

# MOTUS 16-SM



## Low Cost Accelerograph

# Multi-purpose 16bit Accelerograph

## Overview

MOTUS 16-SM is a Class C, low cost 16bit accelerograph with noise MEMS tri-axial accelerometer, a power control (UPS) unit and internal battery that can support the unit operation in cases of power outages for several hours, an integrated processing unit enabling on-site processing, Ethernet port for data telemetry, GPS receiver for time synchronization and IP65 environmental protection. The unit has an external USB adaptor for additional communication options (3G,4G,Wifi). There is though a web interface for remote and local parameter setup, SOH and control.

The integrated processing unit comes with linux OS and hosts a seedlink or Earthworm server to enable real-time data acquisition and telemetry. Miniseed data are stored in the microSD card for local archive.

MOTUS 16-SM can be installed as:

- A node of the G-sense Automated Rapid Damage Assessment System. The G-sense system consists of MOTUS 16-SM nodes installed in different floors of a building and a gateway (mini PC) for real-time data acquisition, analysis and archiving. In case of an important earthquake event, the gateway is calculating the inter-story drift for every floor and estimates the damage probabilities by using the building fragility curves and sends damage alerts (CAP Alerts) to MOTUS NMS that monitors all G-sense installations in different buildings of a city. It is worthy to mention that MOTUS 16-SM nodes supports NTP synchronization, in order to provide accurate time to the units that are installed in building locations where a GPS antenna cannot reach open sky,
- A node of Structural Monitoring System for structures such as bridges, dams, port quay walls and piers.
- A node of a strong motion network for low cost ShakeMap and ShakeAlert implementations, since 16bits are enough to record strong earthquake motion. In addition, MOTUS 16-SM is computing on-site the strong motion parameters required for ShakeMap generation and sends them at the central acquisition server, avoiding the real-time data transmission, minimizing thus, the communication costs.
- A standalone accelerograph to provide alarms in cases of an earthquake event in smart buildings and Cities.

## Applications

### Ideal for:

- Automated Earthquake Rapid Damage Assessment
- Structural Monitoring of Buildings, Bridges, Dams, Port Quay Walls and Piers
- ShakeMap and ShakeAlert
- Smart Buildings and Cities
- Earthquake Alarming



# Specifications

<b>Power</b>	
Input Voltage	5 VDC
Operating Power Consumption	~3W
Internal UPS with 2600mAh LiPO battery (Up to 5 hours Autonomy, Automatic battery charger)	
Powering options	Ext. AC adapter Ext. battery or solar panel
<b>Internal Accelerometer</b>	
Acceleration Measurement Range	± 2 g
Acceleration Measurement Resolution	76.3 µg
Frequency Range	DC to 497 Hz
White Noise $\sigma$	300 µg
Noise Density	45 µg / $\sqrt{\text{Hz}}$
Minimum Drift $\sigma$	37 µg
Sensitivity	660 mV/g
<b>ADC Board</b>	
Analog to Digital Converter Resolution	16 bit
Current Consumption Max	35 mA
Sampling Rate	1 Hz to 1000 Hz
Dynamic range	93.8 dB
<b>Time Base</b>	
Type	GPS with ext. Antenna
Time accuracy (GPS locked)	<10µsec
NTP synchronization	<80µsec
<b>Integrated Processing Unit</b>	
Operating System	Linux
RAM	512Mb
Storage (microSD)	32Gb
Communications	Ethernet, wifi, usb
Recording modes	Cont., Event (STA/LTA), Level
Data Format (seedlink server installed)	mSEED
<b>Enclosure</b>	
Environmental protection	IP65

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