Hydro-Net API Developers Guide

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CUSTOMER RESPONSIBILITY

The customer in applying the product described in this documentation accepts that the product is a programmable electronic system which is inherently complex and which may not be completely free of errors. In doing so the customer therefore undertakes responsibility to ensure that the product is properly installed commissioned operated and maintained by competent and suitably trained persons and in accordance with any instructions or safety precautions made available or good engineering practice and to thoroughly verify the use of the product in the particular application.

ERRORS IN DOCUMENTATION

The product described in this documentation is subject to continuous development and improvement. All information of a technical nature and particulars of the product and its use including the information and particulars contained in this documentation are given by Hydronix in good faith.

Hydronix welcomes comments and suggestions relating to the product and this documentation

ACKNOWLEDGEMENTS

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Revision history

Revision No	Software Version	Date	Description of Change
1.0.0		Aug 2019	First Release

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Chapter 1 Introduction

This guide is aimed at developers who wish to use the Application Programming Interface (API) integrated into the Hydro-Hub and other Hydronix products that have the Hydro-Hub API integrated within them. This guide details the API calls and the data structures returned from them.

The Hydro-Hub API allows developers to quickly and easily interface with a Hydronix sensor network using a web service. The Hydro-Hub API sends all data responses as JSON Objects.

This Chapter details what API calls are available and the response formats for the or network API. This API communicates with the sensors directly. Where no parameters are required as part of the call N/A will be used to denote this. The data objects returned are named in this section however for the structure of the object refer to the relevant object description in Chapter 3.

1 GetSerialPorts

This Method returns the name of all serial ports available on the device running the Hydro-Hub API

URL: api/SensorNetwork/GetSerialPorts

Method: GET

URL Parameters: N/A

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

A JSON array of adapter object (Chapter 3 section 1)

The address property is the name of the serial port. The other properties are used for calls to other adapter types but this is not yet supported in this API

2 SearchNetwork

This Method returns a list of all the sensors on the network of a sepecified adapter. The sensor network on the Hydro-View and Hydro-Hub is on adapter "/dev/ttyAMA0".

URL:api/SensorNetwork/SearchNetwork/?adapterType=x&address=y

Method: GET

URL Parameters:

AdapterType: an integer representing the type of adapter to search.

0 = Serial Port

1 = USB Port – Currently not supported

2=Ethernet Port – Currently not supported

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

A JSON array of Sensor Configuration object (Chapter 3 Section 2). The only properties of the object populated with values from the sensor are:

Sensor ID

Firmware Version

Product Type

unscaledType

unscaled2Type

configCalibrationType

configOutputVariable

configInputUse

smoothingTime

positveSlew

negativeSlew

dspType

averageHoldDelay

averageIncludeLow

averageIncludeHigh

unscaledIncludeLow

unscaledIncludeHigh

This is to speed up the return of the object whilst still returning key information required for sensor type identification and logging requirements.

3 GetSensorConfiguration

This Method returns the entire configuration of a sensor on the network

URL: api/SensorNetwork/GetSensorConfiguration/{id }

Method: GET

URL Parameters:

Id: 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

A JSON array of Sensor Configuration object (Chapter 3 Section 2).

4 SetSensorConfiguration

This Method writes a configuration to a sensor

URL: api/SensorNetwork/SetSensorConfiguration

Method: POST

URL Parameters: N/A

Data Parameters: JSON Array of sensor configuration (See Chapter 3 section 2)

Success Response Code: 200

Success Response Content:

A JSON object of a sensor configuration (See Chapter 3 section 2)

5 GetSensorCalibrationRecords

This Method returns the entire configuration of a sensor on the network

URL: api/SensorNetwork/GetSensorCalibrationRecords/{id }

Method: GET

URL Parameters:

Id: The 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

A JSON array of calibrationrecord objects (Chapter 3 section 3)

6 SetSensorCalibrationPoints

This Method writes a set of calibration points to the sensor with matching ID

URL: api/SensorNetwork/SetSensorCalibrationPoints/{id}

Method: POST

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: JSON Array of CalibrationRecord (Chapter 3 section 3)

Success Response Code: 200

Success Response Content:

A JSON array of the written calibrationrecord objects (Chapter 3 section 3)

7 GetAveragedFactoryValues

This Method reads the frequency and amplitude 10 times and then returns the averaged values. Used for Air/Water calibration process

URL: api/SensorNetwork/GetAveragedFactoryValues/{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

A JSON object of FactoryValue (Chapter 3 section 4)

8 GetResonatorParameters

This Method reads the current live diagnostics values from the sensor

URL: api/SensorNetwork/GetResonatorParameters/{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

A JSON object of DiagnosticsData (Chapter 3 Section 5)

9 AutoCal

This Method performs an Autocal on the sensor

URL: api/SensorNetwork/AutoCal/{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

A JSON object of SensorConfiguration (Chapter 3 Section 2). Water/Air frequency and amplitude values are updated as are temperature offsets and coefficients

10 GetCommonLiveParameters

This method returns the current live parameters of the sensor such as unscaled, moisture and temperatures

URL: api/SensorNetwork/GetCommonLiveParameters/{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

A JSON object of CommonLiveParameters (See Chapter 3 section 8)

11 UploadFile

This method allows the sensor firmware zip file to be uploaded to the server

URL: api/SensorNetwork/UploadFile

Method: POST

URL Parameters: N/A

Data Parameters: FormData

Success Response Code: 200

Success Response Content: Empty Response

12 UpgradeFirmware

This method allows the sensor firmware zip file to be uploaded to the server

URL: api/SensorNetwork/UpgradeFirmware/{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

JSON Object of SensorConfiguration of object identified by ID (Chapter 3 Section 2).

13 UploadSensorFile

This method allows the a sensor backup xml file to be loaded to the server

URL: api/SensorNetwork/RestoreSensor{id}

Method: POST

URL Parameters: N/A

Data Parameters: FormData

Success Response Code: 200

Success Response Content: Empty Result

14 RestoreSensor

This method restores the sensor configuration from a backup xml file. It is important to upload the sensor configuration file, named as id.xml (where ID is the 8 character Id of the sensor), first using “UploadSensorFile” method.

URL: api/SensorNetwork/RestoreSensor{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

JSON Object of SensorConfiguration of restored sensor identified by ID (Chapter 3 Section 2).

15 BackupToXML

This method allows the sensor firmware zip file to be uploaded to the server. It is important to upload the sensor configuration file, named as id.xml (where ID is the 8 character Id of the sensor), first using “UploadSensorFile” method.

URL: api/SensorNetwork/RestoreSensor/{id}

Method: POST

URL Parameters: N/A

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

JSON Object of SensorConfiguration of restored sensor identified by ID (Chapter 3 Section 2).

16 DownloadSensorBackup

This method allows the sensor firmware zip file to be uploaded to the server. It is important to upload the sensor configuration file, named as id.xml (where ID is the 8 character Id of the sensor), first using “UploadSensorFile” method.

URL: api/SensorNetwork/DownloadSensorBackup/{id}

Method: GET

URL Parameters:

Id: The 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content: Returns a filestream to download file

17 DownloadSensorLogFile

This method allows for a log file to be downloaded from the Hydro-Hub. This is a text (.txt) file format shared with the Hydro-Com software.

URL: api/SensorNetwork/DownloadSensorLogFile/{filename}

Method: GET

URL Parameters:

Filename: Do not include the .txt extension

Data Parameters: N/A

Success Response Code: 200

Success Response Content: Returns a filestream to download file

18 UpgradeFirmwareProgress

This method allows the sensor firmware zip file to be uploaded to the server. It is important to upload the sensor configuration file, named as id.xml (where ID is the 8 character Id of the sensor), first using “UploadSensorFile” method.

