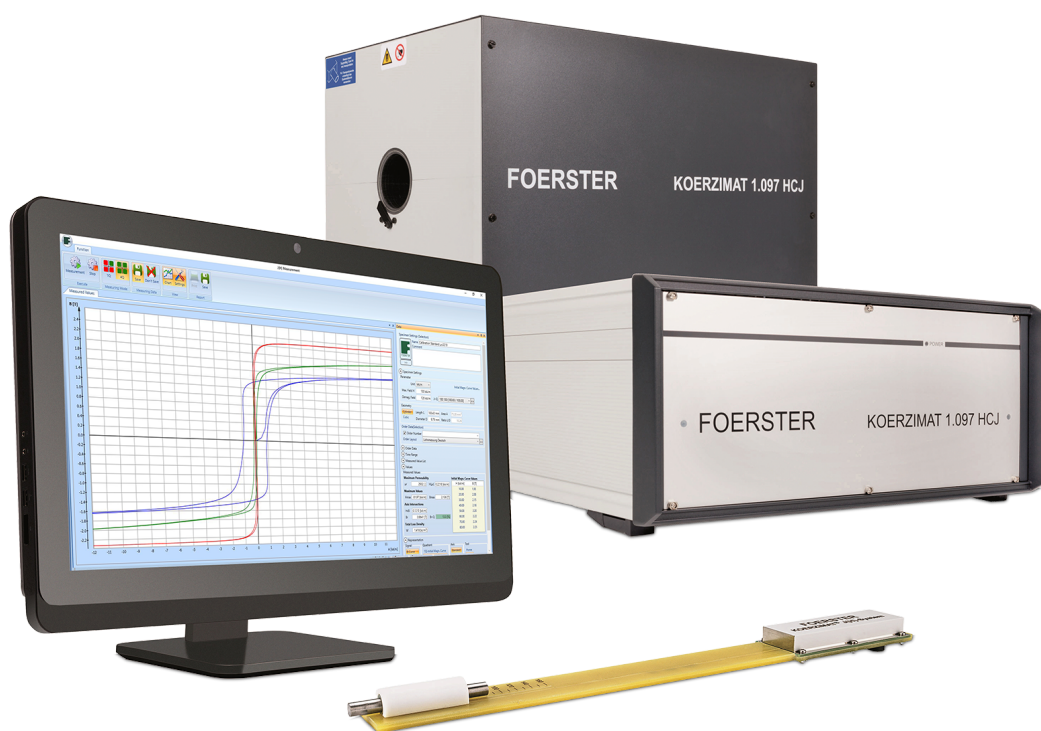




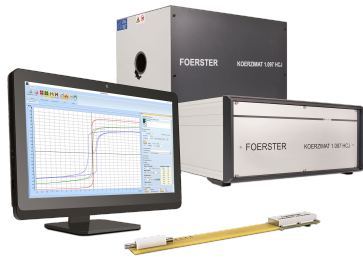
KOERZIMAT PRODUCT FAMILY

Systems for measuring magnetic parameters



KOERZIMAT PRODUCT FAMILY

Systems for measuring magnetic parameters



Material evaluation based on magnetic properties. The KOERZIMAT 1.097 product family provides precise measuring systems for characterizing magnetic materials and components. Depending on the measurement task, the systems can determine coercive field strength HCJ, the complete J-H hysteresis loop, as well as mass-specific saturation polarization σ_s and volume-specific saturation polarization J_s . This enables materials to be characterized and changes caused by manufacturing and machining processes to be reliably monitored.

KOERZIMAT 1.097 HCJ enables fast and largely geometry-independent determination of coercive field strength in an open magnetic circuit in accordance with IEC 60404-7. Typical applications range from monitoring the degree of sintering and grain size of hard metals to quality control of soft magnetic and electromechanical components.

KOERZIMAT 1.097 J-H extends the KOERZIMAT 1.097 HCJ with measurement of the complete J-H hysteresis loop, including the initial magnetization curve of soft magnetic materials. Measurements on round bar and sheet samples provide important magnetic properties and support material selection and quality control, for example for electromagnetic components, actuators and sensors.

