AIR XXS

Real-Time RCS Detection

Technology Overview

TROLEXX

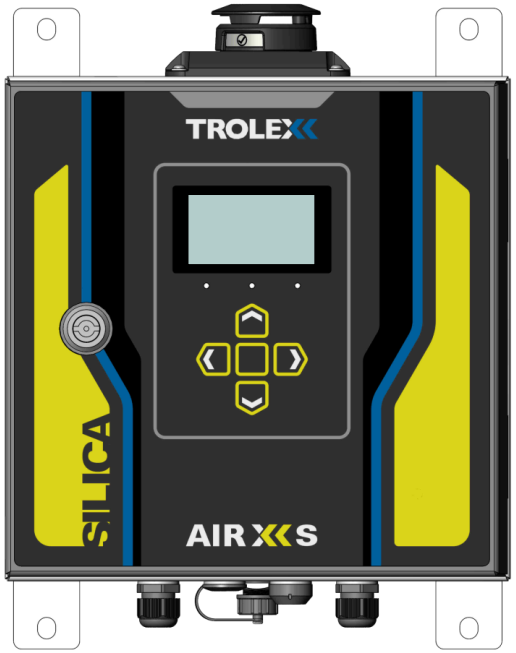
- Founded in 1959
- Headquarters in Stockport
- Design & Manufacture
- Focus on R&D
- Export Globally
- 76 employees
- Environmental Monitoring
- Hazardous Areas

AIR XD

Real-Time, fixed particulate monitor

XD 1 +

Real-Time, personal particulate monitor



AIR XS

Real-Time, fixed Silica monitor

AIR XS | TROLEX

Real-Time RCS Detection

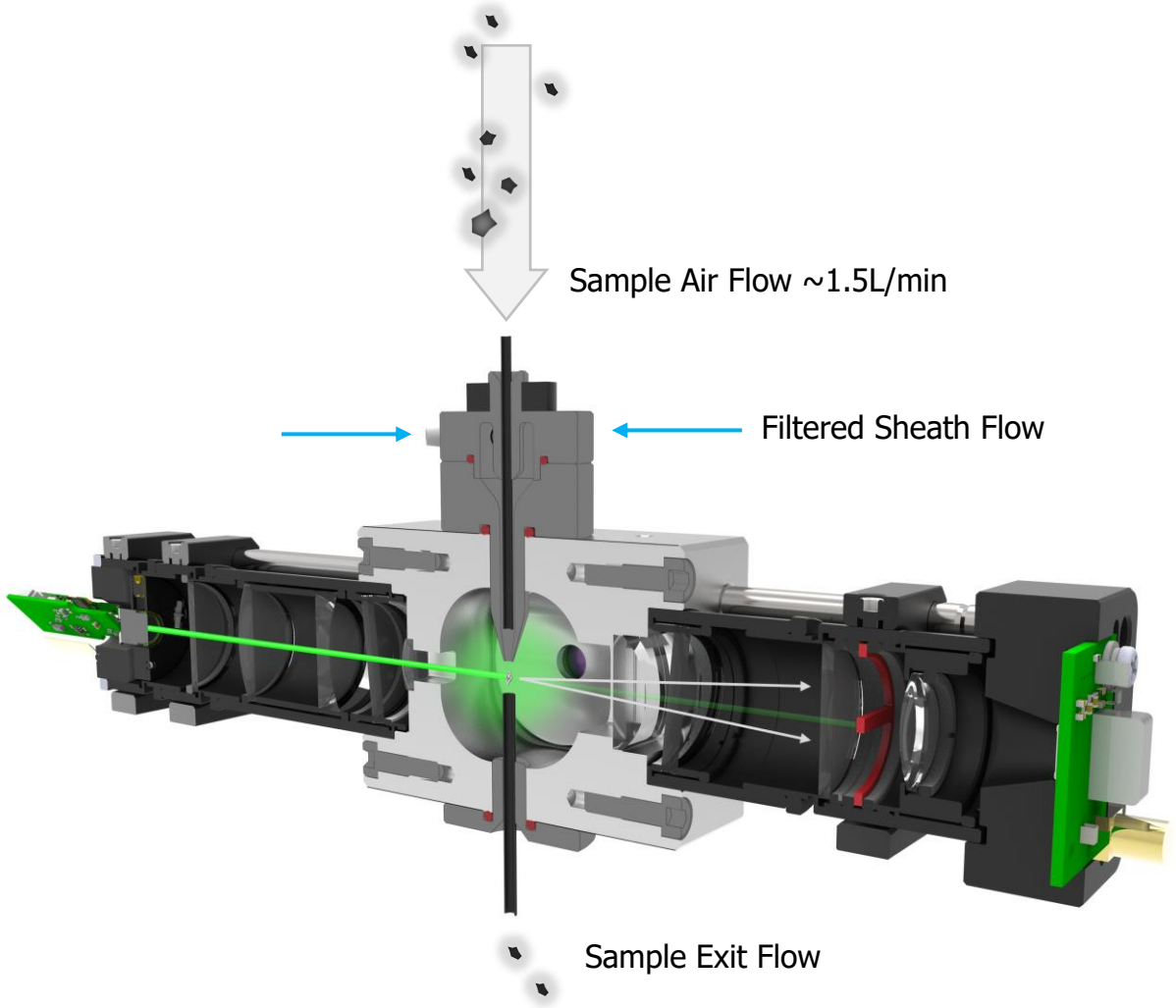
Real-Time RCS Detection

The Product

- Provide Real-time, instantaneous information on changing Silica levels in industrial environments
- Provide on-device / control room display of RCS measurement in mg/m3
- Rolling averaging periods based on 1min, 15min, 1hr, 4hrs, 8hr shift patterns
- On device Warnings and Alarms based on custom trigger thresholds (0.05 mg/m3 for example)
- Data logging for download and post analysis using the Trolex BreatheXS software application, exportable to CVS file

