

MMS[®] Inspection DFT

Coating Thickness Measurement
on Virtually all Metals

- Convenient
- Non-Destructive
- Universal

- Compact
- Robust



Scale 1:1

Description

Gauge properties

The gauge models MMS Inspection DFT measure coating thicknesses easily, quickly, non-destructively and with the precision that is typical for all Fischer instruments.

- Ideal for onsite applications due to the compact size, the light weight and the robust and durable instrument design
- Probe integrated in the measuring instrument for single-handed operation
- IP65, dust-tight and water repellent and resistant
- The 3-point-support ensures a stable and sure positioning on the surface
- Intuitive operation of the menu navigation and graphic display
- The measurement presentation flips automatically and thus allows optimum reading in different measuring positions
- Different languages selectable
- Automatic selection of the measuring method corresponding to the base material (only for gauge variant FE+NF)
- Patented conductivity compensation for measurements on non-magnetic base materials
- Diversity of variants; You can select your suitable gauge according to your requirements from 3 variants with different features. You will find an overview in the sections "Variants" and "Order Information".

Applications

Examples

Steel, iron, cast iron base materials (FE)

- Zinc, chromium, copper, paint, varnish or plastic on steel, iron or cast iron (NF, NC/FE)

Non-ferrous metal base materials (NF)*

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

*only measurable with variant type FE+NF

The gauges are applicable for measurements both on smooth and rough surfaces

Variants

All gauge variants available in 2 types:

- **FE:** Measurements on ferrous base materials (Fe)
- **FE+NF:** Measurements on both as measurements on ferrous (FE) as well as on non-ferrous metal base materials (NF)

Start

Entry level gauge with small data memory for max. 10,000 measured values in one batch and USB interface for data transfer.

Enhanced

Gauge with large data memory for 250,000 measured values in 2500 batches, USB interface for data transfer and 4 batch templates for quick and easy creation of measurement task files (batches).

Individual upgrades are possible for this device model, see following section

High

High-end gauge with large data memory for 250,000 measured values in 2500 batches, USB interface, Bluetooth and WiFi for data transfer as well as a total of 9 batch templates for easy and fast creation of measurement task files (batches). Thereof 5 batch templates with preconfigurations especially for coating thickness measurement in the corrosion protection area, e.g. according to the measuring regulation SSPC PA2.

Upgrade packages for variants

Upgrade packages	Gauge types	Enhanced		High	
		FE	FE+NF	FE	FE+NF
Gauge type FE+NF		●		●	
BT + WiFi		●	●		
Batch Template Package Corosion		●	●		

Batch Template Packages

Basics

Corrosion

Only available for gauge variants High and Enhanced with upgrade Batch Template Package Corrosion

Templates for Creation Measurement Tasks

Batch templates for coating thickness measurement. All metrological functions are available in these templates.

- *Individual*
Template for free configuration, all metrological functions are available
- *Rough*
Template with optimized settings (customizable) for measurements on rough surfaces. Preconfigured: Display and storage of the mean value of a given number (n) of measurements (are also stored) and the calibration method 2-point.
- *Smooth*
Template with optimized settings (customizable) for measurements on smooth surfaces. Preconfigured: Settings of tolerance limit values and calibration method 1-point.
- *Simple*
Template with minimum preconfiguration: Calibration method Zero only and no further metrological function settings (customizable)

Templates with especially designed measurement tasks for measurements of corrosion-protective coatings. The following batch templates are available:

- *Individual*
Template for free configuration, all metrological functions are available
- *IMO PSPC*
Preconfigured template containing 90/10 rule, calibration method and evaluation for coating thickness measurement according to requirements of "Performance Standard for Protective Coatings" of the International Maritime Organization (IMO PSPC)
- *SSPC PA2*
Preconfigured template with settings (partly customizable), calibration method and evaluation regulations for coating thickness measurement according to guideline SSPC-PA2 of the Society for Protective Coatings (SSPC)
- *ISO 19840*
Preconfigured template with settings (partly customizable), calibration method and evaluation regulations for coating thickness measurement according to standard
- *AS 3894.3*
Preconfigured template with settings (partly customizable), calibration method and evaluation regulations for coating thickness measurement according to Australian standards AS 2331.1.4 and AS 3894.3-B
- *SIS 184160*
Preconfigured template with settings (partly customizable), calibration method and evaluation regulations for coating thickness measurement according to Swedish standard SIS 184160

Metrological Functions

Batch

Block creation

Tolerance limits/Nominal thickness

Offset value/Correction value

Measurement value capture

Measurement value storage

Measurement units

Measurement Tasks

File containing all metrological function settings and the linking to calibration necessary for the measurement task as well as the measured values and evaluations.

Measured values grouped in measured value blocks

Adjustable, depending on the selected batch template

Adjustable, is deducted automatically from the measured value. Thus, one obtains the thickness of the top coating if for instance the interim coating is known.

