

Features

- Wireless sensor device supporting a wide range of applications
- Multiple on-board sensors: ambient temperature, relative humidity, acceleration, tilt, impact (shock), vibration, gyroscope, magnetic (proximity), light, sound, motion (PIR), non-contact object temperature (IR), volatile organic compounds (VOC), equivalent CO2
- Configurable sensor parameters
- Seamless interface to RedLore IoT platform: IoT Engine, Positioning Engine, RedBoard™ Dashboards
- Connects directly to enterprise systems (ERP, WMS, BMS,..) and dashboards through API, MQTT,...
- Local configuration of device using Smartphone App
- Low-power mesh network protocol (Wirepas)
- Connects to cellular, WIFI or Ethernet gateway
- Over-the-Air reconfigurable and reprogrammable
- Long-life (up to 10 years) industrial-grade rechargeable battery
- Indoor Positioning and Proximity-detection
- Off-line logging and alerts
- For IP65 devices, see RL5 data sheet

Description



Aimed at a wide variety of applications. Each variant (see next page) has a number of sensors for specific applications. Custom variants can be made to meet specific requirements.



Implements the Wirepas Mesh Network communication protocol: Every device is a wireless router, acting as a repeater for other devices. Supports networks with 1000's of devices. Every device can remain low power and can work uninterruptedly for years on a small battery.



Off-line mode logs critical data and alerts on the device for later uploading.



The accompanying smartphone app connects locally through the built-in NFC 'tap'-interface and/or BLE interface, allowing for configuration and diagnostics. The same functions are available remotely through the RedLore IoT Engine and an API.



All devices have a built-in capability for indoor location tracking and/or proximity detection when combined with the RedLore Position and Proximity Tracking Engine. A device can be configured either as a *fixed position device* – to assist in tracking the location through the positioning engine – or as an *asset tag*, whose location is tracked.



Contains a long-life, industrial-grade, replaceable, commercial-off-the-shelf, AA-size LiSOC12 battery with 2700mAh capacity for up to 10 years of battery life.

Applications

- Transport & Supply Chains
 - Cold Storage Monitoring
 - In-Transit Condition Monitoring of Pallets and Boxes
 - Cold chain monitoring
 - Container & IBC tracking
 - Asset Monitoring & Tracking
- Warehousing
 - Asset Monitoring & Tracking
 - Consignment Stocking
 - Rack Impact Detection
 - Forklift Monitoring & Tracking
 - Pick Notification
- Manufacturing
 - Machine Monitoring
 - Predictive Maintenance
 - Spare Parts Management
 - Environmental Monitoring
- Building automation
 - HVAC
 - Environmental Monitoring
- Infrastructure
 - Integrity Monitoring
 - Control & Automation

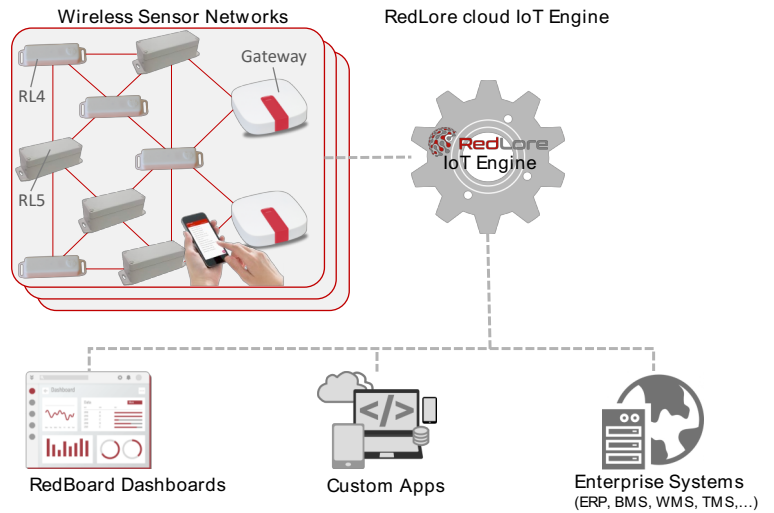


Network

The devices send the sensor data to one or more gateways on site or in the building. The gateways, in turn, forward the data to the cloud via a cellular (4G/LTE) connection, WIFI or Ethernet. A single gateway supports up to 1000 devices. Multiple gateways per site optimize message latency and device battery lifetime.

The wireless sensor devices do not need to have a direct link to the gateway and can hop their messages across other devices.

The IoT Engine ingests and processes the messages, and provides IoT services to applications. Applications can be built using the RedBoard dashboard platform or in 3rd party back-end systems.



