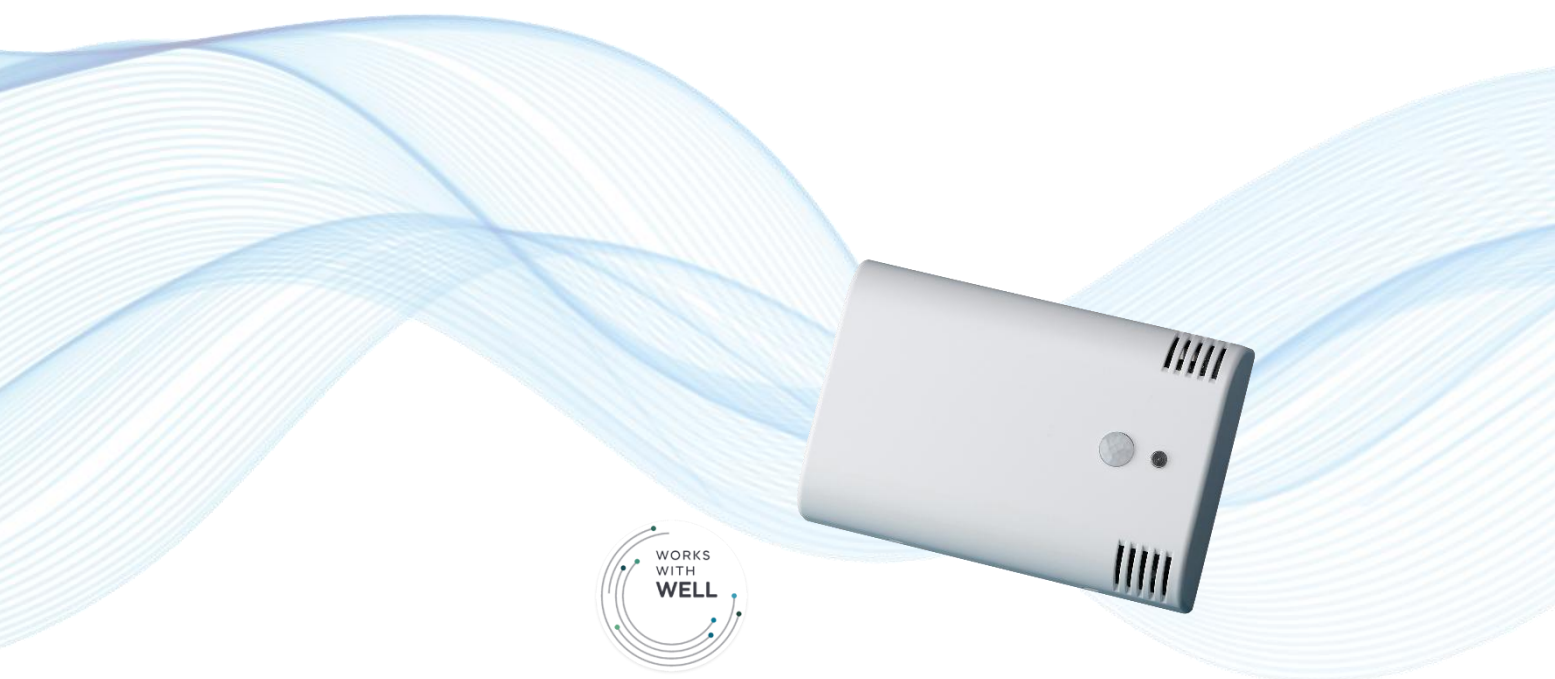




enLink OdourSense

Data Sheet

LoRaWAN® Washroom sensor and odour monitor



enLink OdourSense – Washroom sensor and odour monitor

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1. Specifications

Frequency range	868 / 915 MHz*
Protocol	LoRa®
Receiver sensitivity	-135dBm @ 980bps
RF Transmit power	Up to +14dBm
Antenna	Integrated
Certifications	Pre-certified radio regulatory approvals: 868 & 915 MHz spectrum CE, FCC, IC, UKCA. RoHS
Operating Voltage	3.6 Volts nominal
Batteries	Up to 4 x Lithium (Li-SOCl ₂) AA-size Battery life > 3 years (sensor selection and transmission interval dependant)
External Power	Via 2 pole Molex push button connector. Conductor size 18-26 AWG Input Voltage range: 12-24V DC. Input current 300mA max. Operating current < 100mA
Processor	ARM® Cortex® M0+
Dimensions/Weight	120mm x 80mm x 25mm Weight: 110 grams
Operating	-10 – 60°C 0-95%RH, Non Condensing
Case material	Self-extinguishing ABS UL 94 V0, white

Sensor Characteristics:

Temperature	Accuracy: $\pm 0.2^{\circ}\text{C}$ (typical) Repeatability: $\pm 0.1^{\circ}\text{C}$ Conversion time: 6.35ms
Humidity	Accuracy: $\pm 1.8\%$ (typical) Repeatability: $\pm 0.1\%$ Response time: 4s
