

URBAN AIR QUALITY MONITORING STATION

DATASHEET



Document Release Information

Persons in Charge		Document Information	
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1. Brief Specification

Parameter	Description
Hardware Version	7.1
GPS Module	Embedded
Air Quality Sensor Options:	Patented actively climatized Gas Sensors Enclosure with slots for up to 8 gas sensors in total: - Up to 4 gas sensors for low concentration gas sensing (measured in ppb): CO, NO₂, SO₂, O₃. - Up to 4 gas sensors for high concentration gas sensing (measuring in ppm): CO, NO₂, SO₂, O₃, NH₃, H₂S, Cl₂, HCl, HF, CH₂O, H₂. Particulate Matter Sensors: - High Precision Particulate Matter Sensor - PM10, PM2.5, PM1 - Standard Precision Particulate Matter Sensor - PM10, PM2.5
Environmental Sensing Sensor Options:	Temperature, Humidity, Pressure Sensor Low Concentration CO ₂ Sensor Noise Level (Noise Pollution) Sensor Wind Speed & Wind Direction Sensor Precipitation Sensor
Station Connectivity Options	2G LAN NB-IoT
Power Supply (all included by default)	Power Grid (110V/220V) Solar Panel - 20W Internal UPS Battery - 12 VDC 12Ah
Protection Level	IP65, for outdoor mounting
Operating Temperature	- 30°C ~ + 70°C

Table 1: Urban Air Quality Monitoring Station Brief Specification

Key facts:

- Simultaneously monitors air quality and environmental parameters;
- Measures key air quality indicators, as defined by the European Environmental Agency and the US Environmental Protection Agency;
- Can measure both low gas concentrations (in ppb, used for urban environment sensing), and high gas concentrations (in ppm, used for industrial environment sensing);
- Comes with a unique patented active climatization feature ensuring consistent gas sensor measurements, regardless of outside temperature;
- Industrial-grade IP65 body, able to withstand all weather conditions;
- Fast and easy to install, maintain, and support;
- Utilizes modular design, permitting sensor upgrades, updates and add-ons;
- Provides effortless multi-platform integration using standard protocols.