Real-Time RCS Detection

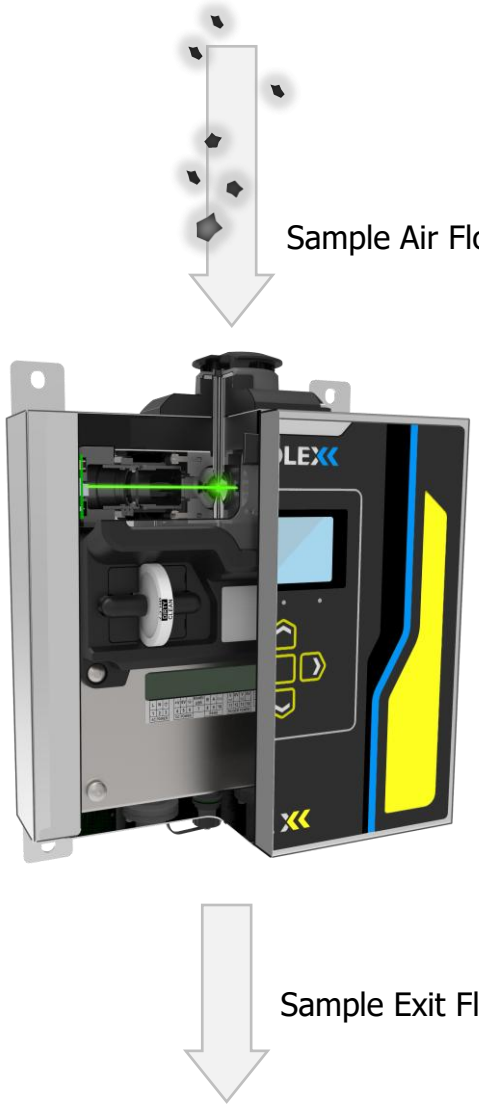
The Method



From the sampled airflow the Air XS Sensor determines the following to support the identification of RCS particles

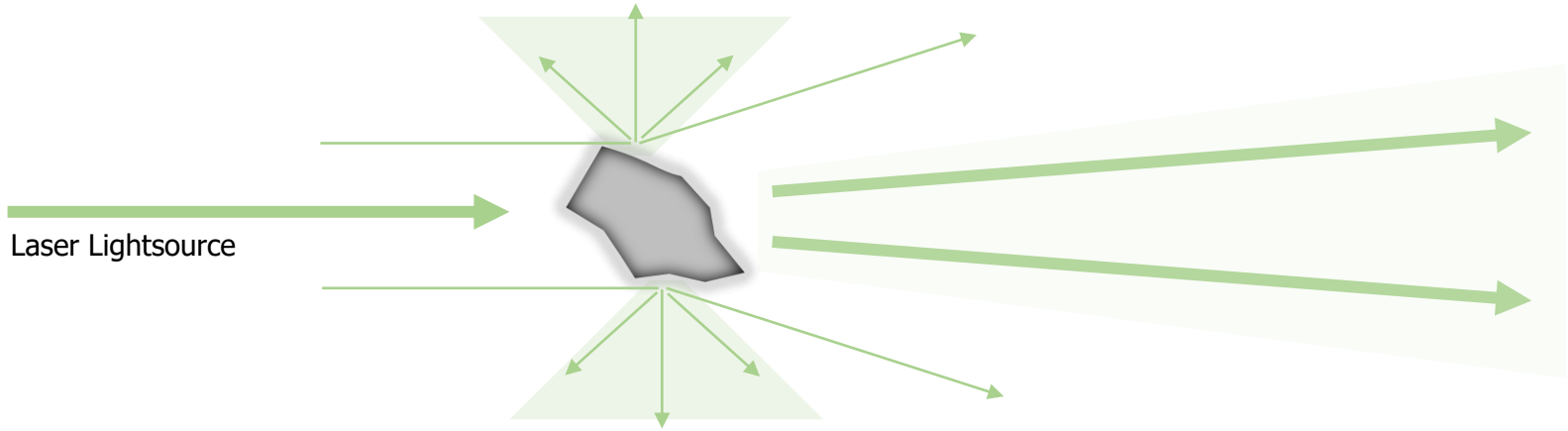
- Airflow Per Litre (Dynamic)
- ~10,000 triggers per second
- Particle count per second
- Particle Density
- Positive RCS count over general dust
- RCS content in mg/m^3

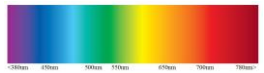
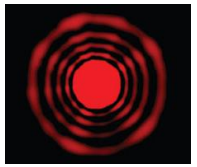
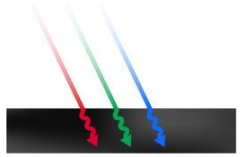
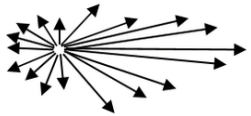
Real-Time RCS Detection