VOC's	IAQ Index 0 to 500 (see below) TVOC level (ppm) Variability $\pm 15\%$ (typical) Response time: ($\tau_{33-63\%}$) 1 s
CO ₂ equivalents (ppm)	Estimation of the CO ₂ level in ppm. The sensor does not directly measure CO ₂ but derives this from the average correlation between VOCs and CO ₂ in humans' exhaled breath.
Pressure	Accuracy: $\pm 0.12\text{hPa}$ (equivalent to $\pm 1\text{m}$ in altitude) Range (with full accuracy): 300 – 1100hPa Resolution: 0.18Pa
Odorous gas sensor	Accuracy: $\pm 5\%$ (measured value) Repeatability: $\pm 1\%$ Response time: < 3 s (T90 < 30 s) Sensitive to a broad range of odorous gases
Light level*	Less than 4% error Precision optical filtering to match human eye: Rejects > 99% of IR (typical). Range: 0.01 lux to 83,000 lux Light source variation (incandescent, halogen, fluorescent): 4%
Presence (PIR)*	Detection distance: 5m. Detection area: 82° horizontal, 94° vertical (see below)
Sound*	Sensitivity: -26dB FS $\pm 1\text{dB}$ SNR: 65dBA Dynamic Range: 91dBA Acoustic Overload Point: 120dB SPL Total Harmonic Distortion: 0.2% (Typical) @ 105dB SPL

* - Optional sensor

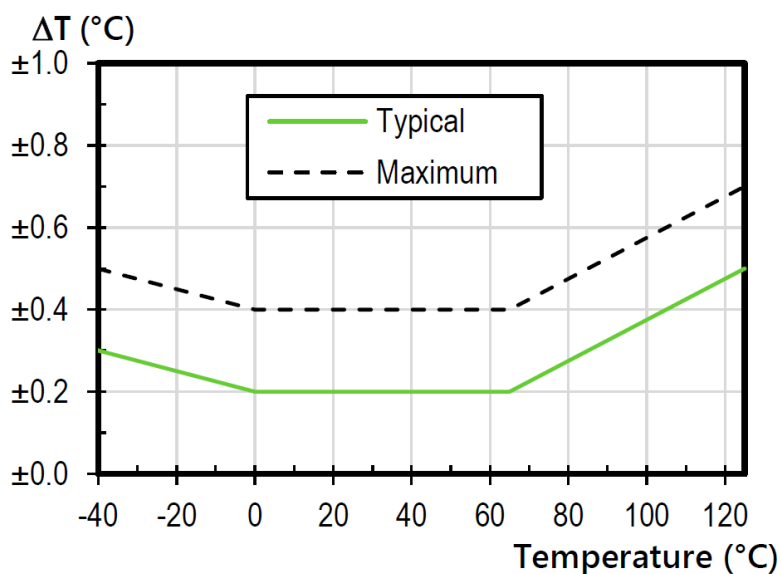
2. Temperature

Features

- Factory calibrated
- High accuracy digital sensor
- Excellent stability at high humidity

