Hydro-View / Hydro-Hub

User Guide

To re-order quote part number:	HD0864
Revision:	1.3.0
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ACKNOWLEDGEMENTS

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1.1.0	1.6.0.0	January 2022	Added HV05 Wall Mounted Enclosure installation. System Time/Date Added Input/Output Protection Diode added
1.2.0	1.8.0.0	November 2022	Updated screenshots to include extra UI features - added calibration select and SSD change from live display
1.3.0	1.14.0.0	October 2025	Safety information added Retrieving and manipulating the IP address using USB memory stick functionality description. Technical specification list expanded

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The Hydro-View touch screen computer and Hydro-Hub access point are devices that enable remote connection to Hydronix microwave moisture sensors for viewing data as well as sensor calibration and configuration. This user guide details the operation and installation of both units.

Both units operate using the same Hydronix Hydro-Net Software. The Hydro-View enables access to the software via an integrated touch screen display. The Hydro-View and Hydro-Hub both enable access remotely over an Ethernet network using a suitable internet browser.

All references to Hydro-Net software are relevant to both the Hydro-View and Hydro-Hub hardware. Some differences in the screen layout can be expected, when connecting remotely, depending on the internet browser in use.

For full technical specifications of the device, see Appendix C. Throughout this document, "Hydro-View / Hydro-Hub" and "The Device" are used interchangeably.

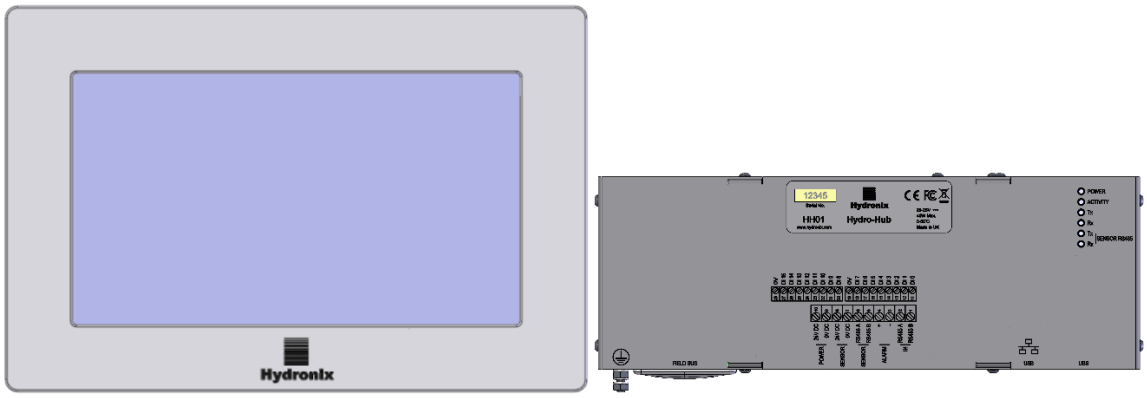


Figure 1: Hydro-View (left) Hydro-Hub (right)

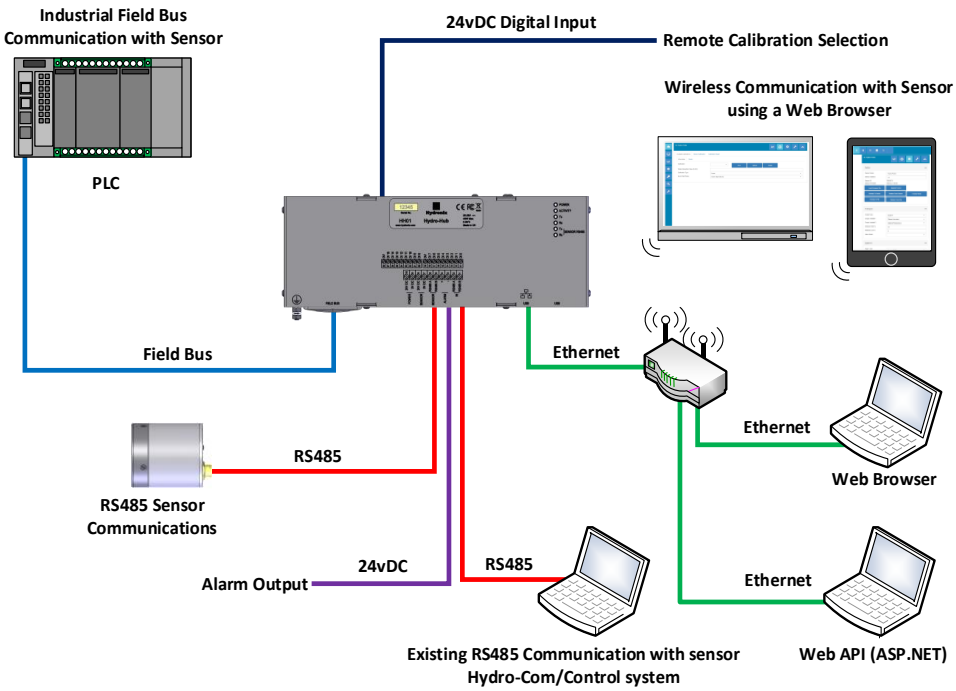


Figure 2: System Communication Overview

1 Intended use

The Hydro-View / Hydro-Hub are intended for use with the Hydronix range of sensors to monitor moisture levels in a process.

2 Special Conditions of Use

- The device shall only be used in accordance with its intended use.
- The device shall only be installed and operated in indoor locations.
- The device must be installed with unobstructed ventilation clearances as specified in Appendix C Section 1.6.
- If installation or operating conditions risk exceeding the maximum temperature specified in Appendix C Section 1.6, additional cooling must be installed.
- Only power supplies that meet the requirements defined in Appendix C Sections 1.3 and 1.5 are to be used to power the device
- The device must be installed in a suitable enclosure. Any mains-voltage carrying parts are not to be exposed. Safe Installation of a suitable power supply is the responsibility of the installer.
- Protective earth must be connected to protective earth as specified in Chapter 2 Sections 3.1 and 3.2, to maintain EMC and safety.
- The device is to be disposed of in a manner that conforms to local regulations for Waste Electronic and Electrical equipment (WEEE).

3 General & Electrical Safety Requirements

NOTE: Protection will be impaired if the unit is used in a manner not specified by the manufacturer.

- The Hydro-View / Hydro-Hub contains no hazardous-live parts. If hazardous-live parts are present within the enclosure where the device is installed, these must be accessible only by tooled or keyed access.
- The Hydro-View / Hydro-Hub shall only be installed by qualified personnel with the necessary knowledge of the protection ratings required for the location and local regulations, and hold all relevant certifications.
- The device shall not be installed or operated if damaged.
- When installing, do not position the device so that it is difficult to operate the disconnect device.

3.1 Protective Earthing Information

To comply with EMC regulations, Hydro-Hub / Hydro-View must be grounded using the earth connection stud.

The sensor’s cable screen (shield) must not be connected to the device’s earth connection stud.

Any sensor connected to the Hydro-View / Hydro-Hub must be sufficiently grounded as defined in the Hydronix Sensor Electrical Installation Guide (HD0678).

The Protective Earth symbol indicates that the earth must be connected to this point.

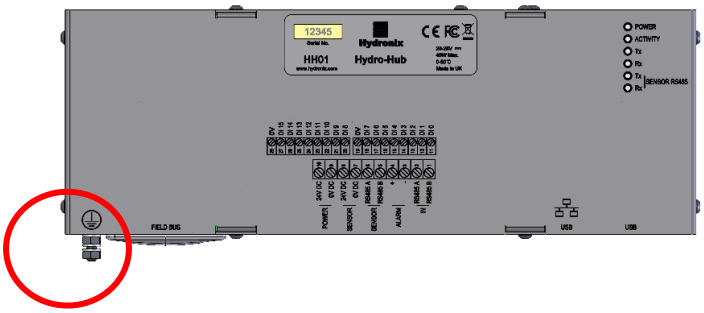


Figure 3: Location of the Protective Earth – Hydro-Hub

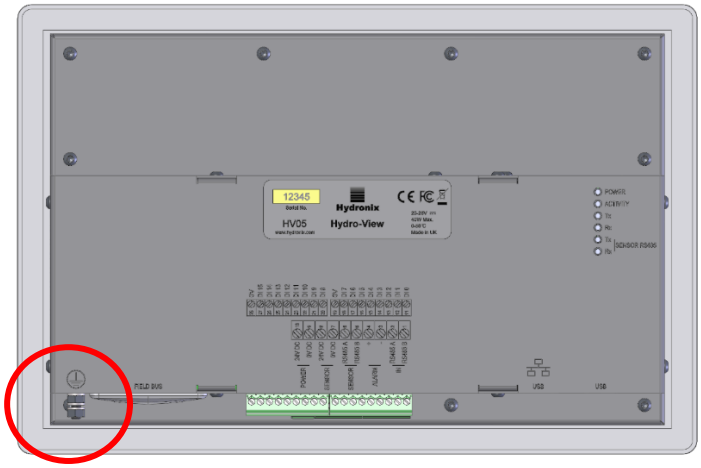


Figure 4: Location of the Protective Earth – Hydro-View

3.2 Protective Earth Installation Requirements

When carrying out electrical installation, adhere to the following requirements:

- Protective conductor connections of outgoing cables must be accessible, protected against accidental loosening and individually detachable.
- Connections for outgoing protective conductors must be so arranged or marked that the associated circuit is clearly visible.
- If one protective conductor is used jointly for several circuits, the cross-section of this conductor must correspond to the largest conductor.
- Protective earth wiring must be able to withstand all thermal and dynamic stresses to which it could be subjected before the overcurrent of a protective device disconnects the equipment from the supply.
- If the Protective earth wiring is also used for other bonding purposes, the protective conductor shall be applied first and secured independently of other connections.

4 Installation

4.1 General Installation Requirements

- The installer is responsible for determining if this device is suitable for the application and location.
- If the Hydro-Control is damaged, do not install it.
- The environmental conditions and limits are listed in Appendix C Section 1.6.

5 Maintenance

- Before carrying out work that involves accessing and interacting with the device's wiring, disconnect the power supply to the device.
- Ensure that the power supply of the device and the power supply of the equipment connected to the device's Inputs and Output remain isolated for the duration of work carried out on the device.
- Works on the device or its wiring must be carried out by competent personnel.
- The only serviceable part of the device is the expansion board. If other parts are damaged, the device must be returned for repair.
- Do not disconnect any wiring while it is energised.
- Regular inspections of the device shall be carried out to ensure it is not damaged. If damage is discovered, immediately stop using the device.

5.1 Cleaning

The front panel of the Hydro-View should be cleaned with a soft cloth. Abrasive materials and liquids must not be used.

1 Hydro-View

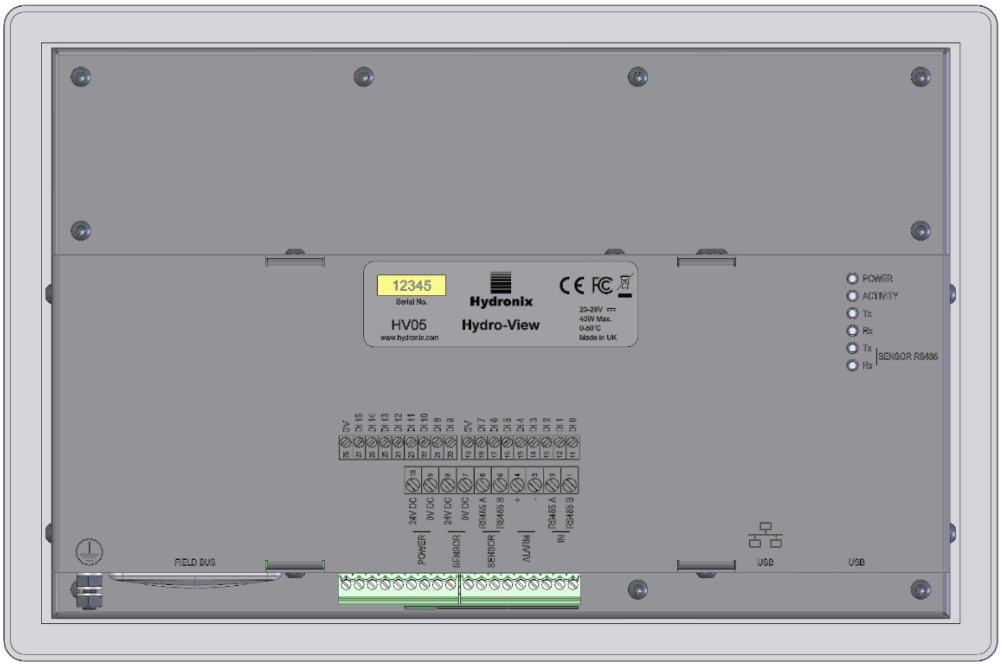


Figure 5: Rear View of the Hydro-View

NOTE:

All electrical connections are made at the base of the unit; therefore, access needs to be provided for the cables and connectors.

A minimum of 100mm of space should be allowed around the unit for cooling air circulation. The cooling vents must not be covered.

A ground stud is positioned at the bottom left of the unit (viewed from the rear).

1.1 Mounting

The Hydro-View is designed to be mounted in a control panel with a maximum thickness of 3mm. The unit is supplied with four mounting brackets — one for each edge (top, bottom, left, and right).

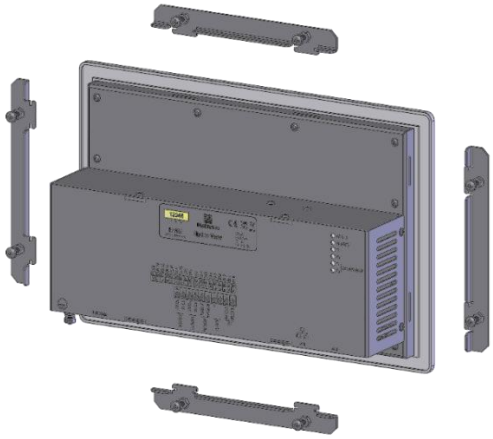


Figure 6: Mounting Brackets

To install the side mounting brackets, insert into the slot and slide down. For the top and lower brackets insert into the slot and slide right.