KOERZIMAT 1.097 MS determines mass-specific saturation polarization σ_s and volume-specific saturation polarization J_s largely independently of sample geometry in accordance with IEC 60404-14. The system is particularly suitable for quality control of hard metals and powder-metallurgical materials as well as for characterizing soft magnetic materials and magnetic phases in steel alloys.

Together, the KOERZIMAT product family covers a wide range of applications, from quality and process control to material characterization and research and development.

YOUR ADVANTAGES AT A GLANCE

Comprehensive material characterization: Determination of various magnetic properties with the KOERZIMAT product family

Coercive field strength: Precise determination of HCJ in accordance with IEC 60404-7

Hysteresis measurement: Determination of complete J(H) and B(H) hysteresis loops, including the initial magnetization curve

Saturation polarization: Determination of σ_s and J_s in accordance with IEC 60404-14

Magnetic material analysis: Determination of magnetic material content and magnetic phases

Flexible sample geometries: Analysis of different materials, components and sample shapes

Measurement software: Control and evaluation of individual and series measurements

Data management: Storage, reporting and export of measurement data

NORMS

— ASTM B886
— ASTM B887

— EN IEC 60404-14
— EN IEC 60404-7:2020

KOERZIMAT 1.097 HCJ/J-H

System for measuring coercive field strength HCJ, J(H) hysteresis and relative permeability $\mu_r(H)$



Material evaluation based on magnetic properties. The KOERZIMAT 1.097 HCJ is a PC-controlled measuring system for fast and precise determination of the coercive field strength HCJ of hard and soft magnetic materials. Measurement is performed in an open magnetic circuit in accordance with IEC 60404-7 and is largely independent of the sample geometry. This allows even complex-shaped components to be tested without extensive sample preparation while covering the entire magnetizable volume.

For measurement, the sample is magnetized inside the magnetically shielded KOERZIMAT coil. Förster probes measure the magnetic polarization while a counteracting magnetic field is applied. The field strength at which the polarization J reaches zero corresponds to the coercive field strength HCJ. Magnetic shielding reduces the influence of the Earth's magnetic field and other magnetic interference.

Typical applications include testing hard metals in accordance with ASTM B887, monitoring carbon balance, sintering degree and grain size, as well as quality control of metal powders. Changes in magnetic properties caused by annealing, machining, stamping, pressing or forming can also be reliably monitored.

With the J-H measurement extension package, the complete J-H hysteresis loop including the initial magnetization curve of soft magnetic steels can also be determined.

YOUR ADVANTAGES AT A GLANCE

Precise HCJ measurement: Automatic determination of coercive field strength in accordance with IEC 60404-7

Largely geometry-independent: Testing of complex-shaped components without extensive sample preparation

Entire sample volume: Measurement of the complete magnetizable material volume

High sensitivity: Measurement of even very small and weakly magnetic samples using the optional internal probe

Magnetically shielded: Reduced influence of the Earth's magnetic field and magnetic interference in industrial environments

Fast measurement: Automatic HCJ measurement in just 3 seconds

Measurement software: Control of individual and series measurements with evaluation, statistics, data management and export

Easy integration: Remote interface for automation and external data access

NORMS

— ASTM B887

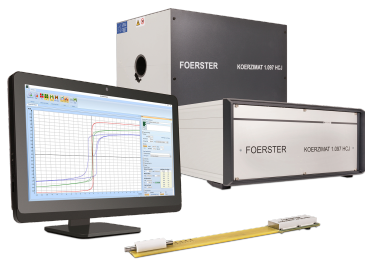
— EN IEC 60404-7:2020

TECHNICAL INFORMATION

HCJ MEASURING RANGE:	0 – 100 kA/m
RELATIVE PERMEABILITY MR(H):	100 – 2500 (J-H measurement)
MAGNETIZING FIELD STRENGTH:	up to 200 kA/m
PULSE MAGNETIZATION:	up to 450 kA/m, optional (depending on coil type)
MAXIMUM MEASURING FIELD STRENGTH:	— 100 kA/m (Coil 40) — 50 kA/m (Coil 60)
HCJ MEASUREMENT TIME:	3 s
MAGNETIZATION TIME:	0.2 – 40 s, adjustable
HCJ MEASUREMENT UNCERTAINTY:	< ±1% of measured value in accordance with IEC 60404-7
MEASURING FIELD UNCERTAINTY:	±0.2% of measured value
COIL INNER DIAMETER:	— 40 mm (Coil 40) — 60 mm (Coil 60)
HOMOGENEOUS FIELD RANGE:	— 170 mm (Coil 40) — 120 mm (Coil 60)
COIL DIMENSIONS (L × W × H):	550 × 340 × 420 mm
MEASURING ELEMENT:	Förster probes (fluxgate)
MEASURING MODULE DIMENSIONS (L × W × H):	465 × 445 × 220 mm
MEASURING MODULE WEIGHT:	approx. 18 kg
DEGREE OF PROTECTION:	IP32
AMBIENT TEMPERATURE:	0 to +40 °C
POWER SUPPLY:	230 V, 50/60 Hz