Real-Time RCS Detection

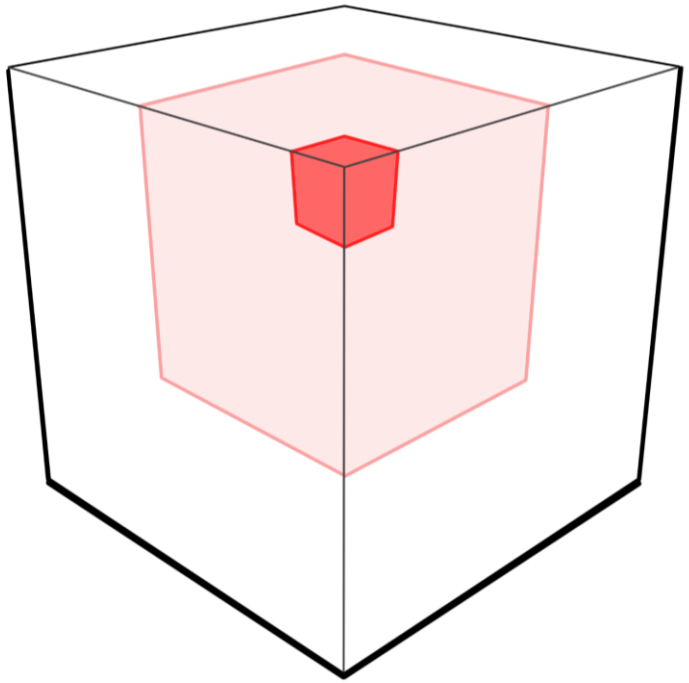
Optical Refraction Technology (ORT)



Particulate Size		Particulate Density		Optical Wavelength		Optical Diffraction		Light Absorption		Signatures
	+		+		+		+		+	
Particulate Sizes 10um – 1um		Reference Density Bulk / Particle		Specifically tuned for Particle Types		Changes in optical Light Scatter / Diffraction Pattern		Reference input vs. output for reference material types		Particle size, shape, symmetry and structure

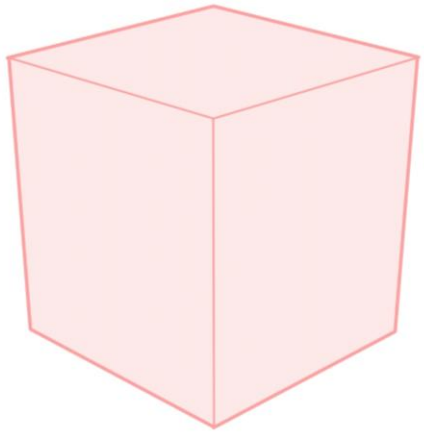
Real-Time RCS Detection

Device Measurement



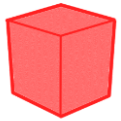
Sample Concentration

Total volume of Air (Litres) sampled over a given time



Mixed Particulates

Volume of Particles sampled from 1 – 40µm in counts



Silica Content

Volume of Silica Particles sampled from 1 – 10µm in counts and $mg.m^{-3}$

Real-Time RCS Detection

Active Sampling Area

Sampling Zone

- Airborne particulates drawn into device relative to the dust inlet port situated on the top of the device.
- Active sampling area typically draws from a ~1m radius in calm air conditions.
- Devices should be positioned relative to particle generation sources or areas of interest
- Sampling can be influenced by environmental conditions such as airflow, local extraction and ambient surroundings.

