Probe summary – coating thickness measurement

Edition March 2022

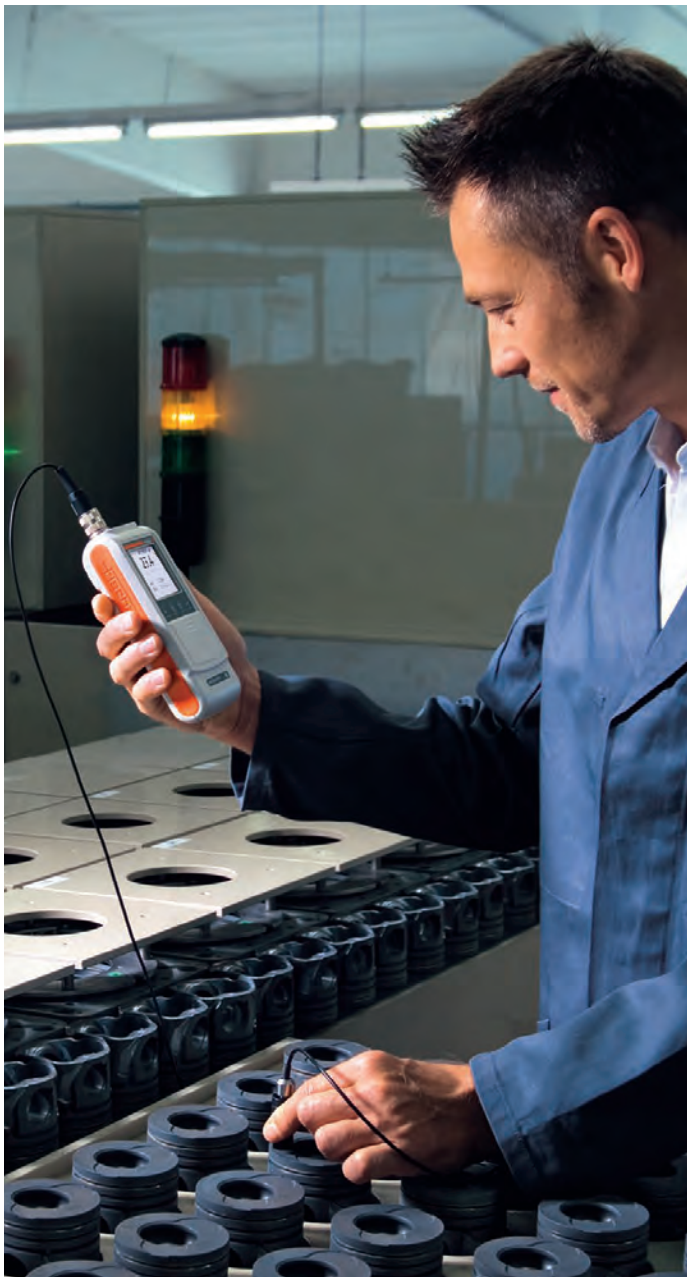
Probes for coating thickness measurement

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 test method. The electrical signal of the probe (count rate, frequency, voltage) is converted into a coating thickness value in the measuring instrument and displayed.

Individual solutions

The ideal probe for each measurement task. Our 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 car bodies. This eliminates the need to cut the car body for coating thickness measurement.



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

Car body in section to show how the probe V3FGA06H measures the EPD coating within the car body.

Measuring with the inside probe FAI3.3-150.

Many and varied probe program

As multifaced the measurement applications of our customers is also the many and varied selection of our probes. Through continuous development and innovations our probe program now includes several hundred probes designed to ensure optimal results with the highest accuracy for the most diverse measurement tasks.

Probe selection based on several criteria

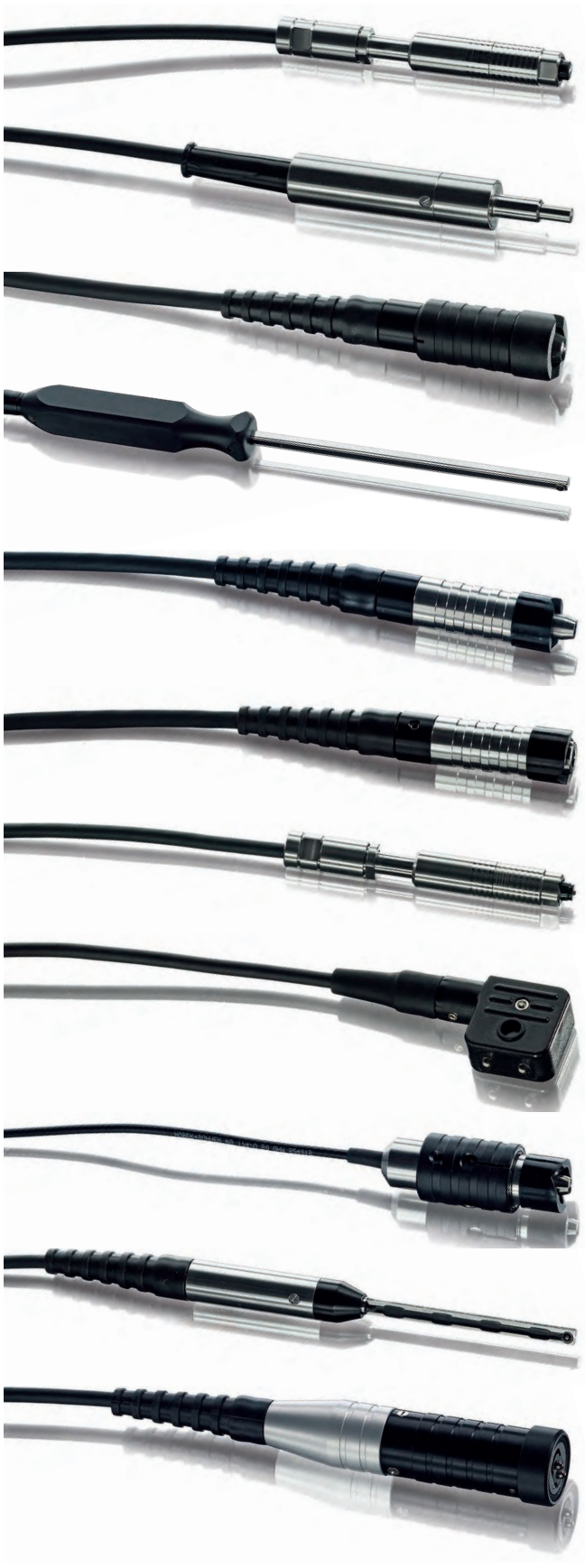
- material combination of coating and base material
- thickness of coating and base material
- dimension of measurement area
- shape of specimen
- surface condition of specimen

Content

Features

- Accuracy and linearity
  All probes are developed and manufactured in-house to strict quality standards. This combined with our factory calibration provides probes with high measurement accuracy and linearity.
- Factory calibration
  Each individual probe is factory-calibrated at several reference points with the greatest care to ensure the highest possible degree of trueness.
- Robust
  Our probes are extremely robust and wear-resistant – they deliver precise measurement results over a long period of time even on hard surfaces and after millions of measurements.
- Conductivity compensation
  Different electrical conductivities of the base material, e. g. different aluminium alloys, can be compensated thanks to high-precision conductivity compensation. This conductivity compensation developed by us is used for all measurements using the amplitude-sensitive test method. This makes it possible to eliminating time-consuming on-site calibration procedures on the actual base material while simultaneously achieving very high levels of trueness.
- Curvature compensation
  Special probes using the amplitude-sensitive eddy current test method are developed that automatically compensate 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 ideal 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.

Many and varied 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

- small to very small
- round or angular shaped

Various measurement sites

- flat, even surfaces
- easily accessible
- in bore-holes
- in grooves and cavities
- on curved surfaces and 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 (like chrome etc.)
- smooth coating materials (like paint, lacquer, textiles etc.)

Various base materials

- iron and steel
- non-ferrous metals
- any metals
- steel under paint-zinc coating systems
- epoxy and plastic

Various probe pole designs

For different surface characteristics such as rough surface, soft coating material etc.:

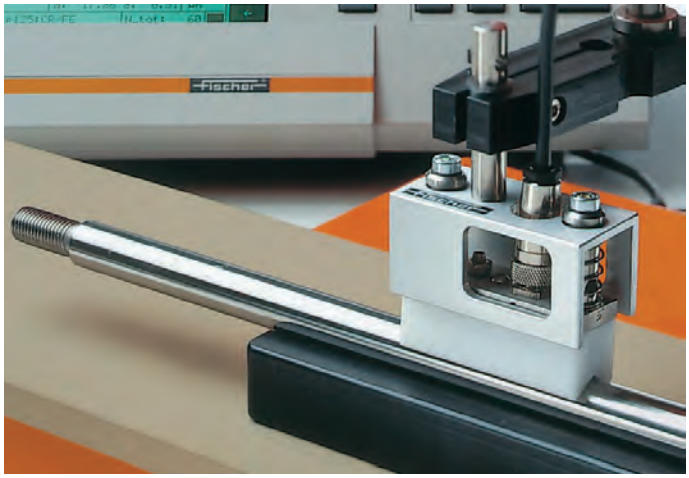
- single pole or two poles
- spherical or flat poles
- different pole sizes
- different pole materials, e.g., hard metal, jewel, TiN/TiC, PVD coated, hard plastic

Many and varied fields of application

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

Duplex measurement of paint-zinc coatings with the probe FDX13H.

