SENIS
magnetic & current measurement

DESCRIPTION

MMS-2A-ROT, the portable Magnetic Field Mapping System allows users to perform a fast, high resolution mapping of magnetic field around a cylindrical-form permanent magnets, such as rotors, disk and ring magnets, both radially and axially magnetized. The map of the magnetic field can be presented as color coded 1D, 2D or 3D display on a PC screen and as a table of numerical values of the magnetic field (each component Bx, By, Bz, Bxy, Btot, etc.). Due to unique features of the applied fully integrated 3-axis Hall probe (Si-chip), all three components of the magnetic field are measured simultaneously at virtually same point (field sensitive area is within a 150μm square). Optionally, a Hall probe can provide up to three selectable magnetic field measuring ranges. The mapping system is controlled by an extremely easy-to-use-software built on MS Windows platform and LabVIEW. Measured data visualization is fully customizable.

In addition to acquiring the measured magnetic field data, the multifunction Data Acquisition Card (NI DAQ) controls the motor of the rotary stage, using the data from the rotary encoder to regulate the angular position. The non-magnetic multi-jaws scroll chuck is mounted on the rotary stage for a precise holding of magnets under test. The probe can be manually positioned in X- and Z-axis.

The 3-axis Hall probe is integrated in a robust and flexible carbon-fiber holder that is kept in-contact to the magnet during the measurement. This allows a fix distance between the sensitive spot of the Hall probe and magnet surface.

KEY FEATURES

- **3D magnetic field mapping utilizing an integrated 3-axis Hall probe with very high spatial resolution (sensitive spot 150x150um).**
- **Mapping of DC and AC magnetic fields (up to 5kHz)**
- **Measurement and visualization of all three components of the magnetic field, Bx, By and Bz as well as B_{xy} (in-plane field distribution), B_{Total}, B_{max}, B_{min}, B_{rms}, North-South pole.**
- **Measured data comparison feature.**
- **Visualization of the multipole magnetic field – number of poles, min, max, average pole width, pole distribution, zero crossing, etc.**
- **Visualization of the magnetic field homogeneity, i.e. angle error.**
- **Fourier Analysis (FFT) and visualization of the first 10 harmonics, single and total harmonic distortion.**
- **On-the-fly scanning (continuous mapping)**
- **Scanning volume: 80 x 80 x 80mm**
- **Scanning speed adjustable: up to 180°/s**
- **Rotary stage with the encoder (resolution 0.03°) and with a non-magnetic scroll-chuck for magnet fixing.**
- **Very high magnetic field resolution**
- **Very high measurement accuracy: better than 0.5%**
- **Selectable measurement ranges: 0.1T; 0.5T; 2T**
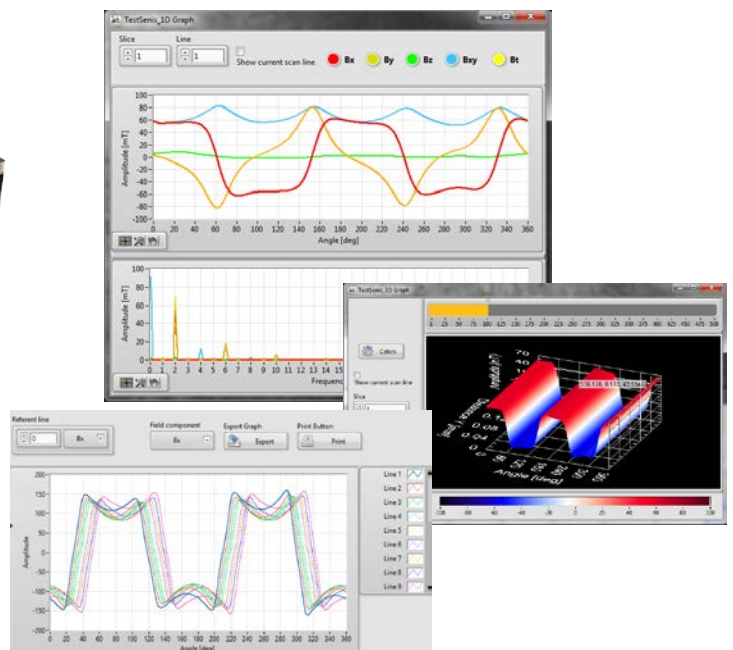- **Mapper software running on Windows tablet PC**

Figure 1: **Magnetic Field Mapper MMS-2A-ROT and Measured Data Visualization**

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SYSTEM SPECIFICATION

Parameter	Values
Dimensions	**200 mm x 280 mm x 300 mm**
Total system weight	**6kg**
Maximal scanning volume (XxYxZ)	**Standard: 80 x 80 x 80 mm^3**
Minimal distance of MFSV (Magnetic Field Sensitive Volume) from the magnet surface	**<0.5mm**
Maximal scanning speed	**180deg/s**
Angular positioning resolution	**0.03°**
Rotary stage accuracy and repeatability	**0.05°**
Start-up time from cold start till availability for measurement	**< 3 min**
Shut down time	**< 1 min**
Magnetic Field Measurement Specifications:	
Magnetic field measurement range (selectable)	**• ± 100 mT** **• ± 500 mT** **• ± 2'000 mT**
Magnetic measurement resolution	**better than 0.05% of the measurement range**
Accuracy of the magnetic field measurement	**better than 0.5% of the measurement range**
Measurement sampling rate	**30 kSamples/s, for 3-channels acquisition**
Magnetic field Frequency Bandwidth	**DC to 5 kHz (-3dB point)**

TYPICAL APPLICATIONS

- Measurement of all three components of DC and AC magnetic field (Bx, By, Bz), magnetic angle measurement, angle error, inhomogeneity, peak and zero value detection of magnetic encoders, number of magnetic poles counting, pole width calculation, pole distribution of multipole magnets and rotors, etc.
- Quality assessment tool in production, for assemblies such as single and multi-pole permanent magnets, rotors, encoders, etc.
- Development of magnet systems

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