Specifications

Measurement:	Temperature °C
Operating Principle:	Digital
Measurement Range (full accuracy):	0°C to +65°C
Expected Operating Life:	> 10 years
Long Term Sensitivity Drift:	< 0.03°C/year
Calibration:	Factory Calibrated
Resolution:	0.01°C
Accuracy (see chart below):	± 0.2°C
Temperature Range:	-40°C to +120°C
Humidity Range (non-condensing):	0 – 100 %RH
Response Time:	< 1 seconds
Storage Temperature:	-65°C to +150°C
Orientation Sensitivity:	None
Part Number:	Fitted as standard to enLink OdourSense



Temperature Accuracy vs. Temperature

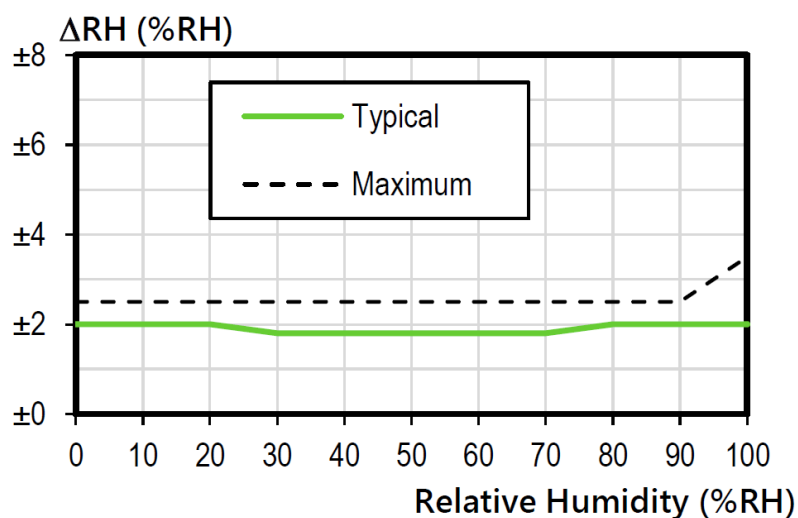
3. Relative Humidity (%RH)

Features

- Factory calibrated
- High accuracy digital sensor
- Excellent stability at high humidity

Specifications

Measurement:	Relative Humidity %RH
Operating Principle:	Digital
Measurement Range (full accuracy):	0 – 100 %RH
Expected Operating Life:	> 10 years
Long Term Sensitivity Drift:	0.2 %RH per year
Calibration:	Factory Calibrated
Resolution:	0.01 %RH
Accuracy (See chart below):	± 1.8 %RH
Temperature Range:	-40°C to +120°C
Response Time:	< 4 seconds
Storage Temperature:	-40°C to +150°C
Orientation Sensitivity:	None
Part Number:	Fitted as standard to enLink OdourSense



RH Accuracy vs. RH

4. Volatile Organic Compounds (IAQ)

Features

- Factory calibrated
- Digital Indoor Air Quality sensor
- Tested to ISO16000-29 "Test methods for VOC detectors".

Specifications

Measurement:	Volatile Organic Compounds VOC's
Operating Principle:	Metal Oxide Adsorption
Measurement Range (full accuracy):	0 – 500 IAQ
Expected Operating Life:	>5 years
Calibration:	Factory Calibrated
Resolution:	1 IAQ
Accuracy:	± 15% (typ.)
Temperature Range:	-40°C to +85°C
Humidity Range (non-condensing):	10 – 95% RH
Response Time:	< 2 seconds
Storage Temperature:	-45°C to +85°C
Orientation Sensitivity:	None
Part Number:	Fitted as standard to enLink OdourSense

