LoRaWAN™ wireless EMS room sensor

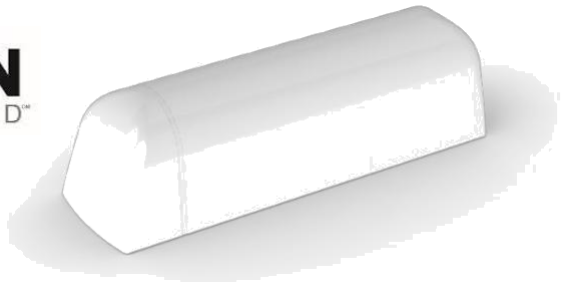
EMS by Elsys

EMS Internal sensors

- Temperature
- Humidity
- Accelerometer
- Water leak detector
- Door switch

EMS Door Internal sensors

- Door switch

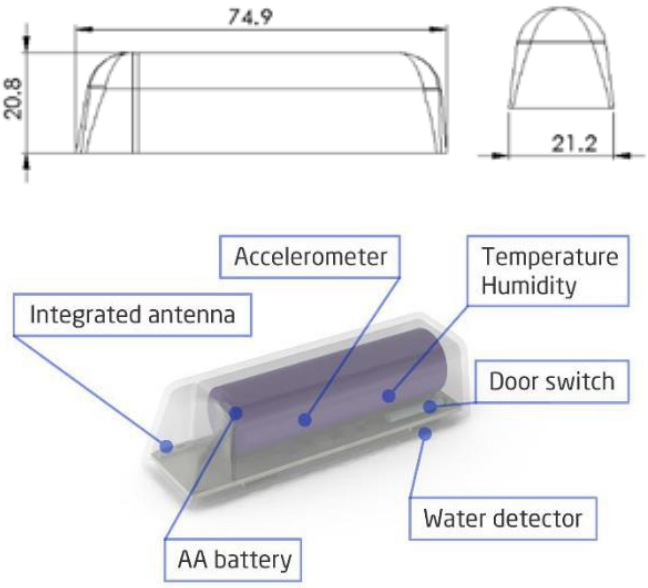


The EMS LoRaWAN sensor is a fully self-contained and self-powered EMS sensor for measuring indoor environments. Temperature, humidity, door switch, leak detection and accelerometer all in one compact unit ideal for mounting on door frames, under desks or any other limited surface area. The EMS Door variant only containing the door switch as a reduced-price unit. (LoRaWAN Certified)

Supported channel plans - US902-928, EU863-870, AS923, AU915-928, KR920-923

Supports Over-the-Air-Activation (**OTAA**) or Activation-by-Personalisation (**ABP**). Compatible with all LoRaWAN Network Servers including The Things Network, Orbiwise, Loriot, Wanesy, LoraServer and others. The Elsys sensors adhering to the latest recommendations of operation as promoted by the LoRaWAN alliance. The sensors supporting best practice of Join methods, Adaptive Data Rate, Link Check, retention of RF parameters during sleep and more.

All Elsys sensors are equipped with **NFC** for easy configuration by the Android app "Sensor Settings" available from the Google Play store. Sample rate, data rate, encryption keys, triggers, activation and other advanced features can be simply changed with a single tap of the sensor. Settings may also be updated remotely Over-The-Air from most LoRaWAN Network Servers or through cloud solutions using LNS API's.



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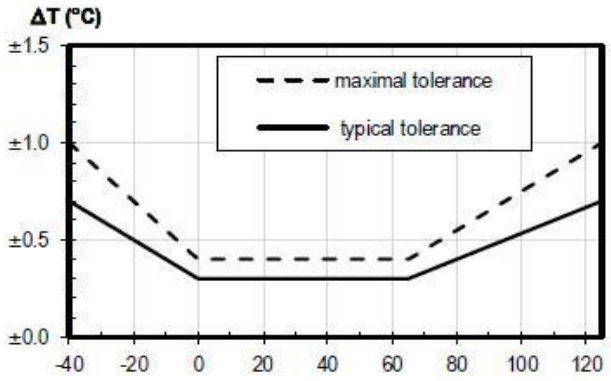
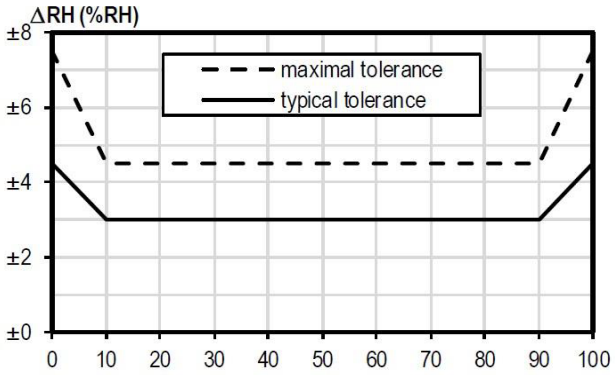
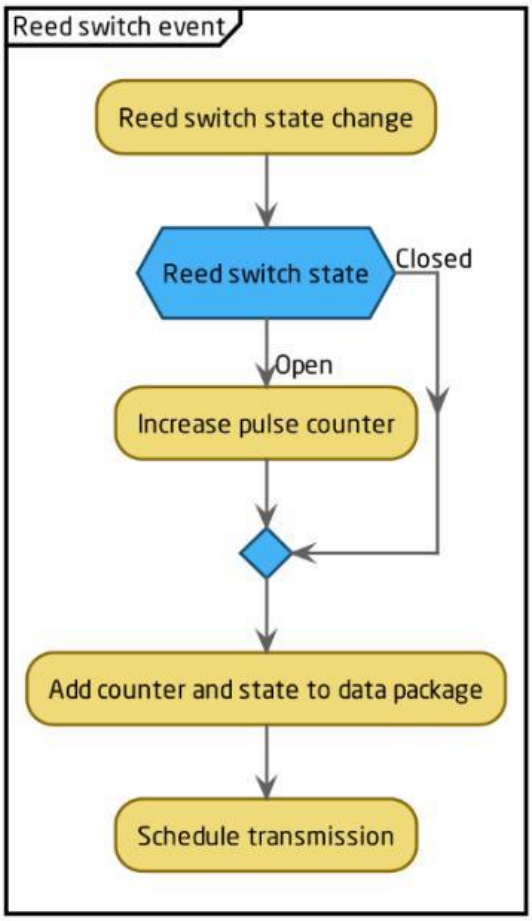
Temperature: Resolution 0.1°C



