

**DESCRIPTION:**

The Sliding Hall Probe system, further SHP, is a module particularly designed to allow an in-contact magnetic field measurement. It can be efficiently applied for low magnetic fields measurement on the magnet surface (linear encoders, code-plates, magnetic bar codes, microfluidic flow cells, magnet arrays, multi-pole magnets, etc.). It allows for very small distance (approx. 0.1mm) between the magnet surface and the Magnetic Field Sensitive Volume (MFSV) of the Hall probe. The SHP system is optimized to provide an easy integration in SENIS Magnetic Transducers, Teslameters and Mapping Systems.

The SHP system integrates the three basic parts:

1. a slightly modified version of the fully integrated 3-Axis Hall probe type F3A-03C;
2. an adequate Probe Holder made of Polyacetal, including
3. Probe Spring made of thin fiberglass

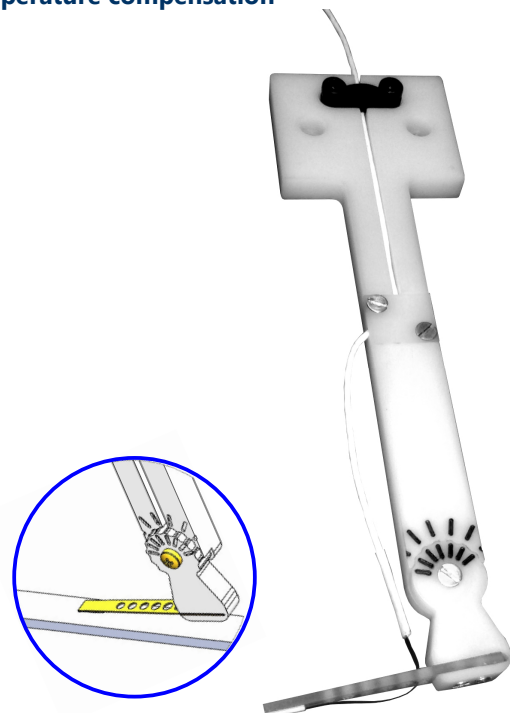
The Hall Probe contains a CMOS integrated circuit, which incorporates three groups of Hall elements, biasing circuits, amplifiers, and a temperature sensor. The integrated Hall elements occupy very small area (150 x 150  $\mu\text{m}$ ), which provides very high spatial resolution of the probe.

The on-chip application of the spinning-current technique in the biasing of the Hall elements suppresses the planar Hall Effect. The signal pre-processing on the chip enables a very high frequency bandwidth (DC to 25 kHz) of the probe; and on-chip signal amplification provides high output signals of the Hall probe.

The sensor chip is embedded in the probe package and connected to the CaH cable, which makes this probe both mechanically and electrically very robust. The chip is glued onto a reference ceramic plate suitable for an appropriate fixing of the probe.

**KEY FEATURES:**

- **Sliding Hall Probe allows an in-contact magnetic field measurement (Magnetic Field Sensitive Volume of the Hall sensor approx. 0.1 mm from the magnet surface)**
- **Fully integrated CMOS 3-axis (Bx, By, Bz) Hall Probe, of which one, two, or three channels are used**
- **3-axis fully integrated CMOS Hall probe (Bx, By, Bz) with the spatial resolution (By: 0.03 x 0.005 x 0.03mm<sup>3</sup>; Bx and Bz: 0.15 x 0.01 x 0.15 mm<sup>3</sup>) and high angular accuracy (orthogonality error less than 0.1°)**
- **Up to 4 selectable magnetic field measurement ranges**
- **Accuracy of magnetic field measurement: better than 0.1%**
- **Measurement ranges (full scales):  $\pm 20$  mT, 50 mT, 0.1T, 0.2T, 0.5T, 1T, 2T**
- **Magnetic Resolution:**
  - better than 0.02% for measurement range  $\geq 0.2\text{T}$
  - better than 0.05% for measurement ranges  $\leq 0.1\text{T}$
- **Virtually no planar Hall Effect**
- **High frequency bandwidth (from DC up to 25 kHz)**
- **High disturbance immunity**
- **Negligible inductive loops on the Probe**
- **Integrated temperature sensor on the probe for temperature compensation**