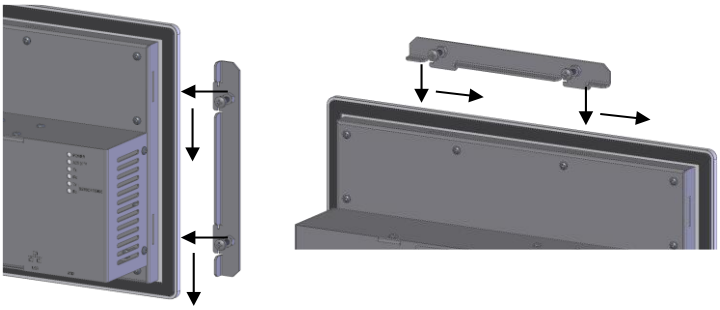


Figure 7: Installing the Mounting Brackets

To install the Hydro-View into a Control panel or enclosure a cut-out of 265mm x 168mm is required.

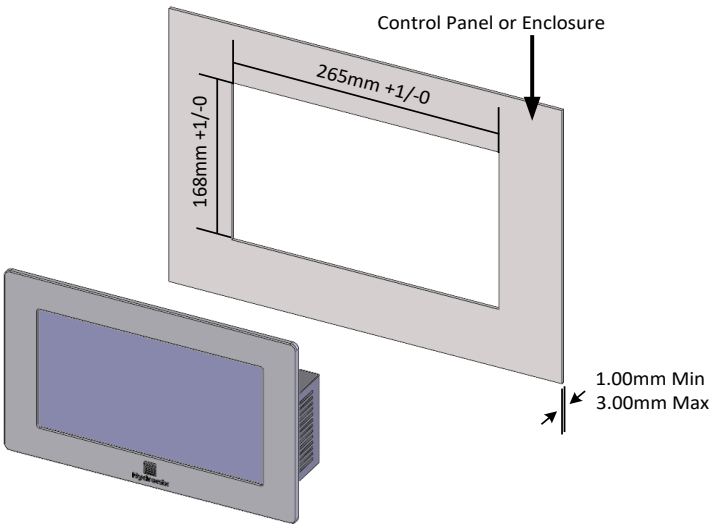


Figure 8: Control Panel Cut-out

To install the Hydro-View, remove the mounting brackets and insert the unit through the cut-out. Re-fit the mounting brackets and tighten the screws evenly to pull the fascia towards the control panel.

Ensure the gasket is compressed against the control panel.

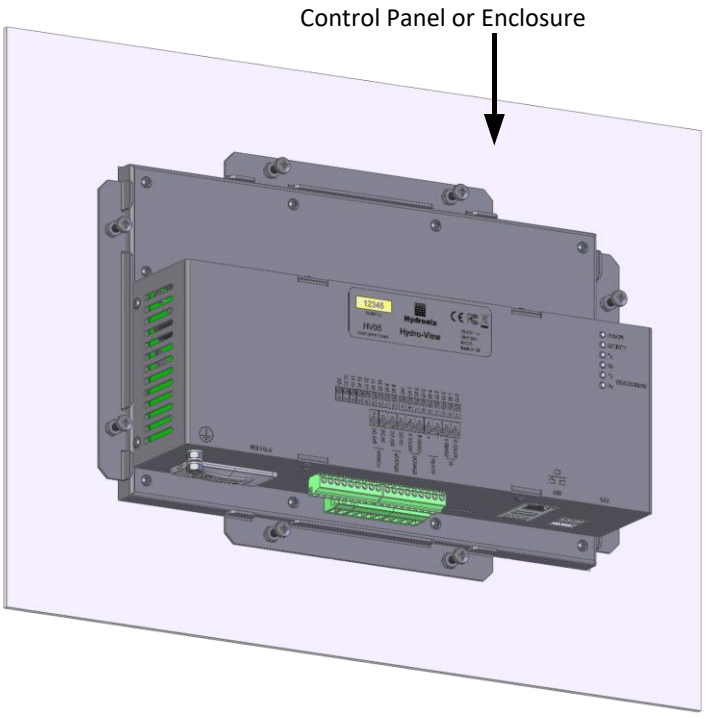


Figure 9: Hydro-View Installed in a Control Panel

2 Hydro-Hub

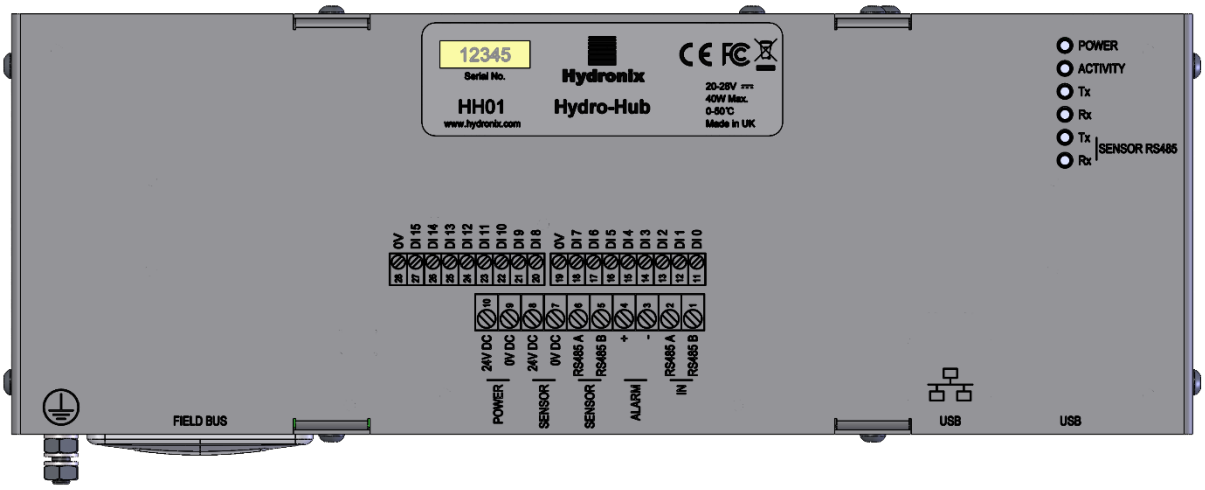


Figure 10: Rear View of the Hydro-Hub

NOTE:

All electrical connections are made at the base of the unit; therefore, access needs to be provided for the cables and connectors.

A minimum of 100mm of space should be allowed around the unit for cooling air circulation. The cooling vents must not be covered.

A ground stud is positioned at the bottom left of the unit (viewed from the rear).

2.1 Mounting

The Hydro-Hub is designed to be installed on to a standard 35mm DIN rail. The unit is supplied with two DIN rail mounting brackets.

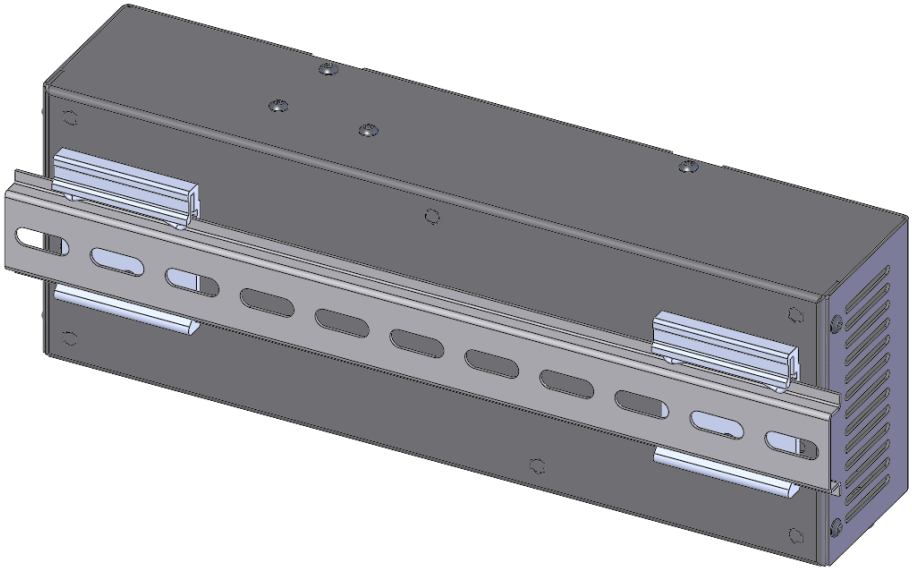


Figure 11: Hydro-Hub DIN rail Mounting Brackets

To remove the Hydro-Hub from the DIN rail push down on the top and tilt the underside of the unit away from the rail.

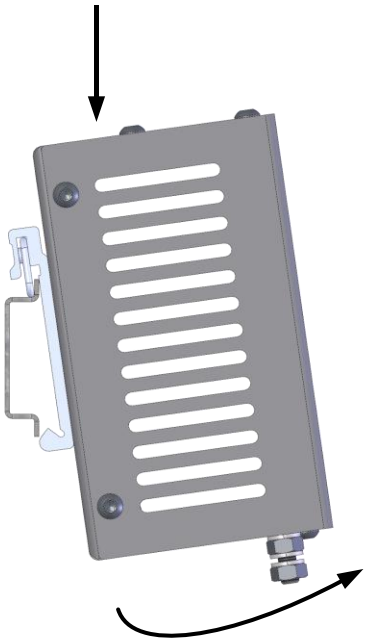


Figure 12: Removing the Hydro-Hub from the DIN Rail

3 HV05 Wall Mounted Enclosure

The Hydro-View can be installed using the HV05 Wall Mounted Enclosure (Figure 13). The HV05 Wall Mounted Enclosure uses the same mounting method as show in section 1.1: Mounting. The enclosure is supplied with a USB panel mounted connector to enable a USB memory stick to be connected to the HV05 without opening the enclosure.

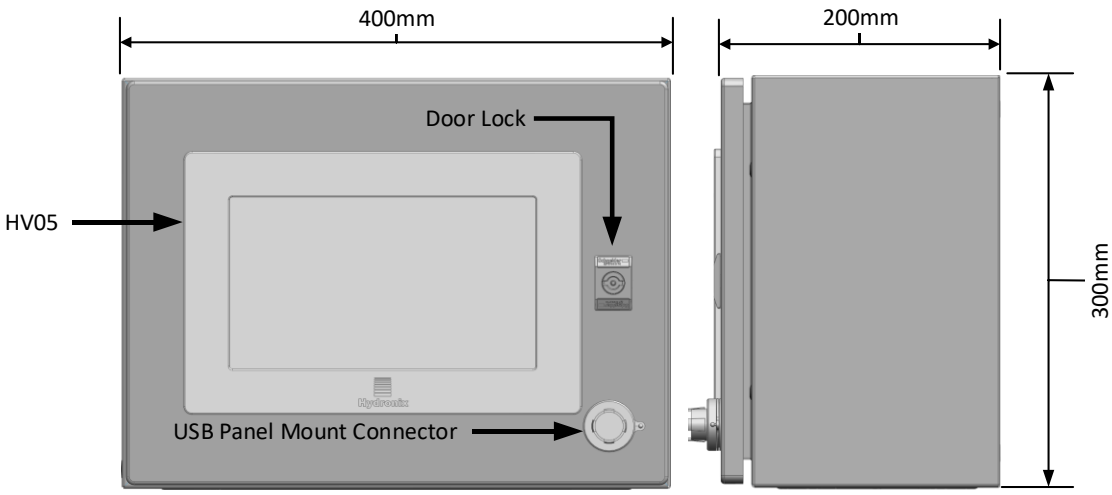


Figure 13: HV05 Wall Mounted Enclosure

The enclosure is supplied with a din rail that can be used to support a power supply (not supplied) and any required terminal blocks (Figure 14). The maximum size of the power supply that will fit into the enclosure is: 125mm (H) x 40mm (W) x 120mm (D). The power supply must be installed in the location as detailed in Figure 14.

