API service

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Introduction

1.1 Recommendations for using the API

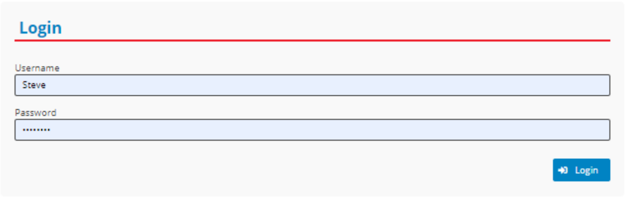
The purpose of the AQMesh API is to offer users the ability to collect data to use in their own database system, and not to provide data in real-time. This means the user always has access to a complete set of data.

1.2 Getting Started

Before you can begin using API calls you will need to login to the web application and accept our T&C's. Once you have logged in using the username and password provided please change your password. As an API user functionality on the web application will be limited to access to the API documentation and changing your password top right menu.

Use https://test.aqmeshdata.net/login for test server

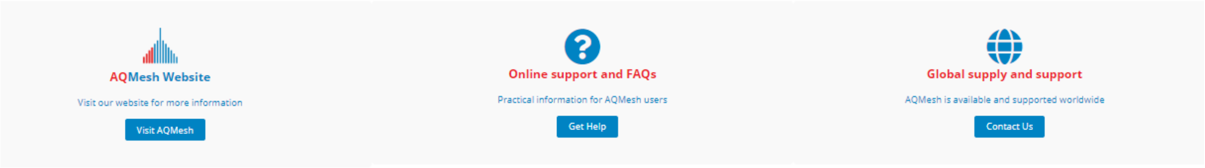
Use https://www.aqmeshdata.net/login once you have purchased an API access contract for you AQMesh pods.



Login

Username: Steve

Password: ••••••••



AQMesh Website

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Practical information for AQMesh users

Global supply and support

AQMesh is available and supported worldwide

1.3 Basic information

This document describes API calls required to get basic data from AQMeshData.net. The latest copy is available via your login please check for additions. It also describes the required input parameters in order to call particular API URLs.

The URL for API access to AQMesh data is https://api.aqmeshdata.net/api

For testing please use https://apitest.aqmeshdata.net/api

For security every API call URL user needs to pass valid bearer token in the body, this token is supplied as a result of the authentication request. This will make the service secure in conjunction with HTTPS.

For help on use of bearer tokens see stack overflow:

https://stackoverflow.com/questions/14627399/setting-authorization-header-of-httpclient

```
// Auth with bearer token
public static HttpClient GetClient(string token)
{
        var authValue = new AuthenticationHeaderValue("Bearer", token);

        var client = new HttpClient(){
            DefaultRequestHeaders = { Authorization = authValue}
            //Set some other client defaults like timeout / BaseAddress
        };
        return client;
}
```

1.4 Postman

A useful tool to help in the development of API’s is Postman which can be downloaded from:
https://www.postman.com/downloads/

We have created an example Postman collection which you can download from and import into Postman once you have installed it, you will need to change the authenticate json to have your username and the password which you assign to that user. You can obtain this collection here:
https://www.aqmesh.com/Postman/API_Test_Example_postman_collection.json

AQMesh API principles

2.1 Status codes

Please note also that standard HTTP Status codes will be used to reinforce the response.

Typical status codes are:

- 200 OK and content in the body of the response
- 204 No Content (but the request had a successful outcome)
- 400 Bad Request (Failed validation)
- 401 Unauthorised (the authenticated user is not authorised to see the requested data)
- 404 Not found (Either the request or the qualifying data)
- 500 Server error

2.2 Content-type headers

The API is designed to accept and respond using JSON.

For example the {{URL}}/api/Authenticate request needs the authentication document to be supplied in the body in JSON:

```
{"username":"AQMeshAPIUser","password":"ThePassword"}
```

This can be reinforced by supplying HTTP “Content-Type“ and “Accept” headers with a value of “application/JSON”

The API can work with XML by supplying “Content-Type“ and “Accept” headers with a value of “application/xml”. It will then expect to received requests in XML and respond in kind:

```
<Auth>
      <UserName>AQMeshAPIUser</UserName>
      <Password>ThePassword</Password>
</Auth>
```

Following the WEB API convention requests which are designed to retrieve information should be performed using HTTPGet. To send or add information HTTPPost and to perform partial updates HTTPPatch. This will be reinforced in this document by noting the appropriate action with each request.

2.3 Accept headers

Error messages which accompany Status code 500 etc. with no “Accept” header or an “Accept” header of “text/plain” or “application/json” then the error will be returned in JSON like this:

```
{
    "message": "A problem happened while handling your request."
}
```

If an “Accept” header of “application/xml” was supplied then the error will be wrapped in “message” tags like this:

```
<message>A problem happened while handling your request.</message>
```

In all other cases the response will be as structured data e.g.:

With “Accept” header of “text/plain” (default) or “application/json”:

```
{
    "token":
"eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJzdWIiOiJPQVFNLUFQSSIsImp0aS
I6ImZjNTE4NDY2LTIzNzgtNDM2NS05YmQyLWE5MTUzZjYyNGNjMCIsIk1lbWJlcnNoaX
BJZCI6IjEiLCJTZXNzaW9uSWQiOiI5MzY4Zjc1My1iMTBlLTQzMjUtOGI3Mi01OWJkNW
ZmOTFmZDEiLCJJUF9BZGRyZXNzIjoiOjoxIiwiZXhwIjoxNTI0MjIyMDk3LCJpc3MiOi
JBUU1lc2guU2VjdXJpdHkuQmVhcmVyIiwiYXVkIjoiQVFNZXNoLlNlY3VyaXR5LkJlYX
JlciJ9.-sF-rZv4DoIDyz_SNofe7a2A7VHBG6jpY_s1t84oub4"
}
```

“Accept” header of “application/xml”:

```
<AuthToken xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">

<Token>eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJzdWIiOiJPQVFNLUFQSSIs
Imp0aSI6Ijg3ODM4Yzc1LTI3NTItNDM0OS1iOGY4LTY1Y2E3Nzk1YTQxYSIsIk1lbWJl
cnNoaXBJZCI6IjEiLCJTZXNzaW9uSWQiOiJmYjVjN2Y5OS0zNzUzLTRhZWMtYTc4NS1h
ZDdmMGUwYjVhNGMiLCJJUF9BZGRyZXNzIjoiOjoxIiwiZXhwIjoxNTI0MjIyMDE1LCJp
c3MiOiJBUU1lc2guU2VjdXJpdHkuQmVhcmVyIiwiYXVkIjoiQVFNZXNoLlNlY3VyaXR5
LkJlYXJlciJ9.DFde73avstNYqweAI_p325Pce2gygav-_E_yWcMFWZA</Token>
</AuthToken>
```

Please note:

If the response to a request is structured data then by default this will return as JSON. This will be the case where there are no “Accept” headers provided or the “Accept” header is anything other than “application/xml”.

