

Orion AQMTM

AIR QUALITY MONITORING

PM₁ | PM_{2.5} | PM₁₀ | NO₂ | NO | CO | O₃ | Humidity | Air Pressure | Temperature



Columbia
Weather Systems

Professional, Innovative Air Quality Measurements



Applications

Urban air quality networks, industrial emission monitoring, building automation, and air quality research.

Professional air quality monitoring systems provide immediate, on-site data for analysis, compliance, and decision-making. Make your environment a healthier and safer place by measuring, analyzing, and understanding the data of air pollution. Algorithms incorporating meteorological parameters of temperature, humidity, and barometric pressure compensate for the impact of ambient conditions on the sensor elements.

- Monitor both air quality and met data with near reference measurement performance
- All-in-one units offer four common gaseous pollutants: nitrogen dioxide (NO₂), nitrogen monoxide (NO), carbon monoxide (CO) and ozone (O₃)
- Meteorological parameters of humidity, pressure and temperature
- AQM - Complete and AQM - PM models add Particulate Matter (PM₁, PM_{2.5} and PM₁₀)
- MicroServer-based monitoring also offers individual sensor options
- Additional meteorological sensors can be integrated such as wind, precipitation, and solar radiation
- Cost-effective, compact sensor solution

All air quality sensors integrate with the Weather MicroServer for monitoring via Cloud Server, any Internet Browser, SCADA systems and/or various industrial protocols.

Choose from three models, all of which include the basic meteorological parameters of temperature, humidity, and barometric pressure.

Orion AQM-Complete

- Particulate measurement with PM₁, PM_{2.5} and PM₁₀ sensor
- Common gaseous pollutants: nitrogen dioxide (NO₂), nitrogen monoxide (NO), carbon monoxide (CO) and ozone (O₃)
- Met parameters of temperature, humidity, barometric pressure

Orion AQM-PM

- Particulate measurement with PM₁, PM_{2.5} and PM₁₀ sensor
- Met parameters of temperature, humidity, barometric pressure

Orion AQM-Gas

- Common gaseous pollutants: nitrogen dioxide (NO₂), nitrogen monoxide (NO), carbon monoxide (CO) and ozone (O₃)
- Met parameters of temperature, humidity, barometric pressure

Monitoring Options

Weather MicroServer™

Self-contained, proprietary weather data logger and powerful communication device. Compatible with all CWS weather stations and offers:

in

- Browser interface
- Data logging with 1-year capacity at 1-min interval
- "Internet-ready" weather monitoring with FTP output, XML, and Internet interfaces
- Industrial communication protocols (Modbus, DNP3, BACnet, and SNMP)

Four serial ports offer interface to the weather station and additional sensors such as visibility and ultrasonic wind sensors. Analog and digital channels available for additional sensor such as temperature, solar radiation, and rain gauge. The MicroServer provides real-time weather data to WeatherMaster software and the Display Console over the network. This allows users to simultaneously monitor the weather over the network.

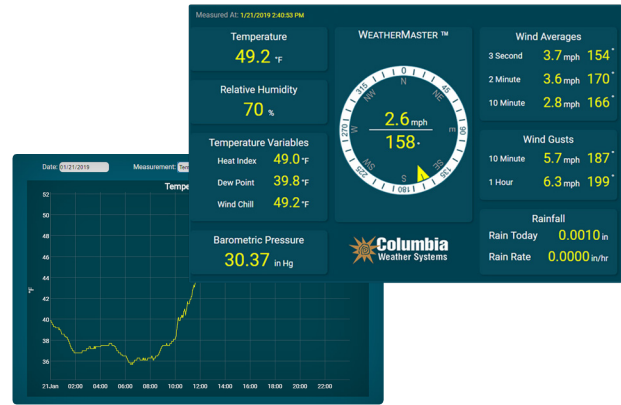


Cloud Weather Server™

Free with the Weather MicroServer, this service offers real-time weather data monitoring on the Internet.

- View display screen remotely from any device using a web browser
- Data uploaded every five seconds
- For one or more weather stations

All monitoring devices can be factory-customized to suit application-specific requirements.



WeatherMaster™ Software

Professional-grade software providing real-time environmental monitoring with display and automatic logging of all measured and calculated parameters.

- Expandable SQL database to archive measured and calculated parameters
- Graphing and trend display of all parameters
- Daily and monthly reports
- Alarm notification via computer, email, and/or text
- Multi-station monitoring and data acquisition
- Screens can be factory-customized to suit application-specific requirements

Optional Cellular Communication

Utilizing a Sierra Wireless Industrial modem offering:

- Ethernet Interface
- LTE broadband connectivity to remote locations and in harsh environments
- Ultra-low power consumption, ideal for solar or battery powered installations
- Built-in, class leading voltage transient protection provides superior reliability and continuous operation



Optional Sensors

Orion 532/533 Wind/Rain Sensor:

Ultrasonic wind speed and direction measurements. Orion 533 adds impact rain sensor.