KOERZIMAT 1.097 J-H

System for measuring magnetic properties of soft magnetic materials



Precisely determine the complete magnetic hysteresis.

KOERZIMAT 1.097 J-H extends the KOERZIMAT 1.097 HCJ with precise measurement of the complete J-H hysteresis loop, including the initial magnetization curve of soft magnetic materials in an open magnetic circuit. It enables the determination of key magnetic properties such as coercive field strength HCJ, remanence Jr, relative permeability $\mu_r(H)$ and hysteresis loss W. Results can be displayed as J(H) or B(H) hysteresis curves.

The measuring system consists of a magnetizing coil, J-sensor, measuring module and KOERZIMAT J-H software. The J-sensor uses a fluxmeter to measure the magnetic induction B of the sample, while the measuring module handles the power supply, measurement and control functions. The controller serves as the central operating and display unit. Influences caused by sample geometry and permeability are compensated by the software's automatic demagnetization correction.

KOERZIMAT J-H is particularly suitable for qualifying soft magnetic raw materials in material production and incoming goods inspection. The complete hysteresis curve provides valuable information on magnetic properties and hysteresis losses, supporting material selection and quality control for electromagnetic components, actuators and sensors.

Measurements can be performed on round bar samples with diameters from 8 to 14 mm as well as sheet samples. Round bar samples do not require precision grinding and are not subjected to mechanical stress during measurement. Custom sample dimensions are available on request.

YOUR ADVANTAGES AT A GLANCE

Complete hysteresis measurement: Fast and precise determination of J(H) and B(H) DC hysteresis loops, including the initial magnetization curve

Comprehensive material characterization: Determination of key magnetic properties such as HCJ, Jr, $\mu_r(H)$ and hysteresis loss W

Automatic demagnetization correction: Software-based compensation for influences caused by sample geometry and permeability

Open magnetic circuit: Determination of the magnetic DC hysteresis without a closed magnetic circuit

Minimal sample preparation: No precision grinding of round bar samples required

No mechanical stress: Samples are not mechanically loaded during measurement

Flexible sample geometries: Measurement of round bar and sheet samples

Magnetically shielded: Reduced influence of external static and dynamic magnetic interference

NORMS

— ASTM B887

— EN IEC 60404-7:2020

TECHNICAL INFORMATION

MEASURED QUANTITIES:	J(H) / B(H) hysteresis incl. initial magnetization curve, Hmax, Jmax, Jr, HCJ, $\mu_r(H)$, W
RELATIVE PERMEABILITY MR(H):	100 – 4,000
MAGNETIZING FIELD STRENGTH:	up to 100 kA/m
MEASUREMENT TIME:	approx. 2 min for complete hysteresis incl. initial magnetization curve
ROUND BAR SAMPLES:	Ø 8 – 14 mm, length-to-diameter ratio ≥ 10
SHEET SAMPLES:	10 mm width, 1.6 / 2.0 mm thickness, length < 150 mm
COIL INNER DIAMETER:	40 mm / 60 mm
MEASURING ELEMENT:	J-sensor with integrated fluxmeter
CONTROLLER / SOFTWARE:	Hysteresis visualization, demagnetization correction, measurement data management, reporting and data export
AMBIENT TEMPERATURE:	0 to +40 °C
DEGREE OF PROTECTION:	IP32

KOERZIMAT 1.097 MS

Systems for measuring the saturation polarization σ_s and J_s



Reliably determine saturation polarization. The KOERZIMAT 1.097 MS is a measuring system for the fast and precise determination of mass-specific saturation polarization σ_s and volume-specific saturation polarization J_s . Measurement is performed according to IEC 60404-14 using the pull-off method in an open magnetic circuit and is largely independent of sample geometry. This allows even complex-shaped samples to be tested without requiring a predefined geometry.

