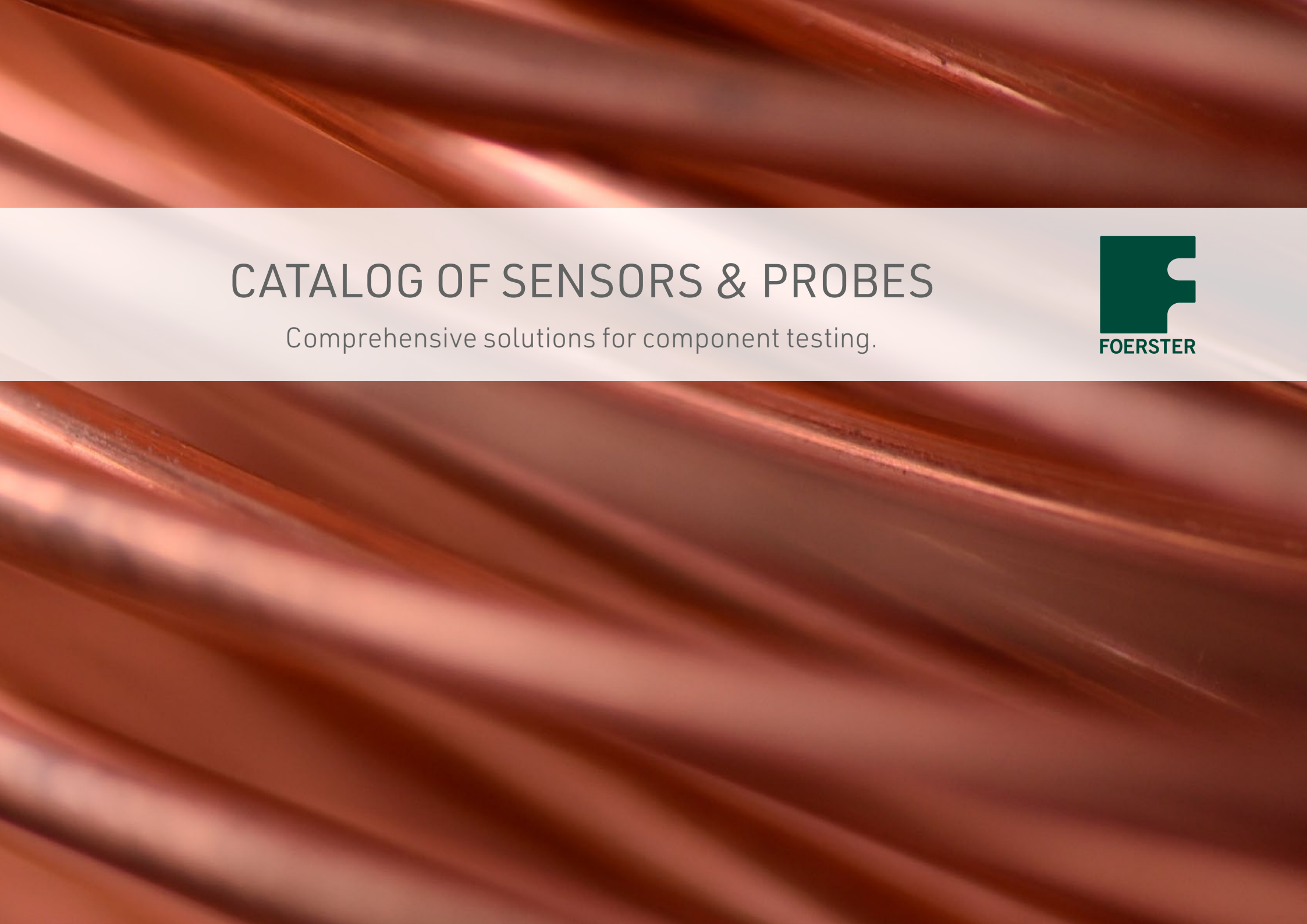
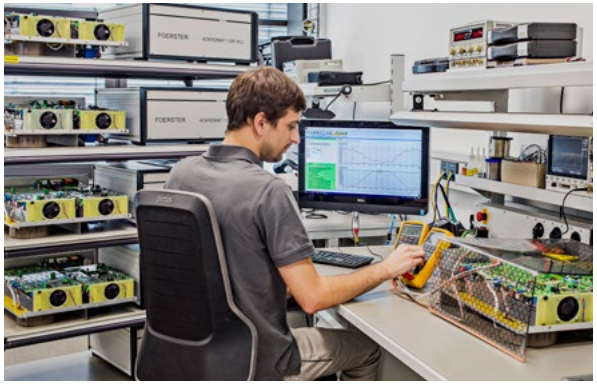


CATALOG OF SENSORS & PROBES

Comprehensive solutions for component testing.

