



AQMesh Small Sensors



Airpointer® Compact Monitoring System



2-WN
Dual Wavelength Integrating
Nephelometer

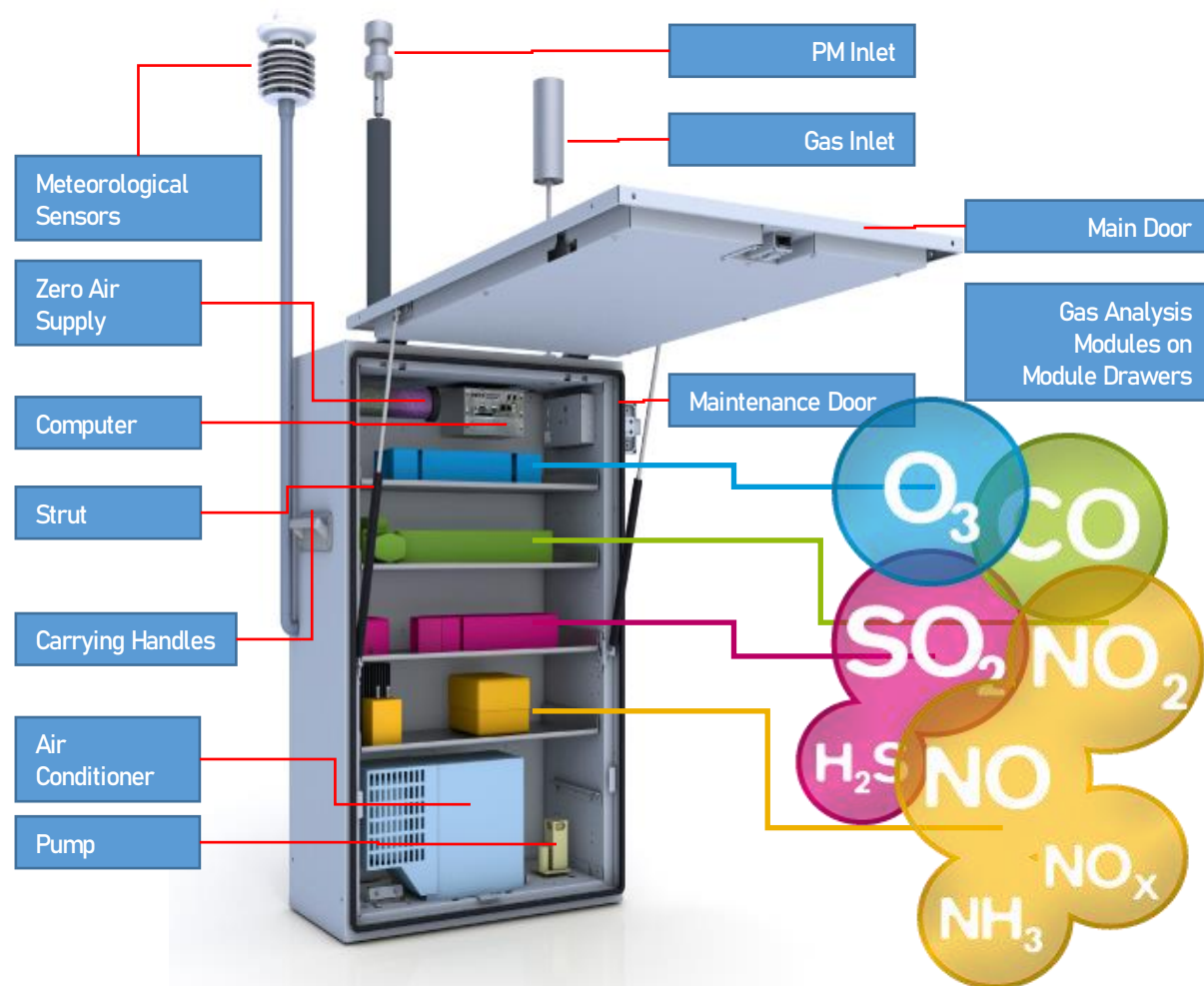


Next Generation Monitoring
Innovative Ambient Air Monitoring

Airpointer Compact Monitoring System



Airpointer The Basics



Measurement Modules

U.S. EPA approved
Federal Equivalent
Method (FEM) criteria
pollutants

- SO₂
- NO₂/NO_x
- CO
- O₃
- PM

Specialty pollutants

- Black Carbon
- BTEX
- H₂S
- CO₂
- NH₃
- NMHC
- VOCs

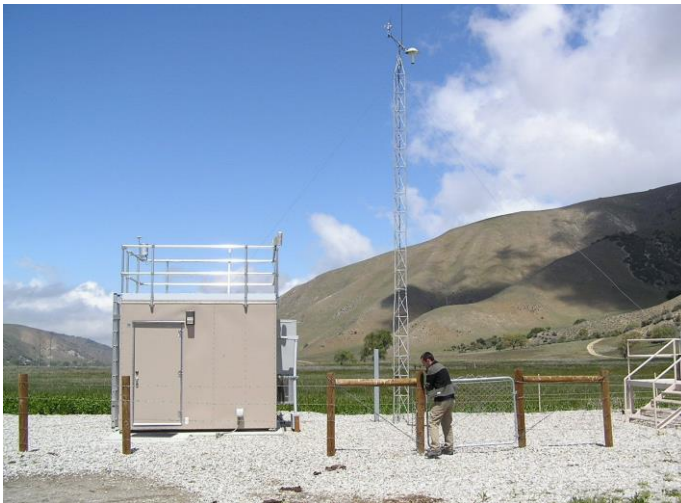
Modules are interchangeable to allow your unit to be individually configured

Allows for quick adaptability for future needs

Airpointer: Benefits-At-A-Glance

While traditional monitoring stations can be:

- Cumbersome
- Requiring large shelters
- Subject to site permits
- Costly for engineering budgets...