Indoor air quality (IAQ) classification and colour coding¹

IAQ Index	Air Quality	Impact (long-term exposure)	Suggested action
0 – 50	Excellent	Pure air; best for wellbeing	No measures needed
51 – 100	Good	No irritation or impact on wellbeing	No measures needed
101 – 150	Lightly polluted	Reduction of wellbeing possible	Ventilation suggested
151 – 200	Moderately polluted	More significant irritation possible	Increase ventilation with clean air
201 – 250 ¹	Heavily polluted	Exposition might lead to effects like headache depending on type of VOC	Optimise ventilation
251 – 350	Severely polluted	More severe health issue possible if harmful VOC present	Contamination should be identified if level is reached even without the presence of people; maximise ventilation and reduce attendance
> 351	Extremely polluted	Headaches, additional neurotoxic effects possible	Contamination needs to be identified; avoid presence in room and maximise ventilation

¹ According to the guidelines issued by the German Federal Environmental Agency, exceeding 25 mg/m³ of total VOC leads to headaches and further neurotoxic impact on health.

²Software auto-calibrates the low and high concentrations applied during testing to IAQ of 25 and 250, respectively

Compliant to the ISO16000-29 standard “Test methods for VOC detectors”.

bVOC mixture with Nitrogen as carrier gas

Molar fraction	Compound	Certified accuracy
5 ppm	Ethane	5 %
10 ppm	Isoprene /2-methyl-1,3 Butadiene	5 %
10 ppm	Ethanol	5 %
50 ppm	Acetone	5 %
15 ppm	Carbon Monoxide	2 %

5. Barometric Pressure (Pa)

Features

- Factory calibrated
- High accuracy digital sensor

Specifications

Measurement:	Barometric Pressure
Operating Principle:	Digital
Measurement Range (full accuracy):	300 – 1100 hPa
Expected Operating Life:	> 5 years
Long Term Stability:	1 hPa per year
Calibration:	Factory Calibrated
Resolution:	0.18 hPa
Accuracy (full range):	± 0.6 hPa
Relative Accuracy	± 0.12 hPa (equivalent to ±1m difference in altitude)
Temperature Range:	0°C to +65°C
Response Time:	< 10 seconds
Storage Temperature:	-45°C to +85°C
Orientation Sensitivity:	None
Part Number:	Fitted as standard to enLink OdourSense

6. Odorous Gases

Features

- Long life
- High reliability
- High resolution
- Combined with intelligent algorithms, has stronger adaptability to the environment, more accurate detection, and stable zero point

Specifications

Gas Detected:	Odorous Gases
Operating Principle:	Solid polymer electrochemical technology
Measurement Range (full accuracy):	0-10ppm
Lower Detection Limit:	0.001ppm
Expected Operating Life:	> 5 years (in relatively clean air, 0-25°C, 30-70%RH)
Calibration:	Manufacturer Calibration Certificate
Resolution:	0.001ppm
Accuracy:	±5 % (Measurement Value)
Repeatability:	1 %
Operating Temperature Range:	-20°C to +70°C
Pressure Range:	Atm. ± 10%
Humidity Range (non-condensing):	15 – 95% RH
Response Time :	< 3 s (T90 < 30 s)
Storage Temperature range:	Storage: 0°C to +20°C
Orientation Sensitivity:	None
Part Number:	Fitted as standard to enLink OdourSense

Target gas detection

The sensor detects a wide range of odour-causing gases:

Gas	Formula	Odour Threshold (ppm, Lev1)	Odour Strength
Methyl Mercaptan	CH ₄ S	0.0001	Extremely strong odour
Methyl Sulfide	C ₂ H ₆ S	0.0001	Extremely strong odour
Trimethylamine	C ₃ H ₉ N	0.0001	Extremely strong odour
Dimethyl Disulfide	C ₂ H ₆ S ₂	0.0003	Very strong odour
Hydrogen Sulfide	H ₂ S	0.0005	Very strong odour
Carbon Disulfide	CS ₂	0.0274	Moderate odour
Styrene	C ₈ H ₈	0.03	Moderate odour
Ammonia	NH ₃	0.1	Weak (relative) odour

Gases Detected and Relative Odour Intensity

enLink OdourSense detects key compounds commonly associated with unpleasant washroom odours, including methyl mercaptan, dimethyl sulfide, hydrogen sulfide and trimethylamine. These gases can be noticeable at very low concentrations, so OdourSense provides a practical indication of relative odour intensity and helps identify when cleaning or ventilation action may be required.