FOERSTER

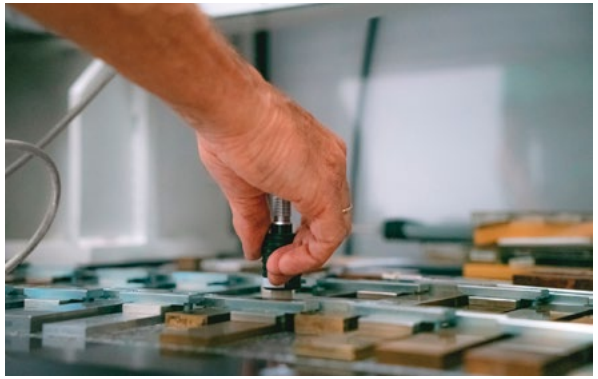


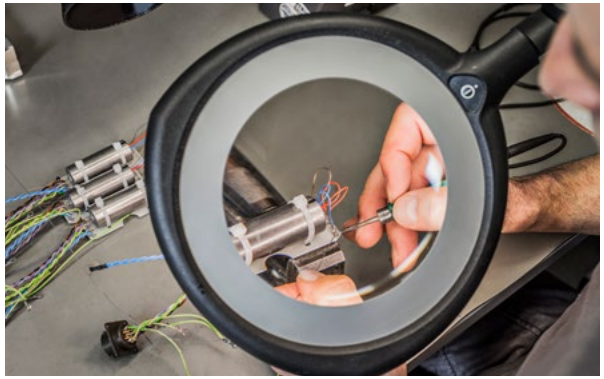
The right sensor for every application - FOERSTER. Since 1948, FOERSTER has been ensuring safety through non-destructive testing of metallic materials, as well as through metal detection and magnetics. We help you see the defects long before they attract attention on their own.

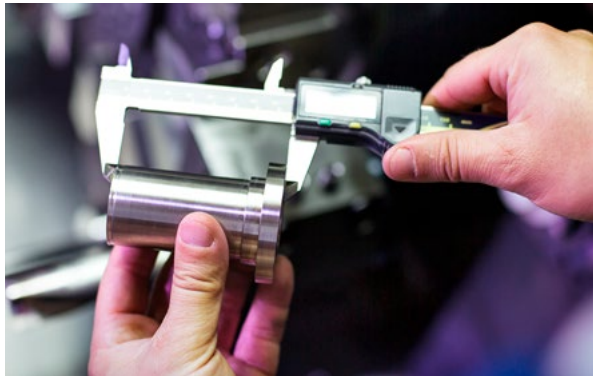
Today, we offer a large portfolio of test equipment and sensor technology to optimally support diverse manufacturing processes and types of finished goods. Our customers worldwide rely on the durable and robust products from FOERSTER.

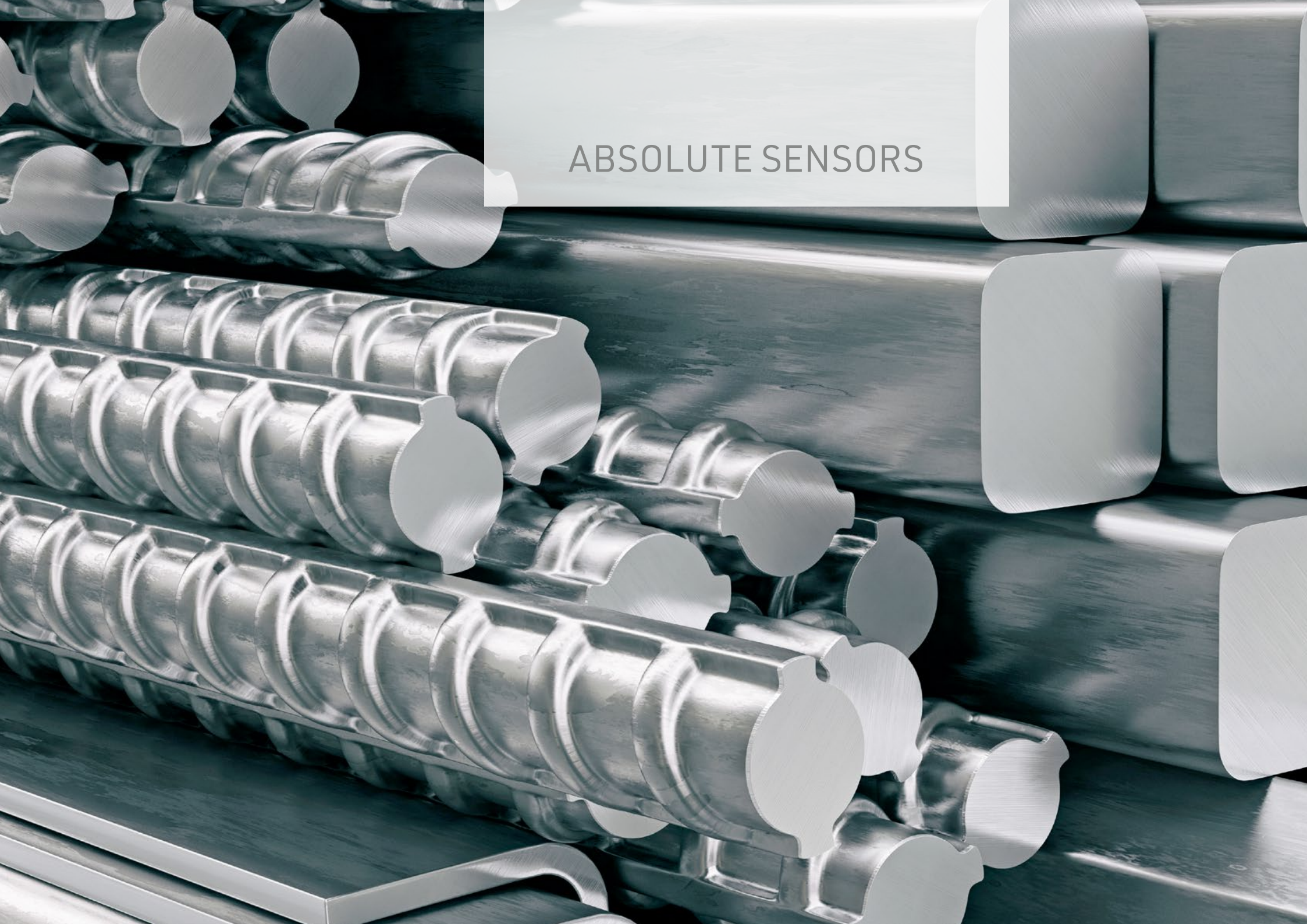
Sensors are at the heart of our technologies. They are so delicate that our highly trained employees must manufacture them by hand under special magnifying glasses. Integrated in robust housings, the sensors withstand the demands of the industry. We're always working to improve: optimizing processes and launching new products on the market.

