

DESCRIPTION:

Low Noise Teslameter with integrated 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 flux density. A digital module is additionally applied to the analog transducer to form the digital Teslameter. Digital Teslameter provides the possibility of automatic data acquisition via a USB serial interface by a host computer. In this way, customers can easily integrate a measurement routine into their measurement system using its programming tools such as Basic, C, C++, Delphi, LabVIEW, etc.

The temperature measurement feature allows user to obtain current temperature values while monitoring the magnetic field.

The transducer consists of two modules:

1. Hall probe and Cable (Module H), and
2. Electronics (Module E).

The Low-Noise Digital Teslameter is a high accuracy temperature-stabilized instrument for the precise measurement of magnetic field.

Each Transducer is calibrated with the individual correction data for the connected probe, so the probe is replaceable.

KEY FEATURES:

- Teslameter for Laboratory Applications
- Teslameter with integrated 1-,2-,3-axis Hall Probes for measuring DC & AC magnetic fields up to 5kHz
- Very High Resolution: 2ppm at magnetic field range: 0.2T, 2T, 20T
- Accuracy better than 0.005%
- High temperature stability (< 20ppm/°C)
- Units in gauss (G), tesla (T)
- TFT LCD graphic display, displaying Bx, By and Bz components and the temperature value measured on the Hall Probe
- Data Acquisition & Visualization PC Software runs on Windows 7/XP (USB 2.0)

TYPICAL APPLICATIONS:

- Quality control and monitoring of permanent magnets & magnet systems (generators, motors)
- Development of magnet systems & process control
- Magnetic field mapping



Figure 1. Low-Noise Teslameter 3MH5A with integrated Hall Probe

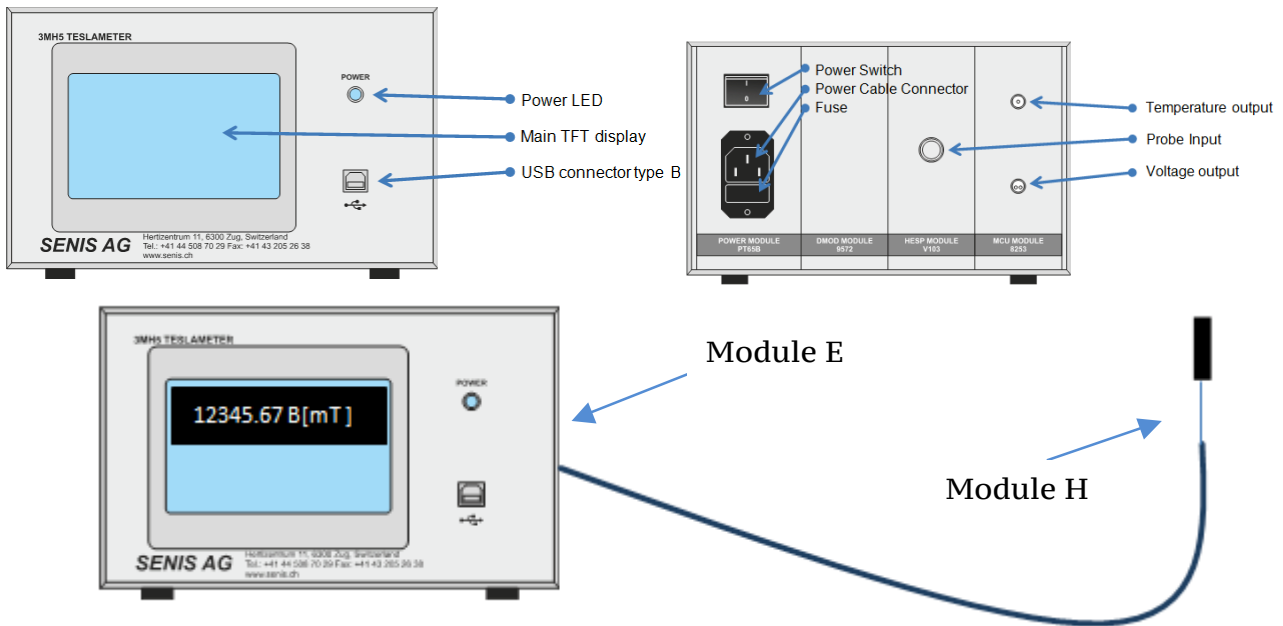


Figure 2. Structure of the Low-Noise Teslameter 3MH5A with integrated Hall Probe
 - Module H, consisting of the Hall Probe and the CaH Cable;
 - Module E, analog and digital electronics for signal conditioning.

