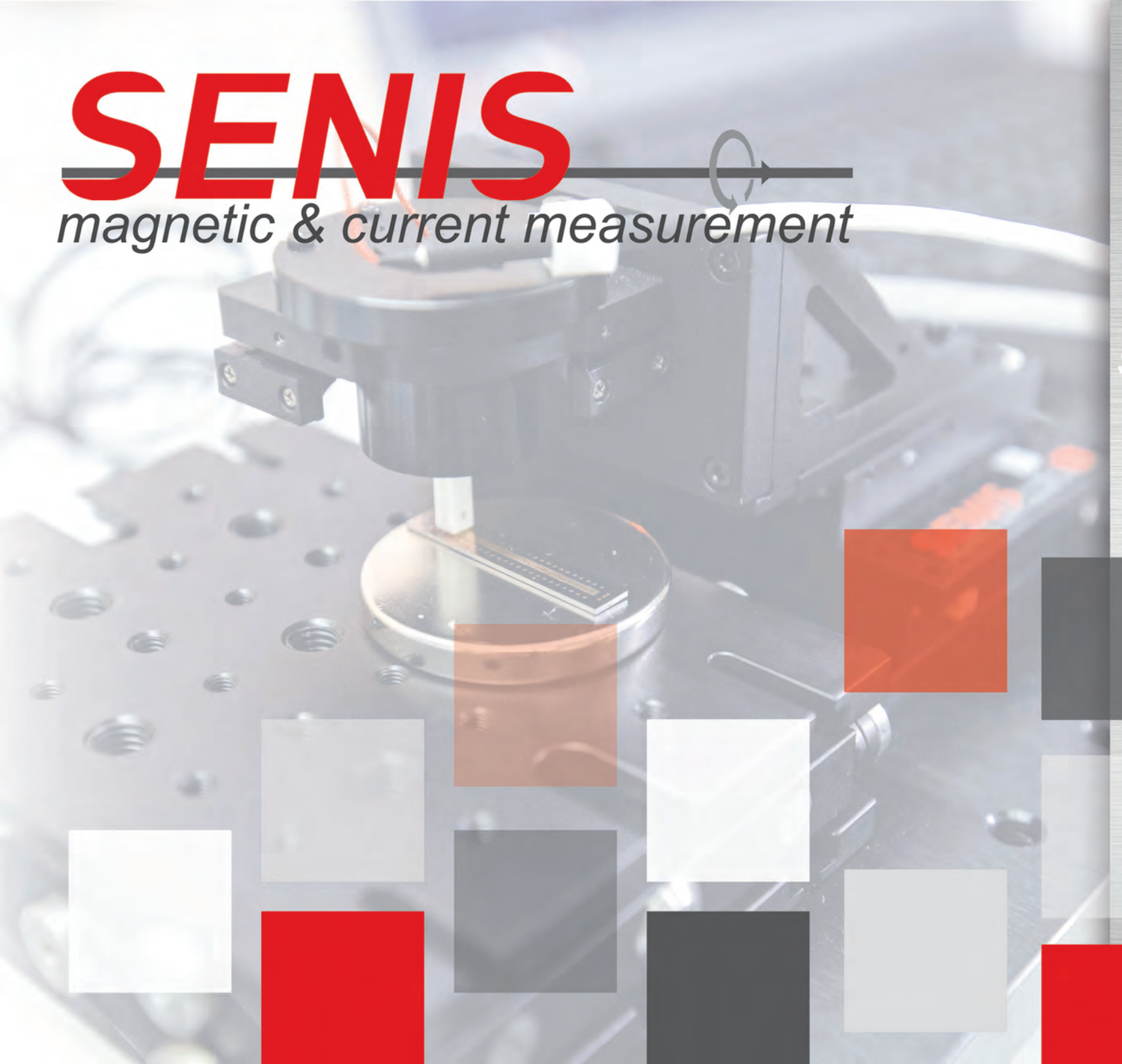
SENIS

magnetic & current measurement



Advanced
Magnetic Field Measurements
Sensors, Instruments and Services

2021
CATALOGUE

About Us

Our Mission

SENIS AG develops, manufactures and suplies advanced instruments for magnetic field measurement and electric current measurement, as well as the corresponding development and engineering. Our products and services and our growth and sustainability always stay in accordance with our customers' needs and satisfaction.

Our Competency

SENIS team has a record of more than 100 patent applications, several hundred technical publications and more than 100 years of overall experience in the field.

In more than 15 years, SENIS has won trust of major physics laboratories and research institutes, as well as worldwide leading companies in the automotive, energy, consumer and test and measurement industries. Working in close cooperation with our customers we try to understand their businesses in order to continuously adapt and improve our products and services according to customers' needs.

Our Customers

SENIS GmbH was founded in February 2004 as a spin-off of SENTRON AG. Electric current sensor business of Ametes AG was merged with SENIS GmbH in 2011 to form SENIS AG, with its headquarter in Canton Zug, Switzerland

Our Growth

SENIS AG is privately owned company, profitable and financially independent. SENIS, with its **ISO 9001** certified subsidiary provides design, key process know-how, advanced manufacturing, calibration & test services and quality assurance.

