

VIBROMETER DATASHEET

SMART MONITORING SYSTEM

Move Solutions™ is a leading company in **Smart Structural Health Monitoring** thanks to our world-class service in both dynamic and static structural analysis. We offer unique **wireless SHM systems** for all civil infrastructures. Our sensors are wireless, cost-effective, non-destructive, robust and small. Easy to install and to configure, they are perfect for structures with difficult access, where wired systems would involve complex and expensive installations, or for historic buildings that require special attention and non-invasive technology. By combining the latest **IoT technology** with deep industry knowledge, Move Solutions™ is disrupting the world on Structural Health Monitoring.

KEY PARAMETERS

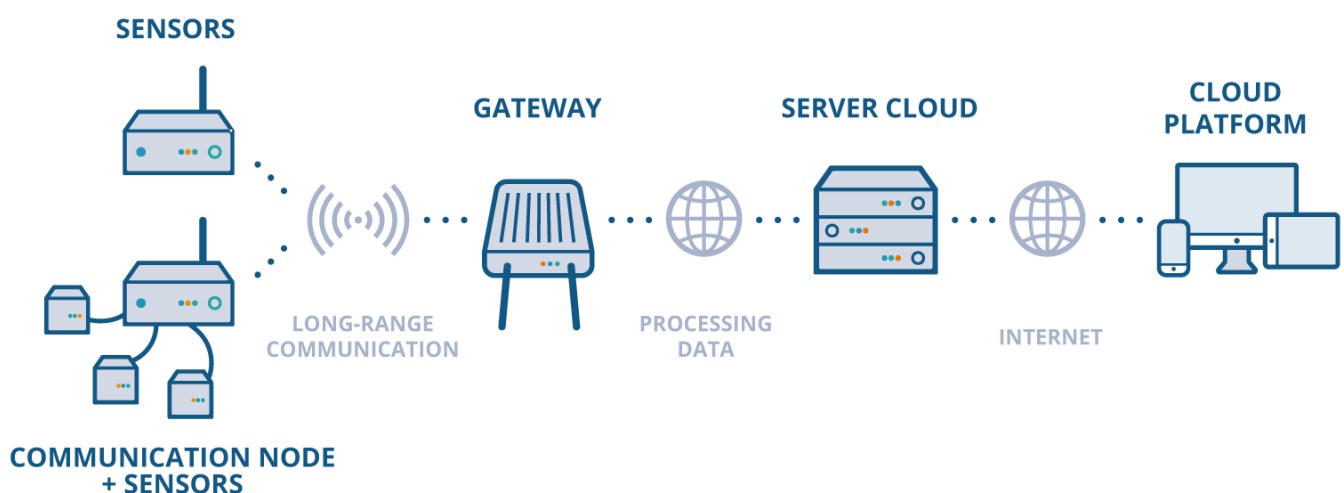
- No wiring
- Easy installation on the structure
- Built-in long-life battery
- High autonomy
- Minimum maintenance required
- Long-range communication
- Fully remote management and customization
- Data analysis with advanced algorithms
- Modular system
- High precision
- Waterproof rating IP67
- Triaxial wireless vibrating sensor
- Acquisition of: Velocity, Frequency, Temperature
- Standards: DIN 4150, UNI 9916
- Two types of acquisition methods: programmed and triggered by unusual events
- Absolute synchronization ± 1 second
- Resolution 0.0015mm/s
- Range of ± 50 mm/s
- Local Storage of up to 2000 acquisitions, one acquisition is composed by 1024 Datapoint. All the acquisitions are also retrievable by USB Connection with a PC
- Integrated temperature sensor

HOW IT WORKS

Move Solutions™ offers a complete package of dynamic and static wireless monitoring devices and a **Cloud Platform** for data visualization and sensor management. Once the sensors and system gateways are properly installed on site, they are ready to receive, store and send data. You can view all this data in real time through a Web interface that allows users to remotely monitor the site or infrastructure. The user can set different parameters for each individual sensor, including sampling rates, resolution, alarm thresholds, activation and much more. The Move Solutions™ monitoring system guarantees accuracy, safety and reliability and a significant reduction in overall monitoring costs.

ADVANTAGES

- Remote monitoring
- No wiring
- Easy installation and use of the system
- Data processing to optimize operations
- Quick addition of sensors to extend the monitored area
- Simple maintenance
- Risk reduction and high reliability
- Cost saving on installation, labor and material needed



VIBROMETER

The triaxial Vibrometer is able to measure the velocity of the point where it is installed, providing complete frequency and amplitude analysis of vibrations.

With the use of Vibrometer devices it is possible to highlight any seismic vibrations, mainly induced by external factors, and monitor their risks. All sensors also record temperature, are battery powered and use the LoRaWAN wireless communication protocol.



VIBROMETER OUTPUT

The Vibrometer acquires triaxial velocity data (mm/s or inch/s) through the continuous integration of the onboard accelerometer output, with a high sample rate.

The system comes with two options:

Time-triggered: Velocity report is sent at a predefined period (remotely configurable between 1 minute - 2 minutes - 5 minutes...). This report contains the peak frequency and the peak amplitude measured on all three axes, together with the temperature.