Automatic upon placement of the gauge probe

on/off switchable

µm/mm or mils/inches

Metrological Functions

Measurement modes

Single reading mode

After each placing of the gauge probe the measuring reading is displayed and stored automatically.

Free running mode

After placing the gauge probe the continuous display of the measured values appears without automatic storage of the measured values. Useful for quick checking of coating thicknesses over a defined surface area, e.g. in tank construction.

Resolution of measurement value

low (up to 1 decimal place), medium (up to 2 decimal places), high (up to 3 decimal places)

Air reference value capture

During measurement, the air reference value is used to compensate the temperature and to reference the zero point determination. Regular measurement of the air reference value is necessary to achieve high measurement accuracy.

- Probe, air value capture as defined in probe (dynamic/static)
- Dynamic, continuous acceptance of the value when the gauge probe is lifted from the surface. Default setting.
- Static, no automatic acceptance. The air reference value must be measured manually at regular intervals. This may be useful for automated measurements or manually triggered measured value acceptance, if the positioning of the gauge probe requires some time, e.g. for measurements in small cavities.

Calibration

For a correct measurement of the coating thickness, the gauge must record the properties (permeability, electrical conductivity, geometry) of the test piece. This adjustment is carried out with a calibration. A calibration is specified by the desired calibration method, the reference specimen (comparable in shape, material, permeability/electrical conductivity to the test piece) and by the foils used. The calibrations are stored in separate files. To be able to measure, you must assign a calibration suitable for the application to the batch.

Calibration Methods

- *Flexible*

Adjustment of the gauge to geometrical form and base material of the test piece: Zero point determination and adjustment to up to two coating thickness values by using calibration foils. On recalibration, the individual calibration steps can be skipped.

- *Zero only*

Adjustment of the gauge to the base material and the geometry shape of the test piece

- *1 Foil*

Adjustment of the gauge to test piece: Adjustment to a coating thickness value by using 1 calibration foil

- *2 Foil*

Adjustment of the gauge to test piece: Adjustment to 2 coating thickness values by using 2 calibration foils

- *Zero + 1 Foil*

Adjustment of the gauge to the base material and the geometry shape of the test piece: Adjustment to the base material and to 1 coating thickness value by using 1 calibration foil

- *Zero + 2 Foil*

Adjustment of the gauge to the base material and the geometry shape of the test piece: Adjustment to the base material and to 2 coating thickness values by using 2 calibration foils

General Features

Measuring methods

Gauge type FE and FE+NF

- Magnetic induction method (ISO 2178, ASTM D7091, Measurement of non-magnetic coatings on magnetic substrates);
- Eddy current method (ISO 2360, ASTM D7091, Measurement of non-conductive coatings on non-magnetic substrate metals);

Gauge type FE+NF

Automatic selection of the measuring method corresponding to the substrate material

Factory calibration

Each individual gauge is factory calibrated at several reference points with the greatest care to ensure the highest possible degree of trueness.

Data memory

The contents of the memory is retained even without batteries; subsequent viewing of the measured individual values and evaluations

- Variant Start with memory capacity of max. 10,000 measured values in 1 batch
- Variants Enhanced and High with memory capacity of 250,000 measured values in 2500 batches

Evaluation

Statistics

- Batch-Template-Package Basics: Display of mean value, standard deviation, min/ max values and number of measurements per block, per batch, coefficient of variation, number of measured values lower/upper the set limit values
- Batch-Template-Package Corrosion: Depending of the selected measuring regulation; e.g. for SSPC-PA2, Display per measurement location (Spot)/area section (Area): Number of (Spots), mean value, standard deviation, coefficient of variation, min./max. values, Range, measured values < 80 %/> 120 % of limit values (coating thickness restriction level 3)

Graphic Presentation

- Histogram, when using the batch template package Basics

Probe

Single tip axial probe with spring-loaded measuring system and with wear-resistant probe tip built-in into gauge

Probe tip radius: 2 mm (78.7 mils); Probe tip material: Hard metal

Measurement interval

More than 140 measurements per minute

Display of measurement capture

Audible by a short beep, visual by colored illuminated LED and by gauge vibration

Display for limit monitoring

- Limit violation: Audible by 2 short beeps, visual by red illuminated LED and by gauge vibration
- Measured values between the limits: Audible by 1 short beep, visual by green illuminated LED and by gauge vibration

Languages

German and English

Presettings for batches

Each new batch is created with a preset measurement unit and resolution for the displayed measured value. For the gauge variant High, the batch template package is also preselected here. You can adapt these presettings to your requirements. However, you can also change the unit of measurement and the resolution for the measured value display at any time in the batch that has already been created.