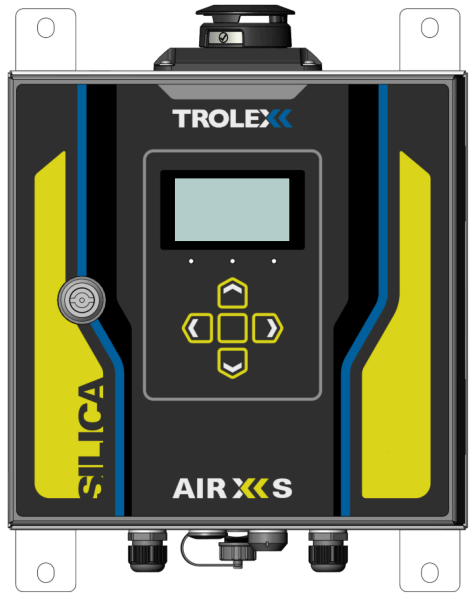
Real-Time RCS Detection

Sensing Parameters

L.O.D
1 µm (micron) Particulate
1 µg/m³ (Microgram) Mass

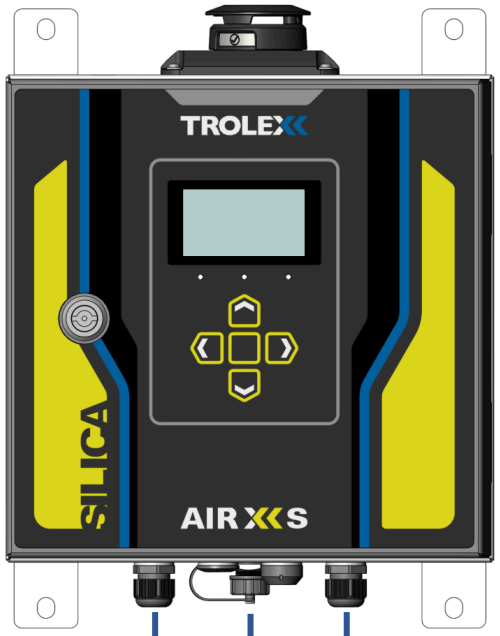
Continuous Loading
25 mg/m³

Max Dust Loading
150 mg/m³



Real-Time RCS Detection

Device Connectivity



Breathe XS Desktop Application

AC or DC Power Input

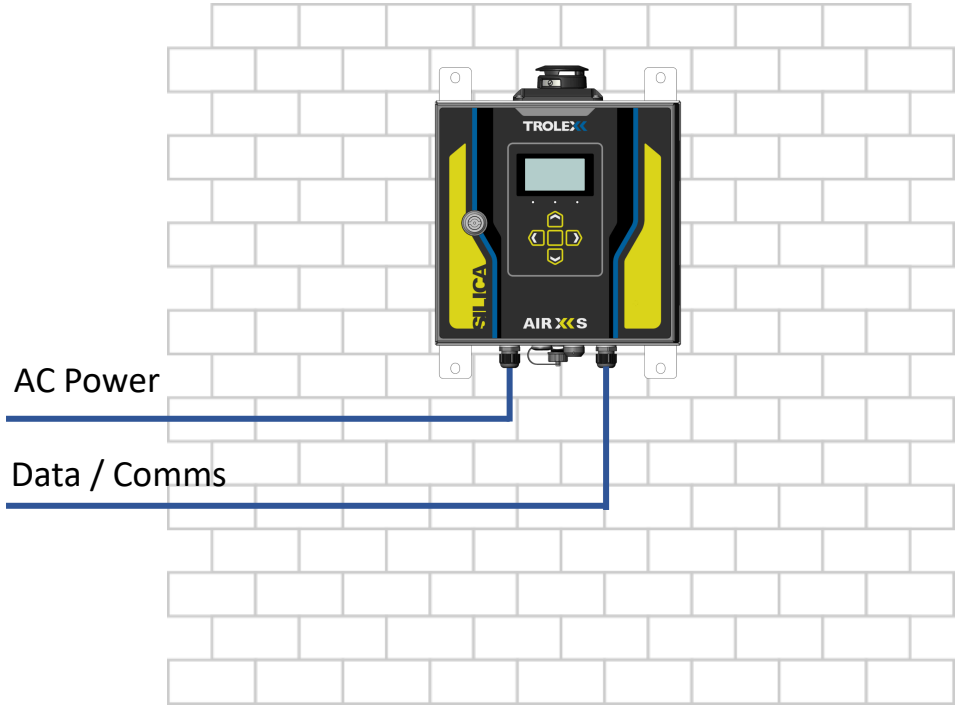
USB Data Download

Ethernet or RS485 Serial (Data Registers)

Windows / Mac PC Or Network

Real-Time RCS Detection

Device Set-Up



Fixed Location Monitoring

Transportable Monitoring

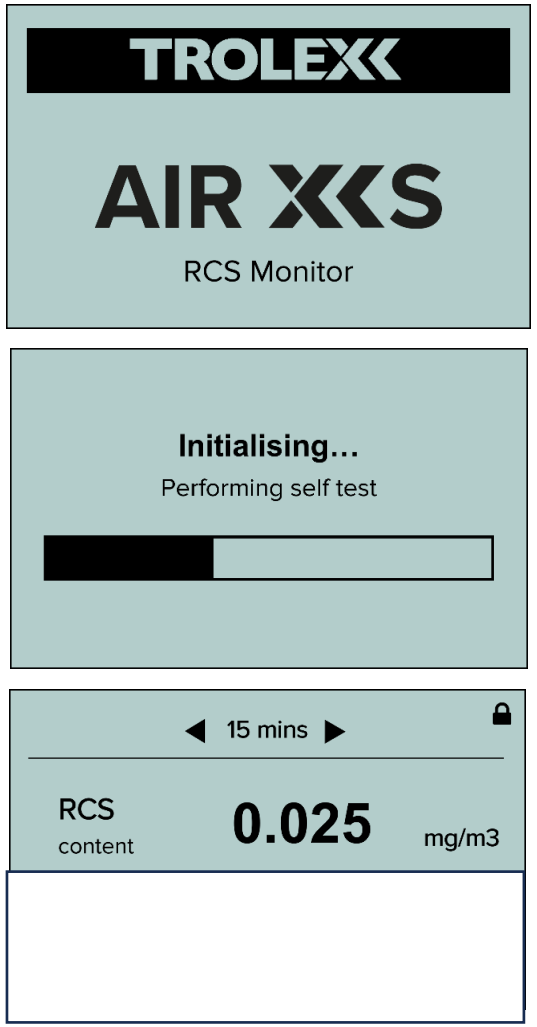
Real-Time RCS Detection

Device Power On and Sampling

Start Up Splash Screen 1.