HALL PROBE SPECIFICATIONS (Module H):

The Hall Probe contains a CMOS integrated circuit, three groups of mutually orthogonal Hall elements and a temperature sensor. The integrated Hall elements occupy very small area (150 μ m x 150 μ m), which provides very high spatial resolution of the probe.

The output of the Hall Probe are high-level analog voltages proportional to the measured components of a magnetic field and a voltage proportional with the probe temperature.

There are a number of different geometries/dimensions of Hall probes available, in order to fulfill a wide range of customer's application requirements.

HALL PROBE KEY FEATURES

The unique advantages of the fully integrated probe include:

- Measurement of magnetic field components
- Very low noise and offset fluctuations
- High disturbance immunity
- Virtually no planar Hall Effect
- Negligible inductive loops
- The probe provides a temperature signal for an efficient compensation of temperature effects

MAGNETIC AND ELECTRICAL SPECIFICATIONS:

(FOR DETAILS, PLEASE SEE THE SPECIFIC DATASHEET WITH SELECTED HALL PROBE)

Magnetic field measurement range: ± 200 mT, 2T, 20T (different ranges available)

Total measuring Accuracy: 0.005%

SPECIFICATIONS (Module H):

Hall Probe 03C for the SENIS I3C Magnetic Field Transducers and 3MH5 Digital Teslameters is a very robust, single-chip integrated 3-axis Hall-Probe.

The Probe contains a CMOS integrated circuit, which incorporates three groups of Hall elements and a temperature sensor.

The integrated Hall elements occupy very small area ($100 \times 100 \mu\text{m}^2$), which provides very high spatial resolution of the 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 of the I3C-03C HALL PROBE SYSTEM:

- Very robust Hall Probe. The chip is glued onto a reference ceramic plate suitable for an appropriate fixing of the probe
- Integrated CMOS 3-axis (Bx, By, Bz) Hall Probe, of which one, two, or three channels are used
- Very low noise and offset fluctuations
- Very high spatial resolution (By: $30 \times 5 \times 30 \mu\text{m}^3$; Bx and Bz: $100 \times 10 \times 100 \mu\text{m}^3$)
- Very high linearity
- High angular accuracy (orthogonality error less than 0.1°)
- Virtually no planar Hall Effect
- Negligible inductive loops on the Probe
- Integrated temperature sensor on the probe for temperature compensation