Carbon Dioxide Sensor: An infrared light source measures ppm-level carbon dioxide.

Other sensors are also available.

Specifications

Measurement Performance - Gases

Property	NO ₂	NO	O ₃	CO
Concentration range	2000 ppb	2000 ppb	2000 ppb	10000 ppb
Detection limit	5 ppb	5 ppb	5 ppb	10 ppb

Field Performance - Gases

Property ¹⁾	NO ₂ ²⁾	NO	O ₃ ⁽²⁾	CO
Accuracy ³⁾	5 ppb	8 ppb	6 ppb	183 ppb
Unit-to-unit correlation ⁵⁾	R ² : 0.98	R ² : 0.96	R ² : 0.95	R ² : 0.97
Precision	3 ppb	3 ppb	4 ppb	25 ppb

- All values are based on 1-hour averages with factory calibration, no linear correction applied. Values are obtained from global field testing in major climate zones against reference instruments. The values represent typical values and may be different based on the location.
- At 10 V/m RF field test, the presence of electromagnetic interference in the range of 800-900 MHz may cause additional deviation for NO₂ and O₃.
- Mean absolute error against reference.

Measurement Performance - Environmental Parameters

Humidity

Accuracy for sensor element	0 ... 90 %RH: ±3 %RH 90 ... 100%RH: ±5 %RH
Resolution	0.1 %RH

Temperature

Accuracy for sensor element at +20°C (+68°F)	0.3°C (0.17°F)
Resolution	0.1 °C

Pressure (indicative)

Accuracy	15 hPa
Resolution	1 hPa

Operating Environment

Operating temperature	-30 ... +46 °C (-22 ... +115 °F) ¹⁾
Storage temperature	+20 ... 25°C (+68 ... 77°F)
Operating humidity	15 ... 100%RH, non-condensing ²⁾
Storage humidity	20 ... 75%RH
Operating pressure	800 ... 1150 hPa

- Optimal performance at -10 ... +30°C (-14 ... +86 °F)
- Optimal performance at 25 ... 100 %RH. Operation in low humidity environments may weaken the gas measurement performance.

Mechanical Specifications

Dimensions (H X Ø)	335 x 133 mm (13.19 x 5.24 in)
Weight, with mounting kit	2.4 kg (5.29 lb)

Measurement Performance - Particles

Property	PM ₁	PM _{2.5}	PM ₁₀
Size range ¹⁾	d	0.6 ... 2.5 µm	0.6 ... 10 µm
Concentration range ²⁾	0 ... 1000 µg/m ³	0 ... 1000 µg/m ³	0 ... 2500 µg/m ³
Detection limit	0.1 µg/m ³	0.1 µg/m ³	0.1 µg/m ³
Sampling time	1 min	1 min	1 min
Sampling interval	10 min	10 min	10 min

Field Performance - Particles

Property ¹⁾	PM ₁	PM _{2.5}	PM ₁₀
Accuracy ²⁾	2 µg/m ³	3 µg/m ³	4 µg/m ³
Unit-to-unit correlation	R ² : 0.99	R ² : 0.97	R ² : 0.97
Precision	1 µg/m ³	2 µg/m ³	3 µg/m ³

- All values are based on 1-hour averaged with factory calibration, no linear correction applied. Values are obtained from global field testing in major climate zones against different reference equivalent methods. The values represent typical values and may be different based on the location and reference instrument. Majority of particle mass within size range.
- Mean absolute error against reference.

Powering

Operating voltage	10 - 25 V DC Max. 1 A at 10 V DC ¹⁾
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Power consumption, max peak ¹⁾	10 W
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Power consumption (average with default settings)

Gas and particle measurement	2.1 W ³⁾ ... 3.7 W ⁵⁾
Gas measurement	1.8 W ... 2.8 W ²⁾
Particle measurement	2.0 W ³⁾ ... 2.7 W ⁵⁾

- Typical consumption in optimal conditions
- Maximum consumption when humidity is > 85%RH and temperature < 0 °C (32 °F)

Compliance

EU directives	EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU) as amended by 2015/863
Compliance marks	CE, China RoHS, FCC, RCM, UKCA
EMC immunity ¹⁾	EN 61326-1, industrial environment
EMC emissions	CISPR 32 / EN 55032, Class B
Cold	IEC 60068-2-1
Dry heat	IEC 60068-2-2
Damp heat	IEC 60068-2-78
Eye safety	IEC 60825-1:2014 (edition 3.0) and EN 60825-1:2014 + A11:2021 FDA 21 CFR 1040.10
IP rating	IP65

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Gas Measurement Technology

The gas measuring technology is based on proprietary advanced algorithms and electrochemical technology. The sampled gas causes a reduction or oxidation reaction in an electrochemical cell. Both reactions create a weak electric current. The electric current is directly dependent on the volume of measured gas.

