

Loadsensing G7

Digital

The G7 Digital Data Logger is a robust, low-power LoRa data logger with extended battery life for wireless acquisition of digital sensors in industrial, structural, geotechnical, and environmental monitoring.

It supports RS-485, SDI-12, Pulse Counter, and Time Domain Reflectometry (TDR) interfaces, enabling applications including structural health monitoring, long IPI and MPBX chains, weather and water monitoring, flow measurement, and ground failure surface detection through TDR cable monitoring.

Key features



ADVANCED OPERATIONAL MODE

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



INTEGRATED TDR

Features a built-in TDR (Time Domain Reflectometer) to locate cable faults and breaks. Combined with coaxial cables, it detects ground movement and soil fractures for mining and geotechnical monitoring.



EXTENDED BATTERY LIFE

Support high-capacity D-size batteries, enabling more than 10 years of operational lifespan depending on configuration and use.



VERSATILE COMMUNICATION PORTS

Dual-protocol digital port (SDI-12 / RS-485): Connects environmental and industrial sensors such as in-place inclinometers (IPIs), multipoint borehole extensometers (MPBX), weather stations, soil moisture probes, flow meters, and water level sensors.

High-accuracy pulse counter: Measures pulses from rain gauges, flow meters, anemometers, and utility meters.



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.



Operational modes

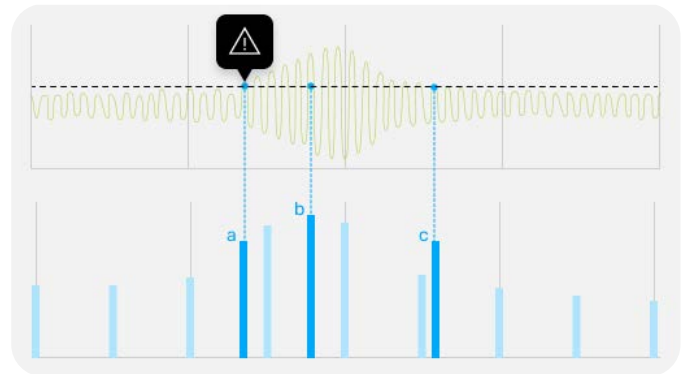
In addition to periodic readings, the G7 Digital Data Logger comes with advanced operational modes that help you optimize workflows, extend battery life, and reduce the number of devices required in the field.

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.



Main applications

The G7 Digital Data Logger enables reliable, long-term monitoring across a wide range of mining and construction applications. It supports multiple sensor types and communication protocols for accurate collection of real-time and historical field data. Typical use cases include:



GEOTECHNICAL MONITORING

- Lateral ground movement of tailings dams and embankments
- Landslides and slope stability
- Ground movement around tunnels and underground excavation
- Settlement and heave under embankments, tanks, and landfills



STRUCTURAL HEALTH MONITORING

- Loads in rock bolts, ground anchors monitoring



WATER MANAGEMENT

- Water quality and high precision liquid level monitoring
- Water flow and pressure

TECHNICAL SPECIFICATIONS

GENERAL

Ports	- SDI-12 / RS-485 x1 - Pulse counter x1 - TDR x1	
Output power		
Supply	Output voltage	Output current
1-D cell battery	5 V	0.4A
	12 V	0.150A
- Selectable regulated output voltage 12 V DC or 5 V DC - Configurable output power on sampling or always on - Configurable voltage threshold on output power		
Interfaces	- SDI-12 - RS-485¹ - Pulse counter - TDR cable distance measurement	
Secondary sensors	- Barometer - Motion detection sensor - Temperature sensor - Humidity sensor	
Operating temperature	−40 °C to 80 °C (−40 °F to 175 °F)	
Power source	Battery supplied: 3.6V D-size user-replaceable high energy density batteries (recommended Saft LSH20)	
Reporting period	Selectable from: 30 s 1, 2, 5, 10, 15, 20, 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	
SDI-12		
Integration & compatibility ¹	SDI-12 generic integration profile as default. Based on SDI-12 version 1.3 / 1.4 command set	
Input protection	- ESD: IEC 61000-4-2, ±30kV contact, ±30kV air - Lightning: IEC 61000-4-5 25A (8/20)	
RS-485 ¹		
Communication mode	Half duplex	
Termination	120ohms configurable termination	