URL: api/SensorNetwork/UpgradeFirmwareProgress/{id}

Method: GET

URL Parameters:

Id: The 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

Returns an integer as a JSON object with the progress of a sensor upgrade

19 SetBaudRate

This method allows the sensor firmware zip file to be uploaded to the server. It is important to upload the sensor configuration file, named as id.xml (where ID is the 8 character Id of the sensor), first using “UploadSensorFile” method.

URL: api/SensorNetwork/SetBaudRate/{id}

Method: POST

URL Parameters:

ID: The 8 character unique id of the sensor

Data Parameters:

Int baud rate: The baud rate required for the sensor i.e. 9600 would be 9600 Baud. This changes the baud rate for all sensors on the network.

Success Response Code: 200

Success Response Content: Returns an int as a JSON object with the baud rate set

20 SetCommsReplyDelay

This method allows a reply delay in milliseconds to be written to the sensor. This would not normally be required with the Hydro-Hub but might be used if the sensor is later to be used with a slower system that requires some time before receiving a sensor reply

URL: api/SensorNetwork/SetCommsReplyDelay/{id}

Method: POST

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content: Returns an integer as JSON object of reply delay

21 SetHardwareDiagnosticsMode

This method sets the sensor in to hardware diagnostic mode allowing IO such as the analogue output to be set to specific values. The values will be held for 5 seconds

URL: api/SensorNetwork/DownloadSensorBackup/{id}

Method: POST

URL Parameters:

Id: The 8 character unique id of the sensor

Data Parameters: JSON array of HardwareValues (See Chapter 3 Section 9)

Success Response Code: 200

Success Response Content: JSON an array of HardwareStatus (See Chapter 3, section 10)

22 SetDACLoop1mA

This method allows a value to be written to the analogue output if the sensor is in hardware test mode

URL: api/SensorNetwork/SetDACLoop1mA/{id}

Method: POST

URL Parameters:

Id: The 8 character unique id of the sensor

Data Parameters: floating point value of mA required for current loop 1

Success Response Code: 200

Success Response Content: JSON string of the sensor id

23 SetDACLoop2mA

This method allows a value to be written to the analogue output if the sensor is in hardware test mode

URL: api/SensorNetwork/SetDACLoop2mA/{id}

Method: POST

URL Parameters:

Id: The 8 character unique id of the sensor

Data Parameters: Floating point value of mA required for current loop 2

Success Response Code: 200

Success Response Content: JSON string of the sensor id

24 GetDigitalInput1Status

This method returns the status of the first digital input

URL: api/SensorNetwork/GetDdigitalInput1Status/{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content: JSON Boolean of true= on. False = off

25 GetDigitalIO2Status

This method returns the status of the second digital IO

URL: api/SensorNetwork/GetDigitalIO2Status/{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content: JSON Boolean of true= on. False = off

26 BackupSensorToFlash

This method will write a sensor configuration to the sensor flash memory

URL: api/SensorNetwork/BackupSensorToFlash/{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: SensorConfiguration Object (See Chapter 3, section 2)

Success Response Code: 200

Success Response Content:

Returns a JSON object of the sensorConfiguration (See Chapter 3, section 2) of the configuration written to the flash

27 RestoreSensorFromFlash

This method restores the sensor configuration written to the flash memory to the active sensor, overwriting the current configuration

URL: api/SensorNetwork/RestoreSensorFromFlash/{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content: JSON of 8 char sensor id string

28 RestoreSensorFromFactory

This method restores the sensor configuration written to the factory section of the flash memory to the active sensor, overwriting the current configuration

URL: api/SensorNetwork/RestoreSensorFromFactory/{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content: JSON of 8 char sensor id string

29 StartAveraging

This method puts the sensor in to averaging mode

URL: api/SensorNetwork/StartAveraging/{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content: JSON of 8 char sensor id string

30 StopAveraging

This method takes the sensor out of averaging mode

URL: api/SensorNetwork/StopAveraging/{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content: JSON of 8 char sensor id string

31 SaveLiveDisplaySetup

This method saves the live display page for the Hydro-Hub

URL: api/SensorNetwork/SaveLiveDisplaySetup

Method: GET

URL Parameters: N/A

Data Parameters: Array of LoggingParameter (See Chapter 3 section 11)

Success Response Code: 200

Success Response Content: JSON Array of logging Parameters

32 GetLiveDisplaySetup

This method gets the saved live display setup

URL: api/SensorNetwork/GetLiveDisplaySetup

Method: GET

URL Parameters: N/A

Data Parameters: N/A

Success Response Code: 200

Success Response Content: JSON Array of logging Parameters

This chapter details the data objects that are returned by the Hydro-Hub Sensor Network API. All objects are in JSON format.

1 Adapter

The adapter object can be used for serial, USB or Ethernet adapters. For serial and USB adapters only the address and Baud rate parameters are relevant.

Example


```
{
  "Address": "COM5",
  "Port": 0,
  "DHCP": false,
  "Gateway": null,
  "BaudRate": 0,
  "ExternalAdapter": false
}
```


Parameter	JavaScript Type	Description
Address	String	The name of the serial port, USB Device or Ethernet I.P Address of the adapter
Port	Number	The port number, only used for Ethernet adapters
DHCP	Boolean	States whether the adapter is set up for DHCP or static I.P addresses. Only used for Ethernet adapters
Gateway	String	The Gateway of the Ethernet adapter
Baud Rate	Number	The Baud Rate for sensor communication
External Adapter	Boolean	True if the adapter is not a Hydronix product or there is no access to the configuration port 30718 due to firewall restrictions

2 Sensor Configuration

Holds all the configuration parameters of a Hydronix sensor.