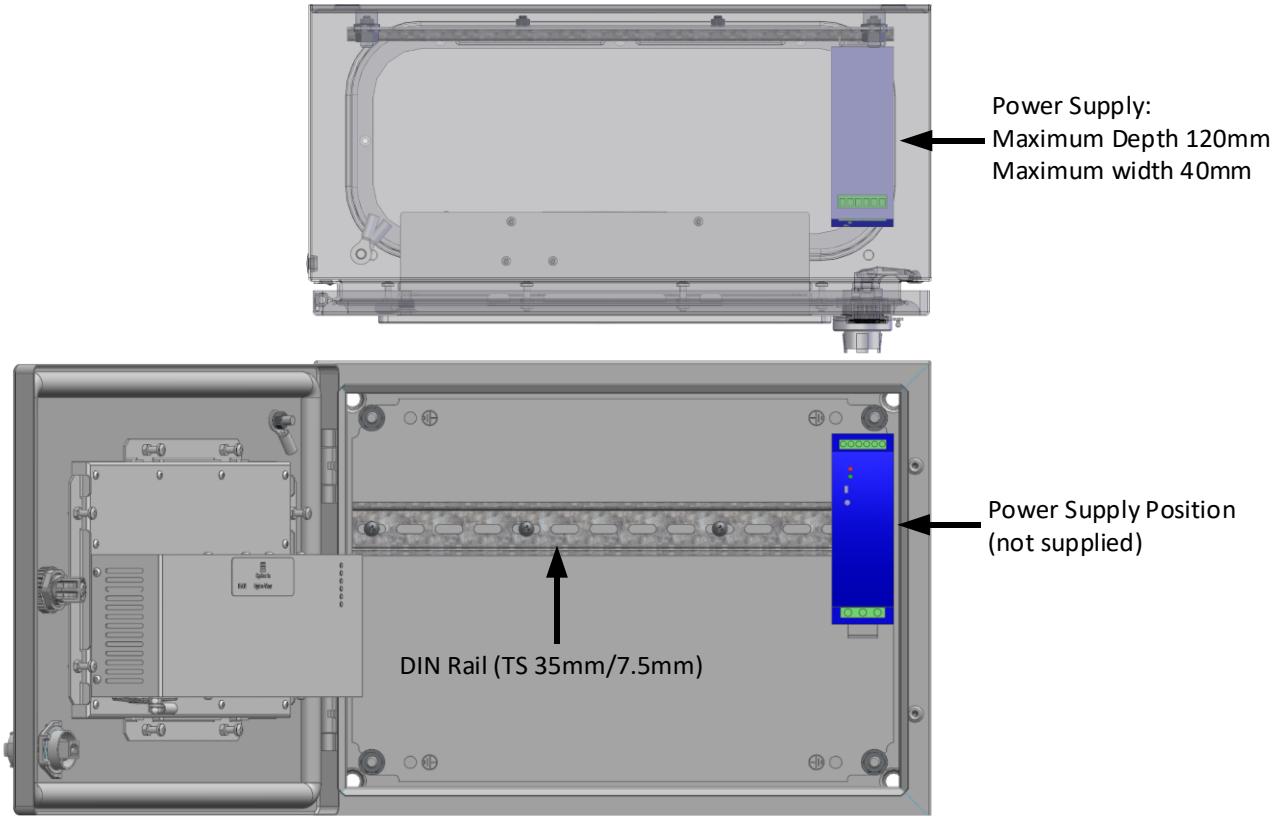


Figure 14: Power Supply Position

This chapter details the electrical installation of the Hydro-View / Hydro-Hub. The connections required will depend on the configuration and integration requirements of the system design.

All images shown in this chapter are of the Hydro-View, however the Hydro-Hub utilises the same connection layout and configuration.

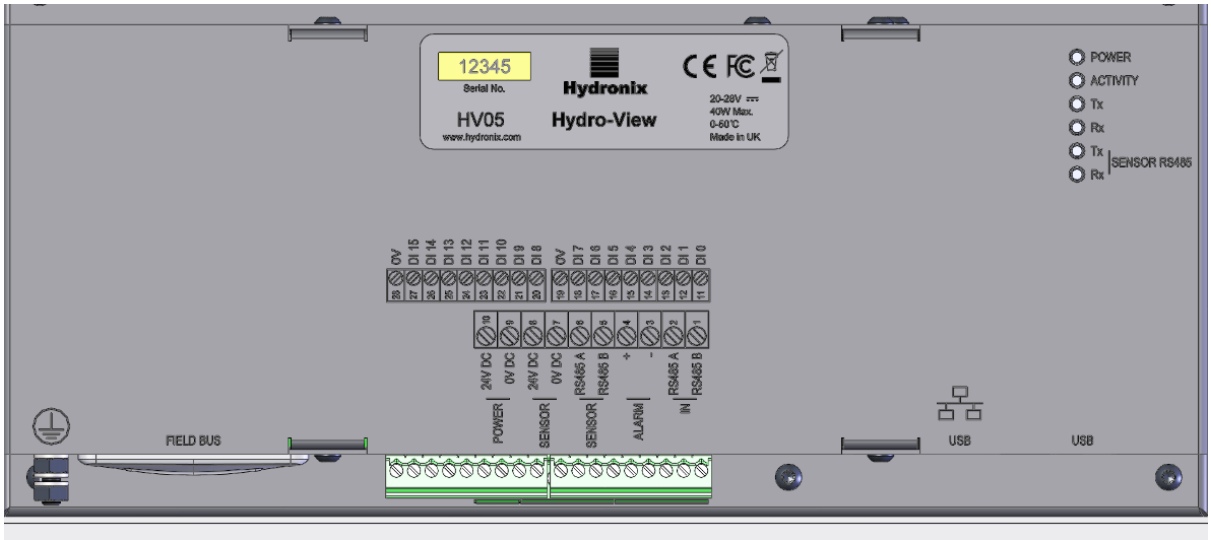


Figure 15: Hydro-View Connection Diagram

The image below shows the electrical connectors. Dependant on the model of unit in use some connectors will not be available.

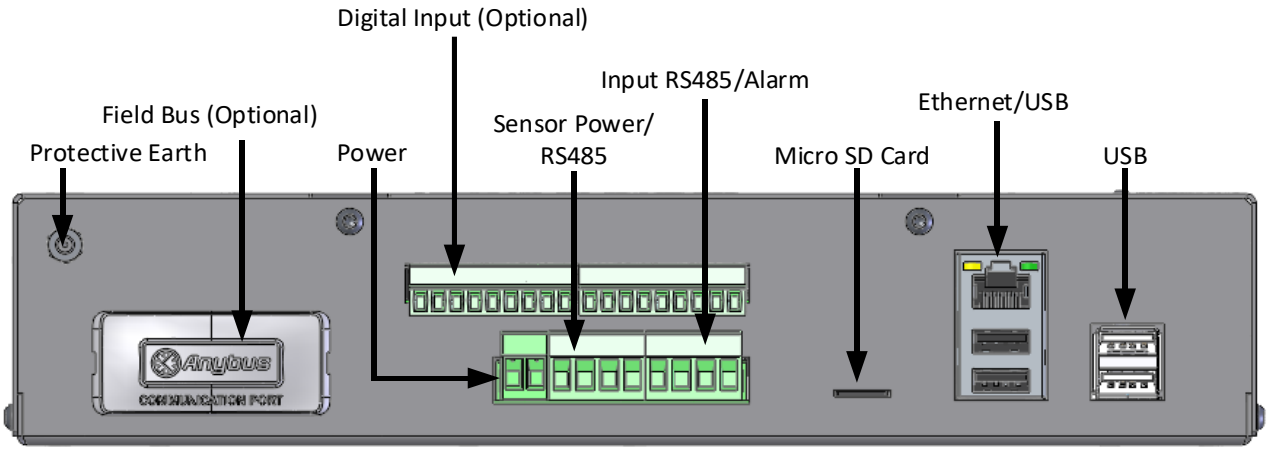


Figure 16: Hydro-View Connectors

1 Connection Pin Assignments

Pin Number	Name	Description
1	RS485 B (Input)	Pass through RS485
2	RS485 A (Input)	Pass Through RS485
3	Alarm -	Voltage free Contact 0v DC
4	Alarm +	Voltage free Contact +24v DC
5	RS485 B (Sensor)	Communication Channel to the Sensor
6	RS485 A (Sensor)	Communication Channel to the Sensor
7	0v DC (Sensor)	Sensor Power
8	+24v DC (Sensor)	Sensor Power
9	0v DC	Hydro-View Power
10	+24v DC	Hydro-View Power
11-18	Digital Inputs 0-7 (+24v DC)	8 Digital inputs +24v DC These inputs are used for remote calibration selection
19	Digital input Common	Digital inputs 0v DC
20-27	Digital Inputs 8-15	8 Digital Inputs +24v DC These Inputs are used for remote calibration selection
28	Digital Input Common	Digital Inputs 0v DC

1.1 Power Supply

The unit requires 24v DC, with a nominal power rating of 44W (with one sensor connected); see Appendix C sections 1.3 and 1.5 for details.

1.2 Communications

1.2.1 RS485

This unit has two separate RS485 communication connections.

Sensor RS485

The connection marked on the device as ‘Sensor RS485 A&B’ is used for communicating with connected sensors. The RS485 serial interface allows up to 16 sensors to be connected via a multi-drop network. See the Hydronix Sensor Electrical Installation Guide (HD0678) for more details on the multi-drop network requirements.

Input RS485

The connection marked on the device as 'IN RS485 A&B' is a pass-through interface provided to enable systems that have been set up to communicate directly with the sensor, using the RS485 protocol, to add a Hydro-View/Hydro-Hub to the network.

RS485 networks are designed to have a single master communicating with the sensors, as a result it is not possible to allow the Control system and Hydro-View / Hydro-Hub to communicate at the same time. The Input RS485 is configured to enable the communications from the control system and the Hydro-View / Hydro-Hub to be marshalled. The marshalling will ensure it is only possible for one message to be transmitted at a time. Messages from both the Control system and the Hydro-View / Hydro-Hub will be transmitted in the order of arrival.

All communications using the input RS485 must be configured as follows:

Baud Rate: 9600

Stop Bits: 1

Flow Control: None

Data Bits: 8

Parity: None

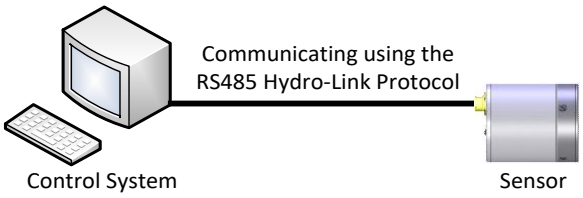


Figure 17: Existing System

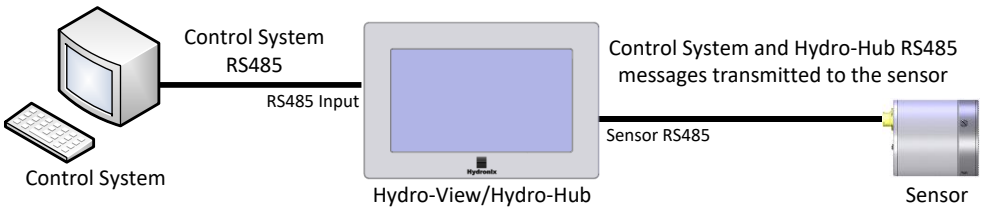


Figure 18: Hydro-View / Hydro-Hub Marshalling the RS485

1.3 Field Bus

This terminal is for a dedicated field bus expansion module. This module is purchased separately. See the associated user guide for connection details.

1.4 Expansion Board Digital Inputs

The optional expansion board digital inputs can be utilised to select a calibration to use with the connected sensors. This enables the sensors to measure multiple materials without needing to manually select the calibration. The calibrations are selected using a Binary format. When a calibration change is requested all data stored in the database, for the selected calibration, is downloaded to the relevant sensor.

Note: If outdoors cabling for the expansion board is to be used it must be limited to 30 metres or less.

Digital inputs 1-4 are used to select the sensor and inputs 8-15 are utilised to select the calibration number required. Digital input 0 is used to trigger the calibration change. Inputs 5, 6 and 7 are reserved for future use.

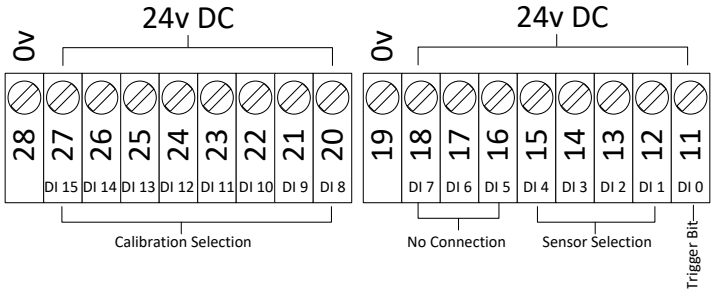


Figure 19: Calibration Selection Wiring

Note: If the expansion board is to be retrospectively installed the work must be undertaken by a competent engineer only. See EN0098 for installation advice.

1.4.1 Input Mode

The Digital inputs are configured to accept binary format input signals.

Digital Input																Selected Value
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	0	0	0	0	NC	NC	NC	1	0	0	0	0	0	0	0	Sensor 1, Calibration1
1	1	0	0	0	NC	NC	NC	0	1	0	0	0	0	0	0	Sensor 2, Calibration 2
1	0	1	0	0	NC	NC	NC	1	1	0	0	0	0	0	0	Sensor 3, Calibration 3
1	1	1	0	0	NC	NC	NC	0	0	1	0	0	0	0	0	Sensor 4, Calibration 4
1	1	1	1	0	NC	NC	NC	0	0	0	1	0	0	0	0	Sensor 8, Calibration 8
1	1	1	0	1	NC	NC	NC	1	0	1	1	0	1	0	0	Sensor 12, Calibration 45
1	1	1	1	1	NC	NC	NC	0	0	0	0	1	0	1	0	Sensor 16, Calibration 80

Table 1: Calibration Selection Digital Inputs

1.4.2 Selecting a Sensor

Digital inputs 1-4 are used to select which connected sensor on the network is configured. Sensors are selected using their RS485 node address (1-16).

Binary 0000 is used to select sensor address 1.

Binary 1111 is used to select sensor address 16.

1.4.3 Selecting a Calibration

To select a calibration, inputs 8-16 are used. Any calibration in the ‘Available Calibration’ list for the selected sensor can be selected. Each calibration is allocated a unique number when created. Any calibration number up to 255 can be selected.

1.4.4 Trigger the Calibration Change

To trigger a calibration change, digital input 0 must be set to high. The change is triggered on the rising edge of the trigger bit.

1.5 Alarm Output

The unit has a 24v DC alarm output that is configured to trigger when the electronics temperature reaches 80°C. If this alarm is triggered, forced cooling will be required or the unit will automatically reduce its performance to protect the electronics. It is essential that the temperature is maintained below 80°C to ensure the electronics are not damaged. The output is a voltage free contact and must have a load connected (see Figure 20 and Figure 21).

