Especially suited for very thick, nonmetallic coatings. For austenitic stainless steel coatings smaller measurement errors due to ferromagnetic delta ferrite content than with all other types of probes. *The values for accuracy 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).*
Probe design	Double tip probe for angular measurements with fixed measuring system
Measuring application	NC/Fe or NF/Fe
Measuring range	0.01 - 30 mm
Accuracy	0.03 - 1 mm: 25 µm 1 - 15 mm: < 2.5 % of value 15 - 30 mm: < 5 % of value
Precision	0.03 - 0.5 mm: 0.0025 mm 0.5 - 30 mm: 0.5 % of value

The following values for measurement errors are valid for a substrate thickness of 1 mm

	Measurement error ≥ 10% for Ø ≤ 140 mm probe needs a minimum of Ø 14 mm
	Measurement error ≥ 10% for Ø ≤ 100 mm probe needs a minimum of Ø 10 mm
	Measurement error ≥ 10% for Ø ≤ - probe needs a minimum of Ø 70 mm
	Meas. error ≥ 10% for edge distance ≤ 7 mm
	Meas. error ≥ 10% for substrate thickness ≤ 1.2 mm

Temperature	- 10 °C ... +40 °C ambient temperature
Probe tip material	Heat treated steel
Probe tip replaceable	Yes
Height	33 mm
Diameter / width	20 mm
Length	95 mm
Works with the instruments	FMP10/20/30/40/100, MMS® PC2 & F-Module PERMASCOPE®

FE02.5 doc12/09

Probe model	**FKB4**	
Part no.	FKB4	604-284

Applications	Measures nonmetallic and nonferrous coatings on steel or iron substrates (NC/Fe or NF/Fe). Well suited for thin coatings. Higher measurement precision on rough surfaces than single tip probes. *The values for accuracy 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).*
Probe design	Double tip probe for angular measurements with fixed measuring system
Measuring application	NC/Fe or NF/Fe
Measuring range	0 - 2000 µm
Accuracy	0 - 100 µm: ± 1 µm 100 - 1500 µm: ≤ 1 % of value 1500 - 2000 µm: ≤ 3 % of value
Precision	0 - 50 µm: ≤ 0.3 µm 50 - 2000 µm: ≤ 0.6 % of value

The following values for measurement errors are valid for a substrate thickness of 75 µm

	Measurement error ≥ 10% for Ø ≤ 54 mm probe needs a minimum of Ø 20 mm
	Measurement error ≥ 10% for Ø ≤ 29 mm probe needs a minimum of Ø 2 mm
	Measurement error ≥ 10% for Ø ≤ 6 mm probe needs a minimum of Ø 6 mm
	Meas. error ≥ 10% for edge distance ≤ 1.5 mm
	Meas. error ≥ 10% for substrate thickness ≤ 0.5 mm

Temperature	- 10 °C ... +40 °C ambient temperature
Probe tip material	PVD-coated steel
Probe tip replaceable	Yes
Height	21 mm
Diameter / width	12 mm
Length	18 mm
Works with the instruments	FMP10/20/30/40/100, MMS® PC2 F-Module PERMASCOPE®

FE06.3 doc12/09

	FKB10
Probe model	**604-177**
Applications	Measurement of non-conductive and non-ferrous metal coatings on steel or iron base materials (NC/Fe or NF/Fe). Especially suited for thick coatings. Higher measurement precision on rough surfaces than single tip probes.
Examples	**Steel or iron base materials (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)
Probe design	Double tip angle probe with fixed measuring system
Applications	NC/Fe or NF/Fe
*	*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).*
Measurement range*	**Steel or iron base materials (Fe)** 0 ... 8 mm / *0 ... 314.96 mils*
Trueness* based on Fischer standards	**Steel or iron base materials (Fe)** 0 ... 0.5 mm: ≤ 0.01 mm 0.5 ... 8.0 mm: ≤ 2 % of reading *0 ... 19.69 mils: ≤ 0.39 mils* *19.69 ... 314.96 mils: ≤ 2 % of reading*
Repeatability precision* based on Fischer standards	**Steel or iron base materials (Fe)** 0 ... 0.5 mm: ≤ 0.0025 mm 0.5 ... 8.0 mm: ≤ 0.5 % of reading *0 ... 19.69 mils: ≤ 0.1 mils* *19.69 ... 314.96 mils: 0.5 % of reading*
Influences*	**Steel or iron base materials (Fe)**

The following values are valid for a reference coating thickness of 0.2 mm (7.87 mils).

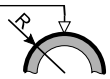
Curvature (R), measurement with reference to master calibration on flat surface

Measuring spot

Measurement error ≥ 10 % for R ≤ 37,5 mm / *R ≤ 1.48 "*
Probe needs a minimum of R = 12 mm / *R = 0.47 "*

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

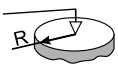
Measuring spot



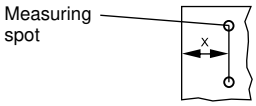
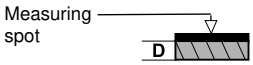
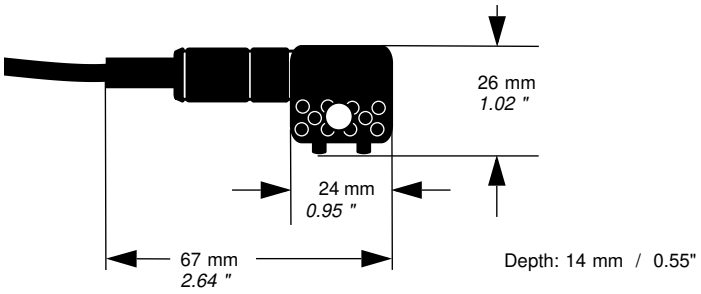
Measurement error ≥ 10 % for R ≤ 25 mm / *R ≤ 0.98 "*
Probe needs a minimum of R = 1 mm / *R = 0.04 "*

Edge distance (R), specification from probe pole center

Measuring spot in the center of the circular surface



Measurement error ≥ 10 % for R ≤ 15 mm / *R ≤ 059 "*
Probe needs a minimum of R = 10 mm / *R = 0.39 "*

Influences*	**Steel or iron base materials (Fe)**
The following values are valid for a reference coating thickness of 0.2 mm (7.87 mils).	
Edge distance (X), specification from probe pole center 	No specification
Base material thickness (D) 	Measurement error ≥ 10 % for D ≤ 0.5 mm / *D ≤ 19.69 mils*
Admissible ambient temperature at operation	- 10 °C ... + 40 °C / *+ 14 °F ... + 104 °F*
Probe tip material	PVC-coated steel
Probe tip replaceable	Yes
Probe tip radiuses	1,5 mm each / *59.06 mils each*
Measuring method	Magnetic induction method according to ISO 2178, ASTM D7091, Non-magnetic coatings on magnetic substrates; Measurement of coating thickness; Magnetic method
Scope of supply	Probe, metal plate NF/FE for instrument check, calibration foils/plates
Works with instruments	All DUALSCOPE® and DELTASCOPE® hand-held instruments of the series FMP and FISCHERSCOPE® MMS® PC2 with F-Module PERMASCOPE®
Dimensions	 Cable length: 1.50 m / *59.06 "*

FE02.4 doc03/12

Probe model	**FKB10-OD**	
Part no.	FKB10-OD	604-219

Applications	Measures nonmetallic and nonferrous coatings on steel or iron substrates (NC/Fe or NF/Fe). The large flat contact surface is especially well suited for thick and compressible soft coatings (for example rubber sheeting for offset printing). *The values for accuracy 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).*
Probe design	Double tip probe for angular measurements with fixed measuring system
Measuring application	NC/Fe or NF/Fe
Measuring range	0 - 8 mm
Accuracy	0 - 0.5 mm: 0.005 mm 0.5 - 8 mm: < 1 % of value
Precision	0 - 0.5 mm: 0.0015 mm 0.5 - 8 mm: 0.3 % of value

The following values for measurement errors are valid for a substrate thickness of 75 µm

	Measurement error ≥ 10% for Ø ≤ for flat specimen only probe needs a minimum of Ø
	Measurement error ≥ 10% for Ø ≤ 50 mm probe needs a minimum of Ø -
	Measurement error ≥ 10% for Ø ≤ 30 mm probe needs a minimum of Ø 38 mm
	-
	Meas. error ≥ 10% for substrate thickness ≤ 0.5 mm
Temperature	- 10 °C ... +40 °C ambient temperature
Probe tip material	Hard plastics
Probe tip replaceable	No
Height	26 mm
Diameter / width	24 mm
Length	53 mm
Works with the instruments	FMP10/20/30/40/100, MMS® PC2 & F-Module PERMASCOPE®

FE02.3 doc09/09

Probe model	**FKB25**	
Part no.	FKB25	604-266

Applications	Measures nonmetallic and nonferrous coatings on steel or iron substrates (NC/Fe or NF/Fe). Especially suited for thick, nonmetallic coatings. *The values for accuracy 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).*
Probe design	Double tip probe for angular measurements with fixed measuring system
Measuring application	NC/Fe or NF/Fe
Measuring range	0 - 15 mm
Accuracy	0 - 1 mm: 0.02 mm 1 - 7 mm: < 2 % of value 7 - 15 mm: < 5 % of value
Precision	0 - 1 mm: 0.005 mm 1 - 15 mm: 0.5 % of value

The following values for measurement errors are valid for a substrate thickness of 0.5 mm

	Measurement error ≥ 10% for Ø ≤ 85 mm probe needs a minimum of Ø 20 mm
	Measurement error ≥ 10% for Ø ≤ 60 mm probe needs a minimum of Ø 10 mm
	Measurement error ≥ 10% for Ø ≤ - probe needs a minimum of Ø 40 mm
	Meas. error ≥ 10% for edge distance ≤ 5 mm
	Meas. error ≥ 10% for substrate thickness ≤ 0.7 mm

Temperature	- 10 °C ... +40 °C ambient temperature
Probe tip material	PVD-coated steel
Probe tip replaceable	Yes
Height	33 mm
Diameter / width	20 mm
Length	65 mm
Works with the instruments	FMP10/20/30/40/100, MMS® PC2 & F-Module PERMASCOPE®

FE02.5 doc12/09

Probe model	**V1FGA1HR34**	
Part no.	V1FGA1HR34	604-183

Applications	Measures nonmetallic and nonferrous coatings on steel or iron substrates (NC/Fe or NF/Fe). Suited for measurements in bore holes, pipes or grooves. To obtain the smallest possible measurement uncertainty, externally triggered measurement acquisition should be used when measuring small inside diameters. Smallest permissible inside diameter: 7 mm. Maximum insertion depth: 60 mm. *The values for accuracy 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).*
Probe design	Single tip probe for inside measurement applications with fixed measuring system
Measuring application	NC/Fe or NF/Fe
Measuring range	0 - 1000 µm
Accuracy	0 - 75 µm: ± 1.5 µm 75 - 700 µm: ± 2 % of value 700 - 1000 µm: ≤ 3 % of value
Precision	0 - 100 µm: ≤ 0.8 µm 100 - 700 µm: ≤ 0.8 % of value 700 µm - 1000 µm: ≤ 1 % of value

The following values for measurement errors are valid for a substrate thickness of 75 µm

	Measurement error ≥ 10% for Ø ≤ 24 mm probe needs a minimum of Ø 7 mm
	Measurement error ≥ 10% for Ø ≤ 11 mm probe needs a minimum of Ø 2 mm
	Measurement error ≥ 10% for Ø ≤ 6.4 mm probe needs a minimum of Ø 3 mm
	Meas. error ≥ 10% for edge distance ≤ 0.2 mm
	Meas. error ≥ 10% for substrate thickness ≤ 0.35 mm

Temperature	- 10 °C ... +40 °C ambient temperature
Probe tip material	Hard metal
Probe tip replaceable	No
Height	4.3 mm
Diameter / width	4 mm
Length	120 mm
Works with the instruments	FMP10/20/30/40/100, MMS® PC2 & F-Module PERMASCOPE®

FE06.1 doc12/09

Probe model	**V3FGA06H**	
Part no.	V3FGA06H	604-517

Applications	Measures nonmetallic (NC) and nonferrous coatings (NF) on steel or iron substrates (Fe). Special probe with flexible measuring head and 3 point support for measurement in cavities. Best suited for automotive industry for measuring of KTL coatings (typical below 25 µm including Zn coating) within the holms of car bodies. Less recommended for very rough surfaces. *The values for accuracy 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 metal coating materials (NF).*
Probe design	Probe with fixed measuring system in flexible measuring head with 3 point support
Measuring application	NC/Fe or NF/Fe
Measuring range	0 - 350 µm
Accuracy	0 - 50 µm: ± 0.5 µm 50 - 200 µm: ± 1 % of value 200 - 350 µm: ≤ 4 % of value
Precision	0 - 50 µm: 0.25 µm 50 - 350 µm: ≤ 0.5 % of value

The following values for measurement errors are valid for a substrate thickness of 25 µm

	Measurement error -8 % for Ø Probe needs a minimum of Ø	40 mm 40 mm
	Measurement error 5 % for Ø Probe needs a minimum of Ø	32 mm 32 mm
	No measurement error for Ø Probe needs a minimum of Ø	13 mm 13 mm
	Meas. error 10% for a edge distance of	0.5 mm
	Meas. error 10% for a substrate thickness of	0.3 mm

Temperature	- 10 °C ... +40 °C ambient temperature
Probe tip material	Hard metal
Probe tip replaceable	No
Height	60 mm
Width	12 mm
Length	260 mm
Works with the instruments	FMP10/20/30/40/100 (not ISOSCOPE®), MMS® PC2 & F-Module PERMASCOPE®

FE06.2 doc06/10

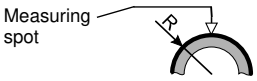
	V7FKB4	V7FKB4L5
Probe model	**604-180**	**604-530**
Applications	Measurement of electrically non-conductive and non-ferrous metal coatings on steel or iron base material (NC/Fe and NF/Fe). The probes are well suited for measurement of thin coatings and feature higher repeatability precision than single tip probes when measuring rough surfaces.	
Examples	**Steel, iron, cast iron base materials (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)	
Probe design	Axial double tip probe with spring-loaded measuring system	
Applications	NC/Fe or NF/Fe	
*	*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).*	
Measurement range*	**Steel, iron, cast iron base materials (Fe)** 0 ... 2000 µm / *0 ... 78.74 mils*	
Trueness*	**Steel, iron, cast iron base materials (Fe)**	
based on Fischer standards	0 ... 100 µm: ≤ 1 µm 100 ... 1500 µm: ≤ 1 % of reading 1500 ... 2000 µm: ≤ 3 % of reading	*0 ... 3.94 mils: ≤ 0.04 mils* *3.94 ... 59.06 mils: ≤ 1 % of reading* *59.06 ... 78.74 mils: ≤ 3 % of reading*
Repeatability precision*	**Steel, iron, cast iron base materials (Fe)**	
based on Fischer standards	0 ... 100 µm: ≤ 0.2 µm 100 ... 2000 µm: ≤ 0.2 % of reading	*0 ... 3.94 mils: ≤ 0.008 mils* *3.94 ... 78.74 mils: ≤ 0.2 % of reading*
Influences*	**Steel, iron, cast iron base materials (Fe)**	

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

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

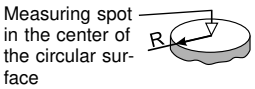
Measurement error ≥ 10 % for R ≤ 22 mm / *R ≤ 0.87 "*
Probe needs a minimum of R = 22 mm (support stand necessary) / *R = 0.87 "*

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



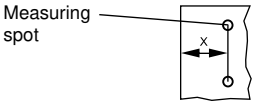
Measurement error ≥ 10 % for R ≤ 14.5 mm / *R ≤ 0.57 "*
Probe needs a minimum of R = 2 mm (support stand necessary) / *R = 0.08 "*

Edge distance (R), specification from probe pole center

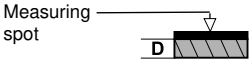
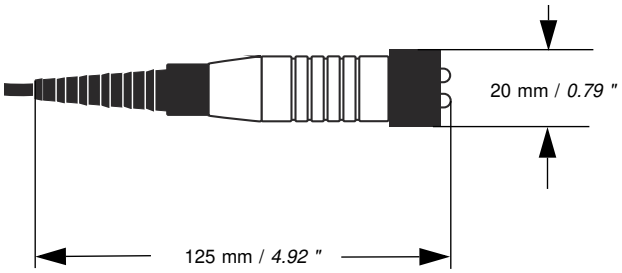