Display

- Graphic display with automatic flipping measuring presentation view (deactivatable) to read measurement results in many different gauge positions
- Setting of brightness and contrast (definable for Office, Sunlight and Night)

Data transfer

Single values

- USB: Data transfer to PC, Data import to MSExcel via PC-Datex software; You can gratis download the PC-Datex program from Fischer-Homepage
- Bluetooth/WiFi: Data transfer to App PHASCOPE® PAINT; Creation and export of reports via App; You can gratis download the App from Google Play Store and Apple App Store

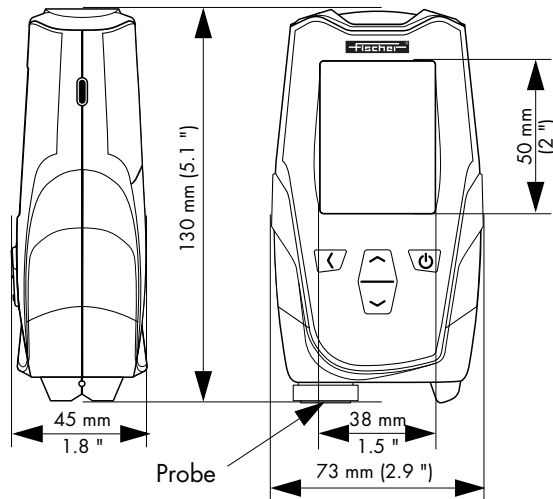
MMS® Inspection DFT

General Features

USB port	2.0 Type C <ul style="list-style-type: none"> • For service purpose • For connecting to PC, for data transfer, max. cable length: 3 m (118 inches) 	
Wireless interface	Bluetooth	WiFi
Only available in the variants High and Enhanced with upgrade package BT+WiFi	Bluetooth module integrated in gauge, Bluetooth v2.1 + EDR, class 2	WiFi module integrated in gauge, Standards IEEE 802.11b/g/n
Admissible ambient temperature range during operation	0 ... +60 °C (+32 ...+140 °F)	
Surface temperature	max. + 60 °C (+140 °F)	
Protection type	IP65	
Weight (incl. Batteries)	ca. 251 g (0.55 lb.)	
Power supply	<ul style="list-style-type: none"> • 2 batteries: Mignon, Alkaline or Lithium, LR6, AA, 1.5 V • 2 rechargeable batteries: Mignon, NiMH, HR6 - AA 	
Battery life	> 8 h for continuous measuring, brightness set to sunlight and deactivated wireless interface	
Specifications valid for +20 °C (+68 °F) ambient temperature and Alkaline batteries used		

Dimensions

Gauge



*

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)	Non-ferrous metal base materials (NF)
0 ... 2500 µm (98.4 mils)	0 ... 2000 µm (78.7 mils)

*

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).

Trueness*

based on Fischer factory calibration standards

Steel, iron, cast iron base materials (FE)

0 ... 75 µm: ≤ 1.5 µm
 75 ... 1000 µm: ≤ 2 % of nominal value
 1000 ... 2000 µm: ≤ 3 % of nominal value
 0 ... 2.9 mils: ≤ 0.06 mils
 2.9 ... 39.4 mils: ≤ 2 % of nominal value
 39.4 ... 78.7 mils: ≤ 3 % of nominal value

Non-ferrous metal base materials (NF)

0 ... 50 µm: ≤ 1 µm
 50 ... 1000 µm: ≤ 2 % of nominal value
 1000 ... 2000 µm: ≤ 3 % of nominal value
 0 ... 2 mils: ≤ 0.04 mils
 2 ... 39.4 mils: ≤ 2 % of nominal value
 39.4 ... 78.7 mils: ≤ 3 % of nominal value

Repeatability Precision*

based on Fischer factory calibration standards 5 single readings per standard

Steel, iron, cast iron base materials (FE)

0 ... 50 µm: ≤ 0.25 µm
 50 ... 2000 µm: ≤ 0.5 % of reading
 0 ... 2 mils: ≤ 0.04 mils
 2 ... 78.7 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 ... 3.9 mils: ≤ 0.02 mils
 3.9 ... 78.7 mils: ≤ 0.5 % of reading

Influence*

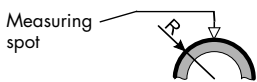
Steel, iron, cast iron base materials (FE)

Non-ferrous metal base materials (NF)

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

The quantity of influences are stated with the expanded measurement uncertainty U with the expanded factor of k = 2 (defines an interval with the confidence level of 95.45 %) - according to ISO/IEC Guide 98-3:2008-09 "Guide to the expression of uncertainty in measurement".