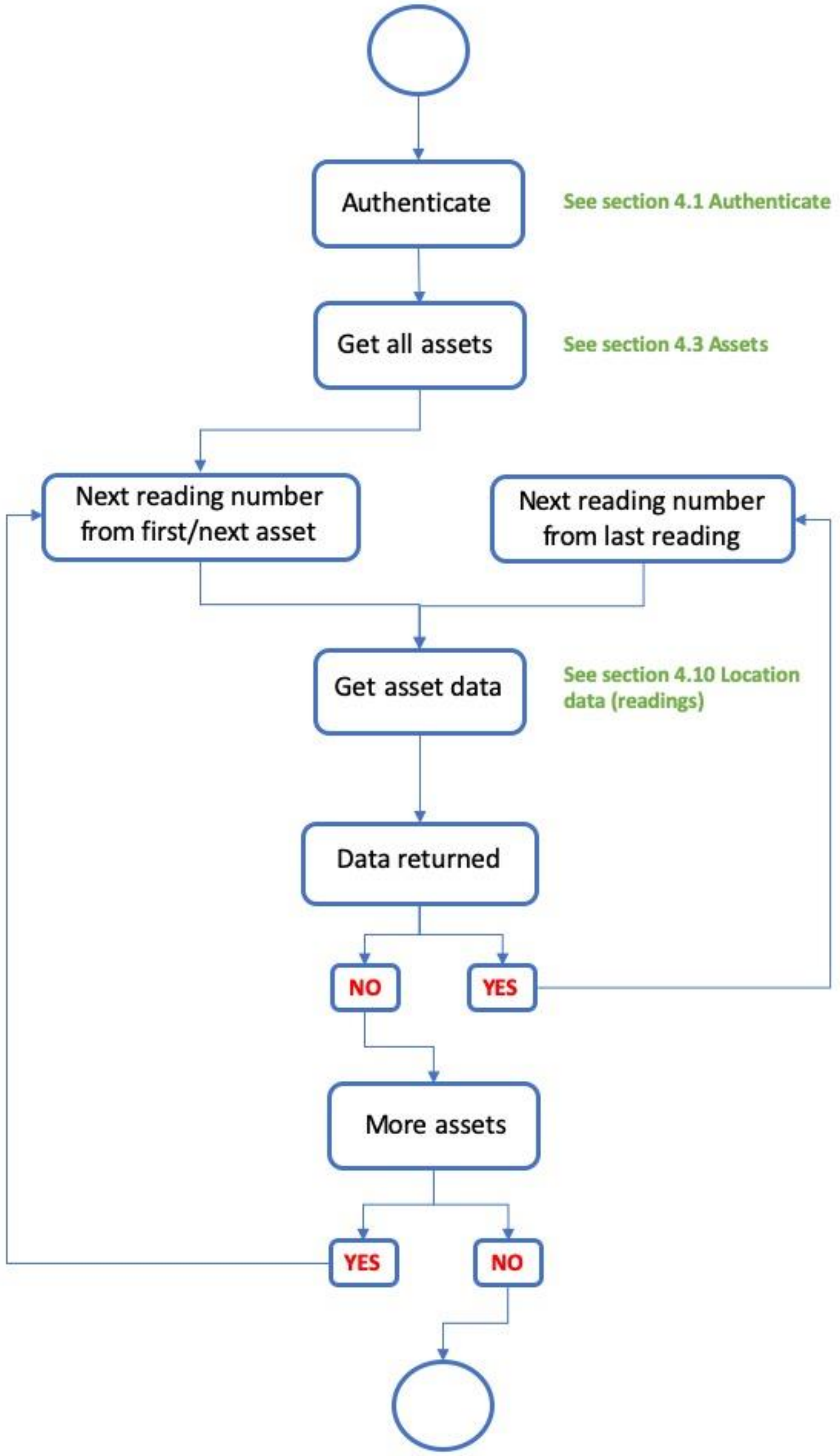
2.4 Error handling

Should something go wrong and it is possible to trap that error then the body of the response which accompany Status code 500 will an explanation like this:

```
{
    "message": "Arithmetic overflow error converting float to data
type numeric."
}
```

However if the 500 status was due to a fundamental issue with the server then an HTML page might be returned in the body.

Typical data access workflow


Authenticate
See section 4.1 Authenticate
Get all assets
See section 4.3 Assets
Next reading number from first/next asset
Next reading number from last reading
Get asset data
See section 4.10 Location data (readings)
Data returned
NO
YES
More assets
YES
NO

3.1 API data access process

The API uses a token to authorise access – this token is returned in the body of the response to the authenticate request.

The token is valid for 120 minutes, therefore the authenticate request will need to be repeated every so often to continue using the service.

A list of pods and their locations will tell you what is available and where to start looking.

Location data returns data for each discrete location.

3.2 Polling

AQMesh pods are pre-programmed with a default logging strategy determined by three time periods, known as P1, P2 and P3.

At P1, the gas and environmental sensors are sampled. At P2, the samples are averaged and some basic calculations are performed and data is stored locally. At P3, the results are transmitted to the AQMesh cloud server using the mobile phone network.

If a particle counter is fitted, an additional set of time periods is used, known as T1, T2 and T3, which work in a similar fashion to P1, P2 and P3 with the exception of T1 controlling the particle counter.

By default, P2/T2 and P3/T3 are set to be the same and it is recommended they remain the same. On newer firmware pods V5 and above these are combined as the readings from the pod are merged into the same packets to be separated on the server.

Based on the default logging strategy, AQMesh pods transmit (P3 and T3) to the AQMesh server on the hour, therefore to ensure the most efficient process, the API should poll at least 5 minutes after the hour.

If the pod transmission interval (P3 and T3) has been amended to be more frequent (such as every 15 minutes or every 30 minutes) then more regular polling would be beneficial, however, the purpose of the AQMesh API is to offer users the ability to collect data to use in their own database system, and not to provide data in real-time. Excessive, inefficient polling will ultimately be blocked and the AQMesh server will no longer respond to API calls.

3.3 Readings

The “next” request returns readings in a manner to insure that no readings are missed. But please note that on occasions data may need to be recalculated for example if a sensor is replaced or a pod is relocated a period of stabilisation will be triggered on the server followed by a period of rebasing. After rebasing has completed the pointers on the server will be reset to the start of the rebasing period to force the API to re-download those readings. In this event the API recipient should update the reading values with the new values.

Pointers can be reset manually on request by EI admin to retrieve data that has been lost or corrupted locally.

Data over 1 year old is archived to preserve the database performance so pointers cannot be reset prior to this point without special permission.

AQMesh API calls

4.1 Authenticate

HttpPost: {{URL}}/api/Authenticate

In the body of the post:

```
{"username":"AQMeshAPIUser","password":"ThePassword"}
```

If successful will return Status 200 with the token in the body of the response as a JSON object see “AQMesh API Principals“ above. This token has a built in Expiry time which is 120 minutes from the point it is created so if a session on the API is to persist beyond 2 hours then the Authenticate request will need to be repeated.

Example token:

```
{
"token":
"eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJzdWIiOiJPQVFNLUFQSSIsImp0aS
I6ImY3MTZlMmFlLTUxZTEtNDJmMS1iNWIxLTAxMjdhNjA2Y2VlMCIsIk1lbWJlcnNoaX
BJZCI6IjEiLCJTZXNzaW9uSWQiOiI5ZWQ1NDdiYi0wZmRlLTQwOTgtODJiYS0xNTE5NW
M5MDU4Y2UiLCJJUF9BZGRyZXNzIjoiOjoxIiwiZXhwIjoxNTI0MjIxNDU1LCJpc3MiOi
JBUU1lc2guU2VjdXJpdHkuQmVhcmVyIiwiYXVkIjoiQVFNZXNoLlNlY3VyaXR5LkJlYX
JlciJ9.nkMegPPMv6K-qNjVoI6t0LYTL-Z1XfyIGLXaFmAUTKU"
}
```

4.2 Data ownership checks

The bearer token not only allows access to the API but it identifies the user who requested it. This is then used by each request to determine whether the user is authorised to access or modify the data they are requesting.

When making requests for lists of data then only data belonging to the user’s organisation will be presented. E.g. If asking for a list of all Customers, only the users organisation will be returned.

If making a request to return or change specific data to which the user does not have access then status 401 “Unauthorised” will be returned.

Please note:

If the user belongs to a data service provider then:

- General requests will return all items with PODs marked as using the data service provider. E.g. all owners who have PODs marked would be returned
- A request for all PODs will return all PODs marked as using the data service provider, regardless of customer or owner
- Readings for PODs marked will be returned
- If a request is made for Readings for a POD NOT marked will result in 401 “unauthorised”

4.3 Assets - Obsolete

Please use 4.19 Assets V1.