Measurement of anodized coating with the curvature-compensating probe FTD3.3.



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

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

Measurement of car body paint thickness using the dual probe FD10.

Basis probes

The following is an excerpt from our probe program with the most frequently used probes and their special properties. The probe illustrations are shown in size comparison.

Steel, iron, cast iron (FE) base materials

Magnetic inductive test method (NC/FE and NF/FE), probe overview from page page 9

Model: FGAB1.3

Measuring range: 0 ... 2000 µm

Measuring range: 0 ... 78.7 mils

Single pole probe – Features

- measurements on smooth surfaces
- only small touchdown area required

Model: FGABI1.3

Measuring range: 0 ... 1000 µm

Measuring range: 0 ... 39.4 mils

Single pole probe – Features

- measurements in bore-holes, pipes etc.
- probes available with insertion depths from 150 to 400 mm (5.91 to 15.74 ")

Model: F20H

Measuring range: 0 ... 2500 µm

Measuring range: 0 ... 98.4 mils

Single pole probe – Features

- measurements on both smooth and rough (e.g., blasted) surfaces
- single pole probe with wear-resistant probe pole
- can be used as a replacement for probe FGA2H, which is no longer available

Model: FGB2

Measuring range: 0 ... 5 mm

Measuring range: 0 ... 0.2 "

Single pole probe – Features

- large geometric influence
- large edge influence
- applicable temporary up to +80 °C (+176 °F)

Model: FKB10

Measuring range: 0 ... 8 mm

Measuring range: 0 ... 0.32 "

Two pole probe – Features

- two pole probe
- higher measurement precision on rough (e.g., blasted) surfaces than single pole probes

Basis probes

Nonferrous metal (NF) base materials

Amplitude-sensitive eddy current test method (NC/NF), probe overview from page 15
The following 4 probes measure with a high-precision conductivity compensation developed by us.

Model: FTA3.3/FTA3.3H **Measuring range: 0 ... 1200 µm**
Measuring range: 0 ... 47.2 mils

Single pole probes – Features

- measurements on smooth surfaces
- high trueness with thin coatings
- no edge influence outside the touchdown area
- FTA3.3H: with wear-resistant probe pole
- recommendation for moist surfaces: probe FTA3.3FG

Model: FAI3.3-xxx **Measuring range: 0 ... 800 µm**
Measuring range: 0 ... 31.5 mils

Single pole probe – Features

- measurements in bore-holes, pipes etc.
- probes available with insertion depths from 150 to 400 mm

Model: FTD3.3 **Measuring range: 0 ... 800 µm**
Measuring range: 0 ... 31.5 mils

Single pole probe – Feature

- excellent curvature compensation for convex curved surfaces

Model: FA9 **Measuring range: 0 ... 3.5 mm**
Measuring range: 0 ... 0.14 "

Single pole probe – Features

- small design height due to angled design
- measurements in bore-holes, pipes and interstices

Electrical conductive coating material (NF)

Phase-sensitive eddy current test method (NF/FE) and (NF/NC), probe overview from page 20

Model: ERCU-N **Meas. range: 0.5 ... 120 µm**
Meas. range: 0.02 ... 4.7 mils

4 needle probe – Features

- specially suited for measurements of electroplated copper coatings on printed circuit boards
- no interference from underlying copper coatings separated by thin isolating layers (multilayer)

Model: ESL080B **Measuring range: 5 ... 100 µm**
Measuring range: 0 ... 3.9 mils

Single pole probe – Feature

- specially probe design for measurements of copper coatings in throughholes of printed circuit boards
- fix insertion depth of 0.8 mm (31.5 mils)

Basis probes

Nonferrous metal (NF) and iron, cast iron or steel (FE) base material – Dual probes

Amplitude-sensitive eddy current test method (NC/NF) and magnetic inductive test method (NC/FE and NF/FE)

The 2 dual probes listed below work with 2 test methods and are therefore able to measure coating thicknesses on nonferrous metals (NF) as well as on ferrous metals (FE), probe overview from page 22.

Model: FD13H

Measuring range: 0 ... 2000 µm

Measuring range: 0 ... 78.7 mils

Single pole probe – Features

- measurements on both smooth and rough (e.g., blasted) surfaces
- single pole probe with wear-resistant probe pole
- automatic activation of the conductivity compensation when using the amplitude-sensitive eddy current test method

Model: FD10

Different measuring ranges

FE: 0 ... 1300 µm (0 ... 51.2 mils)
NF: 0 ... 800 µm (0 ... 31.5 mils)

Single pole probe – Features

- measurements of thin coatings on smooth surfaces
- single pole probe with wear-resistant probe pole
- automatic activation of the conductivity compensation when using the amplitude-sensitive eddy current test method

Paint-Zinc coatings on steel or iron – Duplex probes

FDX13H: Amplitude-sensitive eddy current test method (NC/NF) and magnetic inductive test method (NC/FE and NF/FE)
ESG20: Phase-sensitive eddy current test method (NF/FE) and magnetic inductive test method (NC/FE and NF/FE)

Simultaneous measurement and display of the individual paint/zinc coatings, probe overview from page 23

Model: FDX13H

Measuring range*: 90 ... 800 µm

Measuring range*: 3.5 ... 31.5 mils

* Measuring range for the total paint/zinc coating

Single pole probe – Features

- **Duplex measurements of paint/zinc coating thicknesses**
  Zinc coating ≥ 70 µm (≥ 2.76 mils);
  Paint coating ≥ 20 µm (≥ 0.79 mils)
- single pole probe with wear-resistant probe pole
- automatic activation of the conductivity compensation when using the eddy current test method

Model: ESG20

Measuring ranges

Duplex probe
zinc: 0 ... 150 µm (0 ... 5.9 mils)
paint: 0 ... 550 µm (0 ... 21.65 mils)

Dual probe
NC/NF: 0 ... 2000 µm (0 ... 0.079 ")
NF/FE: 0 ... 700 µm (0 ... 0.028 ")

Single pole probe – Features

- **Duplex probe:** suited for duplex measurements of paint/zinc coating thicknesses on sheet metals with electrolytically or slight hot-dip galvanized coatings,
  typical zinc coatings between 5 ... 20 µm (0.2 ... 0.79 mils)
- **Dual probe**: suited for measurements with automatic base material recognition and also with automatic activation of conductivity compensation for measurement on NF; typical application paint/Al in the automobile manufacturing
- single pole probe with wear-resistant probe pole

Standard probes – program overview

Steel, iron, cast iron (FE) base materials

- coatings made of paint, lacquer, or plastic on steel or iron (NC/FE)
- coatings made of copper, brass zinc, tin or chrome on steel iron (NF/FE)
- coatings made of NiP on steel or iron (NiP/FE, non-magnetizable NiP coatings with P content > 10 %)

Magnetic inductive test method (NC/FE and NF/FE), function principle page 28

- heavy influence on measurement: permeability of base material

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
single pole axial probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**smooth surfaces / electroplated coatings**
FGAB1.3[1]	604-141	0 ... 2000 µm 0 ... 78.7 mils	≥ Ø 10 mm ≥ Ø 0.4 "	■ small touchdown area ■ less edge influence to an edge
FGAB1.3T[1]	604-182	0 ... 2000 µm 0 ... 78.7 mils	≥ Ø 10 mm ≥ Ø 0.4 "	■ short-time usable up to +80 °C (+176 °F) surface temperature
FGABW1.3[1]	604-178	0 ... 2000 µm 0 ... 78.7 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ angled design; min. working hight 30 mm (1,18 ")
FGA06H[1]	604-176	0 ... 700 µm 0 ... 27.6 mils	≥ Ø 10 mm ≥ Ø 0.4 "	■ low curvature influence
FGB2[1]	604-179	0 ... 5 mm 0 ... 0.2 "	≥ Ø 10 mm ≥ Ø 0.4 "	■ also suitable for rougher surfaces ■ short-time usable up to +80 °C (+176 °F) surface temperature ■ large curvature influence ■ twice as large edge influence as FGAB1.3
FGBW2[1]	604-252	0 ... 5 mm 0 ... 0.2 "	≥ Ø 14 mm ≥ Ø 0.55 "	■ large curvature influence ■ twice as large edge influence as FGABW1.3 ■ angled design; min working hight 45 mm (1.77 ")

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole rod-shaped probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**smooth surfaces in bore holes, pipes etc. Ø > 11.5 mm (Ø > 0.45 ")**
FGABI1.3-150[1]	604-175	0 ... 1000 µm 0 ... 39.4 mils	Distance to wall ≥ 4 mm (0.16 ")	■ max. insertion depth 150 mm (5.91 ")
FGABI1.3-260[1]	604-339	0 ... 1000 µm 0 ... 39.4 mils		■ max. insertion depth 260 mm (10.24 ")

1: connectable to all DUALSCOPE®, DUALSCOPE® H and DELTASCOPE® hand-held instruments of FMP series and also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
* Touch area = abbreviation for touch down area

Standard probes – program overview

Steel, iron, cast iron (FE) base materials

- coatings made of paint, lacquer, or plastic on steel or iron (NC/FE)
- coatings made of copper, brass zinc, tin or chrome on steel iron (NF/FE)
- coatings made of NiP on steel or iron (NiP/FE, non-magnetizable NiP coatings with P content > 10 %)

