Environmental Sensor Datasheet

General description

The Environmental Sensor is a wireless sensor that can measure a variety of parameters such as particulate matter, environmental noise, and a wide range of weather-related parameters for an all-round understanding of the environment around it.

KEY FEATURES

- Affordable 3-in-1 particulate, weather, and noise station
- For indoor and outdoor operation
- Compatible with external 12-24V power supplies for extended operation
- Battery operation for fast deployment
- Wireless LoRaWAN connection
- Fully remote configuration and management
- “Low Power” and “Always On” modes for optimal battery life management
- Noise parameters calculated according to definitions in the IEC 61672 regulation
- PM1, PM2.5, PM4 and PM10 measurements with instantaneous, average, and maximum values and trigger mode
- Wind direction and speed measurement with instantaneous, average, and maximum values and trigger mode (external probes required)
- Rainfall measurement with instant and total values and trigger mode for geohazard applications (external probe required)
- Data management and processing through the MyMove IoT Platform
- Its wireless design ensures seamless integration with other Move Solutions and IoT Platform.

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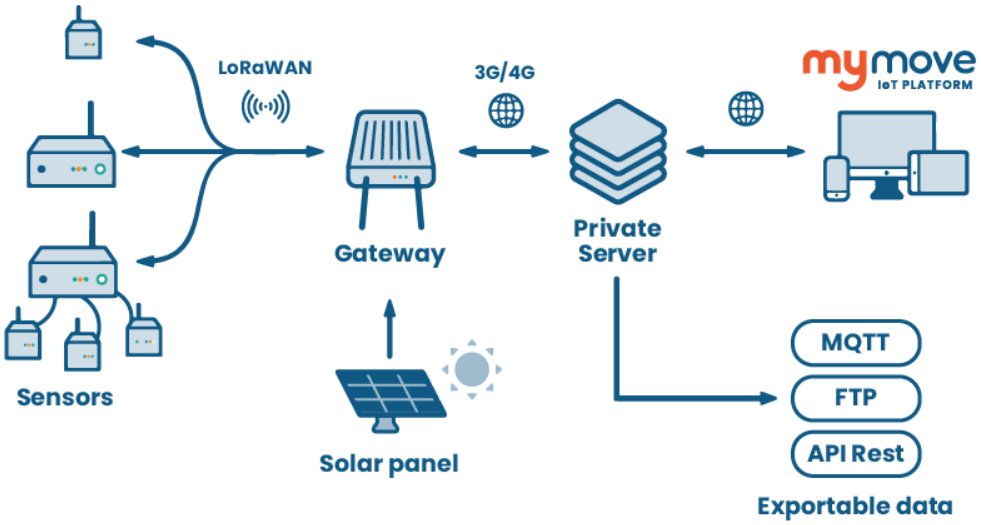
- The sensor offers a variety of working modes to accommodate different scenarios, all manageable through the MyMove IoT Platform. To operate the sensor requires a Move Solutions gateway installed nearby.



At a glance

The Environmental Sensor is made up of three **Agents** that behave as three independent sensors.

The **Noise** agent measures environmental noise through a microphone designed specifically for this product and allows the user to measure $\mathbf{L_{eq}}$ over a plethora of different time windows, as well as $\mathbf{L_{max}}$, $\mathbf{L_{pk}}$, $\mathbf{L_{10}}$, $\mathbf{L_{50}}$ and $\mathbf{L_{90}}$, all with both **A and C frequency weightings and F and S time-weightings** as prescribed in IEC 61672-1[1]. The power efficient microphone allows for up to 5 weeks of continuous monitoring on batteries alone, or an external power supply can be connected for long term monitoring.

The **Air** agent outputs data on particulate matter in the air: instantaneous mass concentration of $\mathbf{PM_1}$, $\mathbf{PM_{2.5}}$, $\mathbf{PM_4}$ **and** $\mathbf{PM_{10}}$ can be measured in Low Power mode, while Always On mode allows the user to collect data on **the maximum and average** mass concentration of particulates in the air and set acquisitions to trigger when the instantaneous mass concentration exceeds a threshold. To maximize insight on these parameters the agent collects data on **atmospheric pressure, ambient temperature and relative humidity**, and an external tipping bucket rain probe can be connected to measure **instantaneous and cumulative rainfall**. A threshold can be set to trigger an acquisition when the total rainfall over a specified time exceeds a user defined threshold.

