

DECK – DYNAMIC DISPLACEMENT SENSOR

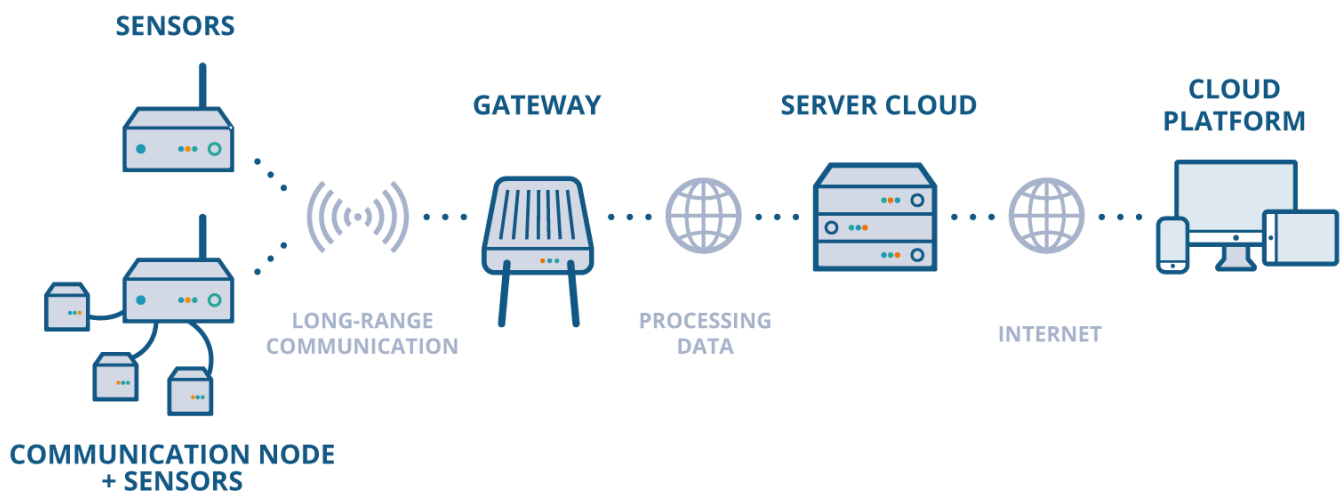
DATASHEET

THE SYSTEM: SMART SHM

Move Solutions is a trusted leader in **Smart Structural Health Monitoring (Smart SHM)**. Our wireless system offers a remote, continuous, and comprehensive analysis of the health of the structures. By integrating cutting-edge **Internet of Things (IoT)** technology with Structural Health Monitoring practices we promote more sustainable and resilient infrastructure.

KEY PARAMETERS

- Easy installation on the structure
- Minimum maintenance required
- Long-range communication
- Fully remote management and customization
- Data analysis with advanced algorithms
- Modular system
- High precision
- Waterproof rating IP67
- Long-life battery
- Integrated temperature sensor



HOW IT WORKS

Move Solutions offers a wireless monitoring system for *static, dynamic, geotechnical and environmental analysis* of all civil infrastructures: bridges, construction sites, rails, and more.

Small **battery-powered sensors** combined with an **IoT Platform** and highly **advanced algorithms** provide a comprehensive monitoring solution aimed at simplifying asset management. The data recorded by the sensors can be viewed on Move Solutions IoT Platform, which allows users to remotely monitor and manage structures in real time. They can set different operating parameters of each sensor, such as sampling rates, resolution and full scale, alarm and activation thresholds, and much more. That allows users to detect structural damage in time to implement preventive maintenance and reduce costs. Move Solutions system empowers infrastructure owners with insights to promote a proactive monitoring approach for safer, more sustainable, and resilient infrastructures.