Example


```
{
   "Id": "003CE771",
   "SensorName": "Hydro-Mix",
   "FirmwareVersion": "HS0102 v1.09.00",
   "SensorAddress": 2,
   "CalibrationCoefficientA": 0.0,
   "CalibrationCoefficientB": 0.0,
   "CalibrationCoefficientC": 0.0,
   "CalibrationSsd": 0.0,
   "CalibrationCoefficientAmodeF": 0.0,
   "CalibrationCoefficientBmodeF": 0.0,
   "CalibrationCoefficientCmodeF": 0.0,
   "CalibrationCoefficientAmodeA": 0.0,
   "CalibrationCoefficientBmodeA": 0.0,
   "CalibrationCoefficientCmodeA": 0.0,
   "CalibrationCoefficientAmodeV": 0.0,
   "CalibrationCoefficientBmodeV": 0.0,
   "CalibrationCoefficientCmodeV": 0.0,
   "CalibrationCoefficientAmodeE": 0.0,
   "CalibrationCoefficientBmodeE": 0.0,
   "CalibrationCoefficientCmodeE": 0.0,
   "CalibrationCoefficientAmodeI": 0.0,
   "CalibrationCoefficientBmodeI": 0.0,
   "CalibrationCoefficientCmodeI": 0.0,
   "BrixCoeffA": 0.0,
   "BrixCoeffB": 0.0,
   "BrixCoeffC": 0.0,
   "BrixCoeffD": 0.0,
   "ConfigOutputType": 0,
   "ConfigOrbArmType": 0,
   "OrbiterArmId": null,
   "ConfigOutputVariable": 4,
   "ConfigOutput1VariableMode": 0,
   "ConfigOutput2VariableMode": 0,
   "ConfigOutput2Variable": 0,
   "ConfigOutputLowMoisture": 0.0,
   "ConfigOutputHighMoisture": 0.0,
   "ConfigInputUse": 0,
   "ConfigIo2use": 0,
   "FrequencyWaterCalibration": 0.0,
   "FrequencyAirCalibration": 0.0,
   "AmplitudeWaterCalibration": 0.0,
   "AmplitudeAirCalibration": 0.0,
   "ElectronicsTemperatureOffset": 0.0,
   "ResonatorTemperatureOffset": 0.0,
   "MaterialTemperatureOffset": 0.0,
   "ElectronicsFrequencyCoefficient": 0.0,
   "ResonatorFrequencyCoefficient": 0.0,
   "MaterialFrequencyCoefficient": 0.0,
   "ElectronicsAmplitudeCoefficient": 0.0,
   "ResonatorAmplitudeCoefficient": 0.0,
   "MaterialAmplitudeCoefficient": 0.0,
   "MinimumTemperature": 0.0,
   "MaximumTemperature": 0.0,
   "AverageHoldDelay": 0,
```

```
  "SmoothingTime": 4,
  "MixerMask": null,
  "PositiveSlew": 1,
  "NegativeSlew": 1,
  "Dsptype": 0,
  "AutotrackTime": 0.0,
  "AutotrackDeviationThreshold": 0.0,
  "AverageIncludeLow": 0.0,
  "AverageIncludeHigh": 30.0,
  "ConfigAveragingMode": 0,
  "UnscaledIncludeLow": 0.0,
  "UnscaledIncludeHigh": 100.0,
  "UnscaledType": 0,
  "UnscaledType2": 3,
  "ConfigHydroLabMeasurementTime": 0,
  "ConfigMaterialTempLowAlarm": 0.0,
  "ConfigMaterialTempHighAlarm": 0.0,
  "FilterInclude": 0.0,
  "ConfigCalibrationName": null,
  "ConfigCalibrationType": 2,
  "ConfigCalibrationRules": 0,
  "CurrentCalibrationInUse": null,
  "AlarmMode": null,
  "CustomConfigs": 15,
  "ProductType": 64
}
```


Parameter	JavaScript Type	Description
id	string	A unique ID of the sensor. 8 Characters long
sensorName	string	A free text name for the sensor (20 chars long)
firmwareVersion	String	The firmware version currently in the sensor
sensorAddress	Number	Node address of the sensor (1-16)
calibrationCoefficientA	Number	Legacy Sensor Calibration A Co-efficient
calibrationCoefficientB	Number	Legacy Sensor Calibration B Co-efficient
calibrationCoefficientC	Number	Legacy Sensor Calibration C Co-efficient
calibrationSdd	Number	Sensor Calibration SSD value
calibrationCoefficientAModeF	Number	Mode F Sensor Calibration A Co-efficient
calibrationCoefficientBModeF	Number	Mode F Sensor Calibration B Co-efficient
calibrationCoefficientCModeF	Number	Mode F Sensor Calibration C Co-efficient
calibrationCoefficientAModeA	Number	Mode A Sensor Calibration A Co-efficient
calibrationCoefficientBModeA	Number	Mode A Sensor Calibration B Co-efficient

calibrationCoefficientCModeA	Number	Mode A Sensor Calibration C Co-efficient
calibrationCoefficientAModeV	Number	Mode V Sensor Calibration A Co-efficient
calibrationCoefficientBModeV	Number	Mode V Sensor Calibration B Co-efficient
calibrationCoefficientCModeV	Number	Mode V Sensor Calibration C Co-efficient
calibrationCoefficientAModeE	Number	Mode E Sensor Calibration A Co-efficient
calibrationCoefficientBModeE	Number	Mode E Sensor Calibration B Co-efficient
calibrationCoefficientCModeE	Number	Mode E Sensor Calibration C Co-efficient
calibrationCoefficientAModeI	Number	Mode I Sensor Calibration A Co-efficient
calibrationCoefficientBModeI	Number	Mode I Sensor Calibration B Co-efficient
calibrationCoefficientCModeI	Number	Mode I Sensor Calibration C Co-efficient
brixCoeffA	Number	Sensor Brix Calibration Coefficient A
brixCoeffB	Number	Sensor Brix Calibration Coefficient B
brixCoeffC	Number	Sensor Brix Calibration Coefficient C
brixCoeffD	Number	Sensor Brix Calibration Coefficient D
configOutputType	Number	Configures both analogue outputs as : 0 : 4-20mA 1 : 0-20mA 2 : Compatibility (Not supported for firmwareHS0102+)
configOrbArmType	Number	The type and length of Orbiter arm fitted. Orbiter products only. Defined integer values: 0x00 : Not Defined 0x10 : ORBA1 (original type – all lengths) 0x20 : ORBA2 560mm 0x21 : ORBA2 700mm 0x22 : ORBA2 1200mm 0x23 : ORBA2 1420mm
orbiterArmId	string	Unique Identifier of the Orbiter Arm connected (Orbiter Products only) Eight character hex notation string: e.g. “81A2FE34”

configOutputVariable	Number	Defines which measured variable is output on the first analogue output Defined Integer values : 0: Raw Moisture 1: Filtered Moisture 2: Average Moisture 3: Raw Unscaled 4: Filtered Unscaled 5: Average Unscaled 6: Remote Value 7: Brix 8: Not Used 9: Material Temperature 10: Raw Unscaled 2 11: Filtered Unscaled 2 12 : AutoTrack Value 13 : AutoTrack Deviation Option 7 is only available on HydroTrac products.
configOutput1VariableMode	Number	Mode of first analogue output 0: Mode F 1: Mode A 2: Mode V 3 : Mode E 4 : Mode I Only usable in firmware HS0102 and above
configOutput2VariableMode	Number	Mode of second analogue output 0: Mode F 1: Mode A 2: Mode V 3 : Mode E 4 : Mode I Only usable in firmware HS0102 and above
configOutput2Variable	Number	Defines which measured variable is output on the second analogue output Defined Integer values : 0: Raw Moisture 1: Filtered Moisture 2: Average Moisture 3: Raw Unscaled

		4: Filtered Unscaled 5: Average Unscaled 6: Remote Value 7: Brix 8: Not Used 9: Material Temperature 10: Raw Unscaled 2 11: Filtered Unscaled 2 12 : AutoTrack Value 13 : AutoTrack Deviation Option 7 is only available on HydroTrac products.
configOutputLowMoisture	Number	Moisture value corresponding to minimum current output of either 4mA or 0mA, depending on setting of configOutputType parameter. Floating point number with 1 decimal place precision : 0.0 to 100.0
configOutputHighMoisture	Number	Moisture value corresponding to maximum current output of either 4mA or 0mA, depending on setting of configOutputType parameter. Floating point number with 1 decimal place precision : 0.0 to 100.0
configInputUse	Number	Digital 1 Function. In mode 1, signal will be averaged while input is active, and held whilst it is inactive. In mode 2, current loop 1 will output Material Temperature if the input is active, otherwise it will output the parameter configured by parameter 6. In mode 3, a new synchronised measurement cycle is started when the input goes active. Timing of transition to inactive is unimportant. Defined Integer Values : 0: Unused 1: Average / Hold 2: Moisture / Temperature 3: Synchronised Reading Trigger 4: Measure Start (Hydro-Lab only)
configIo2Use	Number	Second digital I/O line function. In mode 1, current loop 1 will output Material Temperature if the input is active, otherwise it will output the parameter configured by parameter 6. In mode 2, the output will be active if the Moisture