At FOERSTER, you'll find a comprehensive selection of standard and customized sensors, probes, and coils for component testing. If our standard sensors are not perfectly suited to your testing task, we can develop individualized new solutions specifically tailored to your application.









ABSOLUTE SENSORS

Reliably test material properties with sensors from FOERSTER

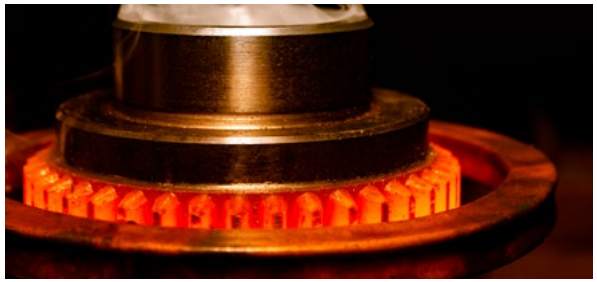
Absolute sensors are mostly used for magneto-inductive testing of material properties. An absolute sensor measures the absolute value of a voltage induced in the sensor. Often, an additional compensation coil is built in to suppress interference and improve test accuracy (I-comp). We offer sensors with two different test frequency ranges to cover the requirements of most applications: HF (1-128 kHz) and LF (2-1000 Hz) probes.

Intended uses

- Hard–soft-test
- Detecting material mix-ups

Connection options

- Cable: standard cable length 3 m; other cable lengths on request
- Connectors: Amphenol, LEMO



Encircling coils

Encircling coils are used to test the entire circumference of a given material. The fine gradations in the diameters of our encircling coils allow perfect matching to the material under test, ensuring reproducible results. FOERSTER encircling coils perform reliably and consistently even under harsh industrial conditions.

Standard material cross-sections:

- Round
- Rectangular

Standard housing dimensions:

- Coil depth 'ultrashort' = 24 mm
- Coil depth 'short' = 40 mm; Ø 5 – 100 mm
- Coil depth 'standard' = 90 mm; Ø 5 – 150 mm

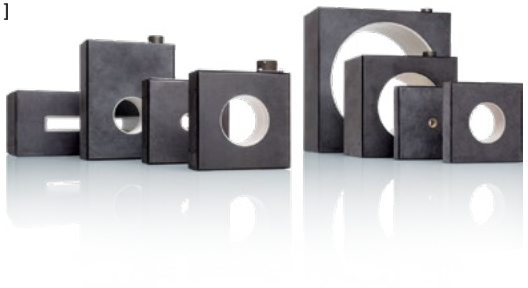
For larger material diameters, we offer custom designs.

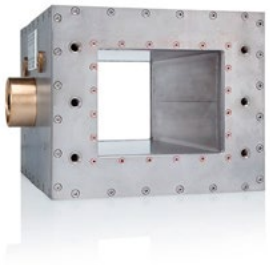
Water-cooled coils

Special water-cooled coils are designed for testing the microstructural properties of components while still hot. Due to their robust build, these coils stand up to even the harshest testing environments. The integrated cooling circuit also significantly increases the service life of the coil.

[1] Encircling coils
[2] Water-cooled coils

[1]





[2]

Pencil probes

Pencil probes are ideal for magneto-inductive testing of specific critical zones or for testing regions with complex geometries. Available in a variety of designs, they can be precisely adapted to the inspection task. This makes it possible to examine areas that would otherwise be difficult to access and allows targeted investigation of local microstructures.