...the Airpointer provides a great alternative:

- 90% smaller in size compared to conventional shelters
- Up to 90% less power consumption due to optimized temperature management
- Single phase electrical power
- Minimal floor space requirement
- Fully type approved for criteria pollutants
- Short installation time
- 50% total costs of ownership compared to conventional stations
- Integrated computer system for data acquisition, storage, remote access, remote control & graphic visualization



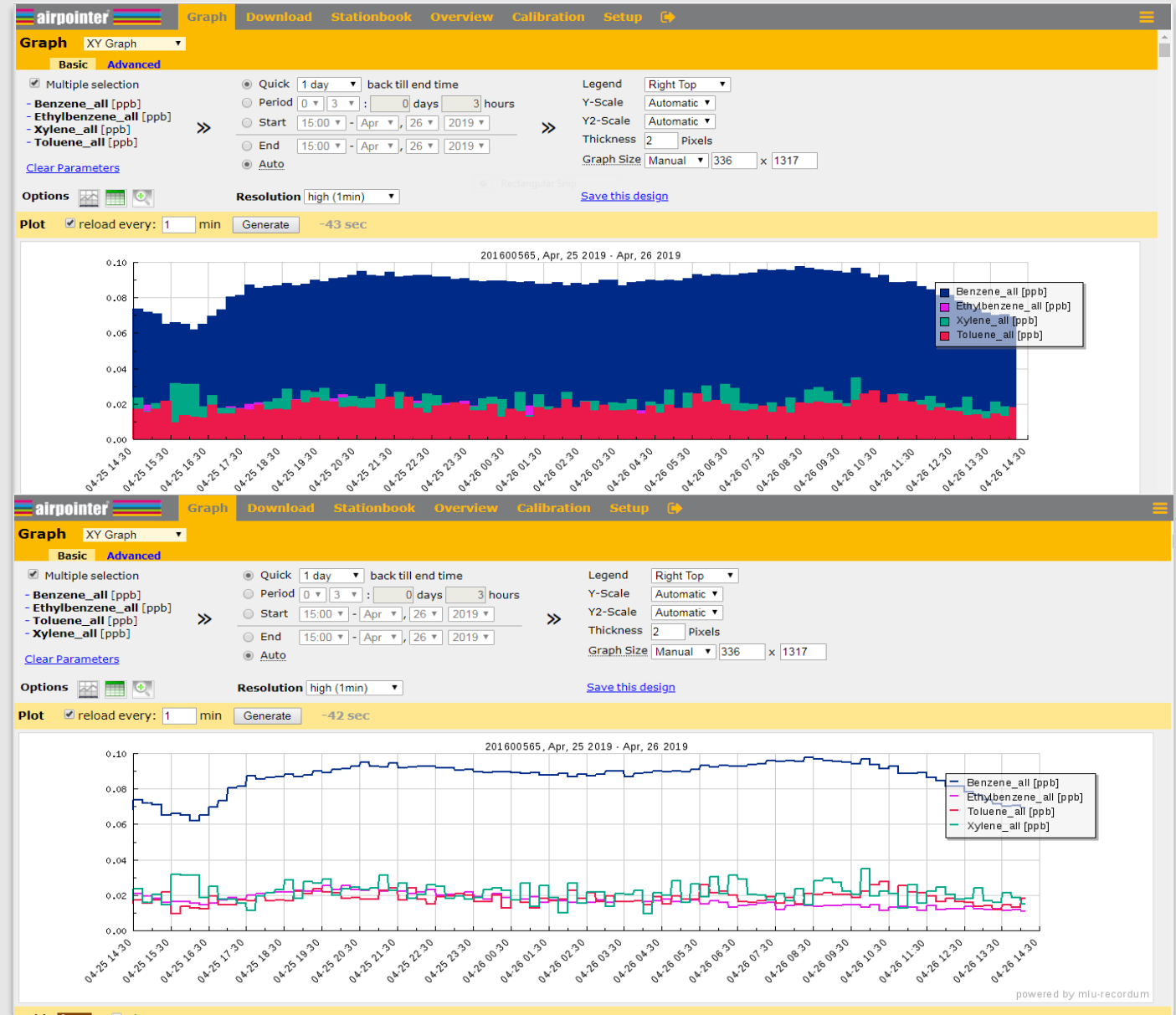
Airpointer Additional Sensors

- Nephelometer for indicative PM visibility and haze (PM_{2.5})
- Met sensors: wind direction, wind velocity, temperature, air pressure, relative humidity, precipitation
- Noise sensors
- Photoionization detector (PID) for volatile organic compounds (VOC)
- Navigation system (GPS) for linking monitoring data with geographical data
- Traffic data sensors



Web interface

- Integrated data management system records monitoring data
- Internal web server allows data retrieval via secure internet connection
- Data are presented in tabular form or clearly arranged graphics