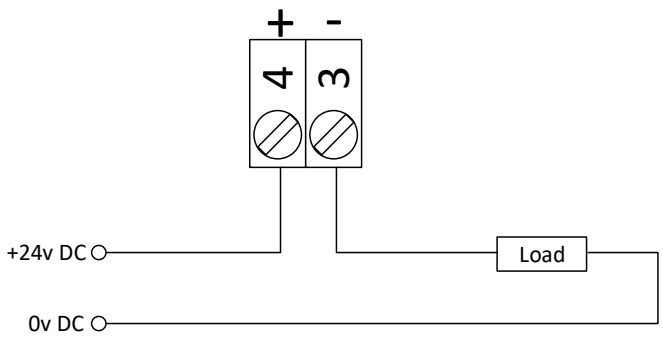


Figure 20: Alarm Output Wiring Example 1

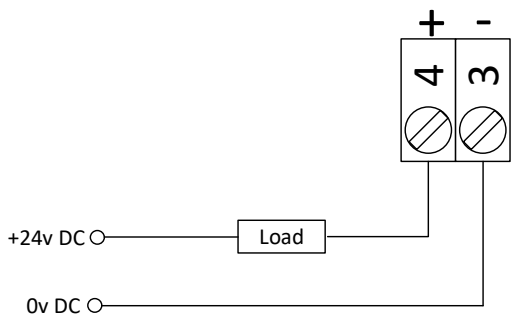


Figure 21: Alarm Output Wiring Example 2

1.5.1 Digital I/O protection

Back electromotive force (Back EMF), also known as counter-electromotive force, is the electromotive force that opposes the change in current through a conductor. When current passes through a coil, such as an inductor, relay coil, motor or solenoid winding, energy is stored in the form of a magnetic field around the coil. When power is removed from the circuit, the magnetic field collapses producing a large reverse voltage spike which can damage sensitive components in the circuit such as transistors and diodes.

It is recommended that a “fly-wheel” diode is connected across any inductive load that is connected to the inputs or outputs of the Hydro View or Hydro Hub. This diode will suppress the back EMF voltage spike, protecting the inputs from damage. The recommended diode for this protection is a 1N4007 or equivalent. It should be connected as shown in Figure 22 and Figure 23.

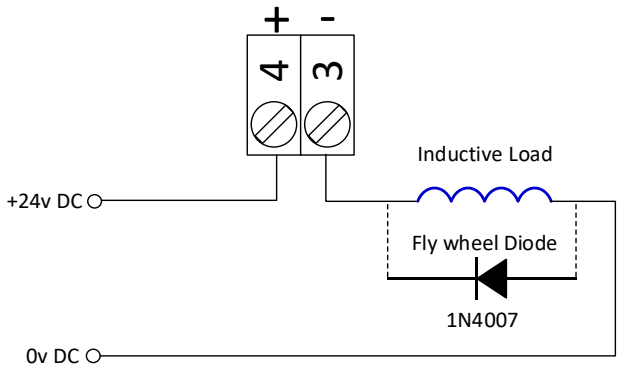


Figure 22: I/O Protection

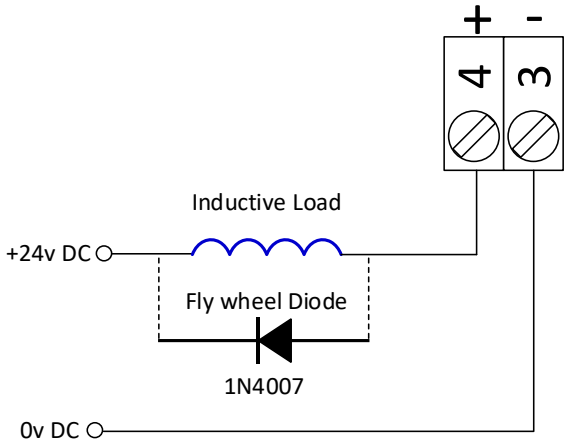


Figure 23: I/O Protection

1.6 Ethernet

The Ethernet port is provided to enable the Hydro-View / Hydro-Hub to be connected to a local network. Once connected to the network, remote access to the unit is possible using Hydro-Com or any compatible internet browser.

1.7 USB

The unit has four built in USB ports to enable data backup, software upgrade and to connect a Keyboard / Mouse.

1 Overview

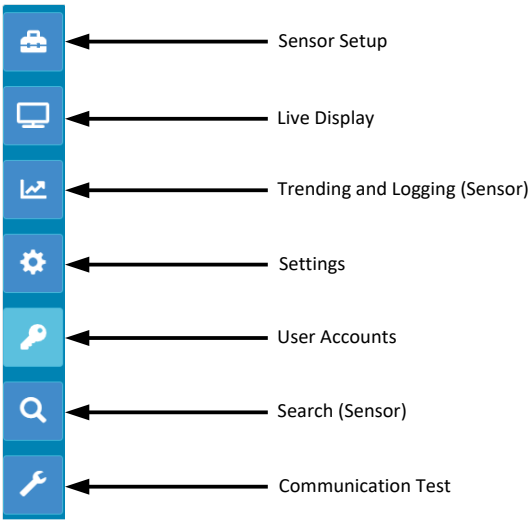


Figure 24: System Overview

The Overview screen provides access to the system setup and also to any connected sensors.

The Overview screen is divided into seven sections. If the control buttons are not available, click or touch on any part of the display to make them visible.

Note: Some options are only available with a valid user account.

1.1 Sensor Setup

The sensor setup section provides access to any connected sensor on the network. See Chapter 7 for details.

Figure 25: Sensor Setup

1.2 Live Display

The Live Display section is used to display live values from any connected sensor on the network.

Figure 26: Live Display

1.2.1 Add a Live Display

To display a value from a sensor the screen must be configured. When first opened the live display is locked, to unlock the display click on the red lock button.

Figure 27: Locked Display

Once unlocked the following options are available:

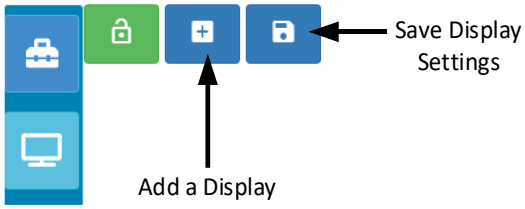


Figure 28: Unlocked Display

To add a sensor to the display, click on the Add a Display button. The Live display is divided into three sections.

Live Values

To configure the live display, select the required values on the screen.

Figure 29: Live Display Configuration

Additional Live displays can be added by clicking on the Add a Display button.

Trend

The output of each sensor can be displayed graphically by selecting the Trend tab.

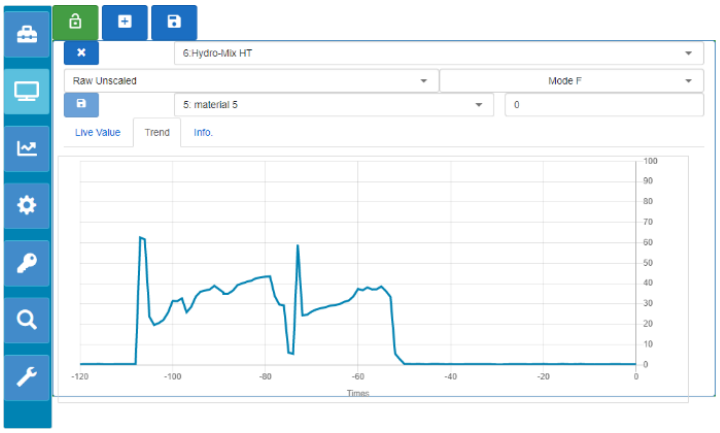


Figure 30: Trend Graph

Info

The sensor ID and current firmware is displayed by selecting the Info Tab.

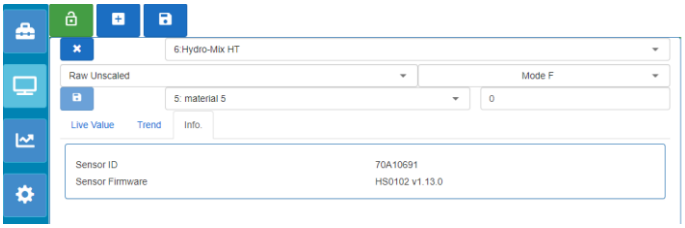


Figure 31: Info

1.2.2 Save a Live Display

Once a display has been configured it can be saved to enable quick access to the same values. Click the Save Display button to save the configuration.

Figure 32: Save Live Display

When the software is restarted the previously configured live display view can be displayed by clicking the ‘Live Display’ button (Figure 26).

Figure 33: Live Display after Reboot

1.2.3 Lock the Live Display

To set the software to display the sensor values on the main overview screen click the green Lock button.

Figure 34: Lock Display

The selected sensor values will now be displayed on the main overview page.

1.2.4 Unlock the Live Display

When a Live display is locked editing of the display is disabled. To edit the Live Display, click on the red Lock button.

Figure 35: Unlock Live Display

1.3 Trending and Logging (Sensor)

The Trending and Logging section enables the user to log any connected sensor value to a text file. When using the Hydro-View a USB memory stick must to be inserted into the unit using one of the available USB ports to store the data. The USB memory stick must be FAT32 formatted and a maximum size of 32GB.

For systems connecting via a remote connection no USB memory stick is required. The data will be stored in a location dependant on your current browser settings.

Figure 36: Trending and Logging

1.3.1 Trending and Logging Setup

To configure Trending and Logging click on the Trending and Logging button (Figure 36). In the Log setup section select any available sensor and confirm the required output to log (Figure 38). The Log Rate can also be configured.

If no sensors are displayed click the search button.

Figure 37: Sensor Search

If the Trending and Logging is being used to configure the sensor signal filters, or to log small material batches, set the log rate to Raw (25 times a second).

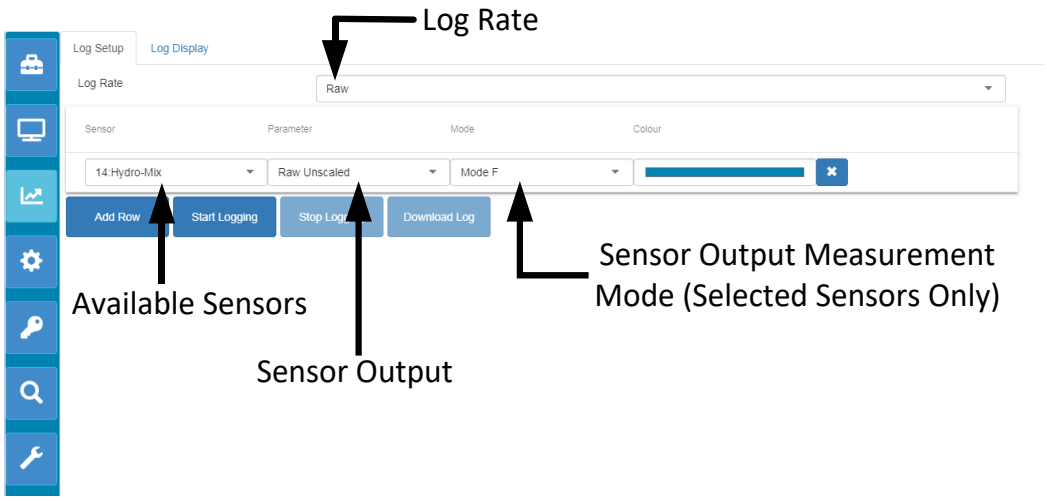


Figure 38: Trending and Logging Setup

Additional sensors and values can be logged by clicking add Row (Figure 39).

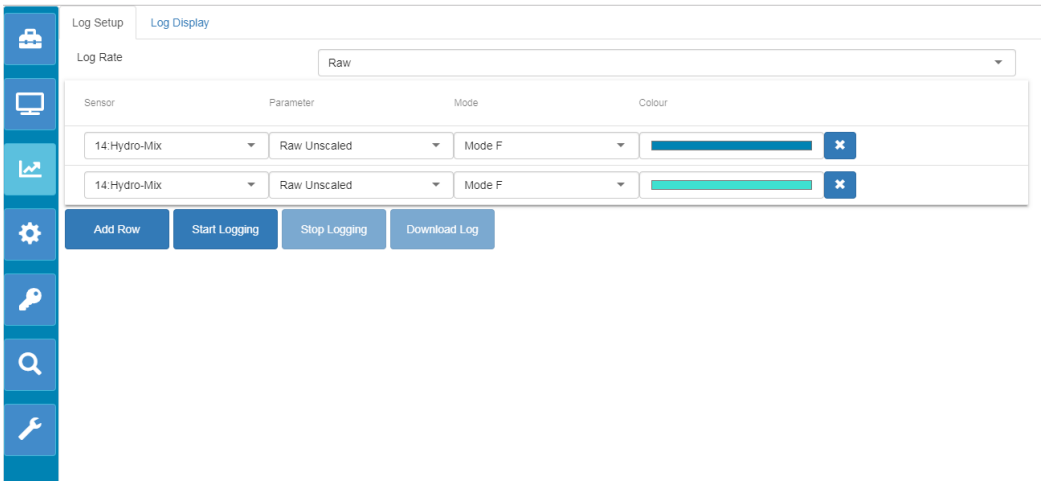


Figure 39: Add Row

To start the Trending and Logging click Start Logging.

Figure 40: Start Logging

Click Stop Logging to stop the logging.

Figure 41: Stop Logging

Once the logging has stopped the data can be downloaded. If using a Hydro-View touch screen unit the data is downloaded to the attached USB memory stick. If using a remote

connection (internet browser) the data is downloaded to the device running the browser. The location of the downloaded data will depend on the current settings in the browser.

To download the data click Download Log.

Figure 42: Download Log

The downloaded data can be viewed using Hydro-Com software or other data processing software.