No measurement error as of R = 14 mm / *R = 0.55 "*
Measurement error ≥ 10 % for R ≤ 6 mm / *R ≤ 0.24 "*
Probe needs a minimum of R = 3 mm (support stand necessary) / *R = 0.12 "*

Edge distance (X), specification from probe pole center



No measurement error as of R = 5 mm / *R = 0.2 "*
Measurement error ≥ 10 % for X ≤ 0.6 mm / *X ≤ 23.62 mils*

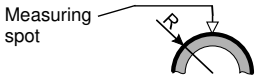
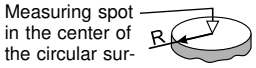
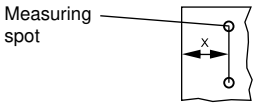
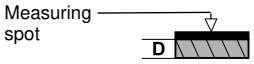
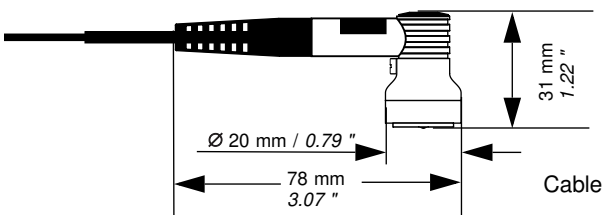
Influences*	**Steel, iron, cast iron base materials (Fe)**
The following values are valid for a reference coating thickness of 75 µm / 2.95 mils.	
Base material thickness (D) Measuring spot 	Measurement error ≥ 10 % for D ≤ 0.7 mm / *D ≤ 27.56 mils*
Admissible ambient temperature at operation	- 10 °C ... + 40 °C / *+ 14 °F ... + 104 °F*
Probe tip material	PVD coated steel
Probe tip replaceable	Yes
Probe tip radius	1.25 mm / *0.05 "*
Measuring method	Magnetic induction method according to ISO 2178, ASTM D7091, Non-magnetic coatings on magnetic substrates; Measurement of coating thickness; Magnetic method
Scope of supply	Probe, metal plate NF/FE for instrument check, calibration foils
Works with instruments	All DUALSCOPE® and DELTASCOPE® hand-held instruments of the series FMP and FISCHERSCOPE® MMS® PC2 with F-Module PERMASCOPE®
Dimensions	 V7FKB4: Cable length 1.50 m / *59.06 "* V7FKB4L5: Cable length 5 m / *196.85 "*

FE06.4 doc04/12

Probe model	**FA14**	
Part no.	**604-589**	
Applications	Measurement of thicker isolation coatings (Iso) either on nonferrous metal substrates (NF) or on steel, iron or cast iron (Fe). The probe is particularly suited for measurements of thick coatings with rough surfaces, e.g. for acoustic absorption coatings in car bodies.	
Examples	**Non-ferrous metal base materials (NF)** • Paint, varnish, vulcanised rubber or plastic coatings on aluminum, copper or brass (NF) The probes feature a patented conductivity compensation. So that the different electrical conductivities of e.g. various aluminum alloys have no effect of the coating thickness measurement.	**Steel, iron, cast iron base materials (Fe)** • Paint, varnish, vulcanised rubber or plastic coatings on steel, iron or cast iron (Fe)
Probe design	Axial single tip probe with spring-loaded measuring system	
Applications	NC/NF	NC/Fe
Measurement range	**Non-ferrous metal base materials (NF)** 0 ... 5 mm / *0 ... 196.85 mils*	**Steel, iron, cast iron base materials (Fe)**
Trueness based on Fischer standards	**Non-ferrous metal base materials (NF)** 0 ... 0.5 mm: ≤ 0.0075 mm 0.5 ... 4 mm: ≤ 1.5 % of reading 4 ... 5 mm: ≤ 2 % of reading *0 ... 19.68 mils: ≤ 0.30 mils* *19.68 ... 157.48 mils: ≤ 1.5 % of reading* *157.48 ... 196.85 mils: ≤ 2 % of reading*	**Steel, iron, cast iron base materials (Fe)** The following values are valid after performing a specific 2-point-calibration on Fe base material for each thickness range listed below. 0 ... 1 mm: ≤ 0.01 mm 1 ... 5 mm: ≤ 2 % of reading *0 ... 39.37 mils: ≤ 0.39 mils* *39.37 ... 196.85 mils: ≤ 2 % of reading*
Repeatability precision based on Fischer standards	**Non-ferrous metal base materials (NF)** 0 ... 1 mm: ≤ 0.002 mm 1 ... 5 mm: ≤ 0.2 % of reading *0 ... 39.37 mils: ≤ 0.079 mils* *39.37 ... 196.85 mils: ≤ 0.2 % of reading*	**Steel, iron, cast iron base materials (Fe)** The following values are valid after performing a specific 2-point-calibration on Fe base material for each thickness range listed below. 0 ... 1 mm: ≤ 0.004 mm 1 ... 5 mm: ≤ 0.4 % of reading *0 ... 39.37 mils: ≤ 0.157 mils* *39.37 ... 196.85 mils: ≤ 0.4 % of reading*
Influences	**Aluminum base material**	**Steel, iron, cast iron base materials (Fe)**

The following values are valid for a reference coating thickness of 0.2 mm (7.87 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 Measurement of Uncertainty).

Curvature (R), measurement with reference to master calibration on flat surface		
Measuring spot 	No measurement error as of R = 683 mm ± 42 mm / *R = 26.89 " ± 1.65 "* Measurement error of 10 % for R = 238 mm ± 9 mm / *R = 9.37 " ± 0.35 "* Probe needs a minimum of R = 35 mm (support stand necessary) / *R = 1.38 "*	No specification

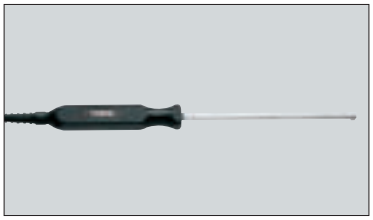
Influences	**Aluminum base material**	**Steel, iron, cast iron base materials (Fe)**
The following values are valid for a reference coating thickness of 0.2 mm (7.87 mils). The measurement errors are stated with the expanded measurement uncertainty U with the expanded factor of k = 2 (defines an interval with the confidence level of 95.45 %) - according to DIN V ENV 13005 "Leitfaden zur Angabe der Unsicherheit beim Messen" (Guide to Measurement of Uncertainty).		
Curvature (R), measurement with reference to master calibration on flat surface 	No measurement error as of R = 530 mm ± 26 mm / *R = 20.87 " ± 1.02 "* Measurement error of 10 % for R = 207 mm ± 7.4 mm / *R = 8.15 " ± 0.29 "* Probe needs a minimum of R = 5 mm (support stand necessary) / *R = 0.2 "*	No specification
Edge distance (R), specification from probe pole center 	No measurement error as of R = 10 mm / *R = 0.39 "* Probe needs a minimum of R = 4 mm (support stand necessary) / *R = 0.16 "*	No specification
Edge distance (X), specification from probe pole center 	No measurement error as of X = 5 mm ± 0.07 mm / *X = 0.2 " ± 0.003 "* Measurement error of 10 % for X = 4.4 mm ± 0.03 mm / *X = 0.17 " ± 0.001 "*	No specification
Base material thickness (D) 	No measurement error as of D = 0.052 mm ± 0.004 mm *D = 2.05 mils ± 0.16 mils* Measurement error of 10 % for D = 0.027 mm ± 0.001 mm *D = 1.06 mils ± 0.039 mils*	No specification
Base material	Influence of the el. conductivity of the base material (NF) in the range from 30 to 100 % IACS: deviation of the coating thickness is ≤ 5 %. For reference coating thickness up from 0.75 mm (*29.53 mils*), the deviation of the coating thickness is ≤ 2 % in the range of 30 to 100 % IACS.	No specification
Admissible ambient temperature at operation	- 10 °C ... + 40 °C / *+ 14 °F ... + 104 °F*	
Probe tip material	Jewel tip	
Probe tip replaceable	No	
Probe tip radius	8 mm / *0.32 "*	
Measuring method	Amplitude sensitive eddy current method according to ISO 2360, ASTM D7091, Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating Thickness - Amplitude-sensitive eddy current method	
Scope of supply	Probe, metal plates ISO/NF and NF/FE for instrument check, calibration foils	
Works with instruments	All DUALSCOPE® and ISOSCOPE® hand-held instruments of the series FMP and FISCHERSCOPE® MMS® PC2 with F-Module PERMASCOPE®	
Dimensions	 Cable length: 1.50 m / *59.06 "*	

FE07.1 doc04/12

Probe model	FA9	
Version description **Part no.**	**FA9** 604-188	
Probe design	Single tip probe for angular measurements with spring-loaded measuring system	*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode	*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Eddy current method	*Method used for the specified measuring application.*
Measuring application	Iso/NF	*Measurable coating/substrate material system.*
Measuring range	0 - 3,5 mm	*Limits of the measurable coating thickness.*
Accuracy	up to 0.25 mm: up to ± 0.005 mm 0.25 - 2.5 mm : up to ± 2 % 2.5 - 3.5 mm: up to ± 3 %	*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading.*
Precision	bis/up to 1 mm: < 0.002 mm 1 - 2.5 mm: < 0.2 % 2.5 - 3.5 mm: < 0.4 %	*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	175 mm 40 mm	7“ 1.6“ 	*Diameter of a specimen with a concave curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	175 mm 2 mm	7“ 80 mils 	*Diameter of a specimen with a convex curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	8 mm 5 mm	320 mils 200 mils 	*Diameter of a flat measurement area, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	3 mm	120 mils 	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %.* *For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	< 0.1 mm	< 4 mils 	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an “infinitely” thick substrate material.*
Probe tip radius	8 mm	320 mils	*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Heat treated steel		*Material of the measuring tip.*
Probe tip replaceable	No		*Specifies, whether a worn measuring tip can be replaced or not.*
Height	23 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Diameter / width	14 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Length	72 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Works with the instruments	FMP10/20/30/40/100, MMS® PC & F-Modul PERMASCOPE®		*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures electrically non-conducting coatings on non-ferromagnetic metal substrate materials (Iso/NF). Suited for the measurement of thicker plastic or rubber coatings.		*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*

Probe model	FA30		
Version description **Part no.**	**FA30** 604-213		
Probe design	Single tip angle probe with fixed measurement system		*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode		*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Eddy current method		*Method used for the specified measuring application.*
Measuring application	Iso/NF, Fe		*Measurable coating/substrate material system.*
Measuring range	0 - 20 mm		*Limits of the measurable coating thickness.*
Accuracy	0 - 2 mm: 0.04 mm 2 - 20 mm: < 2 %		*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading.*
Precision	0 - 1 mm: 0.002 mm 1 - 20 mm: 0.2 %		*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	- -	- -	*Diameter of a specimen with a concave curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	1200 mm 400 mm	48“ 16“	*Diameter of a specimen with a convex curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	42 mm 34 mm	1680 mils 1360 mils	*Diameter of a flat measurement area, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	-	-	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %.* *For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	0.09 mm	4 mils	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an “infinitely” thick substrate material.*
Probe tip radius	Flat: ø 34 mm	Flat: ø 1.36“	*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Hard plastics		*Material of the measuring tip.*
Probe tip replaceable	No		*Specifies, whether a worn measuring tip can be replaced or not.*
Height	43 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Diameter / width	34 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Length	60 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Works with the instruments	FMP10/20/30/40/100, MMS® PC & F-Modul PERMASCOPE®		*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures electrically non-conducting coatings on non-ferromagnetic metal substrate materials (Iso/NF) or on steel or iron (Iso/Fe). Suitable for the measurement of thicker plastic or rubber coatings; also to measure the wall thickness of, for example, plastic tanks with an aluminum backing foil. For surfaces with a larger curvature, a V-groove adapter shoe has to be used.		*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*

Probe model	FA70	
Version description **Part no.**	**FA70** 604-191	
Probe design	Single tip angle probe with fixed measurement system	*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode	*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Eddy current method	*Method used for the specified measuring application.*
Measuring application	Iso/NF, Fe	*Measurable coating/substrate material system.*
Measuring range	0 - 50 mm	*Limits of the measurable coating thickness.*
Accuracy	0 - 5 mm: 0.1 mm 5 - 50 mm: < 2 %	*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading.*
Precision	0 - 50 mm: 0.3 %	*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	- -	- - 	*Diameter of a specimen with a concave curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	2500 mm 600 mm	98“ 24“ 	*Diameter of a specimen with a convex curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	82 mm 74 mm	3.3“ 3“ 	*Diameter of a flat measurement area, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	-	- 	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %.* *For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	0.09 mm	4 mils 	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an “infinitely” thick substrate material.*
Probe tip radius	Flat: ø 74 mm	Flat: ø 3“	*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Hard plastics		*Material of the measuring tip.*
Probe tip replaceable	No		*Specifies, whether a worn measuring tip can be replaced or not.*
Height	43 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Diameter / width	74 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Length	80 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Works with the instruments	FMP10/20/30/40/100, MMS® PC & F-Modul PERMASCOPE®		*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures electrically non-conducting coatings on non-ferromagnetic metal substrate materials (Iso/NF) or on steel and iron (Iso/Fe). Suitable for the measurement of thicker plastic or rubber coatings; also to measure the wall thickness of, for example, plastic tanks with an aluminum backing foil. For surfaces with a larger curvature, a V-groove adapter shoe has to be used.	*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*



Probe model	FAI3.3-150	
Version description **Part no.**	**FAI3.3-150 shaft length 150 mm** 604-187 **FAI3.3-260 shaft length 260 mm** 604-336	
Probe design	Single tip inside probe with spring-loaded measuring system	*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode	*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Eddy current method	*Method used for the specified measuring application.*
Measuring application	Iso/NF	*Measurable coating/substrate material system.*
Measuring range	0 - 800 µm	*Limits of the measurable coating thickness.*
Accuracy	1 - 200 µm: 1 µm 200 - 800 µm: < 0.5 %	*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading.*
Precision	1 - 100 µm: 0.3 µm 100 - 800 µm: 0.3 %	*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	55 mm 2.2“ 9 mm 360 mils	*Diameter of a specimen with a concave curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	50 mm 2“ 2 mm 80 mils	*Diameter of a specimen with a convex curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	4 mm 160 mils 2 mm 80 mils	*Diameter of a flat measurement area, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	- -	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %.* *For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	0.09 mm 4 mils	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an “infinitely” thick substrate material.*
Probe tip radius	1.2 mm 48 mils	*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Saphire jewel tip	*Material of the measuring tip.*
Probe tip replaceable	Yes	*Specifies, whether a worn measuring tip can be replaced or not.*
Height	6,5 mm	*Ref. graphic in the section „Note regarding the probe dimensions“*
Diameter / width	5,5 mm	*Ref. graphic in the section „Note regarding the probe dimensions“*
Length	Depending on version	*Ref. graphic in the section „Note regarding the probe dimensions“*
Works with the instruments	FMP10/20/30/40/100, MMS® PC & F-Modul PERMASCOPE®	*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures electrically non-conducting coatings on non-ferromagnetic metal substrate materials (Iso/NF). Suited for measurements in pipes, bore holes, grooves, etc. External start should be used to avoid contact errors. Smallest permissible inside diameter: 9 mm. Maximum insertion depth: 150 mm.	*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*

	FAW3.3
Probe model	**604-193**
Applications	Measures electrically non-conducting coatings on non-ferrous metal base material (NC/NF). Suited for measurements on plane specimens or in pipes bore holes and recesses. Can possibly also be used when surfaces exhibit a damp condition (acidic contamination of test surface).
Examples	• Paint, varnish or plastic coatings on aluminum, copper or brass (NC/NF) The probe features a patented conductivity compensation. So that the different electrical conductivities of e.g. various aluminum alloys have no effect of the coating thickness measurement.
Probe design	Single tip angle probe with spring-loaded measuring system
Applications	NC/NF
Measurement range	**Non-ferrous metal base materials (NF)** 0 ... 1200 µm / *0 ... 47.24 mils*
Trueness based on Fischer standards	**Non-ferrous metal base materials (NF)** 0 ... 100 µm: ≤ 1 µm 100 ... 800 µm: ≤ 1 % of reading 800 ... 1200 µm: ≤ 3 % of reading *0 4... 3.94 mils: ≤ 0.04 mils* *3.94 ... 31.50 mils:* ≤ *1 %* of reading *31.50 ... 47.24 mils:* ≤ *3 %* of reading
Repeatability precision based on Fischer standards	**Non-ferrous metal base materials (NF)** 0 ... 100 µm: ≤ 0.5 µm 100 ... 1200 µm: ≤ 0.5 % of reading *0 ... 3.94 mils: ≤ 0.02 mils* *3.94 ... 47.24 mils:* ≤ *0.5 %* of reading
Influences	**Aluminum base material**