HttpGet: {{URL}}/api/Pods/Assets

Subject to data ownership checks.

```
 [
      {
          "location_number": 112,
          "location_name": "Location 1582150",
          "location_notes": null,
          "location_owner_number": 1,
          "location_latitude": null,
          "location_longitude": null,
          "location_altitude": null,
          "pod_number": 1013,
          "serial_number": 1582150,
          "part_number": "C12345-0000-2",
          "heated_inlet": false,
          "pod_owner_number": 8,
          "project_number": 26,
          "project_name": "Demo fleet Default Project",
          "project_notes": null,
          "pod_latitude": null,
          "pod_longitude": null,
          "pod_altitude": null,
          "customer_number": 8,
          "customer_name": "Environmental Instruments",
          "owner_number": 8,
          "owner_name": "Environmental Instruments default POD Owner",
          "aml_data_service": true,
          "firmware_version": "v3.22",
          "gas_protocol_version": "V5.0",
          "gas_p1": 10,
          "gas_p2": 900,
          "gas_p3": 3600,
        "particle_p1": 30,
        "particle_protocol_version": "V3.0",
        "particle_p2": 900,
        "particle_p3": 3600,
        "fast_transmission": false,
        "last_connection": "2018-09-19T16:00:19.36",
        "sim_number": "89462046041000904587",
        "re_read_gas_request": 0,
        "next_gas_request": 0,
        "last_gas_reading_number": 2839131,
        "re_read_particle_request": 0,
        "next_particle_request": 0,
        "last_particle_reading_number": 9507441,
        "gps_present": true,
        "gps_status": 2,
        "gps_status_description": "Timeout (Attempted, but timed out)"
    },
    {
        "location_number": 114,
        "location_name": "Location 15150",
        "location_notes": null,
        "location_owner_number": 8,
        "location_latitude": null,
        "location_longitude": null,
        "location_altitude": null,
        "pod_number": 1020,
        "serial_number": 15150,
        "part_number": "G12340-0000-1",
        "heated_inlet": false,
        "pod_owner_number": 8,
        "project_number": 9,
        "project_name": "EI Default Project",
        "project_notes": null,
        "pod_latitude": 0,
        "pod_longitude": 0,
        "pod_altitude": 0,
        "customer_number": 8,
        "customer_name": "Environmental Instruments",
        "owner_number": 8,
        "owner_name": "Environmental Instruments default POD Owner",
        "aml_data_service": false,
        "firmware_version": "v3.33",
        "gas_protocol_version": "V5.0",
        "gas_p1": 10,
        "gas_p2": 900,
        "gas_p3": 3600,
        "particle_p1": 30,
        "particle_protocol_version": "V3.0",
        "particle_p2": 60,
        "particle_p3": 3600,
        "fast_transmission": false,
        "last_connection": "2019-07-29T15:00:30.57",
        "sim_number": "89462046041000939252",
        "re_read_gas_request": 0,
        "next_gas_request": 0,
        "last_gas_reading_number": 70071152,
        "re_read_particle_request": 0,
        "next_particle_request": 0,
        "last_particle_reading_number": 0,
        "gps_present": false,
        "gps_status": 1,
        "gps_status_description": "Unavailable (no GPS module in modem)"
    },
    {
        "location_number": 276,
        "location_name": "Location 2450001",
        "location_notes": null,
        "location_owner_number": 9,
        "location_latitude": null,
        "location_longitude": null,
        "location_altitude": null,
        "pod_number": 1088,
        "serial_number": 2450001,
        "part_number": "C12000-1000-2",
        "heated_inlet": false,
        "pod_owner_number": 9,
        "project_number": 11,
        "project_name": "Example Project",
        "project_notes": "",
        "pod_latitude": 51.604485,
        "pod_longitude": -0.206537,
        "pod_altitude": 111,
        "customer_number": 1,
        "customer_name": "UK Distributor",
        "owner_number": 9,
        "owner_name": "C40",
        "aml_data_service": true,
        "firmware_version": "v3.24",
        "gas_protocol_version": "V5.1",
        "gas_p1": 10,
        "gas_p2": 60,
        "gas_p3": 3600,
        "particle_p1": 30,
        "particle_protocol_version": "V3.0",
        "particle_p2": 60,
        "particle_p3": 3600,
        "fast_transmission": false,
        "last_connection": "2019-07-25T10:00:37.7866667",
        "sim_number": "8934075179004424374",
        "re_read_gas_request": 0,
        "next_gas_request": 0,
        "last_gas_reading_number": 41869205,
        "re_read_particle_request": 0,
        "next_particle_request": 0,
        "last_particle_reading_number": 15323424,
        "gps_present": true,
        "gps_status": 3,
        "gps_status_description": "Located (GPS location known)"
    }
]
```

4.4 Gas frequencies – for v3.xx firmware pods

Please use 4.18 Pod frequencies for v5.xx firmware pods

HttpPatch: {{URL}}/api/Pods/GasFrequencies

Subject to data ownership checks.

In the body of the request include json (or XML see Content-Type Headers):

```
{
      "Serial_Number": 704150,
      "Gas_P1": 5,
      "Gas_P2": 180,
      "Gas_P3": 3600
}
```

The location must belong to the requester or the requester be a data service provider which supplies this location, if not a status 401 "Unauthorised" will result.

The values of the other parameters must conform or status 400 "Bad Request" will result:

- *Gas_P1 (sample frequency)*
    - *Either 5, 10 or 30 seconds.*
    - *Divisible by 5*
- *Gas_P2 (reading interval)*
    - *Minimum Gas_P1*
    - *Either 60, 300, 600, 900 or 1800 seconds.*
    - *Multiple of Gas_P1*
- *Gas_P3 (transmission frequency)*
    - *Minimum Gas_P2*
    - *Either 1800, 3600, 14400, 21600 or 43200 seconds.*
    - *Fast transmission 300, 600 or 900 seconds (via server only)*
    - *Multiple of Gas_P2*
    - *Divisor of 86400*

Please note:

This will also work on newer firmware pods but please note it will change the averaging period and transmission interval for both gas and particle readings as they are combined on new firmware pods.

4.5 PM frequencies – for v3.xx firmware pods

Please use 4.18 pod frequencies for v5.xx firmware pods

HttpPatch: {{URL}}/api/Pods/PMFrequencies

Subject to data ownership checks.

In the body of the request include json (or XML see Content-Type Headers):

```
{
      "Serial_Number": 704150,
      "Particle_P1": 30,
      "Particle_P2": 60,
      "Particle_P3": 3600
}
```

The location must belong to the requester or the requester be a data service provider which supplies this location, if not a status 401 "Unauthorised" will result.

The values of the other parameters must conform or status 400 "Bad Request" will result:

- *Particle_P1 (pump run time)*
    - *Minimum 5 seconds*
    - *Default 30 seconds*
- *Particle_P2 (reading interval)*
    - *Minimum Particle_P1*
    - *Either 60, 180, 600, 900 or 1800 seconds*
- *Particle_P3 (transmission frequency)*
    - *Minimum Particle_P2*
    - *Either 1800, 3600, 14400, 21600 or 43200 seconds*
    - *Fast transmission: either 300, 600 or 900 seconds (via server only)*
    - *Multiple of Particle_P2*
    - *Divisor of 86400*

Please note:

Depending on the power supply, default settings will change, e.g. for pods using any form of battery, default settings are highlighted above in black bold. Whereas if the pod is using DC or Solar DC power, default settings are highlighted above in red italics.

This will also work on newer firmware pods but please note it will change the averaging period and transmission interval for both particle and gas readings as they are combined on new firmware pods.

4.6 Restabalise

HttpPost: {{URL}}/api/Pods/Restabilise/{Serial_Number}

If successful will initiate re-stabilisation of all sensors in the Pod at the specified location and return status 204 “No Content”.

Other possible responses are 401 “Unauthorized” or 404 “Not Found”
Sensors which enter “Stabilisation” will automatically enter rebasing once completed.

4.7 Rebase

4.7.1 Rebase Pod

HttpPost: {{URL}}/api/Pods/ReBase/{Serial_Number}

If successful will initiate re-basing of all sensors in the specified Pod and return status 204 “No Content”.

Other possible responses are 401 “Unauthorized” or 404 “Not Found”

4.7.2 Rebase Sensor

HttpPost: {{URL}}/api/Pods/ReBase/
Body:

```
{
  "pod_serial_number": 704150,
  "sensor_serial_number": "244500417",
  "event_time": "2019-07-20T14:22:19.727Z"
}
```

If successful will initiate re-basing of the specified sensor in the specified Pod and return status 204 “No Content”.

Other possible responses are 400 “Bad request”, 401 “Unauthorized” or 404 “Not Found”.

4.8 Failed sensors

HttpGet: {{URL}}/api/Pods/SensorFail

Example response:

```
[
        {
        "sensor_serial_number": 11,
        "pod_serial_number": 704150,
        "sensor_type": "SO2",
        "fail_type": "Fail criteria exceeded",
        "fail_date": "2018-02-26T09:00:00",
        "status": "Sensor Allocated",
        "owner_name": "Monitors Default",
        "customer_name": "Monitors Limited",
        "alert_email": "support@monitors.co.uk "
    },
    {
        "sensor_serial_number": 12,
        "pod_serial_number": 704150,
        "sensor_type": "NO2",
        "fail_type": "Fail criteria exceeded",
        "fail_date": "2018-02-26T09:00:00",
        "status": "Sensor Allocated",
        "owner_name": "Monitors Default",
        "customer_name": "Monitors Limited",
        "alert_email": "support@monitors.co.uk "
    },
    {
        "sensor_serial_number": 22,
        "pod_serial_number": 704150,
        "sensor_type": "H2S",
        "fail_type": "Fail criteria exceeded",
        "fail_date": "2018-02-26T09:00:00",
        "status": "Sensor Allocated",
        "owner_name": "Monitors Default",
        "customer_name": "Monitors Limited",
        "alert_email": "support@monitors.co.uk "
    }
]
```

4.9 Confirm sensor replacement

HttpPost: {{URL}}/api/Pods/UpdateReplaceSensor/{{PODserialNumber}}/{{Sensor Type}}

If successful will update the POD details replacing the sensor and initiate re-stabilisation of the sensors specified and return status 204 “No Content”.

