

Loadensing G7

Vibrating Wire

The G7 Vibrating Wire (VW) one- two- and six-channel data loggers automate data collection of instruments such as piezometers, load cells, strain gauges and pressure cells wirelessly to your monitoring systems.

It is equipped with environmental sensors to optimize the data acquisition (i.e. barometer for pressure compensation) and device maintenance (i.e. humidity and temperature). The RCR variant is prepared for being embedded in concrete.

The device can initiate trigger-based acquisition in response to vibration or tilt changes and is specifically designed for harsh environments such as railway, mining, and construction.

Key features



ADVANCED OPERATIONAL MODE

Enhanced processing capabilities, enabling more adaptive and autonomous monitoring strategies. Devices can now analyze incoming data locally and react in real time, reducing transmission, optimizing battery life, and enabling new use cases.



INTEGRATED SENSORS

Built-in sensors that enhance reliability and expand monitoring applications, without requiring additional hardware.

Internal environmental monitoring: Integrated pressure, temperature, and humidity sensors to compensate for atmospheric pressure changes, monitor internal conditions, and detect issues such as enclosure failure or improper sealing.

Motion detection: A low-power accelerometer enables trigger-based monitoring in response to seismic activity or ground movement.



EXTENDED BATTERY LIFE

Support high-capacity D-size batteries, enabling more than 15 years of operational lifespan depending on device variant, configuration and use.



MODEL VARIANTS

The G7 Vibrating Wire is offered in five different variants. 6, 2 and 1 channel with external antenna for maximum range, and 6 and 2 channel RCR with internal antenna designed for easy encapsulation if extra protection is needed and suited to be embedded in concrete.



SEAMLESS CONNECTIVITY & CONFIGURATION

Bluetooth connectivity to allow for fast, wireless configuration via the Worldsensing App. The USB-C interface ensures universal compatibility for configuration and supplies external power to the device when necessary.



LSG7VW-1XL0



LSG7VW-2XL0



LSG7VW-6XL0



LSG7VW-2IL0-RCR



LSG7VW-6IL0-RCR

Operational modes

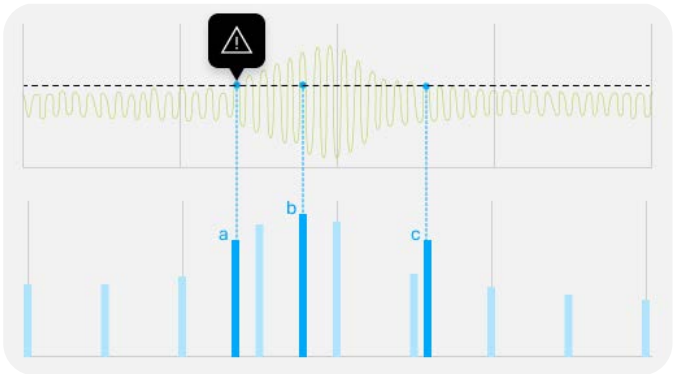
In addition to periodic readings, the G7 Vibrating Wire Data Logger comes with advanced operational modes that help you optimize workflows, extend battery life, and reduce the number of devices required in the field.

Triggered Measurements | Activated by motion

The motion detection sensor detects activity events from variations in absolute angle, angular velocity, or acceleration. When a threshold is exceeded, the primary sensor is triggered to acquire measurements.

The acquisition timing and number of data points can be configured as per : on event (a), on and after event (a, c), after an event (c), or multiple events (a,b,c).

Users can also configure delays and cooldown times to better adapt the measurement process to their monitoring requirements.



Mobile App advanced features

FEATURE	DESCRIPTION
Auto diagnosis	Generates a test signal at a known frequency to verify channel integrity. Automatically checks excitation signal, frequency integrity, and reading consistency.
Autosweep	Automatically detects the optimal sweep frequency by scanning from 300 Hz to 7 kHz and identifying the resonance response.
High-frequency local acquisition mode	Designed for applications requiring more frequent data updates. Readings are stored locally on the device only. Activating this mode temporarily disables standard periodic measurement transmission. User-configurable parameters: • Sampling period: 2 s, 5 s, 10 s, 15 s, 30 s • Duration: 5 min, 15 min, 30 min, 1 h, 2 h

Main applications

The Vibrating Wire Data Logger supports precise, long-term monitoring across a variety of geotechnical and structural applications. It is compatible with a wide range of vibrating wire sensors, enabling reliable data collection for stability, load, and deformation measurements. Typical use cases include the following:

GEOTECHNICAL MONITORING
Ground stability monitoring using vibrating wire multi-point extensometers
Ground settlement measurement with settlement cells connected to the data logger
Pore water pressure and level monitoring using vibrating wire piezometers

STRUCTURAL HEALTH MONITORING
Crack and joint movement monitoring with crackmeters and joint meters
Structural load and tension measurement using load cells and strain gauges

TUNNEL CONSTRUCTION MONITORING
Structural health monitoring of concrete segments
Lining integrity during tunnel construction
Long-term tunnel infrastructure maintenance
Concrete embedded option through RCR variants.

