ASONIK

POLAND, PL-62007 Tuczno, str. Sloneczna 6.
Tel./Fax. (061) 815-6261
http://www.asonik.eu
e-mail: asonik@sylaba.poznan.pl

Smart Magnetic Sensor
Type SMS-102

Probes for Transverse magnetic fields
Ranges: 2000.0, 200.00, 20.00mT and Auto
Analog and Digital output
4½ Digit LCD readout
Auto shut-off
Temperature compensated sensor

ASONIK's new pocket size Smart Magnetic Field Sensor is unique for the features offered. The Sensor will measure transverse magnetic fields up to 2000 mT, and can be set for Auto range.

With the 4 ½ Digit LCD readout you can use the sensor as a stand-alone magnetic field meter. In addition, the sensor is provided with an USB digital input / output so you can connect it directly to the digital port of your computer.

An EEPROM inside the probe has been programmed for temperature compensation of non-linearity error. Following a patented method, the unit removes temperature effects of magnetic sensitivity, resistive residual voltage and also all magneto resistive effects . If necessary, the unit can be re-calibrated easily with the help of an optional zero-gauss chamber.

The SMS-102 comes with complete operating instructions, an transverse probe, the USB cable, the zero-gauss chamber as well as an ABS case.

Specifications

Measurement Ranges:	±19.99 mT, 10µT resolution ±199.99 mT, 100 µT resolution ±1999.9 mT, 1mT resolution
Measured value mode:	Constant Magnetic Field [mT] Alternating Magnetic Field {up to 500Hz} in RMS [mT]
Magnetic Field Sensor:	Hall Effect GaAs type sensor
Measurement Probes:	Axial and Radial, 12.5mm long, 100cm cable with 9 pin "D" type male connector
DC Range Accuracy:	± 0.3%
AC Range Accuracy:	± 1%
Range selection:	Manual, Auto
USB parameters:	9600/n/8/1, Caution: the digital interface works constantly
Digital data format:	ASCII data [±XX,XXmT"CR""LF"], [±XXX,XmT"CR""LF"], [±XXXXmT"CR""LF"]
Measuring utilities:	Zero the hall sensor with the "Zero Gauss Chamber". Set offset readout for the current field. Non-Volatile memory for caching the "last used" measurement range and mode.
User buttons:	Power: on / off Measurement mode: ac / dc Measurement range: 2000mT, 200mT, 20mT, AUTO Zeroing: readout offset / sensor zero
Power Off:	Manual or Auto after 10 min.
Power On:	Manual
Total Weight:	505g (including batteries, USB cable and ABS case)
Dimensions (HxWxD):	130mm x 75mm x 26mm
Display:	4 1/2 digit LCD
Readout frequency:	2.5 Hz
External power supply:	**USB connector**
Supply:	4 x R3 (AAA) type cells

OPERATING PROCEDURE

- Slide open the battery door at the back of the unit. Install the 4 1.5V AAA battery and replace the battery door.
- Plug the sensor into the connector at the top of the unit.
- Turn on the SMS-102 by pressing the POWER switch for at least 1 sec.

The SMS-102 is manually operated by 5 switches.

POWER

On and Off switch.

Press once for at least 1 sec:	instrument turns On.
Press again:	instrument turns Off.

If the "POWER" switch of the SMS-102 is not being used or if no RS232c command is sent, the SMS-102 switches off automatically after 10 minutes. The display shows "OFF" for about 1sec. to indicate that the instrument is switched off. When the battery is too low, the display indicates "LOBAT" and a few seconds later, the SMS-102 switches Off.

When no probe sensor is attached to the connector at the top of the unit, the SMS-102 switches Off a few seconds after being switched On.

RANGE

The values of measurement are displayed in three ranges:

1. 19.99 mT
2. 199.99 mT
3. 1999.9 mT

When the SMS-102 is switched On, it is set on the range last used.

By pressing "RANGE" the unit toggles from the last range used to Auto ranging (display shows blinking dot) to 1999 (display shows 0) to 199.9 (display show 0.0) to 19.99 (display shows 0.00).

ZERO CAL

This button allows one to calibrate the Hall sensor offset. The user has to place the probe in the Zero Gauss Chamber, then press the button "ZERO CAL". The Hall sensor offset is then measured and memorized. The new set of Offsets remain after switching off the SMS-102.

