enLink
IAQ-Plus / IAQ-Vape
Data Sheet

LoRaWAN Wireless Indoor Air Quality Monitor

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enLink IAQ+ Data Sheet

enLink IAQ+ - Wireless Air Quality Monitor

1.Specifications

Frequency range	868 / 915 MHz*
Protocol	LoRaWAN®
Receiver sensitivity	-135dBm @ 980bps
RF Transmit power	Up to +18dBm
Antenna	Integrated
Certifications	Pre-certified radio regulatory approvals: 868 & 915 MHz spectrum CE, FCC RoHS
External Power	12-24V Volts DC. 0.15 Amp (max)
Processor	ARM® Cortex® M0+
Dimensions	168mmø x 47mm
Weight	330g (depending on sensor options)
Orientation	Vertical wall mounting or horizontal ceiling mounting
Operating	0 – 40°C, 0 – 95%RH, Non-Condensing
Case materials	ABS

Temperature | Humidity | VOC's | Pressure | CO_2 | O_3 | Sound | Particles | Plus 1 Gas

The enLink IAQ Indoor Air Quality Monitor is a precision instrument which accurately measures up to 9 key environmental parameters including Temperature, Relative Humidity, VOC's, Carbon Dioxide, Particulate Matter (PM0.1, 0.3, 0.5, 1, 2.5, 5, PM10), Sound Level, Barometric Pressure, Ozone*, Formaldehyde*, Carbon Monoxide*, Nitrogen Dioxide*, Hydrogen Sulphide*, Sulphur Dioxide* and Oxygen*.

enLink IAQ is a precision instrument and satisfies the accuracy and range requirements for IWBI WELL v2 certification.

Readings are transmitted to the cloud using long range LoRa wireless, where the data can be displayed and analysed.
A built in USB port allows all parameters including air quality data, wireless signal strength and wireless network configuration to be viewed and set using simple menus via any USB enabled host such as a PC or Mac.

Features

- Multiple sensor options*
- LoRa long range wireless
- Frequency Range 863-870MHz*
- Frequency Range 902-928MHz*
- Up to +18dBm Tx Power
- Built in USB port for configuration
- Battery or externally powered
- CE / FCC compliant
- RoHS compliant
- Made in the UK

*Model dependent

2. IAQ+ Sensor Characteristics

Temperature	Accuracy: ±0.2°C (typical) Repeatability: ±0.1°C Conversion time: 6.35ms
Humidity	Accuracy: ±2% (typical) Repeatability: ±0.1% Response time: 15s
VOC's	IAQ Index 0 to 500 (see below) TVOC level (ppm) Variability ±15% (typical) Response time: (tτ33-63%) 1 s
Pressure	Accuracy: ±0.12hPa (equivalent to ±1m in altitude) Range (with full accuracy): 300 – 1100hPa Resolution: 0.18Pa
Particulate Matter	Particles measured: PM0.1, PM0.3, PM0.5, PM1, PM2.5, PM5 & PM10 Sensing method: Laser-based light scattering particle sensing Concentration range: 0 – 6,000 µg/m^3 Accuracy: PC0.1 – PC2.5 0 #/L to 200 #/L ± 20 #/cm^3 >200 #/L ±10% ave. PM0.1- PM2.5 0-50ug/m^3 ±5 µg/m^3 >50ug/m^3 ±10% ave. Accuracy: PC5.0 - PC10 0 #/L to 1,000 #/L ± 100 #/ cm^3 >1,000 #/L ±10% m.v. PM5.0 - PM10 0 - 50ug/m^3 ±10% µg/m^3 >50ug/m^3 ±20% ave. Mass concentration resolution: 1 µg/m^3 Lower limit of detection: 0.3 µm Response Time: < 6s (t90) Sensor life expectancy: > 5 years Maintenance Interval: Keep vents clean. No additional maintenance required. PM0.1 is extrapolated data, all other PM ranges are measured.
CO_2	Sensing method: Optical. Non-dispersive infrared (NDIR) Accuracy: ±(30, +3%) ppm (typ.) Range: 0 – 5,000 ppm Extended range 0 – 10,000 ppm Response time: 3 minutes (t90) Sensor life expectancy: >15 years Maintenance Interval: No maintenance required Built in Automatic Baseline Correction

Sound - Optional	Sensitivity: -26dB FS ±1dB SNR: 65dBA Dynamic Range: 91dBA Acoustic Overload Point: 120dB SPL Total Harmonic Distortion: 0.2% (Typ.) @ 105dB SPL

3. Selection Guide / Ordering Information

Part Number	Temperature	Relative Humidity	VOC's	Barometric Pressure	CO_2	Particulates PM0.1,0.3,0.5,1, 2.5, 5, 10
ENL-IAQ+	●	●	●	●	●	●

Order part number **ENL-IAQ+** for base enLink IAQ model with the sensors listed in the table above.

