



AQMesh



Sensor alerts from AQMeshData.net

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1 Alert set up

When setting up an alert on AQMeshData.net there are three main components to the alert: -

- Alert frequency (minutes)
- Averaging period (minutes)
- Threshold values
 - Upper threshold
 - Lower threshold

These are all entered in the below form on the user interface under “Alert Maintenance” and by clicking the  button in the top right of the page.

Add Alert

Contact Name	Units
<input type="text"/>	<input type="text" value=""/>
Email Address	Lower Threshold
<input type="text"/>	<input type="text"/>
Pod Serial Number	Upper Threshold
<input type="text" value="-1"/>	<input type="text"/>
Sensor Type	Alert Frequency (minutes)
<input type="text" value=""/>	<input type="text"/>
Measurement Type	Averaging Period (minutes)
<input type="text" value=""/>	<input type="text"/>
<input type="button" value="Save"/> <input type="button" value="Close"/>	

2 Goals

Various combinations of these settings should allow users to receive alerts in line with WHO and similar threshold breaches for target gases and PM fractions as well as any specific to their own applications at intervals which suit their needs or ability to action any mitigation for pollution episodes.

Some examples of these include: -

Pollutant	Averaging period (minutes)	Threshold (Maximum)	Source
NO2	60	100 ppb	USEPA NAAQS
NO2	1440 (24 hours)	10 $\mu\text{m}/\text{m}^3$	WHO 2021
O3	480 (8 hours)	100 $\mu\text{m}/\text{m}^3$	WHO 2021
O3	480 (8 hours)	70 ppb	USEPA NAAQS
SO2	60	75 ppb	USEPA NAAQS
SO2	180 (3 hours)	500 ppb	USEPA NAAQS
SO2	1440 (24 hours)	40 $\mu\text{m}/\text{m}^3$	WHO 2021
CO	60	35 ppm	USEPA NAAQS
CO	480 (8 hours)	9 ppm	USEPA NAAQS
CO	1440 (24 hours)	4000 $\mu\text{m}/\text{m}^3$	WHO 2021
PM10	1440 (24 hours)	45 $\mu\text{m}/\text{m}^3$	WHO 2021
PM10	1440 (24 hours)	150 $\mu\text{m}/\text{m}^3$	USEPA NAAQS
PM2.5	1440 (24 hours)	15 $\mu\text{m}/\text{m}^3$	WHO 2021
PM2.5	1440 (24 Hours)	35 $\mu\text{m}/\text{m}^3$	USEPA NAAQS

3 Definitions & rules

Label	Description	Access	Limitations/Expectations
Alert Frequency	Interval which an email containing alert notifications <u>can</u> be sent to the user	User editable	<p>If less than the P3 interval then data may not be transmitted, processed and cached in time for the job to run, preventing email notifications at this interval. Can only be actioned if data is present in the cache, i.e. sent by the pod to the server and processed. Alerts are not based on predicted data.</p> <p>If the “Alert threshold” does <u>not</u> exceed the “Threshold limit” then a notification/email should <u>not</u> be sent</p>
Averaging Period	Period used to create an average to compare against the threshold limits	User editable	<p>Must be greater than or equal to the P2 interval</p> <p>Must be a multiple of the P2 interval</p> <p>Must have a defined start and end date & time</p> <p>Must be in line with user expectations of standard beginning and end times, i.e. 00:01 to 00:15 as a 15-minute period, labelled as “time ending” 00:15</p>
Threshold limits (lower and upper)	Value used to create an alert notification when it is exceeded by the averaging period result	User editable	Can be between an exceptional range, both positive and negative – basically no limit to the value