Airpointer measuring pollutant gas in ambient air

O_3 SO_2 H_2S NO NO_2 NO_x

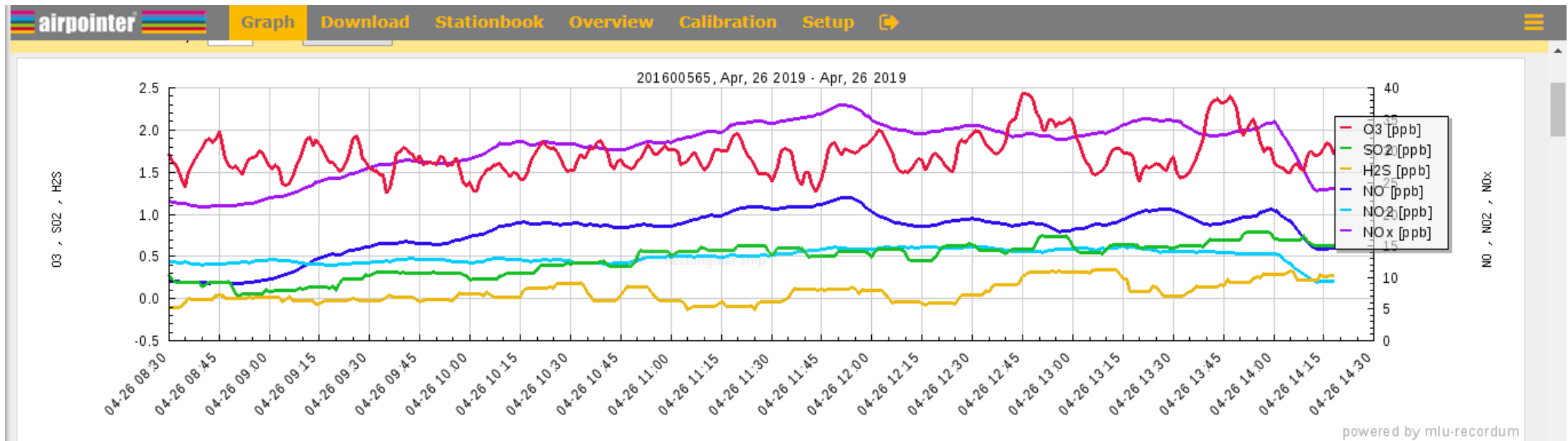
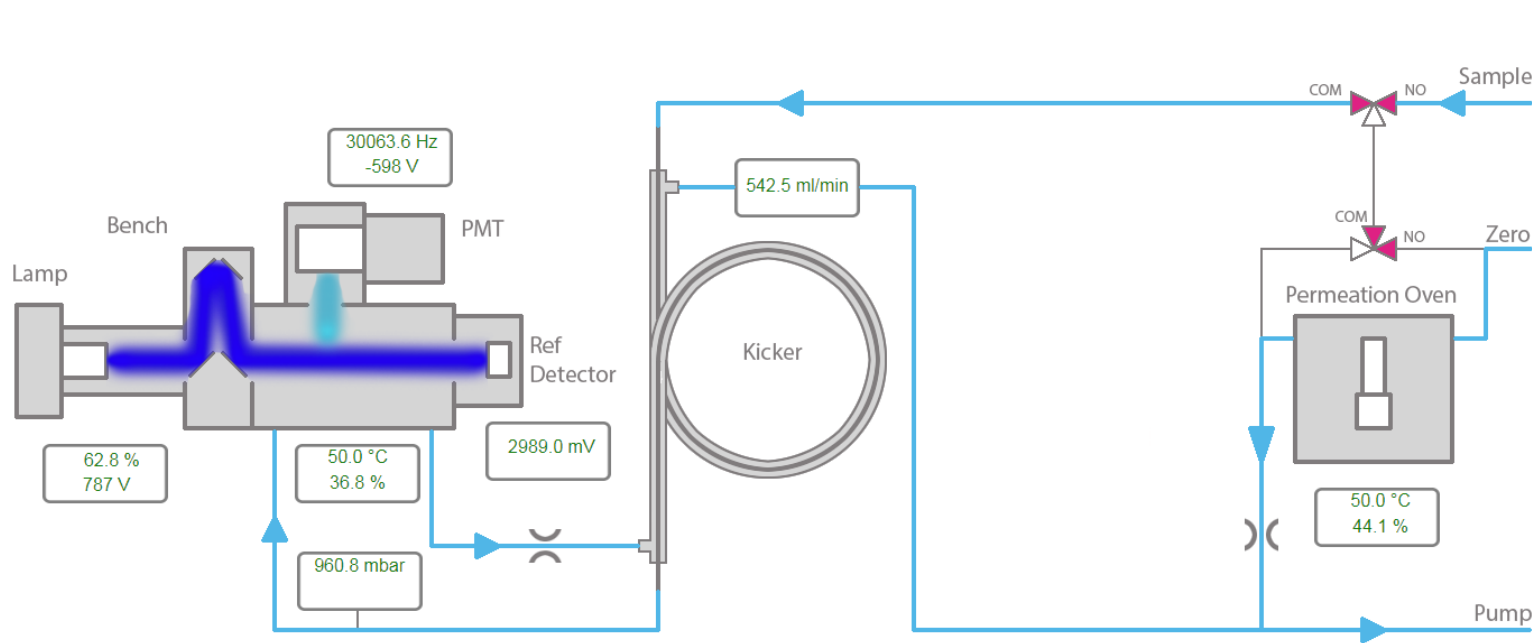