Magnetic inductive test method (NC/FE and NF/FE), function principle page 28

- heavy influence on measurement: permeability of base material

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole rod-shaped probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**smooth surfaces in bore holes, pipes etc. Ø > 11.5 mm (Ø > 0.45 ")**
FGABI1.3-400[1]	604-468	0 ... 1000 µm 0 ... 39.4 mils	Distance to wall ≥ 4 mm (0.16 ")	■ max. insertion depth 400 mm (15.74 ")
V1FGA1HR34[1]	604-183	0 ... 1000 µm 0 ... 39.4 mils		■ max. insertion depth 60 mm (2.36 ") ■ also for measurement on rougher surfaces ■ probe with fixed measuring system ■ wear-resistant probe pole

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**automated measurements (mounted in probe support)**
FGA06H-SC[1]	604-344	0 ... 700 µm 0 ... 27.6 mils	≥ 20 x 60 mm ≥ 0.8 x 2.36 "	■ measurements solely on flat surfaces ■ soft coatings
FGA06H-MC[1]	604-181	0 ... 700 µm 0 ... 27.6 mils	≥ Ø 2 mm ≥ 0.008 "	■ measurements solely on smooth surfaces ■ low curvature influence ■ Micro Cartouche probe tip design
V2FGA06H[1]	605-313	0 ... 700 µm 0 ... 27.6 mils	≥ 20 x 65 mm ≥ 0.8 x 2.56 "	■ especially for measurements on pipes and cylindrical specimens with Ø from 8 to 25 mm (0.32 " to 0.98 ")

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**Special applications**
FGAB1.3-SD[1]	604-227	0 ... 2000 µm 0 ... 78.7 mils	≥ Ø 18 mm ≥ 0.71 "	■ especially for measurements on screen printing texture and similarly structured surfaces

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Standard probes – program overview

Steel, iron, cast iron (FE) base materials

- coatings made of paint, lacquer, or plastic on steel or iron (NC/FE)
- coatings made of copper, brass zinc, tin or chrome on steel iron (NF/FE)
- coatings made of NiP on steel or iron (NiP/FE, non-magnetizable NiP coatings with P content > 10 %)

Magnetic inductive test method (NC/FE and NF/FE), function principle page 28

- heavy influence on measurement: permeability of base material

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**Special applications**
V3FGA06H[1]	604-517	0 ... 350 µm 0 ... 13.8 mils	≥ Ø 13 mm ≥ Ø 0.5 "	■ measurements on smooth surfaces in cavities, optimized for measurements of EPD coatings within holms of car bodies without destroying car body ■ single pole probe with fixed measuring system in flexible measuring head with 3-point-support ■ probe with curved rod
V4FGA06H-150[1]	604-798	0 ... 700 µm 0 ... 27.6 mils	≥ Ø 13 mm ≥ Ø 0.5 "	■ measurements on smooth surfaces in cavities and grooves ■ single pole probe with fixed measuring system in flexible measuring head with 3-point-support ■ probe with a straight line rod of 150 mm (5.91 ")
V4FGA06H-300[1]	604-799			■ as V4FGA06H-150, but with longer rod ■ probe with a straight line rod of 300 mm (11.81 ")

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**rougher surfaces (e.g., blasted surfaces)**
F20H[1]	604-535	0 ... 2500 µm 0 ... 98.4 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ less edge influence to an edge ■ moisture protected ■ wear-resistant probe pole ■ axial design ■ succession for probe FGA2H, which is no longer available
FW20[1]	605-534	0 ... 2500 µm 0 ... 98.4 mils	≥ Ø 14 ≥ Ø 0.55 "	■ as F20H, but in angled design ■ angled design; min. working hight 36 mm (1.42 ")

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Standard probes – program overview

Steel, iron, cast iron (FE) base materials

- coatings made of paint, lacquer, or plastic on steel or iron (NC/FE)
- coatings made of copper, brass zinc, tin or chrome on steel iron (NF/FE)
- coatings made of NiP on steel or iron (NiP/FE, non-magnetizable NiP coatings with P content > 10 %)

Magnetic inductive test method (NC/FE and NF/FE), function principle page 28

- heavy influence on measurement: permeability of base material

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Two pole angled probe with fixed measuring system unless otherwise specified; detailed data in corresponding data sheet				**rougher surfaces (e.g., blasted surfaces)** ■ For measurements on rougher surfaces, the measurement with two pole probes has higher measurement precision than measurements with single pole probes.
FK50[1]	604-185	0 ... 30 mm 0 ... 1.18 "	≥ 10 x 60 mm ≥ 0.4 x 2.36 "	■ thick insulating coatings ■ shortness design; min. working height 150 mm (5.91 ")
FKB4[1]	604-284	0 ... 2000 µm 0 ... 78.7 mils	≥ 10 x 14 mm ≥ 0.4 x 0.55 "	■ measurements of thin coatings on rougher surfaces ■ shortness design; min. working height 30 mm (1.18 ")
V7FKB4[1]	604-180	0 ... 2000 µm 0 ... 78.7 mils	≥ Ø 20 mm ≥ Ø 0.8 "	■ measurements of thin coatings on rougher surfaces ■ two pole axial probe with spring-loaded measuring system
FKB10[1]	604-177	0 ... 8 mm 0 ... 0.32 "	≥ 10 x 20 mm ≥ 0.4 x 0.8 "	■ thick coatings ■ shortness design; min. working height 60 mm (2.36 ")
FKB10-OD[1]	604-219	0 ... 8 mm 0 ... 0.32 "	≥ 24 x 53 mm ≥ 0.94 x 2.1 "	■ measurements solely on flat surfaces with thick soft coatings (e.g., rubber blanket for offset printing) ■ shortness design; min. working height 60 mm (2.36 ")
FKB25[1]	604-266	0 ... 15 mm 0 ... 0.59 "	≥ 10 x 35 mm ≥ 0.4 x 1.37 "	■ especially suited for measurements of thick nonmetallic coatings ■ shortness design; min. working height 90 mm (3,54 ")

1: connectable to all DUALSCOPE®, DUALSCOPE® H and DELTASCOPE® hand-held instruments of FMP series and also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
* Touch area = abbreviation for touch down area

Standard probes – program overview

Steel, iron, cast iron (FE) base materials

- coatings made of copper or zinc on steel or iron (NF/FE), see page 13
- coatings made of nickel on steel or iron (Ni/FE, Ni must be magnetizable), see page 13
- coatings made of thermal sprayed aluminium (TSA) on steel or iron (TSA/FE), see page 14

Phase-sensitive eddy current test method (NF/FE), function principle see page 29

- heavy influence on measurement: temperature of electrically conductive coating material (NF)
- low influence on measurement: geometry of measuring part
- no influence on measurement: surface roughness (ex. cast) and protective lacquer or air gaps

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system; detailed data in corresponding data sheet				**copper or zinc coatings**
ESD20 Zn[2]	603-419	Cu/FE: 1 ... 200 µm 0.04 ... 7.9 mils Zn/FE: 2 ... 200 µm 0.08 ... 7.9 mils	≥ Ø 16 mm ≥ Ø 0.63 "	■ 2 applications: Cu/FE and Zn/FE ■ default pre-calibrated for copper and zinc coatings; the probe may be calibrated for other coating/base materials in Fischer factory ■ Zinc alloy coatings such as ZnNi or ZnFe can only be conditionally measured due to their low electrical conductivity. ■ NF/NF, only if the electrical conductivity of the coating material is at least twice higher as the electrical conductivity of the base material, e.g. Cu/CuZn ■ distance compensated up to 400 µm (15.75 mils) lacquer or air
ESD2.4[2]	603-416	1 ... 150 µm 0.04 ... 5.9 mils	≥ Ø 10 mm ≥ Ø 0.4 "	■ measurements on small parts ■ as ESD20 Zn, but with smaller probe dimensions and lower distance compensation ■ distance compensated up to 250 µm (9.84 mils) lacquer or air

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system; detailed data in corresponding data sheet				**Ni coatings**
ESD20 Ni[2]	603-418	2 ... 100 µm 0.08 ... 3.9 mils (60 kHz) 2 ... 50 µm 0.08 ... 2 mils (240 kHz)	≥ Ø 16 mm ≥ Ø 0.63 "	■ measurement heavily influenced by permeability of base material ■ master calibration with Ni and FE customer standards necessary ■ distance compensated up to 200 µm (7.87 mils) lacquer or air

Further probes for measurement of Ni coatings see from page 18

2: connectable to hand-held instrument PHASCOPE® PMP10 and also to FISCHERSCOPE® MMS® PC2 with module SIGMASCOPE®/PHASCOPE® 1
* Touch area = abbreviation for touch down area

Standard probes – program overview

Steel, iron, cast iron (FE) base materials

- coatings made of copper or zinc on steel or iron (NF/FE), see page 13
- coatings made of nickel on steel or iron (Ni/FE, Ni must be magnetizable), see page 13
- coatings made of thermal sprayed aluminium (TSA) on steel or iron (TSA/FE), see page 14

Phase-sensitive eddy current test method (NF/FE), function principle see page 29

- heavy influence on measurement: temperature of electrically conductive coating material (NF)
- low influence on measurement: geometry of measuring part
- no influence on measurement: surface roughness (ex. cast) and protective lacquer or air gaps

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system; detailed data in corresponding data sheet				**thermal sprayed aluminium coatings (TSA)**
ESD20TSA[2]	605-588	0 ... 650 µm 0 ... 25.6 mils	≥ Ø 17 mm ≥ Ø 0.67 "	■ especially for thickness measurements of thermal sprayed aluminium coatings on steel (TSA/FE) ■ TSA coating thicknesses also measurable on weaky or non-magnetizable base materials as, e.g., stainless steel (TSA/NF)

2: connectable to hand-held instrument PHASCOPE® PMP10 and also to FISCHERSCOPE® MMS® PC2 with module SIGMASCOPE®/PHASCOPE® 1
* Touch area = abbreviation for touch down area

Standard probes – program overview

Non-ferrous base material (NF)

- Coatings made of paint, lacquer or plastic on aluminum, copper or brass (NC/NF)
- anodized coatings on aluminium (NC/NF)
- coatings made of chrome on aluminum, copper or brass (Cr/NF), page 18
- coatings made of NiP on aluminium, non-ferrous metals (NiP/NF; non-magnetizable NiP coatings with P content > 10 %), page 18

Amplitude-sensitive eddy current test method, function principle see page 28

- The following probes measure with a high-precision conductivity compensation developed by us.

