

Fibre-Optic System for Rotational Events Monitoring



*New portable, multipoint measuring system
for Earthquake physics, Volcanology,
Geophysical exploration, Civil engineering*

FOSREM[®]



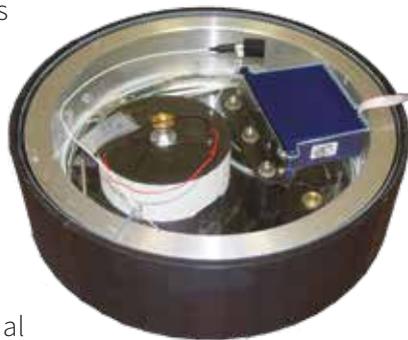
Technical parameters

Rotational rate dynamic range	10 rad/s
Sensitivity	$2,18 \cdot 10^{-8}$ rad/s/ $\sqrt{\text{Hz}}$
Pass band	from DC to $2,56 \cdot 2^n$ Hz ($n=1, \dots, 7$)
Configuration	Open-loop with digital processing
Interfaces	100 Mbps RJ-45 with PoE

Data storage	Internal 64GB flash memory can store up to 7 days of measurement data
Management	Local and remote management and data acquisition over Internet
Power Supply	230 VAC, 12 VDC, via PCU, power consumption less than 15W
Ingress protection	IP66
Dimensions <i>[L x W x H]</i>	360 x 360 x 160 mm, weight: 10kg

Fibre-Optic System for Rotational Events Monitoring

It's a mobile, fiber-optic system, based on Sagnac interferometer for monitoring rotational events and phenomena. The sensor device is optimized for measurement of the rotational rate with sensitivity equal to $2 \cdot 10^{-8}$ rad/s/ $\sqrt{\text{Hz}}$ in pass band from DC to 327,68 Hz. The above mentioned sensitivity as well as rotation rate dynamic range up to 10 rad/s covers weak as well as strong rotational motions connected with irregular object movements, occurring during strong winds, tectonic moves and earthquakes. In this way, the developed system is dedicated to monitoring the rotational vibration in such objects as wind power plants, tall irregular buildings, bridges, and unstable grounds as well as rotational events connected with earthquakes.



Applications

The FOSREM System can be used in the study of geological structures, in new areas of seismology and earthquake engineering. The use of multiple, synchronous operating sensors allows to achieve completely new research perspectives. Dozens of sensors can operate in one worldwide network, transferring data to a central cloud-based system. The data can be viewed and analyzed from anywhere in the world via the Internet. Moreover, control and setup of each sensor is done via the network. The use of encrypted VPN network connections ensures data safety and reliability of the measurements.

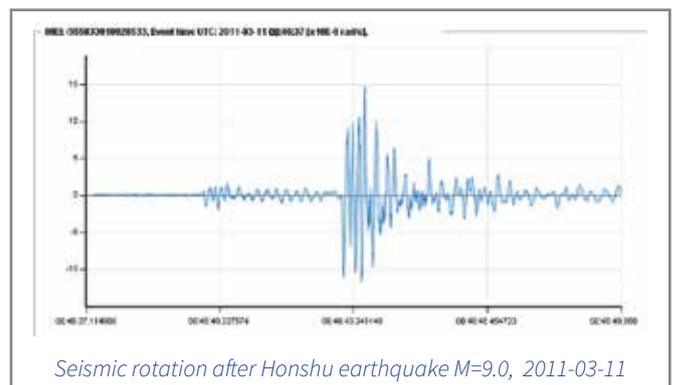
Construction

The FOSREM System includes three parts: FOSREM-BB sensor (FOS-3), one PCU device and PC with special software. The main part is the FOS-3 sensor which contains a complete fiber-optic Sagnac interferometer with 250 mm diameter fiber-optics loop, analog to digital conversion circuits, digital processing unit with two core ARM CPU and power conversion and management parts. All of these are placed in a robust case, meeting the IP66 requirements.

This internal digital processing unit provides rotation speed (Omega) value directly in digital form, 656 samples per second.

The FOS-3 has only one connector. The connection provides data transmission and power supply over only one, standard STP cable within the distance of 100 meters.

The PCU is connected to the Internet over the Ethernet and WiFi local networks or 3G/4G mobile networks. The system provides the VPN functionality, thanks to which you can connect multiple sensors in one large, synchronized network and monitor a large number of sensors from a single location.



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