The base enLink IAQ+ model can be enhanced with up to two additional gas sensors, if two sensors are fitted, one of these must be Ozone. Units may be specified with one additional gas sensor plus Ozone from the selection guide in the section below.

Example 1, to order the unit with an Ozone (0-2ppm) sensor the part number is:

ENL-IAQ+, AQS-O3-2

Example 2, to order the unit with, Ozone (0-2ppm) and Nitrogen Dioxide (0-5ppm) sensors the part number is:

ENL-IAQ+, AQS-O3-2, AQS-NO2-5

Example 3, to order the unit with Nitrogen Dioxide (0-5ppm) sensor the part number is:

ENL-IAQ+, AQS-NO2-5

Sensor Selection Guide							
Parameter	**Type**	**Range**	**Units**	**Part Number**	**Calibration Certificate**	**Specific Gravity (SG) NTP***	**Distribution**
°C	Temperature	-40 - 85	°C	Fitted as standard	Factory Calibrated		
%RH	Humidity	0 - 100	%	Fitted as standard	Factory Calibrated		
Pa	Pressure	300 - 1100	hPa	Fitted as standard	Factory Calibrated		
PM	Particulate Matter	0 - 6,000	µg/m3	Fitted as standard	Factory Calibrated		
Sound	Decibels, A Weighted	91dBa	dB(A)	Option -S	--		
VOC	Volatile Organic Compounds	0 - 500	IAQ	Fitted as standard	Factory Calibrated	1	Evenly Distributed
CO_2	Carbon Dioxide	0 - 5000	ppm	Fitted as standard	Factory Calibrated	1.5189	Floor to Middle
NH_3	Ammonia	0 - 100	ppm	AQS-NH3-100	✓	0.59	Ceiling / roof
NH_3	Ammonia	0 - 1000	ppm	AQS-NH3-1000	✓	0.59	Ceiling / roof
CO	Carbon Monoxide	0 - 10	ppm	AQS-CO-10	✓	0.9667	Evenly Distributed
CO	Carbon Monoxide	0 - 100	ppm	AQS-CO-100	✓	0.9667	Evenly Distributed
HCHO	Formaldehyde	0 - 1	ppm	AQS-HCHO-1	✓	1.067	Evenly Distributed
HCHO	Formaldehyde	0 - 5	ppm	AQS-HCHO-5	✓	1.067	Evenly Distributed
H_2S	Hydrogen Sulphide	0 - 50	ppm	AQS-H2S-50	✓	1.1763	Floor to Middle
NO_2	Nitrogen Dioxide	0 - 2	ppm	AQS-NO2-2	✓	1.58	Floor to Middle
NO_2	Nitrogen Dioxide	0 - 5	ppm	AQS-NO2-5	✓	1.58	Floor to Middle
O_3	Ozone	0 - 2	ppm	AQS-O3-2	✓	1.66	Floor to Middle
SO_2	Sulphur Dioxide	0 - 5	ppm	AQS-SO2-5	✓	2.264	Floor
O_2	Oxygen	0 - 25	%	AQS-O2-25	✓	2.264	Floor

*NTP - Normal Temperature and Pressure - is defined as 20°C (293.15K, 68°F) and 1 atm. (101.325 kN/m^2, 101.325 kPa, 14.7 psia, 0 psig, 30 in Hg, 760 torr)
Sensors are grouped according to Specific Gravity (SG). Gas sensors should be used on the same enLink IAQ unit when the gases are Evenly Distributed and from the same SG band.

Examples:
Oxygen + Carbon Dioxide (Oxygen is evenly distributed and Carbon Dioxide is heavier than air.)
Oxygen + ~~*Carbon Dioxide*~~ + ~~*Ammonia*~~. (Ammonia and Carbon Dioxide have different SG and therefore need to be in separate enLink Air units.)
Oxygen + Ammonia. (Oxygen is evenly distributed and Ammonia is lighter than air.)