Our Sustainability

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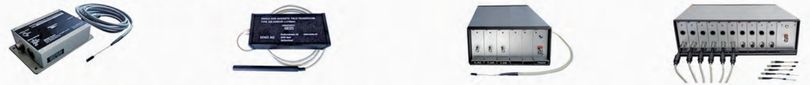

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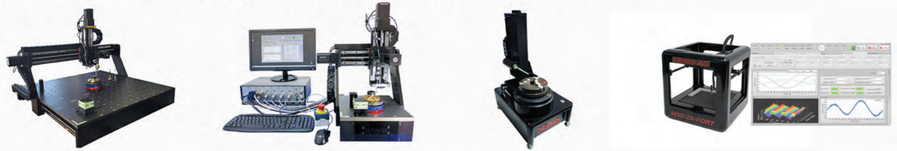

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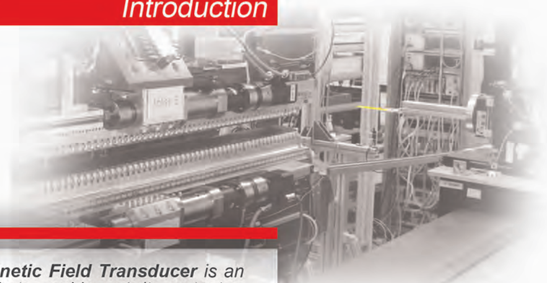
Introduction

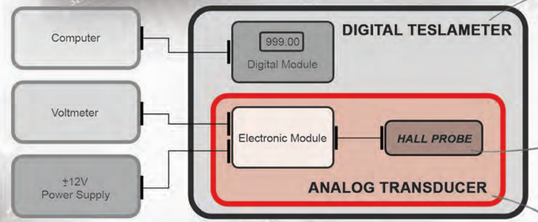


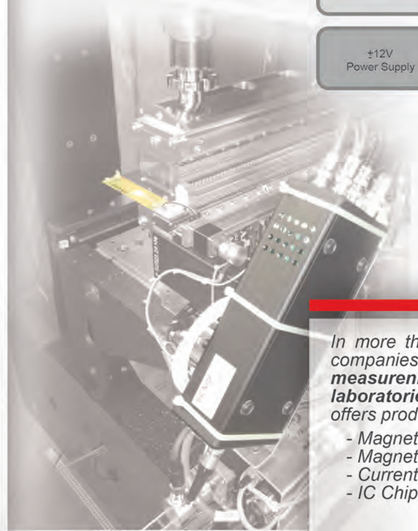
Analog Magnetic Field Transducer *is an instrument that provides at its output a convenient-level voltage proportional to the measured magnetic field. A SENIS Hall magnetic field transducer is composed of two modules - Hall probe with the cable (Module H) connected to the analog electronics for the signal conditioning (Module E).*

To build up a complete measurement system, the electronic module needs to be connected to an adequate power supply and to a voltmeter (or A/D converter or DAQ) for each measured component of the magnetic field.

Digital Teslameter*, or in short Teslameter or Gaussmeter, incorporates a magnetic field transducer, analog-to-digital converter, and a display, which shows the numerical value of the measured magnetic field. A PC can be connected to the serial interface of the Teslameter for visualization and analysis of measured data.*

Both, Magnetic Field Transducer and Teslameter/Gaussmeter may measure 1, 2, or 3 components of the magnetic field; accordingly, they are called 1-, 2-, or 3-axis Magnetic Transducer or Teslameter, respectively.



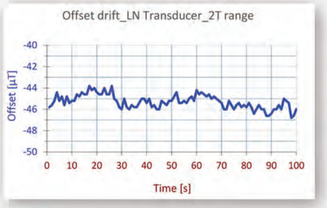


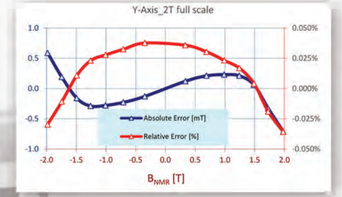
In more than 15 years, SENIS has won trust of leading companies in ***automotive, energy, consumer and test & measurenment industries****; as well as of major physics* ***laboratories and research institutes*** *worldwide. SENIS offers products at services in four main categories:*

- *Magnetometers*
- *Magnetic Mappers*
- *Current Sensors*
- *IC Chip Design*

Magnetometers

The only fully integrated three-axis Hall probe





The smallest and thinnest Hall probe

The best horizontal and vertical Hall sensors in Si-chip

The highest frequency bandwidth

The highest accuracy

The highest magnetic resolution

Typical Application of Magnetic Field Transducers and Digital Teslameter

- *Characterization and quality control of permanent magnets*
- *Development of magnetic systems*
- *Quality control and monitoring of magnetic systems (generators, motors, etc.)*
- *Magnetic field mapping*
- *Inhomogeneity & crack detection & in magnetic materials*
- *Activ magnetic field control and monitoring*
- *Monitoring condition of electrical machines*
- *Nano-Teslameter for zero filed mapping and active field cancellation*
- *Development of systems for high magnetic field levitation/isolation*
- *Application in laboratories and in production lines*

1-, 2-, 3-Axis Integrated Hall Probes with and w/o On-chip Amplifier

High Temperature Hall probe for -40°C – +155°C

Fully integrated 3-axis Hall probe with on-chip amplifier and signal processing

Vacuum suitable Probes

frequency bandwidth from DC up to 75 kHz

3-axis Hall Probe with Field Sensitive Volume of 200 x 20 x 200µm³ (small cross on the chip)

The thinnest Hall probe, packed in ceramic packaging <250µm!