Table **beta** ☐ Show summary

Time	NO [ppb] 1	NO2 [ppb] 2	NOx [ppb] 3	O3 [ppb] 5	SO2 [ppb] 6	H2S [ppb] 7
4/26/2019, 8:30:00 AM	9.46	12.56	22.01	1.71	0.28	-0.11
4/26/2019, 8:31:00 AM	9.40	12.55	21.95	1.62	0.22	-0.11
4/26/2019, 8:32:00 AM	9.36	12.48	21.84	1.58	0.19	-0.11
4/26/2019, 8:33:00 AM	9.36	12.40	21.76	1.52	0.19	-0.11
4/26/2019, 8:34:00 AM	9.30	12.40	21.70	1.42	0.19	-0.09
4/26/2019, 8:35:00 AM	9.22	12.41	21.63	1.31	0.19	-0.05
4/26/2019, 8:36:00 AM	9.20	12.34	21.54	1.50	0.19	0.01
4/26/2019, 8:37:00 AM	9.17	12.19	21.36	1.58	0.19	-0.01
4/26/2019, 8:38:00 AM	9.19	12.10	21.29	1.66	0.19	-0.01

Diagnostics

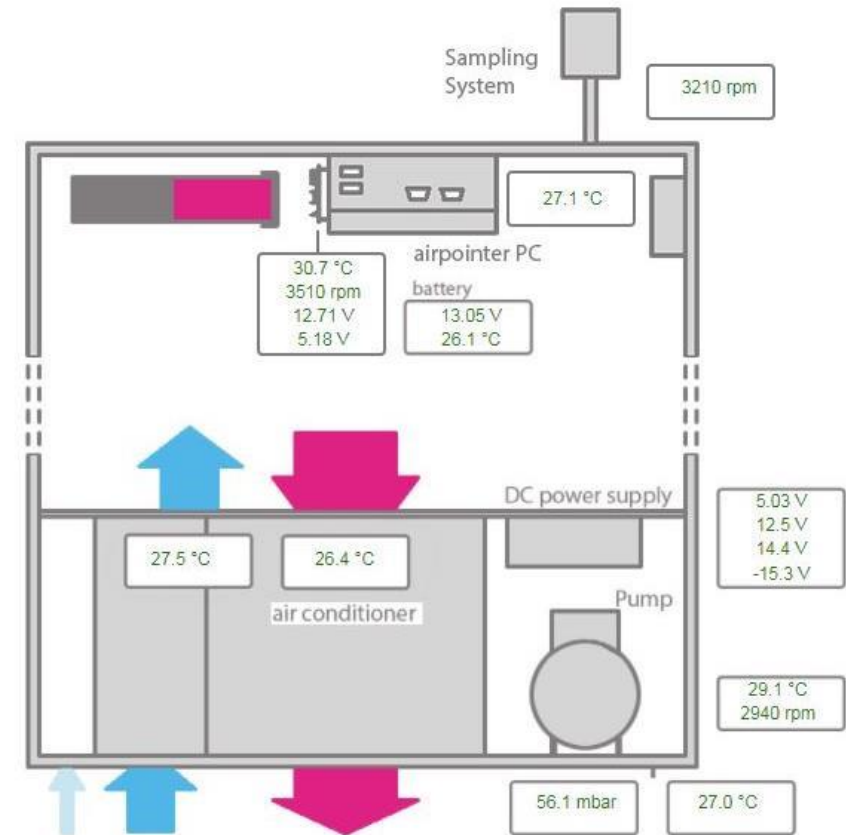
- Real-time information of gas monitoring module



SO₂ 17.9 ppb



Note: '-9999' is displayed for a missing value.