Integration & compatibility ²	Compatible with proprietary or Modbus RTU digital sensors
Input protection	- ESD: IEC 61000-4-2, ±30kV contact, ±30kV air - Lightning: IEC 61000-4-5 25A (8/20)
PULSE COUNTER	
Input type	Potential free (dry contact) and open collector pulses
Pulse counter	32-bit counter that tracks up to 4.29 billion pulses before rollover
Pulse rate	0 to 300Hz
Accuracy	± 1 pulse
Measurement	- Pulse counter: Aggregations (min, max, avg) with configurable sampling period and last accumulated pulses - Pressure & temperature: Aggregations (min, max, avg) with configurable sampling period and last values
Input protection	ESD: IEC 61000-4-2, ±30kV contact, ±30kV air
TDR	
Pulse generator output	0-3.3V
Pulse length	10/250ns (auto-configuration)
Output impedance	50 ohm
VoP	Adjustable from 1.0 % to 99.9 (in 0.1 % step)
Range	900m @100%VOP
Accuracy	<1.5% (short cable <100m) <2.5% (long cable <600m)
Repeatability	<100ps (short cable <100m) <3500ps (long cable <600m)
Input protection	- ESD: IEC 61000-4-2, ±15kV contact, ±17kV air - Lightning: IEC 61000-4-5 1KA (8/20)
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

¹ Please note that the first release exclusively features the SDI-12 port. Support for the RS485 port will follow in a later phase.

² For more details, please check the corresponding User Guide. Contact us for additional information or specific updates.

TEMPERATURE SENSOR	
Range	-40 to 80°C
Accuracy	±0.2°C
Resolution	0.1°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

MECHANICAL SPECIFICATIONS	
Overall dimensions (WxLxH)	140x120x61 mm
Weight (excl. batteries)	662 g
Antenna	External
Weather protection	IP68 (at 2 m for 2 h)
Impact resistance ³	1 m drop onto concrete (20 000 g shock)
Mounting options	Clearance holes for M4 hexagon socket head cap screws in bottom
Communication port	Internal USB-C
Box material	Aluminium alloy
Lid material	Polycarbonate
Battery holder	1 x D-size battery holder

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	±90°	6° s ⁻¹	±2 g
Sampling rate	30 s	30 s	100 Hz
Resolution	0.2°	0.01° s ⁻¹	0.1 mg
Repeatability	0.3°	0.03° 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		

RADIO SPECIFICATIONS	
LONG-RANGE RADIO	
Radio band	subGHz ISM band
Operating frequency bands	Adjustable
Bidirectional communication	Remote reporting period adjustment: • Clock synchronization • Remote configuration of operational modes • Remote switching between operational modes
Maximum link budget	151 dB / 157 dB
MAC protocol	Worldsensing LoRa / LoRaWAN
BLUETOOTH RADIO	
Radio band	2.4GHz ISM band
Configuration	Bluetooth low energy (Bluetooth 5.3)
MEMORY	
Memory structure	Circular buffer
Memory capacity	• 5 months data (5 min reporting period, SDI-12 generic with 10 sensors and 5 datapoints each) • 4 years data (1h reporting period, SDI-12 generic with 10 sensors and 5 datapoints each)

³ The G7 Digital Data Logger has good impact resistance. However it should be treated carefully like any precision instrument.

BATTERY LIFE ESTIMATIONS ⁴			
Reporting period	5 min	1 h	6 h
TDR only	4.5 (4.1) years	9.9 (8.5) years	10.9 (9.2) years
Pulse counter ⁵ only 3s & 15s periods	4.5 (4.1) years	9.7 (8.3) years	10.7 (9.0) years
SDI-12 generic, Low power profile 10mA @ 12V, 5s sample time	1.1 (1.1) years	6.4 (5.8) years	9.9 (8.5) years
SDI-12 generic, Medium power profile 25mA @ 12V, 5s sample time	0.5 (0.5) years	4.2 (3.9) years	8.7 (7.6) years
SDI-12 generic, High power profile 60mA @ 12V, 5s sample time	0.2 (0.2) years	2.3 (2.2) years	6.8 (6.1) years

CERTIFICATIONS ⁶	
North America	FCC, ISED
Latin America	MTC, SUBTEL, ANATEL
Europe and Middle East	CE, UKCA
Asia and Australia	ACMA

⁴ 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.

No Triggered measurements considered.

⁵ Temperature and pressure

⁶ Reach out to us for more information on product certifications.

⁷ Other mounting brackets and accessories available upon request.

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
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-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°
LS-ACC-TDREXT	2m TDR cable extension, BNC (male) to BNC (female) with BNC (M) to N (F) adapter
LS-ACC-MAG	Kit of 3 magnets, Ø 32 mm, strength approx. 30 kg. Screws included
WS-ACC-G7-USBC	Mobile phone to device cable USB-C to USB-C. Length: 1 m

GENERAL DISCLAIMER:

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