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**smooth surfaces**
FTA3.3[3]	604-186	0 ... 1200 µm 0 ... 47.2 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ no edge influence outside the touchdown area ■ very moisture sensitive
FTA3.3H[3]	604-142	0 ... 1200 µm 0 ... 47.2 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ as FTA3.3, but with wear-resistant probe pole ■ higher trueness on thin coatings as FA20H
FTA3.3FG[3]	604-190	0 ... 1200 µm 0 ... 47.2 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ especially for measurements of still wet anodized coatings on aluminium ■ as FTA3.3H, but moist protected
FTA3.3D[3]	604-399	0 ... 1200 µm 0 ... 47.2 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ especially suited for measurements the thickness of very hard, abrasion-resistant coatings ■ as FTA3.3, but with a diamond as wear-resistant probe pole
FTD3.3[3]	604-189	0 ... 800 µm 0 ... 31.5 mils	≥ Ø 17 mm ≥ Ø 0.67 "	■ excellent curvature compensation (patented) on convex curved surfaces with calibration on flat reference parts ■ curvature compensation in diameter range from infinite to about 2 mm (78.74 ") ■ especially suited for measurement on curved surfaces such as car bodies, blinds etc.
FTA3.3-5.6[3]	604-200	0 ... 1200 µm 0 ... 47.2 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ no edge influence ■ also for measurement on rougher surfaces ■ influence of curvature lower than with FTA3.3-5.6HF
FTA3.3-5.6HF[3]	604-229	0 ... 1200 µm 0 ... 47.2 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ well suited for measurement of paint coatings on hot-dip galvanized steel parts with zinc coating > 80 µm (3.15 mils) ■ as FTA3.3-5.6, but with higher trueness

1: connectable to all DUALSCOPE®, DUALSCOPE® H and DELTASCOPE® hand-held instruments of FMP series and also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
3: connectable to all DUALSCOPE®, DUALSCOPE® H and ISOSCOPE® hand-held instruments of FMP series and also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
* Touch area = abbreviation for touchdown area

Standard probes – program overview

Non-ferrous base material (NF)

- Coatings made of paint, lacquer or plastic on aluminum, copper or brass (NC/NF)
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Amplitude-sensitive eddy current test method, function principle see page 28

- The following probes measure with a high-precision conductivity compensation developed by us.

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**smooth surfaces**
FAW3.3[3]	604-193	0 ... 1200 µm 0 ... 47.2 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ conditionally applicable also in the presence of moist (acidic) surface contamination ■ angled design; min. working hight 28 mm (1.1 ") ■ higher trueness as FTA3.3-5.6HF ■ measuring on rougher surfaces use probe FAW3.3-5.6

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole rod-shaped probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**smooth surfaces in bore holes, pipes etc. Ø > 16 mm (0.63 ")**
FAI3.3-150[3]	604-187	0 ... 800 µm 0 ... 31.5 mils	Distance to wall ≥ 4 mm (0.16 ")	■ max. insertion depth 150 mm (5.91 ")
FAI3.3-260[3]	604-339	0 ... 800 µm 0 ... 31.5 mils		■ max. insertion depth 260 mm (10.24 ")

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**automated measurements (mounted in probe support)**
FTA2.4-SC[3]	604-228	0 ... 700 µm 0 ... 27.6 mils	≥ 20 x 60 mm ≥ 0.8 x 2.36 "	■ measurements solely on flat surfaces ■ soft coatings
FTA2.4-MC[3]	604-192	0 ... 700 µm 0 ... 27.6 mils	≥ Ø 5 mm ≥ Ø 0.2 "	■ measurements solely on smooth surfaces ■ low curvature influence ■ Micro-Cartouche probe tip design

1: connectable to all DUALSCOPE®, DUALSCOPE® H and DELTASCOPE® hand-held instruments of FMP series and also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
3: connectable to all DUALSCOPE®, DUALSCOPE® H and ISOSCOPE® hand-held instruments of FMP series and also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
* Touch area = abbreviation for touchdown area

Standard probes – program overview

Non-ferrous base material (NF)

- Coatings made of paint, lacquer or plastic on aluminum, copper or brass (NC/NF)
- anodized coatings on aluminium (NC/NF)
- coatings made of chrome on aluminum, copper or brass (Cr/NF), page 18
- coatings made of NiP on aluminium, non-ferrous metals (NiP/NF; non-magnetizable NiP coatings with P content > 10 %), page 18

Amplitude-sensitive eddy current test method, function principle see page 28

- The following probes measure with a high-precision conductivity compensation developed by us.

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole probes with fixed measuring system unless otherwise specified; detailed data in corresponding data sheet				**rougher surfaces (e.g., blasted surfaces)**
FA9[3]	604-188	0 ... 3.5 mm 0 ... 0.14 "	≥ Ø 14 mm ≥ Ø 0.55 "	■ no edge influence outside the touchdown area ■ influence of curvature lower than with FA14 ■ moisture protected ■ conductivity compensation is not supported ■ angled design with spring-loaded measuring system; min. working hight 37 mm (1.46 "); wear-resistant probe pole
FA14[3,1]	604-589	0 ... 5 mm 0 ... 0.2 "	≥ Ø 20 mm ≥ Ø 0.8 "	■ well suited for measurement of thick isolation coatings as, e.g., acoustic absorption mass ■ measurement also on ferrous metals (FE) ■ angled design with spring-loaded measuring system; min. working hight 51 mm (2.01")
FA20H[3]	604-980	0 ... 2000 µm 0 ... 78.7 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ no edge influence ■ axial design with spring-loaded measuring system; wear-resistant probe pole
FA30[3,1]	604-213	0 ... 20 mm 0 ... 0.8 "	≥ Ø 44 mm ≥ Ø 1.7 "	■ well suited for measurement of thick isolation coatings ■ measurement also on ferrous metals (FE) ■ angled design; min. working hight 125 mm (4.92")
FA70[3,1]	604-191	0 ... 50 mm 0 ... 2 "	≥ Ø 74 mm ≥ Ø 2.9 "	■ well suited for measurement of thick isolation coatings ■ measurement also on ferrous metals (FE) ■ angled design; min. working hight 245 mm (9.65")
FA100[3,1]	604-604	0 ... 100 mm 0 ... 4 "	≥ Ø 120 mm ≥ Ø 4.7 "	■ well suited for measurement of very thick isolation coatings even on slightly curved surfaces as polypropylene coatings on pipelines ■ measurement also on ferrous metals (FE) ■ axial design; min. working hight 590 mm (23.23")

1: connectable to all DUALSCOPE®, DUALSCOPE® H and DELTASCOPE® hand-held instruments of FMP series and also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
3: connectable to all DUALSCOPE®, DUALSCOPE® H and ISOSCOPE® hand-held instruments of FMP series and also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
* Touch area = abbreviation for touchdown area

Standard probes – program overview

Non-ferrous base material (NF)

- Coatings made of paint, lacquer or plastic on aluminum, copper or brass (NC/NF)
- anodized coatings on aluminium (NC/NF)
- coatings made of chrome on aluminum, copper or brass (Cr/NF), page 18
- coatings made of NiP on aluminium, non-ferrous metals (NiP/NF; non-magnetizable NiP coatings with P content > 10 %), page 18

Amplitude-sensitive eddy current test method, function principle see page 28

- The following probes measure with a high-precision conductivity compensation developed by us.