1.3.2 Trending and Logging Display

To view sensor data on a customizable scale trend graph select the ‘Log display’ tab

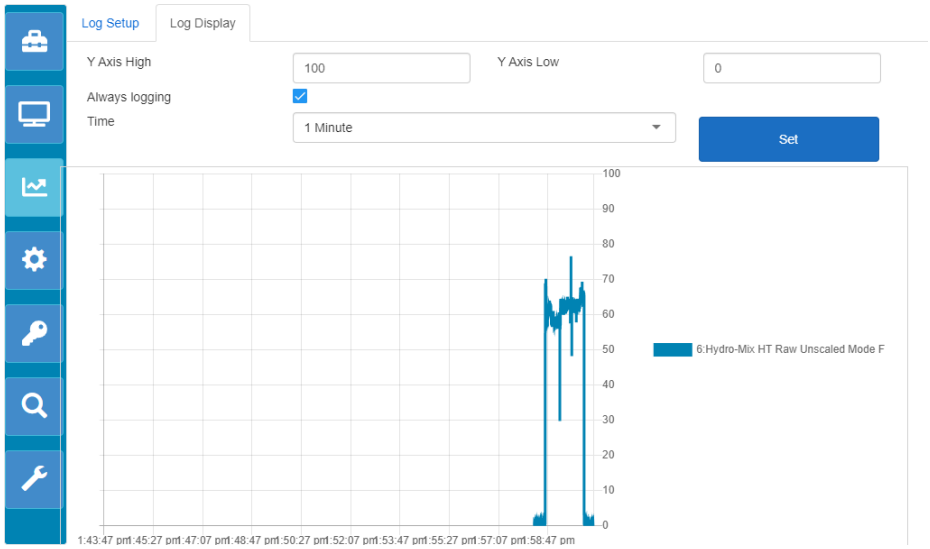


Figure 43 - Log Display

1.4 Settings

The System Settings section (Figure 44) provides the user with the ability to view and upgrade the Hydro-Net software. There is also access to the Ethernet settings that can be used to configure the system to DHCP or Static IP address. The sensor RS485 communication setup is also available in this section.

Figure 44: Settings

1.4.1 System Settings

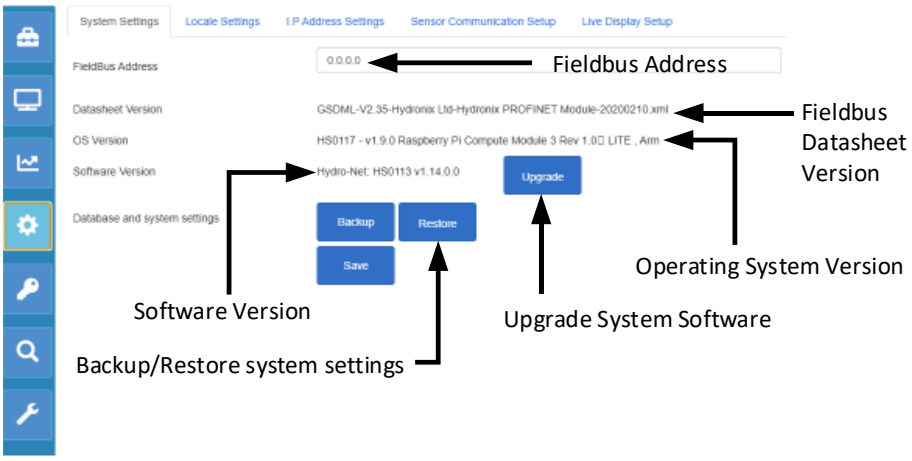


Figure 45: System Settings

Fieldbus Address

Systems utilising Fieldbus communications require this address to be configured to match the connected device.

Datasheet Version

This is the Fieldbus datasheet installed on the unit. This must match the datasheet used on the connected device.

Software Version

The current software installed on the unit

Upgrade System Software

This provides the facility to upgrade the Hydro-Net software. Updates to the software are available from: https://www.hydronix.com. See section 1.4.2 for details.

Backup/Restore System Settings

The current settings in the unit can be saved to file or restored from a previously saved version. See section 1.4.3 for details.

1.4.2 Upgrading the System Software

To upgrade the Hydro-Net software the upgrade file must be downloaded from the Hydronix web site: https://www.hydronix.com

To upgrade the software on a Hydro-View the file must be stored on a USB memory stick inserted into the unit.

To upgrade the software, click Upgrade (Figure 46) and select the software upgrade file.

Figure 46: Upgrade Software

1.4.3 Backup / Restore System Settings

The Hydro-Net software has the ability to create a backup of the system settings. This enables a commissioning engineer to configure the system and to then retain a copy of the system to restore the unit at a later date if required.

Backup

If using a Hydro-View touchscreen unit a USB memory stick must be inserted to create the backup. All data will be saved to the USB memory Stick.

For systems connecting via a remote connection the data will be stored in a location dependant on your current browser settings.

To back up the system click Backup (Figure 47).

Figure 47: Backup System Settings

Restore

To restore a unit using a previously saved backup click Restore (Figure 48)

Figure 48: Restore System Settings

1.4.4 Locale Settings

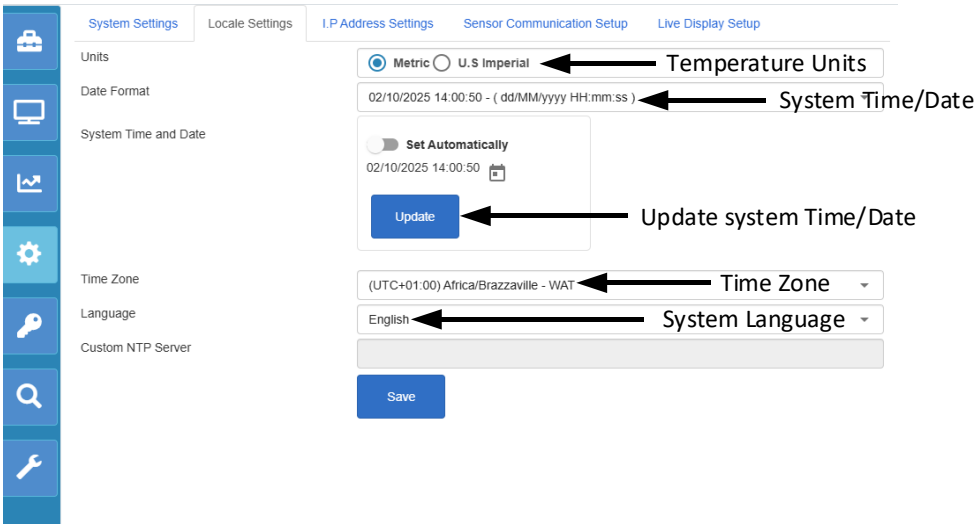


Figure 49: Locale Settings

Temperature Units

The software can be configured to display temperature values as either Celsius or Fahrenheit.

System Time and Date

The current system time and date. This value is automatically updated if the unit is connected to a network with internet access. If the unit is not connected to the internet the time and date can be manually updated as required. Changing the system date and time will ensure any log files created using the Trending and Logging function will display the correct time.

Time Zone

Time zone selection. The system time will be updated to match the selected time zone.

Custom NTP Server

Not yet Implemented.

1.4.5 IP Address Settings

The IP Address setting screen enables the Hydro-Net software to be configured to use a DHCP or Static IP address (Figure 50).

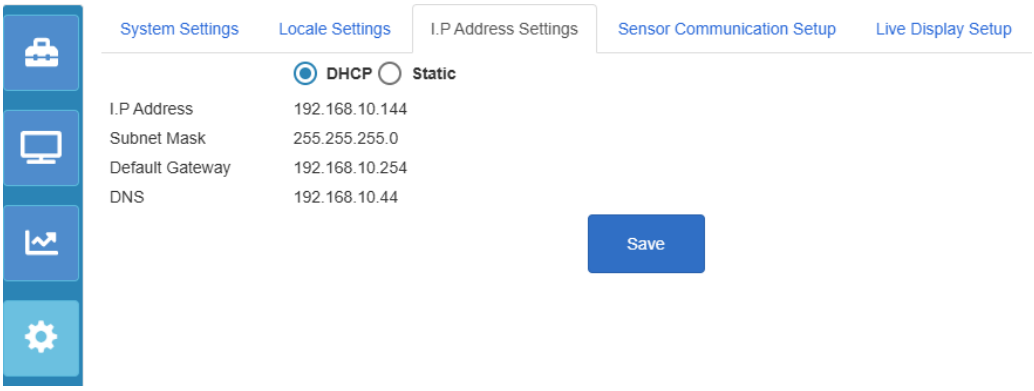


Figure 50: IP Address Settings

In addition to setting a DHCP or Static IP address through the Hydro-Net software, the Hydro-View also supports retrieving and modifying its IP configuration using a USB memory stick. This method allows the current IP settings to be read out or updated when the device's interface is otherwise inaccessible. For full details of this procedure, refer to Appendix B.

1.4.6 Sensor Communication Setup

The Sensor Communications Setup section (Figure 51) configures the Baud rate used by the sensor RS485. The Baud rate can be configured to Auto or Fixed. If set to Auto Baud the software will automatically determine the fastest speed available with the connected sensors on the network. When set to Fixed Baud the software will attempt to communicate at the configured speed. If communication at the configured speed is not possible the baud rate will be set at the maximum available for the connected sensor up to the Max Baud rate.

Once the Baud rate settings have been saved the current Baud rate is updated to indicate the communication speed on the network.

It is recommended to leave the Baud rate set to Auto Baud.

Note: If communication issues are encountered it is recommended to configure the communication as Fixed Baud 9600.

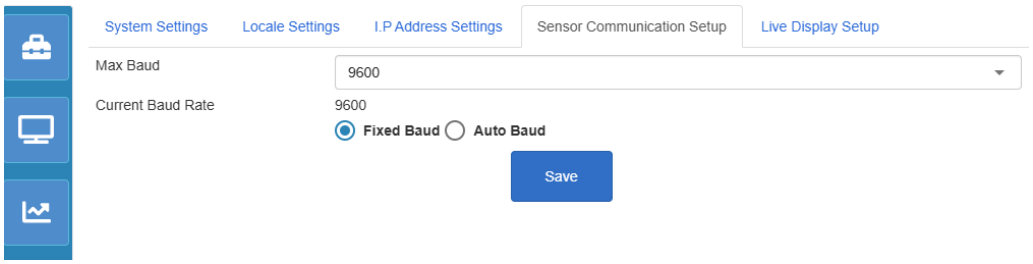


Figure 51: Sensor Communication Setup

1.4.7 Live Display Setup

The Live Display Setup screen allows adjustment of the scaling of the live display graphs.

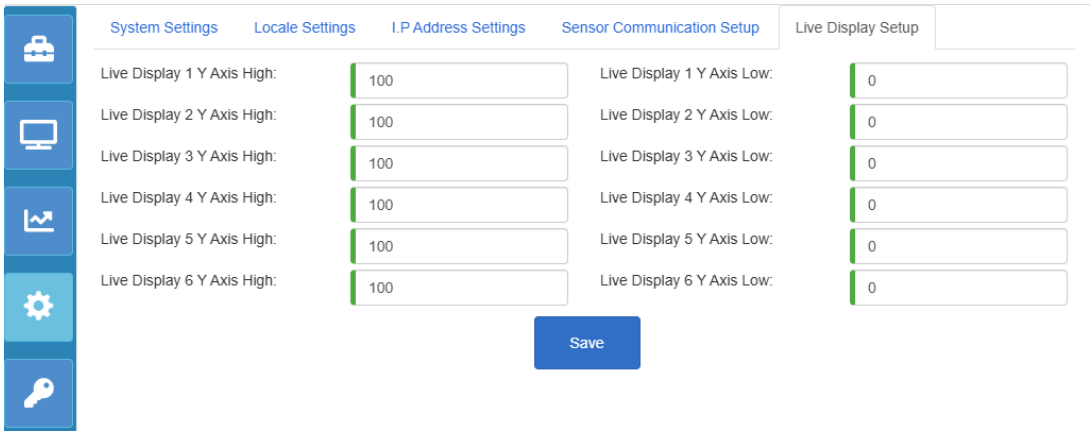


Figure 52: Live display axis scaling settings

1.5 User Accounts

The User Accounts section can be utilised to provide variable levels of access to the software. Access levels are configurable to three levels: Locked, Supervisor and Engineer.

1.5.1 Access Levels

Locked

On start-up the software is automatically locked allowing access to search for connected sensors and previously saved Live Displays.

Supervisor

The supervisor level provides access to search for connected sensors. Live values from the sensor can be displayed and the calibration pages are also enabled. The Trending and logging facility is also available.

Engineer

Engineer level provides full access to all functions.

1.5.2 Default Passwords

On start-up the software is automatically locked. To unlock the software, use the following default passwords:

Supervisor: 3737

Engineer: 0336

1.5.3 Modify User Account Passwords

Changing the default passwords is possible by selecting Change Password next to the required access level.

To modify the password, enter the existing and new password.

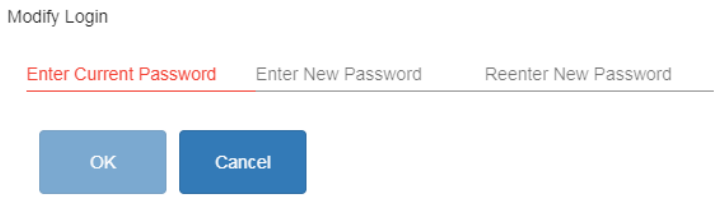


Figure 53: Modify Login Password

1.6 Search (Sensor)

Once activated, the Hydro-View will automatically initiate a search of the RS485 network to find any connected sensors. To communicate with a sensor that has been added to the network after start-up or to manually search, click the search button (Figure 54).

Figure 54: Search Sensor Network

While the unit is searching the sensor network all other functions are disabled (Figure 55).

Figure 55: Search in Progress

1.7 Digital I/O Test

The I/O Test section enables the user to perform diagnostics on the Alarm Output and the optional Expansion Board inputs.

1.7.1 Alarm Output

The Alarm output can be switched on & off to enable the wiring to be tested (Figure 56).

