

MMS[®] Inspection DFT

Coating Thickness Measurement
on Virtually all Metals

- Convenient
- Non-Destructive
- Universal



Scale 1:1

- Compact
- Robust

Description

Gage properties

The gage 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 gage type FE+NF)
- Patented conductivity compensation for measurements on non-magnetic base materials
- Diversity of variants; You can select your suitable gage 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 gages are applicable for measurements both on smooth and rough surfaces

Variants

All gage 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 gage with small data memory for max. 10,000 measured values in one batch and USB interface for data transfer.

Enhanced

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

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

High

High-end gage with large data memory for 250,000 measured values in 2500 batches, USB interface, Bluetooth and WiFi for data transfer as well as batch template packages Industrial and Corrosion for easy and fast creation of measurement task files (batches). The package Corrosion contains 5 batch types 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

Gage types

Enhanced

FE

FE+NF

High

FE

FE+NF

Gage type FE+NF

●

●

BT + WiFi

●

●

Batch Template Package Corossion

●

●

Batch Template Packages

Only available for gage variants Enhanced and High

Industrial

Corrosion

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

Templates for Creation Measurement Tasks

The packages contain various batch types. That are Batch templates for specific coating thickness measurement applications.

Template package contains following batch types:

- *Individual*
Batch template for free configuration, all metrological standard functions are available
- *Elementary*
Template with minimum configuration: Calibration method Zero only and no further metrological function settings (customizable)
- *Smooth Surface*
Preconfigured batch template for measurements on smooth surfaces: Settings of tolerance limit values (customizable) and calibration method Zero + 1 Foil.
- *Rough Surface*
Preconfigured batch template for measurements on rough surfaces: Display and storage of the mean value of a given number (n) of measurements (customizable, single readings are also stored) and the calibration method Zero + 2 Foils.

Template package containing batch types with especially designed measurement tasks for measurements of corrosion-protective coatings. The template package contains following batch types:

- *Individual*
Batch template for free configuration, all metrological standard functions are available
- *IMO PSPC*
Preconfigured batch 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 batch 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 batch template with settings (partly customizable), calibration method and evaluation regulations for coating thickness measurement according to standard ISO 19840
- *AS 3894.3*
Preconfigured batch 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 batch template with settings (partly customizable), calibration method and evaluation regulations for coating thickness measurement according to Swedish standard SIS 184160

Metrological Standard Functions

Batch

Block creation

Tolerance limits/Nominal thickness

Offset value/Correction value

Measurement value capture

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 type

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 gage probe

Metrological Standard Functions

Measurement Tasks

Measurement value storage	On/Off switchable
Measurement units	µm/mm or mils/inches
Measurement modes	<p><i>Single reading mode</i> After each placing of the gage probe the measuring reading is displayed and stored automatically.</p> <p><i>Free running mode</i> After placing the gage 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.</p>
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 reference the zero point determination. Regular measurement of the air reference value is necessary to achieve high measurement accuracy. Automatic capture of the air value always when the gage probe is lifted from the surface.
Calibration	For a correct measurement of the coating thickness, the gage must record the properties (permeability, electrical conductivity, geometry) of the test piece. This adjustment is carried out by a calibration. A calibration is specified by the reference specimen (comparable in shape, material, permeability/electrical conductivity to the test piece) and by the foil standards used (calibration method).

Calibration Methods

Only available for gage variants Enhanced and High

- *Flexible*
Adjustment of the gage 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 gage to the base material and the geometry shape of the test piece
- *1 Foil*
Adjustment of the gage to test piece: Adjustment to a coating thickness value by using 1 calibration foil
- *2 Foil*
Adjustment of the gage to test piece: Adjustment to 2 coating thickness values by using 2 calibration foils
- *Zero + 1 Foil*
Adjustment of the gage 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 gage 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	
Gage type FE and FE+NF	<ul style="list-style-type: none"> • 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);
Gage type FE+NF Automatic selection of the measuring method corresponding to the substrate material	
Factory calibration	Each individual gage is factory calibrated at several reference points with the greatest care to ensure the highest possible degree of trueness.