To determine the hardening depth of cylindrical components we offer special shape-adapted probes. Their optimized interaction volume produces test results with greater selectivity and higher reproducibility than can be achieved using conventional coils.

We offer three different build types of pencil probes:

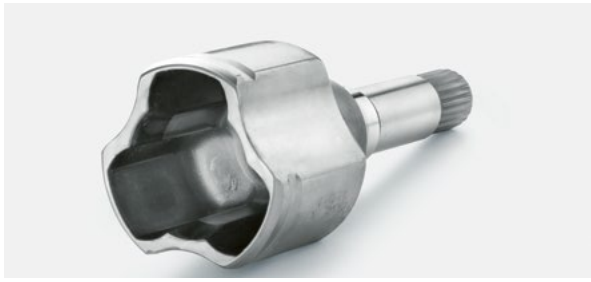
- Multi-core probes
- Ball probes
- Surface probes

Standard housings:

- Straight probes
- Angled probes
- Individualized housing shapes are possible.

Active area (contact zone probe–material):

- Ball probes: half-sphere, Ø 6 mm and Ø 11 mm
- Surface probes: Ø 13 - 57 mm



Special probes

FIT probe (FOERSTER Inside Testing)

The FIT probe is a special type of absolute sensor made specifically for material testing in recesses.

- Housing: individual adaptation to your application
- Active area: approx. 20 mm (FIT-long is approx. 40 mm)

Array probe

For inspecting the surface of larger objects, probe arrays are a good choice. We provide a large number of different array probes for this purpose; each can be individually adapted and set up for your particular application.

[1] Pencil probes
[2] FIT probe

[1]

[2]

PROBES FOR CRACK DETECTION

Reliably detect material cracks

Optimized for identifying cracks in material, crack detection probes have a very high test sensitivity that ensures reproducible results. To enable ideal conformance to the testing task, we offer a comprehensive selection of standard sensors, but for singular and/or complex sample shapes, we also design and manufacture individualized solutions adapted to unique customer requirements.

Intended uses

Detection of cracks by scanning an inspection track through

- Moving the test part
- Moving the probe

Probe parameters

- Frequency ranges: 10 kHz – 20 MHz
- Track width: Bs = 0.8 – 5 mm
- For flex probes: 10 – 20 mm;
  other dimensions on request
- Clearance compensation: optional

Connection options

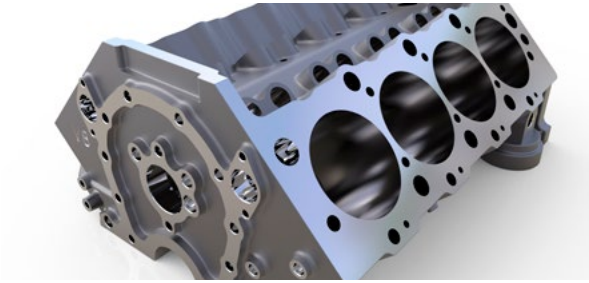
- Cable: standard 3 m;
- Other cable lengths on request
- Connectors: Amphenol, LEMO

Pencil probe

The simplest type of crack detection probe is the pencil probe. A wide variety of probe elements can be installed in these probes.

Robust pencil probe

The robust pencil probe has a particularly sturdy housing of stainless steel, which makes it suitable for use under harsh test conditions.



Angled pencil probe

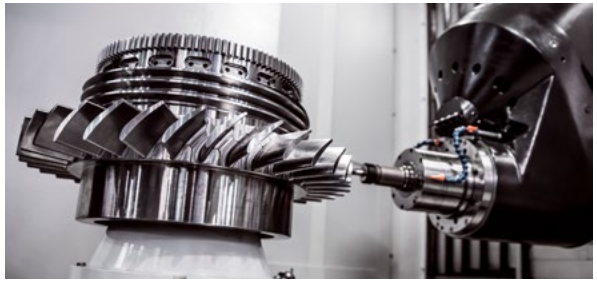
The tip of the angled pencil probe is bent at a 90° angle.

[1] Pencil probe
[2] Robust pencil probe
[3] Angled pencil probe

[1]

[2]

[3]



Special probe types

Flex probes

Besides the standard sensors, flexible sensors are especially useful for crack detection on curved surfaces. When combined with an adapted probe transducer, flex probes make it easy to inspect complex sample shapes, which can be examined using the flex probes alone without additional scanning equipment – saving you valuable time.

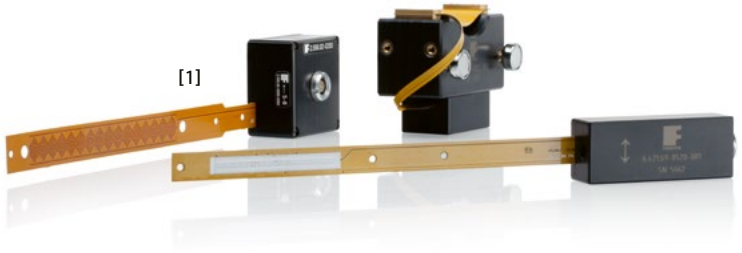
Because these probes are produced by machine, they deliver reproducible test results that comply with the most exacting quality requirements. This also means that, at the end of its service life, a probe can simply be exchanged for another of the same model.