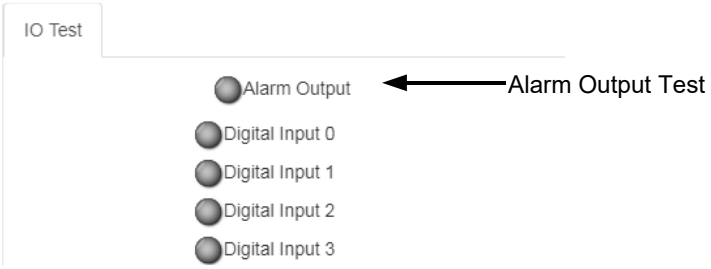


Figure 56: Alarm Output Test

1.7.2 Expansion Board Inputs Test

Each input can be energised with a 24vDC signal to test operation using the indicator lights. The test will also calculate the Sensor address and calibration number selected using the input signals (Figure 57). If the expansion board is not fitted the indicator lights will not be visible.

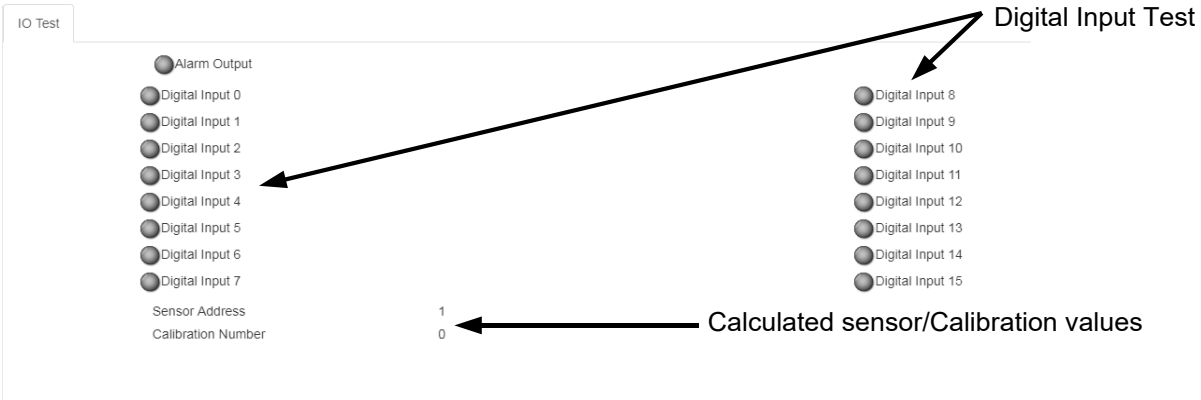


Figure 57: Expansion Board Test

The Hydro-Net software is configured to run as a web server. This enables the unit to provide remote access via any compatible web browser. To enable remote access the unit must be connected to the local Ethernet network.

1 Overview

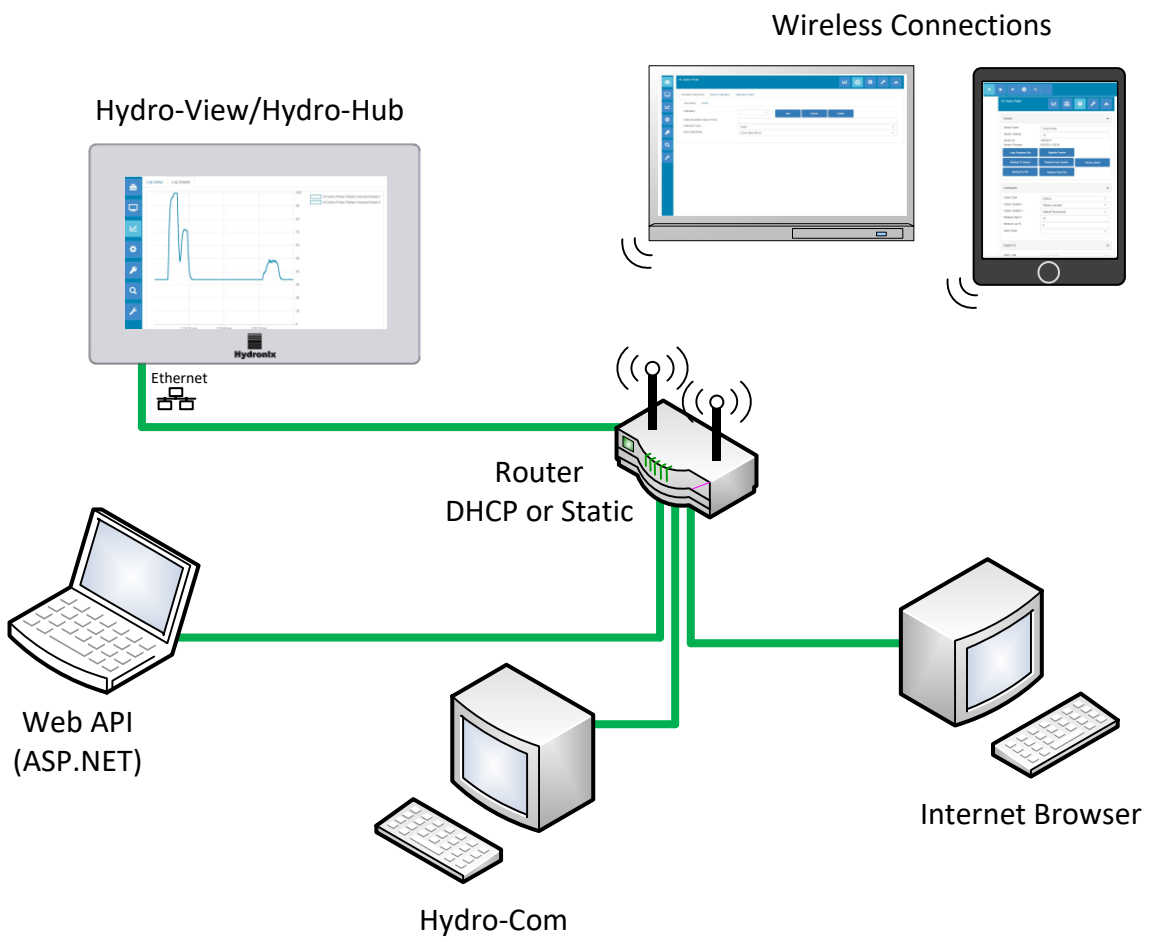


Figure 58: Remote Access Overview

2 Remote Connection Using a Web Browser

2.1 Compatible Browsers

Remote access to the Hydro-View / Hydro-Hub is available via the following compatible web browsers:

Chrome, Edge, Firefox, Safari and Internet Explorer 11

2.2 Setting up a Connection

To remotely access the unit, using a compatible web browser, connect the Hydro-View / Hydro-Hub to the local Ethernet network.

2.2.1 Hydro-View

To setup a remote connection to the Hydro-View the IP Address of the unit must be known. The Hydro-View IP address is recorded in the system settings.

After switching on the Hydro-View the IP address can be located using the following steps.

Power up the Hydro-View and open the User Accounts section.

Figure 59: User Accounts

Log in as an engineer level user.

Select the system settings and open the IP Settings tab.

Figure 60: System Settings

Record the current IP address.

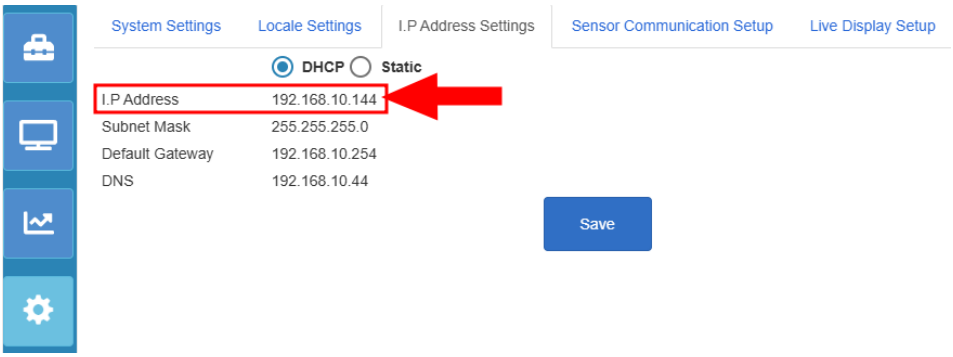


Figure 61: IP Address

Open a compatible internet browser on a machine connected to the same local network as the Hydro-View. Enter the IP address plus the port number 5000.

For example: 192.168.10.53:5000

The software will search for any connected sensors on the network and will display them at the top of the screen.

Figure 62: Hydro-View Web Browser Access

2.2.2 Hydro-Hub

Before setting up a remote connection to the Hydro-Hub the IP Address of the unit must be known. To locate the IP address of the Hydro-Hub it is recommended to use Hydro-Com software. The IP address can be found using the following procedure.

Open Hydro-Com and expand the System Setting section. Expand the Ethernet section and Hydro-Com will search for available devices. Any connected devices will be listed.

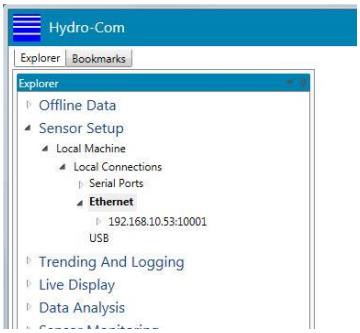


Figure 63: Hydro-Hub IP Address

Observe the limitations described in Chapter 6 Section 3.1. If connection using Hydro-Com is not possible, refer to the feature described in Appendix B.

If more than one Hydronix Ethernet device is connected to the network, ensure the IP address of any previously configured devices is known before searching. It is recommended to clear the Ethernet list before searching for a Hydro-Hub on the network. To clear the list right click on any IP address in the list and select Delete. Once deleted, right click on Ethernet and select search.

Once the IP Address has been recorded open a compatible internet browser on a machine connected to the same local network as the Hydro-Hub. Enter the IP address plus the port number 5000.

For example: 192.168.10.53:5000

The software will search for any connected sensors on the network and will display them at the top of the screen.

Figure 64: Hydro-Hub Web Browser Access

Multicast DNS Access

If only one Hydro-View / Hydro-Hub is connected to the local network, it is possible to access the unit by typing the following address into the browser:

http://hydrohub.Local:5000

Note: To access the Hydro-Net software using this link the computer running the browser must have Bonjour Print Services software installed. Multicast DNS must be enabled on the network.

3 Remote Connection Using Hydro-Com

3.1 Limitations

Remote connection to the device using Hydro-Com is only possible with the network mask setting of 255.255.255.0. Any other subnet mask configuration will prevent Hydro-Com from establishing a successful connection.

The remote connection may not be possible when Ethernet network communication speed is impaired by the Hydro-Hub being accessed through multiple network layers (routers, VPN), as this can prevent Hydro-Com from receiving the sensor's response within its required time limits.

3.2 Setting up a Connection

To communicate with a sensor connected to a Hydro-View / Hydro-Hub open Hydro-Com and select Ethernet in the Sensor Setup, Trending and logging or Live Display sections. The software will search for any connected Hydro-View / Hydro-Hub units on the network.

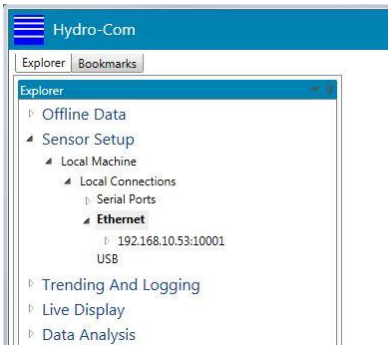


Figure 65: Hydro-Com Ethernet Search

Select the IP address of the unit and the software will search for any connected sensors.

Figure 66: Sensor

Select the sensor to configure / Monitor using Hydro-Com.

4 Web API (asp.net)

The Hydro-Net API allows developers to quickly and easily interface with a Hydronix sensor network using a web service. The Hydro-Net API sends all data responses as JSON Objects. For details on using the API see the Hydro-Net API Developers Guide HD0801.

1 Connecting to a Sensor

The Sensor Setup section is used to access configuration, calibration and diagnostics data from any connected sensor.

On start up the software will automatically search for any connected sensors on the network. The available sensors will be displayed at the top of the screen.

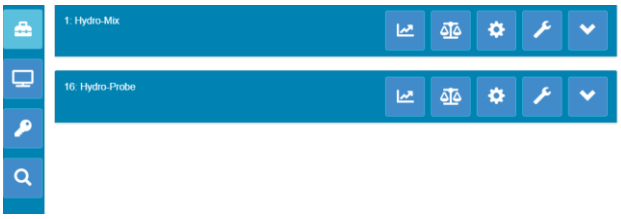


Figure 67: Sensors on the Network

To manually detect a sensor on the network use the search facility.

Figure 68: Manual Search

2 Sensor Configuration

The sensor configuration section is divided into four sections.

2.1 Live Values

Figure 69: Live Values Selector

The Live Values section displays the current output of the sensor. All output values are displayed as a number and graphically.

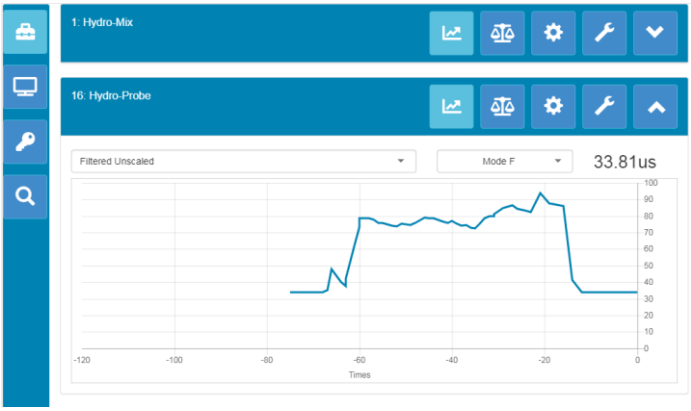


Figure 70: Live Values

2.2 Calibration

Figure 71: Calibration Section Selector

The Calibration section enables the user to view any existing calibration data held in the sensor and also generate a new calibration. For details on how to calibrate the sensor see Chapter 8 and the Sensor Configuration and Calibration Guide HD0679

The calibration section is divided into three tabs.