2. Station Overview

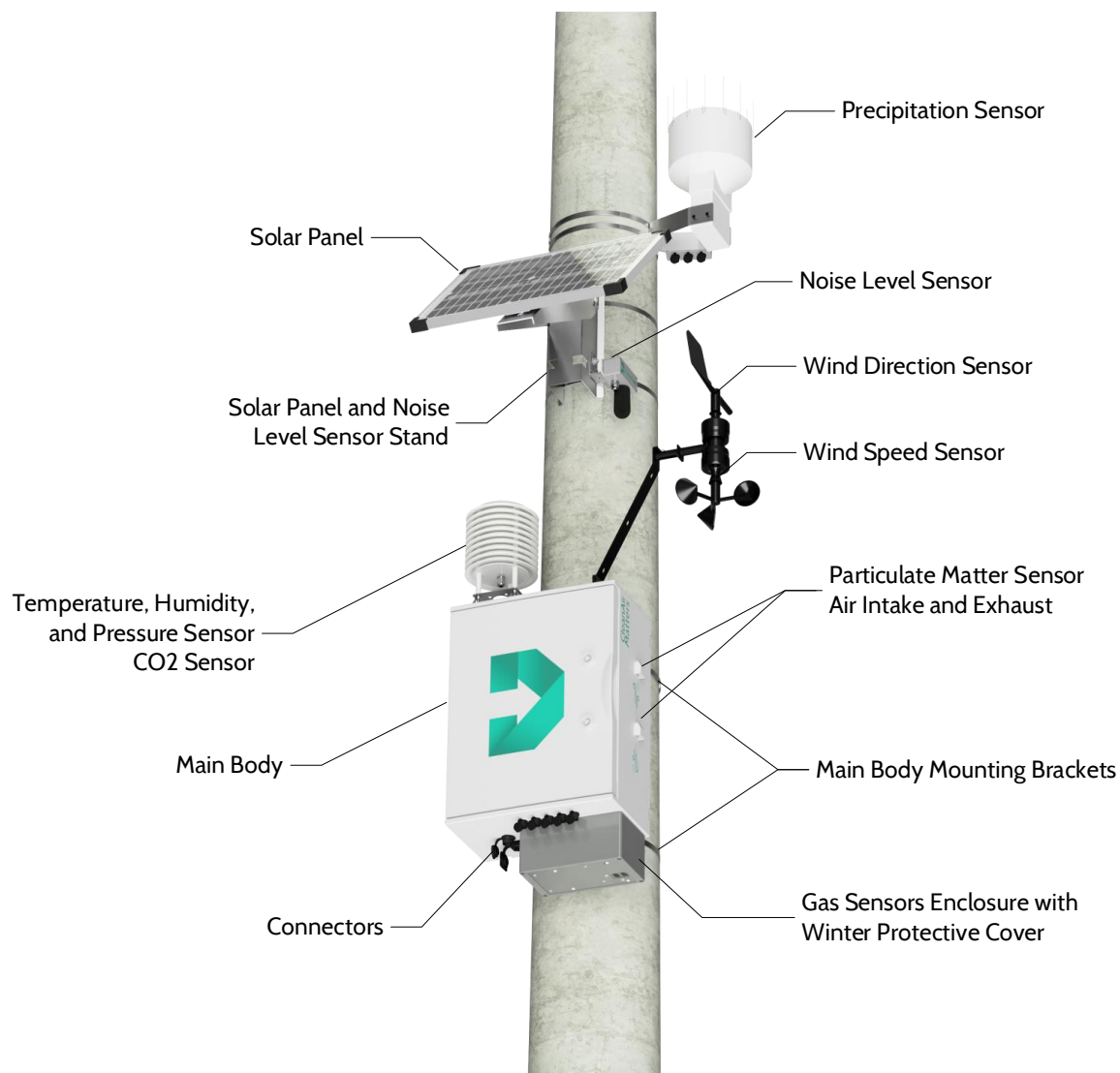


Figure 1: Urban Air Quality Monitoring Station Overview

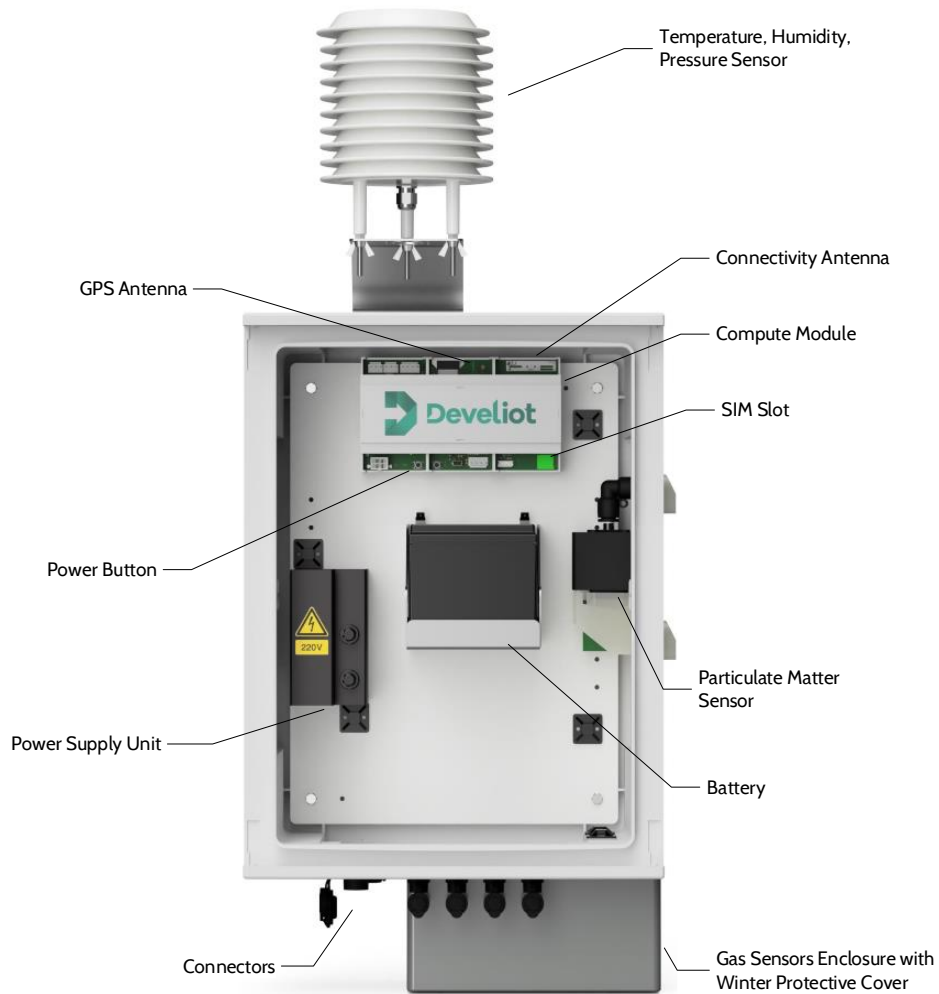


Figure 2: Internal Overview of the Urban Air Quality Monitoring Station

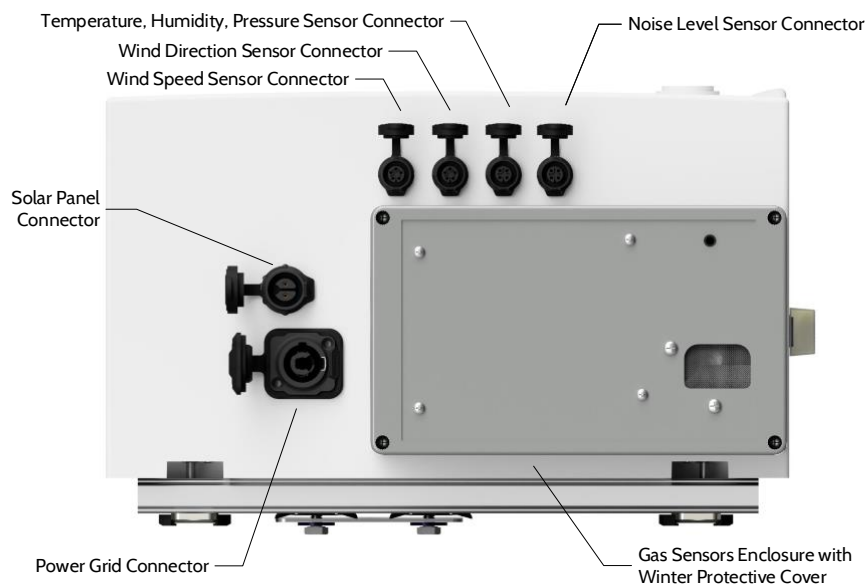


Figure 3: Bottom View of the Urban Air Quality Monitoring Station

3. Main Body

The Station's Main Body consists of a glass filled polyester, robust, waterproof IP65 body designed for quick outdoor deployment on streetlamp posts, masts, building fronts, etc.

The Main Body is shielding the Computing Module and the Power Distribution Components.

The specification of the Main Body is the following:

Parameter	Value
Main Body Dimensions (H x W x L)	430 mm x 325 mm x 185 mm
Main Body Dimensions with Gas Sensors Enclosure and Temperature, Humidity, Pressure Sensor Attached (H x W x L)	765 mm x 325 mm x 210 mm
Minimum Dimension on Installation	800 mm x 500 mm x 550 mm
Material	Glass filled polyester
Protection Level	IP65, for outdoor mounting

Table 2: Main Body Specification

3.1. Compute Module

The Compute Module manages the operation of the Urban Air Quality Monitoring Station. It gathers and transmits all sensor data, tracks GPS coordinates, and monitors various parameters related to the health status of the Station.

The specification of the Compute Module is the following:

Parameter	Value
Operating Temperature	- 30°C ~ + 70°C
Connectivity Options	2G
	LAN
	NB-IoT
Connectivity Options for On-Site Diagnostics	WiFi
GPS Module	Embedded

Table 3: Compute Module Specification

3.2. Power Sources

The Urban Air Quality Monitoring Station embeds three power sources to ensure flexibility of installation and reliability during severe weather conditions.

The specification of the Station's Power Sources is the following:

Parameter	Value
Power Grid Compatibility	110 / 220 VAC
Solar Panel Capacity	20 W
Internal UPS Battery Capacity	12 VDC, 12 Ah

Table 4: Power Sources Specification

The average life of the internal UPS battery without recharging is:

- 7 (seven) days, when Summer Protective Cover is applied, average daily temperature is 20°C, and up to six transmissions per hour are configured;
- 2 (two) days, when Winter Protective Cover is applied, the climatization system is actively used, and up to six transmissions per hour are configured.