Custom probe design is also available on request.

Array probes

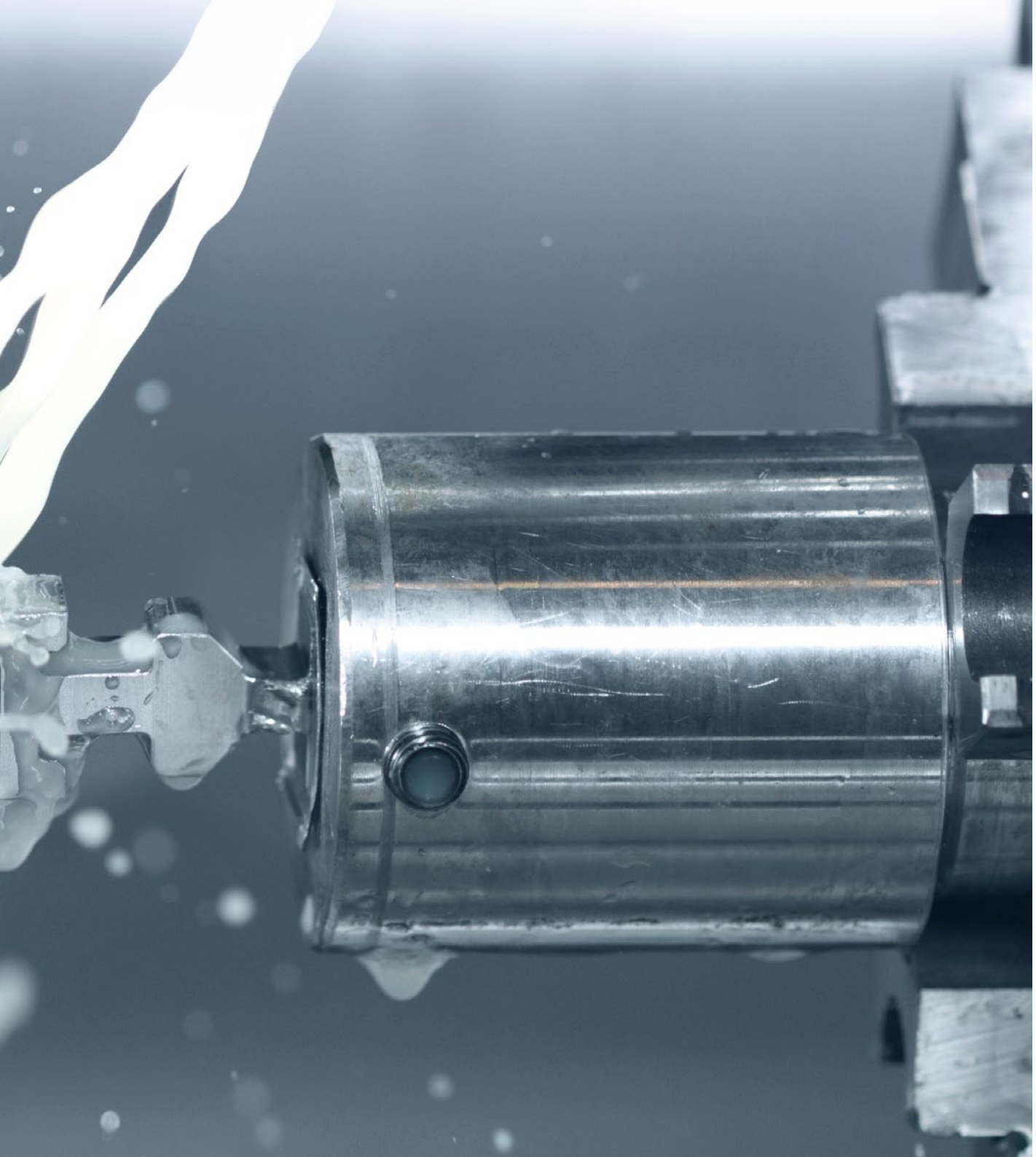
For crack detection on larger object surfaces, arrays of probes produce efficient results. For this purpose, FOERSTER offers many different array probes that can be individually adapted and set up exactly for your specific application.

[1]



[1] Flex probes

MECHANICAL PROBES



Ideally equipped for special requirements

The mechanical probes are made with the same probe elements as the crack detection and absolute probes, but when installed in special housings, they also acquire those respective mechanical properties.

Rotating sensors

For detecting surface defects on stationary parts, sensors are used that rotate around the material and thus completely scan the surface. Various rotating heads with shape-conforming rotating probes are available for this purpose. Inspection with rotating sensor systems allows for high throughput rates with low effort.