(enLink IAQ must be mounted at the correct height for the gases to be measured).

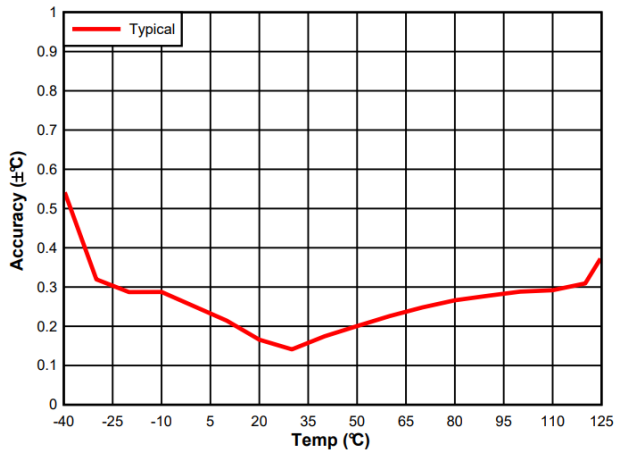
4.Temperature

Features

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

Specifications

Measurement:	Temperature °C
Operating Principle:	Digital
Measurement Range (full accuracy):	5°C to +60°C
Expected Operating Life:	> 10 years
Long Term Sensitivity Drift:	< 2% per month
Calibration:	Factory Calibrated
Resolution:	0.1°C
Accuracy (full range):	± 0.2°C
Temperature Range:	-20°C to +50°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 IAQ+



Temperature Accuracy vs. Temperature

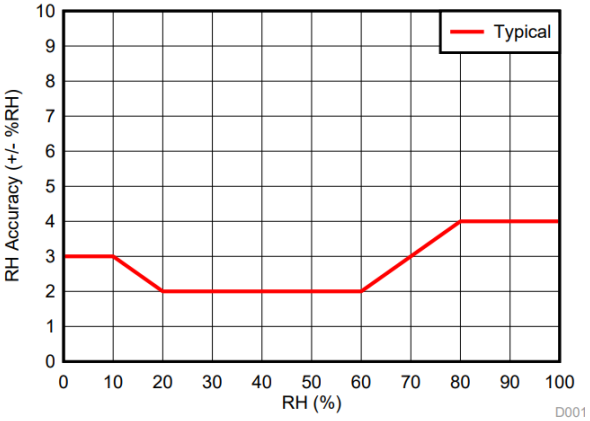
5.Relative Humidity (%RH)

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:	0.25 %RH per year
Calibration:	Factory Calibrated
Resolution:	0.1 %RH
Accuracy (full range):	± 2 %RH
Temperature Range:	-20°C to +70°C
Response Time:	< 1 seconds
Storage Temperature:	-65 °C to +150 °C
Orientation Sensitivity:	None
Part Number:	Fitted as standard to enLink IAQ+



RH Accuracy vs. RH

6.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:	10 years
Long Term Sensitivity Drift:	1 hPa per year
Calibration:	Factory Calibrated
Resolution:	0.18 hPa
Accuracy (full range):	± 0.6 hPa
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 IAQ+

7.Particulate Matter PM0.5 to PM10

Features

- Laser-based light scattering particle sensing
- Concentration range: 0 µg/m3 to 1,000 µg/m3
- Fully calibrated
- Long life
- High reliability
- High resolution

Specifications

Measurement:	**Particulate Matter**
Operating Principle:	Laser-based light scattering particle sensing
Measurement Range (full accuracy):	0 – 6000 µg/m3
Expected Operating Life:	> 5 years
Calibration:	NA
Resolution:	1 µg/m3
Accuracy:	PC0.1 – PC2.5 0 #/L to 200 #/L ± 20 #/cm^3 >200 #/L ±10% ave. PM0.1- PM2.5 0-50ug/m^3 ±5 µg/m^3 >50ug/m^3 ±10% ave. PC5.0 - PC10 0 #/L to 1,000 #/L ± 100 #/ cm^3 >1,000 #/L ±10% m.v. PM5.0 - PM10 0 - 50ug/m^3 ±10% µg/m^3 >50ug/m^3 ±20% ave.
Number count size range	PC 0.1 0.05-<0.1 µm PC 0.3 0.1 to < 0.3 µm PC 0.5 0.3 to < 0.5 µm PC 1.0 0.5 to < 1.0 µm PC 2.5 1.0 to < 2.5 µm PC 5 2.5 to < 5 µm PC 10 5 to <10 µm
Temperature Range:	-10°C to +60°C
Humidity Range (non-condensing):	0 – 95% RH
Response Time (T90):	< 6 seconds
Storage Temperature:	-40°C to +80°C
Orientation Sensitivity:	As per mounting instructions
Part Number:	Fitted as standard to enLink IAQ+