UNIQUE PERFORMANCE:

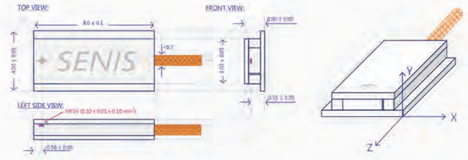
- *Fully integrated CMOS 1-, 2-, 3-axis (Bx, By, Bz) Hall Probe with or without on-chip amplifier & signal processing for offset, noise and planar Hall effect cancelling*
- *On-chip integrated temperature sensor for temperature compensation*
- *Very high spatial resolution: By: 0.045 x 0.005 x 0.045 mm³; Bx and Bz: 0.10 x 0.01 x 0.10 mm³*
- *Suitable for FxA and IxC Magnetic Transducers*
- *High angular accuracy: orthogonality error less than 0.1°*
- *Absolute accuracy: better than ± 0.1 % within ± 2T*
- *Magnetic resolution: <5uT @ 200mT and <10uT @ 2T*
- *Full scale range: 20mT – 20T, calibrated up to 2T*
- *White Noise (@ f > 10 Hz): 0.1 µT/√Hz @ 200mT*
- *Temperature Coefficient of Sensitivity: better than ± 100 ppm/°C (± 0.01 %/°C)*
- *High frequency bandwidth: from DC up to 75kHz for 1-axis; from DC up to 25kHz for 3-axis*
- *Virtually no planar Hall effect*
- *High immunity on electrostatic and inductive disturbances*
- *Negligible inductive loops on the Probe*

Hall Probe A

Very robust *integrated Hall probe for F3A, F1A and IxC magnetic transducers and for OEM customers.*
Dimensions (length, width, thickness, in mm): ***16.5 x 5.0 x 2.3***
Distance to magnetic field sensitive area (front/top): ***1.0mm/1.0mm***

Hall Probe C

Ceramic Hall Probe *suitable for Very* ***High Temperature*** *Range: -40°C to +155°C. For F3A, F1A and IxC magnetic transducers and for OEM customers.*
Dimensions (length, width, thickness, in mm): ***8.0 x 4.0 x 0.9***
Distance to magnetic field sensitive area (front/top): ***0.5mm/0.35mm***



Hall Probe H

Very long and thin *integrated ceramic Hall probe* ***with the protected Si chip*** *for F3A, F1A, IxC magnetic transducers.*
Dimensions (in mm) width, thickness: ***2.0 x 0.5***
length: HS ***8.0;*** *HM* ***46.0;*** *HL* ***71.0***
Distance to magnetic field sensitive area (front/top): ***0.3mm/0.25mm***

Hall Probe K

Very long and thin *integrated ceramic Hall probe* ***with the naked Si chip*** *for F3A, F1A, IxC magnetic transducers.*
Dimensions (in mm) width, thickness: ***2.0 x 0.25***
length: KS ***8.0;*** *KM* ***46.0;*** *KL* ***71.0***
Distance to magnetic field sensitive area (front/top): ***0.3mm/0.01mm***

Hall Probe L

Very long and thin *integrated ceramic Hall probe* ***with the naked Si chip*** *for F3A, F1A, IxC magnetic transducers.*
Dimensions (in mm) width, thickness: ***0.65 x 0.1***
length: LS ***8.0;*** *LM* ***46.0;*** *LL* ***71.0***
Distance to magnetic field sensitive area (front/top): ***0.15mm/0.01mm***

1-, 2-, 3- Axis Hybrid Hall Probes with Discrete Hall Elements

UNIQUE PERFORMANCE:

- *Ultra-low noise & offset fluctuation magnetic transducer, allowing for very high resolution measurements*
- *Spatial resolution: 0.15 x 0.15 x 0.001mm3 per Hall element*
- *Absolute Accuracy: better than ± 0.25 % within ± 2T; better than ± 0.1 % within ± 200mT*
- *Magnetic resolution: 1uT @ 200mT; 2uT @ 500mT and 3uT @ 2T*
- *Full scale range: 200mT – 2T, calibrated*
- *White Noise (@ f > 10 Hz): 15nT/√Hz @ 200mT*
- *Temperature Coefficient of Sensitivity: better than ± 25 ppm/°C (± 0.0025 %/°C)*
- *Very high linearity*
- *Pt-100 temperature sensor mounted onto the probe for temperature compensation*

Hall Probe I

Very robust *hybrid Hall probe for H3A magnetic transducers.*
Dimensions (length, width, thickness in mm): ***16.5 x 5.0 x 1.5***
Distance to magnetic field sensitive area (front/top): ***0.45mm/0.75mm***

Hall Probe S

Very robust and ***thin hybrid Ceramic*** *Hall probe for H3A magnetic transducers.*
Dimensions (length, width, thickness in mm): ***10.0 x 10.0 x 1.4***
Distance to magnetic field sensitive area (front/top): ***2.0mm/0.7mm***

Hall Probe P

Very robust *hybrid Hall probe for H3A magnetic transducers.*
Dimensions (length, width, thickness in mm): ***16.5 x 6.0 x 2.0***
Distance to magnetic field sensitive area (front/top): ***1.5mm/1.15mm***