2.2.1 Available Calibrations

Available Calibrations are calibrations that have been generated using the Hydro-Net software and are stored in the database. Each calibration has a unique number to enable selection using the optional expansion board (See page 27 for details).

2.2.2 Sensor Calibrations

The Sensor Calibration sections enable the user to view the calibration data stored in the sensor. These are the values that are currently in use by the sensor.

2.2.3 Calibration Graph

The Calibration Graph enables the user to view the calibration data graphically

2.3 Sensor Settings

Figure 72: Sensor Settings Selector

The Sensor Settings are divided into seven sections.

For detailed descriptions of each sensor configuration setting see the Sensor Configuration and Calibration Guide HD0679.

2.3.1 Details

Figure 73: Sensor Details

Sensor Address

All Hydronix sensors are set to address 16 as default. If more than one sensor is connected to a network each sensor must have a unique node address allocated to it. To change the sensor node address, connect one sensor at a time and change the node address using the selector. Click ‘Save’ to update the sensor.

Firmware

The version number indicates the firmware installed in the sensor. The firmware held in the sensors flash memory may be upgraded using a file available for download from the Hydronix web site.

Note: If a remote connection is being used the file should be saved to a local drive on your machine and not a network drive. If a Hydro-View unit is used the file must be saved to a USB Memory stick.

The firmware upgrade feature of the software uses a single upgrade file which contains the firmware for all Hydronix sensors. The Hydro-Net software will select the relevant firmware for the specific sensor and upload the data. This feature will prevent incorrect firmware uploading to a sensor which can make it inoperable. Clicking the ‘Upgrade Sensor’ button will invoke a file open box. Browse to the downloaded file and confirm the selection. The upgrade process can take a few minutes to complete.

Before you proceed it is imperative that the sensor power and communication is maintained whist the upgrade is in progress otherwise there is a possibility that the flash memory will be left in an indeterminate state, rendering the sensor inoperable.

Backup to File and Restore from File

The Backup and Restore function enables the sensor settings to be saved to a XML file. Backing up a sensor after commissioning facilitates restoring of a sensor if the configuration is accidently changed. This function also enables the user to keep a record of all settings.

To create a backup, connect the sensor and then select ‘Backup’ and choose a file location. Once a backup has been created the sensor can be restored using this file. To restore a connected sensor, click ‘Restore’ and select the relevant backup file.

Backup to Sensor and Restore from Sensor

All Hydronix sensors utilising firmware HS0102 and above have the ability to store the sensor configuration settings to the internal memory. This facility enables the user to back-up the sensor configuration so it can be restored at a later date if required

Restore Factory Settings

During manufacture all factory settings are stored in a reserved memory location to enable the sensor to be restored to default.

2.3.2 Analogues

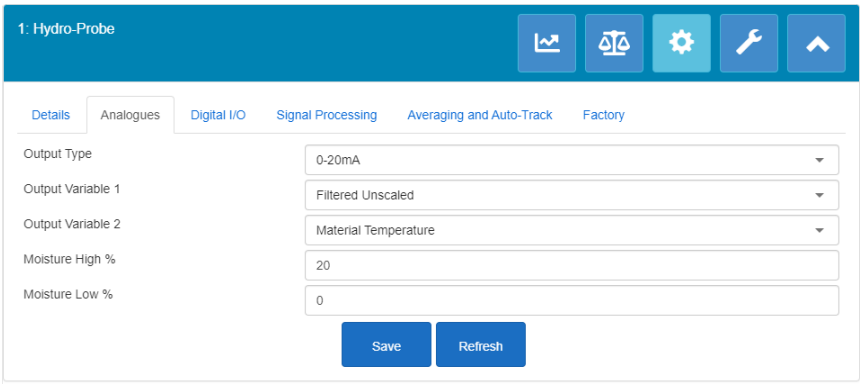


Figure 74: Analogues

The Analogue Configuration section enables the configuration of the following sensor settings:

- Output Type
- Output Variable 1 and 2
- Output Variable Mode
- Moisture Low % and High%
- Alarm Mode

The Output Variable Mode selector configures which measurement mode is used for the output type. The option is only available on Moisture and Unscaled Output types. The available Measurement Modes (F, E, V and Legacy) are dependent on the sensor connected.

2.3.3 Digital I/O

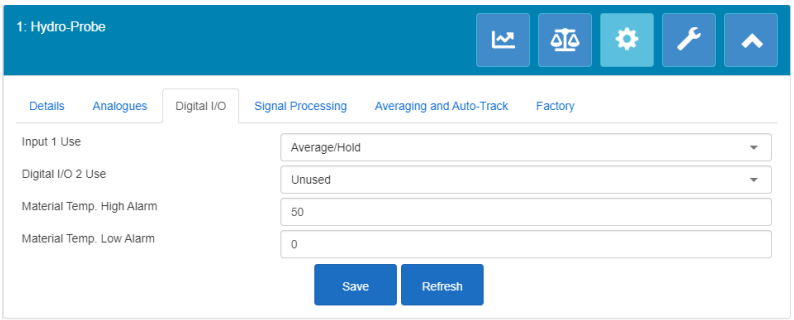


Figure 75: Digital I/O

The Digital Input/Output setup frame is used to configure the Digital Inputs and Output from the sensors. The following can be set:

- Digital I/O 1
- Digital I/O 2
- Material High and Low temperature - configuration for the Material Temperature Alarm output.

2.3.4 Signal Processing

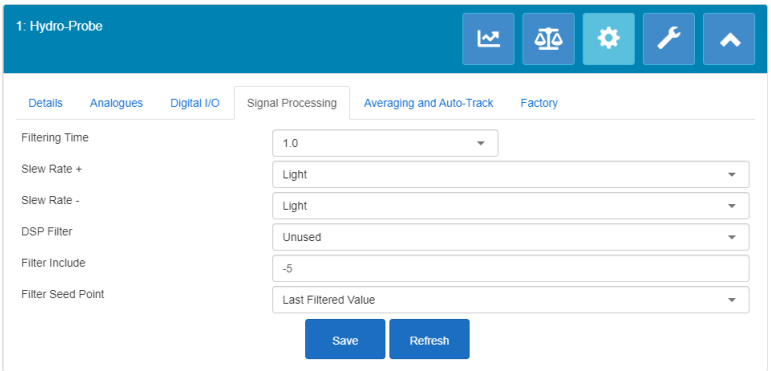


Figure 76: Signal Processing

The Signal Processing frame is used to configure the filtering applied to the sensors Raw output and to set the measurement mode used for the Unscaled output (this facility is not available with all sensors).

The signal processing frame enables the following to be configured:

Filtering

See the Configuration and Calibration Guide HD0679 for detail of how to configure the filtering in the sensor.

- Filtering Time (Smoothing Time)
- Slew Rate +
- Slew Rate –
- Digital Signal Processing (DSP)
- Filter Include set point

Unscaled Mode

- Unscaled 1 measurement mode type (Only with selected sensors)
- Unscaled 2 measurement mode type (Only with selected sensors)

2.3.5 Averaging

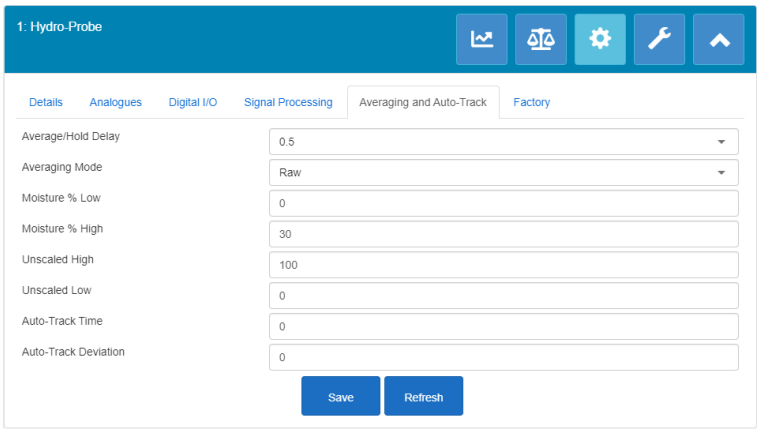


Figure 77: Averaging

The Averaging section configures how the Raw or Filtered output from the sensor is averaged and the Auto-Track alarm set-up.

Averaging

In the Averaging section the following can be configured

- Average/Hold Delay
- Averaging Mode
- Moisture High/Low % Limit
- Unscaled High/Low Limit

Auto-Track

In the Auto-Track section the following can be configured:

- Auto-Track Time
- Auto-Track Deviation Threshold

Auto-Track Configuration

The Auto-Track output alarm is used to indicate when the deviation in the sensor's moisture reading is below the configured limit for a set amount of time. To configure Auto-Track the user must calculate the maximum deviation that is acceptable. As well as the deviation the user must configure the number of data points to be sampled by the sensor (seconds). Once configured, the sensor will average the moisture output over the set amount of time.

The deviation, and the time settings, will be unique for each application. They are dependent on the acceptable deviation in the moisture reading for the application.

The output alarm will be activated when the moisture deviation is below the limit for the set time. This is useful in mixer applications and for continuous flowing materials where a stable signal is required.

2.3.6 Temperature Compensation

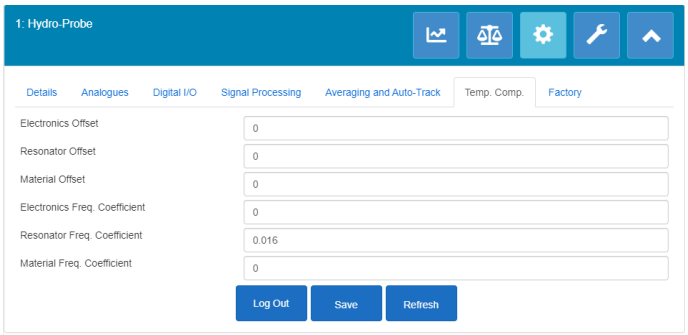


Figure 78: Temperature Compensation

The coefficients used for temperature compensation are configured in this section.

The Temperature Compensation section is not available until logged in to the Factory Settings section. Please refer to the 2.3.7 (Factory Settings (Air/Water)) for log in instructions.

Note: These values should not be changed unless advised by a Hydronix Engineer.

2.3.7 Factory Settings (Air/Water)

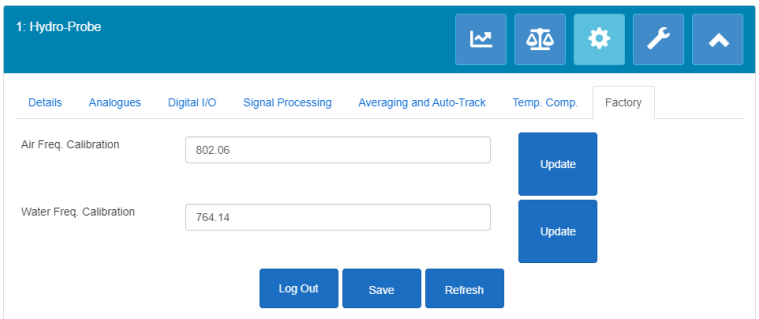


Figure 79: Factory settings

When it is manufactured, each sensor is individually calibrated in a controlled environment so that a zero (0) value relates to the measurement in air and 100 relates to water. This is used to give a raw output value from a Hydronix sensor which ranges from 0 to 100 and is called the Unscaled value.

The air (Zero Unscaled) and the water (100 Unscaled) values are displayed and configured using the factory settings frame. It is not necessary to alter these in normal operation. To check if the factory settings are correct see the resonator section on page 61.

Note: Changing the calibration may adversely affect the operation of your sensor. If recalibration is required, please contact Hydronix Technical Support

To access the Factory Settings section log in using password 0336.

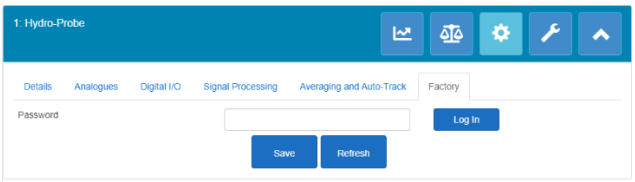


Figure 80: Factory settings section log in

Performing Air and Water Factory Calibration

If a new factory Air and Water calibration is required, the following procedure must be followed to ensure an accurate result. This test should only be performed after contacting Hydronix support for guidance, support@hydronix.com.

1. Clean the sensor ensuring any deposits of material are removed from the sensor face.
2. Fill a circular plastic bucket with clean fresh water at 20ºC. The level of water needs to cover the sensor ceramic faceplate, and at least 200mm of water is needed in front of the ceramic.
3. Add 0.5% by weight of salt – e.g. 50g per 10 litres of water
4. Position the sensor in the water. For a Hydro-Probe Orbiter, it is suggested that the sensor is held in the bucket offset to one side with the face towards the centre of the bucket, hence the measurement is carried out with a full bucket of water in front.

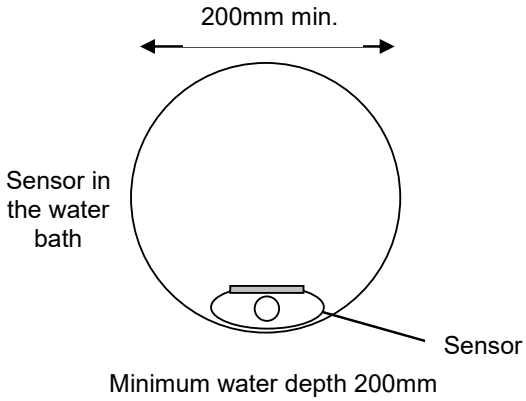


Figure 81: Air/Water Factory Calibration

5. Allow the working temperature of the sensor to stabilise.
6. Open the Factory settings section and press the Update button next to the current Water value. The software will make a measurement and the new frequency and amplitude readings will be displayed in the Water reading box.