Other possible responses are 401 “Unauthorized” or 404 “Not Found.”

4.10 Location data – next (readings)

HttpGet: {{URL}}/api/LocationData/Next/{Location_Number}/{Param}/{Units}/{TPC}/{Version}

Param

- 1 = Gas
- 2 = Particles

Units

1st digit temperature

- 0 – Celsius
- 1 – Fahrenheit

2nd digit ppb or µg/m^3 – this applied to electrolytic sensors only

- 0 – ppb
- 1 - µg/m^3

So

- 00 = Temperature in °C and values in ppb
- 01 = Temperature in °C and values in µg/m^3
- 10 = Temperature in °F and values in ppb
- 11 = Temperature in °F and values in µg/m^3

TPC

For particles only

- 0 = Original output
- 1 = Include TPC in output

Please note:

- Units for TPC are Particle count/cm^3

Version

- 0 = Original output
- 1 = Include Ethylene Oxide in output

4.11 Location data – repeat (readings)

HttpGet: {{URL}}/api/LocationData/Repeat/{Location_Number}/{Param}/{Units}/{Version}

As per 4.10 Location data – next (readings), but this will return exactly the same data as was sent by the server by the most recent “Location data – next”
Param

- 1 = Gas
- 2 = Particles

Units

1st digit temperature

- 0 – Celsius
- 1 – Fahrenheit

2nd digit ppb or µg/m^3 – this applied to electrolytic sensors only

- 0 – ppb
- 1 - µg/m^3

So

- 00 = Temperature in ^{o}C and values in ppb
- 01 = Temperature in ^{o}C and values in µg/m^3
- 10 = Temperature in ^{o}F and values in ppb
- 11 = Temperature in ^{o}F and values in µg/m^3

4.12 Data conditions

Values will be obscured when the system detects that there has been a problem and the values cannot be used.

Reading Value	Sensor State	Description	Long term effects
Estimated reading	*Reading*	*No issue detected*	
Estimated reading	*Rebased*	Indicates the rebasing period after it has completed and values recalculated.	After rebasing completed “Rebasing” is replaced with “Rebased” and pointers reset to ensure data is overwritten with calculated values.
-1000	Not Fitted	Sensor or component not fitted.	Coded flag in data feeds as there is no data to view.
-999	Stabilizing	Either when the POD has just been moved to a new location or manually instigated via server.	Values are redacted as they cannot be relied upon during this 2-day period and will remain non-viewable.
-998	Rebasing	*Typically, this is a 2-day period where local variables are calculated for use in the AQMesh algorithm are found.*	*During the rebasing period the coded flag will remain, however upon completion of this process, valid data will be reinstated – Data will need to be re-retrieved for this period, so API pointers are reset.*
-997	Optimising	When a pod is power-cycled for more than a hour i.e. Maintenance or power failure.	Values are redacted as they cannot be relied upon during this 1-hour period and will remain as non-viewable.
-996	Failed	The system has detected that the sensor has failed.	Data classified as having a sensor fail is redacted & will remain as non-viewable
-995	Cross Gas Error	If a sensor fails which is relied upon for the removal of interferences on another sensor, data from the reliant sensor becomes invalid.	Data will be redacted & remain non-viewable until compensating sensor is replaced and producing good results.
-994	No Data	Data points where the instrument has not recorded a reading.	Coded flag in data feeds as there is no data to view.
-993	Destabilised	The system has detected that the sensors output \ stability may be compromised due to odd fluctuations in temperature and pressure.	Readings for the prescribed period are redacted and are non-viewable until the conditions have normalised.

-992	Extreme Environment	Following intensive testing of all electrochemical sensors we have determined the combination of extremes in climate in which the electrochemical sensors do not provide consistent outputs. As such precise and accurate measurement is not possible	Data classified as within the extreme ranges of environment will be redacted and will remain as non-viewable.
-991	Condensation	NDIR sensor has been affected by condensation on the detector	Data classified as being affected by condensation will be redacted and will remain as non-viewable.

For particle sensors the following table applies:

Reading Value	Sensor Status	Description	Long term effects
Estimated reading	*OK*	*No issue detected*	
Estimated reading	*Deliquescence*	*When not using the heated inlet option, outlying data points caused by hydroscopic particle size growth will be flagged following analysis of the particle count distribution*	*These readings are available but should be considered as potentially unreliable.*
-893	*Misread*	*It is possible if the particle (or noise) sensor is unable to transfer valid data.*	*Occasional loss of data possible. Coded flag in data feed as there is no data to view.*
-892	Other Fault Zero	Due to the warm-up sequence & the timing of the event there is a chance that the particle counter in unable to provide a valid particle reading following a power-cycle and or a change in pod settings.	Occasional loss of data possible. Coded flag in data feed as there is no data to view.