General Features

Data memory	<p>The contents of the memory is retained even without batteries; subsequent viewing of the measured individual values and evaluations</p> <ul style="list-style-type: none"> • Gage variant Start with memory capacity of max. 10,000 measured values in 1 batch • Gage variants Enhanced and High with memory capacity of 250,000 measured values in 2500 batches 				
Evaluation	<p><i>Statistics</i></p> <ul style="list-style-type: none"> • Batch template package Industrial and gage variant Start: 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) <p><i>Graphic Presentation</i></p> <ul style="list-style-type: none"> • Histogram • Chart, showing the progress of measured readings 				
Probe	<p>Single tip axial probe with spring-loaded measuring system and with wear-resistant probe tip built-in into gage Probe tip radius: 2 mm (78.7 mils); Probe tip material: Hard metal</p>				
Measurement interval	More than 140 measurements per minute				
Display of measurement capture	Audible by a short beep, visual by colored illuminated LED and by gage vibration				
Display for limit monitoring	<ul style="list-style-type: none"> • Limit violation: Audible by 2 short beeps, visual by red illuminated LED and by gage vibration • Measured values between the limits: Audible by 1 short beep, visual by green illuminated LED and by gage vibration 				
Languages	German and English				
Presettings for batches <small>Only available in gage variants Enhanced and High</small>	<p>Each new batch is created with a preset measurement unit and resolution for the displayed measured value. For the gage variant High and Enhanced with upgrade Batch Template Package Corrosion, 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.</p>				
Display	<ul style="list-style-type: none"> • Graphic display with automatic flipping measuring presentation view (deactivatable) to read measurement results in many different gage positions • Setting of brightness and contrast (definable for Office, Sunlight and Night) 				
Data transfer	<p>Single values</p> <ul style="list-style-type: none"> • 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 				
USB port	<p>2.0 Type C</p> <ul style="list-style-type: none"> • For service purpose • For connection to PC for data transfer, max. cable length: 3 m (118 inches) 				
Wireless interface	<table border="1"> <thead> <tr> <th>Bluetooth</th> <th>WiFi</th> </tr> </thead> <tbody> <tr> <td>Bluetooth module integrated in gage, Bluetooth v2.1 + EDR, class 2</td> <td>WiFi module integrated in gage, Standards IEEE 802.11b/g/n</td> </tr> </tbody> </table>	Bluetooth	WiFi	Bluetooth module integrated in gage, Bluetooth v2.1 + EDR, class 2	WiFi module integrated in gage, Standards IEEE 802.11b/g/n
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<small>Only available in the variants High and Enhanced with upgrade package BT+WiFi</small>					

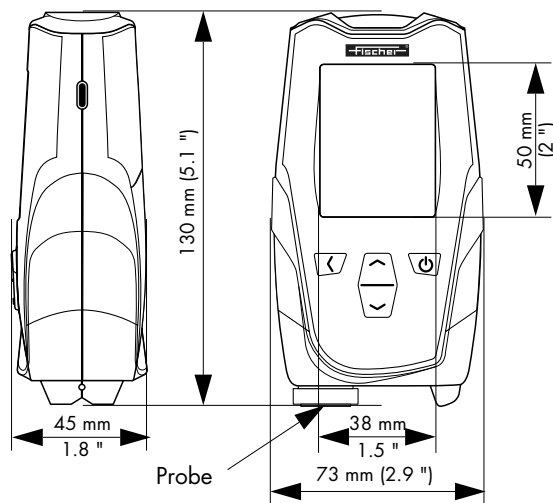
MMS® Inspection DFT

General Features

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	

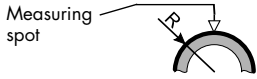
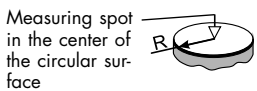
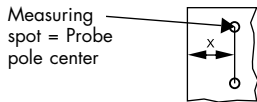
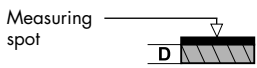
Dimensions

Gage



*	<p>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).</p>	
Measurement Range*	<p>Steel, iron, cast iron base materials (FE)</p> <p>0 ... 2500 µm (98.4 mils)</p>	<p>Non-ferrous metal base materials (NF)</p> <p>0 ... 2000 µm (78.7 mils)</p>
Trueness*	<p>Steel, iron, cast iron base materials (FE)</p> <p>0 ... 75 µm: ≤ 1.5 µm 75 ... 1000 µm: ≤ 2 % of nominal value 1000 ... 2500 µm: ≤ 3 % of nominal value</p> <p>0 ... 2.9 mils: ≤ 0.06 mils 2.9 ... 39.4 mils: ≤ 2 % of nominal value 39.4 ... 98.4 mils: ≤ 3 % of nominal value</p>	<p>Non-ferrous metal base materials (NF)</p> <p>0 ... 50 µm: ≤ 1 µm 50 ... 1000 µm: ≤ 2 % of nominal value 1000 ... 2000 µm: ≤ 3 % of nominal value</p> <p>0 ... 2 mils: ≤ 0.04 mils 2 ... 39.4 mils: ≤ 2 % of nominal value 39.4 ... 78.7 mils: ≤ 3 % of nominal value</p>
Repeatability Precision*	<p>Steel, iron, cast iron base materials (FE)</p> <p>0 ... 50 µm: ≤ 0.25 µm 50 ... 2500 µm: ≤ 0.5 % of reading</p> <p>0 ... 2 mils: ≤ 0.01 mils 2 ... 98.4 mils: ≤ 0.5 % of reading</p>	<p>Non-ferrous metal base materials (NF)</p> <p>0 ... 100 µm: ≤ 0.5 µm 100 ... 2000 µm: ≤ 0.5 % of reading</p> <p>0 ... 3.9 mils: ≤ 0.02 mils 3.9 ... 78.7 mils: ≤ 0.5 % of reading</p>

