

Vibrating wire Node

The Wi-SOS 480 vibrating wire (VW) one- and five-channel data nodes easily connect vibrating wire instruments such as piezometers, load cells, strain gauges and pressure cells to the internet.

The vibrating wire data nodes are autonomous battery-powered devices with C-size batteries that can last up to 10 years with minimal to zero maintenance required. The units may also be used as standalone nodes for manual monitoring and can be easily configured and connected with a USB cable and an Android phone.

Vibrating wire sensors are widely used in geotechnical, hydrological and structural monitoring because of their robustness and long term stability. The VW data nodes provide accurate measurements of the vibrating wire sensors and their thermistors.

The data nodes have an internal barometer which collects and transmits barometric pressure data with each reading. This compensates for changes in atmospheric pressure that vibrating wire sensors, particularly piezometers, are usually subjected to in various applications. This feature also eliminates the need for an external barometric sensor in order to acquire accurate measurements.

FEATURES

- Accurate vibrating wire measurement.
- Integrated barometer.
- Long battery life (>7 years @1h sampling rate).
- Sensor detection.
- Three versions available - 1 and 5 channels.
- Durable and versatile.

CONNECTIVITY

- User-friendly Android configuration app included.
- Web browser software.
- Single-gateway network setup with CMT Edge software (dataserver and radio server hosted in the gateway and data access through standard CSV downloads, FTP push, Modbus TCP).
- Multi-gateway network setup with CMT Cloud software and advanced features with data access via standard CSV downloads, FTP push, API REST and MQTT push.¹

¹ MQTT available upon request



Construction sites and mines are constantly changing, and sensors may sometimes get disconnected due to a cut cable or other physical damages. The vibrating wire data nodes are capable of detecting if a sensor is properly connected and if not, the reading is discarded to avoid false measurements.

5 channel

The 5-channel data node may be used for scenarios in which one borehole contains multiple sensors. This can be the case in mining or civil works, for example, where up to 5 piezometers or multipoint borehole extensometers may be installed in a single borehole. It is also ideal for groups of sensors like strain gauges and load cells with 3 to 5 sensors.

1 channel

The aluminium alloy box version is offered with an external antenna which improves the range for long distance applications such as strain gauges or pore water pressure monitoring.

APPLICATIONS²

- Foundations and deep excavations.
- Tunnels.
- Embankments and landfills.
- Mines.
- Bridges and structural health monitoring.
- Landslides and slope stability monitoring.

ADVANTAGES

- High reliability and robustness.
- Long-range communications (up to 15 km / 9 miles).
- Robust, small and weather-proof box.
- Easy configuration.
- Connectivity for individual sensors and most common borehole installations.
- Proven track record, pioneer in the field.

² The LS-G6-VW is not suitable to be submerged in water or for embedding in concrete linings.

Main specifications

GENERAL

Battery life estimation^{3,4}	1 channel, 1 cell	5 channels, 4 cells	Estimations for Saft LSH 14 batteries based on the lifetime mathematical model.
sampling rate 5 min	0.9 year	2.2 years	
sampling rate 1 h	3.5 years	7.1 years	
sampling rate 6 h	4.6 years	>10 years	
Battery type	3.6V C-Size user-replaceable high energy density battery pack (recommended Saft LSH 14)		
Sampling rate	30 seconds to 1 day		
Device Configuration	Android Mobile Application		
App Advanced functionalities	Threshold configuration feature to discard readings and perform radio signal coverage tests for easy installation.		

VIBRATING WIRE

Data logger			
Channels (frequency and temperature)	5	1	
Measurement method	Embedded algorithms increasing immunity to noise		
Excitation wave	± 5 V		
Measurement range	300 to 7 000 Hz		
Resolution ⁴	<0.01 Hz		
Accuracy ⁴ as f(sweep range)			
Vibrating wire sweep range ⁵	Excitation Frequencies (Hz)	Accuracy - Error (%)	Resolution (Hz)
Sweep A	450 - 1 125	0.013	0.002
Sweep B	800 - 2 000	0.008	0.002
Sweep C	1 400 - 3 500	0.010	0.004
Sweep D	2 300 - 6 000	0.009	0.007

³ Estimations for Saft LSH 14 batteries based on the lifetime mathematical model.

⁴ Typical Europe radio configuration. Spreading factor 9, radio transmit power 14dBm. Considering laboratory conditions. Consumption varies depending on the sensor used, sampling rate and environmental and wireless network conditions.

⁵ Resolution and accuracy within operating temperature

⁶ The vibrating wire sweep range selection is determined by the frequency range of the type of instrument you are reading.

THERMISTOR

Measurement range	0 ohm to 4 Mohm
Resolution	1 ohm
Accuracy (20°C) ⁶	0.05°C (0.04 % FS)

BAROMETER

Pressure Range	300 to 1 100 hPa.
Relative accuracy (950 to 1 050 hPa at 25° C): ±0.12 hPa.	

MEMORY

Memory Structure	Circular Buffer
Maximum Memory Records	72 500 readings (time and 5 sensors)

MECHANICAL

Node	5 channels	1 channel
Box dimensions (WxLxH):	100x200x61 mm	100x100x61 mm
Overall dimensions:	140x220x61 mm (excluding antenna)	140x120x61 (excluding antenna)
Operating temperature:	-40°C to 80°C (-40°F to 175°F)	
Weather protection:	IP67	IP68 (2m for 2 hours)
Weight (excluding batteries):	1 268 g	662 g
Antenna:	External: 114 mm length (including connector)	External: 114 mm length (including connector)
USB (configuration/ ext. power):	External mini USB	Internal mini USB
Box material:	Aluminium alloy	
Clamping range ø:	4-10 mm	
Batteries:	from 1 up to 4	1
Grounding connector:	Integrated	
Surge:	Complies with IEC61000-4-5, Class 2, test level ±1 kV, 2 ohms	

Main specifications

RADIO SPECIFICATIONS

Radio band	ISM sub 1 GHz
Operating frequency bands	Adjustable
Bidirectional communications	Remote sampling rate change/ clock synchronization
Maximum link budget	151 dB / 157 dB
Radio configuration	Star (no repeaters needed)
Radio range with external antenna	
Range open sight.	15 km
Range city street.	4 km
Range manhole in a city street.	2 km
Tunnel	4 km

ACCESSORIES

Other mounting brackets and accessories available on request.

Accessories compatibility	5 channels	1 channel
Plate for pole mounting Includes: U-bolts and nuts for a pole $\varnothing$ less than 50 mm.	✓	✓
Plate for pole mounting Includes: U-bolts and nuts for a pole $\varnothing$ less than 35 mm.	✓	✓
External mounting brackets (set of 2) for wall mounting.	✓	✓
Surge module to comply with IEC61000-4-5 Class 4, test level ± 4 kV, 2 ohms.	✓	✓

An inner view of a vibrating wire data node 1 channel. The data nodes are autonomous battery-powered devices with C-size batteries that can last several years with minimal to zero maintenance required.



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