ADVANTAGES

- Reduction of manual and on-site measurements
- Reduced downtime and disruptions to regular operations
- Real-time, remote and continuous data visualization
- Short-term and long-term data analysis
- Easy addition of sensors to extend the monitored area
- Cost reduction thanks to easy installation and maintenance
- Risk reduction and high reliability
- Preventive maintenance

THE DEVICE: DECK – DYNAMIC DISPLACEMENT SENSOR

The DECK - Dynamic displacement sensor is the only patented wireless sensor on the market capable of measuring the uniaxial oscillations of the structure providing displacement values with an accuracy equal to that of the interferometric radar (0.01 mm). The DECK device samples at 50 Hz, constantly and remotely. It is also capable of detecting temperature and vibration frequency. DECK is battery powered and uses the LoRaWAN wireless communication protocol.



DECK OUTPUT

DECK acquires data from 10 seconds before to 20 seconds after (tot. 30 seconds) each stress of the structure when the activation threshold previously set on the Web Platform is exceeded. The displacement values measured are expressed in mm. It also acquires temperature data.

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 DECK sensor is “plug and play”; by screwing the special antenna on its cover, the device will immediately start trying to communicate with the Gateway. To ensure that the device is working properly the DECK device must be oriented and installed correctly, following these specific steps:

1. ORIENTATION:

The symbol shown in the center of the label indicates which is the axis of the structure (X; Y; Z) with respect to which the DECK device collects measurements. This symbol also shows the orientation and direction of that axis. Therefore:

- The axis of the structure of interest to the measurement must be aligned and oriented according to the representation of the symbol.
- The letter identifies DECK's specific measurement axis.

Z axis = Gravitational axis.

X - Y axes = Longitudinal or transverse axis of the structure.

2. INSTALLATION ON THE STRUCTURE:

- The installation location may vary depending on the orientation label on the device. Agree with the supplier company on the correct place of installation of the DECK device on the structure.
- Securely install the DECK device on the wall, ceiling or floor using the special plate and screws/wall plugs supplied.
- 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 DECK device will be able to detect and send data to the Gateway without interference or data alteration.

Verify, via the Cloud 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.

TECHNICAL SPECIFICATIONS

OPERATION

Operation with programmed acquisitions	Record of an event for each oscillation that exceeds the activation threshold set by the user. For each event: acquisition of displacement for 30 seconds (10 seconds before and 20 seconds after exceeding the threshold). Acquisition of the temperature at each event.
Custom operation software	It is possible to request custom features that the customer deems necessary for their business.
Sampling frequency	50Hz

MEASUREMENT

Acquisition of	<ul style="list-style-type: none"> ▪ Displacement ▪ Temperature
Displacement resolution	0.012mm, 0.024mm
Shift accuracy	±0,01 mm
Measurement of axis	of the Parallel axis to the gravity axis (Z) or perpendicular (X or Y)
Range	± 1.5 mm, ± 3mm
Displacement Bandwidth (-3DB)	0.70 - 15 Hz
Temperature accuracy	0,5°C
Temperature Resolution	0,125°C

RADIO

Central processing unit	ARM Cortex M0 32 Bit
Radio channel frequency	868 MHz (EU) - 125 KHz BW (LoRaWAN)
Transmission power	14 dBm
Link coverage*1	1km (line of sight with the Gateway)

GENERAL DATA

Waterproof rating*2	IP67
Reliability	Internal Watchdog (Inside the Microcontroller) External Watchdog (External to the Microcontroller)
Battery	4 lithium battery type "D" 19Ah 3.6V

Operating temperatures	-40°C/+85°C
Case dimensions	140 x 170 x 65 mm
Case + plate dimensions	200 x 200 x 80 mm
Weight	2.4 Kg

INSTALLATION

Method	Four-point mounting using screws and plugs (Ø10mm, L:30mm)
Site	<ul style="list-style-type: none"> ▪ Fixing on wall ▪ Fixing on ceiling ▪ Fixing on ground

BATTERY LIFE

Sample rate	Estimated autonomy* ³
5 samplings / hour	2 years

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

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

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

REVISION HISTORY

Version v2.

Version	Changelog
v1	First revision
v2	Document template update

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