TECHNICAL SPECIFICATIONS

GENERAL

Input types	Vibrating wire and thermistor per channel		
Data logger	LSG7VW-6XL0 LSG7VW-6ILO	LSG7VW-2XL0 LSG7VW-2ILO	LSG7VW-1XL0
Channels (VW + TH)	6	2	1
Secondary sensors	- Barometer - Motion detection sensor - Temperature sensor - Humidity sensor		
Operating temperature	-40 °C to 80 °C (-40 °F to 175 °F)		
Power source	3.6V D-size LSH20 Li-SOCl2 battery cell		
Reporting period	Selectable from: 30 s 1, 2, 5, 10, 15, 30 min 1, 2, 4, 6, 12, 24 h		
Operational modes	- Periodic Mode - Triggered Measurements Mode (TMM)		
Time synchronization discipline by radio	Better than ± 30 seconds		
Device configuration	- Worldsensing App - CMT Cloud - CMT Edge		
Surge protection compliance ¹	IEC61000-4-5, Class 2, test level ±1 kV, 2 Ω		

VIBRATING WIRE

Measurement method	Embedded algorithms increasing immunity to noise
Excitation wave	± 5 V
Measurement range	300 to 7 000 Hz
Resolution ¹	< 0.01 Hz

Accuracy² as f (sweep range)

Sweep range ³	Excitation frequencies (Hz)	Accuracy - error (%)	Resolution (Hz)
Sweep A	450-1125	0.013	0.002
Sweep B	800-2000	0.008	0.002
Sweep C	1400-3500	0.010	0.004
Sweep D	2300-6000	0.009	0.007

THERMISTOR (PER CHANNEL)

Measurement range	0 Ω to 4 MΩ
Resolution	1 Ω
Accuracy⁴	
Accuracy at 25°C (ambient)	0.04°C (0.03% FS)
Accuracy (-40°C to +80°C)	0.4°C (0.33% FS)

SENSOR DETECTION

Vibrating wire and thermistor	G7 Edge devices perform continuity checks on both VW and thermistor channels. If a sensor disconnects or a cable is cut, readings are discarded and an error is flagged, preventing CMT and external platforms from processing invalid data
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BAROMETER

Pressure range	260 - 1260 hPa (absolute pressure)
Relative accuracy	±0.015 hPa

MOTION DETECTION SENSOR

Sensor type	Low power, 3-axis MEMS accelerometer
Peak-to-peak noise	200 ug/Hz
Offset temperature dependence	±0.68 mg/°C

TEMPERATURE SENSOR

Range	-40° to +80° C
Accuracy	1° C
Resolution	1° C

HUMIDITY SENSOR

Sensor type	Humidity sensor to detect lack of sealing/locking of the enclosure. Statistics of the relative humidity measurements transmitted in the health messages
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MEMORY

Memory structure	Circular buffer
Memory capacity	73 500 readings for 6 channels
	200 000 readings for 1 channel

¹ It is possible to increase the level of surge protection compliance by installing surge protector modules (code: LS-ACC-G7VW-SURGE) into the terminal blocks. With this additional protection, the system can achieve Class 4 compliance, with a test level of ±4 kV / 2000 A (2 Ω) when tested at the system level according to IEC 61000-4-5.

² Resolution and accuracy within operating temperature.

³ The vibrating wire sweep range selection is determined by the frequency range of the type of instrument you are reading.

⁴ The accuracy and resolution are calculated based on a 3 K thermistor.

DEVICE VARIANTS

Device variants	VW 6X	VW 2X	VW 1X	VW 6I RCR	VW 2I RCR
Vibrating Wire+thermistor channels	6 channels	2 channels	1 channel	6 channels	2 channels
Overall dimensions (WxLxH)	140x220x61 mm	140x120x61 mm	140x120x61 mm	126x200x61 mm	126x100x61 mm
Weight (excluding batteries)	1268 g	662 g	662 g	1268 g	662 g
Antenna	External antenna	External antenna	External antenna	Internal antenna	Internal antenna
Battery holder capacity	Up to 2 batteries	1 battery	1 battery	Up to 2 batteries	1 battery

MECHANICAL SPECIFICATIONS

Weather protection	IP68 ⁵
Communication port	Internal USB-C
Box material	Aluminium alloy
Lid material	Polycarbonate
Clamping range $\varnothing$	4-10 mm
Grounding connector	Integrated

OPERATIONAL MODE

TRIGGERED MEASUREMENTS MODE (TMM)