		reading is below the Average Include Low limit (#20) or the Unscaled is below the unscaledIncludeLow. alarmMode which mode F, A, V, E, I is used for this check. In mode 3, the output will be active if the Moisture reading is above or below the averageIncludeLow or unscaledIncludeLow or the Unscaled reading is above averageIncludeHigh or unscaledIncludeHigh Defined integer values : 0: Unused 1: Moisture / Temperature 2: Bin Empty 3: Moisture out of range 4: Sensor ok 5: Vibrator Control (Hydro-Lab only) 6: Material Temperature Alarm 7: AutoTrack Stable 8: Calibration out of Range
frequencyWaterCalibration	Number	Frequency measurement in water at 20ºC. Calibrated in Production, and should not normally be changed. Floating point number in MHz with 3 decimal place precision.
frequencyAirCalibration	Number	Frequency measurement in air at 20ºC. Calibrated in Production, and should not normally be changed. Floating point number in MHz with 3 decimal place precision.
amplitudeWaterCalibration	Number	Amplitude measurement in water at 20ºC. Calibrated in Production, and should not normally be changed. Floating point value with 1 decimal place precision
amplitudeAirCalibration	Number	Amplitude measurement in Air at 20ºC. Calibrated in Production, and should not normally be changed. Floating point value with 1 decimal place precision
electronicsTemperatureOffset	Number	Offset correction for the Electronics Temperature sensor. Floating point value with 1 decimal place precision
resonatorTemperatureOffset	Number	Offset correction for the Resonator Temperature

		sensor. Floating point value with 1 decimal place precision
materialTemperatureOffset	Number	Offset correction for the Material Temperature sensor. Floating point value with 1 decimal place precision
electronicsFrequencyCoefficient	Number	Temperature compensation for the frequency measurement, Electronics portion of the sensor, in MHz / ºC. Floating point number with 4 decimal place precision
resonatorFrequencyCoefficient	Number	Temperature compensation for the frequency measurement, Resonator portion of the sensor, in MHz / ºC. Set in Production and should not normally be changed. Floating point number with 4 decimal place precision
materialFrequencyCoefficient	Number	Temperature compensation for the frequency measurement, Material portion of the sensor, in MHz / ºC. May be set by the user if the material temperature is known to influence the Moisture reading. Floating point number with 4 decimal place precision
electronicsAmplitudeCoefficient	Number	Temperature compensation for the amplitude measurement, Electronics portion of the sensor, in MHz / ºC Floating point number with 4 decimal place precision
resonatorAmplitudeCoefficient	Number	Temperature compensation for the amplitude measurement, Resonator portion of the sensor, in MHz / ºC Floating point number with 4 decimal place precision
materailAmplitudeCoefficient	Number	Temperature compensation for the amplitude measurement, Material portion of the sensor, in MHz / ºC Floating point number with 4 decimal place precision
minimumTemperature	Number	Minimum recorded temperature whilst running
maximumTemperature	Number	Maximum recorded temperature whilst running
averageHoldDelay	Number	Defines the delay between an Average Start

		signal on Digital input and the Averaging process starting. This allows for flowing material to reach the sensor after a silo gate is opened, for example, to ensure an accurate average is calculated. Defined Integer values : 0: 0.0s 1: 0.5s 2: 1.0s 3: 1.5s 4: 2.0s 5: 5.0s 6: 10.0s 7: 20.0s
smoothingTime	Number	Defines the intensity of the time-based smoothing filter. Defined Inter Values: 0: 0.0s 1: 1.0s 2: 2.5s 3: 5.0s 4: 7.5s 5: 10.0s Or any other integer value less than 100, which is taken to be a time in seconds.
mixerMask	Number	Applies to 4 seconds of data at 25 samples per second, beginning when the Synchronous Start input goes active (see configInputUse). If a single cycle is longer than 4s, all readings will be included in the Synchronous Average. If a ‘0’ is present, the reading corresponding to that time from the Synchronous Start input is ignored. If a ‘1’ is present, then the reading is used. This mechanism allows readings to be synchronised to a mixer rotation using a proximity switch, for example. String of 100 ASCII ‘0’ or ‘1’ characters : ‘001111111000111….’
positiveSlew	Number	Defines the intensity of the slew rate limiting filter for positive going signals. For custom values, 4 gives a very heavy filter and 50 gives a very light filter. Defined Integer values :

		0: unused 1: Light 2: Medium 3: Heavy
negativeSlew	Number	Defines the intensity of the slew rate limiting filter for positive going signals. For custom values, 4 gives a very heavy filter and 50 gives a very light filter. Defined Integer values : 0: unused 1: Light 2: Medium 3: Heavy
dspType	Number	Sets intensity of the DSP filter applied to the signal. Defined integer values : 0 : Unused 1 : Very Light 2 : Light 3 : Medium 4 : Heavy 5 : Very Heavy
autotrackTime	Number	AutoTrack detection window. Moving average window Integer value in seconds, 0 - 30
autotrackDeviationThreshold	Number	Threshold with which the AutoTrack deviation is compared to determine the signal stability and used to set the relevant Sensor Status flags. alarmMode determines which Mode F, A, V, E, I is used for this check. Floating point number with 3 decimal place precision.
averageIncludeLow	Number	Lower limit of Moisture values to include when calculating Average Moisture. Can be used to exclude air pockets in the material, for example. Floating point number with 3 decimal place precision
averageIncludeHigh	Number	Upper Limit of Moisture values to include when calculating Average Moisture. Floating point number with 3 decimal place precision

unscaledIncludeLow	Number	Lower limit of Unscaled values to include when calculating Average Unscaled. Can be used to exclude air pockets in the material, for example. Floating point number with 3 decimal place precision
unscaledIncludeHigh	Number	Upper limit of Unscaled values to include when calculating Average Unscaled. Floating point number with 3 decimal place precision
unscaledType	Number	If commands that support F, A, V, E, I qualifiers are sent without a qualifier, this parameter determines which mode value is used. Defined integer values: 0 : Mode F 1 : Mode A 2 : Mode V 3 : Mode E 4 : Mode I
unscaledType2	Number	If commands that support F, A, V, E, I qualifiers are sent without a qualifier, this parameter determines which mode value is used. Defined integer values: 0 : Mode F 1 : Mode A 2 : Mode V 3 : Mode E 4 : Mode I
configHydroLabMeasurementTime	Number	The time period over which a measurement is made. Hydro-Lab products only. Defined integer values: 0 : Not Used 1 : 10 seconds 2 : 20 seconds 3 : 30 seconds 4 : 40 seconds 5 : 50 seconds 6 : 60 seconds
configMaterialTempLowAlarm	Number	Sets relevant bit of status word and the digital output (if configured) if Material Temperature is below this value Floating point number with 1 decimal place precision.