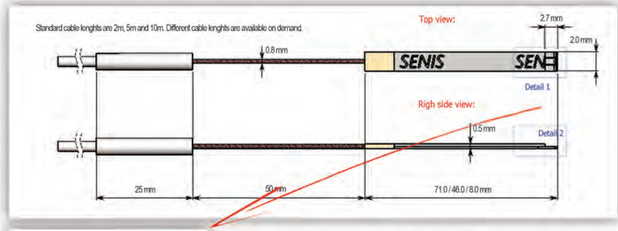
accuracy better than 50ppm

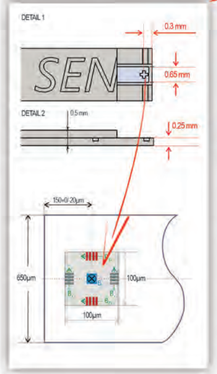
ultra low noise 10nT/Hz^1/2

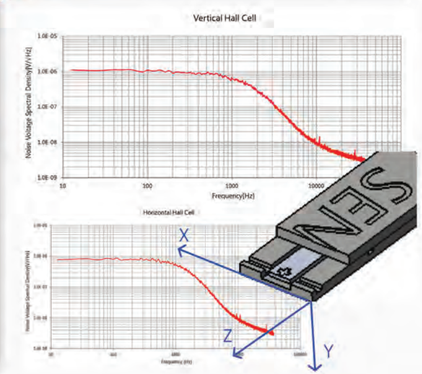
magnetic resolution 2ppm

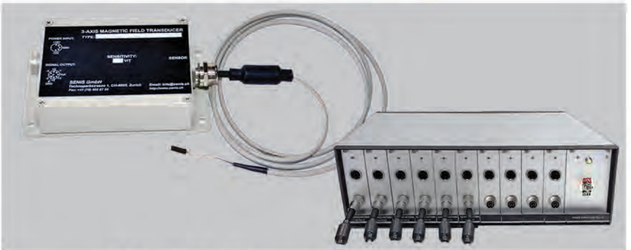
Single-axis Hall Probe with Field Sensitive Volume of 22 x 5 x 22um³

Different Probe head supports are supplied by SENIS to be used as holders for Hall Probes, such as ceramic and FR4 holders, Carbon tubes and Alu-tubes for Aluminium melting applications.









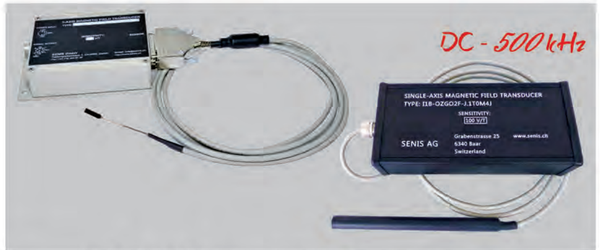
F3A/F1A Magnetic Transducers

*The F3A denotes a range of SENIS Magnetic Field-to-Voltage Transducers with **fully integrated 3-axis Hall Probe**.*
*The F1A denotes a range of Magnetic Field-to-Voltage Transducers with **fully integrated 1-axis Hall Probe**. It measures magnetic field perpendicular to the probe plane (By).*
The Hall Probe contains a CMOS integrated circuit, which incorporates three groups of mutually orthogonal Hall elements, biasing circuits, amplifiers, and a temperature sensor. The integrated Hall elements occupy very small area (140µm x 140µm), which provides very high spatial resolution of the Hall probe.
*The application of the spinning-current technique in the biasing of the Hall elements suppresses the planar Hall effect. The on-chip signal pre-processing enables a very high frequency bandwidth of the probe. **On-chip signal amplification** provides high output signals of the Hall probe, which makes the transducer immune to electromagnetic & electrostatic disturbances.*
The Hall probe is connected with an electronic box that provides biasing for the Hall probe and additional signal conditioning: amplification, linearization, canceling offset, compensation of the temperature variations, and limitation of the frequency bandwidth.

Available as Multichannel Transducer (up to 10 Probes in one housing)

KEY FEATURES

- Fully integrated CMOS 3-axis (Bx, By, Bz) Hall Probe, of which one (F1A), two, or three channels (F3A) are used
- Very high spatial resolution (By: 0,02x0.005x0.02mm³; Bx & Bz: 0.14x0.01x0.14mm³)
- Measurement accuracy: 0.1%
- Magnetic resolution: 30-40uT @ 0.2T & 0.5T; <100uT @ 2T
- Measurement ranges: 20mT, 200mT, 2T, 20T
- High angular accuracy (orthogonality error less than 0.1°)
- Virtually no planar Hall effect
- High frequency bandwidth (from DC up to 25kHz for F3A; from DC up to 75kHz for F1A)
- High disturbance immunity, i.e. very low electrostatic-, inductive- and cable-pickup
- Negligible inductive loops on the probe
- Integrated temperature sensor on the probe for temperature compensation



IxC & I1B Magnetic Transducers

*The IxC denotes a range of SENIS Magnetic-to-Voltage Transducers with integrated **1-, 2- or 3-axis Hall Probe (I1C, I2C, I3C) for very high magnetic resolution.***
The Hall Probe contains a CMOS integrated circuit, which incorporates three groups of mutually orthogonal Hall elements and a temperature sensor. The integrated Hall elements occupy very small area (100µm x 100µm), which provides very high spatial resolution of the probe
The CMOS IC technology enables very high precision in the fabrication of the vertical and horizontal Hall elements, which gives high angular accuracy of the three measurement axes of the probe.
The Hall probe is connected with an electronic box that provides biasing for the Hall probe and the application of the spinning-current technique, which cancels offset, low frequency noise and the planar Hall effect. The additional conditioning of the Hall probe output signals in the electronic box includes Hall signal amplification, high linearization, compensation of the temperature variations, and limitation of the frequency bandwidth.

I1B Magnetic Transducer, with very high frequency bandwidth: DC – 500kHz!