Configurable parameters	• Trigger type • Threshold value • Response strategy • Delay and cooldown values • Enable/disable statistics report
Response strategies	Data collection from primary sensor configurable from: • On event • After event • On and after event • Multiple events (3 max)
Trigger types Threshold breach configurable from:	
Absolute angle variation	θ_{current}
Angular velocity	$\frac{\theta_{\text{current}} - \theta_{\text{previous}}}{30\text{s}}$
Acceleration	$ a - a_{\text{ref}} $

Trigger type specifications

Parameter	Absolute angle	Angular velocity	Acceleration
Range	$\pm 90^\circ$	6° s^{-1}	$\pm 2 \text{ g}$
Sampling rate	30 s	30 s	100 Hz
Resolution	0.2°	$0.01^\circ \text{ s}^{-1}$	0.1 mg
Repeatability	0.3°	$0.03^\circ \text{ s}^{-1}$	2 mg

Statistics report

Reporting format	When enabled, it sends: • Trigger type • Number of events • Event duration • Configuration-related values
Reporting period	Selectable from: • Per event • Periodic (12 h, 24h)
Advanced tools	Baseline reading tool available. Consult user manual

⁵ Water ingress protection also depends on the quality and condition of the cable coming from the sensor. Additionally, the cable's curvature near the cable gland can reduce this protection.

BATTERY LIFE ESTIMATIONS ⁶				
Reporting period	VW 6X	VW 6X TMM ON	VW 2X VW 1X	VW 2X VW 1X TMM ON
5 min	4.2 (4.1) years	4.1 (4.0) years	4.1 (3.9) years	3.9 (3.7) years
1 h	15.9 (14.6) years	14.5 (13.4) years	13.6 (11.8) years	11.8 (10.5) years
6 h	20.1 (18.1) years	18.0 (16.3) years	16.4 (13.9) years	14.0 (12.1) years

RADIO SPECIFICATIONS	
Radio band	ISM sub 1GHz
Operating frequency bands	Adjustable
Bidirectional communications	- Remote reporting period adjustment - Clock synchronization - Remote configuration of operational modes - Remote switching between operational modes
Maximum link budget	151 dB / 157 dB
Configuration	WS LoRa / LoRAWAN
RADIO RANGE	
Open sight	15 km
City street	4 km
Manhole in a city street	2 km
Straight tunnel	4 km (3 km with RCR)
Curved tunnel	1 km (800m with RCR)
Tunnel with TBM interference	170m with RCR

⁶ Values in parentheses = with BLE on.

Battery life estimations are based on a mathematical lifetime model using the Barcelona weather profile and laboratory conditions. Average values are provided for reference. Actual consumption may vary depending on sampling rate, environmental conditions, and wireless network performance.

Conservative radio link scenario: spreading factor 9, radio transmit power 14 dBm. Triggered measurements using acceleration as trigger type and considering 2 event measurements per day.

GENERAL DISCLAIMER:

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ACCESSORIES ⁷	
WS-ACC-POLE-PL8	Aluminum plate for pole mounting. Works with both U-bolts of 35 mm or 50 mm
WS-ACC-U35	U-bolts and nuts for a pole diameter less than 35 mm. To use with WS-ACC-POLE-PL8
WS-ACC-U50	U-bolts and nuts for a pole diameter less than 50 mm. To use with WS-ACC-POLE-PL8
LS-ACC-IN15-HP	Versatile plate for horizontal and vertical surface mounting. Not compatible with LSG7VW-6ILO/6XLO
LS-ACC-MEC-MP	External mounting brackets (set of 4) for wall mounting
LS-ACC-ANT-LORA	Mount bracket. Enables LoRa antenna mounting with extension with clamps/rods
LS-ACC-BIG-HVP	Versatile mount plate for large devices. Horizontal, vertical, or pole mounting with 50mm U-bolts or metal clamps
LS-ACC-G7-VP	Mounting plate for medium-sized nodes for magnetic fix to structures. Attachment option: LS-ACC-MAG
WS-ACC-CELL-1D	Saft LSH20 high power density 3.6 V, D-size spiral cell
LS-G7-ANTE-G7	2.5m LoRa antenna cable extension, RP-SMA (male) to RP-SMA (female). For G7 Edge devices
LS-ACC-ANTAD-G7	Antenna adaptor, RP-SMA male a RP-SMA female 90°
WS-ACC-G7-USBC	Mobile phone to device cable USB-C to USB-C. Length: 1 m
LS-ACC-RESIN	385ml bag of insulating resin to be applied after sensor set up. 1 bag needed for LSG7VW-2ILO-RCR and 2 bags for LSG7VW-6ILO-RCR. Upon request
LS-ACC-G7VW-SURGE	Pack of 3 surge protector modules (1ch) for VW, compatible with G7 VW family (6ch, 2ch, 1ch)

CERTIFICATIONS ⁸	
North America	FCC, ISED
Latin America	MTC, SUBTEL, ANATEL
Europe and Middle East	CE, UKCA
Asia and Australia	ACMA

⁷ Other mounting brackets and accessories available upon request.

⁸ Reach out to us for more information on product certifications.