The R2 rotating head and CIRCOSCAN H were developed expressly for inspecting static components. They offer the highest detection sensitivity for surface-breaking defects, while clearance compensation ensures constant signal evaluation. The rotating sensors can be custom-designed for internal and external testing of specific components, and they can be easily changed.

The rotating sensors are driven by the R2 rotating head at a speed of 3,600 rpm. An output for speed monitoring is provided. In addition, the probes are maintenance-free and simple to integrate into any existing process.

Intended uses:

E.g. cylinder bores, piston bores, valve seat rings, injection nozzles, surface inspection

Connection options:

Connector: Amphenol; probe is plugged into and affixed to rotating head

The Ro 20, Ro 35 and Ro 65 rotating heads were originally developed for the inspection of semi-finished products such as wire, bars or tubes. But the rotating heads are also ideally suited for inspecting a wide variety of components such as piston pins. As these probes whirl around the sample, the sensors take snapshot scans that are recombined to display – at high resolution and in full length – even very shallow surface cracks a mere 30 µm in depth. This enables seamless, contactless inspection with a high throughput of up to 3 m/s.

[1]

[2]

[3]

[1] Rotating head R2
[2] CIRCOSCAN H
[3] Rotating heads Ro 20, Ro 35 and Ro 65

Special probe types

Specially-shaped components require a special approach. We offer solutions ranging from the adaptation of existing sensors to complete redevelopment of the sensor's form. For example, probes with angled heads can be manufactured to match specific contours. And we have already mastered sensors for inspecting extremely narrow bore holes.

MECA probe

The MECA probe is ideal for testing eccentric components such as cams. The probe's built-in mechanics are designed to ensure continuous lift and angle compensation. In this way, the probe always remains perpendicular to the component surface, which minimizes geometry-related interference.

[1]

[2]

[1] Special probe
[2] MECA probe

PROBES FOR CONDUCTIVITY MEASUREMENT

Electrical conductivity measurement – simple, mobile and precise

The portable FOERSTER SIGMATEST 2.070 instrument and its associated probes employ eddy current to measure the electrical conductivity of non-ferromagnetic metals. This also allows determination of physical and technical material properties, making it easy to monitor heavily stressed parts. Electrical conductivity is also useful for quality control, for example in assessing the purity of metals. In addition, it can be used to check the homogeneity of alloys, as well as to quantify stiffness and hardness.

Conductivity probes

FOERSTER's conductivity probes deliver precise and reliable measurements of electrical conductivity. The probe elements can be installed in a wide variety of formats: standard probes, angled probes, probes with a flexible arm, and probes that are individually adapted to special customer requirements.

The probes are offered in diameters of 8 mm or 14 mm. Due to its larger surface, the 14 mm probe is easier to handle and returns slightly more stable measured values. For very narrow or tiny surfaces, for example small coins, the 8 mm probe is ideal.

Range of application:

Quality control of manufactured products; testing of material combinations; sorting of metals, alloys or scrap