4. Sensors and Sensor Modules

4.1. Gas Sensors Enclosure

The Urban Air Quality Monitoring Station is designed to measure both low gas concentrations (in ppb, used for urban environment sensing), and high gas concentrations (in ppm, used for industrial environment sensing), regardless of external environment. It comes with a unique patented climatization feature in which the gas sensors are mounted in a specialized, actively climatized Gas Sensors Enclosure that ensures consistent sensor measurements by actively compensating for negative temperature deviations (e.g. low ambient temperature during winter).

The Gas Sensors Enclosure comes with slots for up to 8 gas sensors in total:

- Up to 4 gas sensors for low concentration gas sensing (measured in ppb): CO, NO₂, SO₂, O₃;
- Up to 4 gas sensors for high concentration gas sensing (measuring in ppm): CO, NO₂, SO₂, O₃, NH₃, H₂S, Cl₂, HCl, HF, CH₂O, H₂.

The Gas Sensors Enclosure comes with two protective covers:

- Winter Protective Cover is equipped with the unique patented active heating system that compensates for negative temperature deviations (e.g. low ambient temperature during winter) to ensure consistent sensor measurements.
- Summer Protective Cover is designed for the warm months of the year to ensure consistent sensor measurements and no overheating of the sensors.

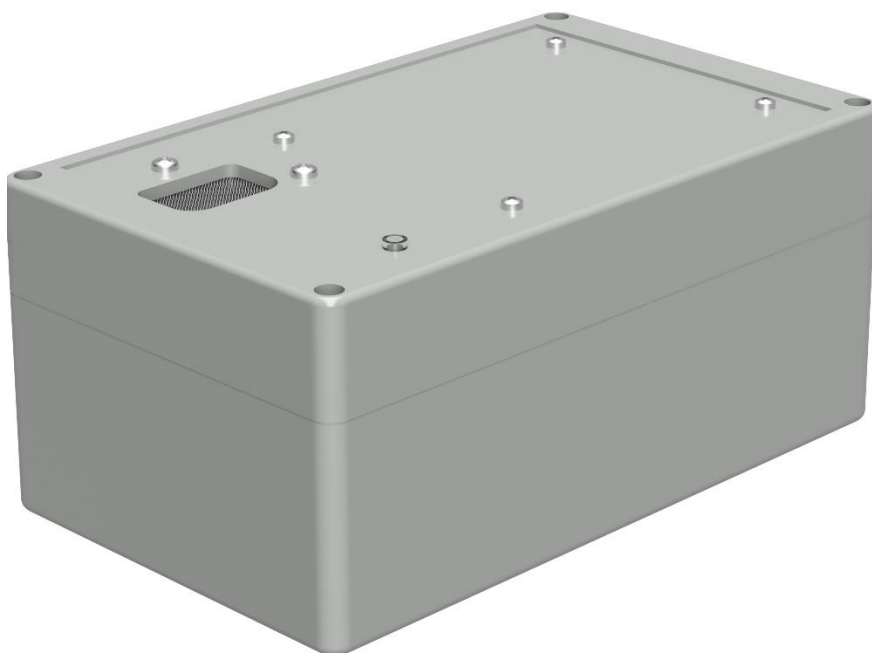


Figure 4: Gas Sensors Enclosure Box with Winter Protective Cover (Bottom is Facing Up)