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole probes with fixed measuring system unless otherwise specified; detailed data in corresponding data sheet				**rougher surfaces (e.g., blasted surfaces)**
FAW3.3-5.6	604-223	0 ... 1200 µm 0 ... 47.2 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ conditionally applicable also in the presence of moist (acidic) surface contamination ■ angled design; min. working hight 28 mm (1.1 ") ■ with rougher surfaces higher trueness as FAW3.3

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole probe with spring-loaded measuring system unless otherwise specified; no data sheets available				**chrome coatings** calibration on chrome coated customer reference parts necessary
FAW3.3-Cr[3]	604-340	0 ... 500 µm 0 ... 20 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ angled design; min. working hight 25 mm (0.98 ")
FAW3.3-Cr-D[3]	605-080	1 ... 500 µm 0.04 ... 20 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ angled design; min. working hight 25 mm (0.98 ") ■ wear-resistant probe pole (diamond calotte)
FTA3.3F-Cr[3]	604-342	0 ... 500 µm 0 ... 20 mils	≥ Ø 10 mm ≥ Ø 0.4 "	■ moisture protected ■ axial design
FTA3.3F-Cr-D[3]	604-505	0 ... 500 µm 0 ... 20 mils	≥ Ø 10 mm ≥ Ø 0.4 "	■ moisture protected ■ axial design; wear-resistant probe pole (diamond calotte)

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole probe with spring-loaded measuring system unless otherwise specified; no data sheet available				**NiP on aluminium** calibration on NiP coated customer reference parts necessary
FTA3.3F-Cr[3]	604-342	0 ... 500 µm 0 ... 20 mils	≥ Ø 10 mm ≥ Ø 0.4 "	■ moisture protected ■ axial design

1: connectable to all DUALSCOPE®, DUALSCOPE® H and DELTASCOPE® hand-held instruments of FMP series and also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
3: connectable to all DUALSCOPE®, DUALSCOPE® H and ISOSCOPE® hand-held instruments of FMP series and also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
* Touch area = abbreviation for touchdown area

Standard probes – program overview

Non-magnetizable base material (NF, NC)

- coatings made of nickel on aluminum, copper or brass (Ni/NF, NC)
- thick coatings made of nickel on plastic (Ni/NC)

Magnetic inductive test method (Ni/FE and Ni/NC), function principle page 28

- heavy influence to measurement: permeability of coating material
- calibration on nickel coated customer reference parts necessary

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**Ni coatings on smooth surfaces**
FGAB1.3-Ni[1]	604-371	0 ... 200 µm 0 ... 7.9 mils	≥ Ø 10 mm ≥ Ø 0.4 "	■ small touchdown area
FN4D[4]	604-417	1 ... 150 µm 0.04 ... 5.9 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ dual probe, works also with other test methods, see section dual probes page 22

Probe for application Ni/FE see section ESD20 Ni on page 13
Probe for application NiP/NF see section FTA3.3F-Cr on page 18

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole angled probe with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**automated measurements (mounted in probe support)**
FGA5/6-Ni[1]	604-364	0 ... 3 mm 0 ... 0.12 "	≥ 28 x 28 mm ≥ 1.1 x 1.1 "	■ measurements solely on flat surfaces ■ thick Ni coatings

1: connectable to all DUALSCOPE®, DUALSCOPE® H and DELTASCOPE® hand-held instruments of FMP series and also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
4: connectable to hand-held instrument DUALSCOPE® H and also to FISCHERSCOPE® MMS® PC2 with module NICKELSCOPE®
* Touch area = abbreviation for touchdown area

Standard probes – program overview

Base material printed circuit board (NC)

- coatings made from copper on printed circuit boards (Cu/NC, NF/NC)

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**Amplitude-sensitive eddy current test method (Cu/NC and NF/NC)** ■ The following probes measure with a high-precision conductivity compensation developed by us.
FTA3.3-Cu-HF[3]	604-362	0 ... 9 µm 0 ... 0.35 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ specially for measurements of copper coatings on printed circuit boards ■ up from 1.6 mm (0.06 ") printed circuit board thicknesses no influence from opposite copper coatings ■ (very) thin coatings ■ no edge influence outside the touchdown area
FTA3.3F-Cu[3]	604-194	1 ... 150 µm 0.04 ... 5.9 mils	≥ Ø 10 mm ≥ Ø 0.4 "	

Probe for application Cu/FE see section "copper or zinc coatings" on page 13

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**Phase-sensitive eddy current test method (Cu/NC and NF/NC)** ■ heavy influence on measurement: temperature of electrically conductive coating material (Cu, NF) ■ no influence on measurement: protective lacquer coatings or air gaps
ESD20-Cu[2]	603-417	1 ... 270 µm 0.04 ... 10.6 mils (60 kHz) 1 ... 100 µm 0.04 ... 3.9 mils (240 kHz)	≥ Ø 17 mm ≥ Ø 0.67 "	■ default pre-calibrated to Cu coatings ■ the probe may be master calibrated for other coating materials (Al, CuZn, etc.) in the Fischer factory ■ distance compensated up to 300 µm (11.81 mils) at 60 kHz
ESL080B[2]	603-802	5 ... 100 µm 0.2 ... 3.9 mils	bore Ø 0.8 ... 2 mm Ø 0.03 ... 0.08 "	■ specially for measurement of copper thicknesses in throughholes of printed circuit boards ■ fix insertion depth of 0.8 mm (0.03 ") ■ suited for board thicknesses from 0.5 ... 1.6 mm (0.02 ... 0.06 ") ■ axial measuring probe with needle shaped measuring element

2: connectable to hand-held instrument PHASCOPE® PMP10 and also to FISCHERSCOPE® MMS® PC2 with module SIGMASCOPE®/PHASCOPE® 1
3: connectable to all DUALSCOPE®, DUALSCOPE® H and ISOSCOPE® hand-held instruments of FMP series and also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
7: connectable to FISCHERSCOPE® MMS® PC2 with module SR-SCOPE
* Touch area = abbreviation for touchdown area

Standard probes – program overview

Base material printed circuit board (NC)

- coatings made from copper on printed circuit boards (Cu/NC, NF/NC)

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**Phase-sensitive eddy current test method (Cu/NC and NF/NC)** ■ heavy influence on measurement: temperature of electrically conductive coating material (Cu, NF) ■ no influence on measurement: protective lacquer coatings or air gaps
ESL080V[2]	603-968	5 ... 100 µm 0.2 ... 3.9 mils	bore Ø 0.8 ... 2 mm Ø 0.03 ... 0.08 "	■ specially for measurement of copper thicknesses in throughholes of printed circuit boards ■ variable insertion depth from 0.8 ... 4.4 mm (0.03 ... 0.17 ") by using attachable distance rings ■ suited for board thicknesses from 1.6 ... 8 mm (0.06 ... 0.31 ") ■ axial measuring probe with needle shaped measuring element

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
4 needle axial probe with spring-loaded measuring elements (needles) unless otherwise specified; detailed data in corresponding data sheet				**Microresistivity test method (Cu/NC)** ■ heavy influence on measurement: temperature of electrically conductive coating materials (Cu) ■ no influence on measurement: opposite copper coatings separated by thin isolating layers
ERCU-N[7]	603-220	0.5 ... 10 µm 0.02 ... 0.4 mils 5 ... 120 µm 0.2 ... 4.7 mils	≥ 1 x 4 mm ≥ 0.04 ... 0.16 "	■ specially for measurements of electroplated copper coatings on printed circuit boards ■ higher precision by splitting the measuring range in two ranges ■ ERCU-N: measurements on conducting paths ≥ 5 mm (≥ 0.2 "), with suitable calibration measurements on smaller structures are also possible Tip: align probe needles perpendicular to the conductor path during measurement ■ ERCU-D10: suited for planar copper coatings
ERCU-D10[7]	603-387	0.1 ... 10 µm 0.004 ... 0.4 " 5 ... 200 µm 02. ... 8 "	≥ 1 x 26 mm ≥ 0.04 ... 1 "	

Special probe type for thickness measurement of chemical deposited copper coatings on request.
Use probe ESD20-Cu for measurements under protective lacquer coatings, short description see page 20

2: connectable to hand-held instrument PHASCOPE® PMP10 and also to FISCHERSCOPE® MMS® PC2 with module SIGMASCOPE®/PHASCOPE® 1
3: connectable to all DUALSCOPE®, DUALSCOPE® H and ISOSCOPE® hand-held instruments of FMP series and also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
7: connectable to FISCHERSCOPE® MMS® PC2 with module SR-SCOPE
* Touch area = abbreviation for touchdown area

Standard probes – program overview

Metal base material (NF or FE) – Dual probes

Dual probes can optionally work with one of two test methods. For measurements with automatic base material detection, one of the two test methods is used accordingly.

- coatings made of paint, lacquer, or plastic on steel or iron (NC/FE)
- coatings made of copper, brass, zinc, tin or chrome on steel iron (NF/FE)
- Coatings made of paint, lacquer or plastic on aluminium, copper or brass (NC/NF)

Magnetic inductive test method,
function principle page 28

- heavy influence to measurement: permeability of coating material

Amplitude-sensitive eddy current test method,
function principle see page 28

- The following probes measure with a high-precision conductivity compensation developed by us.