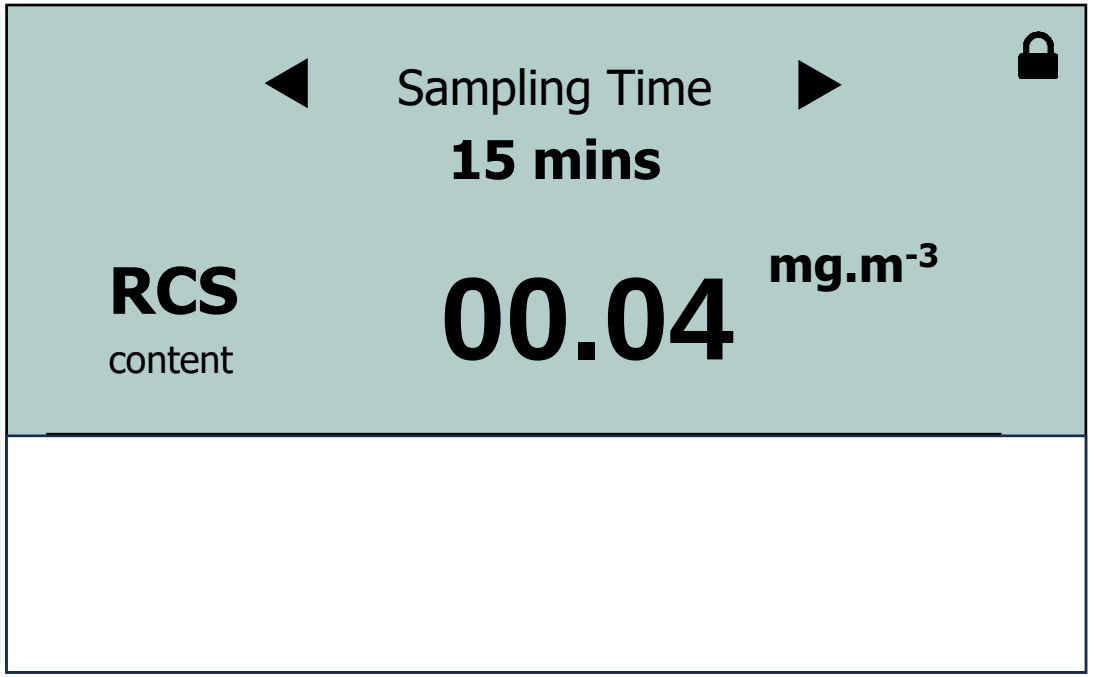
Warm Up / Self Test 2.

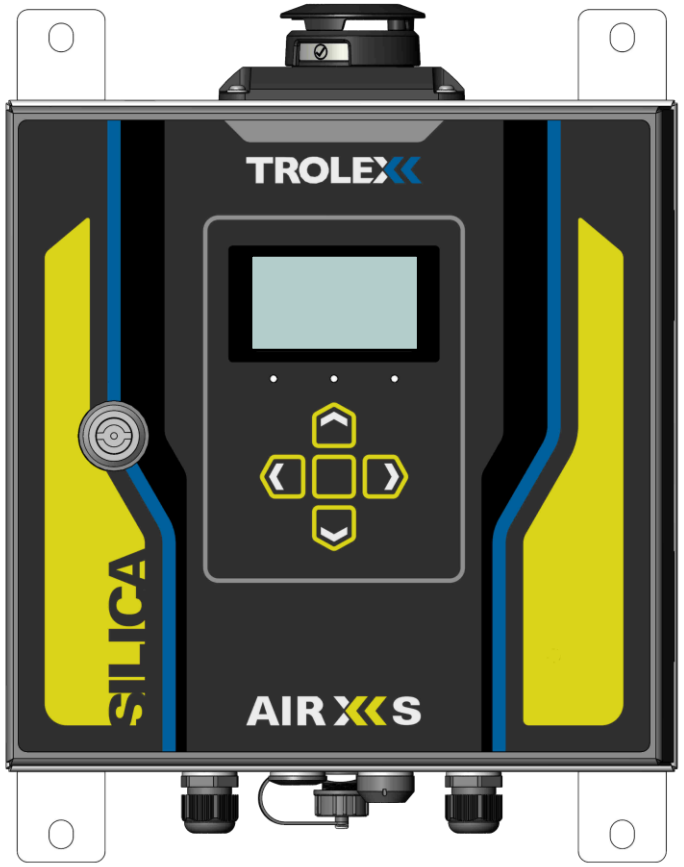
Sampling… 3.