Humidity: Resolution 0.1% RH



Door Switch



Accelerometer

Range: ± 2.0 g
Sensitivity: 16 mg/digit
Data rate: 10 Hz

Water leak detection

The water leak detector consists of bottom-mounted probes which are continuously monitored by the sensor. A detection level is sent periodically, and an alarm is sent when water is detected.

Door switch

The door switch consists of a reed switch on one side of the sensor. The maximum detection distance is 10 mm but may be affected by the material of the door (metal will reduce the range).

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Device Specifications

Mechanical specifications	
Weight	10 g excluding batteries / 30 g including batteries
Dimensions	21.2 x 74.9 x 20.8 mm
Enclosure	Plastic, PC/ABS
Operating conditions	
Temperature	0 to 40 °C
Humidity	0 to 85% RH (non-condensing)
Device Power Supply	
Battery Type	1 x 3.6V AA Lithium Battery ($Li\text{-}SOCl_2$)
Expected Battery Life	Up to 10 years (Depending on configuration and environment)
Device Logging Function	
Sampling Interval	Configurable via NFC and downlink configuration
Data Upload Interval	Configurable via NFC and downlink configuration

Radio / Wireless

LoRaWAN parameters	
Wireless Technology	LoRaWAN® 1.0.3
Wireless Security	LoRaWAN® End-to-End encryption (AES-CTR), Data Integrity Protection (AES-CMAC)
LoRaWAN Device Type	Class A/C (configurable) End-device
Supported LoRaWAN® features	OTAA, ABP, ADR, Adaptive Channel Setup
Supported LoRaWAN® regions	US902 – 928, EU863 – 870, AS923, AU915 – 928, KR920 – 923, RU864, IN865
Link Budget	137 dB (SF7) to 151 dB (SF12)
RF Transmit Power	14 dB / 20 dB (Region specific)

Payload Format

Data types			
Type value	*Type*	*Data size*	*Comment*
0x01	Temperature	2	-3276.5 °C → 3276.5 °C (Value of: 100 → 10.0 °C)
0x02	Humidity	1	0 –100%
0x03	Acceleration/Level	3	X , Y, Z - 127 → + 127 (Value of: 63 =1G)
0x07	VDD (Battery voltage)	2	0 -65535mV
0x0A	Pulse count	2	0 -65535 (Between two send intervals)
0x0B	Pulse count ABS	4	Absolute value 0-429467295
0x0D	Digital	1	1 / 0 (On / Off)

This datasheet is compiled from original publications by Elsys available from the manufacturer's website:

- https://elsys.se/public/datasheets/EMS_datasheet.pdf
- https://elsys.se/public/documents/Declaration-of-conformity-Elsys-LoRa.pdf

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Battery life predictions

The nature of Radio Frequency technology is suggested distances are subject to the configuration, environmental conditions, obstacles, topography of the surrounding area and other possible interferences by other devices on the same frequency. LoRaWAN allows for a variance in the transmission speed known as Date Rate (or Spread Factor) which can dynamically adjust the Data Rate to achieve the best range while extending battery life. Over greater distances or through obstacles, a slower Date Rate is used which may consume significantly more time on air and therefore greater battery consumption. Battery life also affected by the frequency of samples taken.

The following is provided by the manufacturer as a guide. No guarantee is made on distance or battery life.

*Sample time of 300 seconds (5minutes) with **Spread Factor 7***

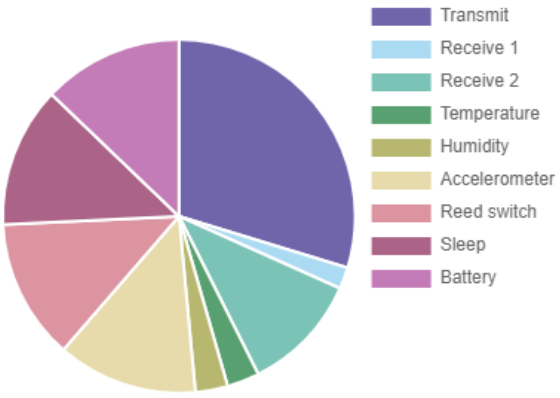
Sample time: 300 Seconds
Sensor: EMS (Select Elsys sensor)
Battery capacity: 2700 Capacity(mAh)
Battery performance: 80 Performance(%)

Spreading factor: (•) SF7 ( ) SF8 ( ) SF9 ( ) SF10 ( ) SF11 ( ) SF12

Result:

The battery will last for **7.9** years*. The sensor will draw **31**uA and **274**mAh in one year.

( ) Details



*Sample time of 300 seconds (5minutes) with **Spread Factor 12***

Sample time: 300 Seconds
Sensor: EMS (Select Elsys sensor)
Battery capacity: 2700 Capacity(mAh)
Battery performance: 80 Performance(%)

Spreading factor: ( ) SF7 ( ) SF8 ( ) SF9 ( ) SF10 ( ) SF11 (•) SF12

Result:

The battery will last for **1** years*. The sensor will draw **242**uA and **2120**mAh in one year.

( ) Details