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

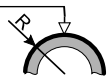
Curvature (R), measurement with reference to master calibration on flat surface

Measuring spot

Measurement error ≥ 10 % for R ≤ 31 mm / *R ≤ 1.22 "*
Probe needs a minimum of R = 13 mm (support stand necessary) / *R = 0.51 "*

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

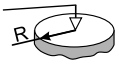
Measuring spot



Measurement error ≥ 10 % for R ≤ 27 mm / *R ≤ 1.06 "*
Probe needs a minimum of R = 1 mm (support stand necessary) / *R = 39.37 mils*

Edge distance (R), specification from probe pole center

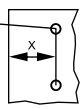
Measuring spot in the center of the circular surface



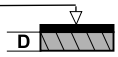
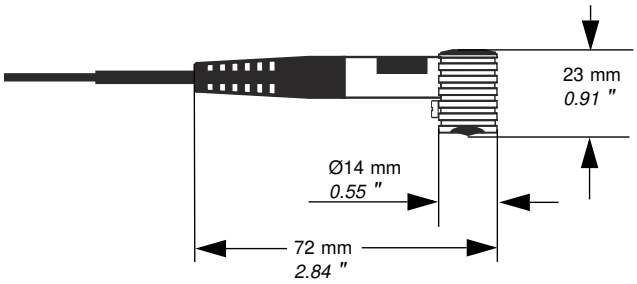
No measurement error as of R > 6 mm / *R > 0.24 "*
Measurement error ≥ 10 % for R ≤ 1.5 mm / *R = 59.06 mils*
Probe needs a minimum of R = 1 mm (support stand necessary) / *R = 39.37 mils*

Edge distance (X), specification from probe pole center

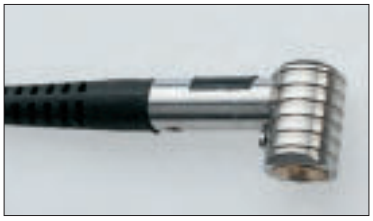
Measuring spot



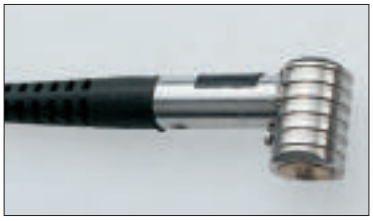
No measurement error as of X > 2 mm / *X > 78.74 mils*
Measurement error ≥ 10 % for X ≤ 1.2 mm / *X ≤ 47.24 mils*

Influences	**Aluminum base material**
The following values are valid for a reference coating thickness of 75 µm / 2.95 mils.	
Base material thickness (D) Measuring spot 	Measurement error ≥ 10 % for D ≤ 0.1 mm / *D = 3.94 mils*
Base material	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*
Probe tip material	Jewel tip
Probe tip replaceable	Yes
Probe tip radius	1,2 mm / *47.24 mils*
Measuring method	Amplitude sensitive eddy current method according to ISO 2360, ASTM D7091, Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating Thickness - Amplitude-sensitive eddy current method
Scope of supply	Probe, metal plate ISO/NF for instrument check, calibration foils
Works with instruments	All DUALSCOPE® and ISOSCOPE® hand-held instruments of the series FMP and FISCHERSCOPE® MMS® PC2 with F-Module PERMASCOPE®
Dimensions	 Cable length: 1.50 m / *59.06 "*

FE06 doc04/12



Probe model	FAW3.3-5.6	
Version description **Part no.**	**FAW3.3-5.6** 604-223	
Probe design	Single tip probe for angular measurements with spring-loaded measuring system	*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode	*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Eddy current method	*Method used for the specified measuring application.*
Measuring application	Iso/NF	*Measurable coating/substrate material system.*
Measuring range	0 - 1200 µm	*Limits of the measurable coating thickness.*
Accuracy	up to 50 µm: 0.75 µm 50 - 800 µm: ± 1.5 % 800 - 1200 µm: < 3 %	*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading.*
Precision	bis/up to 100 µm: 0.7 µm 100 - 1200 µm: < 0.7 %	*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	47 mm / 1.88“ 40 mm / 1.6“	*Diameter of a specimen with a concave curvature, under which the error is > 10 %. Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	54 mm / 2.16“ 2 mm / 80 mils	*Diameter of a specimen with a convex curvature, under which the error is > 10 %. Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	3 mm / 120 mils 2 mm / 200 mils	*Diameter of a flat measurement area, under which the error is > 10 %. Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	1.2 mm / 48 mils	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %. For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	< 0.1 mm / < 4 mils	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an “infinitely” thick substrate material.*
Probe tip radius	5.6 mm / 220 mils	*Radius of the probe measuring tip. The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Alumina	*Material of the measuring tip.*
Probe tip replaceable	Yes	*Specifies, whether a worn measuring tip can be replaced or not.*
Height	23 mm	*Ref. graphic in the section „Note regarding the probe dimensions“*
Diameter / width	14 mm	*Ref. graphic in the section „Note regarding the probe dimensions“*
Length	72 mm	*Ref. graphic in the section „Note regarding the probe dimensions“*
Works with the instruments	FMP10/20/30/40/100, MMS® PC & F-Modul PERMASCOPE®	*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures electrically non-conducting coatings on non-ferromagnetic metal substrate materials (Iso/NF). Due to the larger radius of the probe tip, lower measurement scatter on rough surfaces than with FAW3.3 probe.	*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*



Probe model	FAW3.3-5.6 HF	
Version description **Part no.**	**FAW3.3-5.6 HF** 604-224	
Probe design	Single tip probe for angular measurements with spring-loaded measuring system	*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode	*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Eddy current method	*Method used for the specified measuring application.*
Measuring application	Iso/NF	*Measurable coating/substrate material system.*
Measuring range	0 - 1200 µm	*Limits of the measurable coating thickness.*
Accuracy	up to 50 µm: ± 1 µm 50 - 800 µm: < 2 % 800 - 1200 µm: < 5 %	*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading.*
Precision	bis/up to 100 µm: 1.5 µm 100 - 1200 µm: < 1.5 %	*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	54 mm 24 mm	2.16“ 960 mils	*Diameter of a specimen with a concave curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	57 mm 2 mm	2.28“ 80 mils	*Diameter of a specimen with a convex curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	3 mm 1.5 mm	120 mils 60 mils	*Diameter of a flat measurement area, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	1.25 mm	50 mils	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %.* *For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	< 0.1 mm	< 4 mils	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an “infinitely” thick substrate material.*
Probe tip radius	10 mm	400 mils	*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Alumina		*Material of the measuring tip.*
Probe tip replaceable	Yes		*Specifies, whether a worn measuring tip can be replaced or not.*
Height	23 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Diameter / width	14 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Length	72 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Works with the instruments	FMP10/20/30/40/100, MMS® PC & F-Modul PERMASCOPE®		*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures electrically non-conducting coatings on non-ferromagnetic metal substrate materials (Iso/NF). Due to high measurement frequency suitable for measuring Iso-coatings on thin base material..		*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*

Probe model	FTA2.4-MC	
Version description **Part no.**	**FTA2.4-MC** 604-192	
Probe design	Axial single tip probe with spring-loaded measuring system	*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode	*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Eddy current method	*Method used for the specified measuring application.*
Measuring application	Iso/NF	*Measurable coating/substrate material system.*
Measuring range	0 - 700 µm	*Limits of the measurable coating thickness.*
Accuracy	up to 50 µm: ± 1 µm 50 - 500 µm: < 2 % 500 - 700 µm: < 5 %	*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading.*
Precision	0 - 100 µm: 0.5 µm 100 - 700 µm: < 0.5 %	*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	15 mm 600 mils 8 mm 560 mils	*Diameter of a specimen with a concave curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	23 mm 920 mils 2 mm 80 mils	*Diameter of a specimen with a convex curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	2 mm 80 mils 1 mm 40 mils	*Diameter of a flat measurement area, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	0.8 mm 32 mils	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %.* *For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	0.15 mm 6 mils	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an "infinitely" thick substrate material.*
Probe tip radius	0.5 mm 20 mils	*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Ruby jewel tip	*Material of the measuring tip.*
Probe tip replaceable	Yes	*Specifies, whether a worn measuring tip can be replaced or not.*
Height	-	*Ref. graphic in the section „Note regarding the probe dimensions"*
Diameter / width	13 mm	*Ref. graphic in the section „Note regarding the probe dimensions"*
Length	110 mm	*Ref. graphic in the section „Note regarding the probe dimensions"*
Works with the instruments	FMP10/20/30/40/100, MMS® PC & F-Modul PERMASCOPE®	*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures electrically non-conducting coatings on non-ferromagnetic metal substrate materials (Iso/NF). Mechanical design especially suited for installation in customer-specific probe fixtures or guide devices for precise probe positioning.	*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*

Probe model	FTA2.4-SC	
Version description **Part no.**	**FTA2.4-SC standard version** 604-228 **FTA2.4L-SC cable length 3 m** 604-267	
Probe design	Single tip probe with spring-loaded measuring system, integrated in flat contact surface	*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode	*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Eddy current method	*Method used for the specified measuring application.*
Measuring application	Iso/NF	*Measurable coating/substrate material system.*
Measuring range	0 - 700 µm	*Limits of the measurable coating thickness.*
Accuracy	0 - 50 µm: 0.5 µm 50 - 300 µm: < 1 % 300 - 700 µm: < 2 %	*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading.*
Precision	0 - 100 µm: 0.2 µm 100 - 700 µm: 0.2 %	*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	- -	*Diameter of a specimen with a concave curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	- -	*Diameter of a specimen with a convex curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	Smallest test area Min. area 800 mils x 2.4“	*Diameter of a flat measurement area, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	-	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %.* *For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	0.4 mm 16 mils	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an “infinitely” thick substrate material.*
Probe tip radius	0.5 mm 20 mils	*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Ruby jewel tip	*Material of the measuring tip.*
Probe tip replaceable	Yes	*Specifies, whether a worn measuring tip can be replaced or not.*
Height	-	*Ref. graphic in the section „Note regarding the probe dimensions“*
Diameter / width	13 mm	*Ref. graphic in the section „Note regarding the probe dimensions“*
Length	110 mm	*Ref. graphic in the section „Note regarding the probe dimensions“*
Works with the instruments	FMP10/20/30/40/100, MMS® PC & F-Modul PERMASCOPE®	*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures electrically non-conducting coatings on non-ferromagnetic metal substrate materials (Iso/NF). Due to the large contact surface and spring-loaded measuring element with very little mass and low contact pressure, especially suited for soft coatings such as those found on aluminum tubes or for automated measuring systems. No measurement tip wear even after several million measurement cycles when used properly. For flat specimens only.	*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*

Probe model	FTA3.3		
Version description **Part no.**	**FTA3.3** 604-186		
Probe design	Axial single tip probe with spring-loaded measuring system		*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode		*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Eddy current method		*Method used for the specified measuring application.*
Measuring application	Iso/NF		*Measurable coating/substrate material system.*
Measuring range	0 - 1200 µm		*Limits of the measurable coating thickness.*
Accuracy	up to 100 µm: ± 1 µm 100 - 800 µm: ± 1 % 800 - 1200 µm: < 3 %		*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading.*
Precision	bis/up to 100 µm: 0.4 µm 100 - 1200 µm: < 0.4 %		*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	69 mm 18 mm	2.76“ 720 mils	*Diameter of a specimen with a concave curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	57 mm 2 mm	2.28“ 80 mils	*Diameter of a specimen with a convex curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	3 mm 2 mm	120 mils 80 mils	*Diameter of a flat measurement area, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	1 mm	40 mils	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %.* *For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	< 0.1 mm	< 4 mils	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an “infinitely” thick substrate material.*
Probe tip radius	1.2 mm	48 mils	*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Ruby jewel tip		*Material of the measuring tip.*
Probe tip replaceable	Yes		*Specifies, whether a worn measuring tip can be replaced or not.*
Height	-		*Ref. graphic in the section „Note regarding the probe dimensions“*
Diameter / width	18 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Length	70 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Works with the instruments	FMP10/20/30/40/100, MMS® PC & F-Modul PERMASCOPE®		*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures electrically non-conducting coatings on non-ferromagnetic metal substrate materials (Iso/NF). Standard probe for paint and plastic coatings, as well as for anodized coatings. Can possibly also be used when surfaces exhibit a damp condition (acidic contamination of test surface). Smaller tilting effect than with ETA3.3FG probe.		*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*

Probe model	FTA3.3-5.6	
Version description **Part no.**	**FTA3.3-5.6** 604-200	
Probe design	Axial single tip probe with spring-loaded measuring system	*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode	*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Eddy current method	*Method used for the specified measuring application.*
Measuring application	Iso/NF	*Measurable coating/substrate material system.*
Measuring range	0 - 1200 µm	*Limits of the measurable coating thickness.*
Accuracy	up to 50 µm: ± 0.8 µm 50 - 1200 µm: up to ± 1.5 %	*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading.*
Precision	0 - 100 µm: 0.5 µm 100 - 1200 µm: 0.5 %	*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	32 mm 40 mm	1.28“ 1.6“	*Diameter of a specimen with a concave curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	43 mm 2 mm	1.72“ 80 mils	*Diameter of a specimen with a convex curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	- 5 mm	- 200 mils	*Diameter of a flat measurement area, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	-	-	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %.* *For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	< 0.1 mm	< 4 mils	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an “infinitely” thick substrate material.*
Probe tip radius	5.6 mm	220 mils	*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Alumina		*Material of the measuring tip.*
Probe tip replaceable	Yes		*Specifies, whether a worn measuring tip can be replaced or not.*
Height	-		*Ref. graphic in the section „Note regarding the probe dimensions“*
Diameter / width	18 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Length	70 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Works with the instruments	FMP10/20/30/40/100, MMS® PC & F-Modul PERMASCOPE®		*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures electrically non-conducting coatings on non-ferromagnetic metal substrate materials (Iso/NF). Due to the larger radius of the probe tip, lower measurement scatter on rough surfaces than with FTA3.3 probe.		*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*

Probe model	FTA3.3-5.6-HF	
Version description **Part no.**	**FTA3.3-5.6-HF** 604-229	
Probe design	Axial single tip probe with spring-loaded measuring system	*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode	*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Eddy current method	*Method used for the specified measuring application.*
Measuring application	Iso/NF	*Measurable coating/substrate material system.*
Measuring range	0 - 1200 µm	*Limits of the measurable coating thickness.*
Accuracy	0 - 50 µm: ± 1 µm 50 - 800 µm: up to ± 2 % 800 - 1200 µm: up to ± 5 %	*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading.*
Precision	0 - 100 µm: 1 µm 100 - 1200 µm: 1 %	*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	72 mm 40 mm	2.88“ 1.6“ 	*Diameter of a specimen with a concave curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	22 mm 2 mm	880 mils 80 mils 	*Diameter of a specimen with a convex curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	- 5 mm	- 200 mils 	*Diameter of a flat measurement area, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	0.4 mm	16 mils 	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %.* *For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	< 0.1 mm	< 4 mils 	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an “infinitely” thick substrate material.*
Probe tip radius	5.6 mm	220 mils	*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Alumina		*Material of the measuring tip.*
Probe tip replaceable	Yes		*Specifies, whether a worn measuring tip can be replaced or not.*
Height	-		*Ref. graphic in the section „Note regarding the probe dimensions“*
Diameter / width	18 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Length	70 mm		*Ref. graphic in the section „Note regarding the probe dimensions“*
Works with the instruments	FMP10/20/30/40/100, MMS® PC & F-Modul PERMASCOPE®		*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures electrically non-conducting coatings on non-ferromagnetic metal substrate materials (Iso/NF). Due to the larger radius of the probe tip and the high measurement frequency, especially suited for the measurement of paint coatings on hot-dipped galvanized steel components with a zinc thickness of > 80 µm (3.2 mils).		*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*