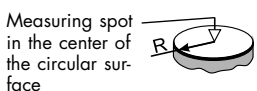
Curvature (R), measurement error from nominal value with reference to master calibration on flat surface



No measurement error within the trueness as of R = 84 mm ± 8 mm (3.3 " ± 0.3 ")
 Measurement error 10 % for R = 17 mm ± 1.5 mm (0.7 " ± 0.06 ")
 A minimum of R = 1.5 mm (0.06 ") is required

No measurement error within the trueness as of R = 447 mm ± 28 mm (17.6 " ± 1.1 ")
 Measurement error 10 % for R = 92 mm ± 3.4 mm (3.6 " ± 0.13 ")
 A minimum of R = 1.5 mm (0.06 ") is required

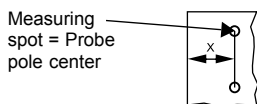
Edge distance (R), specification from probe tip center, measurement error from nominal value



No measurement error within the trueness as of R = 10.5 mm ± 0.7 mm (0.4 " ± 0.03 ")
 Measurement error 10 % for R = 5.8 mm ± 0.25 mm (0.23 " ± 0.098 ")
 A minimum of R = 2.5 mm (0.098 ") is required

No measurement error within the trueness as of R = 3.2 mm ± 0.2 mm (0.13 " ± 0.008 ")
 Measurement error 10 % for R = 2.4 mm ± 0.04 mm (0.095 " ± 0.002 ")
 A minimum of R = 1.7 mm (0.07 ") is required

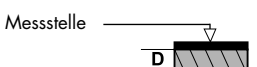
Edge distance (X), specification from probe tip center, measurement error from nominal value



No measurement error within the trueness as of X = 3.6 mm ± 0.3 mm (0.14 " ± 0.012 ")
 Measurement error 10 % for X = 1.0 mm ± 0.05 mm (0.04 " ± 0.002 ")

No measurement error within the trueness as of X = 2.2 mm ± 0.05 mm (0.087 " ± 0.002 ")
 Measurement error 10 % for X = 1.9 mm ± 0.04 mm (0.075 " ± 0.0016 ")

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



Steel, iron, cast iron base materials (FE)

No measurement error within the trueness as of D = 1.0 mm ± 0.1 mm (0.04 " ± 0.004 ")
 Measurement error 10 % for D = 0.5 mm ± 0.03 mm (0.02 " ± 0.0012 ")

Aluminium base material

No measurement error within the trueness as of D = 0.1 mm ± 0.01 mm (3.9 mils ± 0.39 mils)
 Measurement error 10 % for D = 0.02 mm ± 0.001 mm (0.79 mils ± 0.039 mils)

Influence*

	Steel, iron, cast iron base materials (FE)	Non-ferrous metal base materials (NF)
<p>The following values are valid for a coating thickness with a nominal value of 75 µm / 2.95 mils. The quantity of influences are stated with the expanded measurement uncertainty U with the expanded factor of k = 2 (defines an interval with the confidence level of 95.45 %) - according to ISO/IEC Guide 98-3:2008-09 "Guide to the expression of uncertainty in measurement".</p>		
Base material	<p>Steel, iron, cast iron base materials (FE)</p> <p>Influence on base material (FE) permeability in regard to Fischer calibration standards (master calibration): No measurement error within the trueness as of 137 FN ± 0.2 FN Measurement error of 10 % for ferrite content of 123 FN ± 0.8 FN</p>	<p>Non-ferrous metal base materials (NF)</p> <p>Influence of the el. conductivity of the base material (NF) in the range from 30 to 100 % IACS: Measurement error ≤ 3 %, valid for the total measurement range</p>

Scope of Supply

- Gauge; lanyard; 2 batteries; USB cable type C to type A (1 m (39.4 inches)); guideline; calibration set suitable to gauge type
- Calibration set for gauge type FE
 (Test plate NF/FE and 3 calibration foils (ca. 25 µm (0.98 mils), 75 µm (2.95 mils) and 540 µm (21.26 mils))
 - Calibration set for gauge type FE+NF
 (Test plates NF/FE and ISO/NF as well as 3 calibration foils (ca. 25 µm (0.98 mils), 75 µm (2.95 mils) and 540 µm (21.26 mils))

Order Information

Gauge		MMS Inspection DFT				
Variant	Order No.	Type	Batch Template Package	Interface	Memory capacity	Upgrade
Start	606-026	FE	Basics	USB	max. 10,000 measured values in 1 batch	
	606-029	FE+NF				
Enhanced	606-027	FE	Basics	USB	250,000 measured values in 2500 batches	●
	606-030	FE+NF				
High	606-028	FE	Basics + Corrosion	USB + BT + WiFi	250,000 measured values in 2500 batches	●
	606-031	FE+NF				

Upgrade Packages for Variants Enhanced and High

Upgrade Packages	Order No.	Suitable for gauge type (variants)
Gauge type FE+NF	606-037	FE (Enhanced and High)
BT + WiFi	606-038	FE and FE+NF (Enhanced)
Batch Template Package Corrosion	606-039	FE and FE+NF (Enhanced)