The table below shows the concentration of each gas required to achieve the stated odour intensity level.

Gas		Ammonia	Hydrogen Sulfide	Methyl Mercaptan	Methyl Sulfide	Carbon disulfide	Dimethyl Disulfide	Trimethyl-amine	Styrene	Average odour Level
Chemical Formula		NH ₃	H ₂ S	CH ₄ S	C ₂ H ₆ S	CS ₂	C ₂ H ₆ S ₂	C ₃ H ₉ N	C ₈ H ₈	
Molecular Weight		17.031	34.08	48.10	62.13	76.14	94.20	59.11	104.15	
Level	Unit									
Lev1	mg/m ³	0.0697	0.0007	0.0002	0.0003	0.0853	0.0012	0.0002	0.1278	0.0357
	ppm	0.1000	0.0005	0.0001	0.0001	0.0274	0.0003	0.0001	0.0300	0.0198
Lev2	mg/m ³	0.4179	0.0084	0.0014	0.0051	1.0240	0.0116	0.0024	1.7038	0.3968
	ppm	0.6000	0.0060	0.0007	0.0020	0.3288	0.0030	0.0010	0.4000	0.1677
Lev2.5	mg/m ³	0.6965	0.0279	0.0039	0.0254	1.0240	0.0347	0.0121	1.7038	0.4410
	ppm	1.0000	0.0200	0.0020	0.0100	0.3288	0.0090	0.0050	0.4000	0.2219
Lev3	mg/m ³	1.3931	0.0835	0.0079	0.1016	2.0520	0.1156	0.0484	3.4076	0.9012
	ppm	2.0000	0.0600	0.0040	0.0400	0.6590	0.0300	0.0200	0.8000	0.4516
Lev3.5	mg/m ³	3.4826	0.2788	0.0197	0.5082	5.1310	0.3853	0.1692	8.5190	2.3117
	ppm	5.0000	0.2000	0.0100	0.2000	1.6477	0.1000	0.0700	2.0000	1.1535
Lev4	mg/m ³	6.9653	0.9757	0.0590	2.0328	10.263	1.1558	0.4835	17.038	4.8717
	ppm	10.0000	0.7000	0.0300	0.8000	3.2961	0.3000	0.2000	4.0000	2.4158
Lev5	mg/m ³	27.8611	4.1814	0.3934	5.0819	5.1310	11.5577	7.2524	8.5190	8.7472
	ppm	40.0000	3.0000	0.2000	2.0000	1.6477	3.0000	3.0000	2.0000	6.8560

Odour Intensity Level and Sensitivity to different gases

Level	Sensor PPB Reading	Meaning
Lev1	19.8	Very weak odour / just detectable
Lev2	167.7	Weak but noticeable odour
Lev2.5	221.9	Between weak and moderate
Lev3	451.6	Moderate odour
Lev3.5	1,153.5	Between moderate and strong
Lev4	2,415.8	Strong odour
Lev5	6,856.0	Very strong odour

Odour Intensity Level Interpretation

Synetica plug-in gas sensors are natively calibrated in ppm/ppb. Any mg/m³ or µg/m³ values are derived calculations, based on the molecular weight of the specific gas being measured.

The odour gas sensor is designed to be broadly sensitive to all odorous gases and is likewise calibrated in ppb/ppm. However, it is non-selective and cannot determine which individual gases are present (in the same way that a VOC sensor cannot identify specific compounds). As a result, the sensor reports the mg/m³ value as numerically equivalent to the ppb/ppm value, rather than performing a gas-specific mass conversion.