4.13 Example data (gas)

HttpGet: //{{URL}}/api/LocationData/next/510/1/11/1

Example JSON response (Gas)

```
[
    {
        "gas_reading_number": 3256954,
        "location_number": 510,
        "pod_serial_number": 2410149,
        "owner_number": 8,
        "reading_datestamp": "2019-04-19T09:15:00",
        "gas_p1": 10,
        "gas_p2": 900,
        "gas_p3": 3600,
        "gasprotocol_version": "v4.2.3",
        "battery_voltage": 3.3,
        "temperature_f": 54.7,
        "pressure": 1024.5,
        "humidity": 69.5,
        "noise_level": -1000.0,
        "peak_noise": -1000.0,
        "co_sensor_serial_number": "162640361",
        "co_state": "Reading",
        "co_prescaled": 444.39,
        "co_slope": 1.0574,
        "co_offset": -76.2663,
        "co_units": "µg/m³",
        "no_sensor_serial_number": "160360435",
        "no_state": "Reading",
        "no_prescaled": 5.83,
        "no_slope": 1.0000,
        "no_offset": 0.0000,
        "no_units": "µg/m³",
        "so2_sensor_serial_number": "164642759",
        "so2_state": "Reading",
        "so2_prescaled": -1.09,
        "so2_slope": 1.0000,
        "so2_offset": 0.0000,
        "so2_units": "µg/m³",
        "no2_sensor_serial_number": "202363414",
        "no2_state": "Reading",
        "no2_prescaled": 3.59,
        "no2_slope": 1.0000,
        "no2_offset": 0.0000,
        "no2_units": "µg/m³",
        "o3_sensor_serial_number": "245500944",
        "o3_state": "Reading",
        "o3_prescaled": 57.06,
        "o3_slope": 1.0000,
        "o3_offset": 0.0000,
        "o3_units": "µg/m³",
        "h2s_sensor_serial_number": null,
        "h2s_state": "Not Fitted",
        "h2s_prescaled": -1000.00,
        "h2s_slope": null,
        "h2s_offset": null,
        "h2s_units": "µg/m³",
        "eo_sensor_serial_number": null,
        "eo_state": "Not Fitted",
        "eo_prescaled": -1000.00,
        "eo_slope": null,
        "eo_offset": null,
        "eo_units": "µg/m³",
        "uart_type": "CO2",
        "uart_sensor_serial_number": null,
        "uart_state": "Not Fitted",
        "uart_prescaled": -1000.00,
        "uart_slope": null,
        "uart_offset": null,
        "uart_units": "mg/m³",
        "aux1_sensor_serial_number": null,
        "aux1_type": "Not Fitted",
        "aux1_state": "Not Fitted",
        "aux1_prescaled": -1000.00,
        "aux1_slope": 1.0000,
        "aux1_offset": 0.0000,
        "aux1_units": null,
        "aux2_sensor_serial_number": null,
        "aux2_type": "Not Fitted",
        "aux2_state": "Not Fitted",
        "aux2_prescaled": -1000.00,
        "aux2_slope": 1.0000,
        "aux2_offset": 0.0000,
        "aux2_units": null,
        "aux3": 1494.00,
        "aux4": 0.00
    },
    {
        "gas_reading_number": 3256955,
        "location_number": 510,
        "pod_serial_number": 2410149,
        "owner_number": 8,
        "reading_datestamp": "2019-04-19T09:30:00",
        "gas_p1": 10,
        "gas_p2": 900,
        "gas_p3": 3600,
        "gasprotocol_version": "v4.2.3",
        "battery_voltage": 3.3,
        "temperature_f": 56.1,
        "pressure": 1024.3,
        "humidity": 67.5,
        "noise_level": -1000.0,
        "peak_noise": -1000.0,
        "co_sensor_serial_number": "162640361",
        "co_state": "Reading",
        "co_prescaled": 484.49,
        "co_slope": 1.0574,
        "co_offset": -76.2663,
        "co_units": "µg/m³",
        "no_sensor_serial_number": "160360435",
        "no_state": "Reading",
        "no_prescaled": 7.10,
        "no_slope": 1.0000,
        "no_offset": 0.0000,
        "no_units": "µg/m³",
        "so2_sensor_serial_number": "164642759",
        "so2_state": "Reading",
        "so2_prescaled": -0.83,
        "so2_slope": 1.0000,
        "so2_offset": 0.0000,
        "so2_units": "µg/m³",
        "no2_sensor_serial_number": "202363414",
        "no2_state": "Reading",
        "no2_prescaled": 3.69,
        "no2_slope": 1.0000,
        "no2_offset": 0.0000,
        "no2_units": "µg/m³",
        "o3_sensor_serial_number": "245500944",
        "o3_state": "Reading",
        "o3_prescaled": 52.70,
        "o3_slope": 1.0000,
        "o3_offset": 0.0000,
        "o3_units": "µg/m³",
        "h2s_sensor_serial_number": null,
        "h2s_state": "Not Fitted",
        "h2s_prescaled": -1000.00,
        "h2s_slope": null,
        "h2s_offset": null,
        "h2s_units": "µg/m³",
        "eo_sensor_serial_number": null,
        "eo_state": "Not Fitted",
        "eo_prescaled": -1000.00,
        "eo_slope": null,
        "eo_offset": null,
        "eo_units": "µg/m³",
        "uart_type": "CO2",
        "uart_sensor_serial_number": null,
        "uart_state": "Not Fitted",
        "uart_prescaled": -1000.00,
        "uart_slope": null,
        "uart_offset": null,
        "uart_units": "mg/m³",
        "aux1_sensor_serial_number": null,
        "aux1_type": "Not Fitted",
        "aux1_state": "Not Fitted",
        "aux1_prescaled": -1000.00,
        "aux1_slope": 1.0000,
        "aux1_offset": 0.0000,
        "aux1_units": null,
        "aux2_sensor_serial_number": null,
        "aux2_type": "Not Fitted",
        "aux2_state": "Not Fitted",
        "aux2_prescaled": -1000.00,
        "aux2_slope": 1.0000,
        "aux2_offset": 0.0000,
        "aux2_units": null,
        "aux3": 1474.00,
        "aux4": 0.00
    },
    {
        "gas_reading_number": 3256956,
        "location_number": 510,
        "pod_serial_number": 2410149,
        "owner_number": 8,
        "reading_datestamp": "2019-04-19T09:45:00",
        "gas_p1": 10,
        "gas_p2": 900,
        "gas_p3": 3600,
        "gasprotocol_version": "v4.2.3",
        "battery_voltage": 3.3,
        "temperature_f": 57.9,
        "pressure": 1024.6,
        "humidity": 65.0,
        "noise_level": -1000.0,
        "peak_noise": -1000.0,
        "co_sensor_serial_number": "162640361",
        "co_state": "Reading",
        "co_prescaled": 439.09,
        "co_slope": 1.0574,
        "co_offset": -76.2663,
        "co_units": "µg/m³",
        "no_sensor_serial_number": "160360435",
        "no_state": "Reading",
        "no_prescaled": 9.40,
        "no_slope": 1.0000,
        "no_offset": 0.0000,
        "no_units": "µg/m³",
        "so2_sensor_serial_number": "164642759",
        "so2_state": "Reading",
        "so2_prescaled": -1.36,
        "so2_slope": 1.0000,
        "so2_offset": 0.0000,
        "so2_units": "µg/m³",
        "no2_sensor_serial_number": "202363414",
        "no2_state": "Reading",
        "no2_prescaled": -1.45,
        "no2_slope": 1.0000,
        "no2_offset": 0.0000,
        "no2_units": "µg/m³",
        "o3_sensor_serial_number": "245500944",
        "o3_state": "Reading",
        "o3_prescaled": 53.94,
        "o3_slope": 1.0000,
        "o3_offset": 0.0000,
        "o3_units": "µg/m³",
        "h2s_sensor_serial_number": null,
        "h2s_state": "Not Fitted",
        "h2s_prescaled": -1000.00,
        "h2s_slope": null,
        "h2s_offset": null,
        "h2s_units": "µg/m³",
        "eo_sensor_serial_number": null,
        "eo_state": "Not Fitted",
        "eo_prescaled": -1000.00,
        "eo_slope": null,
        "eo_offset": null,
        "eo_units": "µg/m³",
        "uart_type": "CO2",
        "uart_sensor_serial_number": null,
        "uart_state": "Not Fitted",
        "uart_prescaled": -1000.00,
        "uart_slope": null,
        "uart_offset": null,
        "uart_units": "mg/m³",
        "aux1_sensor_serial_number": null,
        "aux1_type": "Not Fitted",
        "aux1_state": "Not Fitted",
        "aux1_prescaled": -1000.00,
        "aux1_slope": 1.0000,
        "aux1_offset": 0.0000,
        "aux1_units": null,
        "aux2_sensor_serial_number": null,
        "aux2_type": "Not Fitted",
        "aux2_state": "Not Fitted",
        "aux2_prescaled": -1000.00,
        "aux2_slope": 1.0000,
        "aux2_offset": 0.0000,
        "aux2_units": null,
        "aux3": 1517.00,
        "aux4": 0.00
    },
    {
        "gas_reading_number": 3256957,
        "location_number": 510,
        "pod_serial_number": 2410149,
        "owner_number": 8,
        "reading_datestamp": "2019-04-19T10:00:00",
        "gas_p1": 10,
        "gas_p2": 900,
        "gas_p3": 3600,
        "gasprotocol_version": "v4.2.3",
        "battery_voltage": 3.3,
        "temperature_f": 60.1,
        "pressure": 1025.0,
        "humidity": 62.4,
        "noise_level": -1000.0,
        "peak_noise": -1000.0,
        "co_sensor_serial_number": "162640361",
        "co_state": "Reading",
        "co_prescaled": 430.96,
        "co_slope": 1.0574,
        "co_offset": -76.2663,
        "co_units": "µg/m³",
        "no_sensor_serial_number": "160360435",
        "no_state": "Reading",
        "no_prescaled": 9.64,
        "no_slope": 1.0000,
        "no_offset": 0.0000,
        "no_units": "µg/m³",
        "so2_sensor_serial_number": "164642759",
        "so2_state": "Reading",
        "so2_prescaled": -1.55,
        "so2_slope": 1.0000,
        "so2_offset": 0.0000,
        "so2_units": "µg/m³",
        "no2_sensor_serial_number": "202363414",
        "no2_state": "Reading",
        "no2_prescaled": -2.92,
        "no2_slope": 1.0000,
        "no2_offset": 0.0000,
        "no2_units": "µg/m³",
        "o3_sensor_serial_number": "245500944",
        "o3_state": "Reading",
        "o3_prescaled": 48.70,
        "o3_slope": 1.0000,
        "o3_offset": 0.0000,
        "o3_units": "µg/m³",
        "h2s_sensor_serial_number": null,
        "h2s_state": "Not Fitted",
        "h2s_prescaled": -1000.00,
        "h2s_slope": null,
        "h2s_offset": null,
        "h2s_units": "µg/m³",
        "eo_sensor_serial_number": null,
        "eo_state": "Not Fitted",
        "eo_prescaled": -1000.00,
        "eo_slope": null,
        "eo_offset": null,
        "eo_units": "µg/m³",
        "uart_type": "CO2",
        "uart_sensor_serial_number": null,
        "uart_state": "Not Fitted",
        "uart_prescaled": -1000.00,
        "uart_slope": null,
        "uart_offset": null,
        "uart_units": "mg/m³",
        "aux1_sensor_serial_number": null,
        "aux1_type": "Not Fitted",
        "aux1_state": "Not Fitted",
        "aux1_prescaled": -1000.00,
        "aux1_slope": 1.0000,
        "aux1_offset": 0.0000,
        "aux1_units": null,
        "aux2_sensor_serial_number": null,
        "aux2_type": "Not Fitted",
        "aux2_state": "Not Fitted",
        "aux2_prescaled": -1000.00,
        "aux2_slope": 1.0000,
        "aux2_offset": 0.0000,
        "aux2_units": null,
        "aux3": 1541.00,
        "aux4": 0.00
    }
]
```

4.14 Example data (PM) - Obsolete

Please use 4.15 with TPC. i.e. add /1 to the end of the request.

