

## About us

The **Laboratory of Electromagnetic Innovations (LEMI)** was founded 2008 as a joint venture between KMS Technologies and the Lviv Centre of Institute for Space Research (LCISR) to focus on the development and production of high quality electromagnetic (EM) sensors. LEMI is located in Lviv, Ukraine. To learn more

## Mission

The mission of the joint venture is to produce the highest quality geophysical EM sensors with the lowest noise figure on the market, at competitive prices. The primary product lines are low noise custom EM induction coil magnetometers and custom fluxgate magnetometers. These sensors may be optimized for use in marine and land magnetotelluric (MT) and controlled source EM (CSEM) measurements.

## Products

LEMI is specialized in high quality, low noise sensors for a wide variety of applications including geophysical field measurements, satellite navigation, signature detection and UXO recovery.

- EM induction coil magnetometers
- Custom fluxgate magnetometers
- Potential free electrodes
- Geophysical recorders
- Sensor calibration systems
- Specialty equipments for electromagnentic measurement

# Fluxgate magnetometers

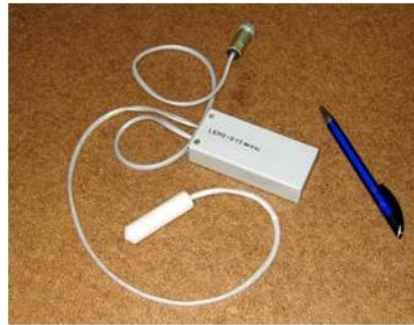
## LEMI-011

Low power 3-components fluxgate magnetometer . Manufactured in two versions: monoblock (“tube and “box” shape, sensor included) and as a p.c. board and sensor with cable up to 3 m. Convenient for orientation purposes.



## LEMI-019

Ultra-low power consumption featuring two analog outputs – filtered (0.003-10 Hz) and unfiltered (from DC). A miniature one-component fluxgate magnetometer intended for the measurement of one component of the magnetic field vector in land conditions.



## LEMI-022

High resolution and precision with low noise and low temperature offset including both digital and analog outputs. A vector magnetometer for the precise measurement of Earth's magnetic field and its variations at laboratory and land conditions.



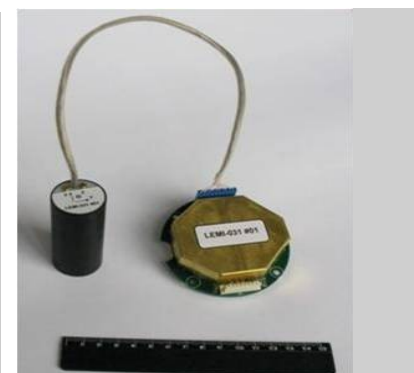
## LEMI-024

A three-component low power high sensitive analog fluxgate magnetometer intended for the monitoring of three components of the magnetic field vector. Including a DC unfiltered output, used for rough estimating of magnetic field intensity, and high sensitivity filtered output, for weak fluctuations measured in the frequency band of 0.003-10 Hz.



## LEMI-031

A three-component ultra low power with low temperature drift. Intended for the monitoring of the three components of magnetic field vector and its variations in both land and laboratory conditions. Designed for battery-powered applications. A differential analog output can be easily converted to digital using an A/D convertor.



# Coil magnetometers



## **LEMI-118**

High frequency induction coil magnetometer with low noise and low power consumption. Intended for the study of magnetic field fluctuation in the frequency band 1Hz to 70,000 Hz.



## **LEMI-120**

Broadband (0.0001- 1,000 Hz) low frequency induction coil magnetometer with the lowest noise in class.

A broadband land induction coil that was developed to measure variations of the Earth's magnetic field, particularly for applications in Magnetotellurics (MT) and Controlled Source Magnetotellurics (CSMT).



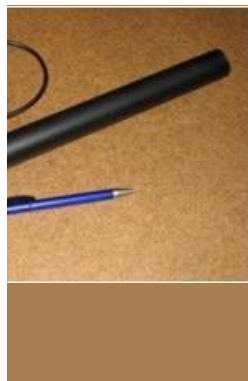
## **LEMI-121**

Very low noise combined with low power consumption and compact design (560 mm length) induction coil magnetometer. Intended for the study of magnetic field fluctuations in the frequency band 0.0001-500 Hz, can be used instead of the LEMI-120 magnetometer due to size and weight criteria.



## **LEMI-123**

Low noise and low power induction coil magnetometer optimized for packaging into size limited acquisition stations (25 mm length). Designed to measure magnetic field variations in the frequency band from 1 Hz to 1000 Hz.



## **LEMI-134**

High frequency (0.5 - 200,000 Hz) with extremely low noise, compact and lightweight induction coil magnetometer.

New calculation methodology based on a minimum mass approach enabled us to minimize the weight while conserving the length necessary to provide low noise levels in a wide frequency band.

