

KEY FEATURES:

- Maximal scanning volume (X x Y x Z): 135 x 135 x 135 mm³
- Scanning speed: adjustable, up to 50 mm/s
- Scanning spatial resolution: down to 10 μm
- Point-to-point and continuous (on-the-fly) scanning
- Probe protection utilizing Tactile (Touch) Sensor
- Rotation stage for the magnet under test (0.2° resolution)
- Multi-jaw scroll chuck as a precise magnet holder
- 3-axis fully integrated CMOS Hall probe (B_x, B_y, B_z) with the spatial resolution (B_y: 0.03 x 0.005 x 0.03mm³; B_x & B_z: 0.15 x 0.01 x 0.15 mm³); high angular accuracy
- Up to 3 selectable magnetic field measurement ranges
- Accuracy of magnetic field measurement: better than 0.5%
- DC and AC field measurements from DC to 2.5kHz (-3dB point); option: up to 25kHz for 3-axis probe and 75 kHz for 1-axis probe
- Protection cabinet for safety operation
- Easy to use software on MS Windows platform
- Color coded 2D and 3D isometric representation of the magnetic field

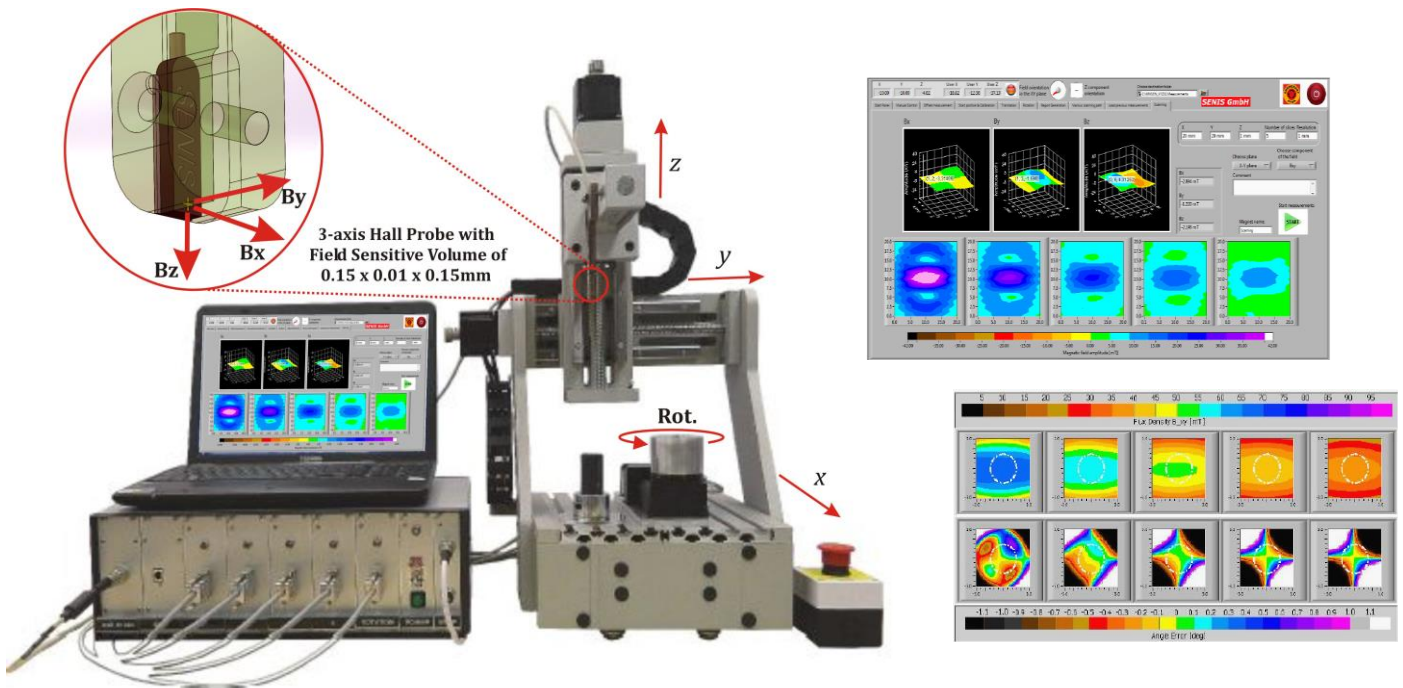


Figure 1: Scanning system MMS-1-RS with integrated rotation stage for the magnet under test and visualisation of the magnetic field and magnetic angle of permanent magnets in 3D and 2D

DESCRIPTION:

The SENIS Magnetic Field Mapping System MMS-1-RS allows a user to perform a fast, high resolution mapping of the magnetic field around an electromagnet or permanent magnet. The map of the magnetic field can be presented in the form of color coded 2D or 3D isometric visual display on a PC screen, as a table of numerical values of the magnetic field, as the total magnetic field value, etc. Due to unique features of the applied fully integrated CMOS Hall probe, all three components of the magnetic field (B_x , B_y , B_z) are measured simultaneously at virtually the same point. Optionally, a Hall probe can provide up to three selectable magnetic field measuring ranges. The mapping system is controlled by an easy-to-use software built on Windows platform and LabVIEW.