Available as Multichannel Transducer (up to 10 Probes in one housing)

KEY FEATURES

- Probe, of wich one (I1C), two (I2C) or three (I3C) channels are used.
- Very high spatial resolution (By:0.045x0.005x0.045mm³; Bx and Bz: 0.10x0.01x0.10mm³)
- Very low noise and offset fluctuations
- Measurement accuracy: 0.1%
- Magnetic resolution: 5uT @ 0.2T; 8uT @ 0.5T; 10uT @ 2T
- Measurement ranges: 20mT, 200mT, 2T, 20T
- High angular accuracy (orthogonality error less than 0.1°)
- Very high linearity
- Negligible inductive loops on the probe
- Integrated temperature sensor on the probe for temperature compensation

HxA Low-Noise Magnetic Transducers

*The HxA denotes a range of **Low Noise** SENIS Magnetic Field-to-Voltage Transducers with **hybrid 1-, 2-, 3-axis Hall Probe** (H1A,H2A,H3A) with discrete Hall sensors.*
The Hybrid Hall Probe integrates three high-resolution with good angular accuracy (orthogonality error < 2°) of the three measurement axis of the probe and a temperature sensor.
The Hall probe is connected with an electronic box that provides biasing for the Hall probe and the application of the spinning-current technique, which very effectively cancels offset, low frequency noise and the planar Hall effect. The additional conditioning of the Hall probe output signals in the electronic box includes Hall signal amplification, high linearization, compensation of the temperature variations, and limitation of the frequency bandwidth.
The outputs of the Magnetic Transducers are high-level differential voltages proportional with each of the measured components of a magnetic flux density; and a ground-referred voltage proportional with the probe temperature.

KEY FEATURES

- Hybrid 1-, 2-, 3-axis (Bx, By, Bz) Hall Probe with discrete Hall sensors, of which one, two, or three channels are used
- Ultra-low noise & offset fluctuations, allowing for very high resolution measurements (spectral density of noise down to 10 nT/Hz$^{1/2}$)
- Spatial resolution: 0.15 x 0.15 x 0.001 mm³ per Hall sensor
- Measurement accuracy: 0.25%
- Magnetic resolution: 1-2uT @ 0.2T; 2-3uT @ 0.5T; 3-4uT @ 2T
- Measurement ranges: 200mT, 2T, 20T
- Very high linearity
- Magnetic transducer based on much improved offset and noise reduction technique
- Very low planar Hall voltage
- Temperature sensor on the probe for temperature compensation

3DACMT AC Magnetic Transducer

The 3-Axis AC Magnetic Transducer 3DACMT-1 is a compact instrument to measure all 3 components of alternating magnetic fields (10kHz - 200kHz) with very high resolution (1,5µT) in a small volume (3,6cm³). It incorporates three groups of mutually orthogonal coils, analog integrators and amplifiers within a small non magnetic cube (15x15x 5mm³) with an excelent angular accuracy (<1°). This transducer can beperfectly applied for the mapping of wireless charges for electric vehicles.

NVM-01 - NANOVOLT-AMPLIFIER

NVM-01 is an ultra low noise (10 nT/Hz$^{1/2}$) amplifier for sensitive DC/AC measurements and data acquisition systems. It is ideal as the input unit for measuring low noise and low impedance sources. By using purpose shaped coils the NVM-01 can enable the measurement of very small changes in magnetic flux in a region of interest

Attribute / Type	Probe Technology	Number of Measure. dAxes	Hall Probe Spatial Resolution	DC Field Resolution (over 0.01-10Hz, peak-to-peak value) @ Full Scale	Hall Probes – maximal thickness	Accuracy	Digital Teslameter version	Frequency Bandwidth ANALOG MFT / DIGITAL Teslameter DTM	Disturbance Immunity (inductive, el. static and Cable pickup)
F3A	Silicon, Fully Integrated 3D, Amplifier & Spinning-current on-chip	1, 2, 3	150 x 10 x 150 µm	100µT @ 2T 700µT @20T	<1.2mm – 0.25mm	0.10% (see below NOTE 1)	3MTS 3MH3 3MH4	MFT: 25kHz DTM: 15kHz	Excellent
F1A	Silicon, Fully Integrated 1D, Amplifier & Spinning-current on-chip	1	400 x 10 x 40 µm	60µT @ 2T 500µT @20T				MFT: 75kHz DTM: 15kHz	Excellent
I3C	Silicon, Integrated 3D, Hall & temp.; Spinning current in the electronics	1,2,3	100 x 10 x 100 µm	Y: 5-10µT @ 2T X, Z: 20-30µT @ 2T	<1.2mm	0.01% 0.005%	3MH5 3MH6	MFT: 4kHz DTM: 10kHz	Very good
H3A	GaAs; Hybrid Hall & temp. sensor; Spinning current in the electronics	1, 2, 3	150 x 1 x 150 µm	< 3µT @ 2T	1.5mm - 0.5mm			4kHz	Excellent

3MH3 Teslameter for Industrial Applications

Teslameter with fully integrated 1-, 2-, 3-axis Hall Probe incorporates a high accuracy magnetic field-to-analog-voltage transducer with a high-level, temperature compensated output signal for each of the three components of the measured magnetic field (Bx, By and Bz). A digital module is additionally applied to the analog transducer to form the digital Teslameter. The digital module provides the accuracy of 0.05% and allows displaying the measured values on LCD display on the device.
Digital Teslameter provides the possibility of automatic data acquisition via USB serial port by a host computer. In this way, customers can easily integrate a measurement routine into their measurement system using its programming tools such as C, C++, LabVIEW, etc.

The temperature measurement feature allows a user to obtain current temperature values around the Hall probe while monitoring the magnetic field.
The transducer consists of two modules, Hall probe and cable, and an electronic module. To build up a complete measurement system the electronic module needs to be connected to an adequate power supply and to computer for measured data acquisition and visualization.