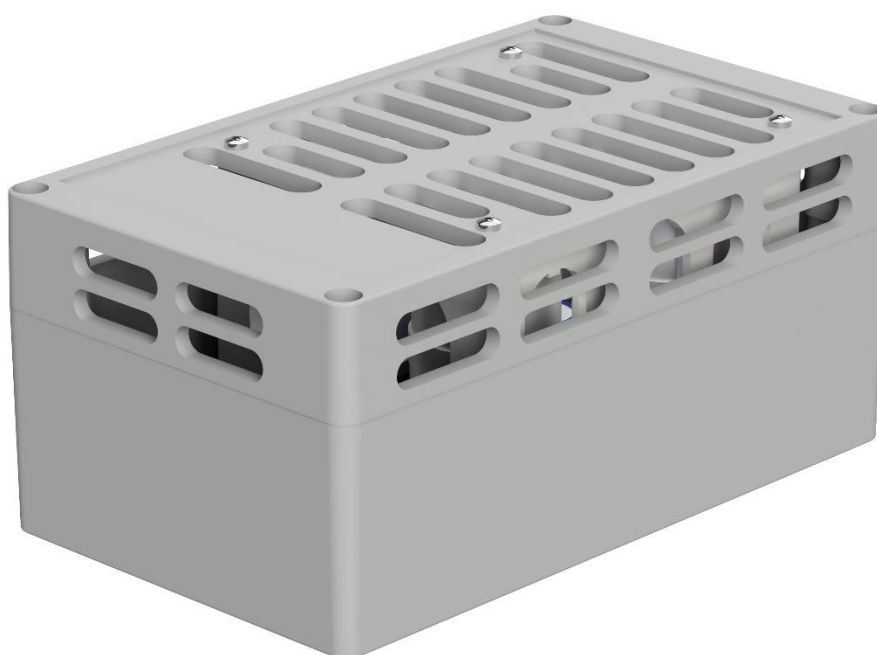


Figure 5: Gas Sensors Enclosure Box with Summer Protective Cover (Bottom is Facing Up)

4.1.1. Low Concentration Gas Sensors



Figure 6: Low Concentration Gas Sensor (Bottom is Facing Up)

4.1.1.1. Specification of Low Concentration Nitrogen Dioxide (NO₂) Sensor

Parameter	Values
Target Gas	NO ₂
Detection Range	0 ~ 1 ppm
Resolution	< 10 ppb
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 39 mm x 44 mm

Table 5: Specification of Low Concentration NO₂ Sensor

4.1.1.2. Specification of Low Concentration Carbon Monoxide (CO) Sensor

Parameter	Values
Target Gas	CO
Detection Range	0 ~ 10 ppm
Resolution	< 10 ppb
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 39 mm x 44 mm

Table 6: Specification of Low Concentration CO Sensor

4.1.1.3. Specification of Low Concentration for Sulfur Dioxide (SO₂) Sensor

Parameter	Values
Target Gas	SO ₂
Detection Range	0 ~ 1 ppm
Resolution	< 10 ppb
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 39 mm x 44 mm

Table 7: Specification of Low Concentration SO₂ Sensor

4.1.1.4. Specification of Low Concentration Ozone (O₃) Sensor

Parameter	Values
Target Gas	O ₃
Detection Range	0 ~ 1 ppm
Resolution	< 10 ppb
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 39 mm x 44 mm

Table 8: Specification of Low Concentration O₃ Sensor

4.1.2. High Concentration Gas Sensors



Figure 7: High Gas Concentration Sensors (Bottom is Facing Up)

4.1.2.1. Specification of High Concentration Nitrogen Dioxide (NO₂) Sensor

Parameter	Value
Target Gas	NO ₂
Detection Range	0 ~ 20 ppm
Resolution	0.1 ppm
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 24 mm x 25 mm

Table 9: Specification of High Concentration NO₂ Sensor

4.1.2.2. Specification of High Concentration Carbon Monoxide (CO) Sensor

Parameter	Value
Target Gas	CO
Detection Range	0 ~ 1000 ppm
Resolution	0.5 ppm
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 24 mm x 25 mm

Table 10: Specification of High Concentration CO Sensor

4.1.2.3. Specification of High Concentration Sulfur Dioxide (SO₂) Sensor

Parameter	Value
Target Gas	SO ₂
Detection Range	0 ~ 20 ppm
Resolution	0.1 ppm
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 24 mm x 25 mm

Table 11: Specification of High Concentration SO₂ Sensor

4.1.2.4. Specification of High Concentration Ozone (O₃) Sensor

Parameter	Value
Target Gas	O ₃
Detection Range	0 ~ 18 ppm
Resolution	0.2 ppm
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 24 mm x 25 mm

Table 12: Specification of High Concentration O₃ Sensor

4.1.2.5. Specification of High Concentration Ammonia (NH₃) Sensor

Parameter	Value
Target Gas	NH ₃
Detection Range	0 ~ 50 ppm
Resolution	0.5 ppm
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 24 mm x 25 mm