At a measurement start, the probe moves automatically to its "Home position". The coordinates of the

"Home position" are stored relative to the mapper coordinate system that is defined by three optical boundary switches (one for each moving direction).

A Tactile Sensor (available as option) prevents a mechanical probe damage. It serves as an emergency stop provision, which is triggered whenever an object is touched by the probe during the measurement process.

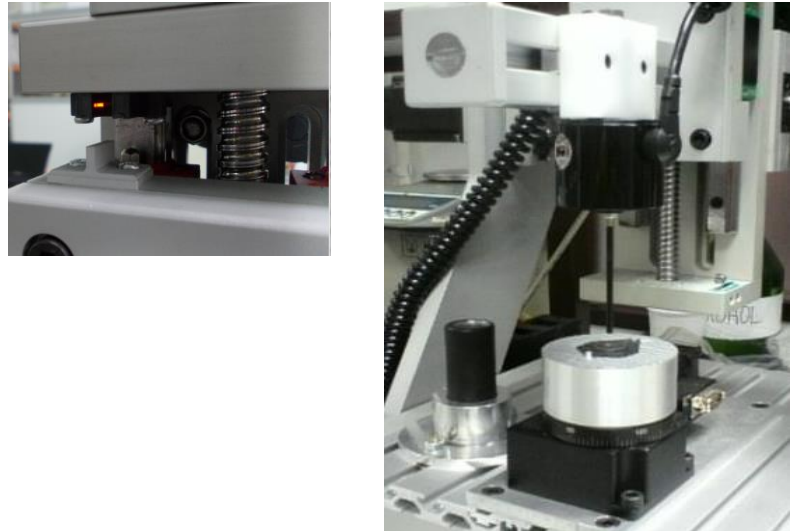


Figure 2: **Optical Boundary Switch (left), Tactile Sensor (right)**



Figure 3: **Scanning system MMS-1-RS equipped with the protection cabinet to satisfy the CE directives (mandatory for the production environments)**

The standard system consists of the following six modules:

1. High accuracy 3-axis SENIS Magnetic Field Transducer
2. Multifunction DAQ **NI 6212**, which controls the motor drivers for all three mechanical axes and for rotation stage, receives data from transducer and sends them to a computer. DAQ uses an USB connection to interface with a PC
3. Step motor drivers **SSMD**, which control the movements of the platform
4. Cartesian moving platform **CMP**, with the 3-axis Hall probe attached to it
5. Emergency Stop safety equipment
6. Personal Computer (**PC**)

Options:

1. Tactile sensor as an emergency stop provision to prevent a probe damage
2. Protection Cabinet to satisfy the CE directives (mandatory for the production environments)