Request

HttpGet: //{{URL}}/api/LocationData/Next/510/2/10

Example JSON response (Particle)

```
[
    {
        "particle_reading_number": 15613118,
        "location_number": 510,
        "pod_serial_number": 2410149,
        "owner_number": 8,
        "reading_datestamp": "2019-03-08T15:11:00",
        "particle_p1": 30,
        "particle_p2": 60,
        "particle_p3": 3600,
        "particleprotocol_version": "v3.0",
        "reading_status": "Other Fault Zero",
        "battery_voltage": 3.0,
        "battery_low": false,
        "super_cap_voltage": 4.0,
        "temperature_f": 48.920000,
        "humidity": 66.2,
        "pressure": 1003.1,
        "particle_modem_overlap": false,
        "pm10_prescale": -893.00,
        "pm10_slope": 1.0000,
        "pm10_offset": 0.0000,
        "pm_course_prescale": -1000.0,
        "pm_course_slope": 1.0,
        "pm_course_offset": 0.0,
        "pm4_prescale": -893.00,
        "pm4_slope": 1.0000,
        "pm4_offset": 0.0000,
        "pm2_5_prescale": -893.00,
        "pm2_5_slope": 1.0000,
        "pm2_5_offset": 0.0000,
        "pm1_prescale": -893.00,
        "pm1_slope": 1.0000,
        "pm1_offset": 0.0000,
        "pm_total_prescale": -893.00,
        "pm_total_slope": 1.0000,
        "pm_total_offset": 0.0000
    },
    {
        "particle_reading_number": 15613119,
        "location_number": 510,
        "pod_serial_number": 2410149,
        "owner_number": 8,
        "reading_datestamp": "2019-03-08T15:12:00",
        "particle_p1": 30,
        "particle_p2": 60,
        "particle_p3": 3600,
        "particleprotocol_version": "v3.0",
        "reading_status": "OK",
        "battery_voltage": 3.0,
        "battery_low": false,
        "super_cap_voltage": 4.0,
        "temperature_f": 48.920000,
        "humidity": 66.2,
        "pressure": 1003.1,
        "particle_modem_overlap": false,
        "pm10_prescale": 0.24,
        "pm10_slope": 1.0000,
        "pm10_offset": 0.0000,
        "pm_course_prescale": -1000.0,
        "pm_course_slope": 1.0,
        "pm_course_offset": 0.0,
        "pm4_prescale": 0.24,
        "pm4_slope": 1.0000,
        "pm4_offset": 0.0000,
        "pm2_5_prescale": 0.17,
        "pm2_5_slope": 1.0000,
        "pm2_5_offset": 0.0000,
        "pm1_prescale": 0.11,
        "pm1_slope": 1.0000,
            "pm1_offset": 0.0000,
            "pm_total_prescale": 0.24,
            "pm_total_slope": 1.0000,
            "pm_total_offset": 0.0000
        },
        {
            "particle_reading_number": 15613120,
            "location_number": 510,
            "pod_serial_number": 2410149,
            "owner_number": 8,
            "reading_datestamp": "2019-03-08T15:13:00",
            "particle_p1": 30,
            "particle_p2": 60,
            "particle_p3": 3600,
            "particleprotocol_version": "v3.0",
            "reading_status": "OK",
            "battery_voltage": 3.0,
            "battery_low": false,
            "super_cap_voltage": 4.0,
            "temperature_f": 48.920000,
            "humidity": 66.2,
            "pressure": 1003.1,
            "particle_modem_overlap": false,
            "pm10_prescale": 0.22,
            "pm10_slope": 1.0000,
            "pm10_offset": 0.0000,
            "pm_course_prescale": -1000.0,
            "pm_course_slope": 1.0,
            "pm_course_offset": 0.0,
            "pm4_prescale": 0.22,
            "pm4_slope": 1.0000,
            "pm4_offset": 0.0000,
            "pm2_5_prescale": 0.20,
            "pm2_5_slope": 1.0000,
            "pm2_5_offset": 0.0000,
            "pm1_prescale": 0.15,
            "pm1_slope": 1.0000,
            "pm1_offset": 0.0000,
            "pm_total_prescale": 0.22,
            "pm_total_slope": 1.0000,
            "pm_total_offset": 0.0000
        },
        {
            "particle_reading_number": 15613121,
            "location_number": 510,
            "pod_serial_number": 2410149,
            "owner_number": 8,
            "reading_datestamp": "2019-03-08T15:14:00",
            "particle_p1": 30,
            "particle_p2": 60,
            "particle_p3": 3600,
            "particleprotocol_version": "v3.0",
            "reading_status": "OK",
            "battery_voltage": 3.0,
            "battery_low": false,
            "super_cap_voltage": 4.0,
            "temperature_f": 48.920000,
            "humidity": 66.2,
        "pressure": 1003.1,
        "particle_modem_overlap": false,
        "pm10_prescale": 0.12,
        "pm10_slope": 1.0000,
        "pm10_offset": 0.0000,
        "pm_course_prescale": -1000.0,
        "pm_course_slope": 1.0,
        "pm_course_offset": 0.0,
        "pm4_prescale": 0.12,
        "pm4_slope": 1.0000,
        "pm4_offset": 0.0000,
        "pm2_5_prescale": 0.11,
        "pm2_5_slope": 1.0000,
        "pm2_5_offset": 0.0000,
        "pm1_prescale": 0.09,
        "pm1_slope": 1.0000,
        "pm1_offset": 0.0000,
        "pm_total_prescale": 0.12,
        "pm_total_slope": 1.0000,
        "pm_total_offset": 0.0000
    },
    {
        "particle_reading_number": 15613136,
        "location_number": 510,
        "pod_serial_number": 2410149,
        "owner_number": 8,
        "reading_datestamp": "2019-03-08T15:15:00",
        "particle_p1": 30,
        "particle_p2": 60,
        "particle_p3": 3600,
        "particleprotocol_version": "v3.0",
        "reading_status": "OK",
        "battery_voltage": 3.0,
        "battery_low": false,
        "super_cap_voltage": 4.0,
        "temperature_f": 48.920000,
        "humidity": 66.2,
        "pressure": 1003.1,
        "particle_modem_overlap": false,
        "pm10_prescale": 0.14,
        "pm10_slope": 1.0000,
        "pm10_offset": 0.0000,
        "pm_course_prescale": -1000.0,
        "pm_course_slope": 1.0,
        "pm_course_offset": 0.0,
        "pm4_prescale": 0.14,
        "pm4_slope": 1.0000,
        "pm4_offset": 0.0000,
        "pm2_5_prescale": 0.14,
        "pm2_5_slope": 1.0000,
        "pm2_5_offset": 0.0000,
        "pm1_prescale": 0.11,
        "pm1_slope": 1.0000,
        "pm1_offset": 0.0000,
        "pm_total_prescale": 0.14,
        "pm_total_slope": 1.0000,
        "pm_total_offset": 0.0000
    }
```

```
]
```