Model	Part no.	Measurement range	Touch area*	Features / typical applications / examples
Single pole axial probe with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**smooth surfaces / electroplated coatings**
FD10[5]	604-143	NC/FE: 0 ... 1300 µm[x] NC/NF: 0 ... 800 µm[x]	≥ Ø 14 mm ≥ Ø 0.55 "	■ also suited for measuring thin layers ■ wear-resistant probe pole [x]: NC/FE: 0 ... 51.2 mils and NC/NF: 0 ... 31.5 mils

Model	Part no.	Measurement range	Touch area*	Features / typical applications / examples
Single pole axial probes with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**rougher surfaces (e.g., blasted surfaces)**
FD13H[5]	604-508	0 ... 2000 µm 0 ... 78.7 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ wear-resistant probe pole
FDW13H[5]	604-800	0 ... 2000 µm 0 ... 78.7 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ wear-resistant probe pole ■ angled design; min. working hight 35 mm (1.38 ")
ESG20[6]	603-690	NC/NF: 0 ... 2000 µm[x] NF/FE: 0 ... 700 µm[x]	≥ Ø 19 mm ≥ Ø 0.75 "	■ well suited for measuring lacquer/Al and paint+Zn/Fe (with zinc thicknesses of 5 ... 20 µm (0.2 ... 0.8 mils)) ■ also usable for duplex measurements, see page 23 [x]: NC/NF: 0 ... 78.7 mils and NF/FE: 0 ... 27.6 mils

Model	Part no.	Measurement range	Touch area*	Features / typical applications / examples
Single pole axial probe with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**smooth surfaces / thick coatings / Ni coatings**
FN4D[4]	604-417	NC/NF: 0 ... 2.5 mm[x] NC, NF/FE: 0 ... 7 mm[x] Ni/NF: 1 ... 150 µm[x]	≥ Ø 14 mm ≥ Ø 0.55 "	■ NC, NF/FE: the electrical conductivity of the metal coatings has no influence on measurement ■ probe pole replaceable in one of our service centers [x]: NC/NF: 0 ... 0.98 "; NC, NF/FE: 0 ... 0.3 " and Ni/NF: 0.04 ... 5.9 mils

4: connectable to hand-held instrument DUALSCOPE® H and also to FISCHERSCOPE® MMS® PC2 with module NICKELSCOPE®
5: connectable to all DUALSCOPE®, DUALSCOPE® H hand-held instruments of FMP series sand also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
6: connectable to hand-held instrument PHASCOPE® PMP10 DUPLEX and also to FISCHERSCOPE® MMS® PC2 with module PHASCOPE®/DUPLEX
* Touch area = abbreviation for touch down area

Standard probes – program overview

Steel, iron, cast iron (FE) base materials – Duplex probes

Duplex probes work simultaneously with 2 test methods. With duplex probes a simultaneous measurement and display of the paint and zinc coatings on steel or iron takes place – shortly duplex measurement, functional principle see page 31.

Magnetic inductive test method,
function principle page 28

- heavy influence to measurement: permeability of base material

Amplitude-sensitive eddy current test method,
function principle see page 28

- The following probes measure with a high-precision conductivity compensation developed by us.

Phase-sensitive eddy current test method (NF/FE),
function principle see page 29

- heavy influence on measurement: temperature of electrically conductive coating material (NF)
- low influence on measurement: geometry of measuring part
- no influence on measurement: surface roughness (ex. cast) and protective lacquer or air gap

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probe with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**heavy corrosion protection**
FDX13H[5]	604-596	Total thickness of zinc and paint coatings 90 ...800 µm 3.5 ... 31.5 mils	≥ Ø 14 mm ≥ Ø 0.55 "	■ especially for duplex measurements of paint-zinc coatings on steel or iron ■ paint coatings ≥ 20 µm (0.79 mils) ■ zinc coatings ≥ 70 µm (2.76 mils) ■ wear-resistant probe pole ■ used test methods: amplitude-sensitive eddy current and magnetic inductive test methods

Model	Part no.	Meas. range	Touch area*	Features / typical applications / examples
Single pole axial probe with spring-loaded measuring system unless otherwise specified; detailed data in corresponding data sheet				**electrolytically or slightly hot-dip galvanized coatings**
ESG20[6]	603-690	Duplex paint: 0 ... 550 µm 0 ... 21.7 mils Zn: 0 ... 150 µm 0 ... 5.9 mils	≥ Ø 19 mm ≥ Ø 0.75 "	■ especially for duplex measurements of paint-zinc coatings on sheet metals ■ typical zinc coatings between 5 ... 20 µm (0.2 ... 0.79 mils) ■ used test methods: phase-sensitive eddy current and magnetic inductive test methods ■ also usable as dual probe for measurements with automatic base material recognition, see page 22

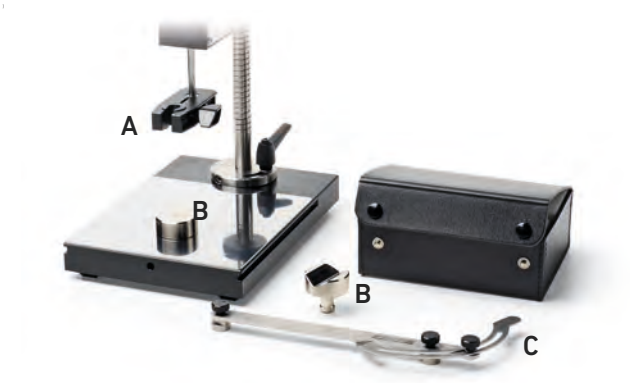
5: connectable to all DUALSCOPE®, DUALSCOPE® H hand-held instruments of FMP series sand also to FISCHERSCOPE® MMS® PC2 with module PERMASCOPE®
6: connectable to hand-held instrument PHASCOPE® PMP10 DUPLEX and also to FISCHERSCOPE® MMS® PC2 with module PHASCOPE®/DUPLEX
* Touch area = abbreviation for touchdown area

Probes – Accessories

Support stands

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

Standard scope of supply of support stands



(A) various clamping devices suitable for the axial standard probes, (B) even and V-tables for small parts, (C) Stop device for repeatable specimen positioning

Support stand V12 Base (604-420)

Support stand with mechanical probe lowering. A specific lever mechanism of the stand slows down the lowering speed shortly before the probe reaches the surface of the specimen.

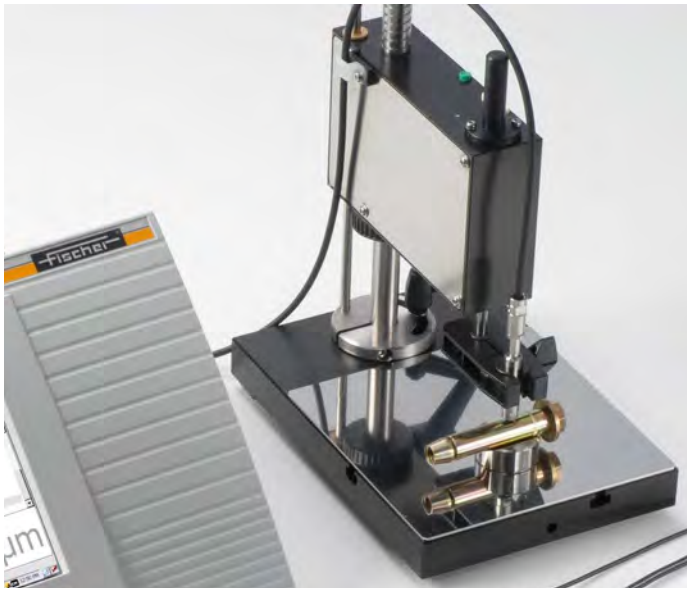
Support stand V12 MOT (604-374)

Support stand with motorized probe lowering for maximum repeatability precision. Control directly on the support stand or via the measurement instrument FISCHERSCOPE® MMS® PC2. The teach-in function guarantees a gentle touchdown of the probe on the specimen surface.

Probes – Accessories

Application examples

Measurements of anodized coatings on sleeves using the curvature-compensated probe FTD3.3, clamped into the support stand V12 Base.



Measurement of zinc coating on screw using the probe FGAB1.3, clamped into the support stand V12 MOT.

Probe clamping devices suitable for support stands V12 Base and V12 MOT

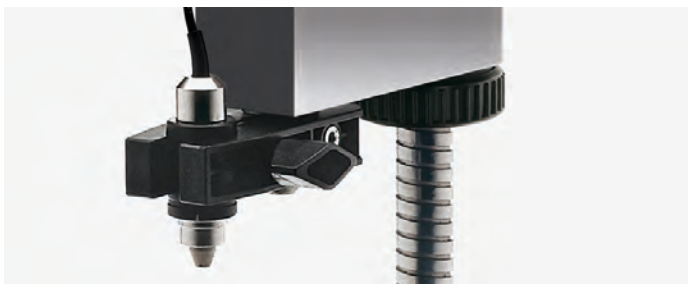
Clamping device 601-691

Clamping device for inside probes

Clamping device 600-077

Clamping device for angled probes

Clamping device 600-213



Clamping device for axial probes with Ø 16 mm (0.63 ")

Clamping device 603-658

Clamping device for ERCU probes

Probes – Accessories

Screw measuring device

Screw measuring device 602-916

Device for reproducible positioning and precise measurement of coating thicknesses on metallic fasteners according ISO 4042.
Suitable for probes FGAB1.3, FGA06H or ESD2.4.

Scope of supply

- Fixture for fillister head and ULF/ULS screws (M3; M3.5; M4)
  Fixture for fillister head screws with Philips cross-head DIN 7985 or ISO 7045
- Fixture for cylinder head screws according to ISO 1207 (≤ M3) or ISO 4762/DIN 7984 (≤ M12).

Please specify the required dimension with the order.

Guiding device for angle probes

Guiding device for angle probes 600-080

The guiding device makes it easier to reach the measurement points in bore holes or recesses. The angle probe is just clamped into the guiding device.
Insertion depth max 180 mm (7.09 ")

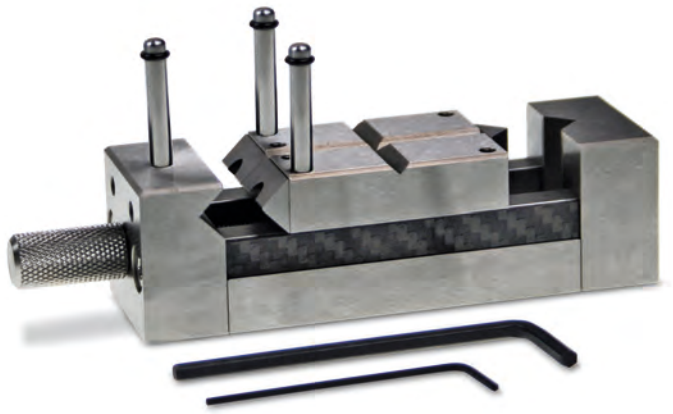
Measurement of the lacquer thickness on an aluminium rim wheel with the probe FAW3.3, clamped in the guiding device.