Real-Time RCS Detection

On Device Display Readout





SETTINGS

1. Alarms
2. Communication
3. Data Download
4. Maintenance

ALARMS

1. Details
2. Configure

ALARM SETTINGS

1. Alarm A
2. Alarm B

ALARM SETTINGS

Channel:	15 min
Value:	0.05
Mode:	Auto Reset
Units:	mg/m3

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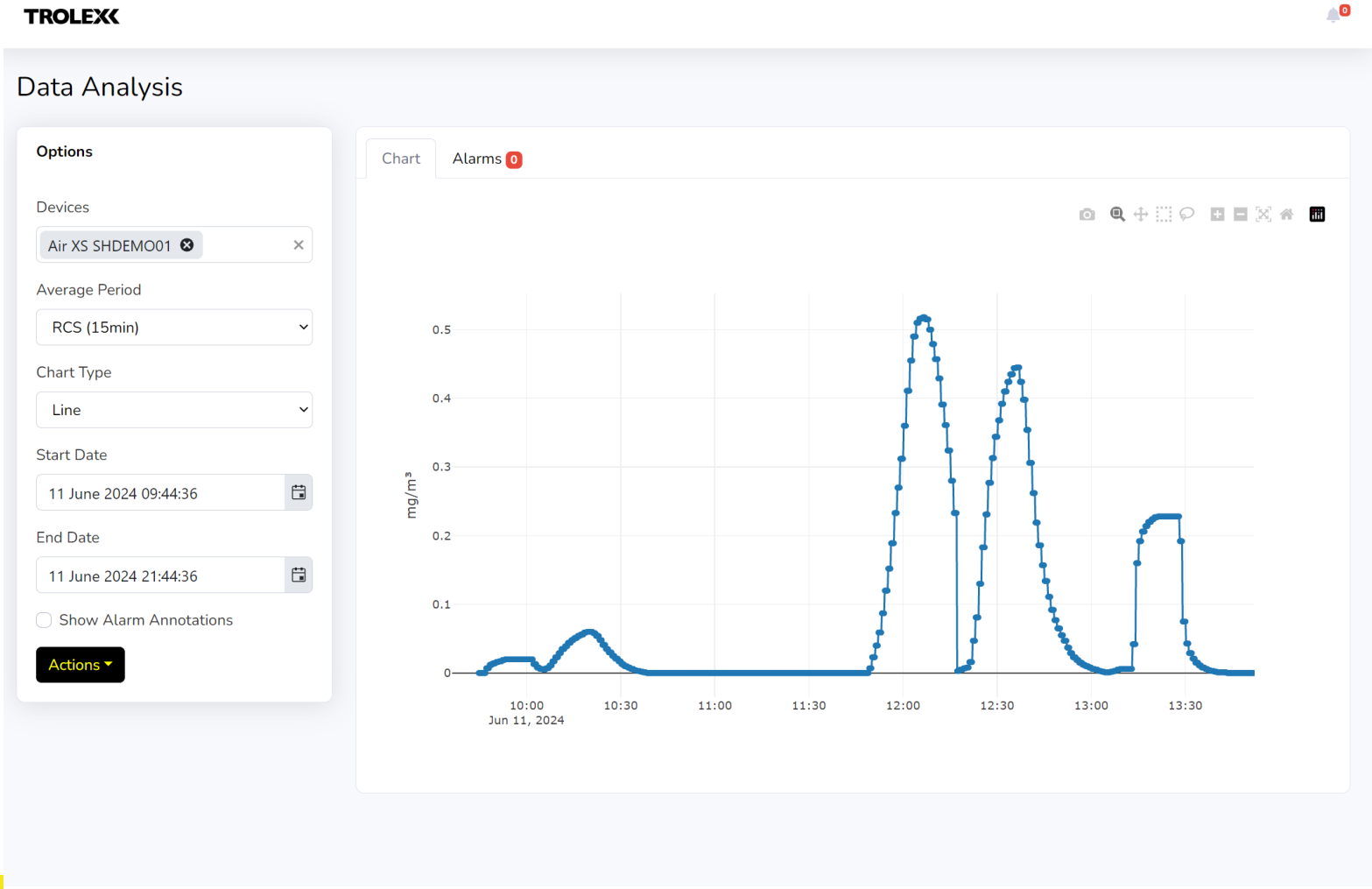
Real-Time RCS Detection

Real-Time RCS Detection

Data Review – Breathe XS



Real-Time RCS Detection

Data Review – Breathe XS

TROLEX

Data Analysis

Options

Devices

Air XS SHDEMO01

Average Period

RCS (8hr)

Chart Type

Line

Start Date

01 June 2024 17:52:53

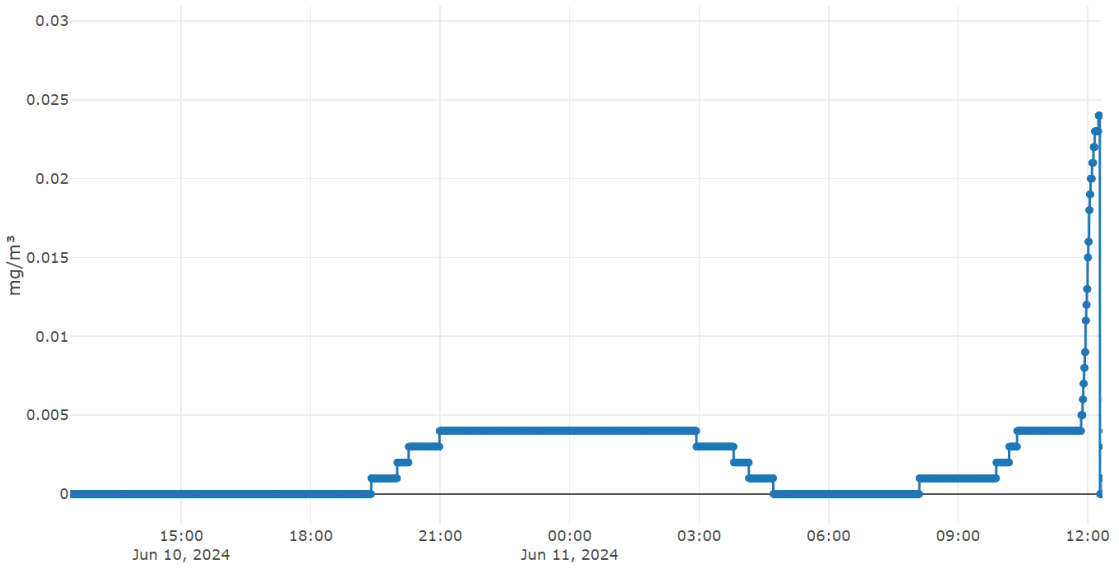
End Date

26 February 2025 17:52:53

Show Alarm Annotations

Actions

Chart | Alarms 0



Real-Time RCS Detection

Key Installation Notes

- Humidity may impact the aerodynamic size of some particles.
- Device positioning should be considered relative to dust suppression systems or airborne mist or suppressants.
- Device cleaning regimes may need to be considered depending on environmental dust loading.