KEY FEATURES

- *Teslameter with fully integrated 1-, 2-, 3-axis Hall Probes for measuring DC & AC magnetic fields (up to 1kHz)*
- *Resolution of 100ppm at ± 20mT, 200mT, 2T, 20T*
- *Accuracy up to 0.05%*
- *Auto range capability (± 20mT, 200mT, 2T, 20T)*
- *LCD Digital display, displaying Bx, By and Bz components and the temperature value measured on the Hall Probe. Graphic LCD for fast signal analysis*
- *Data Acquisition & Visualization PC Software via USB (Windows operating system)*
- *Remote software access for measurement monitoring (LabVIEW VI)*

3MH6 Teslameter for Laboratory Applications

The 3MH6 Digital Low-Noise Teslameter is a high-performance magnetic field measuring instrument based on the Hall-effect magnetic-field-to-voltage transducer with a high-level, temperature compensated output signal for each of three components of the measured magnetic flux density components, Bx, By and Bz. It incorporates a TFT LCD graphic display for an intuitive device operation and configuration, as well as for numerical and graphical measured data visualization. The USB serial communication ports allow automatic data acquisition by a host computer.

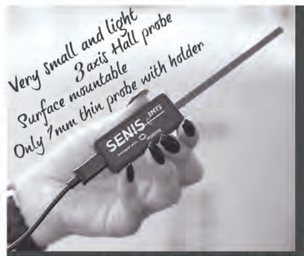
The digital data correction provides an accuracy of better than 0.01%. The unique SENIS single-chip integrated 3-axis Hall probe allows measuring simultaneously all three components of the magnetic field at virtually the same spot within a 100 µm x 100 µm.

The individual calibrated correction data of each interchangeable probe are stored in the Probe connector and in the Teslameter device and therefore allow building long term stable and precise instruments for accurate 1-, 2- and 3 axis magnetic field mapping, magnetic field control and permanent magnet quality inspection.

KEY FEATURES

- Teslameter with integrated 1-,2-,3-axis Hall Probes for measuring DC & AC magnetic fields up to 2.5kHz (-3dB). Selectable sampling rate up to 7500samples/sek
- Very High Resolution: 1ppm at
- Magnetic field ranges: 100mT, 500mT, 2T, 20T
- Accuracy better than 0.01%
- High temperature stability (< 20ppm/°C)
- Auto range, zeroing, hold reading capability
- Trigger input/output (up to 4000samples/sek)
- Signal Analysis (signal frequency measurement, rms value, min/max value, etc.)
- TFT LCD graphic display (107x71mm), displaying Bx, By and Bz components and the temperature value measured on the Hall Probe
- User friendly graphical user interface running on Android platform
- Data Acquisition & Visualization PC Software runs on Windows operating system
- Measure data recording with selectable sampling rate (0.5s - 60s, i.e. 2.5 - 300days)

Unparalleled price-performance ratio



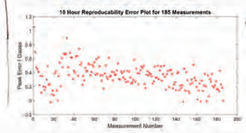
3MTS USB Handheld Teslameter

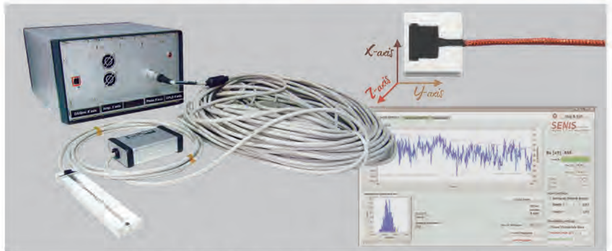
KEY FEATURES

- *SENIS Teslameter developed with Matesy*
- *3MTS-1 with carbon-fiber holder / 3MTS-2 with cable (1m, 2m, 5m)*
- *Four Measurement ranges: 20mT / 200mT / 3T / 20T*
- *Accuracy: better than 1% of full scale*
- *f-bandwidth: DC – 500Hz*
- *AD Conversion: 12bit (Optional :16bit)*
- *Magnetic resolution: 40uT; AMR probes for low magnetic fields (nT)*
- *EEPROM for storing of calibration data; different calibration levels*
- *USB interface; User-friendly Teslameter software for PCs, Tablets and Smartphones*
- *Optional wireless module, battery powered*

MLNT-3D Low-Noise Digital Transducer

- *Miniaturised electronic box: 145 x 45 x 45mm*
- *3-axis (Bx, By, Bz) Hall Probe*
- *Measurement range up to +/-2T*
- *Measurement of DC & AC magnetic fields (up to 500Hz)*
- *External Trigger (Synchronization between probe position and measurement)*
- *DC magnetic resolution 0.8 uT*
- *Broadband noise 2 uT*



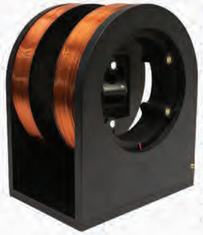


3NTA1 3-axis Nanoteslameter

KEY FEATURES

- *Measurement range 1nT-0.1mT*
- *Measurement resolution 0.5nT*
- *Measurement accuracy <1%*
- *f-bandwidth: DC - 30Hz*
- *1-, 2-, or 3-axis AMR probe with up to 40m cable*
- *Very small probe dimensions 10.0 x 9.0 x 1.4mm*
- *Well defined position of sensitive area*
- *Monitoring and active cancelation of environmental magnetic fields*
- *Measuring stray magnetic fields of electrical machines*
- *Zero-field mapping & directional drilling*