Table 13: Specification of High Concentration NH₃ Sensor

4.1.2.6. Specification of High Concentration Hydrogen Sulfide (H₂S) Sensor

Parameter	Value
Target Gas	H ₂ S
Detection Range	0 ~ 100 ppm
Resolution	0.1 ppm
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 24 mm x 25 mm

Table 14: Specification of High Concentration H₂S Sensor

4.1.2.7. Specification of High Concentration Chlorine (Cl₂) Sensor

Parameter	Value
Target Gas	Cl ₂
Detection Range	0 ~ 10 ppm
Resolution	0.1 ppm
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 24 mm x 25 mm

Table 15: Specification of High Concentration Cl₂ Sensor

4.1.2.8. Specification of High Concentration Hydrogen Fluoride (HF) Sensor

Parameter	Value
Target Gas	HF
Detection Range	0 ~ 10 ppm
Resolution	0.1 ppm
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 24 mm x 25 mm

Table 16: Specification of High Concentration HF Sensor

4.1.2.9. Specification of High Concentration Formaldehyde (CH₂O) Sensor

Parameter	Value
Target Gas	CH ₂ O
Detection Range	0 ~ 10 ppm
Resolution	0.1 ppm
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 24 mm x 25 mm

Table 17: Specification of High Concentration CH₂O Sensor

4.1.2.10. Specification of High Concentration Hydrogen (H₂) Sensor

Parameter	Value
Target Gas	H ₂
Detection Range	0 ~ 1000 ppm
Resolution	2 ppm
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 24 mm x 25 mm

Table 18: Specification of High Concentration H₂ Sensor

4.1.2.11. Specification of High Concentration Hydrogen Chloride (HCl) Sensor

Parameter	Value
Target Gas	HCl
Detection Range	0 ~ 20 ppm
Resolution	0.1 ppm
Response Time	< 120 sec
Lifespan	12 months (in use)
Storage Temperature	0 ~ 20°C
Storage Humidity	40 ~ 60% RH
Operating Temperature	-20 ~ +50°C
Operating Humidity	15 ~ 90% RH (no condensation)
Size	Ø 24 mm x 25 mm

Table 19: Specification of High Concentration HCl Sensor

4.2. Particulate Matter Sensors

The Urban Air Quality Monitoring Station provides options to use one of two Particulate Matter Sensors:

- The Standard Precision Particulate Matter Sensor is a great choice when the main focus of a project is on tracking local and transborder pollutants with very good level of accuracy.
- The High Precision Particulate Matter Sensor is a great choice when the main focus of a project is on tracking local and transborder pollutants with high precision.

4.2.1. Specification of Standard Precision Particulate Matter Sensor

The Standard Precision Particulate Matter Sensor utilizes the laser scattering principle to detect the dust particles in the air. The sensor comes with a small form factor, providing very good selectivity and stability in detecting particles sized between 0.3 to 10µm.

The Standard Precision Particulate Matter Sensor is enclosed in the Main Body, ensuring optimal air flow, measurement accuracy, and ease of sensor replacement.



Figure 8: Standard Precision Particulate Matter Sensor

Parameter	Value
Target Particles	PM10
	PM2.5
Detection Range	0 ~ 1000 µg/m ³
Resolution	0.1 ug/m ³
Response Time	<45 sec
Lifespan	12 months (in use)
Storage Temperature	-20 ~ 60°C
Storage Humidity	≤90% RH (no condensation)
Operating Temperature	-10°C ~ +50°C
Operating Humidity	≤85% RH (no condensation)
Operating Pressure	860 ~ 1100 hPa
Size of Sensor	71 mm x 70 mm x 23 mm

Table 20: Specification of Standard Precision Particulate Matter Sensor

4.2.2. Specification of High Precision Particulate Matter Sensor

The High Precision Particulate Matter Sensor utilizes the laser scattering principle to detect the dust particles in the air. The sensor provides excellent selectivity and stability in detecting particles sized between 0.35 to 40µm.

The High Precision Particulate Matter Sensor is enclosed in the Main Body, ensuring optimal air flow, measurement accuracy, and ease of sensor replacement.