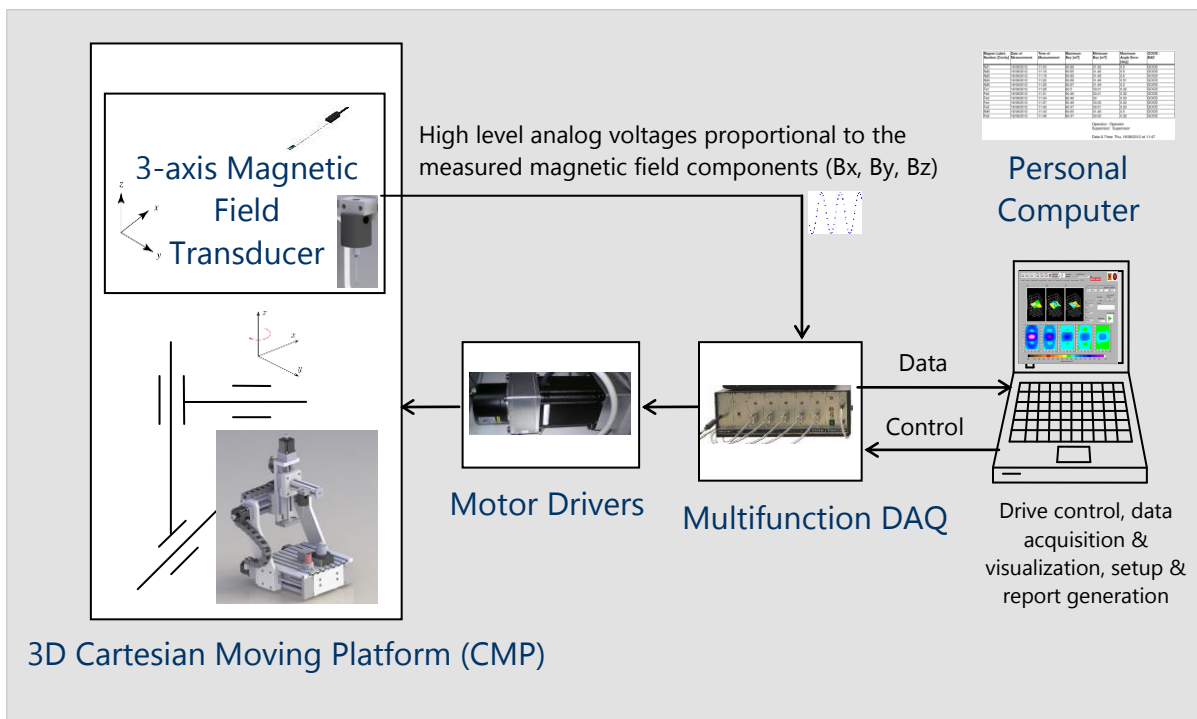


Figure 4: **Block-diagram of the magnetic field mapping system MMS-1-RS**

The SENIS calibration procedure for the magnetic field mapping system has been derived from approved technical standards and is made with instrumentation calibrated under these standards.

SYSTEM SPECIFICATIONS:

Mechanical Specifications:	
Parameter	Values
The dimensions of the mechanical part of the scanner	400 mm x 350 mm x 650 mm
Total system weight	<ul style="list-style-type: none"> • Mechanical part: 26 kg • Electronic module: 7 kg • Personal Computer: 2 kg
Maximal scanning volume (XxYxZ)	135 x 135 x 135 mm ³
Minimal distance of MFSV (Magnetic Field Sensitive Volume) from the magnet surface	1.1 mm (if the 03A Hall probe is applied) 0.3 mm (if the 03G Hall probe is applied as an option)
Maximal scanning speed	50 mm/s in "SCANNING ON THE FLY" mode (continuous scanning)
Minimal distance between two measurements (spatial resolution)	10 µm
Hall Probe positioning accuracy and repeatability	± 10 µm
Start-up time from cold start till availability for measurement	< 3 min
Shut down time	< 1 min
Recovery time from an emergency stop	< 1 min
Magnetic Field Measurement Specifications:	
Parameter	Values
Magnetic field measurement range Standard: one (fixed) measuring range Optional: Multiple selectable measuring ranges (up to 3)	<ul style="list-style-type: none"> • ± 20 mT • ± 50 mT • ± 100 mT • ± 200 mT • ± 500 mT • ± 1'000 mT • ± 2'000 mT
Magnetic measurement resolution	better than 0.02% for measurement range ≥200mT better than 0.05% for measurement range ≤100mT
Accuracy of the magnetic field measurement	better than 0.5%
Measurement sampling rate	> 60 kSamples/s, for 3-channels acquisition > 200 kSamples/s, for 1-channel acquisition
Magnetic field Frequency Bandwidth	DC to 2.5 kHz (-3dB point) Optional: DC to 25kHz for 3-axis, i.e. to 75kHz for 1-axis (-3dB)

SOFTWARE:

The user-friendly software, based on LabVIEW on MS Windows platform, offers the following features:

- Automatic color coding of magnetic field with appropriate legend
 - Magnetic field and magnetic angle measurement presentation
 - Report generation
 - Measurement range selection
 - User defined scanning area and resolution
 - Zoom and rotate of 2D and 3D images
 - Movable cursor displaying X and Y coordinate and magnetic flux density value
 - Calibration Mode
 - Probe returns to the start measuring point after the full scan is performed
- ... and much more.

TYPICAL APPLICATIONS:

- Measurement of all three components of magnetic field (B_x , B_y , B_z), magnetic angle measurement, peak and zero value detection of magnetic encoders, counting the number of magnetic poles, etc.
- Quality assessment tool in production, for assemblies such as loudspeakers, single and multi-pole permanent magnets, photocopier rollers and magnetic ribbons, etc.
- Detection of cracks in permanent magnets
- Development of magnet systems
- AC magnetic field mapping
- Application in laboratories and in production lines, etc.

RECOMMENDED ACCESSORIES:

- Rotating stage for the magnet under test, including the control integrated into the software
- Tactile Sensor
- Multi-jaw scroll chuck as very precise magnet holder
- Reference cube for precise positioning of the rectangular magnets
- Zero Gauss Chamber
- Protection Cabinet to satisfy the CE directives (mandatory for the production environments)