8. Volatile Organic Compounds VOC's (IAQ)

Indoor air quality (IAQ) classification and colour coding[1]

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/m^3 of total VOC leads to headaches and further neurotoxic impact on health.

[2]Software 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 %

9. Carbon Dioxide (CO_2)

Features

- Advanced optical NDIR technology rather than short-life electrochemical
- Long life due to non-depleting sensing principle
- Self-correcting for pressure and altitude variations
- High reliability
- High resolution
- Automatic Baseline Correction

Specifications

Gas Detected:	Carbon Dioxide CO_2
Operating Principle:	Non-dispersive infrared (NDIR)
Measurement Range (full accuracy):	0 – 5000 ppm
Expected Operating Life:	> 15 years
Calibration:	Automatic baseline correction
Resolution:	0.1 ppm
Accuracy:	+/- (30, +3%) of reading, ppm
Temperature Range:	0°C to +50°C
Humidity Range (non-condensing):	0 – 95% RH
Response Time (T90):	< 60 seconds
Storage Temperature:	0°C to +20°C
Orientation Sensitivity:	None
Part Number:	Fitted as standard to enLink IAQ+

10.Ammonia (NH_3)

Features

- Liquid electrolyte
- Highly sensitive
- Combined with intelligent algorithms, has stronger adaptability to the environment, more accurate detection, and stable zero point

Specifications

Gas Detected:	**Ammonia NH_3**
Operating Principle:	Liquid electrochemical sensing technology
Measurement Range (full accuracy):	AQS-NH3-100 100 ppm AQS-NH3-500 500 ppm AQS-NH3-1000 1000 ppm
Expected Operating Life:	> 18 months
Calibration:	Manufacturer Calibration Certificate
Resolution:	AQS-NH3-100 0.1 ppm AQS-NH3-500 0.1 ppm AQS-NH3-1000 0.1 ppm
Accuracy:	± 5% Full Scale
Repeatability:	≤ 2%
Temperature Range:	-20°C to +40°C
Pressure Range:	900 – 1100 mbar
Humidity Range (non-condensing):	15 – 95% RH
Response Time (T90):	< 50 seconds
Storage Temperature:	0°C to +20°C
Orientation Sensitivity:	None
Part Number:	AQS-NH3-100 AQS-NH3-500 AQS-NH3-1000

11. Carbon Monoxide (CO)

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:	**Carbon Monoxide CO**	
Operating Principle:	Solid polymer electrochemical technology	
Measurement Range (full accuracy):	AQS-CO-10 AQS-CO-100	0-10ppm 0-100ppm
Lower Detection Limit:	AQS-CO-10 AQS-CO-100	0.1ppm 1ppm
Expected Operating Life:	> 3 years (in relatively clean air, 0-25°C, 30-70%RH)	
Calibration:	Manufacturer Calibration Certificate	
Resolution:	AQS-CO-10 AQS-CO-100	0.01ppm 0.1ppm
Accuracy:	AQS-CO-10 AQS-CO-100	0-5ppm +/-2-5% 5-10ppm +/-5% ±5% Full Scale
Repeatability:	≤ 2%	
Temperature Range:	-40°C to +50°C	
Pressure Range:	Atm. ± 10%	
Humidity Range (non-condensing):	15 – 95% RH	
Response Time (T90):	< 30 seconds	
Storage Temperature:	0°C to +20°C	
Orientation Sensitivity:	None	
Part Number:	AQS-CO-10 AQS-CO-100	

12.Formaldehyde (CH_2O)