HALL PROBE and CABLE DIMENSIONS AND CHARACTERISTICS

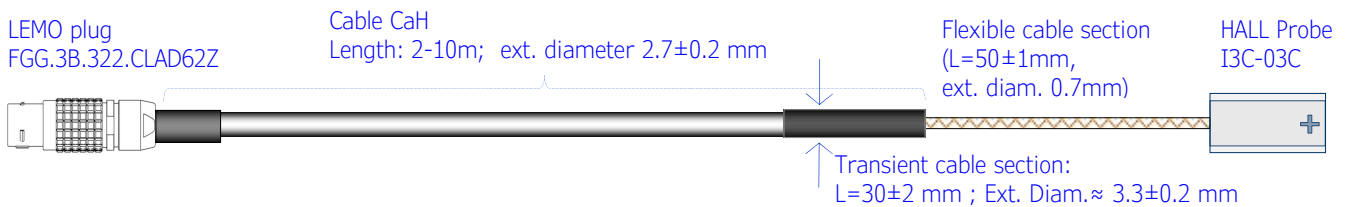
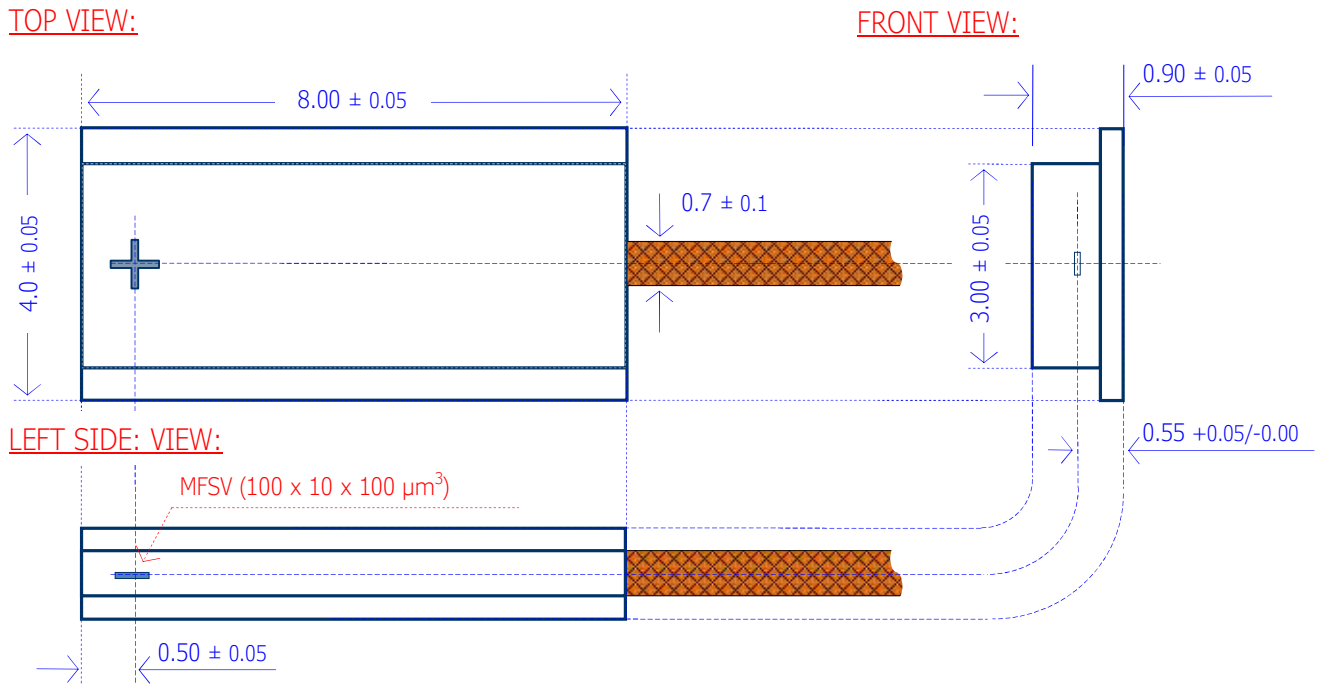


Figure 1. Dimensions of the I3C-03CxxL Hall Probe and Cable (Module H).
NOTE: Different lengths of the CaH Cable are available, upon a request.

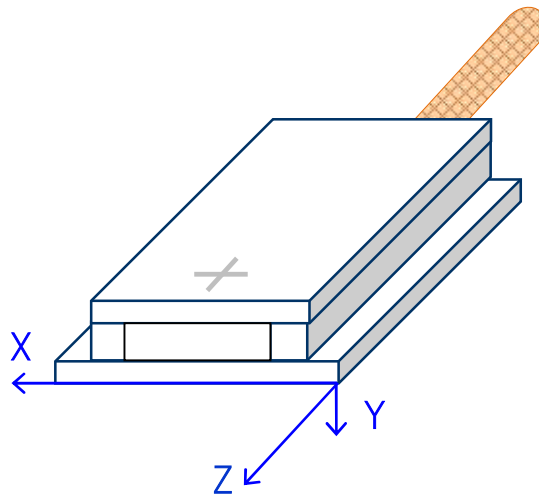


Figure 4. Reference Cartesian coordinate system of the integrated 3-axis Hall probe I3C-03CxxL