configMaterialTempHighAlarm	Number	Sets relevant bit of status word and the digital output (if configured) if Material Temperature exceeds this value Floating point number with 1 decimal place precision.
filterInclude	Number	A threshold below which Raw Unscaled values will not be used in calculation of the Filtered Unscaled and therefore Filtered Moisture. If Raw Unscaled is below the threshold, the previous value of Filtered Unscaled will be retained until Raw Unscaled exceeds the threshold again. Floating point number with 1 decimal place precision
configCalibrationName	string	Name of the calibration stored
configCalibrationType	Number	Integer index identifies which calibration within the sensor is to be edited. When the sensor only supports one calibration index is always 0. Linear or Polynomial type calibration is used for all materials except Brix type measurements when Exponential is used. Only valid types for the current product type can be set. Requires an additional index to specify which Material Calibration is referenced. Requires a space before and after the index. Defined Integer values: 0 : UNDEFINED 1 : LINEAR 2 : POLYNOMIAL 3 : EXPONENTIAL
configCalibrationRules	Number	Integer index identifies which calibration within the sensor is to be edited. When the sensor only supports one calibration index is always 0. Records which set of rules where used by a Host system to calculate the calibration coefficients. Requires an additional index to specify which Material Calibration is referenced. Requires a space before and after the index. Defined Integer values: 0 : NONE USED 1 : SAND 0 – 2mm 2 : SAND 0 – 4mm 3 : GRAVEL 4 – 8mm 4 : STONE 8 – 16mm 5 : STONE 16 – 22mm

currentCalibrationInUse	String	Represents a GUID to identify the calibration being used
alarmMode	string	Determines which Measurement Mode is used for checks of the alarm outputs: Bin Empty, Moisture Out of Range and AutoTrack Stable. A blank value written will set the sensor to Legacy Mode, so that Unscaled1Type will be used to determine the operation of the alarms. If the sensor is in Legacy Mode, a read request will return a blank response. A single char value: F : Mode F A : Mode A V : Mode V E : Mode E I : Mode I *{blank}* : Legacy Mode
customConfigs	Number	0 HP02V1, 1 HP02V2, 2 HP03, 3 HM05V1PRE15, 4 HM05V1POST15, 5 HM06, 6 HM07, 7 HT01, 8 HT02, 9 HPORBPRE214, 10 HPORBPOST214, 11 HPORB2, 12 HL01, 13 HL02, 14 HP04, 15 HM08, 16 HMXT, 17 HPORB3, 18 HPSE2, 19 HPSE3, 20 HT03, 21 HPXT2, 22 HIGHTEMPPROBE, 23 HIGHTEMPMIX,

		24 HPXT_EX, 25 HMXT_EX, 26 MIXXTATEX, 27 MIXXT, 28 UNSPECIFIED
productType	number	Set Product Type. This Once Only option defines the type of product for electronics versions that may be used in a number of product variants. Once set, this option cannot be changed, to prevent inadvertent changes which would stop a product working. Valid parameters are: 0x000 : NOT SET / UNDEFINED 0x010 : ORBITER 0x020 : HYDROTRAC 0x028 : HYDROPROBE SE 0x040 : HYDROMIX 0x080 : HYDROLAB 0x100 : HYDROPROBE 0x108 : HYDROPROBE XT 0x201 : HI-TEMP PROBE 0x202 : HI-TEMP MIX

3 CalibrationRecord

Stores calibration point information. Only available in HS0102 Firmware and above

Example


```
{
"ModeF": 5.0,
 "ModeA": 0.0,
"ModeV": 5.0,
"ModeE": 5.0,
"ModeI": 0.0,
 "Moisture": 5.0,
 "SampleTime": 9370738,
"Include": true,
"Note": ""
 }
```


Parameter	Javascript Type	Description
modeF	Number	Unscaled Mode F value
modeA	Number	Unscaled Mode A value
modeV	Number	Unscaled Mode V Value

modeE	Number	Unscaled Mode E Value
modeI	Number	Unscaled Mode I Value
Moisture	Number	The lab moisture of the sample
SampleTime	Number	An integer number representing the minutes passed since 01/01/2000
Include	Boolean	Indicates whether the point is include as part of the calibration line calculation
Note	String	A free text field for entering user observations about the sample

4 FactoryValue

The factoryvalue object returns a frequency and amplitude reading from the sensor

Example


```
{
"Frequency": 802.44,
"Amplitude": 3000.00
}
```


Parameter	JavaScript Type	Description
Frequency	Number	The Frequency in MHz to 2 d.p
Amplitude	Number	The Amplitude to 2 d.p

5 DiagnosticsData

The DiagnosticsData object is a current snapshot of the sensors live diagnostics values

Example


```
{
  "ResonatorGraphData": [
    {
      "X": 0.0,
      "Y": 9.0,
      "Tooltip": null
    },
    {
      "X": 1.0,
      "Y": 9.0,
      "Tooltip": null
    },
    {
      "X": 2.0,
      "Y": 9.0,
      "Tooltip": null
    },
```

```
…points 3-48

    {
      "X": 3.0,
      "Y": 9.0,
      "Tooltip": null
    },
    {
      "X": 49.0,
      "Y": 9.0,
      "Tooltip": null
    }
  ],
  "UncompensatedFrequency": 808.97,
  "UncompensatedBandwidth": 0.0,
  "UncompensatedAmplitude": 3242.0,
  "UncompensatedReference": 3237.0,
  "CompensatedFrequency": 809.01,
  "CompensatedAmplitude": 3243.4,
  "RFSignalLevel": 0.0,
  "ElectronicsTemperature": 32.5,
  "ResonatorTemperature": 21.9,
  "MaterialTemperature": 21.8,
  "MaximumTemperature": 40.4,
  "MinimumTemperature": 20.9,
  "RunTimeInMinutes": 217647,
  "CurrentSensorStatus": {
    "DataInvalid": false,
    "DataInvalidLatched": true,
    "Unreliable": false,
    "UnreliableLatched": false,
    "Offscale": false,
    "OffscaleLatched": false,
    "DigitalIn1": true,
    "DigitalIO2": true,
    "SensorHot": false,
    "SensorHotLatched": false,
    "SensorCold": false,
    "SensorColdLatched": false,
    "AutoTrackStatus": true,
    "AutoTrackStatusLatched": true,
    "DigitalIODirection": false
  }
}
```


Parameter	JavaScript Type	Description
resonatorGraphData	Point[]	See section 6
uncompensatedFrequency	Number	The uncompensated frequency measurement to 2 d.p
uncompenssatedBandwidth	Number	Legacy value, no longer measured in Firmware HS0102+
uncompensatedAmplitude	Number	The uncompensated amplitude to 1 d.p
UncompensatedReference	Number	The reference level for amplitude measurement

compensatedFrequency	Number	The temperature compensated frequency value to 2 d.p
compensatedAmplitude	Number	The temperature compensated amplitude to 1 d.p
RFSignalLevel	Number	Legacy Value, no longer measured
electronicsTemperature	Number	Electronics temperature in °C
resonatorTemperature	Number	Resonator temperature in °C
materialTemperature	Number	Material temperature in °C
maximumTemperature	Number	Maximum running temperature °C
minimumTemperature	Number	Minimum running temperature °C
runtimeMinutes	Number	Number of minutes probe has been powered on since built
CurrentSensorStatus	SensorStatus	See section 7

6 Point

The factoryvalue object returns a frequency and amplitude reading from the sensor

Example


```
{
"X": 0.0,
"Y": 9.0,
"Tooltip": null
},
```


Parameter	JavaScript Type	Description
X	Number	X Co-ordinate
Y	Number	Y Co-ordinate
ToolTip	string	Tooltip text for point

7 SensorStatus

The current status of the sensor

Example


```
{
   "DataInvalid": false,
   "DataInvalidLatched": true,
   "Unreliable": false,
   "UnreliableLatched": false,
   "Offscale": false,
   "OffscaleLatched": false,
   "DigitalIn1": true,
   "DigitalIO2": true,
   "SensorHot": false,
   "SensorHotLatched": false,
   "SensorCold": false,
   "SensorColdLatched": false,
   "AutoTrackStatus": true,
   "AutoTrackStatusLatched": true,
   "DigitalIODirection": false
 }
```


A ‘true’ indicates that the described condition is true. A ‘true’ in a latched position implies that the state has existed at some point since the status was last read, but may no longer be present.

