

MOVE SOLUTIONS

DATASHEET OF TRIAxIAL VIBROMETER

SYSTEM FOR MONITORING

Move Solutions for monitoring the stability of a structure recommends **DECK** sensors, devices capable of capturing the amplitude of dynamic oscillation. Thanks to the use of this sensor it is possible to continuously monitor the modal parameters of the structure and verify its stability over time. It is also possible to understand the amplitude of the dynamic deformation, or even any seismic vibrations and monitor the risk.

The Move monitoring system also includes **Accelerometers** for modal study, **Tiltmeters** for static monitoring, **Vibrometer** for vibration analysis and **Strain gauges** for monitoring cracks and openings. Using the **Communication Node** with multiple inputs (analog or digital) it is possible to monitor the water pressure and many other parameters of the surrounding areas.

FEATURES

- High precision
- Data analysis with advanced algorithms
- No wiring
- Long-range communication
- Modular system
- High autonomy
- Complete management and customization
- Minimum maintenance required
- Strong design

MEASUREMENTS

- Dynamic displacement amplitude monitoring
- Modal analysis of the structure
- Vibrational study of the structure
- Static monitoring of the inclination of the structure
- Analysis of the amplitude of the dynamic deformation
- Monitoring of cracks and openings
- Real-time water pressure monitoring
- Highlighting of seismic vibrations

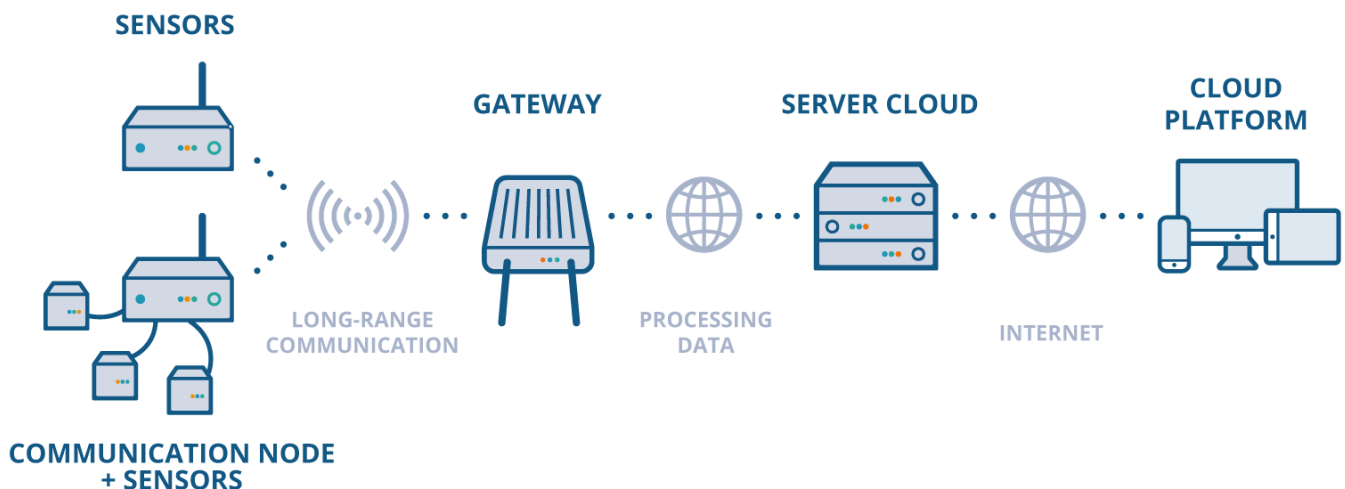
HOW IT WORKS

Move Solutions includes a complete package of wireless devices and a **Web 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.

LOGISTICAL-ECONOMIC ADVANTAGES

- Remote monitoring of difficult to access structures
- Ease of installation and use of the system
- Data processing to optimize operations
- Easy addition of sensors to extend the monitored area
- Cost reduction through easy maintenance
- No wiring, saving on installation materials
- Consequent labor savings
- Risk reduction and high reliability



TRIAXIAL 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 try to send data to the Gateway device. To ensure correct operation the Vibrometer 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 Vibrometer 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 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 all the antennas 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.

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. 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 Standards¹ | 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 $\mu\text{g}/\sqrt{\text{Hz}}$ |

| 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 | |
|--------------------------------|--------------------------------------|
| Waterproof Rating 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-ALSi12 |

| INSTALLATION | |
|--------------|---|
| Method | Two-point mounting with 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 | Battery Estimation ⁴ | |
| 1 minute | Good | 1.4 years | |
| 5 minutes | Good | 1.5 years | |
| 1 minutes | 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

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