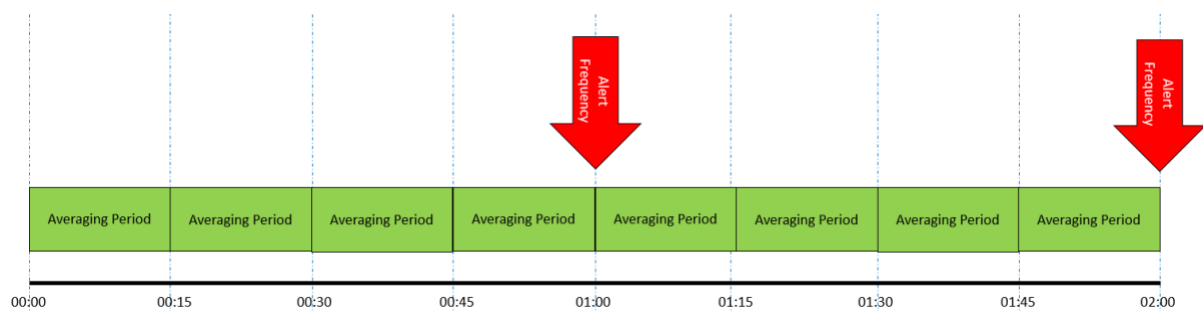
Rolling average	When “Averaging period” is greater than the “Alert frequency” so the same data (not all) is used for multiple alert checks during the “job run”	-	Must comply with all “Alert Frequency” and “Averaging Period” limitations
Standard average	When “Averaging period” is less than or equal to the “Alert frequency”	-	Must comply with all “Alert Frequency” and “Averaging Period” limitations
Trigger email	Trigger alerts occur when data passes from a level below an “upper threshold” to a value above it, or from a level above a “lower threshold” to a value below it.	-	
Reset email	Reset alerts are generated for the first data point which no longer breaches the threshold value. The alert is then reset and the next breach will create a new trigger alert.	-	

4 Standard averages

“Averaging period” is less than the “Alert Frequency”

Example:-

Alert frequency (minutes)	Averaging period (minutes)
60	15



In this example the alert is checked at the top of every hour and four averaged periods will be compared against the threshold limits. Should the threshold limits be broken by any of the averaging periods since the previous “job run interval” was completed, then an email notification will be generated which will include time stamped results.

Alert emails will also be generated when data comes back within the alert thresholds set by the user.

Other setting examples (pod dependant):-

Alert frequency (minutes)	Averaging period (minutes)
60	1
60	5
60	10
60	15
60	30
5	1
10	1

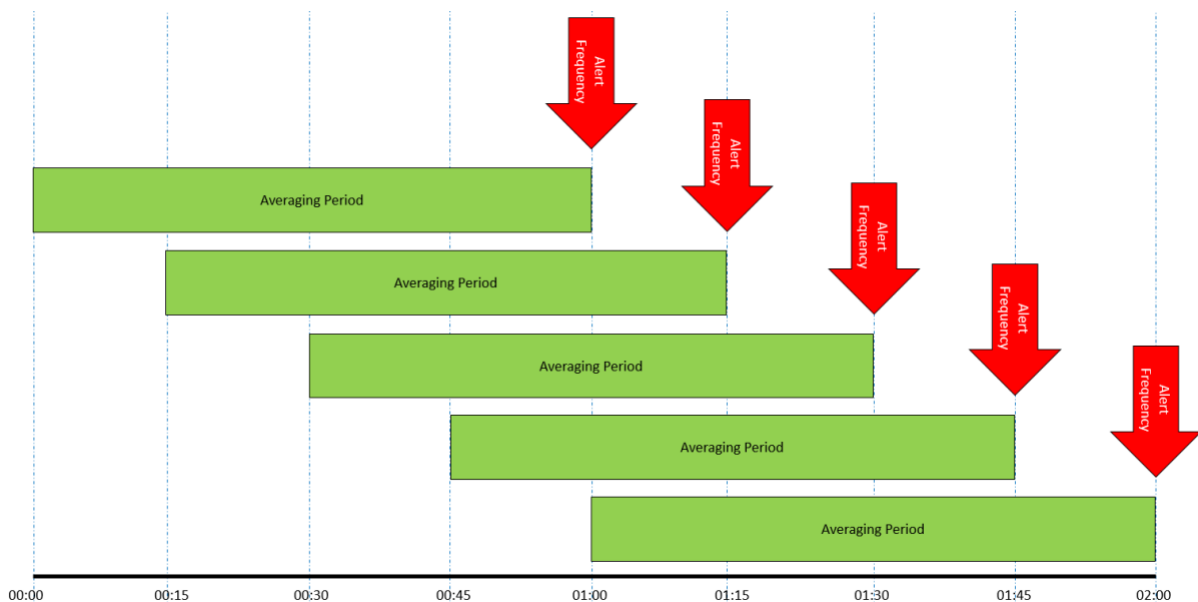
10	5
30	1
30	5
30	10
30	15
1440 (24 hours)	1
1440 (24 hours)	5
1440 (24 hours)	10
1440 (24 hours)	15
1440 (24 hours)	30
1440 (24 hours)	60