**SLIDING HALL PROBE SYSTEM\_MECHANICAL SPECIFICATIONS**

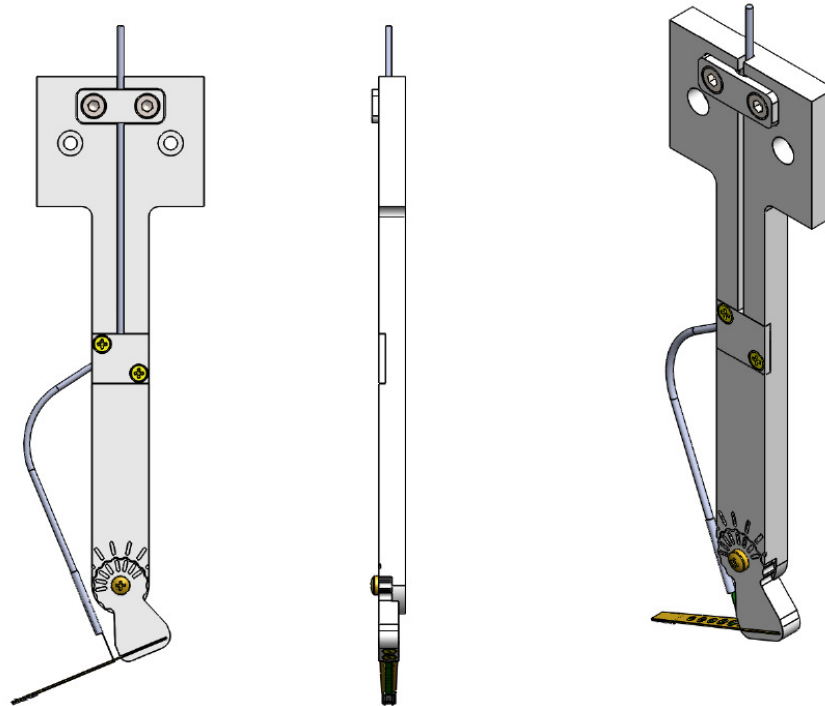


Figure 1. The drawings of the Sliding Hall Probe System (SHP)

The Sliding Probe is completely in-factory assembled. For the measurement of a magnetic field the Probe Holder has to be lifted down (by SENIS Mapper or a customer's measurement set-up) until the sliding surface of the probe comes in contact with the surface of the magnet under test (please see Figure 2):