Parameter	JavaScript Type	Description
dataInvalid	Boolean	Data Invalid : either Unscaled or Moisture is outside of the defined Average Include limits. (Applies to Frequency Mode measurement only)
dataInvalidLatched	Boolean	
Unreliable	Boolean	Unreliable. *Behaviour not currently defined.*
unreliableLatched	Boolean	
Offscale	Boolean	Offscale. The analogue output has been driven beyond its configured upper or lower limits.
offscaleLatched	Boolean	
digitalIn1	Boolean	Digital input 1. The state of I/O line 1 (input)
DigitalIO2	Boolean	Digital input 2. The state of I/O line 2 (input or output)
SensorHot	Boolean	Sensor Too Hot - the temperature of the internal electronics is greater than 85ºC. This may damage the sensor.
SensorHotLatched	Boolean	
SensorCold	Boolean	Sensor Too Cold - the temperature of the

		measurement system (resonator) is below 1°C
sensorColdLatched	Boolean	
autoTrackStatus	Boolean	AutoTrack Status – indicates whether the AutoTrack deviation is within the configured Maximum deviation.
autoTrackStatusLatched	Boolean	
DigitalIODirection	Boolean	I/O line 2 direction: true = output

8 CommonLiveParameters

The CommonLiveParameter object returns the current unscaled, moisture and temperature values in addition to a time stamp (UTC tick format) of when the data was compiled

Example


```
{
 "SensorId": "003CE771",
 "TimeStamp": 1513342446047.1733,
 "RawMoistureModeF": 11.47,
 "RawMoistureModeA": 0.0,
 "RawMoistureModeV": 8.6,
 "RawMoistureModeE": 7.99,
 "RawMoistureModeI": 0.0,
 "FilteredMoistureModeF": 11.44,
 "FilteredMoistureModeA": 0.0,
 "FilteredMoistureModeV": 8.57,
 "FilteredMoistureModeE": 7.97,
 "FilteredMoistureModeI": 0.0,
 "AverageMoistureModeF": 0.0,
 "AverageMoistureModeA": 0.0,
 "AverageMoistureModeV": 0.0,
 "AverageMoistureModeE": 0.0,
 "AverageMoistureModeI": 0.0,
 "RawUnscaledModeF": 11.99,
 "RawUnscaledModeA": -0.46,
 "RawUnscaledModeV": 8.48,
 "RawUnscaledModeE": 7.85,
 "RawUnscaledModeI": -25.0,
 "FilteredUnscaledModeF": 11.88,
 "FilteredUnscaledModeA": -0.29,
 "FilteredUnscaledModeV": 8.39,
 "FilteredUnscaledModeE": 7.77,
 "FilteredUnscaledModeI": 99.97,
 "AverageUnscaledModeF": 0.0,
 "AverageUnscaledModeA": 0.0,
 "AverageUnscaledModeV": 0.0,
 "AverageUnscaledModeE": 0.0,
 "AverageUnscaledModeI": 0.0,
 "ElectronicsTemperature": 33.1,
 "ResonatorTemperature": 22.4,
 "MaterialTemperature": 22.3,
 "FilteredBrix": -99.0,
 "AutoTrackDeviationModeF": -99.0,
 "AutoTrackDeviationModeA": -99.0,
 "AutoTrackDeviationModeV": -99.0,
```

```
  "AutoTrackDeviationModeE": -99.0,
  "AutoTrackDeviationModeI": -99.0,
  "AutoTrackValueModeF": -99.0,
  "AutoTrackValueModeA": -99.0,
  "AutoTrackValueModeV": -99.0,
  "AutoTrackValueModeE": -99.0,
  "AutoTrackValueModeI": -99.0,
  "AveragingStatus": false,
  "AutoTrackStatus": false
}
```


Parameter	JavaScript Type	Description
SensorID	String	8 character unique ID of the sensor
timestamp	Number	UTC tick timestamp
RawMoistureModeF	Number	Raw Moisture Value in Mode F
RawMoistureModeA	Number	Raw Moisture Value in Mode A
RawMoistureModeV	Number	Raw Moisture Value in Mode V
RawMoistureModeE	Number	Raw Moisture Value in Mode E
RawMoistureModeI	Number	Raw Moisture Value in Mode I
FilteredMoistureModeF	Number	Filtered Moisture Value in Mode F
FilteredMoistureModeA	Number	Filtered Moisture Value in Mode A
FilteredMoistureModeV	Number	Filtered Moisture Value in Mode V
FilteredMoistureModeE	Number	Filtered Moisture Value in Mode E
FilteredMoistureModeI	Number	Filtered Moisture Value in Mode I
AverageMoistureModeF	Number	Average Moisture Value Mode F
AverageMoistureModeA	Number	Average Moisture Value Mode A
AverageMoistureModeV	Number	Average Moisture Value Mode V
AverageMoistureModeE	Number	Average Moisture Value Mode E
AverageMoistureModeI	Number	Average Moisture Value Mode I
RawUnscaledModeF	Number	Raw Unscaled Mode F
RawUnscaledModeA	Number	Raw Unscaled Mode A
RawUnscaledModeV	Number	Raw Unscaled Mode V

RawUnscaledModeE	Number	Raw Unscaled Mode E
RawUnscaledModeI	Number	Raw Unscaled Mode I
FilteredUnscaledModeF	Number	Filtered Unscaled Mode F
FilteredUnscaledModeA	Number	Filtered Unscaled Mode A
FilteredUnscaledModeV	Number	Filtered Unscaled Mode V
FilteredUnscaledModeE	Number	Filtered Unscaled Mode E
FilteredUnscaledModeI	Number	Filtered Unscaled Mode I
AverageUnscaledModeF	Number	Average Unscaled Mode F
AverageUnscaledModeA	Number	Average Unscaled Mode A
AverageUnscaledModeV	Number	Average Unscaled Mode V
AverageUnscaledModeE	Number	Average Unscaled Mode E
AverageUnscaledModeI	Number	Average Unscaled Mode I
ElectronicsTemperature	Number	Electronics Temperature to 1 d.p
ResonatorTemperature	Number	Resonator Temperature to 1 d.p
MaterialTemperature	Number	Material Temperature to 1 d.p
FilteredBrix	Number	Brix value to 2 d.p (only available in Hydro-Trac Sensors)
AutoTrackDeviationModeF	Number	Autotrack Deviation value mode F
AutoTrackDeviationModeA	Number	Autotrack Deviation value mode A
AutoTrackDeviationModeV	Number	Autotrack Deviation value mode V
AutoTrackDeviationModeE	Number	Autotrack Deviation value mode E
AutoTrackDeviationModeI	Number	Autotrack Deviation value mode I
AutoTrackValueModeF	Number	Autotrack Deviation value mode F
AutoTrackValueModeA	Number	Autotrack Deviation value mode A
AutoTrackValueModeV	Number	Autotrack Deviation value mode V
AutoTrackValueModeE	Number	Autotrack Deviation value mode E
AutoTrackValueModeI	Number	Autotrack Deviation value mode I

AveragingStatus	Boolean	True if averaging signal
AutoTrackStatus	Boolean	True if auto-track conditions met

9 HardwareDiagnosticsObject

The HardwareDiagnosticsObject can be used to set all of the physical IO to specific values during hardware test mode

Example


```
{
  "vco": 0,
  "rfAtennuator": 0,
  "dacLoop1ma": 0.0,
  "dacLoop2ma": 0.0,
  "digitalOutput": false
}
```


