

## DIGITAL SEISMOMETERS AND ACCELEROMETERS BY R-SENSORS

R-sensors' digital seismometers and accelerometers are cost effective and more reliable solution in comparison with stand-alone digitizers and seismometers.

A digital seismometer means a molecular-electronic seismometer and a digitizer (data logger) inside. Molecular-electronic seismometers are extremely durable and therefore not equipped with locks and other special devices for carrying, packaging, unpacking and transportation. The seismometer does not need a mass centering and does not require a level adjustment – it operates correctly at installation tilts of up to 15°.

A digital accelerometer means a molecular-electronic accelerometer and a data logger inside.

More technical parameters are presented in datasheets or on Geoarmatech' website at [www.Geoarmatech.com](http://www.Geoarmatech.com).

R-sensors' digital broadband seismometers include the following models:

**CME-4x11ND** models are digital 3-component compact-size broadband seismometers. The following modifications are available:

- **CME-4211ND** is a digital 3-component broadband seismometer. The rugged case includes a broadband seismometer and a 24-bit autonomous data acquisition system. With its small size and light weight, easiness in operation, mechanical reliability and low energy consumption, this seismometer can be an irreplaceable instrument for field geophysical surveys. While equipping permanent seismic stations, a reasonable price combined with capability to record broadband signals of long-distance earthquakes will be attractive.
- **CME-4311ND** is a digital 3-component low-noise broadband seismometer. A bandwidth of up to 60 sec provides recording the most remote teleseismic events. This model is excellent not only for permanent installations but also for field seismological surveys through its integrated digital recording system, compact size, light weight, rugged case, easiness in operation and low power consumption.

**CME-6x11ND** models are digital 3-component low-noise broadband seismometers with a force feedback.

The following modifications are available:

- **CME-6011ND** is a digital 3-component low-noise broadband seismometer with a force feedback. A bandwidth of up to **30 sec** provides recording of the remote seismic events. This seismometer combines the low-noise molecular-electronic sensing element

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Some of presented features and parameters apply to specific versions of the seismometer. Specifications are subject to change without notice.

(transducer) and the electrodynamic feedback that result in a very flat response over a wide frequency range, a high dynamic range and a greatly improved time and temperature stability of the parameters. This seismometer can be used in various applications including seismic observatories, seismological surveys, seismic microzoning and passive broadband seismic exploration.

- **CME-6111ND** is a 3-component low-noise broadband seismometer with a force feedback. The seismometer has a bandwidth of up to **60 sec**, a high dynamic range and a greatly improved time and temperature stability of the parameters.

R-sensors' digital accelerometers include the following modifications:

- **MTSS-1033ND** is a 3-component digital compact-size accelerometer. It is designed for strong motion measurements, **industrial vibrations** monitoring and analysis. It also can be used as a component of a seismic alarm system. The three identical sensors furnished with a strong electrodynamic force feedback ensure second-to- none input range, precision and high stability. This model features  $\pm 3g$  input signal range and a self-noise level of  $130 \text{ ng}/\sqrt{\text{Hz}}$  at 10 Hz.
- **MTSS-1043ND** is a 3-component digital compact-size light-weight accelerometer. It is designed to measure **seismic signals** and can be used for earthquake measurements, active seismic, structural health monitoring of high-rise buildings and so on. The electrodynamic feedback provides a high precision level and stability of the sensors parameters. This model has a self-noise level of  $70 \text{ ng}/\sqrt{\text{Hz}}$  at 10 Hz.

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## DIGITAL SEISMOMETER CME-4211ND

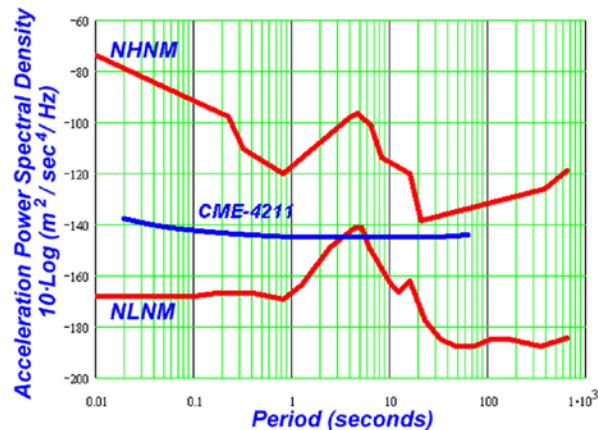


CME-4211ND is a digital 3-component compact-size broadband seismometer. The rugged case includes a broadband seismometer and a 24-bit autonomous data logger.

With its small size and light weight, easiness in operation, mechanical reliability and low energy consumption, this seismometer can be an irreplaceable instrument for field geophysical surveys. While equipping permanent seismic stations, a reasonable price combined with recordings of broadband signals of long-distance earthquakes will be attractive.

CME-4211ND is excellent for structural health monitoring as a part of timely or permanent deployment systems. In addition to the standard version designed for field surveys, the seismometer is also available for boreholes of over 108-mm diameter.

<b>Configuration</b>	<b>Triaxial – Vertical, North, East</b>
<b>Sensitivity</b>	<b>2000 V/(m/s) or customized</b>
<b>Maximum input signal</b>	<b>5 mm/sec</b>
<b>Frequency bandwidth</b>	<b>0.033 Hz (30 sec) – 50 Hz or customized down to 60 sec</b>
<b>Dynamic range at 1 Hz</b>	<b>113 dB</b>
<b>Integral noise in the band 0,033 (50 sec) – 50 Hz</b>	<b>76 nm/sec (152 μV)</b>
<b>Self-noise</b>	<b>See the graph below</b>
<b>Non-linearity at 1 Hz</b>	<b>0.5 %</b>
<b>Temperature range</b>	<b>Standard -12°C...+55°C (10.4°F...131°F) Low-temperature -40°C...+55°C (-40°F...131°F)</b>
<b>Supply voltage* (all possible options)</b>	<b>12 V Nominal (9-36 V permissible) 5 V via USB</b>
<b>Power consumption</b>	<b>&lt; 1 W during stand-alone recording</b>
<b>Settling time till correct readings after power on</b>	<b>10-30 minutes</b>
<b>Mass locking, mass centering</b>	<b>None required</b>
<b>Connector type, cable</b>	<b>10-pin PC-10 multipurpose connector, 1.5 m USB A-B cable</b>
<b>Case type, material</b>	<b>Aluminum</b>
<b>Case accessories</b>	<b>Bubble level, handle, 3 feet, 2 pointers</b>
<b>Weight</b>	<b>5 kg</b>
<b>Dimensions including handle, diameter x height</b>	<b>180 x 195 mm</b>
<b>Digitizer Specifications</b>	
<b>ADC resolution</b>	<b>24 bit</b>
<b>ADC sampling rate</b>	<b>1, 10, 50, 100, 125, 250, 500, 1000 Hz</b>
<b>Data recording format</b>	<b>Internal binary miniSeed, SEG converters provided</b>
<b>Data storage</b>	<b>microSD 32 GB</b>
<b>GNSS timing accuracy</b>	<b>&lt; 1μs</b>
<b>GNSS receiver</b>	<b>GPS / GLONASS</b>



Source: Center for Molecular Electronics, Moscow Institute of Physics and Technology, 2012

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