Probes – Accessories

Universal jaw vice

Universal jaw vice 604-261

Universal jaw vice makes it easier to fix and to position small parts of any shape. For measurements in combination with the support stands V12 Base or V12 MOT.



Scope of supply

carrying case, accessories and operator's manual

Spare parts

Placing rings and prism adapters for placing the probe easier onto the surface.

Placing rings

600-282 (1PU = 10 pc.)	**604-361 (1PU = 10 pc.)**	**505-549 (1PU = 1 pc.)**	**363-043 (1PU = 1 pc.)**
			
suitable for probes			
ESD2.4 FGA06H FGAB1.3 FGAB1.3-Ni FGAB1.3T FGB2	F20H FA20H FD10 FD13H FDX13H FN4D FTA3.3 FTA3.3F-Cr FTA3.3F-Cr-D FTA3.3F-Cu FTA3.3F-Cu-HF FTA3.3FG FTA3.3H FTA3.3-5.6 FTA3.3-5.6HF	FTD3.3	V7FKB4

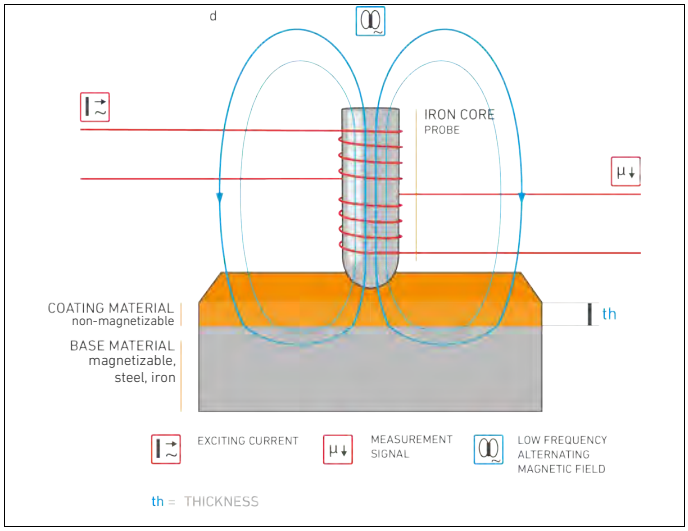
Prism adapters

600-073 (1PU = 1 pc.)	**600-337 (1PU = 1 pc.)**	**600-223 (1PU = 1 pc.)**
		
suitable for probes		
ESD2.4 FGA06H FGAB1.3 FGAB1.3-Ni FGAB1.3T FGB2	F20H FA20H FD10 FD13H FDX13H FN4D FTA3.3 FTA3.3F-Cr FTA3.3F-Cr-D FTA3.3F-Cu FTA3.3F-Cu-HF FTA3.3FG FTA3.3H FTA3.3-5.6	FGA2H

Test methods

Magnetic inductive test method

Standard: DIN EN ISO 2178



Schematic illustration of magnetic inductive test method The penetration depth of the field depends on the permeability of the base material.

Functional principle

Contact test 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 exploring coil measures the magnetic field. In the gage, the obtained measurement signal is converted into the coating thickness values via the probe characteristic, i.e., the functional correlation between the probe signal and the coating thickness.

Major areas of application

Non-magnetizable coating material on magnetizable base material.

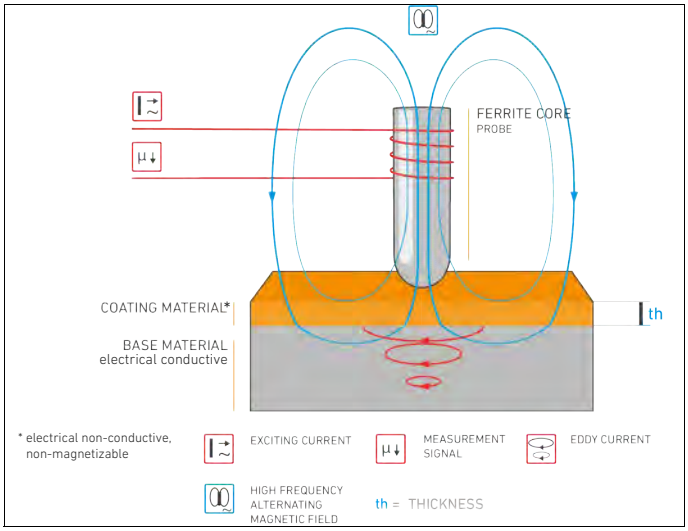
- galvanic coatings made of chrome, zinc, copper or aluminium on steel and iron
- paint, enamel, lacquer or plastic coatings on steel or iron

Used in the following gages

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

Eddy current test method (amplitude-sensitive)

Standard: DIN EN ISO 2360



Schematic illustration of amplitude-sensitive eddy current test method. The penetration depth of the field depends on the used frequency (probe frequency) and the electrical conductivity of base the material.

Functional principle

Contact test 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. In the gage, the obtained measurement signal, influenced by the eddy currents, is converted into the coating thickness values via the probe characteristic, i.e., the functional correlation between the probe signal and the coating thickness.

Major areas of application

Electrically non-conductive and non-magnetizable coating material on electrically conductive nonferrous metals.

- paint, lacquer or plastic coatings on aluminium, copper, brass, zinc
- anodized coatings on aluminium

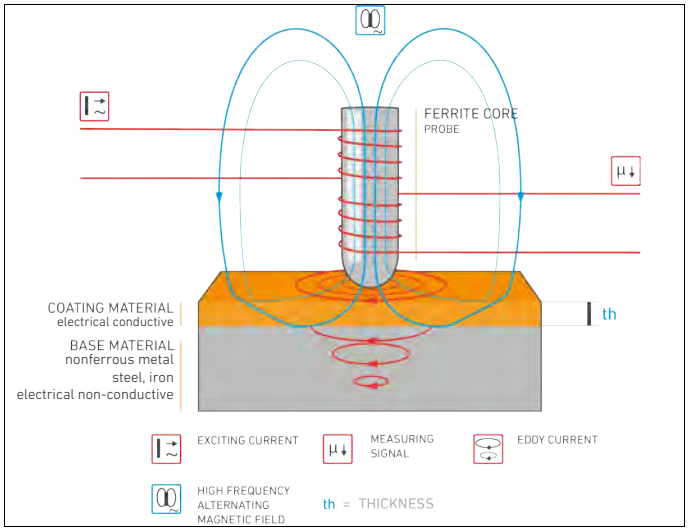
Used in the following gages

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

Test methods

Eddy current test method (phase-sensitive)

Standard: DIN EN ISO 21968



Schematic illustration of phase-sensitive eddy current test method. The penetration depth of the field depends on the used frequency (probe frequency) and the electrical conductivity of the materials.

Functional principle

Contact test 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. In the gage, the phase shift Phi (φ) between excitation current and measurement signal is converted into the coating thickness values via the probe characteristic, i.e., the functional correlation between the probe signal and the coating thickness. Depending on the probe type, the measured value is independent of the distance between probe and coating surface within certain limits.

Major areas of application

Electrically conductive coating material on any base material.

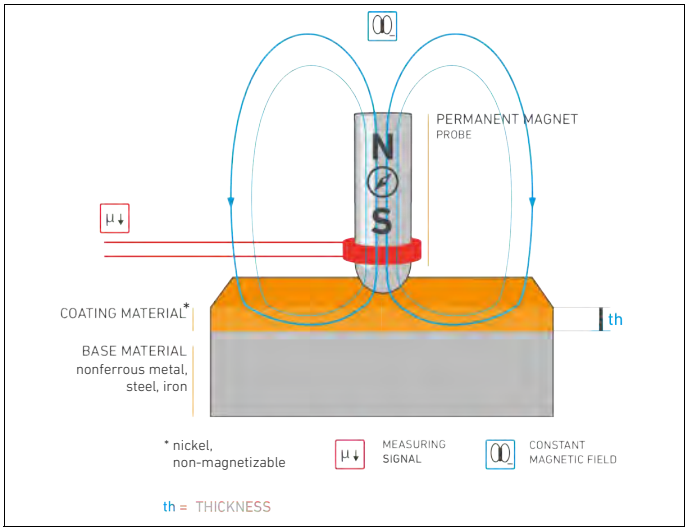
- coatings made of zinc or nickel on steel or iron
- coatings made of copper on brass or stainless steel
- coatings made of copper on epoxy, also under protection lacquer coatings

Used in the following gages

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

Magnetic test method

Standard: DIN EN ISO 2178



Schematic illustration of magnetic test method. The penetration depth of the field depends on the permeability of the coating or base material.

Functional principle

Contact test method. 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. In the gage, the obtained measurement signal of the magnetic field strength, measured by a suitable sensor, is converted into the coating thickness values via the probe characteristic, i.e., the functional correlation between the probe signal and the coating thickness.

Major areas of application

Non-magnetizable coating material on steel/iron or nickel coatings on non-ferrous metals.