By measuring the electric current and using advanced calculation and compensation algorithms, the AQM-Gas calculates the gas content. Most electrochemical cells are highly susceptible to ambient conditions (temperature and humidity), but the AQM-Gas reverses the impact with a proprietary adjustment and compensation system, which guarantees accurate ppb measurements.

The electrochemical cells require a stabilization period of at least 24 hours after switching the device on before using the measurement results. To ensure optimal measuring accuracy, a 48-hour stabilization period is recommended. The devices take measurements during the stabilization period, but the measurements are marked as invalid.



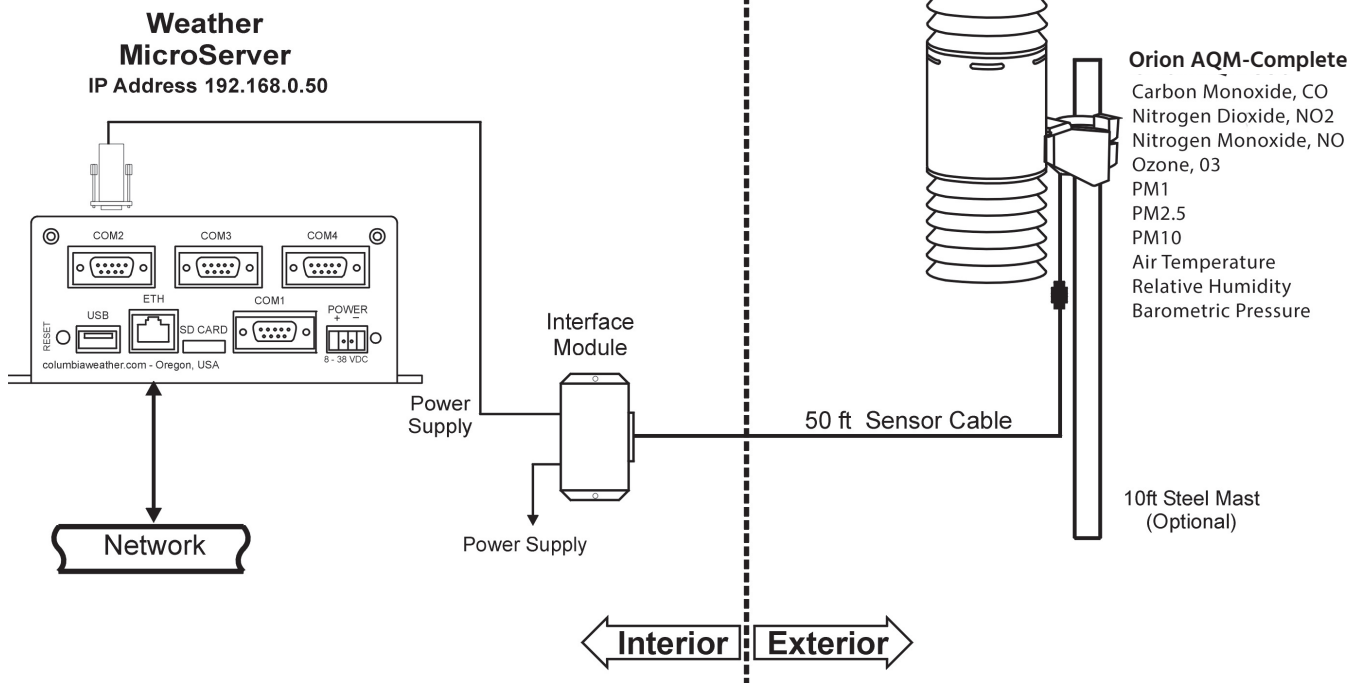
Laser Particle Measurement Technology

The technology of the laser particle counter in the Orion AQM-PM is based on the scattering of laser light caused by passing particles. With the help of optics and photosensitive sensors, the laser particle counter measures the angular scattering intensity data and analyzes it with digital signal processing (DSP).

The method allows measuring of particles of sizes 0.3 ... 10 µm, and calculating the particle masses PM1, PM2.5 and PM10. The laser particle counter is a Class 1 laser product.

Contact us today for a free quotation!

System Diagram



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