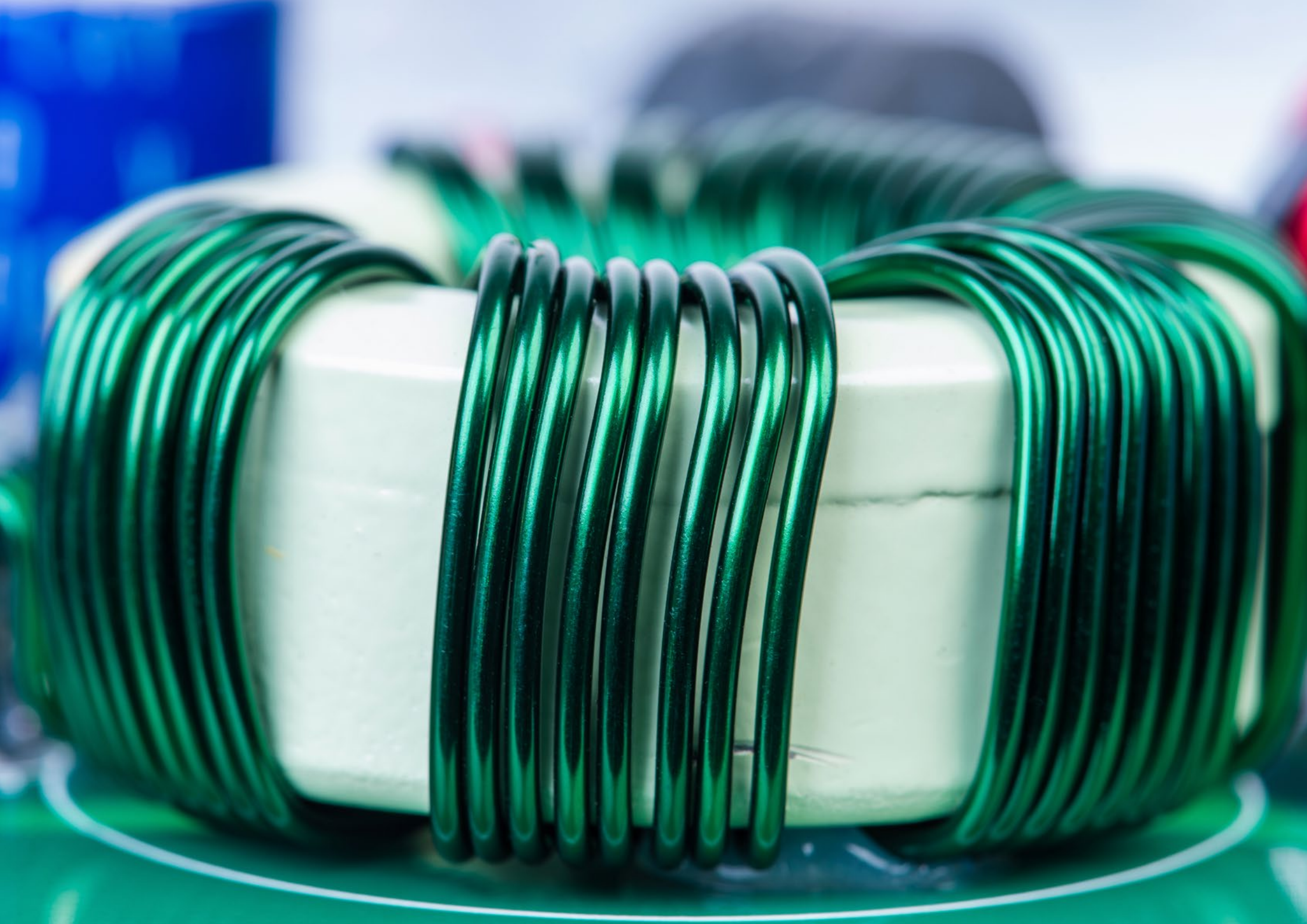
Connection options

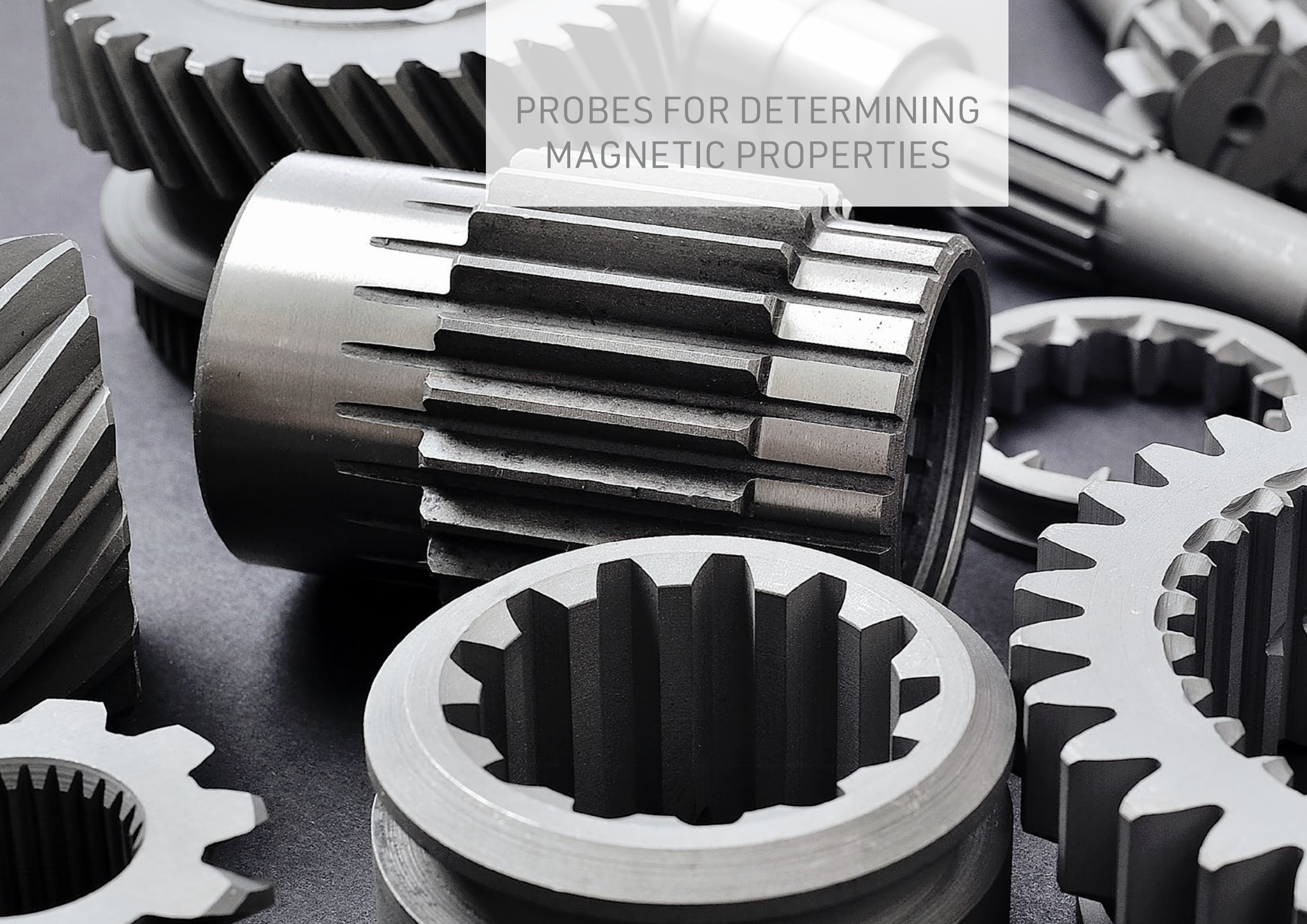
- Cable: standard cable length 2 m;
  other cable lengths on request
- Connector: LEMO