Details

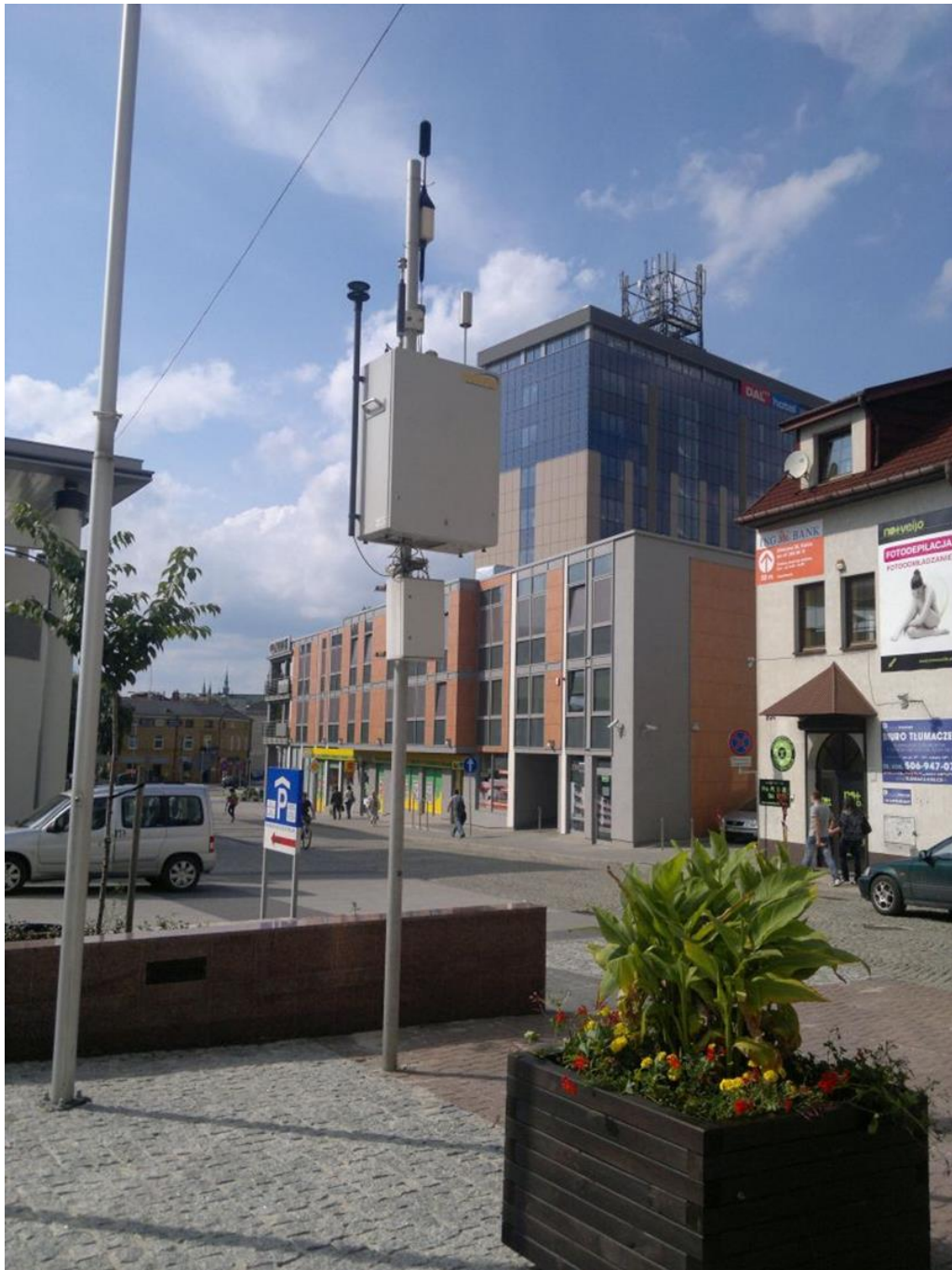


The side maintenance door is provided for quick and simple maintenance.
Maintenance switch, sample gas filter, notebook network connection (RJ45), sample gas inlet, notebook power supply.





Ease of
transporting



Mounting



Permanent Installations





Ease of shipping

2-WIN

Dual Wavelength Integrating Nephelometer

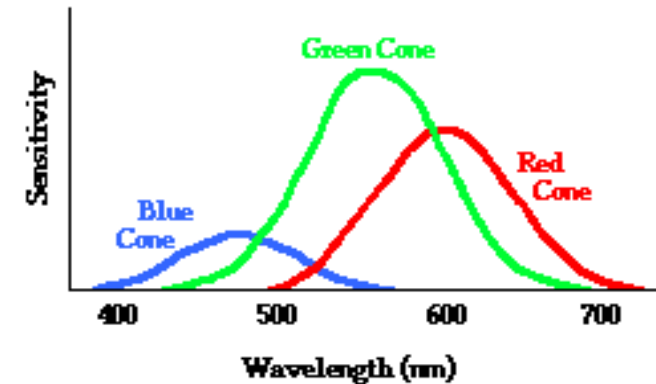


2-WIN

Dual-wavelength integrating nephelometer

Measures **light scattering coefficient** (σ_{SP}) at 2 user-selectable wavelengths from built-in 3 wavelength light source

- **450 nm** (blue) interacts strongly with fine and ultrafine particulates (wood fires, automobiles)
- **525 nm** (green) interacts strongly throughout the human range of visibility (smog, fog, haze)
- **635 nm** (red) interacts strongly with large particulate matter (sea salt, pollen)



Continuous Measurements:

- Dust
- Particulate
- Visibility



Nephelometer Applications

- Visibility monitoring (haze, smog, fog)
- PM_{2.5} mass measurement (correlation)
- Dust/sand storm monitoring (early warning)
- Bushfire monitoring
- Source apportionment
- Global warming studies



Benefits-At-A-Glance

- Fast response rates
- Minimal maintenance
- Low power draw
- Operation in a station or its own weatherproof enclosure



2-WIN Benefits

- Ability to differentiate between smoke air pollution and dust air pollution
 - Better data with prescribed agricultural burns
 - Distinction from dust information
 - ID of encroaching wildfire smoke as external events
- Automating samplers
 - Can trigger samplers in real-time
 - Automation to capture data during extreme conditions
- Objective measurement of visibility degradation during elevated particulate events