4.15 Example data (PM) with TPC

Request

HttpGet: //{{URL}}/api/LocationData/Next/510/2/10/**1**

Example JSON response (Particle with TPC)

```
[
    {
        "particle_reading_number": 15622255,
        "location_number": 510,
        "pod_serial_number": 2410149,
        "owner_number": 8,
        "reading_datestamp": "2019-03-09T16:11:00",
        "particle_p1": 30,
        "particle_p2": 60,
        "particle_p3": 3600,
        "particleprotocol_version": "v3.0",
        "reading_status": "OK",
        "battery_voltage": 3.0,
        "battery_low": false,
        "super_cap_voltage": 4.0,
        "temperature_f": 52.160000,
        "humidity": 50.3,
        "pressure": 1009.4,
        "particle_modem_overlap": false,
        "pm10_prescale": 0.17,
        "pm10_slope": 1.0000,
        "pm10_offset": 0.0000,
        "pm4_prescale": 0.17,
        "pm4_slope": 1.0000,
        "pm4_offset": 0.0000,
        "pm2_5_prescale": 0.17,
        "pm2_5_slope": 1.0000,
        "pm2_5_offset": 0.0000,
        "pm1_prescale": 0.15,
        "pm1_slope": 1.0000,
        "pm1_offset": 0.0000,
        "pm_tpc_prescale": 0.36,
        "pm_tpc_slope": 1.0000,
        "pm_tpc_offset": 0.0000,
        "pm_total_prescale": 0.17,
        "pm_total_slope": 1.0000,
        "pm_total_offset": 0.0000
    },
    {
        "particle_reading_number": 15622256,
        "location_number": 510,
        "pod_serial_number": 2410149,
        "owner_number": 8,
        "reading_datestamp": "2019-03-09T16:12:00",
        "particle_p1": 30,
        "particle_p2": 60,
        "particle_p3": 3600,
        "particleprotocol_version": "v3.0",
            "reading_status": "OK",
            "battery_voltage": 3.0,
            "battery_low": false,
            "super_cap_voltage": 4.0,
            "temperature_f": 52.160000,
            "humidity": 50.3,
            "pressure": 1009.4,
            "particle_modem_overlap": false,
            "pm10_prescale": 0.15,
            "pm10_slope": 1.0000,
            "pm10_offset": 0.0000,
            "pm4_prescale": 0.15,
            "pm4_slope": 1.0000,
            "pm4_offset": 0.0000,
            "pm2_5_prescale": 0.15,
            "pm2_5_slope": 1.0000,
            "pm2_5_offset": 0.0000,
            "pm1_prescale": 0.13,
            "pm1_slope": 1.0000,
            "pm1_offset": 0.0000,
            "pm_tpc_prescale": 0.32,
            "pm_tpc_slope": 1.0000,
            "pm_tpc_offset": 0.0000,
            "pm_total_prescale": 0.15,
            "pm_total_slope": 1.0000,
            "pm_total_offset": 0.0000
        },
        {
            "particle_reading_number": 15622257,
            "location_number": 510,
            "pod_serial_number": 2410149,
            "owner_number": 8,
            "reading_datestamp": "2019-03-09T16:13:00",
            "particle_p1": 30,
            "particle_p2": 60,
            "particle_p3": 3600,
            "particleprotocol_version": "v3.0",
            "reading_status": "OK",
            "battery_voltage": 3.0,
            "battery_low": false,
            "super_cap_voltage": 4.0,
            "temperature_f": 52.160000,
            "humidity": 50.3,
            "pressure": 1009.4,
            "particle_modem_overlap": false,
            "pm10_prescale": 0.16,
            "pm10_slope": 1.0000,
            "pm10_offset": 0.0000,
            "pm4_prescale": 0.16,
            "pm4_slope": 1.0000,
            "pm4_offset": 0.0000,
            "pm2_5_prescale": 0.16,
            "pm2_5_slope": 1.0000,
            "pm2_5_offset": 0.0000,
            "pm1_prescale": 0.14,
            "pm1_slope": 1.0000,
            "pm1_offset": 0.0000,
            "pm_tpc_prescale": 0.37,
        "pm_tpc_slope": 1.0000,
        "pm_tpc_offset": 0.0000,
        "pm_total_prescale": 0.16,
        "pm_total_slope": 1.0000,
        "pm_total_offset": 0.0000
    }
]
```

4.16 Server ping

This is intended to allow monitoring of the system health in general.

Request

HttpGet: {{URL}}/api/serverping

Response

```
{
    "server_time": "2018-07-10T09:02:42.417",
    "last_sequence_number": 106649,
    "most_recent_reading": "2018-07-10T08:57:00",
    "last_communication": "2018-07-10T09:00:47.1933333",
    "most_recent_processed": "2018-07-10T09:01:23.7466667",
    "version": "Vn 0.9"
}
```

4.17 System Notifications

This allows retrieval of general system information e.g. planned downtime.

HttpGet: {{URL}}/api/notification/system

Response

```
[
    {
        "system_information": "New API request available \"api/notification/system\""
    },
    {
        "system_information": "Second message"
    }
]
```

4.18 Pod frequencies for v5.xx firmware pods

HttpPatch: {{URL}}/api/Pods/PodFrequencies

Subject to data ownership checks.

For new firmware pods F/W version 5.1 and higher there are no separate averaging frequencies P2/T2 or transmission intervals P3/T3 for Gas and Particles.

A combined PodFrequencies call has been included to reduce confusion and should be used for newer firmware pods.
For particle only pods leave the Gas_P1 at default and for gas only pods leave Particle_P1 at default, they will be ignored by the pod but sending invalid values will result in errors in the API response.

In the body of the request include json (or XML see Content-Type Headers):

```
{
      "Serial_Number": 704150,
      "Particle_P1": 30,
      "Gas_P1": 5,
      "Pod_P2": 180,
      "Pod_P3": 3600
}
```

The location must belong to the requester or the requester be a data service provider which supplies this location, if not a status 401 “Unauthorised” will result.

The values of the other parameters must conform or status 400 “Bad Request” will result:

- Particle_P1 (pump run time)
  - Either *30* or 60 seconds
- Gas_P1 (sample frequency)
  - Either 5, 10 or 30 seconds.
  - Divisible by 5
- Pod_P2 (reading interval)
  - Minimum Gas_P1
  - Either *60*, 300, 600, 900 or 1800 seconds.
  - Multiple of Gas_P1

- Pod_P3 (transmission frequency)
    - Minimum Pod_P2
    - Either 1800, 3600, 14400, 21600 or 43200 seconds.
    - Fast transmission 300, 600 or 900 seconds (via server only)
    - Multiple of Pod_P2
    - Divisor of 86400

Please note:

Depending on the power supply, default settings will change, e.g. for pods using any form of battery, default settings are highlighted above in black bold. Whereas if the pod is using DC or Solar DC power, default settings are highlighted above in *red italics*.

4.19 Assets_V1

HttpGet: {{URL}}/api/Pods/Assets_V1

Supports the combined pod P2 (reading averaging) and combined P3 (transmission interval) used in the new pod firmware. To return Pod_P2 & Pod_P3, averaging period and transmission interval for new firmware pods i.e. newer then V5.0. Subject to data ownership checks.

```
[
    {
        "location_number": 112,
        "location_name": "Location 1582150",
        "location_notes": null,
        "location_owner_number": 1,
        "location_latitude": null,
        "location_longitude": null,
        "location_altitude": null,
        "pod_number": 1013,
        "serial_number": 1582150,
        "part_number": "C12345-0000-2",
        "heated_inlet": false,
        "pod_owner_number": 8,
        "project_number": 26,
        "project_name": "Demo fleet Default Project",
        "project_notes": null,
        "pod_latitude": null,
        "pod_longitude": null,
        "pod_altitude": null,
        "customer_number": 8,
        "customer_name": "Environmental Instruments",
        "owner_number": 8,
        "owner_name": "Environmental Instruments default POD Owner",
        "aml_data_service": true,
        "firmware_version": "v3.22",
        "gas_protocol_version": "V5.0",
            "gas_p1": 10,
            "gas_p2": 900,
            "gas_p3": 3600,
            "particle_p1": 30,
            "particle_protocol_version": "V3.0",
            "particle_p2": 900,
            "particle_p3": 3600,
            "fast_transmission": false,
            "last_connection": "2018-09-19T16:00:19.36",
            "sim_number": "89462046041000904587",
            "re_read_gas_request": 0,
            "next_gas_request": 0,
            "last_gas_reading_number": 2839131,
            "re_read_particle_request": 0,
            "next_particle_request": 0,
            "last_particle_reading_number": 9507441,
            "gps_present": true,
            "gps_status": 2,
            "gps_status_description": "Timeout (Attempted, but timed out)",
            "pod_p2": null,
            "pod_p3": null
    },
    {
        "location_number": 915,
        "location_name": "Location 2410103",
        "location_notes": null,
        "location_owner_number": 21,
        "location_latitude": 52.201599,
        "location_longitude": -1.726683,
        "location_altitude": null,
        "pod_number": 1204,
        "serial_number": 2410103,
        "part_number": "C12300-1000-2",
        "heated_inlet": false,
        "pod_owner_number": 21,
        "project_number": 26,
        "project_name": "Demo fleet Default Project",
        "project_notes": "User for customers who want to try out the API before they have r
eceived or in some cases ordered pods. ",
        "pod_latitude": 52.201641,
        "pod_longitude": -1.727222,
        "pod_altitude": 108,
        "customer_number": 8,
        "customer_name": "Environmental Instruments.,(Distributor)",
        "owner_number": 21,
        "owner_name": "API Test Pods",
        "aml_data_service": false,
        "firmware_version": "v5.6",
        "gas_protocol_version": "V5.1",
        "gas_p1": 10,
        "gas_p2": 60,
        "gas_p3": 300,
        "particle_p1": 30,
        "particle_protocol_version": "V3.0",
        "particle_p2": 60,
        "particle_p3": 300,
        "fast_transmission": true,
        "last_connection": "2021-02-18T12:00:53.38",
        "sim_number": "89462046041000892733",
        "re_read_gas_request": 81634669,
        "next_gas_request": 81634669,
        "last_gas_reading_number": 84494438,
        "re_read_particle_request": 0,
        "next_particle_request": 0,
        "last_particle_reading_number": 20823551,
        "gps_present": true,
        "gps_status": 3,
        "gps_status_description": "Located (GPS location known)",
        "pod_p2": 60,
        "pod_p3": 300
    }
]
```

4.20 Sensor Details

HttpGet: {{URL}}/api/sensor/SensorDetail//{Active}

Param

- 0 = All

  Pod status is valid for all deployed pods
- 1 = Active Pods only

  Pod status is either “Installed” or “Active”

Returns details for all sensors in pods categorised by the “Active” filter subject to ownership checks.