Probe model	FTA3.3FG		
Version description **Part no.**	**FTA3.3FG** 604-190		
Probe design	Axial single tip probe with spring-loaded measuring system		*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode		*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Eddy current method		*Method used for the specified measuring application.*
Measuring application	Iso/NF		*Measurable coating/substrate material system.*
Measuring range	0 - 1200 µm		*Limits of the measurable coating thickness.*
Accuracy	0 - 50 µm: 0.5 µm 50 - 1200 µm: < 1 %		*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading.*
Precision	0 - 35 µm: 0.35 µm 35 - 1200 µm: 1 %		*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	- -	- -	*Diameter of a specimen with a concave curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	12 mm 10 mm	480 mils 400 mils	*Diameter of a specimen with a convex curvature, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	15 mm 10 mm	600 mils 400 mils	*Diameter of a flat measurement area, under which the error is > 10 %.* *Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	-	-	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %.* *For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	0.09 mm	4 mils	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an "infinitely" thick substrate material.*
Probe tip radius	7 mm	280 mils	*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Vespel SP1		*Material of the measuring tip.*
Probe tip replaceable	No		*Specifies, whether a worn measuring tip can be replaced or not.*
Height	-		*Ref. graphic in the section „Note regarding the probe dimensions"*
Diameter / width	18 mm		*Ref. graphic in the section „Note regarding the probe dimensions"*
Length	80 mm		*Ref. graphic in the section „Note regarding the probe dimensions"*
Works with the instruments	FMP10/20/30/40/100, MMS® PC & F-Modul PERMASCOPE®		*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures electrically non-conducting coatings on non-ferromagnetic metal substrate materials (Iso/NF). Entire probe, incl. cable connector, protected from moisture infiltration. Thus, especially suited for anodized coatings with acidic contamination of the test surface. Larger tilting effect than with FTA3.3 probe.		*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*

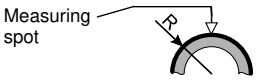
Probe model	**FTA3.3H**	**FTA3.3HL3**
Part no.	**604-142**	**604-685**
Applications	Measures electrically non-conducting coatings on non-ferrous metal base material (NC/NF). The probe is well suited for coating thickness measurements of thin coatings (e.g. thicknesses between 2 and 5 µm). A calibration to such thin thicknesses leads to excellent trueness values. Very damp sensitive: not suited for measurements on damp (acidic) surface soilings.	
Examples	**Non-ferrous metal base materials (NF)** • Paint, varnish or plastic coatings on aluminum, copper or brass (NC/NF) The probes feature a patented conductivity compensation. So that the different electrical conductivities of e.g. various aluminum alloys have no effect of the coating thickness measurement.	
Probe design	• Axial single tip probe with spring-loaded measuring system • Robust probe design with wear-resistant probe tip	
Applications	NC/NF	
Measurement range	**Non-ferrous metal base materials (NF)**	
	0 ... 1200 µm / *0 ... 47.24 mils*	
Trueness	**Non-ferrous metal base materials (NF)**	
based on Fischer standards	0 ... 50 µm: ≤ 0.5 µm 50 ... 800 µm: ≤ 1 % of reading 800 ... 1200 µm: ≤ % of reading 0 ... 1.97 *mils: ≤ 0.02 mils* 1.97 ... *31.5 mils: ≤ 1 % of reading* *31.5 ... 47.24 mils: ≤ 3 % of reading*	
Repeatability precision	**Non-ferrous metal base materials (NF)**	
based on Fischer standards	0 ... 100 µm: ≤ 0.4 µm 100 ... 1200 µm: ≤ 0.4 % of reading *0 ... 3.94 mils: ≤ 0.016 mils* *3.94 ... 47.24 mils: ≤ 0.4 % of reading*	
Influences	**Aluminum base material**	

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

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

Measurement error ≥ 10 % for R ≤ 31 mm / *R ≤ 1.22 "*
Probe needs a minimum of R = 9 mm (support stand necessary) / *R = 354.33 mils*

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

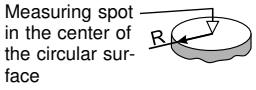


Measurement error of ≥ 10 % for R ≤ 28.5 mm / *R ≤ 1.12 "*
Probe needs a minimum of R = 1 mm (support stand necessary) / *R = 39.37 mils*

Influences	**Aluminum base material**

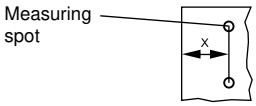
The following values are valid for a reference coating thickness of 75 µm / 2.95 mils.

Edge distance (R), specification from probe pole center



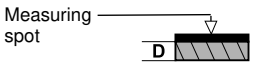
No measurement error as of R = 4 mm / *R = 157.48 mils*
Measurement error ≥ 10 % for R ≤ 1 mm / *R ≤ 39.37 mils*
Probe needs a minimum of R = 2 mm (support stand necessary) / *R = 78.74 mils*

Edge distance (X), specification from probe pole center



Measurement error of ≥ 10 % for X ≤ 1 mm / *X ≤ 39.37 mils*

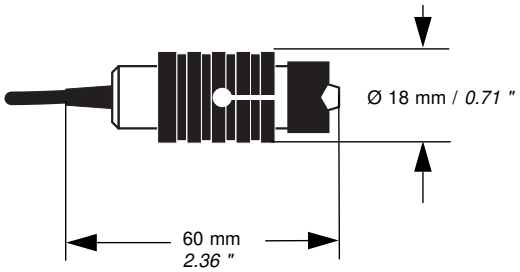
Base material thickness (D)



Measurement error of 10 % for D < 0.1 mm / *D < 3.94 mils*

Base material	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*
Probe tip material	Hard metal
Probe tip replaceable	No
Probe tip radius	1.2 mm / *0.5 "*
Measuring method	Amplitude sensitive eddy current method according to ISO 2360, ASTM D7091, Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating Thickness - Amplitude-sensitive eddy current method
Scope of supply	Probe, metal plate ISO/NF for instrument check, calibration foils
Works with instruments	All DUALSCOPE® and ISOSCOPE® hand-held instruments of the series FMP and FISCHERSCOPE® MMS® PC2 with F-Module PERMASCOPE®

Dimensions



Cable length: 1.50 m / *59.06 "*
Cable length: 3 m / *118.1 "*

FE06.0 doc04/12

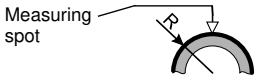
	FTD3.3
Probe model	**604-189**
Applications	Measures electrically non-conducting coatings on non-ferrous metal base material (NC/NF). Excellent curvature compensation (patented) in a diameter range from infinite to about 2 mm *(0.08 ").* Especially suited for measurements on curved surfaces such as car bodies, blinds, etc. Not usable: connected with acids liquids, measuring thin coatings in small concave curvature diameter.
Examples	**Non-ferrous metal base materials (NF)** • Paint, varnish or plastic coatings on aluminum, copper or brass (NC/NF) • Anodized coatings on aluminum The probe features a patented conductivity compensation. So that the different electrical conductivities of e.g. various aluminum alloys have no effect of the coating thickness measurement.
Probe design	Axial single tip probe with spring-loaded measuring system
Applications	NC/NF
Measurement range	**Non-ferrous metal base materials (NF)** 0 ... 800 µm / *0 ... 31.5 mils*
Trueness based on Fischer standards	**Non-ferrous metal base materials (NF)** Flat specimen 0 ... 100 µm: ≤ 1 µm — *0 ... 3.94 mils: ≤ 0.04 mils* 100 ... 500 µm: ≤ 1 % of reading — *3.94 ... 19.69 mils: ≤ 1 % of reading* 500 ... 800 µm: ≤ 3 % of reading — *19.69 ... 31.50 mils: ≤ 3 % of reading* Convex curvature *Data determined by reference to Ø of 4, 16 and 25 mm (0.16 ", 0.67 ", 0.98 ".; the v-slot in the support ring of the probe aligns parallel to the surface line.* 0 ... 50 µm: ≤ 2.5 µm — *0 ... 1.97 mils: ≤ 98.43 mils* 50 ... 800 µm: ≤ 5 % of reading — *1.97 ... 31.50 mils: ≤ 5 % of reading* Concave curvature *Data determined by reference to Ø of 25 mm (0.98 "); the v-slot in the support ring of the probe aligns parallel to the surface line.* 45 ... 800 µm: ≤ 5 % of reading — *1.77 ... 31.50 mils: ≤ 5 % of reading*
Repeatability precision based on Fischer standards	**Non-ferrous metal base materials (NF)** Flat specimen 0 ... 100 µm: ≤ 0.5 µm — *0 ... 3.94 mils: ≤ 0.02 mils* 100 ... 800 µm: ≤ 0.5 % of reading — *3.94 ... 31.50 mils: ≤ 0.5 % of reading* Convex curvature *Data determined by reference to Ø of 4, 16 and 25 mm (0.16 ", 0.67 ", 0.98 ".; the v-slot in the support ring of the probe aligns parallel to the surface line.* 0 ... 100 µm: ≤ 1 µm — *0 ... 3.94 mils: ≤ 0.04 mils* 100 ... 800 µm: ≤ 1 % of reading — *3.94 ... 31.5 mils: ≤ 1 % of reading* Concave curvature *Data determined by reference to Ø of 25 mm (0.98 "); the v-slot in the support ring of the probe aligns parallel to the surface line.* 45 ... 100 µm: ≤ 1 µm — *1.77 ... 3.94 mils: ≤ 0.04 mils* 100 ... 800 µm: ≤ 1 % of reading — *3.94 ... 31.50 mils: ≤ 1 % of reading*

Influences

Curvature (R, concave)

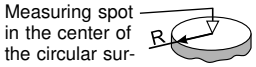
Probe needs a minimum of R = 16 mm (support stand necessary) / *R = 0.63 "*

Curvature (R, convex)



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

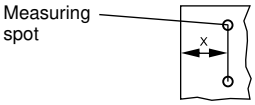
Edge distance (R), specification from probe pole center



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

Edge distance (X), specification from probe pole center

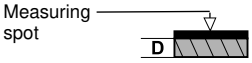
The following values are valid for a reference coating thickness of 100 µm (3.94 mils) measured on aluminum.



Measurement error ≥ 10 % for X ≤ 1.5 mm / *X ≤ 59.06 mils*

Base material thickness (D)

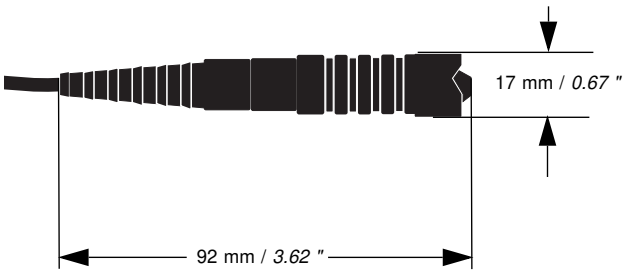
Measurement errors valid for aluminum base materials.



Measurement error ≥ 10 % for D ≤ 0.05 mm / *D ≤ 1.97 mils*

Base material	Influence of the el. conductivity of the base material (NF) in the range from 20 to 80 % IACS: deviation of coating thickness is ≤ 1.5 % for normalization on Al with ca. 40 % IACS. Valid for the total measurement range.
Admissible ambient temperature at operation	- 10 °C ... + 40 °C / *+ 14 °F ... + 104 °F*
Probe tip material	Jewel tip
Probe tip replaceable	Yes
Probe tip radius	1.2 mm / *0.05 "*
Measuring method	Amplitude sensitive eddy current method according to ISO 2360, ASTM D7091, Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating Thickness - Amplitude-sensitive eddy current method
Scope of supply	Probe, metal plate ISO/NF for instrument check, calibration foils
Works with instruments	All DUALSCOPE® and ISOSCOPE® hand-held instruments of the series FMP and FISCHERSCOPE® MMS® PC2 with F-Module PERMASCOPE®

Dimensions



Cable length: 1.50 m / *59.06 "*

FE01.5 doc03/12

Probe model	FD10			
Version description	**FD10**			
Part no.	604-143			
Probe design	Axial probe with spring-loaded measuring system			
Measuring mode	DUAL mode with one active meas. channel. Automatic switching between Magnetic induction and Eddy current *			
Measuring method	Magnetic induction method		Magnetic induction and amplitude-sensitive Eddy current method	
Measuring application	NF, Iso/Fe		Iso/NF	
Measuring range	0 - 1300 µm		0 - 800 µm	
Accuracy	up to 100 µm: ± 2 µm 100 - 1000 µm: ± 2 % 1000 - 1300 µm : < 3 %		up to 100 µm: ± 2 µm 100 - 800 µm: ± 2 %	
Precision	bis/up to 60 µm: 0.3 µm 60 - 1300 µm: < 0.5 %		bis/up to 100 µm: 0.4 µm 100 - 800 µm: < 0.4 %	
Ø (concave) for 10 % error **Min. Ø**	38 mm 30 mm	1.52“ 1.2“	82 mm 30 mm	3.28“ 1.2“
Ø (convex) for 10 % error **Min. Ø**	10 mm 2 mm	400 mils 80 mils	80 mm 2 mm	3.2“ 80 mils
Meas. area Ø for 10 % error **Min. measuring area Ø**	18 mm 3.6 mm	720 mils 144 mils	3.2 mm 2 mm	128 mils 80 mils
Edge distance for 10 % error	0.6 mm	24 mils	1 mm	40 mils
Substrate th. for 10 % error	0.4 mm	4 mils	< 0.1 mm	< 4 mils
Probe tip radius	0.6 mm	24 mils	0.6 mm	24 mils
Probe tip material	Hard metal		Hard metal	
Probe tip replaceable	No		No	
Height	-		-	
Diameter / width	13 mm		13 mm	
Length	100 mm		100 mm	
Works with the instruments	FMP 20 / 40 / 100, MMS® PC mit F-Modul PERMASCOPE®		FMP 20 / 40 / 100, MMS® PC & F-Modul PERMASCOPE®	
Applications	Measures electrically non-conducting coatings (paint, lacquer) or non-ferromagnetic metal coatings (Zn, Cr, Cu) on steel and iron. Due to the small probe tip, no suitability for measurements on rough, e.g., sand-blasted surfaces.		Measures electrically non-conducting coatings (e.g. paint, lacquer) on non-ferromagnetic metals like Al, Cu, stainless steel ... Due to the small probe tip no suitability for measurements on rough, e.g., sand-blasted surfaces.	

*) The Dual mode with automatic base material recognition and automatic measurement method selection can be switched off. Instead, you can activate either ONLY the magnetic induction method or ONLY the Eddy current method. This f xed method setting enables an increased measuring range (0 to 1500 µm instead of 0 to 1300 µm for the magnetic induction method and 0 to 1200 µm instead of 0 to 800 µm for the Eddy current method. The trueness changes as well to ± 3 % in the range between 800 to 1200 µm.

Probe models	**FD13H**	**FD13HL3**
Part no.	**604-508**	**604-746**

Applications

Probes for measurements on virtually all metals. The probes work 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 probes are also well suited for measurements on rough surfaces.

Examples

Steel or iron base materials (Fe)

- Paint, varnish 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 or iron (NF/Fe)

Non-ferrous metal base materials (NF)

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

The probes feature a patented conductivity compensation. So that the different electrical conductivities of e.g. various aluminum alloys have no effect of the coating thickness measurement.