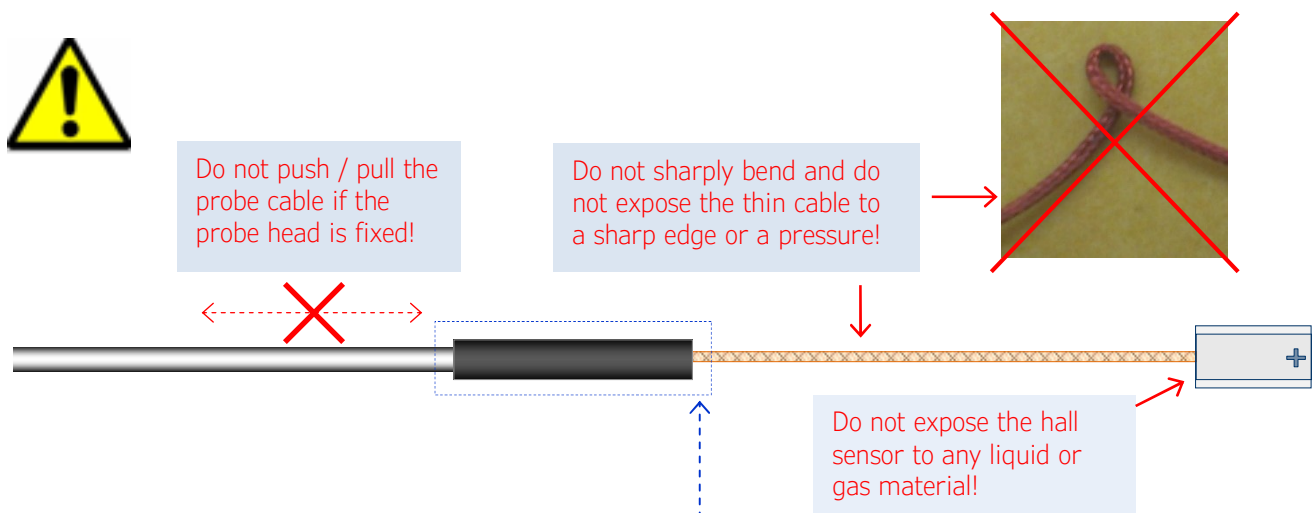
Parameter			
Dimensions	X (mm)	Y (mm)	Z (mm)
Magnetic Field sensitive volume (MFSV)	0.10	0.01	0.10
Position of the FSV centre of the sensor	2.00 ± 0.05	$-0.55 -0.05/+0.00$	-0.50 ± 0.05
Total probe external dimensions	4.00 ± 0.05	0.90 ± 0.05	8.00 ± 0.05
Positioning accuracy			
Angular accuracy of axes with respect to the reference surface	$\pm 0.5^\circ$, Determined during calibration		
Cable properties			
Length:	6m (max. tolerance ± 0.1 m) <i>(the probe cable is determined with a 22-pins LEMO plug FGG.3B.322.CLAD62Z for a connection with the electronic box)</i>		
Conductor:	Silver plated soft copper core, 7 x 44 AWG		
Insulation:	PFA (Perfluoroalkoxy), diameter 0.30 mm		
Twisting:	15 x Diameter		
Shield:	Silver plated soft copper braid		
Jacket:	PFA (Perfluoroalkoxy)		
Service temperature:	$-196 / +200$ °C		
Linear resistance:	1.4 Ω /m		
Rated voltage:	150 Vac		
RoHS compliance:	Yes		

INSTALLATION MANUAL FOR THE 03C HALL PROBE

Though the 03C probe is very robust with respect to its size, it should be handled with special care.

Considering that we deal with a high-precision device of very small dimensions, following precautions should help to avoid damage to the probe during installation and handling, and ensure that the device's accurate calibration remains preserved:

- The Hall Probe is sensitive to Electrostatic Discharge (ESD). Please follow the proper ESD protection precautions when handling the Hall probe.
- The mounting of the Probe should be carried out by application of very low pressure to its head and particularly on the thin cable.
- Do not apply more force than required to hold the probe in its place. Damage to either the ceramics package of the Hall sensor or thin wiring could destroy the Probe.
- If the probe head is clamped, the user needs to make sure that the environment surface in contact with the reference plane of the probe is flat and covers as much of the probe reference surface as possible. Do not apply more force than required to hold the probe in its mounting.
- In order to prevent rupture of the thin probe wiring, the user should fix and secure the probe cable in the proximity of the head. The thin wires of the flexible section of the probe can be folded only with a special care. Any repetition sharp bending must be strongly avoided.



- Do not expose the thin cable to the external sharp edges.
- Avoid any high pressure and bending of the **transient cable section** between the thin and thick Probe cables.
- Avoid the immersion of the probe of any liquid, and its exposure to moisture and aggressive gasses.