The **Wind** agent takes measurements from two external **Wind speed** and **Wind direction** probes. The Low Power mode consists of programmed reading of instantaneous speed and direction, with cadence ranging between 2 minutes and 24 hours. A more power-hungry Always On mode enables the user to also measure average and maximum wind speeds, as well as enabling a trigger mode on instantaneous wind speed.

[1] This product is not certified according to the IEC 61672 standard but conforms to the definition of the output parameters described in it.

Technical specifications

Noise Agent	
Technology	MEMS
Resolution	0.01 dB_{SPL} for L_{Aeq}, L_{Ceq}, L_{AFmax}, L_{CFmax}, L_{ASmax}, L_{CSmax}, L_{Apk}, L_{Cpk}
	1.0 dB_{SPL} for L_{AF10}, L_{AF50}, L_{AD90}, L_{CF10}, L_{CF50}, L_{CF90}
Accuracy (1 kHz, 94 dB_{SPL})	± 0.5 dB_{SPL}
Sampling Frequency	48 kHz
Output Parameters	• L_{Aeq} over the selected averaging time • L_{Ceq} over the selected averaging time • L_{AFmax} since last communication • L_{CFmax} since last communication • L_{ASmax} since last communication • L_{AFmax} since last communication • L_{Apk} since last communication • L_{Cpk} since last communication • L_{AF10} since last communication • L_{AF50} since last communication • L_{AF90} since last communication • L_{CF10} since last communication • L_{CF50} since last communication • L_{CF90} since last communication
Cadence (communication period)	2 minutes, 5 minutes, 10 minutes, 15 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, 6 hours, 12 hours, 24 hours.
Averaging times	2 minutes, 5 minutes, 10 minutes, 15 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, 6 hours, 12 hours, 24 hours.

Air Agent	
Cadence (communication period)	2 minutes, 5 minutes, 10 minutes, 15 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, 6 hours, 12 hours, 24 hours.
Particulate matter	
Technology	Laser scattering
Range	0 - 1000 µg/m^3

Size range	PM1: 0.3 – 1.0 µm PM2.5: 0.3 – 2.5 µm PM4: 0.3 – 4.0 µm PM10: 0.3 – 10.0 µm
Accuracy (PM1 and PM2.5)	Reading < 100 µg/m³: ±5 µg/m³ and 5% of reading Reading > 100 µg/m³: ± 10% of reading
Accuracy (PM4 and PM10)	Reading < 100 µg/m³: ±25 µg/m³ Reading > 100 µg/m³: ± 25% of reading
Resolution	0.1 µg/m³
Output parameters (Low Power mode)	Instantaneous PM1, PM2.5, PM4 and PM10
Output parameters (Always On mode)	• Instantaneous PM1, PM2.5, PM4 and PM10 • Maximum PM1, PM2.5, PM4 and PM10 since last communication • Average PM1, PM2.5, PM4 and PM10 over the selected averaging time
Threshold resolution (Always On mode only)	10 µg/m³
Averaging times	2 minutes, 5 minutes, 10 minutes, 15 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, 6 hours, 12 hours, 24 hours.
Rain (External probe required, see Ordering Information)	
Technology	Tipping bucket
Resolution[1]	0.2 mm
Accuracy[1]	± 4% (at 2 mm/min)
Output parameters	• Rainfall since last communication • Total rainfall over the selected averaging time
Averaging times	2 minutes, 5 minutes, 10 minutes, 15 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, 6 hours, 12 hours, 24 hours.
Threshold resolution	Same as Resolution. Threshold is applied to the total rainfall over the selected averaging time.
Atmospheric pressure	
Resolution	0.01 hPa
Accuracy	±0.5 hPa
Range	0 – 1250 hPa
Output parameters	Instantaneous atmospheric pressure

Temperature	
Resolution	0.01 °C
Accuracy	±0.7 °C
Output parameters	Instantaneous ambient temperature
Relative Humidity	
Resolution	0.01 %RH
Accuracy	±6 %RH (30-70 %RH)
Output parameters	Instantaneous relative humidity

[1] These values are based on the rain probe provided by Move Solutions as an accessory. Other rain probes may differ.