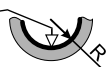
Probe design

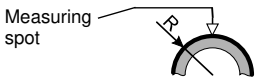
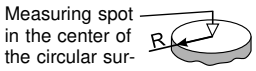
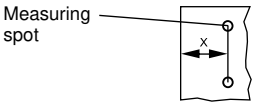
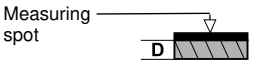
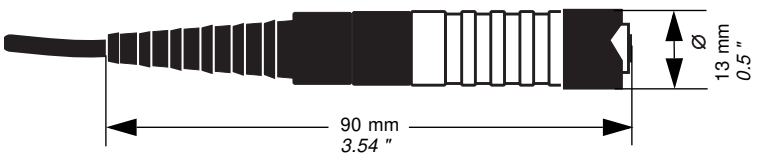
- Axial single tip probe with spring-loaded measuring system
- Robust probe design with wear-resistant probe tip

Applications	NC/Fe or NF/Fe	NC/NF
*	*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).*	
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* based on Fischer standards	**Steel or iron base materials (Fe)** 0 ... 75 µm: ≤ 1.5 µm 75 ... 1000 µm: ≤ 2 % of reading 1000 ... 2000 µm: ≤ 3 % of reading *0 ... 2.95 mils: ≤ 0.06 mils* *2.95 ... 39.37 mils: ≤ 2 % of reading* *39.37 ... 78.74 mils: ≤ 3 % of reading*	**Non-ferrous metal base materials (NF)** 0 ... 50 µm: ≤ 1 µm 50 ... 1000 µm: ≤ 2 % of reading 1000 ... 2000 µm: ≤ 3 % of reading *0 ... 1.97 mils: ≤ 0.039 mils* *1.97 ... 39.37 mils: ≤ 2 % of reading* *39.37 ... 78.74 mils: ≤ 3 % of reading*
Repeatability precision* based on Fischer standards	**Steel or iron base materials (Fe)** 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)**	**Aluminum base material**

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 Measurement of Uncertainty).

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

Measuring spot 	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 "*

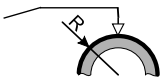
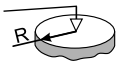
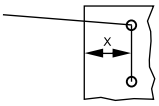
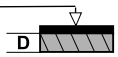
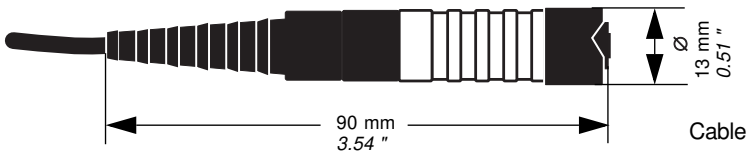
Influences*	**Steel or iron base materials (Fe)**	**Aluminum base material**
The following values are valid for a reference coating thickness of 75 µm / 2.95 mils. *The measurement errors are stated with the expanded measurement uncertainty U with the expanded factor of k = 2 (defines an interval with the confidence level of 95.45 %) - according to DIN V ENV 13005 "Leitfaden zur Angabe der Unsicherheit beim Messen" (Guide to Measurement of Uncertainty).*		
Curvature (R), measurement with reference to master calibration on flat surface		
	Measurement error of 10 % for R = 16 mm ± 1.2 mm / *R = 0.63 " ± 0.047 "* Probe needs a minimum of R = 1.5 mm (support stand necessary) / *R = 0.06 "*	Measurement error of 10 % for R = 92 mm ± 3.4 mm / *R = 3.62 " ± 0.13 "* Probe needs a minimum of R = 1.5 mm (support stand necessary) / *R = 0.06 "*
Edge distance (R), specification from probe pole center		
	No measurement error as of R = 11.5 mm ± 0.3 mm / *R = 0.45 " ± 0.012 "* Measurement error of 10 % for R = 6.4 mm ± 0.3 mm / R = 0.25 " *± 0.012 "* Probe needs a minimum of R = 2.5 mm (support stand necessary) / *R = 0.098 "*	No measurement error as of R = 3.2 mm ± 0.2 mm / *R = 0.13 " ± 0.0079 "* Measurement error of 10 % for R = 2.4 mm ± 0.04 mm / R = 0.094 " *± 0.0016 "* Probe needs a minimum of R = 1.7 mm (support stand necessary) / *R = 0.067 "*
Edge distance (X), specification from probe pole center		
	No measurement error as of X = 3.6 mm ± 0.3 mm / *X = 0.14 " ± 0.012 "* Measurement error of 10 % for X = 1.0 mm ± 0.05 mm / *X = 0.039 " ± 0.002 "*	No measurement error as of X = 2.2 mm ± 0.05 mm / *X = 0.087 " ± 0.002 "* Measurement error of 10 % for X = 1.9 mm ± 0.04 mm / *X = 0.075 " ± 0.0016 "*
Base material thickness (D) 	No measurement error as of D = 1.0 mm ± 0.1 mm / *D = 39.4 mils ± 3.94 mils* Measurement error of 10 % for D = 0.5 mm ± 0.03 mm / *D = 19.7 mils ± 1.18 mils*	No measurement error as of D = 0.1 mm ± 0.01 mm / *D = 3.94 mils ± 0.39 mils* Measurement error of 10 % for D = 0.02 mm ± 0.001 mm / *D = 0.79 mils ± 0.039 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 ± 0.2 FN onwards. Measurement error of 10 % for ferrite content of 123 FN ± 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 ≤ 2 %, valid for the total measurement range.
Admissible ambient temperature at operation	- 10 °C ... + 40 °C / *+ 14 °F ... + 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, Non-magnetic coatings on magnetic substrates; Measurement of coating thickness; Magnetic method	Amplitude sensitive eddy current method according to ISO 2360, ASTM D7091, Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating Thickness - Amplitude-sensitive eddy current method
Scope of supply	Probe, metal plates ISO/NF and NF/FE for instrument check, calibration foils	
Works with instruments	All DUALSCOPE® hand-held instruments of the series FMP and FISCHERSCOPE® MMS® PC2 with F-Module PERMASCOPE®	
Dimensions	 FD13H : cable length 1.5 m / *59.1 "* FD13HL3: cable length 3 m / *118 "*	

FE07.1 doc04/12

Coating Thickness | Material Analysis | Microhardness | Material Testing

Probe model	**FN4D**		
Part no.	**604-417**		
Applications	• Measurement on thick metal or protective coatings on steel and iron (NF/Fe or NC/Fe) • Measurement on protective or Nickel coatings on non-ferromagnetic metals, e.g., aluminum, copper or brass (Iso/NF or Ni/NF)		
Examples	**Steel or iron base material (Fe)** • Zinc, chromium, copper, paint, varnish, vulcanized rubber and plastic coatings on steel, iron or cast iron (Fe) The probe is particularly suited for measurements on thick metal coatings (e. g. 300 µm/11.8 mils copper) and thick protective coatings (e. g. 5 mm/197 mils enamel) on steel and iron. The electrical conductivity of the metal coating do not influence the measurement.	**Nonferrous metal base material (NF)** • Paint, varnish or plastic coatings on aluminum, copper or brass • Anodic coatings on aluminum • Galvanically deposited nickel coatings (Ni) on copper or aluminum; also suited for nickel coatings on pc-board contacts, even under a thin gold coating • Chemically deposited nickel coatings (Ni), if magnetizable, on copper or aluminum. This is typically the case if the phosphor content of the nickel coating is less than 8 % or after heat treatment.	
Probe design	Axial single tip probe with spring-loaded measuring system		
Applications	NF/Fe; NC/Fe	Ni/NF; Ni/NC	NC/NF
*	*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).*		
Measurement ranges*	**Steel or iron base material (Fe)** 0 ... 7 mm / *0 ... 270 mils*	**Ni coating material** (Ni/NF, NC) 1 ... 150 µm / *0.039 ... 5.85 mils*	**NF base material** (NC/NF) 0 ... 2.5 mm / *0 ... 98 mils*
Trueness* based on Fischer-Standards	**Steel or iron base material (Fe)** 0 ... 0.15 mm: ≤ 0.005 mm 0.15 ... 3 mm: ≤ 3 % of reading 3 ... 7 mm: ≤ 5 % of reading *0 ... 5.9 mils ≤ 0.2 mils* *5.9 ... 118 mils: ≤ 3 % or reading* *118 ... 275 mils: ≤ 5 % of reading*	**Ni coating material** (Ni/NF, NC) 1 ... 15 µm: ≤ 0.3 µm 15 ... 150 µm: ≤ 2 % of reading *0.039 ... 0.59 mils: ≤ 0.012 mils* *0.59 ... 5.9 mils: ≤ 2 % of read.*	**NF base material** (NC/NF) 0 ... 0.05 mm: ≤ 0.001 mm 0.05 ... 1 mm: ≤ 2 % of reading 1 ... 2.5 mm: ≤ 3 % of reading *0 ... 2 mils: ≤ 0.039 mils* *0 ... 39 mils: ≤ 2 % of reading* *39 ... 98 mils: ≤ 3 % of reading*
Repeatability Precision* based on Fischer-Standards	**Steel or iron base material (Fe)** 0 ... 0.2 mm: ≤ 0.002 mm 0.2 ... 7 mm: ≤ 1 % of reading *0 ... 7.9 mils: ≤ 0.079 mils* *7.9 ... 275 mils: ≤ 1 % of reading*	**Ni coating material** (Ni/NF, NC) 1 ... 20 µm: ≤ 0.2 µm 20 ... 150 µm: ≤ 1 % of reading *0.039 ... 0.79 mils: ≤ 0.0079 mils* *0.79 ... 5.9 mils: ≤ 1 % of read.*	**NF base material** (NC/NF) 0 ... 0.05 mm: ≤ 0.0005 mm 0.05 ... 1 mm: ≤ 1 % of reading 1 ... 2.5 mm: ≤ 1.5 % of reading *0 ... 2 mils: ≤ 0.02 mils* *2 ... 39 mils: ≤ 1 % of reading* *39 ... 98 mils ≤ 1.5 % of reading*
Geometrical influences* *Following values are valid for*	**Steel or iron base material (Fe)** *Reference coating thickness (NC): 0.2 mm / 7.9 mils*	**Ni coating material** (Ni/NF) *Reference coating thickness (Ni): 25 µm / 0.98 mils*	**NF base material** (NC/NF) *Reference coating thickness (NC): 0.075 mm / 3 mils*
Curvature (R), measurement with reference to master calibration on flat surface			
Measuring spot 	Measurement error of - 4% for R ≈ 50 mm / *1.97 "* Probe needs a minimum of R = 50 mm / *1.97 "*	Measurement error of 5.5 % for R ≈ 50 mm / *1.97 "* Probe needs a minimum of R = 50 mm / *1.97 "*	Measurement error of 10 % for R ≈ 105 mm / *4.13 "* Probe needs a minimum of R = 50 mm / *1.97 "*

Coating Thickness | Material Analysis | Microhardness | Material Testing

Geometrical influences*	**Steel or iron base material (Fe)**	**Ni coating material** (Ni/NF)	**NF base material** (NC/NF)
Following values are valid for	*Reference coating thickness (NC): 0.2 mm / 7.9 mils*	*Reference coating thickness (Ni): 25 µm / 0.98 mils*	*Reference coating thickness (NC): 0.075 mm / 3 mils*
Curvature (R), measurement with reference to master calibration on flat surface			
Measuring spot 	Measurement error of 10 % for R ≈ 10 mm / *0.39 "* Probe needs a minimum of R ≈ 1 mm / *39 mils* (support stand necessary)	Measurement error of 10 % for R ≈ 50 mm / *1.97 "* Probe needs a minimum of R = 1 mm / *39 mils* (support stand necessary)	Measurement error of 10 % for R ≈ 132 mm / *5.2 "* Probe needs a minimum of R = 1 mm / *39 mils* (support stand necessary)
Edge distance (R), specification from probe pole center			
Measuring spot in the center of the circular surface 	No measurement error for R > 40 mm / *1.57 "* Measurement error of 10 % for R ≈ 15 mm / *0.59 "* Probe needs a minimum of R = 3.5 mm / *138 mils* (support stand necessary)	No measurement error for R > 36 mm / *1.42 "* Measurement error of 10 % for R ≈ 24 mm / *0.94 "* Probe needs a minimum of R = 4.5 mm / *177 mils* (support stand necessary)	No measurement error for R > 7 mm / *0.28 "* Measurement error of 10 % for R ≈ 3 mm / *0.12 "* Probe needs a minimum of R = 1 mm / *39 mils* (support stand necessary)
Edge distance (X), specification from probe pole center			
Measuring spot 	No measurement error for X > 10 mm / *390 mils* Measurement error of 10 % for X ≈ 1 mm / *39 mils*	No measurement error for X > 10 mm / *390 mils* Measurement error of 10 % for X ≈ 1.1 mm / *43.31 mils*	No measurement error for X > 5 mm / *197 mils* Measurement error of 10 % for X ≈ 2.3 mm / *90.55 mils*
Base material thickness (D) Measuring spot 	Measurement error of 10 % for D ≈ 0.8 mm / *31.5 mils*	-	Measurement error of 10 % for D ≈ 0,1 mm / *3.9 mils*
Base material	-	-	**Base material 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 ≤ 2 %, valid for the total measurement range
Admissible ambient temperature at operation	- 10 °C ... + 40 °C *+ 14 °F ... + 104 °F*		
Probe tip material	Jewel tip		
Probe tip replaceable	Yes		
Probe tip radius	1.2 mm / 47.2 mils		
Measuring methods	**Steel or iron base material (Fe)**	**Ni coating material**	**Base material NF**
	Magnetic induction method according to ISO 2178, ASTM D7091, Non-magnetic coatings on magnetic substrates; Measurement of coating thickness; Magnetic method		Amplitude sensitive eddy current method according to ISO 2360, ASTM D7091, Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating Thickness - Amplitude-sensitive eddy current method
Scope of supply	Probe, metal plates and pieces NF/FE, ISO/NF and Ni for instrument check, calibration foils		
Works with instruments	DUALSCOPE® H FMP150 and FISCHERSCOPE® MMS® PC2 with F module NICKELSCOPE®		
Dimensions	 Cable length: 1.50 m / *59.06 "*		

FE06.1 doc03/12

	FDX13H
Probe model	**604-596**
Applications	Specifications measurements in the corrosion protection sector. The individual coating thicknesses of the duplex coating system are measured simultaneously and displayed in the instrument separately. The probe features a conductivity compensation, so that the different electrical conductivities of zinc have no effect on the coating thickness measurement. Prerequisite: min. of 70 µm (*2.76 mils*) hot-dip galvanized zinc coatings including diffusion zones. The probe is not suited for measurements of coating systems containing magnetizable micaceous iron oxide. This distorts the measurement and results in too low coating thickness values.
Examples	• Paint/lacquer and zinc coatings on hot-dip galvanized steel or iron (continuous or batch galvanized) • Power pylons, bridge structural components, traffic guidance systems • Gates, fences, guard rails
Probe design	• Axial single tip probe with spring-loaded measuring system • Robust probe design with wear-resistant probe tip
Application	Paint/Zn/Fe

Measurement range	**Total paint/zinc coatings**	**Zinc coating**	**Paint coating**
	90 ... 800 µm / *3.54 ... 31.5 mils*	≥ 70 µm / *≥ 2.76 mils*	≥ 20 µm / *≥ 0.79 mils*

Trueness based on Fischer standards	**Zinc coating on steel or iron (Zn/Fe)**	**Paint coating on Zn/Fe**
	Valid for paint layer thicknesses between 20 ... 300 µm (0.79 ... 11.81 mils) Zn coating ≥ 70 µm: ≤ 5 % of reading *Zn coating ≥ 2.76 mils: ≤ 5 % of reading*	*Valid for Zn layer thicknesses ≥ 70 µm (2.76 mils) and normalization on the respective Zn coating material* 20 ... 100 µm: ≤ 2 µm Paint coating > 100 µm: ≤ 2 % of reading *0.79 ... 3.94 mils: ≤ 0.08 mils* *Paint coating > 3.94 mils: ≤ 2 % of reading*

Repeatability precision based on Fischer standards	**Zinc coating on steel or iron (Zn/Fe)**	**Paint coating on Zn/Fe**
	Valid for paint layer thicknesses between 20 ... 300 µm (0.79 ... 11.81 mils) Zn coating ≥ 70 µm: ≤ 2 % of reading *Zn coating ≥ 2.76 mils: ≤ 2 % of reading*	*Valid for Zn layer thicknesses ≥ 70 µm (2.76 mils)* 20 ... 100 µm: ≤ 0.6 µm Paint coating ≥ 100 µm: ≤ 0.6 % of reading *0.79 ... 3.94 mils: ≤ 0.024 mils* *Paint coating > 3.94 mils: ≤ 0.6 % of reading*

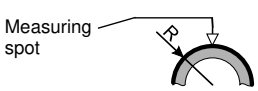
Influences	**Zinc coating on steel or iron (Zn/Fe)**	**Paint coating on Zn/Fe**
The following values are valid for a	*reference coating thickness of 100 µm / 3.94 mils zinc on steel or iron; no paint coating*	*reference coating thickness of 100 µm / 3.94 mils paint on 100 µm / 3.94 mils zinc on steel or iron*

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 Measurement of Uncertainty).