7. Ambient Light (lux)

Features

- Factory calibrated
- High accuracy digital sensor
- Precision optical filtering to match human eye (rejects >99% of IR)

Specifications

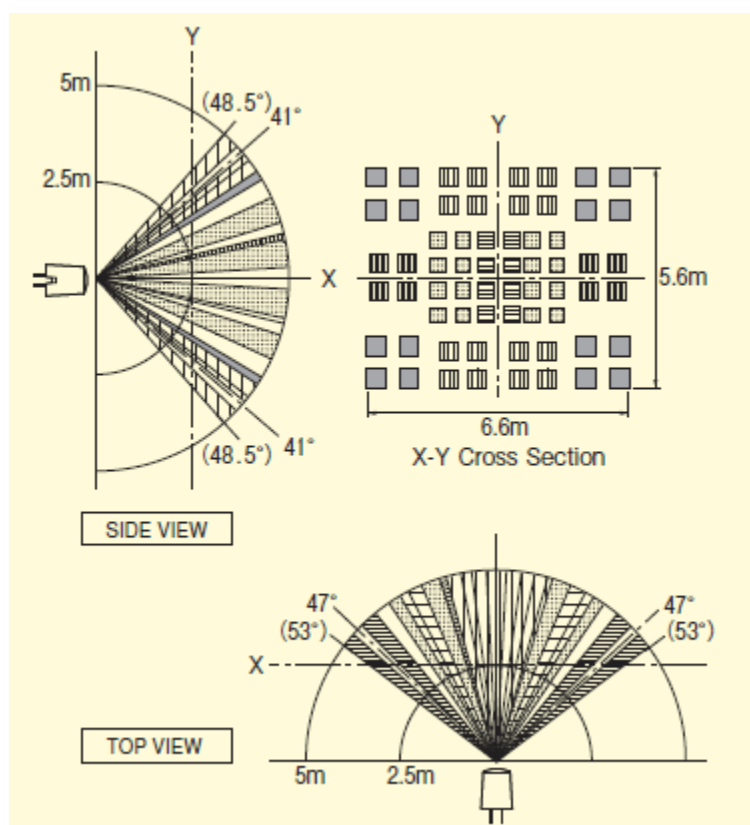
Measurement:	Ambient Light lux
Operating Principle:	Digital
Measurement Range (full accuracy):	0.01 – 83k lux
Expected Operating Life:	10 years
Sensitivity Drift:	0.01 % per °C
Calibration:	Factory Calibrated
Resolution:	0.01 lux
Accuracy (> 40 lux):	± 2%
Temperature Range:	0°C to +65°C
Response Time:	< 1 seconds
Storage Temperature:	-65 °C to +105 °C
Orientation Sensitivity:	None
Part Number:	Optional sensor – L Option

8. PIR Sensor

Detection Characteristics

Items	Specifications
Detection distance	Max. 5m
Field of view	94° × 82°
Detection zone	64 beams
Detection condition	• The temperature difference between the target and the surroundings must be higher than 4°C • Movement speed: 1.0m/s • Target concept: Human body with an approx. size of 700×250mm • Target moving direction: Crossing the detection beam.
Part Number:	Optional sensor – M Option

Detection Zone



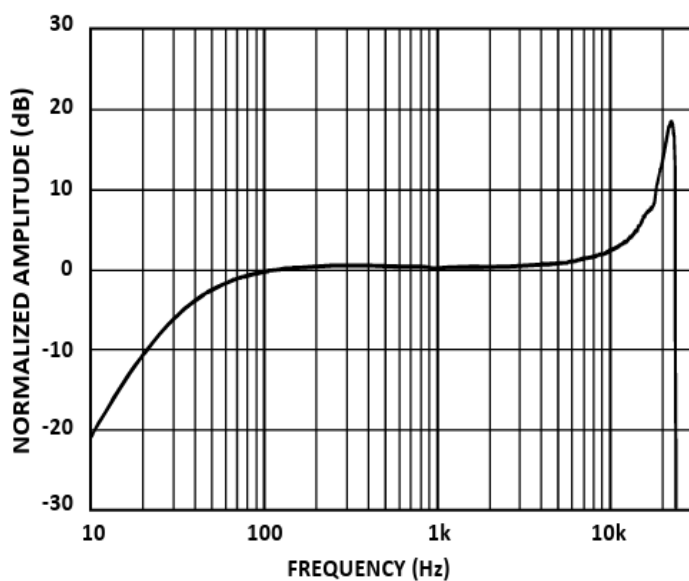
9. Sound level dB(A)