Parameter	JavaScript Type	Description
vco	String	Current VCO (PLL) frequency in Hz
rfAttenuator	Number	Current RF Level (scaled 0 – 1024)
dacLoop1ma	Number	Value in mA to set for current loop 1
dacLoop2ma	Number	Value in mA to set for current loop 2
digitalOutput	Boolean	True if on

10 HardwareSetup

The HardwareSetup object reports the current status of the sensor

Example


```
{
  "CurrentVcoFrequencyHz": 813334960,
  "CurrentRfLevel": 26,
  "ReferenceLevel": 0,
  "ElectronicsTempAdcValue": 369,
  "ResonatorTempAdcValue": 240,
  "SupplyVoltageAdcValue": 871,
  "CurrentSensorStatus": {
    "DataInvalid": false,
    "DataInvalidLatched": false,
    "Unreliable": false,
    "UnreliableLatched": false,
    "Offscale": false,
    "OffscaleLatched": false,
    "DigitalIn1": true,
    "DigitalIO2": true,
    "SensorHot": false,
    "SensorHotLatched": false,
    "SensorCold": false,
```

```
    "SensorColdLatched": false,
    "AutoTrackStatus": true,
    "AutoTrackStatusLatched": true,
    "DigitalIODirection": false
  }
 }
```


Parameter	JavaScript Type	Description
CurrentVCOFrequencyHz	Number	Frequency in Hz
CurrentRfLevel	Number	Current RF Level (scaled 0 – 1024)
ElectronicsTempAdcValue	Number	Electronics Temperature ADC Value (0 – 1024)
ResonatorTempAdcValue	Number	Resonator Temperature ADC Value (0 – 1024)
SupplyVoltageAdcValue	Number	Supply Voltage ADC Value (0 – 1024)
CurrentSensorStatus	SensorStatus	See Chapter 3 section 7

11 LoggingParameters

This holds an array of the setup parameters for the live display objects on the Hydro-Hub live display screen

Example


```
{
 "sensor": "003CE771",
"parameter": 4,
"mode": 0,
"color": "#0083b3",
"modeDisabled": false,
"availableParameters": [
{
"index": 0,
"parameter": "rawMoisture",
"fastTrendParameter": 101,
"description": "RawMoisture"
},
{
"index": 1,
"parameter": "filteredMoisture",
"fastTrendParameter": 103,
"description": "FilteredMoisture"
},
{
 "index": 2,
"parameter": "averageMoisture",
"fastTrendParameter": 105,
"description": "AverageMoisture"
},
{
"index": 3,
"parameter": "rawUnscaled",
"fastTrendParameter": 100,
```

```
"description": "RawUnscaled"
},
{
"index": 4,
"parameter": "filteredUnscaled",
"fastTrendParameter": 102,
"description": "FilteredUnscaled"
},
{
"index": 5,
"parameter": "averageUnscaled",
"fastTrendParameter": 104,
"description": "AverageUnscaled"
},
{
"index": 9,
"parameter": "materialTemperature",
"fastTrendParameter": 0,
"description": "MaterialTemperature"
},
{
"index": 12,
"parameter": "autoTrackValue",
"fastTrendParameter": 71,
"description": "AutoTrackValue"
},
{
"index": 13,
"parameter": "autoTrackDeviation",
"fastTrendParameter": 72,
"description": "AutoTrackDeviation"
},
{
"index": 14,
"parameter": "electronicsTemperature",
"fastTrendParameter": 0,
"description": "ElectronicsTemperature"
}
],
"unscaled1Mode": 0,
"unscaled2Mode": 3
},
```


Parameter	JavaScript Type	Description
Sensor	String	ID of the sensor
parameter	Number	Defined Integer values : 0: Raw Moisture 1: Filtered Moisture 2: Average Moisture 3: Raw Unscaled 4: Filtered Unscaled 5: Average Unscaled 6: Remote Value

		7: Brix 8: Not Used 9: Material Temperature 10: Raw Unscaled 2 11: Filtered Unscaled 2 12 : AutoTrack Value 13 : AutoTrack Deviation Option 7 is only available on HydroTrac products.
mode	Number	Defined integer values: 0 : Mode F 1 : Mode A 2 : Mode V 3 : Mode E 4 : Mode I
color	string	Hex color of graph line
modeDisabled	Boolean	If true it is possible for the user to request the unscaled mode to report (true for parameter = 0-5)
availableParameters	OutputVariable	See Chapter 3 section 12
Unscaled1Mode	Integer	Unscaled Type 1 parameter Defined integer values: 0 : Mode F 1 : Mode A 2 : Mode V 3 : Mode E 4 : Mode I
Unscaled2Mode	Integer	Unscaled Type 2 parameter Defined integer values: 0 : Mode F 1 : Mode A 2 : Mode V 3 : Mode E 4 : Mode I

12 OutputVariable

The HardwareDiagnosticsObject can be used to set all of the physical IO to specific values during hardware test mode

The available output variables are as follows:

index	Fast trend parameter	parameter	description
0	101	rawMoisture	Raw Moisture
1	103	filteredMoisture	Filtered Moisture
2	105	averageMoisture	Average Moisture
3	100	rawUnscaled	Raw Unscaled
4	102	filteredUnscaled	Filtered Unscaled
5	104	averageUnscaled	Average Unscaled
6	0	remoteValue	Remote Value
7	0	brix	Brix
9	0	materialTemperature	Material Temperature
10	96	rawUnscaled	Raw Unscaled 2
11	97	filteredUnscaled	Filtered Unscaled 2
12	71	autoTrackValue	Auto Track Value
13	72	autoTrackDeviation	Auto Track Deviation
14	0	electronicsTemperature	Electronics Temperature

NB: If fast trend parameter is 0 no fast trend is available

Example

```
{
   "index": 0,
   "parameter": "rawMoisture",
   "fastTrendParameter": 101,
   "description": "RawMoisture"
},
```

Parameter	JavaScript Type	Description
Index	Number	0: Raw Moisture 1: Filtered Moisture

		2: Average Moisture 3: Raw Unscaled 4: Filtered Unscaled 5: Average Unscaled 6: Remote Value 7: Brix 8: Not Used 9: Material Temperature 10: Raw Unscaled 2 11: Filtered Unscaled 2 12 : AutoTrack Value 13 : AutoTrack Deviation
parameter	string	The name of the parameter (as above without spaces and first character lower case)
FastTrendParameter	Number	A fast trend value, 0 if unavailable
Description	String	A free text field for description

This Chapter details what API calls are available and the response formats. This API handles calls to the database on the Hydro-Hub. Where no parameters are required as part of the call N/A will be used to denote this. The data objects returned are named in this section however for the structure of the object refer to the relevant object description in Chapter 5.

1 GetSensorConfiguration

This Method returns the entire configuration of a sensor in the database

URL: api/HydroComDB/GetSensorConfiguration/{id }

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

A JSON array of Sensor Configuration object (See Chapter 3 Section 2).

2 SetSensorConfiguration

This Method writes a configuration to a sensor

URL: api/HydroComDB/SetSensorConfiguration/{id}

Method: POST

URL Parameters: N/A

Data Parameters: Sensor Configuration object (Chapter 3 Section 2).

Success Response Code: 200

Success Response Content:

A JSON object of a sensor configuration (See Chapter 3 Section 2)

3 GetSensorEntityID

This Method returns the unique database id for the sensor. This is a string representation of a GUID.