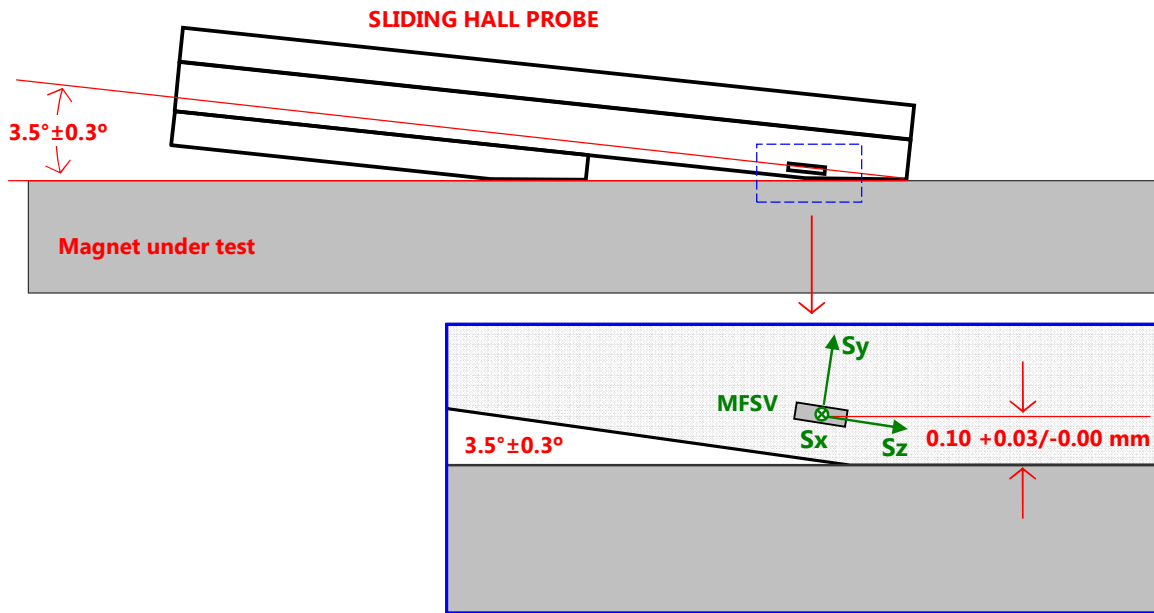


Figure 2. Sliding Hall Probe in contact with the surface of the magnet under test

MODIFIED HALL PROBE 03C - DIMENSIONS AND CHARACTERISTICS

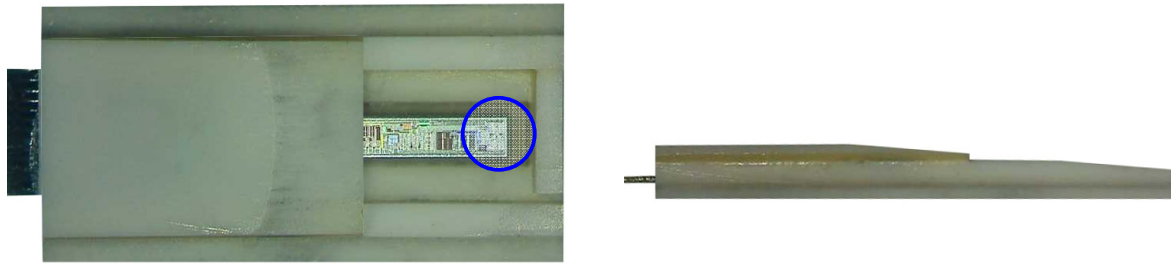


Figure 3. Modified SENIS fully integrated 3-axis Hall probe 03C (magnetic field sensitive part of the 3D Hall sensor is visible, under protective silicon filling)