Features

- High accuracy digital MEMS microphone
- Wide Frequency Response from 50 Hz to 20 kHz

Specifications

Measurement:	Sound pressure level
Operating Principle:	Digital MEMS
Sensitivity	-26dB FS $\pm$ 1dB
SNR	65dBA
Dynamic Range	91dBA
Acoustic Overload Point	120dB SPL
Total Harmonic Distortion	0.2% (Typ.) @ 105dB SPL
Orientation Sensitivity:	None
Part Number:	Optional sensor – S Option



Typical Frequency Response (Measured)

10. Selection Guide / Ordering Information

This datasheet covers the enLink OdourSense range of LoRaWAN® environmental monitoring sensors. Depending on the model selected, the following measurements are available:

- Temperature
- Relative Humidity
- VOC's
- Barometric Pressure
- Odourous gases
- Light Level *
- Motion (PIR) *
- Sound level *

The OdourSense range is available in several configurations to suit different application requirements. The model selection matrix below details the measurements available with each variant.

Part Number	Temperature	Relative Humidity	VOC's	Barometric Pressure	Odour	Light Level	Motion	Sound
ENL-OS	●	●	●	●	●			
ENL-OS-L	●	●	●	●	●	●		
ENL-OS-LM	●	●	●	●	●	●	●	
ENL-OS-LMS	●	●	●	●	●	●	●	●

11. Battery Installation / Replacement

enLink Zone Plus devices use 4 x SAFT LS14500 AA size 3.6 Volt Lithium Thionyl Chloride (Li-SOCl₂) batteries (non-rechargeable) or direct equivalent.

No other batteries are approved for use in the device.

Lithium Thionyl Chloride batteries have very high energy capacity and must be used and handled with care observing the guidance below.



WARNING

Risk of death or serious injury from explosion or fire.

- Keep out of sight and reach of children.
- Fire, explosion and burn hazard - do not recharge, short circuit, crush, disassemble, incinerate.
- Due to the high terminal voltage (3.6V), they are not suitable as direct replacements for other battery technologies in the same can sizes.
- When not in use the Batteries must be stored in a non-Hazardous Area.
- Do not change batteries in an explosive gas atmosphere.
- When installing batteries, do not snag the battery terminal on the clip or the battery may be damaged. Do not apply excessive force.
- Do not drop. Dropping the battery may cause damage. If a battery is dropped, do not install the dropped battery into the unit. Dispose of dropped battery promptly per local regulations or per the battery manufacturer's recommendations.

Guidance

- Always install the batteries correctly as per instructions taking great care to observe the battery polarity.
- Ensure that the contact points are clean and conductive.
- All batteries must be the same model from the same manufacturer.
- Do not mix old and new batteries or batteries from different manufacturers.
- Do not heat or attempt to recharge the battery.
- Do not dispose of in a fire.
- Only install approved batteries: SAFT LS14500 Lithium Thionyl Chloride AA Battery 3.6 Volt, or direct equivalent.

Safe disposal



- Please recycle responsibly, a wide range of schemes are available.
- Do not dispose of in normal waste or in a fire.