[1]

[2]

[1] SIGMATEST 2.070
[2] Conductivity probes





PROBES FOR DETERMINING MAGNETIC PROPERTIES

Reliable determination of magnetic material properties

FOERSTER has developed precise measuring instruments for determining the magnetic properties of metals, including permeability, coercivity, magnetic remanence, residual magnetic field and magnetic phase. These parameters are used for, among other things, controlling the quality of metals, assessing the degree of sintering in hard-metal sintering processes, or localizing ferritic inclusions in stainless steels.

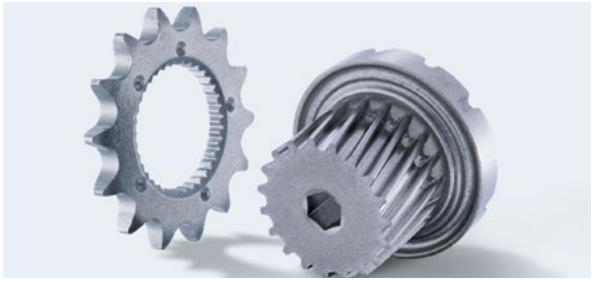
KOERZIMAT coils

The KOERZIMAT coils, when combined with the measuring instrument of the same name, form a measuring unit that takes precise, automatic and fast measurements of the weight-specific saturation polarization (σ_s) and the volume-specific saturation polarization (J_s). The largely geometry-agnostic measurement approach allows even complex-shaped samples to be inspected.

Application examples: assessing the degree of sintering in hard-metal sintering processes; determining the proportion of tungsten in cobalt or the amount of free iron, cobalt or nickel in powders / hard metals; determining the saturation polarization (J_s) in Tesla on soft-magnetic circuit components.

Standard housing dimensions:

- Coil type 40 (Ø max. 40 mm)
- Coil type 60 (Ø max. 60 mm)



J-sensor

The J-sensor extends the measurement capabilities of the KOERZIMAT, making it possible to ascertain the complete J-H hysteresis, including the initial curve of soft magnetic steels.

Sample size:

- The maximum sample size is given by the homogeneous magnetization range of the coil.

Round bar specimens

- Ø 8 - 14 mm; other diameters on request
- Length / diameter ratio: 10:1

Sheet metal specimens

- Width 10 mm
- Thickness 1.6 / 2.00 mm;
  other sheet thicknesses and dimensions on request

[1] KOERZIMAT 1.097 HCJ
[2] Internal probe
[3] J-Sensor

[1]

[2]

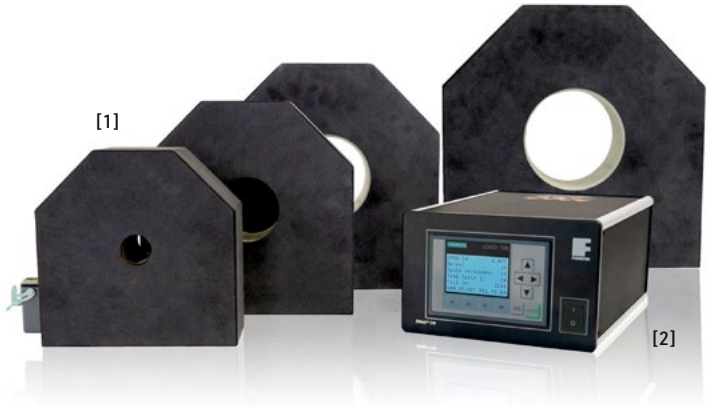
[3]

Demagnetization coils

Magnetized components can generate interference when testing for cracks or microstructure with eddy current, leading to false conclusions about a component's condition and, consequently, pseudo-rejects. To prevent this, ZMAG coils were developed in combination with the powerful demagnetizing unit ZMAG CM. The pulsed technique allows for greater penetration depth to demagnetize the components effectively and quickly. This significantly increases process quality and reliability.

Field of application:
Demagnetization of components during and after production

Housing:
Four coil sizes are available with diameters of 30 / 75 / 110 / 220 mm; other sizes on request.



[1] Demagnetizing coils
[2] ZMAG CM

FOERSTER

Institut Dr. Foerster GmbH & Co. KG
In Laisen 70 | 72766 Reutlingen | Germany
+49 7121 140 0 | info@foerstergroup.com

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