Figure 9: High Precision Particulate Matter Sensor

Parameter	Value
Target Particles	PM10
	PM2.5
	PM1
Detection Range	0 ~ 1500 µg/m ³
Resolution	0.1 ug/m ³
Response Time	<30 sec
Lifespan	18 months (in use)
Storage Temperature	-20 ~ 60°C
Storage Humidity	≤99% RH (no condensation)
Operating Temperature	-10°C ~ +50°C
Operating Humidity	≤95% RH (no condensation)
Operating Pressure	750 ~ 1100 hPa
Size	75 mm x 60 mm x 63.5 mm

Table 21: Specification of High Precision Particulate Matter Sensor

4.3. Specification of Temperature, Humidity, Pressure Sensor

The Temperature, Humidity, Pressure Sensor is enclosed in a specially designed protective shield located over the Main Body. The Sensor's protective shield ensures constant natural air convection in order to achieve accurate and consistent sensor readings.

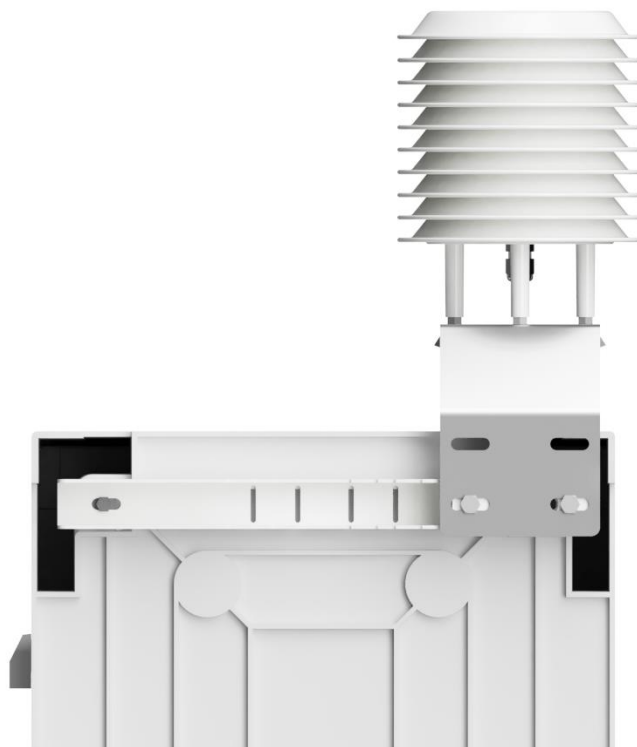


Figure 10: Temperature, Humidity, Pressure Sensor Mounted on The Station

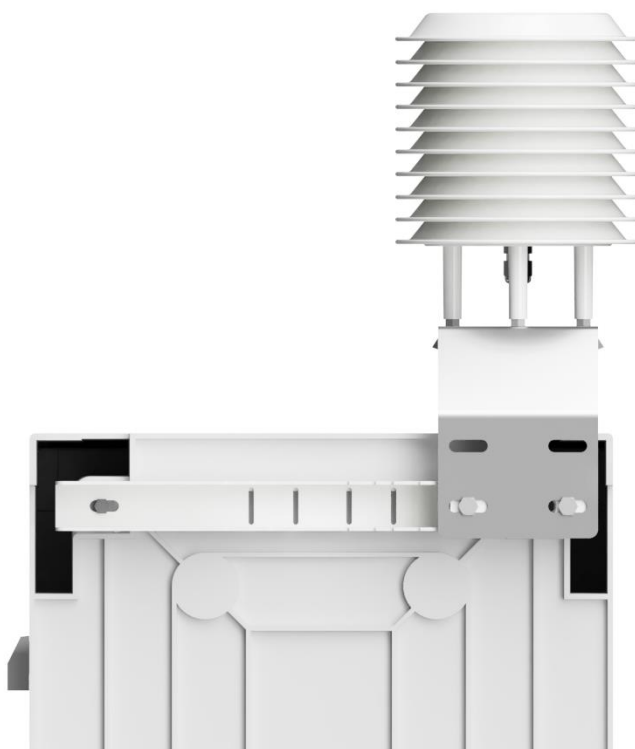
Parameter	Value
Target Parameters	Temperature
	Humidity
	Pressure
Detection Range - Temperature	-40 ~ 80°C
Detection Range - Humidity	0 ~ 100% RH
Detection Range - Pressure	300 ~ 1200 hPa
Resolution - Temperature	0.015°C
Resolution - Humidity	0.01 %RH
Resolution - Pressure	0.0016 hPa
Accuracy - Temperature	0.2°C
Accuracy - Humidity	1.5%
Accuracy - Pressure	0.5 hPa
Response Time	1 sec
Storage Temperature	-40 ~ 80°C
Storage Humidity	0 ~ 100% RH
Storage Pressure	0 ~ 1200 hPa