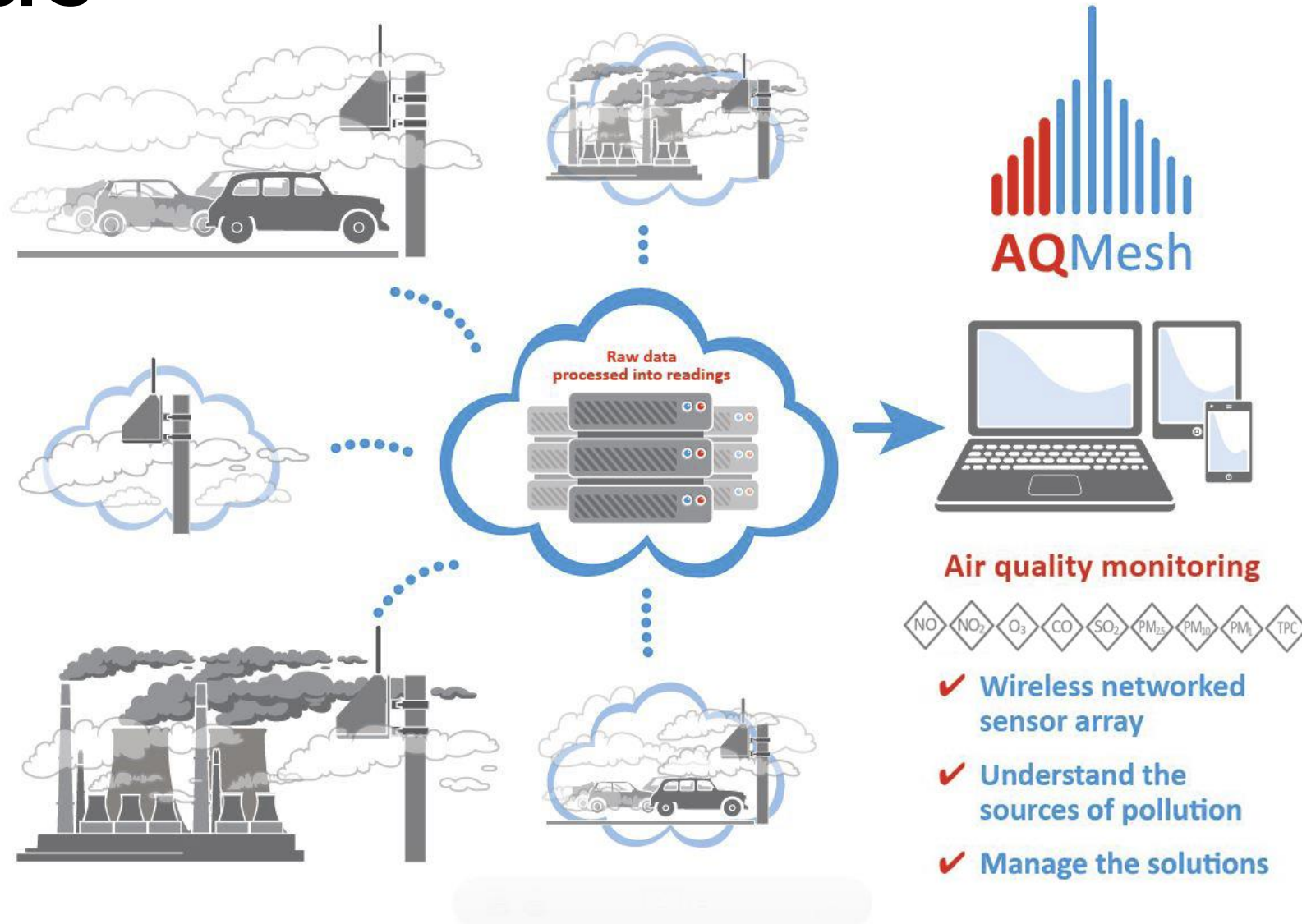


AQMesh Small Sensors



AQMesh Small Sensors

- Near real-time localized air quality
- Up to 5 gases and PM in a single pod
- GPRS communication
- Cloud-based data processing
- Secure online access
- Proven performance against reference equipment around the world



Configurations

- Measures NO, NO₂, NO_x, O₃, CO, SO₂, CO₂ and H₂S using the latest generation of electrochemical sensors
- Measures particulates PM₁, PM_{2.5}, PM₁₀ and TPC with a light-scattering optical particle counter
- Measures relative humidity, pod temperature, atmospheric pressure and noise
- Power options include battery and solar panels

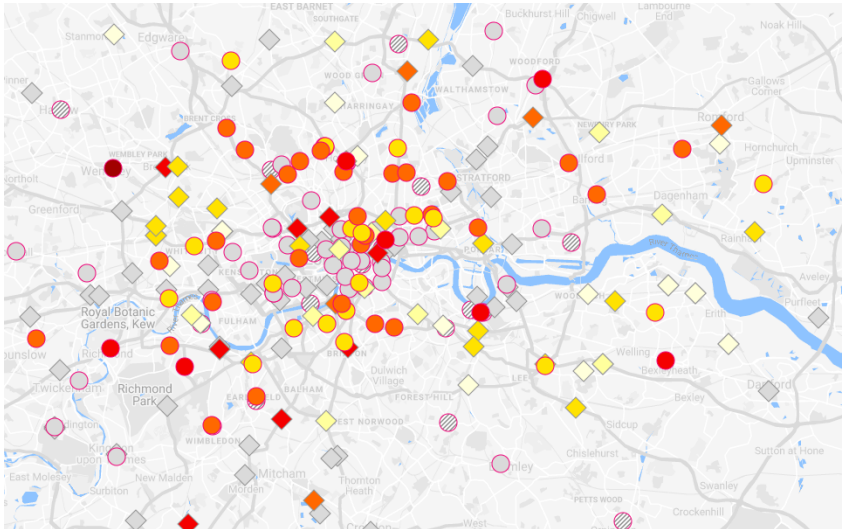


AQMesh Applications

- Urban hotspot identification/monitoring
- Smart cities
- Construction developments
- Industrial: Source apportionment, fenceline monitoring
- Research projects
- Outdoor-indoor monitoring
- Employee exposure
- Mobile monitoring