<b>Fluxgate</b>					
Sensor	LEMI-011	LEMI-019	LEMI-022	LEMI-024	LEMI-031
Measurement range	+/- 50,000 nT	Unfiltered +/- 60,000 nT Filtered +/- 15 nT	+/- 68,000 nT	Unfiltered +/- 80,000 nT Filtered +/- 200 nT	+/- 53,000 nT
Frequency range	0 - 20 Hz	Unfiltered DC - 15 Hz Filtered 0.02 - 5 Hz	0 - 0.03 Hz	Unfiltered DC - 500 Hz Filtered 0.003 - 10 Hz	DC - 15 Hz
Sensitivity	45 mV/nT	Unfiltered 0.05 mV/nT Filtered 270 mV/nT	Analog 2.4 mV/nT Digital resolution 0.033 nT	Unfiltered 0.056 mV/nT Filtered 22.4 mV/nT	0.6 mV/nT
Noise level	0.1 nT / $\sqrt{\text{Hz}}$ @ 5 Hz	$\leq 15 \text{ pT}/\sqrt{\text{Hz}}$ @ 1 Hz	$< 10 \text{ pT}/\sqrt{\text{Hz}}$ @ 1 Hz	$\leq 6 \text{ pT}/\sqrt{\text{Hz}}$ @ 1 Hz	$< 25 \text{ pT}/\sqrt{\text{Hz}}$ @ 1 Hz
Number of axis	3	1	3	3	3
Orthogonality error of sensor axes, max	+/- 2°	N/A	$< 30$ min of arc		$< 2^\circ$
Power	2.5 - 5.5 mA @ 5V	$\leq 30 \text{ mW}$	$< 0.7 \text{ W}$	$\leq 350 \text{ mW}$	$< 10 \text{ mW}$
Dimension	Sensor 50 X 16 X 16 mm Monoblock "tube" 160 X 20 X 7 mm Monoblock "box" 115 X 60 X 27 mm	Sensor 60 mm (L), 17 mm (D) Box 100 X 20 X 40 mm	Sensor with support 2.7 kg Electronic unit 1.8 kg	Sensor w/o cable 76mm (L), 76 mm (D) Box 110 X 75 X 67 mm	Sensor 70.5 mm (L), 32 mm (D) Electronics Board 84 mm (D), 22 mm (H)
<b>Induction coil</b>					
Sensor	LEMI-118	LEMI-120	LEMI-121	LEMI-123	LEMI-134
Frequency range	1 - 70,000 Hz	0.0001 - 1,000 Hz	0.001 - 500 Hz	1 - 1,000 Hz	0.5 - 50,000 Hz 0.5 - 200,000 Hz (on)
Transformation factor	Linear section $f^* 1 \text{ mV}/\text{nT}$ Flat section 20 mV/nT	Linear section $f^* 100$ or 200 mV/nT Flat section 100 or 200 mV/nT	Linear section $f^* 200 \text{ mV}/\text{nT}$ Flat section 200 mV/nT	Linear section $f^* 0.2 \text{ mV}/\text{nT}$ Flat section 20 mV/nT	Linear section $f^* 4 \text{ mV}/\text{nT}$ Flat section 20 mV/nT
Noise level	1 Hz $\leq 5 \text{ pT}/\sqrt{\text{Hz}}$ 10 Hz $\leq 0.2 \text{ pT}/\sqrt{\text{Hz}}$ 10,000 Hz $\leq 0.005 \text{ pT}/\sqrt{\text{Hz}}$ 50,000 Hz $\leq 0.001 \text{ pT}/\sqrt{\text{Hz}}$	0.001 Hz $\leq 100 \text{ pT}/\sqrt{\text{Hz}}$ 0.01 Hz $\leq 10 \text{ pT}/\sqrt{\text{Hz}}$ 1 Hz $\leq 0.1 \text{ pT}/\sqrt{\text{Hz}}$ 100 Hz $\leq 0.01 \text{ pT}/\sqrt{\text{Hz}}$	0.001 Hz $\leq 600 \text{ pT}/\sqrt{\text{Hz}}$ 0.01 Hz $\leq 5 \text{ pT}/\sqrt{\text{Hz}}$ 100 Hz $\leq 0.05 \text{ pT}/\sqrt{\text{Hz}}$	1 Hz $\leq 8 \text{ pT}/\sqrt{\text{Hz}}$ 10 Hz $\leq 0.5 \text{ pT}/\sqrt{\text{Hz}}$ 100 Hz $\leq 0.05 \text{ pT}/\sqrt{\text{Hz}}$ 1000 Hz $\leq 0.02 \text{ pT}/\sqrt{\text{Hz}}$	
Power	$\leq 240 \text{ mW}$	225 mW	116 mW	65 mW	300 mW
Dimension	800 mm (L) 42 mm (D)	1340 mm (L) 85 mm (D)	560 mm (L) 85 mm (D)	255 mm (L) 48 mm (D)	400 mm (L) 10 mm (D)

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