Example response:

```
[
    {
        "pod_number": 1204,
        "customer_number": 8,
        "customer_name": "Environmental Instruments.,(Distributor)",
        "owner_number": 21,
        "owner_name": "API Test Pods",
        "project_number": 26,
        "project_name": "Demo fleet Default Project",
        "pod_status_number": 6,
        "pod_status_name": "Active",
        "serial_number": 2410103,
        "last_communicated": "2021-05-12T13:00:58.1033333",
        "sensor_serial_number": "202641142",
        "sensor_version_number": 16760,
        "sensor_type_name": "NO2",
        "sensor_status_name": "Reading",
        "installation_date": "2018-07-16T13:22:08.91",
        "age_in_months": 34,
        "run_time_hours": null,
        "expiry_date": "2019-07-16T00:00:00",
        "replacement_needed": "Replacement of the NO2 electro-
chemical sensor is recommended."
    },
    {
        "pod_number": 1204,
        "customer_number": 8,
        "customer_name": "Environmental Instruments.,(Distributor)",
        "owner_number": 21,
        "owner_name": "API Test Pods",
        "project_number": 26,
        "project_name": "Demo fleet Default Project",
        "pod_status_number": 6,
        "pod_status_name": "Active",
        "serial_number": 2410103,
        "last_communicated": "2021-05-12T13:00:58.1033333",
        "sensor_serial_number": "204641031",
        "sensor_version_number": 17164,
        "sensor_type_name": "O3",
        "sensor_status_name": "Reading",
        "installation_date": "2019-03-04T15:19:00.73",
        "age_in_months": 26,
        "run_time_hours": null,
        "expiry_date": "2020-03-04T00:00:00",
        "replacement_needed": "Replacement of the O3 electro-
chemical sensor is recommended."
    },
    {
        "pod_number": 1204,
        "customer_number": 8,
        "customer_name": "Environmental Instruments.,(Distributor)",
        "owner_number": 21,
        "owner_name": "API Test Pods",
        "project_number": 26,
        "project_name": "Demo fleet Default Project",
        "pod_status_number": 6,
        "pod_status_name": "Active",
        "serial_number": 2410103,
        "last_communicated": "2021-05-12T13:00:58.1033333",
        "sensor_serial_number": "160140537",
        "sensor_version_number": 17022,
        "sensor_type_name": "NO",
        "sensor_status_name": "Reading",
        "installation_date": "2018-07-16T13:22:08.91",
        "age_in_months": 34,
        "run_time_hours": null,
        "expiry_date": "2019-07-16T00:00:00",
        "replacement_needed": "Replacement of the NO electro-
chemical sensor is recommended."
    },
    {
        "pod_number": 1204,
        "customer_number": 8,
        "customer_name": "Environmental Instruments.,(Distributor)",
        "owner_number": 21,
        "owner_name": "API Test Pods",
        "project_number": 26,
        "project_name": "Demo fleet Default Project",
        "pod_status_number": 6,
        "pod_status_name": "Active",
        "serial_number": 2410103,
        "last_communicated": "2021-05-12T13:00:58.1033333",
        "sensor_serial_number": "03196303",
        "sensor_version_number": 20868,
        "sensor_type_name": "CO2",
        "sensor_status_name": "Reading",
        "installation_date": "2018-07-16T13:22:08.91",
        "age_in_months": 34,
        "run_time_hours": null,
        "expiry_date": "2019-07-16T00:00:00",
        "replacement_needed": "No action needed"
    },
    {
        "pod_number": 1204,
        "customer_number": 8,
        "customer_name": "Environmental Instruments.,(Distributor)",
        "owner_number": 21,
        "owner_name": "API Test Pods",
        "project_number": 26,
        "project_name": "Demo fleet Default Project",
        "pod_status_number": 6,
        "pod_status_name": "Active",
        "serial_number": 2410103,
        "last_communicated": "2021-05-12T13:00:58.1033333",
        "sensor_serial_number": "2013065/5/1116/7",
        "sensor_version_number": 106,
        "sensor_type_name": "Particle Pump",
        "sensor_status_name": "Installed",
        "installation_date": "2018-07-16T13:22:08.91",
        "age_in_months": 34,
        "run_time_hours": 1,
        "expiry_date": "2019-07-16T00:00:00",
        "replacement_needed": "Replacement of the particle pump is recommended."
    },
    {
        "pod_number": 1204,
        "customer_number": 8,
        "customer_name": "Environmental Instruments.,(Distributor)",
        "owner_number": 21,
        "owner_name": "API Test Pods",
        "project_number": 26,
        "project_name": "Demo fleet Default Project",
        "pod_status_number": 6,
        "pod_status_name": "Active",
        "serial_number": 2410103,
        "last_communicated": "2021-05-12T13:00:58.1033333",
        "sensor_serial_number": "82401126",
        "sensor_version_number": 106,
        "sensor_type_name": "Particle Laser",
        "sensor_status_name": "Installed",
        "installation_date": "2018-07-16T13:22:08.91",
        "age_in_months": 34,
        "run_time_hours": 1,
        "expiry_date": "2019-07-16T00:00:00",
        "replacement_needed": "Replacement of the particle laser is recommended."
    }
]
```

Document control

5.1 Document revisions

Version	Date	Author	Notes
0.1	28/02/2018	J. Burniston	Initial draft
0.2	20/04/2018	Ken Vickers	After initial User interface testing
0.3	26/04/2018	Ken Vickers	Errors returned as JSON not Text
0.4	01/05/2018	Ken Vickers	After review with Steve Earp
0.5	02/05/2018	S.Earp	Added some comments to clarify P's and T's, GPS status. Removed & clarified Readings
0.6	02/05/2018	Ken Vickers	Lower case JSON field names
0.7	03/05/2018	Ken Vickers	Turn off IGNORE Nulls to show all fields in example JSON
0.8	08/05/2018	Tom Townend	Minor amends and clarifications throughout – major changes to descriptions of data flags
0.9	10/05/2018	Ken Vickers	Added "Location_Number" to "Pods" response Change argument from Location Number to Serial Number for Frequency patches and rebase and restabilise requests. All locations documented Minor corrections/edits
1.0	13/06/2018	Ken Vickers	Report Next Reading numbers on POD and in error message.
1.1	28/06/2018	S.Earp	Minor edits for clarity
1.2	10/07/2018	K. Vickers	Server Ping – health check Added "Reading" to table of data conditions
1.3	10/07/2018	K.Vickers	Refreshed examples with realistic responses.
1.4	18/07/2018	K Vickers	Document Units parameter for LocationData

1.5	26/07/2018	K Vickers	Refresh examples with new fields e.g. units
1.6	30/08/2018	K Vickers	Change PM item names Adjust precision
1.7	31/08/2018	K Vickers	Particle protocol version in PM Take sample from test system
1.8	10/09/2018	K Vickers	Particle items pm_c_slope & pm_c_offset become pm_course_slope & pm_course_offset
1.9	13/09/2018	K Vickers	Error handling documented
1.10	18/10/2018	K Vickers	Status in Sensor Fail
1.11	12/12/2018	K Vickers	Refresh readings output example JSON
1.12	08/03/2019	S.Earp	Added basic implementation guidelines.
2.0	17/04/2019	J. Burniston	Added flowchart and polling information and reformatted entire document
2.1	13/06/2019	K. Vickers	LocationData/Next replaces LocationData/Number
2.2	20/06/2019	K.Vickers	Extra details in “Locations” response
2.3	01/07/2019	K.Vickers	New call “Assets” Deprecate “Locations” and “Pods”
2.4	02/07/2019	K.Vickers	Extra Details in LocationData/Next Gas example.
2.5	22/07/2019	K.Vickers	Rebase Sensor
2.6	04/12/2019	K.Vickers	PM with Total Particle Count
2.7	21/08/2020	K.Vickers	Added note of units for TPC in 4.10
2.8	26/08/2020	K.Vickers	Added Reading/OK status to flag table
2.9	26/08/2020	K.Vickers	Added “Rebased” to flag table
2.10	05/10/2020	K.Vickers	Added System Notifications.
2.11	10/02/2021	K.Vickers	Added Pod Frequencies

2.12 2.13 2.14	17/02/2021 18/02/2021 12/05/2021	K.Vickers K.Vickers K.Vickers	Readings and pointer reset. Assets_V1 Sensor Details
2.15	27/10/2021	S.Earp	Manual reset of pointers
2.16	12/01/2022	K.Vickers	Postman
2.17	15/03/2022	K.Vickers	LocationData Version