Reference Magnet & Helmholtz Coils



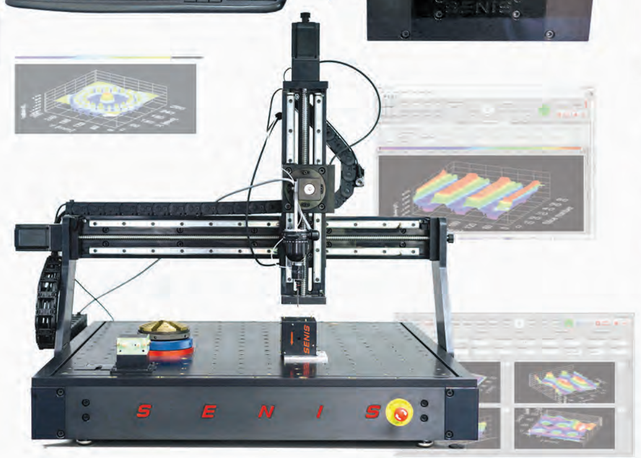
REFERENCE MAGNETS

- *Highly accurate in-situ validation and re-calibration of magnetic field sensors, teslameters and mappers*
- *Magnetic fields available: 100mT, 50mT, 1mT*
- *Accurate 3-axis recalibration for mappers*
- *Probe holder for 3MTS handheld teslameter*
- *Stable reference magnet*

HELMHOLTZ COILS

- *Magnetic field up to 20mT / 100mT*
- *High magnetic field uniformity: better than 4x10-4 over a 20mm*
- *Compact, with the weight of 32kg*
- *Inner diameter 180mm*
- *Possibility to rotate a magnetic sensor within the*
- *Helmholtz coils in all three angles (tilt, roll, pitch)*

Magnetic Field Mappers



High-end Mapper MMS-1A-RS

SENIS Magnetic Field Mapping System MMS-1-RS and high-end version MMS-1A-RS allows users to perform fast and high resolution mapping of the magnetic field around electromagnets and permanent magnets. The map of the magnetic field can be presented as 2D or 3D graphs and as tables of numerical measured values. Due to the unique features of the applied Hall probe, all three components of the magnetic field (Bx, By, Bz) are measured simultaneously at virtually the same point.

The position coordinates (X, Y, Z) are calculated relative to the mapper coordinate system, which is defined by the linear encoders and the rotary encoder at the rotating stage. An autonomous motion control unit allows for the simultaneous control of four axes (X, Y, Z-linear modules and rotation stage).

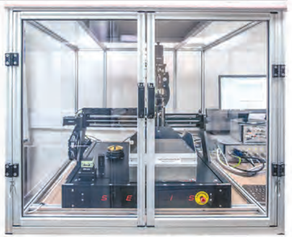
A Touch (Tactile) Sensor prevents probe damage. It serves as an emergency stop provision, which is triggered whenever an object is touched by the probe during the measurement process. The touch stylus sensor can be used for simple dimensional measurement and for absolute magnet positioning.

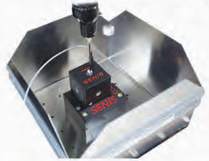
The recently developed adapter between the touch sensor and the measurement probes allows for an easy interchangeability of Hall probes, touch stylus and other specialized probes, such as the eddy-current probe for crack detection, very long probes for large rotors, sliding probe for in-contact measurements, probe arrays, etc.

KEY FEATURES

- *Maximal Scanning volume (X x Y x Z):*
  standard: 125x125x150mm³; option: 570x570x380mm³ and larger
- *Scanning speed adjustable, up to 100 mm/s*
- *Linear modules with high resolution (1µm)*
- *Rotary stage with high resolution (0.02°) and high speed*
- *Point-by-point and continuous (on-the-fly) scanning*
- *Absolute magnet positioning utilizing Tactile (Touch) Sensor*
- *3-axis fully integrated CMOS Hall probe (Bx, By, Bz) with the high spatial resolution (field sensitive spot 150 x 150 x 10 µm) and high angular accuracy (orthogonality error < 0.1°)*
- *Up to 3 selectable magnetic field measurement ranges*
- *Accuracy of magnetic field measurement: better than 0.1%*
- *Magnetic resolution <10uT*
- *On-site calibration routines for origin and Hall sensor orthogonality using SENIS proprietary calibration tools and algorithms*
- *DC and AC field measurements from DC up to 25kHz (-3dB point);*
- *Protective cabinet for safety operation*
- *Easy to use software on MS Windows platform*
- *Color coded 2D and 3D isometric representation of the magnetic field*
- *Eddy-current probes for crack detection*
- *Special probes for rotor testing*
- *AMR probes for very small magnetic fields of down to 50nT (e.g. demagnetized parts)*

AC Mappers, AMR Probes, Large Rotors & Solenoids





Portable Magnetic Mappers

KEY FEATURES

- *3D Mappers, light and compact, with 3 motorised axis*
- *Small dimensions 200 x 200 x 300 mm*
- *Scanning volume: 155 mm (Z-axis), 55 mm (radial)*
- *3-axis Measurenment accuracy 1%*
- *In contact magnetic field measurenment (0.3 mm to magnet)*
- *Positioning resolution 0.1 mm / repeatability 20 µm*
- *Measurement ranges 100mT, 500mT, 2T*

M3D-2A-PORT

MMS-2A-ROT

Crack Detection

The idea of the eddy-current probe integrated in the magnetic field mapper turned into the development of the Defectoscope that is specialised in the cracks and inhomogeneity detection in magnetized and non-magnetized materials for 100% EOL quality control.

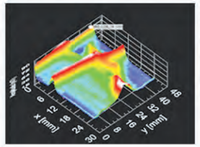
The size of pickup coils, the frequency of the generated eddy-current, the conductivity and permeability of the material determines the depth and the resolution of cracks that can be detected.

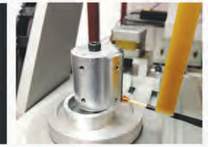
Defectoscope for inhomogeneity and cracks detection in magnetized and non-magnetized materials

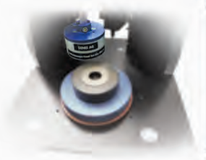
A exciting coil generates eddy curents in the measured meterial. Pickup coils integrated in the probe measure eddy current distribution and detect non-uniformities in presence of cracks in AlNiCo alloys, SmCo, NdFeB and other conducting materials of different sizes/geometries.