URL: api/HydroComDB/GetSensorEntityID/{id}

Method: GET

URL Parameters: N/A

Data Parameters: Sensor Configuration object (Chapter 3 Section 2).

Success Response Code: 200

Success Response Content:

A string representation of a GUID

4 GetAvailableCalibrationsForSensor

This Method returns tall the calibrations that are available for the sensor on the Hydro-Hub unit

URL: api/HydroComDB/GetAvailableCalibrationsForSensor/{id}

Method: GET

URL Parameters:

Id: the 8 character unique id of the sensor

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

A JSON array of Calibrations (See Chapter 5, Section 1)

5 GetCalibrationPoints

This Method returns all the calibration points for the calibration matching the id

URL: api/HydroComDB/GetCalibrationPoints/{id}

Method: GET

URL Parameters:

Id: the GUID id of the calibration points are required for

Data Parameters: N/A

Success Response Code: 200

Success Response Content:

A JSON array of Calibration points (See Chapter 5, Section 2)

6 UpdateOrAddCalibrationPoints

This Method updates existing points or adds new ones if they do not exist for the calibration identified by id in URL.

URL: api/HydroComDB/UpdateOrAddCalibrationPoints/{id}

Method: POST

URL Parameters:

Id: the GUID id of the calibration points are required for

Data Parameters: Array of calibration points to update or add

Success Response Code: 200

Success Response Content:

A JSON array of Calibration points updated or added (See Chapter 5, Section 2)

7 DeleteCalibration

This Method returns tall the calibrations that are available for the sensor on the Hydro-Hub unit

URL: api/HydroComDB/DeleteCalibration/{id}

Method: POST

URL Parameters: N/A

Data Parameters: CalibrationToDelete

Success Response Code: 200

Success Response Content:

A JSON array of Calibration deleted (See Chapter 5, Section 1)

8 CalculateCalibrationCoefficients

This Method returns tall the calibrations that are available for the sensor on the Hydro-Hub unit

URL: api/HydroComDB/CalculateCalibrationCoefficients

Method: POST

URL Parameters: N/A

Data Parameters: JObject.

JObject.calibration: Calibration Object (See Chapter 5 section 1)

JObject.calibrationPoints: List of calibration points

Success Response Code: 200

Success Response Content:

A JSON Object of modified calibration with new coefficients (See Chapter 5, Section 1)

This chapter details the data objects that are returned by the Hydro-Hub Database API. All objects are in JSON format.

1 Calibration

The calibration object stores the calibration co-efficients, name and unique id of the calibration

Example


```
[
  {
    "Id": "1cc5cf6d-f5ac-45a4-9ba6-cc39bf36be0b",
    "Name": "test",
    "SensorIdentity": "cb80ce0d-eb7f-4b99-bc5d-189efbcc431a",
    "CalibrationType": 1,
    "Acoeff": 0.0,
    "Bcoeff": 0.0,
    "Ccoeff": 0.0,
    "Dcoeff": 0.0,
    "AcoeffModeF": 0.0,
    "BcoeffModeF": 1.0,
    "CcoeffModeF": 0.0,
    "AcoeffModeA": 0.0,
    "BcoeffModeA": 0.0,
    "CcoeffModeA": 0.0,
    "AcoeffModeV": 0.0,
    "BcoeffModeV": 1.0,
    "CcoeffModeV": -5.0,
    "AcoeffModeE": 0.0,
    "BcoeffModeE": 1.0,
    "CcoeffModeE": -10.0,
    "AcoeffModeI": 0.0,
    "BcoeffModeI": 0.0,
    "CcoeffModeI": 0.0,
    "RuleType": 0,
    "LastModified": "04/12/2017 11:10:46",
    "R2error": 0.0,
    "R2errorModeF": 1.0,
    "R2errorModeA": -9.0,
    "R2errorModeV": 1.0,
    "R2errorModeE": 1.0,
    "R2errorModeI": -9.0,
    "TableNumber": 0
  }
]
```


Parameter	JavaScript Type	Description
Id	String	A string representation of a GUID
Name	String	A 20 character free text name for the calibration
SensorIdentity	String	A string representation of a guid to uniquely identify the sensor this calibration is attributed to

CalibrationType	Number	0: Undefined 1: Linear 2: Quadratic 3: Exponential
Acoeff	Number	The legacy or Brix A coefficient for the sensor.
Bcoeff	Number	The legacy or Brix B coefficient for the sensor.
Ccoeff	Number	The legacy or Brix C coefficient for the sensor
Dcoeff	Number	The legacy or Brix D coefficient for the sensor
AcoeffModeF	Number	Mode F A coefficient for the sensor.
BcoeffModeF	Number	Mode F B coefficient for the sensor.
CcoeffModeF	Number	Mode F C coefficient for the sensor
AcoeffModeA	Number	Mode A A coefficient for the sensor.
BcoeffModeA	Number	Mode A B coefficient for the sensor.
CcoeffModeA	Number	Mode A C coefficient for the sensor
AcoeffModeV	Number	Mode V A coefficient for the sensor.
BcoeffModeV	Number	Mode V B coefficient for the sensor.
CcoeffModeV	Number	Mode V C coefficient for the sensor
AcoeffModeE	Number	Mode E A coefficient for the sensor.
BcoeffModeE	Number	Mode E B coefficient for the sensor.
CcoeffModeE	Number	Mode E C coefficient for the sensor
AcoeffModeI	Number	Mode I A coefficient for the sensor.
BcoeffModeI	Number	Mode I B coefficient for the sensor.
CcoeffModeI	Number	Mode I C coefficient for the sensor
RuleType	Number	0 : NONE USED 1 : SAND 0 – 2mm 2 : SAND 0 – 4mm 3 : GRAVEL 4 – 8mm 4 : STONE 8 – 16mm 5 : STONE 16 – 22mm

LastModified	String	Date of last modification
R2Error	Number	R2Error for legacy/brix coefficients
R2ErrorModeF	Number	R2Error for Mode F Coefficients
R2ErrorModeA	Number	R2Error for Mode A Coefficients
R2ErrorModeV	Number	R2Error for Mode V Coefficients
R2ErrorModeE	Number	R2Error for Mode E Coefficients
R2ErrorModeI	Number	R2Error for Mode I Coefficients
TableNumber	Number	Always 0 as only 1 table supported in sensor

2 CalibrationPoint

Stores all the information related to a calibration point

Example


```
{
  "Id": "585e851f-c3b3-4caf-975d-5ecb221ade82",
  "CalibrationId": "1cc5cf6d-f5ac-45a4-9ba6-cc39bf36be0b",
  "Unscaled": 0.0,
  "ModeF": 5.0,
  "ModeA": 0.0,
  "ModeV": 10.0,
  "ModeE": 15.0,
  "ModeI": 0.0,
  "Moisture": 5.0,
  "Include": true,
  "Person": "abc",
  "Date": "2017-10-05T15:32"
}
```


Parameter	JavaScript Type	Description
Id	String	String representation of a GUID to uniquely identify a new calibration point
CalibrationId	String	TA string representation of a GUID uniquely identifying the calibration the point belongs to
Unscaled	Number	Legacy unscaled value for point
Mode F	Number	Unscaled Mode F value for point
Mode A	Number	Unscaled Mode A value for point
Mode V	Number	Unscaled Mode V value for point

Mode E	Number	Unscaled Mode E value for point
Mode I	Number	Unscaled Mode I value for point
Moisture	Number	Lab Moisture (or Lab Brix) value for point
Include	Boolean	True if point used to determine coefficients
Person	String	Mapped to ‘note’ in sensor points
Date	string	Date point was recorded