12. LoRaWAN Payload Decoder

The latest LoRaWAN payload decoders and guides are available on the Synetica GitHub repository:

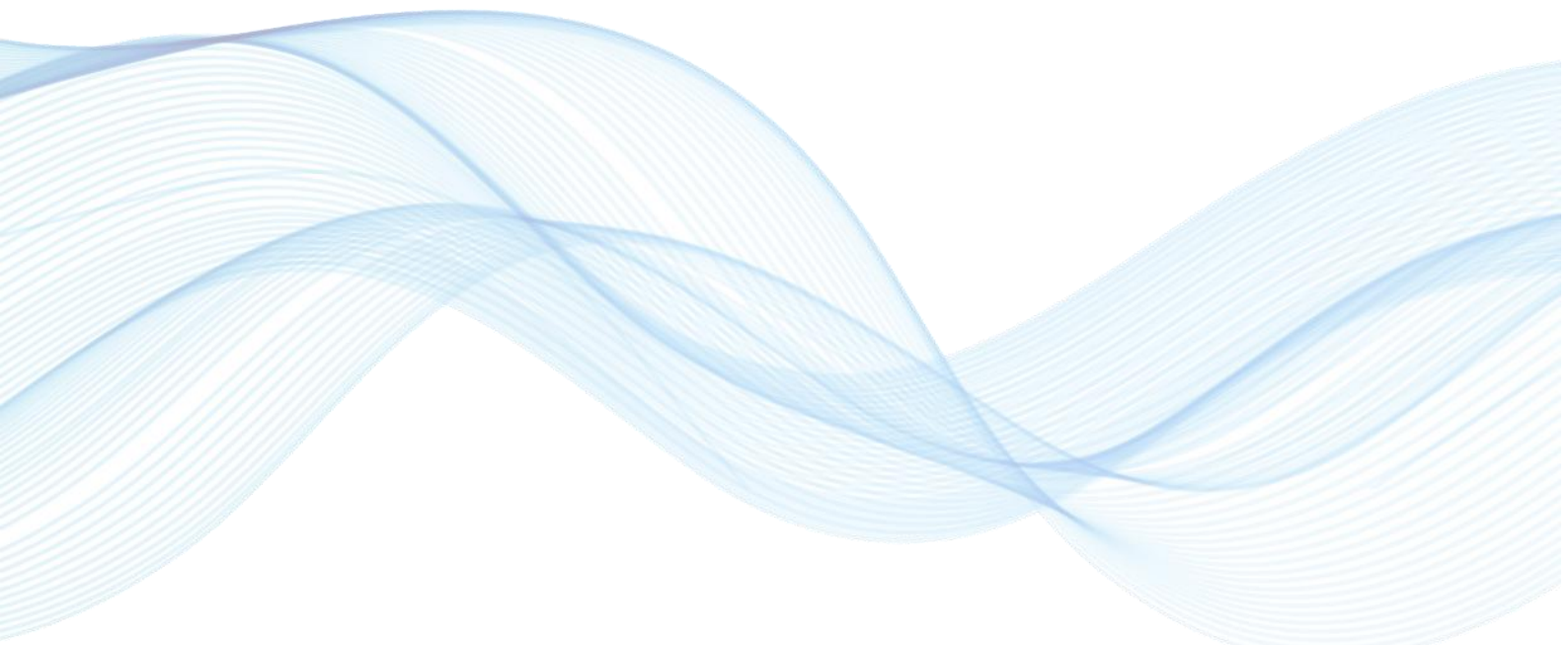
<https://github.com/synetica/enlink-decoder>

A live payload decoder which allows you to paste LoRa payloads in Hexadecimal or Base 64 and see the correctly decoded results can be found at the link below:

<https://synetica.github.io/enlink-decoder/>

13. Technical Support

For technical assistance, please visit the downloads section of our web site at www.synetica.net or email us at support@synetica.net



About us

Synetica was established in 2008 with the simple idea to revolutionise air quality monitoring, energy usage and remote asset monitoring. Our global customer base relies on our expertise to help them reduce emissions and clean up the air they breathe by allowing them to monitor their energy usage and key environmental parameters via the touch of a button.

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