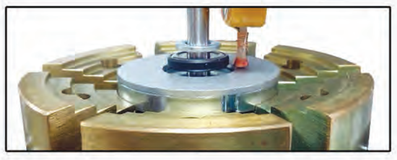
Magnetic materials can be uncoated or coated (Epoxy, Copper, Zinc, Chrome, Nickel limited, etc.)

Detected craks can be of different sizes (from less than 1µ width, more than 0.5mm lenght and 0,1 to 1mm depth)

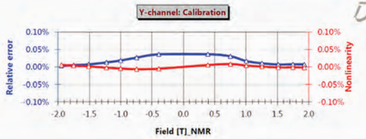








Calibration & Tests



Contract R&D

DC Calibration

Test Services

Engineering

Consulting

SENIS offers DC and AC calibration services for magnetic field measurement equipment in the field range of 1µT up to 20T and for 1%, 0.1% and 0.01% accuracy.
SENIS' calibration laboratory applied for ***ISO 17025 Accreditation*** *for DC Calibration, magnetic field up to 1.5T and 0.1% accuracy.*

DC Calibration

Output vs Magnetic field and Temperature (OBT). *DC calibration may include temperature dependences of offset and transduction constant of a measurement instrument. The result of such DC calibration, called OBT calibration, is a table which shows the actual values of the Teslameter output reading, or the output voltage of the magnetic transducer, for a number of DC magnetic field intensities and probe temperatures, at room temperature of the electronic module.*
With the aid of an OBT calibration table, the accuracy of DC and low-frequency magnetic measurement can be increased up to the limit

AC Calibration

AC calibration provides information about the actual small-signal frequency response of a magnetic measurement instrument. The calibration results are given as plots and tables, which show the actual values of the Teslameter output reading, or the output voltage of the magnetic transducer, for a reference AC magnetic field with amplitude of a few mT, at a number of frequencies, at room temperature of the probe and electronic module.

Calibration Conditions and Equipment:
Max amplitude of the periodic magnetic field used for calibration: 10mT
Frequency range: DC to 1MHz
Calibration temperature: 20°C ±3°C
Optionally, AC calibration can be performed in the temperature range from -40°C to 160°C

Angular Calibration

The result of the probe angular calibration is a set of three numbers for each sensing axis of the Hall probe, which provides the information about the exact orientation of the Hall elements in the probe with respect to the co-ordinate system of the probe package.

Test Services

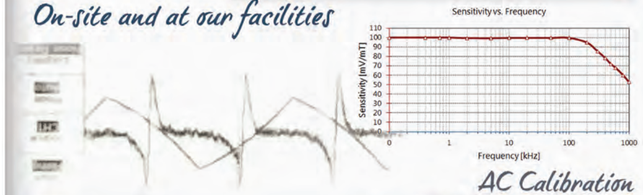
Senis provides to its customers various Test Services for permanent magnets and magnetic and electromagnetic systems:

- *Magnetic field mapping of permanent magnets*
- *Magnetic field mapping of electromagnets*
- *High temperature treatment of magnets*
- *Detection of cracks in permanent magnets*

Engineering and Contract R&D

SENIS implements customized innovative solutions to fullfill the higheest customers requirements with extraordinary performance.

On-site and at our facilities



AC Calibration

IC Design and New Sensor Chips

- ***Fast Angular Position Sensor - FAMAS***
  - *Rotation angle and speed sensor*
  - *Direct angle position (no need for ADC)*
  - *Very high rotational speed: up to 400,000 rpm*
  - *High resolution: 0.08°*
  - *Very fast response: 600ns*
  - *SPI and A quad B interface with index*
- ***Smart 3-axis Hall Sensor - 3DHALL***
  - *Any-Axis linear Hall sensor (Bx, By, Bz)*
  - *High spatial resolution 100µm x 100µm x 10µm*
  - *High magnetic field resolution +/- 1µT*
  - *Seven selectable ranges: from 15mT to 4T*
  - *High frequency bandwidth, DC to 300kHz*
  - *Analog, PWM and digital SPI outputs are available for all three axes at any time*
  - *On-chip correction of sensitivity, offset, noise and temperature drift*
- ***HF Current Sensor - ANYCS***
  - *Sensitivity parallel and perpendicular to the chip surface*
  - *32 selectable ranges from 5mT to 1T*
  - *High frequency bandwidth, DC to 1MHz*
  - *High temperature: -40°C - +150°C*
  - *Analog output (ratiometric and non-ratiometric)*

Our Inventions and Know-How

Our R&D team, led by Prof. R. Popovic, invented some of the most advanced magnetic field sensors:

- *The most sensitive Vertical Hall Devices*
- *The first integrated 3D Hall Probe*
- *The most successful Compass Chip*

We can help you develop your own advanced products based on these inventions, solutions and related know-how. Or we can grant you a license on some of our patents or ASIC designs.

IC Design & Sensors

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Senis products are applied in various applications for monitoring magnet systems, characterization of permanent magnets, mapping magnetic fields, developing magnet systems, etc.

Senis has won the trust of leading automotive, energy and industry companies, as well as major physics laboratories worldwide.

▶▶▶ Our World Records:

the only fully integrated 3-axis Hall Probe on the market

the best horizontal and vertical Hall sensors integrated in a single Si-chip

the smallest and thinnest 3-axis Hall Probe

magnetic field transducer & teslameter

with the highest magnetic resolution

and the highest frequency bandwidth

magnetic field measurements with the highest accuracy

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