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>		
<p>Curvature (R), measurement error from nominal value with reference to master calibration on flat surface</p>		
 <p>Measuring spot</p>	<p>No measurement error within the trueness as of $R = 75 \text{ mm} \pm 5 \text{ mm}$ (2.95 " \pm 0.2 ") Measurement error 10 % for $R = 15 \text{ mm} \pm 1 \text{ mm}$ (0.59 " \pm 0.04 ") A minimum of $R = 2 \text{ mm}$ (0.08 ") is required</p>	<p>No measurement error within the trueness as of $R = 550 \text{ mm} \pm 60 \text{ mm}$ (21.7 " \pm 2.4 ") Measurement error 10 % for $R = 109 \text{ mm} \pm 8 \text{ mm}$ (4.29 " \pm 0.32 ") A minimum of $R = 2 \text{ mm}$ (0.08 ") is required</p>
<p>Edge distance (R), specification from probe tip center, measurement error from nominal value</p>		
 <p>Measuring spot in the center of the circular surface</p>	<p>A minimum of $R = 12 \text{ mm}$ (0.47 ") is required No measurement error within the trueness</p>	<p>A minimum of $R = 12 \text{ mm}$ (0.47 ") is required No measurement error within the trueness</p>
<p>Edge distance (X), specification from probe tip center, measurement error from nominal value</p>		
 <p>Measuring spot = Probe pole center</p>	<p>Minimum distance: $X = 12 \text{ mm}$ (0.47 ") No measurement error within the trueness</p>	<p>Minimum distance: $X = 12 \text{ mm}$ (0.47 ") No measurement error within the trueness</p>
<p>Base material thickness (D), measurement error from nominal value</p>		
 <p>Measuring spot</p>	<p>Steel, iron, cast iron base materials (FE) No measurement error within the trueness as of $D = 0.86 \text{ mm} \pm 0.09 \text{ mm}$ (33.85 mils \pm 3.54 mils) Measurement error 10 % for $D = 0.44 \text{ mm} \pm 0.02 \text{ mm}$ (17.32 mils \pm 0.79 mils)</p>	<p>Copper base material No measurement error within the trueness as of $D = 0.09 \text{ mm} \pm 0.009 \text{ mm}$ (3.54 mils \pm 0.35 mils) Measurement error 10 % for $D = 0.035 \text{ mm} \pm 0.002 \text{ mm}$ (1.38 mils \pm 0.079 mils)</p>
<p>Base material</p>		
	<p>Steel, iron, cast iron base materials (FE) Influence on base material (FE) permeability in regard to Fischer calibration standards (master calibration): No measurement error within the trueness as of 137 FN \pm 0.2 FN Measurement error of 10 % for ferrite content of 122 FN \pm 1.1 FN</p>	<p>Non-ferrous metal base materials (NF) Influence of the el. conductivity of the base material (NF) in the range from 30 to 100 % IACS: Measurement error $\leq 2 \%$, valid for the total measurement range</p>
<p>Temperature</p>		
	<p>No influence</p>	<p>In a range of $\pm 20 \text{ }^\circ\text{C}$: $\pm 3 \mu\text{m}$ In a range of $\pm 68 \text{ }^\circ\text{F}$: $\pm 0.12 \text{ mils}$</p>

Scope of Supply

Gage; lanyard; 2 batteries; USB cable type C to type A (1 m (39.4 inches)); guideline; calibration set suitable to gage type

- Calibration set for gage type FE
(Test plate NF/FE (603-477) and 3 calibration foils (ca. 25 µm/0.98 mils (505-953), 75 µm/2.95 mils (505-955) and 540 µm/21.26 mils (505-965))
- Calibration set for gage type FE+NF
(Test plates NF/FE (603-477) and ISO/NF (603-478) as well as 3 calibration foils (ca. 25 µm/0.98 mils (505-953), 75 µm/2.95 mils (505-955) and 540 µm/21.26 mils (505-965))

Order Information

Gage		MMS Inspection DFT				
Variant	Order No.	Type	Batch Template Package	Interface	Memory capacity	Upgrade
Start	606-026	FE	Industrial	USB	max. 10,000 measured values in 1 batch	
	606-029	FE+NF				
Enhanced	606-027	FE	Industrial	USB	250,000 measured values in 2500 batches	●
	606-030	FE+NF				
High	606-028	FE	Industrial + 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 gage type (variants)
Gage 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)

NDT Supply.com, Inc.

7952 Nieman Road
Lenexa, KS 66214-1560 USA

Phone: 913-685-0675, Fax: 913-685-1125
e-mail: sales@ndtsupply.com, www.ndtsupply.com