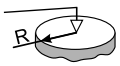
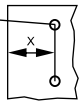
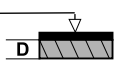
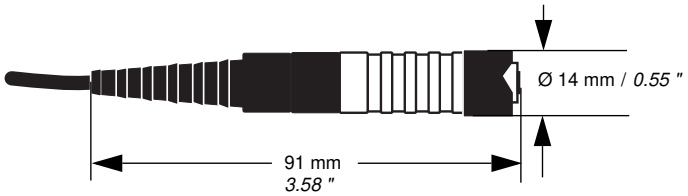
Curvature (R), measurement with reference to master calibration on flat surface

	Measurement error of 10 % for R = 26 mm ± 4 mm / *R = 1.02 " ± 0.16 "*	Measurement error of 10 % for R = 67 mm ± 4.7 mm / *R = 2.64 " ± 0.19 "*
	Probe needs a minimum of R = 25 mm (support stand necessary) / *R = 0.98 "*	

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

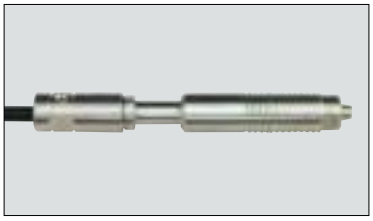


	Measurement error of 10 % for R = 11 mm ± 0.6 mm / *R = 0.43 " ± 0.024 "*	Measurement error of 10 % for R = 71 mm ± 9.1 mm / *R = 2.79 " ± 0.36 "*
	Probe needs a minimum of R = 1.5 mm (support stand necessary) / *R = 0.06 "*	

Influences	**Zinc coating on steel or iron (Zn/Fe)**	**Paint coating on Zn/Fe**
The following values are valid for a	*reference coating thickness of 100 µm / 3.94 mils zinc on steel or iron; no paint coating*	*reference coating thickness of 100 µm / 3.94 mils paint on 100 µm / 3.94 mils zinc on steel or iron*
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 Measurement of Uncertainty).		
Edge distance (R), specification from probe pole center		
Measuring spot in the center of the circular surface 	No measurement error as of R = 16 mm ± 1.5 mm / *R = 0.63 " ± 0.06 "* Measurement error of 10 % for R = 11.9 mm ± 0.8 mm / *R = 0.47 " ± 0.03 "*	No specification
	Probe needs a minimum of R = 2.5 mm (support stand necessary) / *R = 0.098 "*	
Edge distance (X), specification from probe pole center		
Measuring spot 	No measurement error as of X = 1.83 mm ± 0.05 mm / *X = 0.072 " ± 0.002 "* Measurement error of 10 % for X = 0.85 mm ± 0.03 mm / *X = 0.034 " ± 0.0012 "*	No measurement error as of X = 2.1 mm ± 0.4 mm / *X = 0.08 " ± 0.02 "* Measurement error of 10 % for X = 1.24 mm ± 0.035 mm / *X = 0.05 " ± 0.0014 "*
Base material thickness (D) 	No measurement error as of D = 0.62 mm ± 0.04 mm / *D = 0.024 " ± 0.002 "* Measurement error of 10 % for D = 0.44 mm ± 0.02 mm / *D = 0.0173 " ± 0.0009 "*	No specification
Base material	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 129 FN ± 0.5 FN onwards. Measurement error of 10 % for a ferrite content of 118 FN ± 1 FN.	The influence of the electrical conductivity of the zinc material is compensated.
Admissible ambient temperature at operation	- 10 °C ... + 40 °C / *+ 14 °F ... + 104 °F*	
Probe tip material	Hard metal	
Probe tip replaceable	No	
Probe tip radius	2 mm / *0.079 "*	
Measuring method	Magnetic induction method according to ISO 2178, ASTM D7091, Non-magnetic coatings on magnetic substrates; Measurement of coating thickness; Magnetic method	Amplitude sensitive eddy current method according to ISO 2360, ASTM D7091, Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating Thickness - Amplitude-sensitive eddy current method
Scope of supply	Probe, metal plate NF/FE and Zn standard for instrument check, calibration foils	
Works with instruments	All DUALSCOPE® hand-held instruments of the series FMP and FISCHERSCOPE® MMS® PC2 with F-Module PERMASCOPE®	
Dimensions		
	Cable length: 1.50 m / *59.06 "*	

FE07 doc04/12-1

Probe model	ESD20Zn	
Version description	**ESD20Zn**	**ESD20Zn**
Part no.	603-419	603-419
Probe design	Axial single tip probe with spring-loaded measuring system	Axial single tip probe with spring-loaded measuring system
Measuring mode	Single mode (60 kHz)	Single mode (240 kHz)
Measuring method	Phase-sensitive Eddy current method	Phase-sensitive Eddy current method
Measuring application	Cu/Fe	Zn/Fe
Measuring range	1 - 200 µm	2 - 200 µm
Lift-off	h: 0 - 400 µm	h: 0 - 400 µm
Precision	0.07 µm o. 0.5 %	0.2 µm o. 0.5 %
Ø (concave) for 10 % error **Min. Ø**	Not possible	Not possible
Ø (convex) for 10 % error **Min. Ø**	4 mm 160 mils 2 mm 80 mils	4 mm 160 mils 2 mm 80 mils
Meas. area Ø for 10 % error **Min. measuring area Ø**	6 mm 240 mils 6 mm 240 mils	6 mm 240 mils 6 mm 240 mils
Edge distance for 10 % error	- -	- -
Substrate th. for 10 % error	0.1 mm 4 mils	0.1 mm 4 mils
Probe tip radius	Flat: ø 5.5 mm Flat: ø 220 mils	Flat: ø 5.5 mm Flat: ø 220 mils
Probe tip material	Hard plastics	Hard plastics
Probe tip replaceable	No	No
Height	-	-
Diameter / width	16 mm	16 mm
Length	110 mm	110 mm
Works with the instruments	PHASCOPE® PMP10; MMS® PC SIGMASCOPE®	PHASCOPE® PMP10; MMS® PC SIGMASCOPE®
Applications	Measures non-ferromagnetic metal coatings with a minimum electrical conductivity of 1 MS/m on steel or iron. Two measurement frequencies, 60 kHz and 240 kHz, are available. For Cu/Fe, preferably 60 kHz, for Zn/Fe, preferably 240 kHz. Not suited for ZnNi or ZnFe coatings.	Measures non-ferromagnetic metal coatings with a minimum electrical conductivity of 1 MS/m on steel or iron. Two measurement frequencies, 60 kHz and 240 kHz, are available. For Cu/Fe, preferably 60 kHz, for Zn/Fe, preferably 240 kHz. Not suited for ZnNi or ZnFe coatings.



Probe model	ESD2.4	
Version description **Part no.**	**ESD2.4** 603-416	
Probe design	Axial single tip probe with fixed measuring system	*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode (Zn/Fe)	*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Phase-sensitive Eddy current method	*Method used for the specified measuring application.*
Measuring application	NF/Fe	*Measurable coating/substrate material system.*
Measuring range	1 - 150 µm (Zn/Fe)	*Limits of the measurable coating thickness.*
Lift-off	h: 0 - 250 µm	*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading. Example: In the interval 50 … 1000 µm, the trueness is 0.5 %. Standard: DIN EN ISO 8402*
Precision	1 - 100 µm: < 0.3 µm (Zn/Fe)	*Repeatable standard deviation s of n = 10 single readings.*

Ø (concave) for 10 % error **Min. Ø**	Not possible			*Diameter of a specimen with a concave curvature, under which the error is > 10 %. Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	2 mm 2 mm	80 mils 80 mils		*Diameter of a specimen with a convex curvature, under which the error is > 10 %. Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	3.5 mm 3.3 mm	140 mils 132 mils		*Diameter of a flat measurement area, under which the error is > 10 %. Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	-	-		*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %. For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	0.1 mm	4 mils		*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an "infinitely" thick substrate material.*
Probe tip radius	Flat: ø 3.3 mm	Flat: ø 132 mils		*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Zirconium oxide			*Material of the measuring tip.*
Probe tip replaceable	No			*Specifies, whether a worn measuring tip can be replaced or not.*
Height	-			*Ref. graphic in the section „Note regarding the probe dimensions"*
Diameter / width	10 mm			*Ref. graphic in the section „Note regarding the probe dimensions"*
Length	110 mm			*Ref. graphic in the section „Note regarding the probe dimensions"*
Works with the instruments	PHASCOPE® PMP10; MMS® PC SIGMASCOPE®			*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*

Applications	Measures non-ferromagnetic metal coatings, preferably of zinc, with a minimum electrical conductivity of 1 MS/m on steel or iron. Due to the high measurement frequency, especially suited for the measurement of small parts or small test areas. Limited suitability for ZnNi coatings. Not ZnFe coatings. Measurement frequency 1.25 MHz.	*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*

Probe model	ESD20Ni	
Version description	**ESD20Ni**	**ESD20Ni**
Part no.	603-418	603-418
Probe design	Axial single tip probe with spring-loaded measuring system	Axial single tip probe with spring-loaded measuring system
Measuring mode	Single mode (60 kHz)	Single mode (240 kHz)
Measuring method	Phase-sensitive Eddy current method	Phase-sensitive Eddy current method
Measuring application	galv. Ni/Fe	galv. Ni/Fe
Measuring range	2 - 100 µm	1 - 50 µm
Lift-off	h: 0 - 200 µm	h: 0 - 200 µm
Precision	0.05 µm o. 1 %	0.05 µm o. 1 %
Ø (concave) for 10 % error **Min. Ø**	Not possible	Not possible
Ø (convex) for 10 % error **Min. Ø**	4 mm 160 mils 2 mm 80 mils	4 mm 160 mils 2 mm 80 mils
Meas. area Ø for 10 % error **Min. measuring area Ø**	6 mm 240 mils 6 mm 240 mils	6 mm 240 mils 6 mm 240 mils
Edge distance for 10 % error	- -	- -
Substrate th. for 10 % error	0.1 mm 4 mils	0.1 mm 4 mils
Probe tip radius	Flat: ø 5.5 mm Flat: ø 220 mils	Flat: ø 5.5 mm Flat: ø 220 mils
Probe tip material	Hard plastics	Hard plastics
Probe tip replaceable	No	No
Height	-	-
Diameter / width	16 mm	16 mm
Length	110 mm	110 mm
Works with the instruments	PHASCOPE® PMP10; MMS® PC SIGMASCOPE®	PHASCOPE® PMP10; MMS® PC SIGMASCOPE®
Applications	Measures electroplated nickel coatings on steel or iron, even under paint. Two measurement frequencies, 60 kHz and 240 kHz, are available.	Measures electroplated nickel coatings on steel or iron, even under paint. Two measurement frequencies, 60 kHz and 240 kHz, are available.

Probe model	ESD20Cu	
Version description **Part no.**	**ESD20Cu; standard version** 603-417 **ESD20CuL2; cable 2 m** 603-775	**ESD20Cu; standard version** 603-417 **ESD20CuL2; cable 2 m** 603-775
Probe design	Axial single tip probe with spring-loaded measuring system	Axial single tip probe with spring-loaded measuring system
Measuring mode	Single mode (60 kHz)	Single mode (240 kHz)
Measuring method	Phase-sensitive Eddy current method	Phase-sensitive Eddy current method
Measuring application	Cu/Iso	Cu/Iso
Measuring range	1 - 270 µm	1 - 270 µm
Lift-off	h: 0 - 300 µm	h: 0 - 300 µm
Precision	0.02 µm o. 0.5 %	0.02 µm o. 0.5 %

Ø (concave) for 10 % error **Min. Ø**	Not possible		Not possible	
Ø (convex) for 10 % error **Min. Ø**	6 mm 2 mm	240 mils 80 mils	6 mm 2 mm	240 mils 80 mils
Meas. area Ø for 10 % error **Min. measuring area Ø**	20 mm 6 mm	800 mils 240 mils	20 mm 6 mm	800 mils 240 mils
Edge distance for 10 % error	-	-	-	-
Substrate th. for 10 % error	0.6 mm sat.	24 mils sat.	0.6 mm sat.	24 mils sat.
Probe tip radius	Flat: ø 5.5 mm	Flat: ø 220 mils	Flat: ø 5.5 mm	Flat: ø 220 mils
Probe tip material	Hard plastics		Hard plastics	
Probe tip replaceable	No		No	
Height	-		-	
Diameter / width	16 mm		16 mm	
Length	110 mm		110 mm	
Works with the instruments	PHASCOPE® PMP10; MMS® PC SIGMASCOPE®		PHASCOPE® PMP10; MMS® PC SIGMASCOPE®	
Applications	Measures nonferrous metal coatings on electrically non-conducting substrate materials, preferably of Cu on pc-boards, even under a paint coating. Two measurement frequencies, 60 kHz and 240 kHz, are available.		Measures nonferrous metal coatings on electrically non-conducting substrate materials, preferably of Cu on pc-boards, even under a paint coating. Two measurement frequencies, 60 kHz and 240 kHz, are available.	

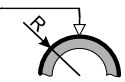
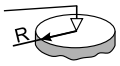
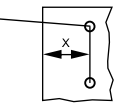
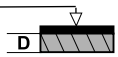
Probe model	ESL080B	
Version description **Part no.**	**ESL080B** 603-802	
Probe design	Axial single tip probe with fixed measuring system	*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode; see separate brochure page 4	*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Phase-sensitive Eddy current method	*Method used for the specified measuring application.*
Measuring application	Cu/Iso	*Measurable coating/substrate material system.*
Measuring range	5 - 80 µm	*Limits of the measurable coating thickness.*
Lift-off	Lift-off compensation for bore hole diameters 0.8 mm - 1.8 mm	*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading. Example: In the interval 50 … 1000 µm, the trueness is 0.5 %. Standard: DIN EN ISO 8402*
Precision	0.1 µm o. 1 %	*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	Not relevant 	*Diameter of a specimen with a concave curvature, under which the error is > 10 %. Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	Not relevant 	*Diameter of a specimen with a convex curvature, under which the error is > 10 %. Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	Not relevant 	*Diameter of a flat measurement area, under which the error is > 10 %. Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	Not relevant 	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %. For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	See applications 	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an "infinitely" thick substrate material.*
Probe tip radius	0.39 mm 15 mils	*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Steel	*Material of the measuring tip.*
Probe tip replaceable	Plug-in type replacement element	*Specifies, whether a worn measuring tip can be replaced or not.*
Height	-	*Ref. graphic in the section „Note regarding the probe dimensions"*
Diameter / width	13 mm	*Ref. graphic in the section „Note regarding the probe dimensions"*
Length	140 mm	*Ref. graphic in the section „Note regarding the probe dimensions"*
Works with the instruments	PHASCOPE® PMP10; MMS® PC + Mod. SIGMASCOPE® + Mod. PHASCOPE® ESL	*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures the copper coating thickness even under thin Sn- or SnPb coating, in metal through holes on pc-boards. Only for measurements in bore holes with 0.8 to 2 mm diameter. Board thickness D can be entered for D = 0.5 to 8 mm (20 to 320 mils). Measurement frequency 240 kHz. Cable length 1.15 m.	*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*