**TOP VIEW:**

**FRONT VIEW:**

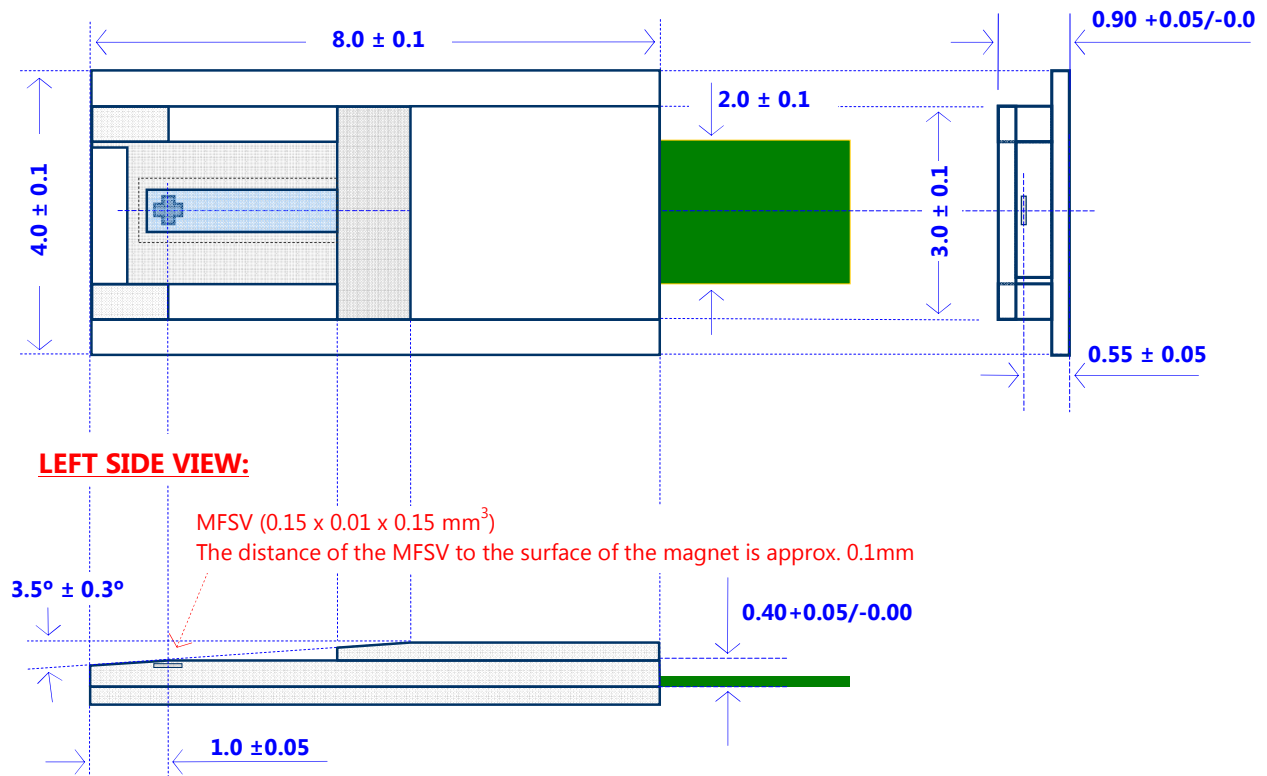


Figure 4. Dimensions and tolerances of the modified 03C Hall probe

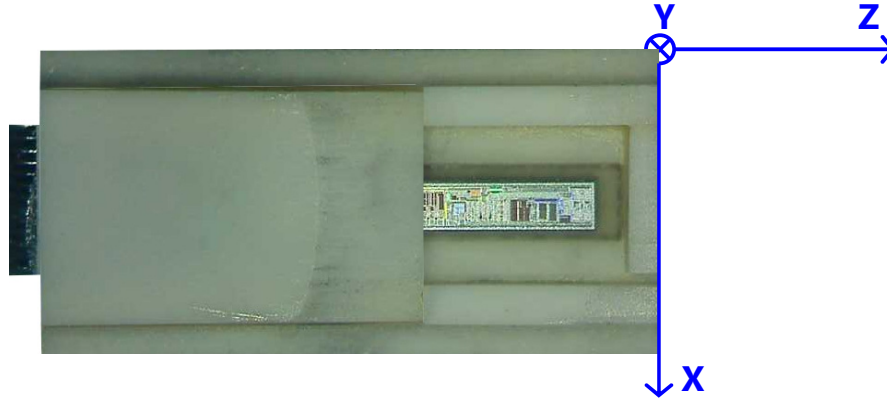


Figure 5. Reference Cartesian coordinate system of the Sliding Hall probe

<i>Dimension</i>	<i>X [mm]</i>	<i>Y [mm]</i>	<i>Z [mm]</i>
Magnetic field sensitive volume (MFSV)	0.15	0.01	0.15
Position of the center of MFSV (corresponding to FSP, see <i>Figures 3 and 4</i> )	$2.0 \pm 0.1$	$-0.55 \pm 0.05$	$-1.0 \pm 0.05$
Total Probe external dimensions	$4.0 \pm 0.1$	$0.90 +0.05/-0.00$	$8.0 \pm 0.1$
Angular accuracy of the axes	$\pm 0.5^\circ$ with respect to the reference surface		
CaH Cable (construction and characteristics)	Conductor: Silver plated soft copper core, 7 x 44 AWG Insulation: PFA (Perfluoro Alkoxy), diameter 0.30 mm Twisting: 15 x Diameter Shield: Silver plated soft copper braid Jacket: PFA (Perfluoro Alkoxy)		
Total length of the CaH cable:	<ul style="list-style-type: none"> <li>▪ Standard: 2 m (Probe notation: <b>03C02</b>)</li> <li>▪ Optional: XX m (Probe notation: <b>03CXX</b>)</li> </ul>		
<i>NOTE: Various cable lengths are available upon request.</i>			