Technical Note:
Particulate Matter Sensor Head PM10 / PM2.5 (PM)

Aeroqual's PM Sensor Head offers precision active sampling, Fast T_{90} response time, Humidity compensation, K factor adjustment (Series 300, 500 models) and is compatible with a wide range of gaseous measurements, providing the attention to data quality that Aeroqual is renowned for.

The Sensor has the following specifications:

PARTICULATE MATTER	SENSOR CODE	SENSOR TYPE	RANGE (mg /m3)	MINIMUM DETECTION LIMIT (mg /m3)	ACCURACY OF FACTORY CALIBRATION	RESOLUTION (mg /m3)	RESPONSE TIME (S)	OPERATING CONDITIONS		APPLICATION TYPE		
								TEMP	RH	ENV	IAQ	IND
(PM2.5) (PM10)	PM	LPC	0.001-1.000	0.001	±0.005 mg/m³ + 15%	0.001	5	0 to 40°C	0 to 90%	✓	✓	✓

Handheld Unit Compatible Firmware Versions

The PM sensor head is compatible with handheld units only.
S200: V5.3 or higher
S300: V6.3 or higher
S500: V6.4 or higher

Application

The PM Sensor Head is suitable for a wide range of applications, indoor or outdoor. Ranging from indoor air quality monitoring, construction dust monitoring, monitoring transport emissions, smog monitoring, community exposure studies and air quality model validation.
The PM sensor head is not designed for long term outdoor use and as sensitive scientific equipment care must be taken to avoid damage via weather conditions, vibration and impact.

USA EPA Air Quality Index Values for PM10 and PM2.5

PM10, 24hr	PM2.5, 24hr	AQI	EPA Term
mg/m³	mg/m³		
0 – 0.054	0 – 0.012	0-50	Good
0.055 – 0.154	0.0121 – 0.0354	51-100	Moderate
0.155 – 0.254	0.0355 – 0.0554	101-150	Unhealthy for Sensitive Groups
0.254 – 0.354	0.0555 – 0.1504	151-200	Unhealthy
0.355 – 0.424	0.1505 – 0.2504	201-300	Very Unhealthy
0.421 – 0.600	0.2505 – 0.5004	300-500	Hazardous

Source: Revised Air Quality Standards For Particle Pollution And Updates To The Air Quality Index (AQI). North Carolina: US EPA Office of Air Quality Planning and Standards. 2013.

Operation

The PM Sensor Head uses a laser and optical sensor to measure light scattered from particles passing through the laser beam. The sensor head also compensates for humidity by way of an on-board humidity sensor. In humid conditions, light scattering sensors are likely to read high because moisture surrounds particles, causing them to appear 'bigger'. The humidity compensation feature reduces this effect on the measurement.
In the case of the Series 300 and 500 base units, a gain (or K factor) can be applied to the sensor output. This allows users to adjust the readings relative to a trusted source such as EPA-approved reference monitor.

Operating Life

The laser diode within the PM Sensor Head has an operating life of up to 8000 hours. This provides an expected life span of 2 years for typical portable monitor applications. The sensor head may be returned to Aeroqual for factory servicing and calibration as required.

Data Logging (Series 500)

The PM sensor head measures 2 simultaneous readings, PM10 and PM2.5.
The Series 500 handheld unit can store a limited number of data points (8188) this means that the length of time that data can be logged depends upon the frequency and number of data points recorded. Once Capacity is reached new data will begin to overwrite the oldest logged data.

Maximum Period to be Logged						
		Logging Frequency				
		1m	5m	10m	30m	1hr
Data Points	4 PM 2.5, PM 10, Temp & RH	33 hours	165 hours	330 hours	990 hours	1980 hours
	2 PM 2.5 & PM 10	66 hours	330 hours	660 hours	1980 hours	3960 hours

Version 6.5 or higher of the Aeroqual Series 500 software is required for export of the logged data to PC.

The latest PC software is available from:
https://www.aeroqual.com/support/product-software