Probe model	ESL080V	
Version description **Part no.**	**ESL080V** 603-968	
Probe design	Axial single tip probe with fixed measuring system	*Mechanical design principle of the measurement probe.*
Measuring mode	Single mode; see separate brochure page 4	*Specifies, whether this probe is suitable for only one (single mode), for several (DUAL mode) or for a combination of two methods (DUPLEX mode).*
Measuring method	Phase-sensitive Eddy current method	*Method used for the specified measuring application.*
Measuring application	Cu/Iso	*Measurable coating/substrate material system.*
Measuring range	5 - 80 µm	*Limits of the measurable coating thickness.*
Lift-off	Lift-off compensation for bore hole diameters 0.8 mm – 1.8 mm	*The trueness is determined using calibration standards of known thicknesses. It is the difference between the nominal value of the calibration standard and the measured value. The trueness can be stated as an absolute value or as a percentage of the reading. Example: In the interval 50 … 1000 µm, the trueness is 0.5 %. Standard: DIN EN ISO 8402*
Precision	0.1 µm o. 1 %	*Repeatable standard deviation s of n = 10 single readings.*
Ø (concave) for 10 % error **Min. Ø**	Not relevant 	*Diameter of a specimen with a concave curvature, under which the error is > 10 %. Min. Ø: Smallest diameter permissible for measurements.*
Ø (convex) for 10 % error **Min. Ø**	Not relevant 	*Diameter of a specimen with a convex curvature, under which the error is > 10 %. Min. Ø: Smallest diameter permissible for a measurement.*
Meas. area Ø for 10 % error **Min. measuring area Ø**	Not relevant 	*Diameter of a flat measurement area, under which the error is > 10 %. Min. Ø: Smallest diameter permissible for a measurement.*
Edge distance for 10 % error	Not relevant 	*Distance of the probe tip to the edge of the specimen underneath which the error is > 10 %. For 2-tip probes: Parallel distance tip connection line to the edge.*
Substrate th. for 10 % error	See applications 	*This the thickness d of the substrate material, under which the reading will deviate by more than 10 % from an "infinitely" thick substrate material.*
Probe tip radius	0.39 mm 15 mils	*Radius of the probe measuring tip.* *The measuring tip establishes the contact with the surface of the specimen.*
Probe tip material	Steel	*Material of the measuring tip.*
Probe tip replaceable	Plug-in type replacement element	*Specifies, whether a worn measuring tip can be replaced or not.*
Height	-	*Ref. graphic in the section „Note regarding the probe dimensions"*
Diameter / width	13 mm	*Ref. graphic in the section „Note regarding the probe dimensions"*
Length	140 mm	*Ref. graphic in the section „Note regarding the probe dimensions"*
Works with the instruments	PHASCOPE® PMP10; MMS® PC SIGMASCOPE® + PHASCOPE® ESL	*Designation of the HELMUT FISCHER instruments to which the respective probe can be connected.*
Applications	Measures the copper coating thickness even under thin Sn or SnPb coating, in metal-coated through holes on pc-boards. Only for measurements in bore holes with 0.8 to 2 mm diameter. Board thickness D can be entered for D = 0.5 to 8 mm (20 to 320 mils). Measurement frequency 240 kHz. Cable length 1.15 m. Spacer rings position the meas. element in the middle of the longitudinal bore hole axis.	*Abbreviations:* *NF: Non-ferrous metals (non-ferromagnetic properties).* *Fe: Iron or steel (with ferromagnetic properties).* *Iso: Material with isolating properties, i.e., electrically non-conducting e.g., paint.* **) The limits are referenced to a coating thickness that generates a measuring signal at about the center of the usable signal range. With increasing coating thicknesses, the 10 % error will be reached only at smaller radii or substrate material thicknesses, respectively.*

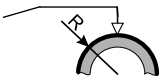
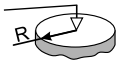
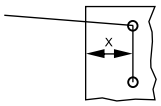
	ESG20
Probe model	**603-690**
Applications	Duplex measurement on sheet metal with electrolytically or slight hot-dip galvanized coatings. The individual coating thicknesses of the duplex coating system are measured simultaneously and displayed in the instrument separately. Typical zinc coatings between 5 and 20 µm respectively 0.2 to 0.79 mils. Hot-dip galvanized zinc coatings without pronounced zinc-iron diffusion zone can also be measured. The probe can also be used as a dual probe with automatically base material recognition under the coating. In this case either the amplitude sensitive eddy current test method or the magnetic induction test method is used. The conductivity comensation is active when using the amplitude sensitive eddy current test method for measurement. Typical application is paint/Al in the automobile manufactories.
Examples	Duplex applications (Paint/Zn/Fe) • Paint/lacquer and zinc coatings on steel or iron sheet metals • Domestic appliance and electrical industry • Auto body painting and brake pipes • Cladding, steel roof constructions, packaging or vending machine housings
	Dual applications • Paint, varnish or plastic coatings on steel, iron or cast iron (NC/Fe) • Non-ferrous coatings on steel, iron or cast iron (NF/Fe) • Paint, varnish or plastic coatings on aluminum. copper or brass (NC/NF) *Further technical data next page from Application (dual).*
Probe design	• Axial single tip probe with spring-loaded measuring system • Robust probe design with replaceable probe tip

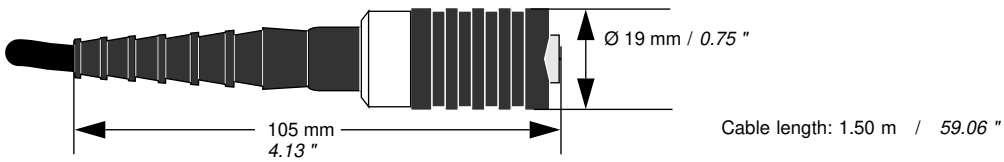
Application (duplex)	Paint/Zn/Fe and NC/NF		
Measurement range	**Total paint/zinc coatings**	**Zinc coating**	**Paint coating**
	0 ... 700 µm / *0 ... 27.6 mils*	≤ 150 µm / *≤ 5.9 mils*	≤ 550 µm / *≤ 21.7 mils*

Trueness based on Fischer standards	**Zinc coating on steel or iron (Zn/Fe)** *Valid for paint coating thicknesses ≤ 500 µm* 2 ... 30 µm: ≤ 0.5 µm 30 ... 100 µm: ≤ 1 µm *Valid for paint coatings ≤ 19.7 mils:* *0.08 ... 1.2 mils: ≤ 0.02 mils* *1.2 ... 3.9 mils: ≤ 0.04 mils*	**Paint coating on Zn/Fe (NC/NF)** *Valid for Zn coating thicknesses x and normalization on the respective Zn coating material* *x ≤ 30 µm (1.2 mils)* 2 ... 100 µm: ≤ 1 µm 100 ... 500 µm: ≤ 1 % of reading *0.08 ... 3.9 mils: ≤ 0.04 mils* *3.9 ... 19.7 mils: ≤ 1 % of reading* *x: 30 ... 100 µm (1.2 ... 3.9 mils)* 2 ... 100 µm: ≤ 2 µm 100 ... 500 µm: ≤ 2 % of reading *0.08 ... 3.9 mils: ≤ 0.08 mils* *3.9 ... 19.7 mils: ≤ 2 % of reading*
Repeatability precision based on Fischer standards	**Zinc coating on steel or iron (Zn/Fe)** 2 ... 30 µm: ≤ 0.1 µm 30 ... 100 µm: ≤ 0.3 % of reading *0.08 ... 1.2 mils: ≤ 0.004 mils* *1.2 ... 3.9 mils: ≤ 0.3 % of reading*	**Paint coating on Zn/Fe (NC/NF)** 2 ... 100 µm: ≤ 0.5 µm 100 ... 500 µm: ≤ 0.5 % of reading *0.08 ... 3.9 mils: ≤ 0.02 mils* *3.9 ... 19.7 mils: ≤ 0.5 % of reading*

Influences	**Zinc coating on steel or iron (Zn/Fe)**	**Paint coating on Zn/Fe (NC/NF)**
The following values are valid for a	*reference coating thickness of 21 µm / 0.83 mils zinc on steel or iron; no paint coating*	*reference coating thickness of 75 µm / 2.95 mils paint on 21 µm / 0.83 mils zinc on steel or iron*
Curvature (R), measurement with reference to master calibration on flat surface		
Measuring spot 	Measurement error of -4.5 % for R = 22 mm / *R = 0.87 "* Measurement error of -10 % for R = 10 mm / *R = 0.39 "*	Measurement error of 10 % for R = 22 mm / *R = 0.87 "* Measurement error of 22 % for R = 10 mm / *R = 0.39 "*
	Probe needs a minimum of R = 4 mm (support stand necessary) / *R = 0.16 "*	
Edge distance (R), specification from probe pole center		
Measuring spot in the center of the circular surface 	No specification	No specification
	Probe needs a minimum of R = 5 mm (support stand necessary) / *R = 0.2 "*	
Edge distance (X), specification from probe pole center		
Measuring spot 	Measurement error of -9 % for X = 1 mm / *X = 0.039 "* Measurement error of -4 % for X = 2 mm / *X = 0.079 "*	Measurement error of 21 % for X = 1 mm / *X = 0.039 "* Measurement error of 10 % for X = 2 mm / *X = 0.079 "*
Base material thickness (D) Measuring spot 	No specification	Measurement error of 10 % for D = 0.3 mm / *D = 0.012 "*
Measuring method	Magnetic induction method according to ISO 2178, ASTM D7091, Non-magnetic coatings on magnetic substrates; Measurement of coating thickness; Magnetic method	Phase sensitive eddy current method according to ISO 21968, Non-magnetic metallic coatings on metallic and non-metallic basis materials - Measurement of coating thickness - Phase-sensitive eddy-current method

Application (dual)	NC/Fe or NF/Fe	NC/NF
*	*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).*	
Measurement range*	**Steel or iron base materials (Fe)** 0 ... 700 µm / *0 ... 27.6 mils*	**Non-ferrous metal base materials (NF)** 0 ... 2000 µm / *0 ... 78.7 mils*
Trueness* based on Fischer standards	**Steel or iron base materials (Fe)** 2 ... 100 µm: ≤ 1 µm 100 ... 400 µm: ≤ 1 % of reading 400 ... 600 µm: ≤ 2 % of reading *0.08 ... 3.9 mils: ≤ 0.02 mils* *3.9 ... 15.7 mils: ≤ 1 % of reading* *15.7 ... 23.6 mils: ≤ 2 % of reading*	**Aluminum base material (NF)** 5 ... 100 µm: ≤ 2 µm 100 ... 2000 µm: ≤ 2 % of reading *0.08 ... 3.9 mils: ≤ 0.04 mils* *3.9 ... 78.7 mils: ≤ 2 % of reading*
Repeatability precision* based on Fischer standards	**Steel or iron base materials (Fe)** 2 ... 100 µm: ≤ 0.5 µm 100 ... 600 µm: ≤ 0.5 % of reading *0.08 ... 3.9 mils: ≤ 0.02 mils* *3.9 ... 23.6 mils: ≤ 0.5 % of reading*	**Aluminum base material (NF)** 5 ... 100 µm: ≤ 0.5 µm 100 ... 2000 µm: ≤ 0.5 % of reading *0.08 ... 3.9 mils: ≤ 0.02 mils* *3.9 ... 78.7 mils: ≤ 0.5 % of reading*

Influences	**Steel or iron base materials (Fe)**	**Aluminum base material (NF)**
The following values are valid for a	*reference coating thickness of 100 µm / 3.9 mils*	*reference coating thickness of 100 µm / 3.9 mils*
Curvature (R), measurement with reference to master calibration on flat surface		
Measuring spot 	Measurement error of 10 % for R = 8 mm / *R = 0.3.2 "*	Measurement error of 10 % for R = 192,5 mm / *R = 7.6 "*
	Probe needs a minimum of R = 4 mm (support stand necessary) / *R = 0.16 "*	
Edge distance (R), specification from probe pole center		
Measuring spot in the center of the circular surface 	No specification	No specification
	Probe needs a minimum of R = 5 mm (support stand necessary) / *R = 0.2 "*	
Edge distance (X), specification from probe pole center		
Measuring spot 	Measurement error < 5 % for X = 1 mm / *X = 0.039 "*	Measurement error of 10 % for X = 5 mm / *X = 0.197 "*
Base material thickness (D) Measuring spot 	Measurement error of 10 % for D = 0.33 mm / *D = 0.013 "*	Measurement error of 10 % for D = 0.2 mm / *D = 0.0079 "*
Base material	Influence of the permeability of the base material (Fe) with reference to Fischer calibration standards (master calibration): Measurement error ≥ 10 % for a ferrite content ≥ 115 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 ≤ 3 %, valid for coating thicknesses ≥ 100 µm (*3.9 mils*).
Measuring method	Magnetic induction method according to ISO 2178, ASTM D7091, Non-magnetic coatings on magnetic substrates; Measurement of coating thickness; Magnetic method	Amplitude sensitive eddy current method according to ISO 2360, ASTM D7091, Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating Thickness - Amplitude-sensitive eddy current method

Admissible ambient temperature at operation	- 10 °C ... + 40 °C / *+ 14 °F ... + 104 °F*
Probe tip material	PVD coated steel
Probe tip replaceable	Yes
Probe tip radius	0.75 mm / *0.03 "*
Scope of supply	Probe, metal plates NF/FE, ISO/NF and Zn standard for instrument check, calibration foils
Works with instruments	PHASCOPE® PMP10 Duplex and FISCHERSCOPE® MMS® PC2 with module PHASCOPE® DUPLEX
Dimensions	

FE01.5 doc09/12

Accessories

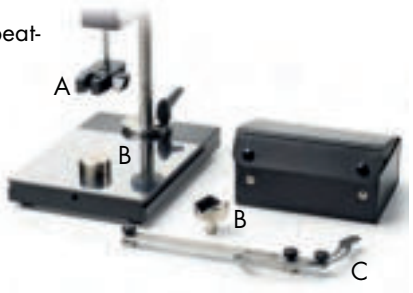
Support stands
For precise and reproducible measurements on small parts, such as fasteners, stampings, sleeves etc. or parts with complex geometry a measurement stand is necessary, into which a probe can be clamped. The reproducible positioning of the probe on the specimen substantially improves the repeatability of the readings – reduction of the reading variation. Suitable for all probes.

Stand V12 BASE (604-420)
Support stand with mechanical probe lowering device. A specific lever mechanism of the stand slows down the lowering speed shortly before the probe reaches the surface of the specimen. Thereby the probe is very softly placed on the surface of the specimen.

Measurements of anodized coatings on sleeves using the curvature-compensating probe FTD3.3, mounted into the support stand V12 BASE

Stand V12 MOT (604-374)
Stand with motorized probe lowering device for top repeatability. It can be directly controlled by the stand keys or within the instrument FISCHERSCOPE® MMS® PC2. The Teach-In function ensures a very soft placing of the probe onto the specimen's surface.

Standard scope of supply of the support stands
- Various clamping devices for Fischer standard axial probes (A)
- Even and V-table for small parts (B)
- Stop device for repeatable specimen positioning (C)



Clamping device (602-691)
Optional accessory for clamping inside probes into the support stands V12 BASE or V12 MOT.

Clamping device (600-077)
Optional accessory for clamping angles probes into the support stands V12 BASE or V12 MOT.

Clamping device (600-213)
Optional accessory for clamping axial probes with Ø 16 mm into the support stands V12 BASE or V12 MOT.

Measurement of zinc coatings on screws using the probe FGAB1.3, mounted into the support stand V12 MOT

Guiding device for angle probes (600-080)
The guiding device makes it easier to reach the measurement point in bore holes or recesses. The angle probe is just clamped into the guiding device.
Insertion depth: max. 180 mm (7.09 ")

Measurement of the lacquer thickness on an aluminum rim wheel with the probe FAW3.3, mounted in the guiding device

Screw measurement device (602-916)
For accurate measurements of coating thicknesses on metallic fasteners according ISO 4042.
Suitable for the probes FGAB1.3, FGA06H or ESD2.4.
Scope of supply:
- Fixture for fillister head and ULF/ULS screws (M3; M3.5; M4)
- Fixture for cylinder head screws according to ISO 1207 (≤ M3) or ISO 4762/DIN 7984 (≤ M12).
  Please specify the required dimension with the order.

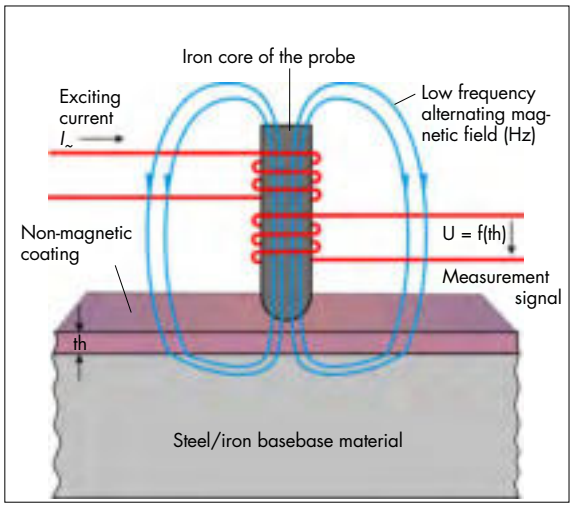
Universal bench device (604-261)
Universal bench device to fix and to position small parts of any shape. For measurements in combination with the support stands V12 Base or V12 MOT.
- Dimensions (HxWxD): 27 mm x 115 mm x 30 mm (1.1 " x 4.5 " x 1.2 ")
- Removable horizontal and vertical prisms
- Jaw width of 0.1 - 25 mm (0.004 - 0.984 ")

Scope of supply:
Carrying case, accessories and operator's manual

Measurement Methods

Magnetic induction test method

Standards: ISO 2178, ASTM 7091



Schematic diagram of the magnetic induction test method. The indentation depth depends on the permeability of the base material.