Product Variants

Variants	C	B	D	G	H	J	L	M	N	O	Q	R	S
Sensors	HVAC	Comfort	Sensor Tag	Asset monitor	Anchor	Occupancy	Motion	Motion & HVAC	Vibration adv.	Air Quality	Comfort +	Temp. external	Non-contact temp.
Temperature	✓	✓		✓				✓		✓	✓	✓	
Relative humidity	✓	✓		✓				✓		✓	✓		
Light		✓		✓							✓		
Sound		✓		✓							✓		
VOC Volatile Organic										✓	✓		
eCO2 equiv. CO2										✓	✓		
Motion (PIR)						✓	✓	✓					
Infrared						✓							✓
Acceleration 3-axis			✓	✓					✓				
Gyroscope 3-axis									✓				
Magnetic				✓									

Other features	
Interfaces	Wirepas Low-Power Mesh, NFC (Smartphone 'tap'), Bluetooth Low Energy (BLE)
RGB LED	✓
Battery	LiSOC12 – 2700mAh – Up to 10 years life-time – COTS replaceable – AA size
Dimensions	72 x 23 x 26mm (2.8 x 0.9 x 1") + flanges of 9mm (0.4") each long end variant R 'Temp. external': 88 x 53 x 28mm (3.5 x 2.1 x 1.1") + flanges 10mm (0.4")
Weight (incl. battery)	43g
Ingress Protection	IP53 (for IP65 see RL5)

Operating parameters and tolerances¹

General

Operating temperature	-30°C...+85°C (variants B, D, G)	-40°C...+65°C (variants O, Q)
	-30°C...+70°C (variants L, M)	-40°C...+85°C (other variants)
	-55°C...+100°C (external temperature probe of variant R)	
Data update rate	10 seconds to 10 days	
Configuration	Remotely through API or through NFC	

Temperature sensor

Operating temperature	-40°C...+85°C (all variants except N and R)		
	0°C...+50°C (variant N)		
	-55°C...+100°C (variant R)		
Accuracy tolerance	<u>variant G, N</u>	<u>variant R</u>	<u>other variants</u>
	2°C	±0.5°C (-10 to +85°)	±0.2°C (15...50°C)
			±0.3°C (-25...85°C)
			±0.5°C (< -25°C)
Measurement procedure	single measurement at update rate interval		

Humidity sensor

Operating range	0...100%RH
Accuracy tolerance (@30°C)	±2 %RH between 10%...80 %RH, ±3 %RH otherwise
Long term stability	0.25 %RH/year
Measurement procedure	single measurement at update rate interval

Light sensor

Operating range	0.01...64,000 Lux
Viewing angle	~ 100° at 71% intensity
Spectral response	close to human eye, rejects 50/60Hz flicker
Measurement procedure	single measurement at update rate interval

Microphone

Operating sound level	30..75 dB
Frequency	100...20kHz
Measurement procedure	average of burst measurements, configurable 1/s to 1/min
Filtering	on request: LP, HP, BP, FFT, sound signature detection

¹Accuracy tolerances specified are typical and may vary from one product to another and depending on the application and installation.

Accelerometer

Operating range	$\pm 2/\pm 4/\pm 8/\pm 16$ g for all 3 axes (configurable)
Accuracy tolerance	down to 1mg (depends on variant and configuration)
Measurement procedure	12Hz measurement, reporting min, avg, and max at update rate interval
Special modes	shock (impact) detection, vibration monitoring, FFT signal analysis, vibration signature detection

Gyroscope

Operating range	$\pm 125/\pm 250/\pm 500/\pm 1000/\pm 2000$ dps (all 3 axes, configurable)
Accuracy tolerance	$\pm 3\%$ of full-scale operating range
Measurement procedure	12Hz measurement, reporting min, avg, and max at update rate interval

Magnetic sensor

Operating range	20 mT and 200 mT (configurable) Note: 1 Gauss = 0.1 mT
Measurement procedure	single measurement of magnetic field at update rate interval, or, switch-mode (message sent when magnet presented), or count-mode (pulse counting,...)

PIR motion sensor

Operating range/sensitivity	1 to 5m (configurable)
Field of view	$\sim 100^\circ$
Directional sensitivity	1 dimension, sensitivity depends on operating range
Measurement procedure	continuous measurement with trigger counting

IR (infrared) sensor

Operating temperature	$-20^\circ\text{C} \dots +85^\circ\text{C}$
Accuracy tolerance	$\pm 3^\circ\text{C}$
Field of view	$\sim 120^\circ$ at 50% intensity
Measurement procedure	single measurement at update rate interval

Volatile Organic Compound (VOC) sensor

Operating range	0...1000ppm (ethanol in air) (0..90%RH)
Repeatability	$\pm 10\%$

Equivalent Carbon Dioxide (eCO₂) sensor

Operating range	400...5000ppm
Accuracy tolerance	$\pm 25\%$

Certifications

Contains FCC ID	2AA9B04 In conformance with Federal Communications Commission (FCC) CFR47 Telecommunications, Part 15 Subpart C "Intentional Radiators".
Contains IC (ISED)	12208A-04 In conformance with Industry Canada (IC) Radio Standards Specification (RSS) RSS-210 and RSSGen.
CE, ROHS	In conformance with Radio Equipment Directive 2014/53/EU: <ul style="list-style-type: none">• EN 60950-1: 2006 + A11: 2009 + A1: 2010 + A12: 2011 + A2: 2013• ETSI EN 300 328 V 2.1.1• ETSI EN 301 489-1 V2.1.1• ETSI EN 301 489-17 V3.1.1
NIST	(Optional) NIST-traceable Certificate of Compliance

- This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment complies with Part 15 of the FCC Rules.
- This device complies with Industry Canada license-exempt RSS standard(s).
- Operation is subject the following two conditions:
 - (1) This device may not cause harmful interference, and
 - (2) This device must accept any interference received, including interference that may cause undesired operation.
- The devices must be installed and used in strict accordance with the manufacturer's instructions.

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