The Zero Cal function is not be used to zero the Hall sensor offset when the sensor is in a given magnetic field. (See offset)

OFFSET

This button allows one to zero the readout value when the sensor is in a given magnetic field. The readout offset is then measured and memorized, works nor for “Auro ranging” mode. The new Offset does not remain in memory after switching off the SMS-102. This function is used to show small variations in large background fields. When activated, the relative function displays deviation from a specific setpoint.

AC/DC

This button switches the SMS-102 to measure the constant / alternating magnetic field.

Press once :	instrument is in AC measuring mode
Press again:	instrument is in DC measuring mode

The AC measuring mode calculates the alternating part of the measured magnetic field value and displays the result in True RMS.

The serial USB interface :

The serial USB interface is based on RS232c and is designed to output the measured data in a digital mode or to control the unit.

Ensure the instrument is OFF before connecting an RS232c cable from the SMS-102 to the serial port of the computer.

Set the computer with the following RS232c parameters:

9600 bauds, 8 bits, no parity, 1 stop bit, XON/OFF

Digital output data format:

ASCII data:	[±XX,XXmT”CR””LF”]
	[±XXX,XmT”CR””LF”]
	[±XXXXmT”CR”LF”]

The control of the SMS-102 through the serial interface is with a set of commands. Every command consists of a single ASCII character. The set of commands is described below:

1. “O” - OFFSET ON
2. “Q” - OFFSET OFF
3. “P” - POWER OFF

4. „C” - ZERO CAL
5. “A” - AUTORANGING
6. “1” - RANGE 19.99
7. “2” - RANGE 199.9
8. “3” - RANGE 1999

9. „F” - FUZZY ON (autoranging depending to measured value)
10. „N” - FUZZY OFF
11. “V” - Voltage Readout
12. “B” - [mT] Readout
13. “S” - FAST_DC ON (without AC calculating)
14. “L” - FAST_DC OFF
15. “T” - SEND the one byte STATUS WORD (technical purposes)

STATUS WORD bits:

7 (MSB)	6	5	4	3	2	1	0 (LSB)
READOUT H – [mT] L – [mV]	LOBAT H – ON L – OFF	FUZZY H – ON L – OFF	AC H – AC L – DC	FAST_DC H – ON L – OFF	RNG 1999	RNG 199.9	RNG 19.99

STATUS WORD output data ASCII format:

[XXXX Y : xxxxxxxx “CR” “LF”]

Character description:

XXXX- The number of the Hall probe sensor
Y - Type of the Hall Probe sensor (Axial or Transversal)
xxxxxxxx - Status Word bits starting from MSB
CR - control character
LF - control character

Magnetic Units - Magnetic Induction vs. Magnetic Field

Magnetic induction and magnetic field are often used synonymously.
In many cases it is easy to conclude from magnetic induction to magnetic field and vice versa.
The magnetic field H describes the field generated by a free current only, the magnetic induction B describes the field generated by a current plus the effect of magnetization of a material. Materials can decrease or increase the magnetic induction.
They are then called paramagnetic or diamagnetic materials.
The relation between magnetic induction and magnetic field in vacuum as well as in air or any other nonmagnetic environment is constant:

$B = \mu_0 \times H$.

The proportional factor m_0 is called constant of permeability and has a value of $4\pi \times 10^{-7}$ Vs/Am or 1.256×10^{-6} Vs/Am in SI[1)] units.
The relation is extended in magnetic materials to

$B = \mu_r \times \mu_0 \times H$,

where μ_r is a positive number. μ_r equals 1 in vacuum or air and can reach values above 1000 for soft magnetic materials.

[1)] The SI units ("système internationale") form a metric system of physical units all derived from the basic units kilogram kg for mass, meter m for length, second s for time, Ampere A for current, candela Cd for light intensity and mol for amount of mass. SI units are legally prescribed in many countries and should always be preferred!

Unit System Magnetic Induction *B* Magnetic Field *H*
SI[1)] units Tesla: 1 T = 1 Vs/Am^2 A/m
Older units Gauss: 1 G = 10^{-4} T Oersted: 1 Oe = $10^3/4\pi$ A/m

Conversion Table for Common Magnetic Units

	mT (Tesla)	**G (Gauss)**	**kA/m**	**Oe (Oersted)**
1 mT	1.0000	10.000	0.7960*	10.000*
1 G	0.1000	1.0000	0.0796*	1.0000*
1 kA/m	1.2560*	12.560*	1.0000	12.560
1 Oe	0.1000*	1.0000*	0.0796	1.0000

* in free air