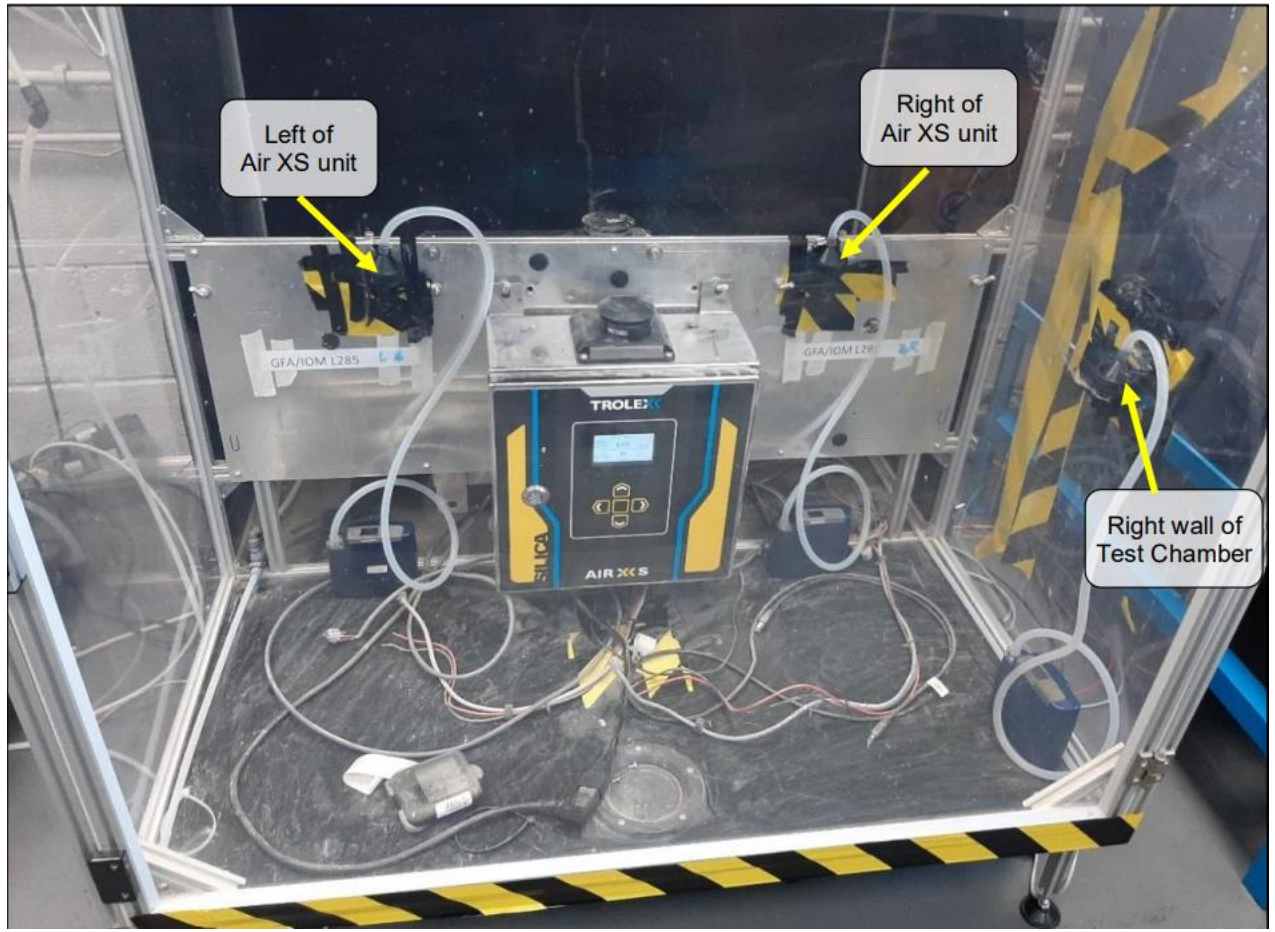
Real-Time RCS Detection

Key Installation Notes

Pilot in green means that the dust values are low so you can enter inside

Real-Time RCS Detection

Device Testing and Benchmarking



Real-Time RCS Detection

Device Testing and Benchmarking

Table A1: Respirable Crystalline Silica Results (Quartz + Cristobalite), 14-03-2024 – Low Dose, 30 mg (Total 123 mg)								
Sample No.	Sample ID	Sample Description	Run Time	Ave Flow Rate	Sample Volume	Substance	Analytical Results*	Measured Concentration
			mins	l/min	m^3		mg	mg/m^3
F566	Sample 1	LHS of Trolex Unit	481	2.202	1.059	Respirable Crystalline Silica (Quartz + Cristobalite)	0.057	0.054
F567	Sample 2	RHS of Trolex Unit	481	2.183	1.050	Respirable Crystalline Silica (Quartz + Cristobalite)	< 0.036**	< 0.034
F568	Sample 3	RHS of Trolex Test Chamber	481	2.202	1.059	Respirable Crystalline Silica (Quartz + Cristobalite)	0.040	0.038
F562*	Field Blank	Reference Sample 1	-	-	-	Respirable Crystalline Silica (Quartz + Cristobalite)	< 0.010	-
F563*	Field Blank	Reference Sample 2	-	-	-	Respirable Crystalline Silica (Quartz + Cristobalite)	< 0.010	-
F564*	Field Blank	Reference Sample 3	-	-	-	Respirable Crystalline Silica (Quartz + Cristobalite)	< 0.010	-

* Where the 'less than' symbol (<) is used, this denotes that the results for both Quartz and Cristobalite were below the analytical limit of detection.
** For sample F567, the 'less than' symbol (<) denotes that no detectable level of cristobalite was reported (i.e. < 0.005 mg).