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:	**Formaldehyde CH2O**	
Operating Principle:	Solid polymer electrochemical technology	
Measurement Range (full accuracy):	AQS-HCHO-1 AQS-HCHO-5	0 – 1 ppm 0 – 5 ppm
Lower Detection Limit:	0.01ppm	
Expected Operating Life:	> 2 years (in relatively clean air, 0-25°C, 30-70%RH)	
Calibration:	Manufacturer Calibration Certificate	
Resolution:	0.001ppm	
Accuracy:	AQS-HCHO-1	100ppb-200ppb error is ±15% 200ppb-1000ppb error is ±10%
	AQS-HCHO-5	0.1ppm-0.2ppm error is ±15% 0.2ppm-5ppm error is ±10%
Repeatability:	≤ 2%	
Temperature Range:	-40°C to +50°C	
Humidity Range (non-condensing):	15 – 90% RH	
Response Time (T50):	< 40 seconds	
Storage Temperature:	5°C to +20°C	
Orientation Sensitivity:	None	
Part Number:	AQS-HCHO-1 AQS-HCHO-5	

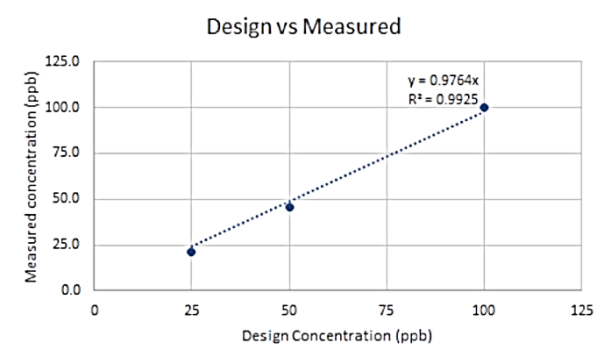
13.Ozone (O_2)

Features

- Nano gas Sensor
- Long life
- High reliability
- High Sensitivity to single digit ppb

Specifications

Gas Detected:	Ozone O_3
Operating Principle:	Nano Gas Sensor
Measurement Range:	0 – 2ppm
Expected Operating Life:	> 2 years
Calibration:	Factory calibrated
Resolution:	1ppb
Accuracy (@100ppb):	±10% of reading
Temperature Range:	5˚C to +65˚C
Humidity Range (non-condensing):	5 – 99% RH
Response Time (T90):	< 10 seconds
Storage Temperature:	0˚C to +50˚C
Orientation Sensitivity:	None
Part Number:	AQS-O3-1



Ozone Sensor percent error for Design versus Measured in laboratory environments show a 14.9% variance at 25 ppb; 8.5% variance at 50ppb and 0.1% variance at 100 ppb exposure.

14.Nitrogen Dioxide (NO_2)

Features

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

Specifications

Gas Detected:	**Nitrogen Dioxide NO2**
Operating Principle:	Solid Polymer Electrochemical Sensing Technology
Measurement Range (full accuracy):	AQS-NO2-2 0 – 2 ppm AQS-NO2-5 0 – 5 ppm
Expected Operating Life:	> 2 years (in relatively clean air, 0-25°C, 30-70%RH)
Calibration:	Manufacturer Calibration Certificate
Resolution:	0.001 ppm
Accuracy:	±5% Full Scale
Lower Detection Limit:	0.05ppm
Temperature Range:	-40°C to +50°C
Humidity Range (non-condensing):	15 – 90% RH
Response Time (T90):	< 50 seconds
Storage Temperature:	5°C to +20°C
Orientation Sensitivity:	None
Part Number:	AQS-NO2-2 AQS-NO2-5

15.Oxygen (O_2)

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:	**Oxygen O_2**
Operating Principle:	Solid polymer electrochemical technology
Measurement Range:	0 – 25% O_2
Expected Operating Life:	> 2 years
Calibration:	Factory calibrated
Resolution:	0.01%
Accuracy:	±5% Full Scale
Lower Detection Limit:	0.5% Vol.
Temperature Range:	-40°C to +50°C
Pressure Range:	Atm. ±10%
Humidity Range (non-condensing):	15 – 95% RH
Response Time (T90):	< 10 seconds
Storage Temperature:	0°C to +40°C
Orientation Sensitivity:	None
Part Number:	AQS-O2-25

16. Battery Installation / Replacement

enLink IAQ devices use 4 x SAFT LS14500 or EVE ER14505 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 or EVE ER14505 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.

Specifications are subject to change without notice

About us

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Scientific & Environmental Monitoring Technologies

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