Functional principle

Contact method. The excitation current generates a low-frequency magnetic field with a strength that corresponds to the distance between the probe and the base material. A measurement coil measures the magnetic field. In the instrument, the obtained measurement signal is converted into the coating thickness values via the characteristic probe output function, i.e., the functional correlation between the probe signal and the coating thickness.

Main fields of application

Non-magnetizable coating materials on magnetizable base material.

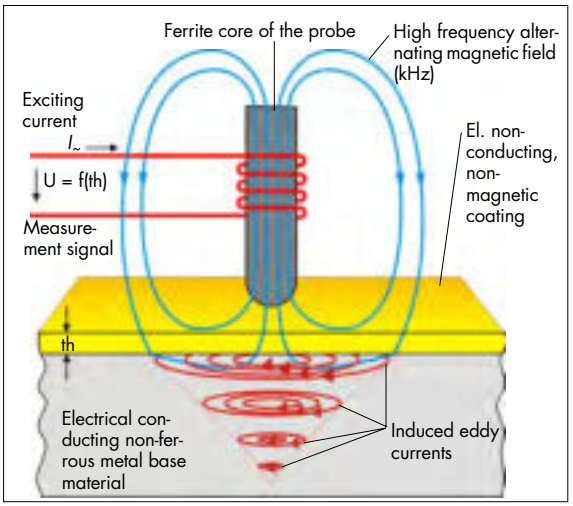
- Electroplated coatings of chrome, zinc, copper or aluminum on steel or iron
- Paint, enamel, lacquer or plastic coatings on steel or iron

Suitable instrument types

DELTASCOPE®, DUALSCOPE®, FISCHERSCOPE®
MMS® PC2 with module PERMASCOPE®

Eddy current test method (amplitude sensitive)

Standards: ISO 2360, ASTM 7091



Schematic diagram of the amplitude sensitive eddy current test method. The indentation depth depends on the used frequency and the electrical conductivity of the base material.

Functional principle

Contact method. The excitation current generates a high-frequency magnetic field, which induces eddy currents in the base material. The strength of the eddy currents corresponds to the distance between the measurement probe and the base material. The magnetic field of the eddy currents opposes the original magnetic field and provides the measurement signal. Using the characteristic probe output function, i.e., the functional correlation between the measurement signal and the coating thickness, the measurement signal is converted in the instrument into the coating thickness value.

Main fields of application

Electrical non-conductive and non-magnetizable coating material on electrical conducting non-ferrous metal base materials.

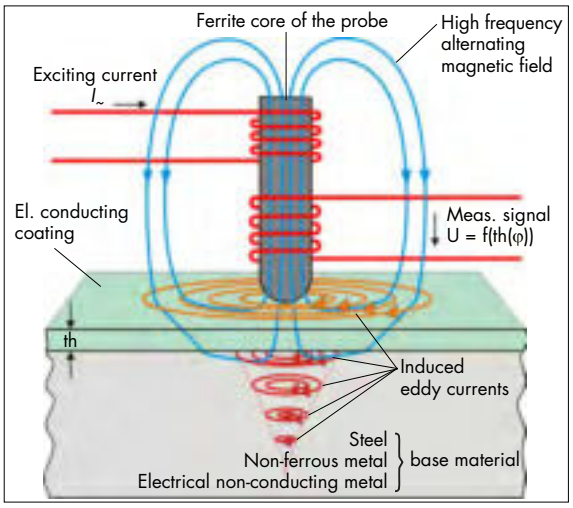
- Paint, lacquer or plastic coatings on aluminum, copper, brass, zinc
- Anodized coatings on aluminum

Suitable instrument types

ISOSCOPE®, DUALSCOPE®, FISCHERSCOPE®
MMS® PC2 with module PERMASCOPE®

Eddy current test method (phase sensitive)

Standard: ISO 21968



Schematic diagram of the phase sensitive eddy current method. The indentation depth of the magnetic field depends on the used frequency and the electrical conductivity of the materials.

Functional principle

Contact method. The excitation current generates a high-frequency magnetic field, which induces eddy currents in the material (coating or base material). The different formation of the eddy currents in the coating material and the base material is used for the coating thickness measurement. The phase shift Phi between the excitation current and the measurement signal is converted to a coating thickness value by using the characteristic probe output function, i.e., the functional correlation between the measurement signal and the coating thickness. In a certain range, which is determined by the probe, the reading is not dependent on the distance between the probe and the coating surface.

Main fields of application

Electrical conductive coating material on any base material.

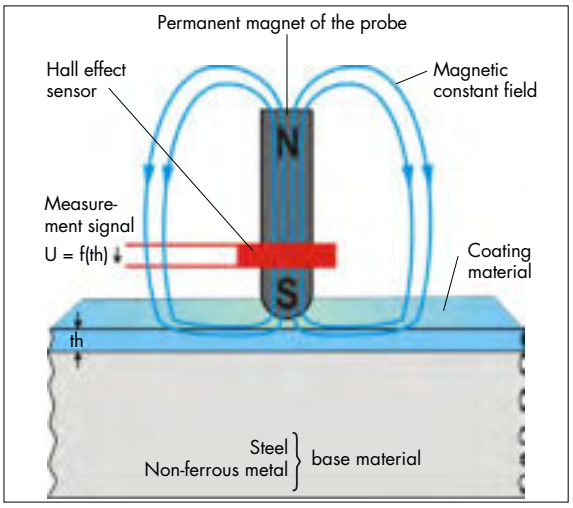
- Zinc or Nickel coatings on steel or iron
- Copper coatings on brass or stainless steel
- Copper coatings on Epoxy, even under a lacquer protection coating

Suitable instrument types

PHASCOPE® PMP10, FISCHERSCOPE® MMS® PC2 with module SIGMASCOPE®/PHASCOPE® 1

Magnetic test method

Standards: ISO 2178, ASTM 7091



Schematic diagram of the magnetic test method. The indentation depth of the magnetic field depends on the permeability of the base material.

Functional principle

A permanent magnet generates a constant magnetic field with a strength that corresponds to the thickness of the coating to be measured or the distance between the measurement probe and the base material. The magnetic field strength is measured by a suitable sensor; using the characteristic probe output function, i.e., the functional correlation between the measurement signal and the coating thickness. The measurement signal is converted in the instrument into a coating thickness value.

Main fields of application

Non-magnetizable coating material on steel or iron or nickel coating on non-ferrous metal base material.

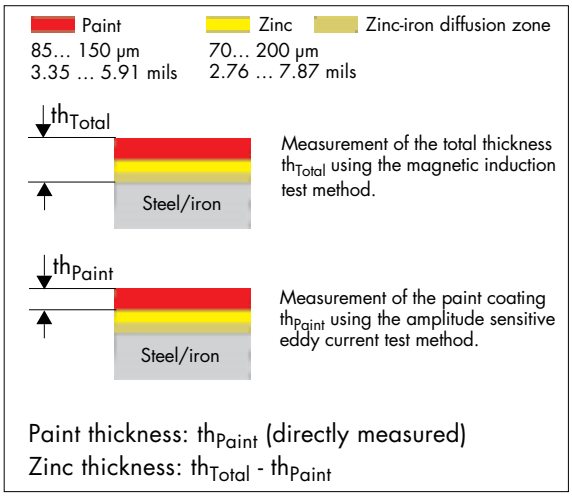
- Thick electroplated coatings of chrome, zinc, copper, aluminum etc. on steel or iron
- Thick coatings of enamel, paint or plastic on steel or iron
- Galvanically deposited nickel coatings (Ni) on copper or aluminum; also suited for nickel coatings on pc-board contacts, even under a thin gold coating
- Chemically deposited nickel coatings (Ni), if magnetizable, on copper or aluminum

Suitable instrument types

DUALSCOPE® H FMP150, FISCHERSCOPE® MMS® PC2 with module NICKELSCOPE®

Duplex Measurement

Duplex measurements in the corrosion protection sector (zinc coatings ≥ 70 µm/ 2.76 mils)



Determining the single coating thicknesses at the duplex measurement using the amplitude sensitive eddy current and the magnetic induction test methods

Functional principle

The magnetic induction test method and the amplitude sensitive eddy current test method are used for measuring duplex coatings with thick zinc coatings (≥ 70 µm / 2.76 mils). The operational principles of these two test methods are described on the preceding pages. The two test methods are used parallel such that in one measurement step, the individual coating thickness of paint and zinc are computed and displayed from the two measured readings. The non-magnetic zinc-iron diffusion zone goes along with the zinc coating thickness. The probe features a conductivity compensation, so that the different electrical conductivities of the pure zinc coating and the zinc-iron diffusion zone have no effect on the thickness measurement of the paint coating.

Main fields of application

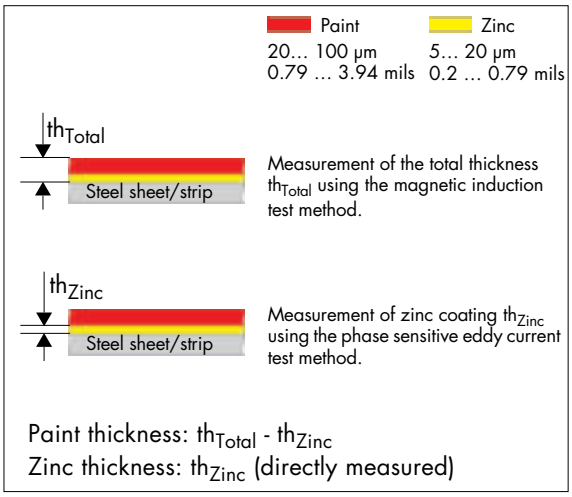
Duplex coatings on steel or iron.

- Specification measurements in the **corrosion protection sector** (zinc coatings ≥ 70 µm / 2.76 mils)
- Paint/lacquer and zinc coating thickness on hot-dip galvanized steel or iron (continuous or batch galvanized)
- Power pylons, bridge structural components, traffic guidance systems
- Gates, fences, guard rails

Suitable instrument types

DUALSCOPE® FMP20, DUALSCOPE® FMP40, DUALSCOPE® FMP100, DUALSCOPE® H FMP150

Duplex measurements on sheet metal with electrolytically or slight hot-dip galvanized coatings



Determining the single coating thicknesses at the duplex measurement using the phase sensitive eddy current and the magnetic induction test methods

Functional principle

The magnetic induction test method and the phase sensitive eddy current test method are used for measuring duplex coatings with thin zinc coatings (typical between 5 and 20 µm respectively 0.2 to 0.79 mils). The operational principles of these two test methods are described on the preceding pages. The two test methods are used parallel such that in one measurement step, the individual coating thickness of paint and zinc are computed and displayed from the two measured readings. Duplex coatings with hot-dip galvanized zinc coatings without pronounced zinc-iron diffusion zone can also be measured with these test methods.

Main fields of application

Duplex coatings on steel or iron.

- Quality measurements of **electrolytically or slight hot-dip galvanized coatings** (typical zinc coatings between 5 and 20 µm respectively 0.2 to 0.79 mils)
- Domestic appliance and electrical industry
- Auto body painting and brake pipes
- Cladding, steel roof constructions, packaging or vending machine housings

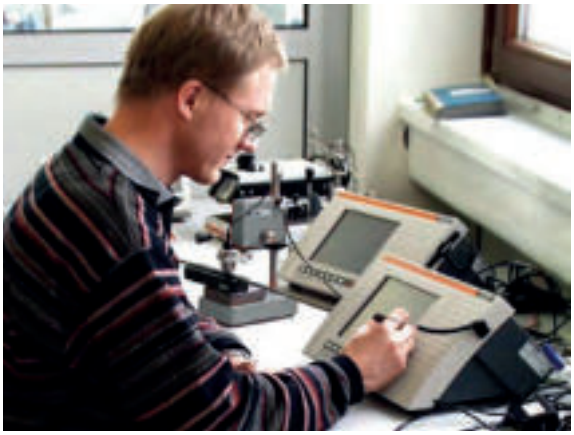
Suitable instrument types

PHASCOPE® PMP10 DUPLEX, FISCHERSCOPE® MMS® PC2 with module PHASCOPE® DUPLEX

Service worldwide
FISCHER has established a tightly-linked global network of service partners with highly qualified staff. Offering fast help, repairing and the availability of leasing and rental units, FISCHER supports you in every respect concerning your instruments and their use.

Calibration and certification
On your request Fischer issues a Quality Inspection Certificate for your probe and instrument according to DIN 55350-18. A broad assortment of calibration foils is available from FISCHER. On your request FISCHER issues a factory Certificate for your calibration foil.

Application laboratories
More and more, demanding applications require highly qualified application advice. FISCHER addresses this need with its application laboratories located around the world (Germany, Switzerland, China, USA).



Measuring on a customer's specimen in a FISCHER application laboratory

User on-site training
With our training program we make your employees fin on-site for your measuring task. Our trainer takes account of your individual requirements and wishes.

User training for the DUALSCOPE® FMP100 on-site at the customer's

Seminars
Because we want you to receive maximum benefit from our products, FISCHER's experts are happy to share their application know-how. The seminars not only teach metrological basics but also hand-on experience in small groups to put the theory into practice.

A FISCHER seminar teaches metrological basics and practical knowledge in small groups

Fischer Worldwide

Helmut Fischer GmbH
Institut für Elektronik und Messtechnik
71069 Sindelfingen, **Germany**
Tel. +49 70 31 30 30
mail@helmut-fischer.de

Fischer Instrumentation (GB) Ltd
Lymington, Hampshire SO41 8JD, **England**
Tel. +44 15 90 68 41 00
mail@fischergb.co.uk

Helmut Fischer AG
CH-6331 Hünenberg, **Switzerland**
Tel. +41 41 785 08 00
switzerland@helmutfischer.com

Fischer Instrumentation Electronique
78180 Montigny le Bretonneux, **France**
Tel. +33 1 30 58 00 58
france@helmutfischer.com

Helmut Fischer S.R.L.
20099 Sesto San Giovanni (Milano), **Italy**
Tel. +39 0 22 55 26 26
italy@helmutfischer.com

Fischer Instruments, S.A.
08018 Barcelona, **Spain**
Tel. +34 9 33 09 79 16
spain@helmutfischer.com

Helmut Fischer Meettechniek B.V.
5627 GB Eindhoven, **The Netherlands**
Tel. +31 40 248 22 55
netherlands@helmutfischer.com

Fischer Technology, Inc.
Windsor, CT 06095, **USA**
Tel. 1 (860) 683-0781
info@fischer-technology.com

Helmut Fischer S. de R.L. de C.V.
76230 Querétaro, QRO, **Mexico**
Tel: +52 1 (442) 190-99 88
hhuerta@fischer-technology.com

Fischer do Brasil
04561-001 São Paulo, **Brazil**
Tel. +55 11 35 88 09 09
brasil@helmutfischer.com

Fischer Instruments K.K.
Saitama-ken 340-0012, **Japan**
Tel. +81 4 89 29 34 55
japan@helmutfischer.com

Nantong Fischer Instrumentation Ltd
Shanghai 200333, P.R. **China**
Tel. +86 21 32 51 31 31
china@helmutfischer.com

Fischer Instrumentation (Far East) Ltd
Kwai Chung, N.T., **Hong Kong**
Tel. +852 24 20 11 00
hongkong@helmutfischer.com

Fischer Measurement Technologies (India) Pvt. Ltd
Pune 411036, **India**
Tel. + 91 20 26 82 20 65
india@helmutfischer.com

Fischer Instrumentation (S) Pte Ltd
Singapore 658065, **Singapore**
Tel. +65 62 76 67 76
singapore@helmutfischer.com

Helmut Fischer Korea Co., Ltd
Seoul-City, **Republic of Korea**
Tel. +82 24 15 23 81
korea@helmutfischer.com

www.helmut-fischer.com

902-112 09/12 9-12