The measuring system uses a powerful permanent magnet in a Halbach arrangement to saturate the sample. As the sample is withdrawn from the homogeneous magnetic field, its magnetic dipole moment is measured using a pair of Helmholtz coils and a fluxmeter. The sample mass is additionally taken into account to calculate σ_s , while the sample volume or density is required to determine J_s .

Typical applications include quality control of hard metals according to ASTM B886, monitoring the degree of sintering and carbon balance, and determining the amount of tungsten dissolved in cobalt as well as the free iron, cobalt or nickel content in powders and hard metals. The system is also suitable for characterizing soft magnetic components, investigating new alloys and determining magnetic phases in steel alloys.

With the MS 26 × 60 for particularly small samples and the MS 31 × 69 for larger sample masses, two system variants are available for different testing requirements.

YOUR ADVANTAGES AT A GLANCE

Precise saturation measurement: Determination of magnetic properties in accordance with IEC 60404-14

Versatile material analysis: Determination of σ_s , J_s , magnetic dipole moment, magnetic material content and magnetic phase

Largely geometry-independent: Measurement of complex-shaped samples without requiring a predefined sample geometry

High sensitivity: MS 26 × 60 for particularly small samples and low magnetic material content

Large sample space: MS 31 × 69 for sample masses up to approx. 200 g

Consistent measuring conditions: Strong, homogeneous magnetic field generated by compact Halbach magnet systems

Automatic compensation: Compensation for the magnetic influence of the sample holder

Traceable calibration: Calibration traceable to national standards (PTB)

NORMS

— ASTM B886

— EN IEC 60404-14

TECHNICAL INFORMATION

MEASURED QUANTITIES:	j, σ_s , J_s , magnetic material content MA, W, magnetic phase MP
TEST METHOD:	Pull-off method according to IEC 60404-14
MAX. SAMPLE MASS:	— approx. 50 g (MS 26 × 60) — approx. 200 g (MS 31 × 69)
SAMPLE SPACE (W × L × H):	— 30 × 40 × 18 mm (MS 26 × 60) — 41 × 58.5 × 23 mm (MS 31 × 69)
MAGNETIC FLUX DENSITY:	— ≥ 1.00 T (MS 26 × 60) — ≥ 1.05 T (MS 31 × 69)
HOMOGENEOUS FIELD RANGE:	— $\varnothing 26 \times 16$ mm (MS 26 × 60) — $\varnothing 32 \times 21$ mm (MS 31 × 69)
SENSITIVITY:	— 2×10^{-11} Vsm ≈ 0.1 mg Co (MS 26 × 60) — 1×10^{-10} Vsm ≈ 0.5 mg Co (MS 31 × 69)
MEASUREMENT UNCERTAINTY:	< 0.5% of measured value (calibration with Ni standard)
LINEARITY:	$\pm 0.1\%$ of full-scale value
MEASUREMENT TIME:	— 3 s (MS 26 × 60) — approx. 10 s (MS 31 × 69), excluding mass determination
MEASURING ELEMENT:	Helmholtz coil pair with fluxmeter
SAMPLE HOLDER:	— manual (MS 26 × 60) — pneumatic (MS 31 × 69)
INTERFACE:	LAN 100 Mbit; additional I/O port for MS 31 × 69
SYSTEM DIMENSIONS (W × H × L):	— approx. 172 × 217 × 230 mm (MS 26 × 60) — approx. 265 × 280 × 460 mm (MS 31 × 69)
WEIGHT:	— approx. 13.9 kg (MS 26 × 60) — approx. 29 kg (MS 31 × 69)
DEGREE OF PROTECTION:	IP53
AMBIENT TEMPERATURE:	+5 to +45 °C
POWER SUPPLY:	100 – 240 V, 50/60 Hz
COMPRESSED AIR SUPPLY:	6 bar (MS 31 × 69 only)

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The FOERSTER Group is represented by subsidiaries and representatives in over 60 countries worldwide. You can find a complete overview on our website.

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