Success Story: Breathe London

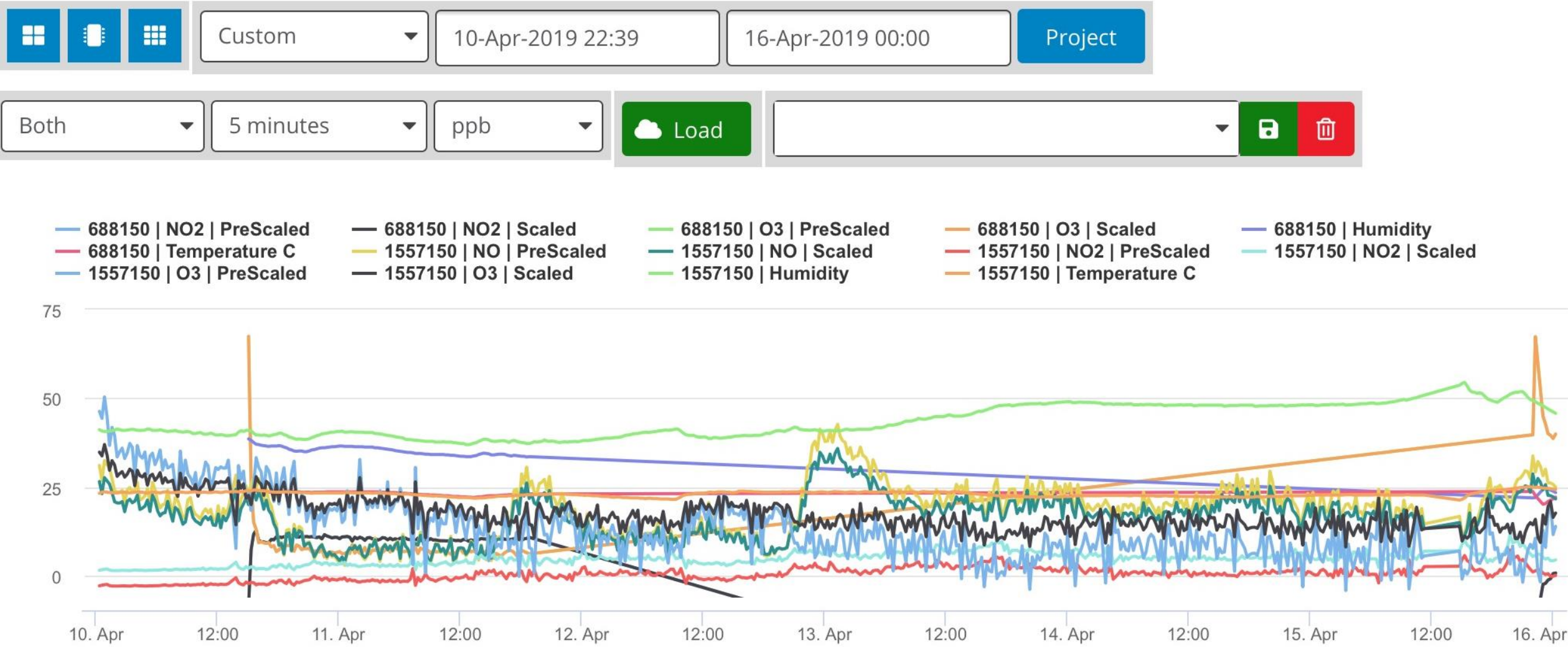


The Breathe London stationary network is made up of 100 **AQMesh** pods, each containing a collection of small sensor-based air quality monitors that offer near real-time localised air quality information. They measure nitrogen dioxide (NO₂) and nitric oxide (NO) using electrochemical sensors; particulate matter (PM) in various size cuts (PM_{2.5} and PM₁₀ are reported) using a light-scattering optical particle counter; and carbon dioxide (CO₂) using a non-dispersive infrared absorbance sensor. In some locations, the pods measure ozone (O₃), also using electrochemical sensors. The pods measure temperature, humidity and air pressure for the purposes of correction for environmental conditions. Each sensor pod is set up to collect data continuously for 10-second intervals and create an average every 1-15 minutes, synchronised to the top of each hour. Data presented on the Breathe London website is shown as hourly averages, with a small lag from real time before they appear online.

Site selection: The 100 pods are located across Greater London. Locations are identified based on a number of criteria developed in consultation with the Greater London Authority. These criteria include:

- Coverage in all 32 London boroughs plus the City of London.
- Filling gaps in the existing network of government air quality monitors.
- Placing priorities on “sensitive” locations, such as primary schools and medical facilities.
- Supporting assessments of the impact of new policies designed to reduce air pollution, such as the Ultra-Low Emission Zone (ULEZ), the Expanded ULEZ and the Low-Emission Bus Zones (LEBZ).
- Distribution across a mix of traffic levels and varying distances from major roads and intersections, parks, residential areas, high-traffic streets and other commercial areas.
- Reserving 3 of the pods (termed “gold pods”) for performance evaluation over the long-term using periodic co-location studies alongside reference instruments.