The Vibrometer has a local storage system available where it saves all the acquisitions which exceeded the threshold. Wireless transmission of collected results are sent and displayed on the Move System.

Threshold-triggered: Velocity report is sent when a predefined threshold is exceeded. This report contains the peak frequency and the peak amplitude measured on all three axes, together with the temperature. Every acquisition is stored in the local storage. Wireless transmission of collected results are sent and displayed on the Move System.

DOWNLOAD DOCUMENTATION

Visit the website at www.movesolutions.it to download further documentation relating to technical specifications and/or information on the Move Solutions™ structural monitoring system.

QUICK GUIDE TO USE

The triaxial Vibrometer device is “plug and play”; by screwing the special antenna on the cover, the device will immediately start to detect and send data. To ensure correct operation, see the chapter “Tiltmeter Orientation” and “Tiltmeter Installation Guide”, the Tiltmeter sensor must be correctly oriented and installed, following these specific steps:

1. ORIENTATION:

- X, Y axes shown on the orientation label, must be aligned as the axes of interest of the structure.
- The Z axis must always be oriented upwards.

2. INSTALLATION ON THE STRUCTURE:

- Agree with the supplier company on the correct place of installation on the structure of the Tiltmeter device.
- Firmly install the Vibrometer on the wall, ceiling or floor using the special plate and screws/wall plugs supplied. It is possible to rotate the plate relative to the device to keep the X axis parallel to the gravitational axis and oriented upwards, regardless of the agreed installation location.
- To install multiple Vibrometers on the same structure, use the same orientation convention, i.e. with the axes shown on the label of each specific device oriented in the same way.
- Install all sensors on the structure before powering and turning on the Gateway device.

3. SCREWING THE ANTENNA:

- Before activating the Gateway, screw the LoRaWAN 868 Mhz antenna onto the device cover.

After meeting these orientation and installation requirements, the Vibrometer device will be able to detect and send data to the Gateway without interference or data alteration.

Verify, via the Web Platform, the correct functioning of the sensor just installed. From the moment the Gateway is powered up, and therefore from the actual start-up and activation moment, a maximum waiting of about an hour is required before it is possible to correctly view all the sensors online.



The triaxial Vibrometer is able to measure the velocity of the point where it is installed, providing complete frequency and amplitude analysis of vibrations. With the use of Vibrometer devices it is possible to highlight any seismic vibrations, mainly induced by external factors, and monitor their risks. Battery power supply and LoRaWAN wireless transmission. The acquisition modes can be set by the user via the web interface provided in the service.

TECHNICAL SPECIFICATIONS

OPERATION

Wireless data transmission of	Maximum detected PPV, timestamp, maximum amplitude and frequency detected for each axis, maximum velocity detected for each axis, temperature.
Local storage of	Up to 2000 acquisitions, one acquisition is composed of 1024 Datapoint. All the acquisitions are retrievable by USB Connection with a PC.
Custom operation software	It is possible to request custom features that the client deems necessary for their business.
Sample rate	512Hz (Derived from a 4 kHz sampling rate by means of downsampling)
Absolute synchronization	± 1 second
Supportable Standards*1	DIN4150, UNI9916, BS7385, SN 640 312a, RI8507

MEASUREMENT

Technology	MEMS technology – Triaxial
Acquisition of	<ul style="list-style-type: none"> ▪ Velocity ▪ Frequency ▪ Temperature
Resolution	0.0015 mm/s
Range	± 50 mm/s
Noise density	22.5 µg/√Hz

RADIO	
Radio channel	LoRaWAN communication protocol
Radio channel frequency	ISM 868MHz / 915MHz
Link coverage*2	1 km (line of sight with the Gateway)
GENERAL DATA	
Ingress protection*3	IP67
Battery	1 lithium battery type "D" 19Ah 3.6V
Operating temperatures	-40°C / +85°C
Dimensions	75 x 80 x 57 mm
Weight	1.1 Kg
Case material	Alloy GD-AISI12
Corrosion resistance	>1000 hours in salt spray
INSTALLATION	
Method	Two-point mounting using screws and plugs (Ø6mm, L:30mm)
Site	<ul style="list-style-type: none"> ▪ Fixing on wall ▪ Fixing on ceiling ▪ Fixing on ground ▪ Fixing underground

BATTERY LIFE		
Acquisition rate	Radio connection quality	Estimated battery life*4
1 minute	Good	1.4 years
5 minutes	Good	1.5 years
1 minute	Bad	1 year
5 minutes	Bad	1.3 years

*1 A calibration may be necessary to be fully compliant with the standards. Calibration service available on request.

*2 Wireless coverage of the device may vary depending on the scenario.

*3 Guaranteed only with the dust cap or smart cable correctly screwed.

*4 Battery life may shorten when operating in extreme temperatures.

REVISION HISTORY

Version v3.

Version	Changelog
v1	First revision
v2	Improved accelerometer output description
v3	Document template update

Note: Specifications are subject to review and change without notice.