Operating Temperature	-40 ~ 80°C
Operating Humidity	0 ~ 100% RH
Operating Pressure	300 ~ 1200 hPa
Size with Shield	370 mm x 140 mm x 170 mm

Table 22: Specification of Temperature and Humidity Sensor

4.4. Specification of Low Concentration Carbon Dioxide (CO₂) Sensor

The Low Concentration Carbon Dioxide (CO₂) Sensor is enclosed in a specially designed protective shield together with the Temperature, Humidity, Pressure Sensor. The Sensor's protective shield ensures constant natural air convection in order to achieve accurate and consistent sensor readings.

*Figure 11: Low Gas Concentration CO₂ Sensor*

Parameter	Values
Target Gas	CO ₂
Detection Range	0 ~ 5000 ppm
Resolution	1 ppm
Accuracy	40 ppm +5%
Response Time	< 60 sec
Lifespan	120 months (in air)
	60 months (in use)

Storage Temperature	-10 ~ +70°C
Operating Temperature	-10 ~ +60°C
Operating Humidity	0 ~ 95% RH
Size with Shield	370 mm x 140 mm x 170 mm

Table 23: Specification of Low Concentration CO₂ Sensor

4.5. Specification of Noise Level Sensor

The Noise Level (Noise Pollution) Sensor adopts a omnidirectional industrial two-microphone formation ensuring 360 degrees of sound capture for consistent and accurate noise sensing. The sensor is positioned in a separate body that is mounted under the Solar Panel.



Figure 12: Noise Level Sensor

Parameter	Value
Target Parameter	Noise Level
Detection Range	30 dB ~ 120 dB
Resolution	0.1 dB
Accuracy	0.5 dB
Response Time	<3 sec
Storage Temperature	-30°C ~ +60°C
Storage Humidity	0 ~ 100% RH
Operating Temperature	-30°C ~ +60°C
Size	120 mm x 100 mm x 35 mm
Size	120 mm x 100 mm x 35 mm

Table 24: Specification of Noise Level Sensor

4.6. Specification of Wind Speed and Wind Direction Sensor

The Wind Speed Sensor adopts a three-wind cup structure produced of ABS material with very high strength. The sensor comes with great resolution, which enables the speed detection to be triggered from very low speed air masses. It adopts a precise internal angle sensor and low inertia vane response for wind direction.



Figure 13: Wind Speed and Wind Direction Sensor

Parameter	Value
Target Parameters	Wind Speed
	Wind Direction
Detection Range - Wind Speed	0 ~ 45 m/s (0 ~ 162 km/h)
Detection Range - Wind Direction	0 ~ 359°
Resolution - Wind Speed	0.1 m/s
Resolution - Wind Direction	1°
Accuracy - Wind Speed	0.5 m/s
Accuracy - Wind Direction	3°
Response Time	1 sec
Storage Temperature	-20°C ~ +60°C
Storage Humidity	0 ~ 100% RH
Operating Temperature	-40 ~ 80°C
Operating Humidity	0 ~ 100% RH
Size	Ø 223 mm x 190 mm
Protection Level	IP54, for outdoor mounting

Table 25: Specification of Wind Speed and Wind Direction Sensor

4.7. Specification of Precipitation Sensor

The Precipitation Sensor adopts a precise self-emptying tipping bucket. Meteorological patented unique single spoon tipping bucket is one of the most accurate and reliable automatic rain gauges on the market. As an accessory a leaf grid with bird spikes can be provided.



Figure 14: Precipitation Sensor

Parameter	Value
Target Parameter	Rain, Precipitation
Detection Range	0.10 mm, 0.20 mm, 0.25 mm, 0.50 mm
Resolution	0.10 mm
Accuracy	±2%
Response Time	<1 sec
Storage Temperature	-20°C ~ +80°C
Storage Humidity	0 ~ 100% RH
Operating Temperature	0°C ~ +60°C
Operating Humidity	0 ~ 100% RH
Size	Ø 200 mm x 255 mm
Protection Level	IP54, for outdoor mounting

Table 26: Specification of Precipitation Sensor