5 Rolling averages

“Averaging period” is greater than or equal to “Alert Frequency”

Example:-

Alert Frequency (minutes)	Averaging Period (minutes)
15	60



In this example the alert is checked at every 15-minute interval past the top of every hour and one averaging period will be compared against the threshold limits. Should the threshold limits be broken by any of the averaging periods

since the previous “job run interval” was completed, then an email notification will be generated which will include time stamped results.

Alert emails will also be generated when data comes back within the alert thresholds set by the user.

Other setting examples (pod dependant):-

Alert frequency (minutes)	Averaging period (minutes)
60	60
60	480 (8 hours)
60	720 (12 hours)
60	1440 (24 hours)
15	15
15	30
15	60
15	480 (8 hours)
15	720 (12 hours)
15	1440 (24 hours)

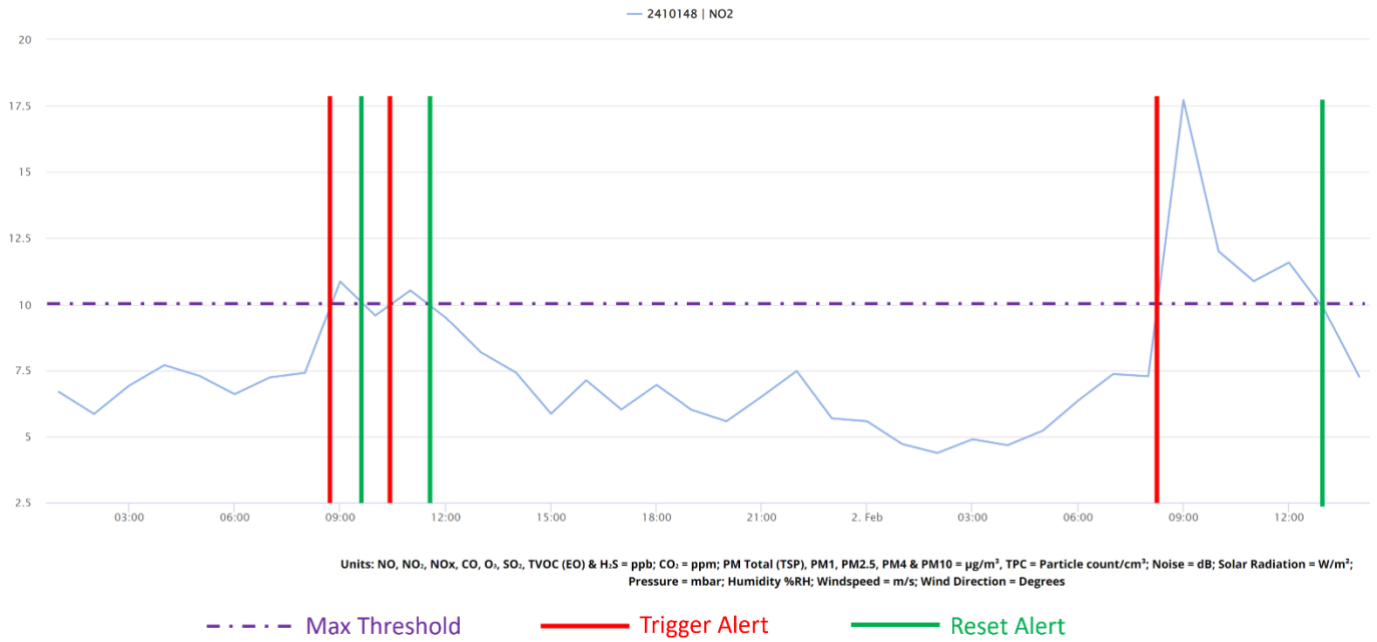
6 Alert email

There are two type of email generated by an alert set up; the first is a “Trigger” alert and the second is a “Reset” alert.

Trigger alerts occur when data passes from a level below an “upper threshold” to a value above it, **or** from a level above a “lower threshold”.to a value below it.

While reset alerts are generated for the first data point which no longer breaches the threshold value. The alert is then reset and the next breach will create a new trigger alert.

Multiple trigger alerts are not generated for consecutive data points which breaches a threshold value without the alert being reset.



Example alert email:-

AQMesh Reset Alert for AQMesh Pod

Pod Serial Number	Sensor Type	Maximum Threshold	Units	Measurement Type	Alert Frequency (mins)	Alert Average (mins)
2410148	NO	10	ppb	Prescaled	60	15

Timestamp UTC	Timestamp Project TZ	NO State	NO Prescaled	Reading Date From	Reading Date To	Row Count
27 Mar 2023 08:00	27 Mar 2023 08:00	Reading	9.50	27 Mar 2023 07:00	27 Mar 2023 08:00	15

Notes
Standard averaging, greater than, test 22/3/23

Column label	Description
Pod Serial Number	Pod which the alert email is referencing