Wind Agent (External probe required, see Ordering Information)	
Technology	External 4-20 mA wind direction and wind speed sensors
External sensors supply voltage	12.3 VDC ±2% (70 mA)
Supported analog interface	4-20 mA (3 wires)
Range	0.4-25 mA
Resolution	0.001 mA
Accuracy of readout	±0.03 mA
Accuracy of wind speed sensor	±0.3 m/s
Accuracy of wind direction sensor	±3°
Output parameters (Low Power mode)	• Instantaneous wind speed (3 seconds average) • Instantaneous wind direction
Output parameters (Always On mode)	• Instantaneous wind speed (3 seconds average) • Instantaneous wind direction • Average wind speed over the selected cadence time • Maximum wind speed since last communication
Cadence (communication period)	2 minutes, 5 minutes, 10 minutes, 15 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, 6 hours, 12 hours, 24 hours.
Threshold resolution (Always On mode only)	0.1 mA

General data	
Wireless connection technology	Sub-GHz LoRaWAN protocol[1] (gateway required)
Supported LoRaWAN regions	EU868, US915, AU915
Wireless coverage[2]	1 km line of sight from the nearest gateway
Internal storage	Up to 10000 air agent events OR Up to 14000 noise agent events OR Up to 24000 wind agent events
Cable connection	Move Solutions 8-pole connector (Move Link). For compatible accessories visit Move Solutions' website or contact us directly.
Battery	2x 19Ah 3.6V replaceable lithium battery (Suggested: EVE ER34615PHR4).
External Power	12 – 24 VDC
Maximum required power from external power supply	900 mW
Operating range	0 ~ 90 (non-condensing) %RH -10 ~ 50 °C
Storage conditions	0 ~ 80 (non-condensing) %RH -40 ~ 70 °C
Dimensions	220.2 x 206.6 x 70 mm
Weight[3]	1.5 kg
Case material	Polycarbonate
Microphone material	Anodized Aluminum
Installation options	Wall or pole mount
Software version	v1

[1] The sensor's LoRaWAN connection operates on a best-effort basis, which means that while most data packets are delivered, there is a slight possibility of occasional packet loss.
[2] Wireless coverage may vary based on the actual deployment scenario.
[3] Refers to the sensor unit itself. External accessories, such as mounting plate, external connectors and probes are not included since they are optional and/or can be replaced with alternative parts to fit specific applications.

Battery duration

Parameters not mentioned in the table have little or no effect on overall battery duration.

Noise agent	Wind agent	Air agent	Expected duration[1]
ON Any cadence	OFF	OFF	6 weeks
OFF	Low Power Mode[2] Cadence 30 minutes	OFF	3.3 years
OFF	Low Power Mode[2] Cadence 2 minutes	OFF	3 months
OFF	Always On Mode[2] Any cadence	OFF	12 days
OFF	OFF	Low Power Mode Cadence 30 minutes	1.5 years
OFF	OFF	Low Power Mode Cadence 10 minutes	6 months
OFF	OFF	Always On Mode Any cadence	11 days
ON Any cadence	Low Power Mode[2] Cadence 30 minutes	Low Power Mode Cadence 30 minutes	5 weeks
OFF	Low Power Mode[2] Cadence 30 minutes	Low Power Mode Cadence 30 minutes	1 year
ON Any cadence	OFF	Always On Mode Any cadence	8 days
ON Any cadence	Always On Mode[2] Any cadence	OFF	9 days
ON Any cadence	Always On Mode[2] Any cadence	Always On Mode Any cadence	5 days

[1] The expected battery life is only an estimate and can vary depending on a variety of environmental factors.
[2] Power consumption of Wind agent is directly affected by the output of the wind probes. Estimates in this table are based on an above-average use case, but in extreme cases the battery duration might be reduced.