Note: The same field blanks as those listed for the monitoring performed on the 11th March 2024 were used, as the filters were all from the same batch and were submitted for analysis simultaneously.

Trolex Air XS average RCS concentration over 8h	Average Concentration
	mg/m^3
	0.054

Real-Time RCS Detection

Device Testing and Benchmarking

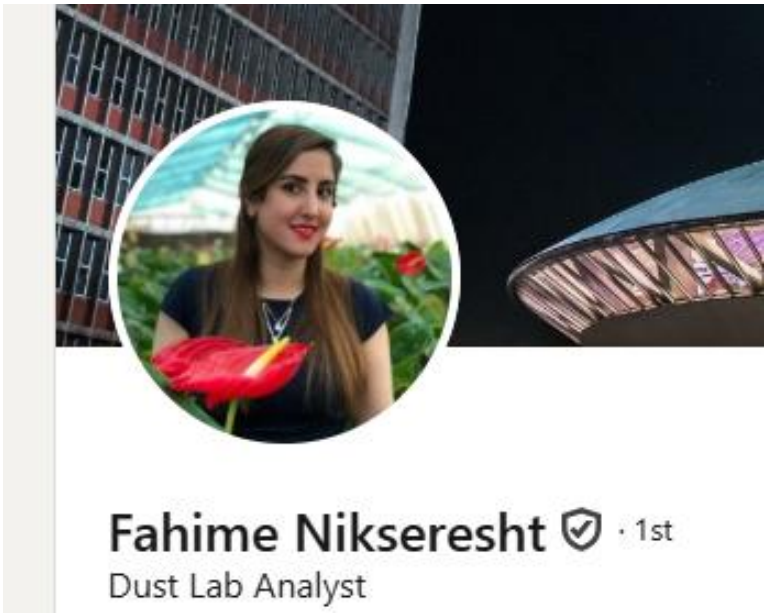
Table A1: Respirable Crystalline Silica Results (Quartz + Cristobalite), 11-03-2024 – High Dose, 300 mg (Total 1200 mg)								
Sample No.	Sample ID	Sample Description	Run Time	Ave Flow Rate	Sample Volume	Substance	Analytical Results*	Measured Concentration
			mins	l/min	m^3		mg	mg/m^3
F556	Sample 1	LHS of Trolex Unit	485	2.217	1.075	Respirable Crystalline Silica (Quartz + Cristobalite)	0.219	0.20
F554	Sample 2	RHS of Trolex Unit	485	2.152	1.044	Respirable Crystalline Silica (Quartz + Cristobalite)	0.143	0.14
F555	Sample 3	RHS of Trolex Test Chamber	485	2.181	1.058	Respirable Crystalline Silica (Quartz + Cristobalite)	0.155	0.15
F562	Field Blank	Reference Sample 1	-	-	-	Respirable Crystalline Silica (Quartz + Cristobalite)	< 0.010	-
F563	Field Blank	Reference Sample 2	-	-	-	Respirable Crystalline Silica (Quartz + Cristobalite)	< 0.010	-
F564	Field Blank	Reference Sample 3	-	-	-	Respirable Crystalline Silica (Quartz + Cristobalite)	< 0.010	-

* Where the 'less than' symbol (<) is used, this denotes that the results for both Quartz and Cristobalite were below the analytical limit of detection.

Trolex Air XS average RCS concentration over 8h	Average Concentration
	mg/m^3
	0.238

Real-Time RCS Detection

Device Testing and Benchmarking



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Dust Lab Analyst

Shahid Chamran University of Ahvaz (Jundi Shapur)

Doctor of Philosophy - PhD, Soil Physics and Conservation

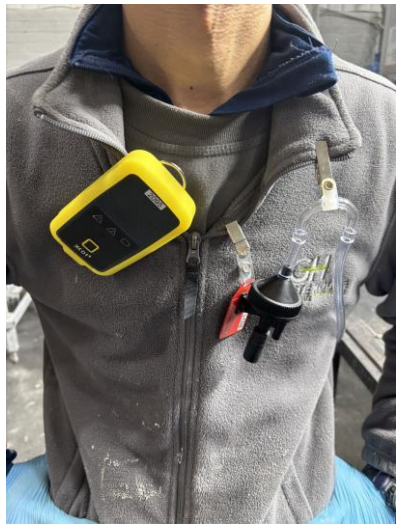
2013 - 2018

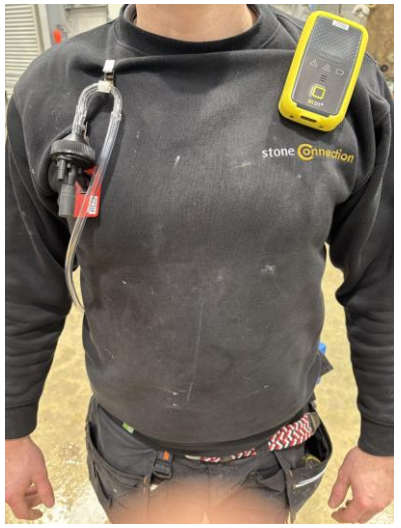
Results-driven Soil Science professional with a diverse background spanning laboratory analysis, project management, and teaching. A proactive researcher dedicated to innovative solutions for environmental challenges, with a strong publication record in prestigious journals.

Real-Time RCS Detection

Device Testing and Benchmarking

15 years working in Occupational Hygiene, in both South Africa and UK.





Real-Time RCS Detection

Device Testing and Benchmarking

Real-Time RCS Detection

Device Testing and Benchmarking

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