- thick galvanic coatings made of chrome, zinc, copper, aluminium etc. on steel and iron
- thick enamel, paint, lacquer or plastic coatings on steel or iron
- electroplated nickel coatings (Ni) on copper or aluminium, on circuit board pins also under thin gold coating
- chemically deposited nickel coatings (Ni), if magnetizable, on copper or aluminium

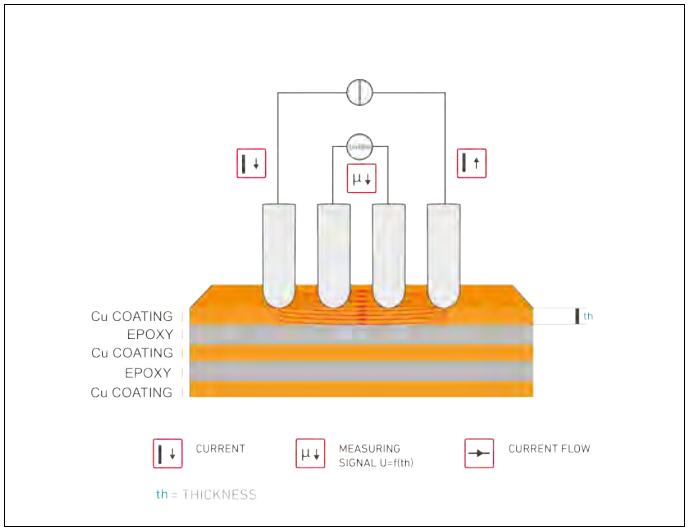
Used in the following gages

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

Test methods

Microresistivity test method

Standard: DIN EN 14571



Schematic illustration of microresistivity test method. The electrical conductivity depends on the temperature of the coating material.

Functional principle

Contact test method. The probe contacts the specimen surface with 4 needles (electrodes). The two outer needles supply a current to the coating. The copper coating between the two inner needles serves as an electrical resistor at which the voltage drop is measured. This is inversely proportional to the thickness of the copper coating. In the gage, the obtained measurement signal is converted into the coating thickness values via the probe characteristic, i.e., the functional correlation between the probe signal and the coating thickness.

Major areas of application

Copper coating on PCB material

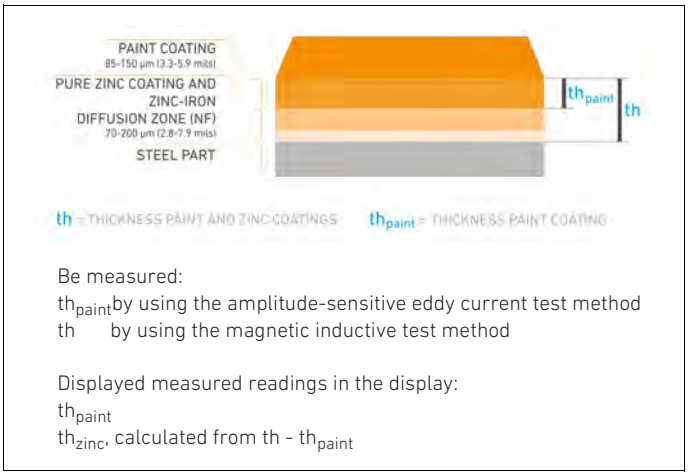
- copper coatings on multi layers or laminates

Used in the following gages

FISCHERSCOPE® MMS® PC2 with module SR-SCOPE

Duplex measurement – function principle

FDX13H: Duplex measurement of paint-zinc coatings in heavy corrosion protection (zinc thicknesses ≥ 70 µm (2.8 mils))



Be measured:
th_{paint} by using the amplitude-sensitive eddy current test method
th by using the magnetic inductive test method

Displayed measured readings in the display:
th_{paint}
th_{zinc}, calculated from th - th_{paint}

Schematic illustration of determining the single coating thicknesses at measurement with the amplitude-sensitive eddy current and the magnetic inductive test method

Functional principle

The magnetic induction test method and the amplitude-sensitive eddy current test method are used for duplex measurement, the simultaneous measuring of paint-zinc coatings with thick zinc coatings (larger 70 µm (2.8 mils)). The test methods are described from page 28. The two test methods are used simultaneously 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 different electrical conductivities of the pure zinc coating and the zinc-iron diffusion zone do not affect the measurement of the paint thickness due to the applied high-precision conductivity compensation developed by us.

Major areas of application

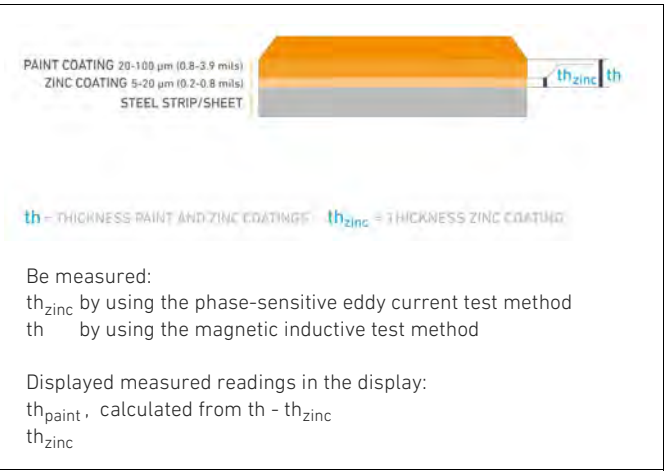
Paint-zinc coatings on steel or iron.

- control measurements in heavy corrosion protection (zinc thicknesses ≥ 70 µm (2.8 mils))
- paint and zinc coating thicknesses of hot-dip galvanized steel parts (continuous or batch galvanized)
- electricity pylons, bridge structural components, traffic guidance systems
- gates, fences, railings

Suitable gage types

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

ESG20: Duplex measurement of paint-zinc coatings on sheet metals (zinc thicknesses ≤ 20 µm (0.8 mils))



Be measured:
th_{zinc} by using the phase-sensitive eddy current test method
th by using the magnetic inductive test method

Displayed measured readings in the display:
th_{paint}, calculated from th - th_{zinc}
th_{zinc}

Schematic illustration of determining the single coating thicknesses at measurement with the phase-sensitive eddy current and the magnetic inductive test method

Functional principle

The magnetic induction test method and the phase-sensitive eddy current test method are used for duplex measurement, the simultaneous measuring of paint-zinc coatings with thin zinc coatings (typical between 5 and 20 µm (0.2 and 0.8 mils)). The test methods are described from page 28. The two test methods are used simultaneously such that in one measurement step, the individual coating thickness of paint and zinc are computed and displayed from the two measured readings. These test methods can also be used to measure paint-zinc coatings on hot-dip galvanized sheets or strips, provided there is no pronounced zinc-iron diffusion zone.

Major areas of application

Paint-zinc coatings on steel or iron.

- quality measurements of slight hot-dip galvanized or electrolytically galvanized sheet metals (typical zinc coatings between 5 ... 20 µm respectively 0.25 ... 0.8 mils)
- domestic appliance and electrical industry
- car body painting and brake pipes
- cladding, steel roof constructions, packaging or vending machine housings

Suitable gage types

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

Our services

Service worldwide

FISCHER has established a tightly-linked and excellent global network of service partners with highly qualified staff. Offering fast help, repair and the availability of leasing and rental units, our service supports you on site in every respect concerning your Fischer gages and their use.

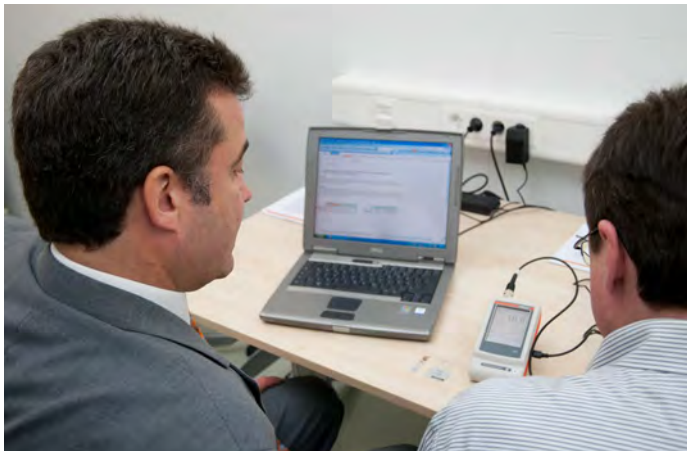
Calibration and certification

On your request we issue a Inspection Certificate 3.1 for your probe and instrument according to ISO 10474. A broad assortment of calibration foils is available for probe calibration, for the calibration foils we will issue a Test Certificate on request.

Example of a calibration foil set

User on-site training

With our training program we make your employees fit 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.

Application laboratories

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

Measuring on a customer's specimen in one of our application laboratories.

Seminars

Because we want you to receive maximum benefit from our products, our experts are happy to share their application know-how. In our seminars, you will not only learn the fundamentals of metrology, but you will also apply the theory in a practical way in small workshops.

Practical knowledge in small groups.

You can find us in:
AFRICA | ASIA | AUSTRALIA | EUROPE | NORTH AMERICA | SOUTH AMERICA

Our measuring instruments, software and accessories are developed, produced and constantly optimized in-house. The goal is to make the world of our customers measurably easier – made in Germany!

Our experienced staff will be happy to advise you locally and in your national language. Please find your personal contact partner at:

www.helmut-fischer.com

Global Sales, Application and Service

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