Ordering information

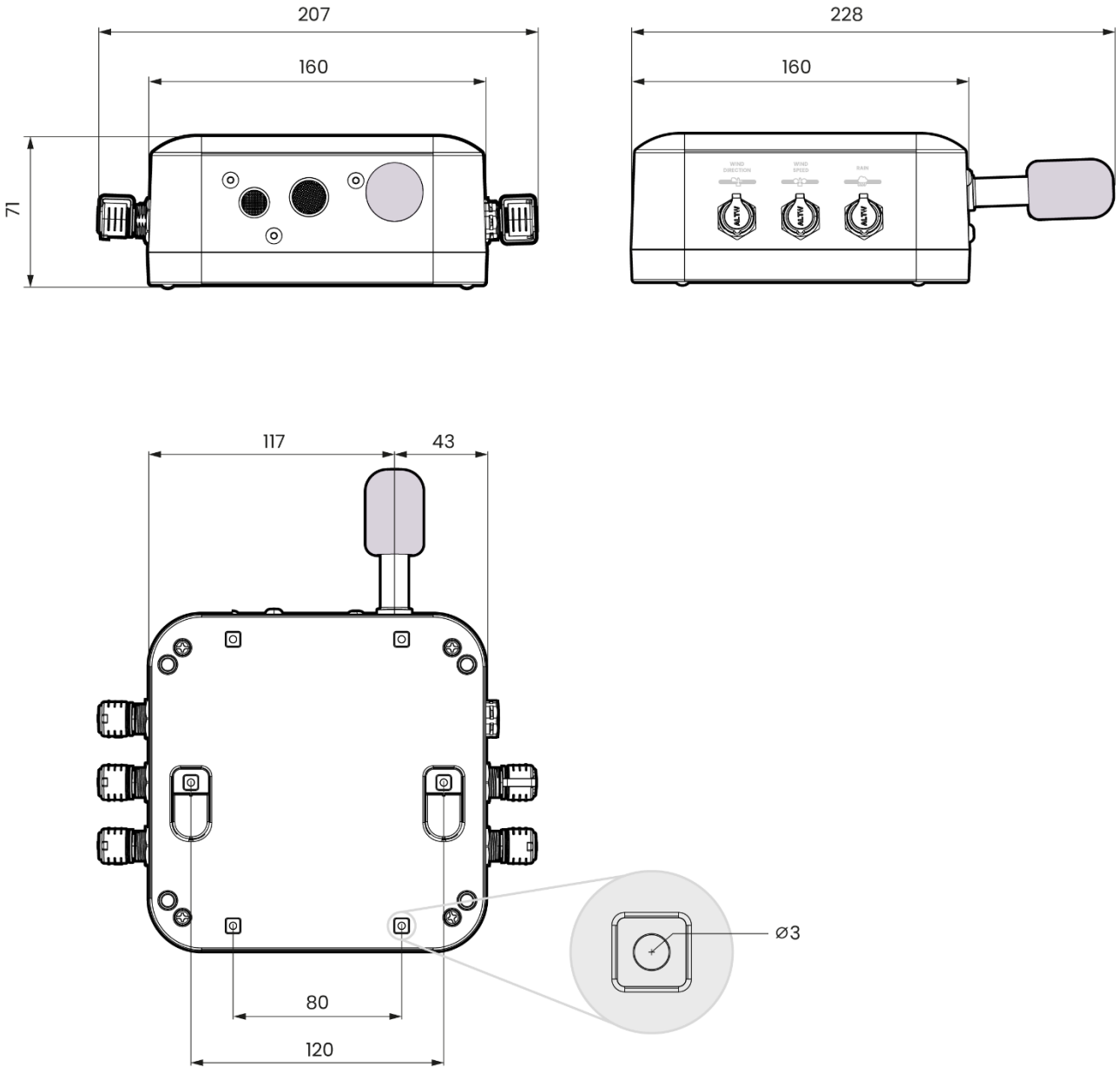
Sensor	Part number
Environmental Sensor standard bundle *Includes: sensor unit, pole mount kit for sensor unit*	ENV-BND-STD-1
Environmental Sensor rain bundle *Includes: sensor unit, rain probe, pole mount kit for sensor unit and probe*	ENV-BND-R-1
Environmental Sensor wind bundle *Includes: sensor unit, wind speed and direction probes, pole mount kit for sensor unit and probes*	ENV-BND-W-1
Environmental Sensor rain and wind bundle *Includes: sensor unit, rain probe, wind speed and direction probes, pole mount kit for sensor unit and probes*	ENV-BND-RW-1

Accessories	Part number
Data download cable	Coming soon
Battery pack	SBE-STD-CB-1

Mechanical drawings

WITHOUT CONNECTORS

All dimensions are in millimeters



MAXIMUM WIDTH WITH CONNECTORS

All dimensions are in millimeters