Sensor Type	Sensor species which has breached the alert settings
Maximum/Minimum Threshold	Value entered into the alert set up
Units	Units chosen when setting up the alert
Measurement Type	QA/QC level applied to the data used for alerts
Alert Frequency (mins)	Value entered into the alert set up
Alert Average (mins)	Value entered into the alert set up
Timestamp UTC	Time and date (time ending) of alert breach in UTC
Timestamp Project TZ	Time and date (time ending) of alert breach in the chosen project time zone
[Sensor Type] State	State of the sensor when the alert is breached, i.e. Reading, Extreme Environment, Deliquescence. Used to help understand the relevance of the alert
[Sensor Type] [measurement Type]	Averaged value used for the alert check in the units listed under 'units'
Reading Date From	Start date and time (time ending) used to calculate the value used for the alert
Reading Date To	Finish date and time (time ending) used to calculate the value used for the alert
Row Count	Depending on the alert settings and pod settings, this indicates the number of data points used to calculate the average

7 Frequently asked questions

Question	Answer
Are the alert timing based on time ending or time beginning?	Time ending.
Can I set up an alert for anything other than a PM or gas reading (e.g. low battery)?	Yes, simply select the correct sensor type and units when setting up the alert via the user interface.
Can I have alerts sent to more than one email address?	Yes. When creating your alert just separate multiple emails using a “;” and add as many email addresses as you require.
Do I need to enter both an upper AND lower threshold for the alert?	No, for each alert you can chose to have either or both an upper and lower threshold.

8 Document history & version control

Sensor alerts from AQMeshData.net
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Version Control QMS ISO9001:2015		
<small>Controlled electronically in Environmental Instruments Ltd "Compliance" SharePoint only</small>		
Version number	Changes made	Date Issued
1.0	Original document	March 2023