Data via Secure Web Site

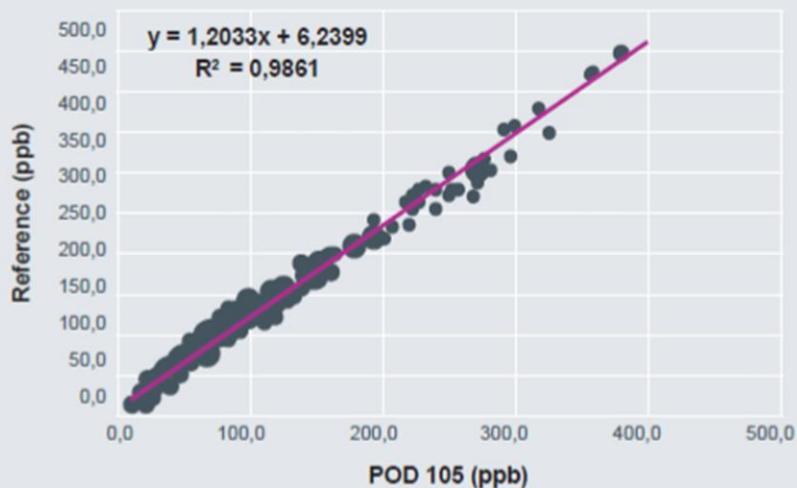


Data Comparisons



Co-location comparison trials against certified reference equipment continue to prove AQMesh performance and reliability for localised air quality monitoring.

Environmental Technology 2018, "Latest AQMesh co-location studies show capability of small sensor systems", 14 Nov.



	Gradient	Intercept	R ²	Average (min-max)
NO ₂	0.94±0.07	0.34±0.47	0.8±0.11	6.2 (0-22.3)
NO	-	Comparable performance		-
CO	0.91±0.12	54.7±76.7	0.89±0.13	606 (390-8300*)
O ₃	0.88±0.16	4.16±6.2	0.74±0.18	32.9 (0.13 – 227**)
SO ₂	0.88±0.37	0.13±0.37	0.93±0.08	0.48 (0 – 60*)
PM ₁	0.98±0.46	0.03±0.046	0.97±0.03	1.64 (0 – 8.4)
PM _{2.5}	0.98±0.07	0.13±0.03	0.98±0.02	7.02 (0 – 52)
PM ₁₀	0.96±0.03	0.50±0.82	0.95±0.03	12.6 (0 – 104)

** single event

* single measurement



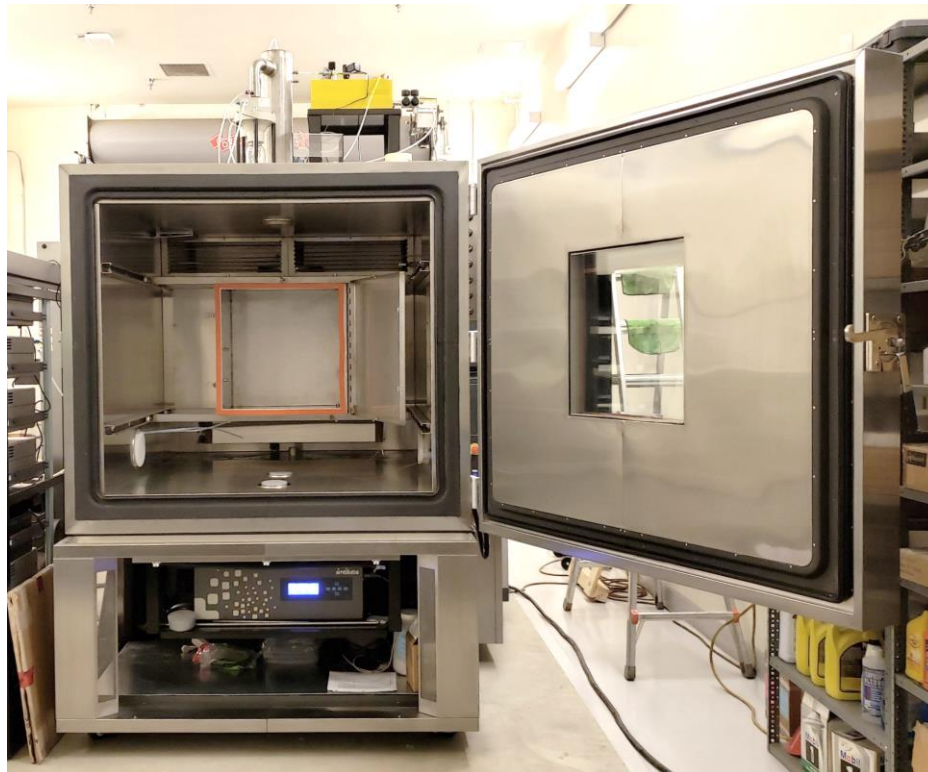
Easily Deployable

Test Chambers



Test Chambers

- Uniquely designed
- Produce, replicate, sustain and sequence environmental conditions
- Gas dilution systems
- Particle delivery systems
- External analytical systems





Questions?

Laura Brown

lbrown@ambilabs.com | 401-595-5197

www.ambilabs.com | 877-247-0403

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