Figure 82: Update Water Calibration

7. Remove the sensor from the water and dry the ceramic face plate
8. An air reading should be made with the sensor face-plate clean, dry and free from obstructions. Press the Update button next to the current Air value. The software

will take a measurement and the new frequency and amplitude readings will be displayed in the Air reading box.

Figure 83: Update Air Calibration

9. To upload the factory settings to the sensor, press the 'Save' button.

Figure 84: Save Factory Settings

Note: Not all sensors support the amplitude measurement so will only update the frequency value. The Hydro-Net software will detect which measurement modes the connected sensor supports.

Automatic Calibration (AutoCal)

When fitting a new sensing arm to a Hydro-Probe Orbiter or replacing the ceramic on a Hydro-Mix the Air and Water factory calibrations need to be updated. However, if the sensor is installed in a mixer, it is not always possible to manually perform the air and water readings. To help with this issue an alternative function called AutoCal may be used. This makes an air reading and then calculates the water reading based on the previous air-water difference.

Figure 85: AutoCal

When using AutoCal with a Hydro-Probe Orbiter, certain arm types require the selection of the type, and length, from the drop-down menu. If this option is not available, the connected arm has been automatically detected by the Hydro-Probe Orbiter Head Unit.

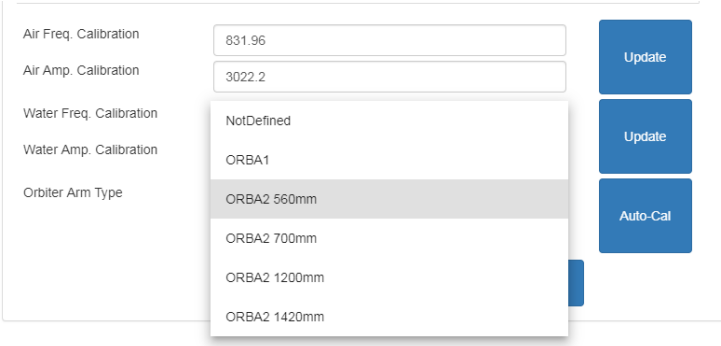


Figure 86: Arm Selection

During the AutoCal procedure, the ceramic face must be clean, dry and free from obstruction. Once the 'Automatic Calibration' button is pressed, the AutoCal measurement will start and should take approximately 30 seconds. The sensor will then be ready for use in the mixer.

Note: For conveyor belts or free fall applications, an Air and Water calibration is still required.

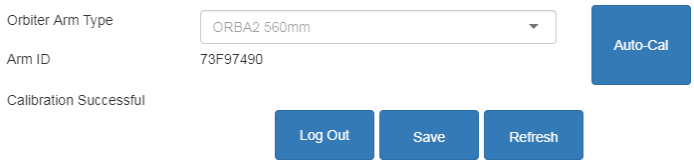


Figure 87: Successful AutoCal Procedure

Note: For the most consistent performance it is recommended that a full Air and Water calibration is performed. See page 57 for details

2.4 Diagnostics

Figure 88: Diagnostics Selector

The diagnostics section is divided into two sections: Live Data and Hardware Test. This enables the user to diagnose any possible faults with the sensor.

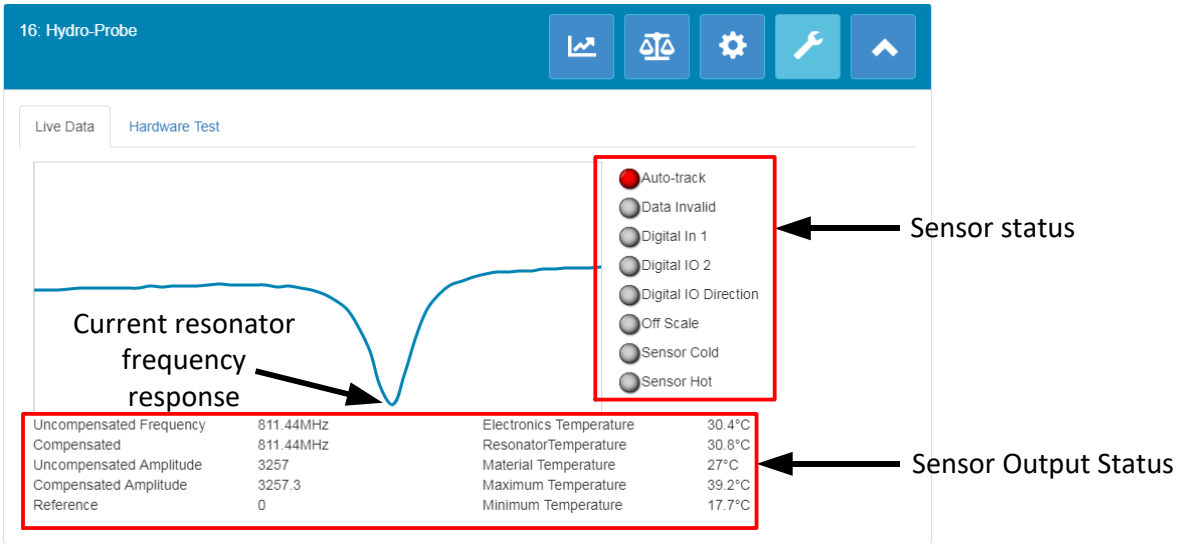


Figure 89: Diagnostics

2.4.1 Resonator

The Resonator Graph displays the current frequency response of the sensors resonator. The resonator response can be helpful in determining if a sensor is operating correctly.

The frequency and amplitude response should always be within the factory Air and Water values (Page 57). With the sensor clean and with no obstructions in front of the ceramic face plate the frequency and amplitude should be very close to the factory Air value. When a hand is placed on the ceramic face plate the frequency and amplitude should be within the Factory Air and Water range. Contact Hydronix support for assistance if the sensor does not operate within the Air/Water span. support@Hydronix.com

Figure 90 shows the typical resonator response with the sensor in air and with a hand on the ceramic (Some sensor will display the graph as a peak instead of a trough).

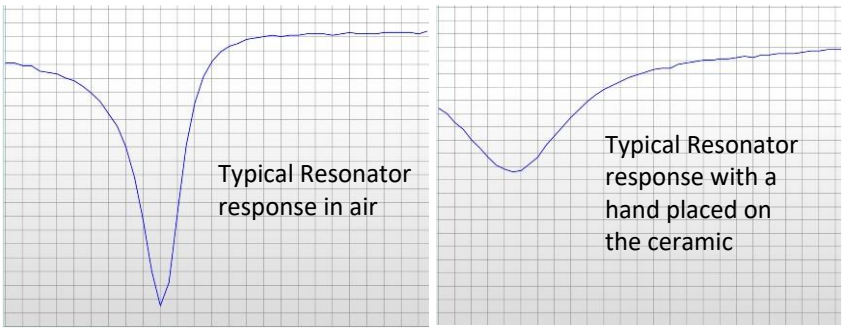


Figure 90: Typical Resonator Response

2.4.2 Sensor Status

The sensor status displays the current digital I/O and alarm status (Figure 91). This can be used to confirm the functionality of the digital outputs and to ensure that the sensor is operating within pre-set limits.

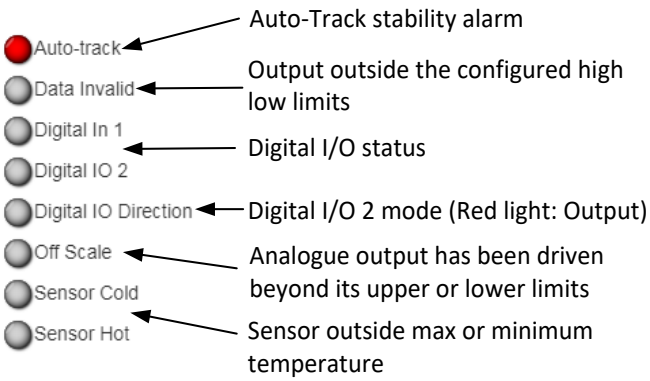


Figure 91: Current Sensor Status

2.4.3 Sensor Output Status

The Sensor Output Status displays the current frequency, amplitude and temperature measurements. The current run time for the sensor is also displayed (the run time indicates the amount of time the sensor has been powered up).

Uncompensated Frequency	811.42MHz	Electronics Temperature	30.7°C
Compensated	811.42MHz	ResonatorTemperature	31.1°C
Uncompensated Amplitude	3259	Material Temperature	27.4°C
Compensated Amplitude	3259.1	Maximum Temperature	39.2°C
Reference	0	Minimum Temperature	17.7°C

Figure 92: Current Sensor Output Values

2.4.4 Hardware Test

The Hardware Test frame enables the user to test the operation of the analogue outputs, current loops and the digital I/O's.

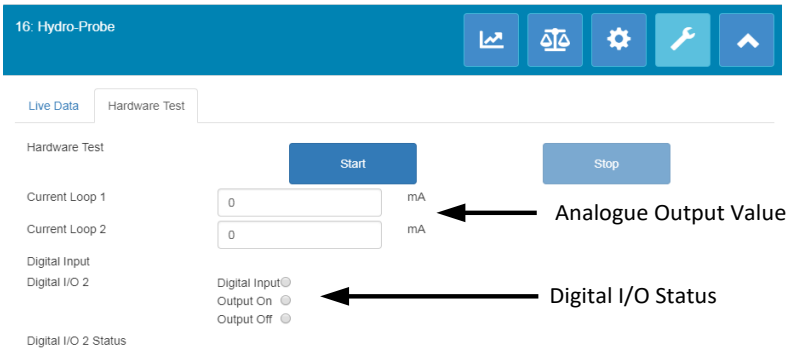


Figure 93: Hardware Test Frame

Analogue Outputs (Current Loop)

When connecting the sensors analogue outputs to a PLC it is necessary to scale the output from the sensor to ensure the PLC is displaying the correct value. Using the Hardware Test section the analogue outputs can be forced to a known value to confirm the correct operation.

To force the analogue output, set the required output to a specific value and press Start. The output will now stay as set until the Stop button is pressed.

Figure 94: Analogue Output Control

Digital I/O's

The functionality of the digital inputs and output can be checked using the Digital Input and Output frame. The current status of both Digital I/O's is displayed, and Digital IO 2 can be set as an input or output to confirm the correct operation. The test is only performed once the Start button is pressed.

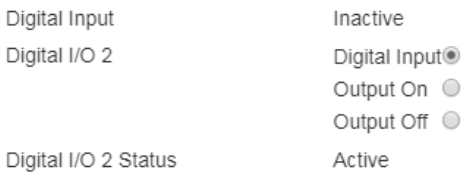


Figure 95: Digital Output Control

1 Introduction to Calibration

For sensor applications where the moisture % is required to be directly output, the sensor will require calibrating to the material that is to be measured.

The Hydro-Net software calibration facility is used to capture Unscaled values and to read this against corresponding moisture values derived from taking and drying samples. This utility is intended for use with sensors measuring in flowing materials, such as in bins or on conveyor belts. The calibration procedure for mixer applications where water is added under controlled conditions to reach a specified moisture value is performed by the mixer control system or a Hydronix Hydro-Control and not by the Hydro-Net software.

For full details about the calibration process see the Configuration and Calibration guide HD0679 or the specific sensor user guide.

2 Calibrating a Sensor

2.1 Coefficients

The calibration process is performed to enable the coefficients to be calculated that are required to convert the sensors Unscaled output into a true moisture %. For most applications only the B and C coefficients are required, see the Configuration and Calibration guide HD0679 for details.

All of the latest Hydronix moisture sensors (excluding the Hydro-Probe) have the ability to select the measurement mode used to calculate the Unscaled output. To output moisture using the different measurement modes requires separate coefficients for each mode (F, E and V). In older Hydronix sensors (Pre-Firmware HS0102) the sensor has to be calibrated separately in each mode to create the coefficients.

When Hydro-Net software is connected to the latest versions of the sensors (Firmware HS0102 or higher) the Unscaled values for each measurement mode are stored at the same time. This facility gives the user the ability to calculate the coefficients in every available measurement mode simultaneously. With all measurement modes calibrated it is possible to select the most appropriate mode to use for a given material without requiring the calibration process to be re-done. The sensor stores the coefficients internally for each mode enabling the sensor to output the moisture % for any mode as required.

Mode F	A: 0.0000	B: 0.2390	C: 0.1090
Mode V	A: 0.0000	B: 0.2890	C: 0.3590
Mode E	A: 0.0000	B: 0.2990	C: 0.3560

Figure 96: Coefficients for all Measurement Modes

2.2 Calibration Data Table

All calibration data points, including the Unscaled values for each measurement mode and the resultant moisture %, are stored in the sensor's memory (Only available with sensors with firmware HS0102 or higher). This enables the user to interrogate the values used to create the coefficients and the moisture spread of the collected samples. The chart will also indicate which samples have been included in the calculations.

Date	Moisture	Mode F	Mode V	Mode E	Include	Notes
29/10/2018 10:12	4	15.9	11.32	11.59	✓	
29/10/2018 10:12	6.5	27.25	23.47	21.44	✓	
29/10/2018 10:12	12	49.51	39.27	38.56	✓	

Figure 97: Calibration Data Table

2.3 Legacy Calibration Coefficients

When the latest versions of Hydronix microwave moisture sensors (Firmware HS0102 or higher) are connected to legacy products, such as Hydro-Com pre 2.0.0 and Hydro-View IV pre 2.0.0, the sensor will only have the coefficients for one measurement mode stored. This will be displayed in the sensor calibration tab under 'Legacy Coefficients'. The Legacy Coefficients are read only in Hydro-Net software.

If the calibration in the sensor was created using legacy software, it is advisable to create a new calibration using the existing calibration data. However, this will only create a calibration in a single measurement mode. If all measurement modes are required the calibration process must be re-done.

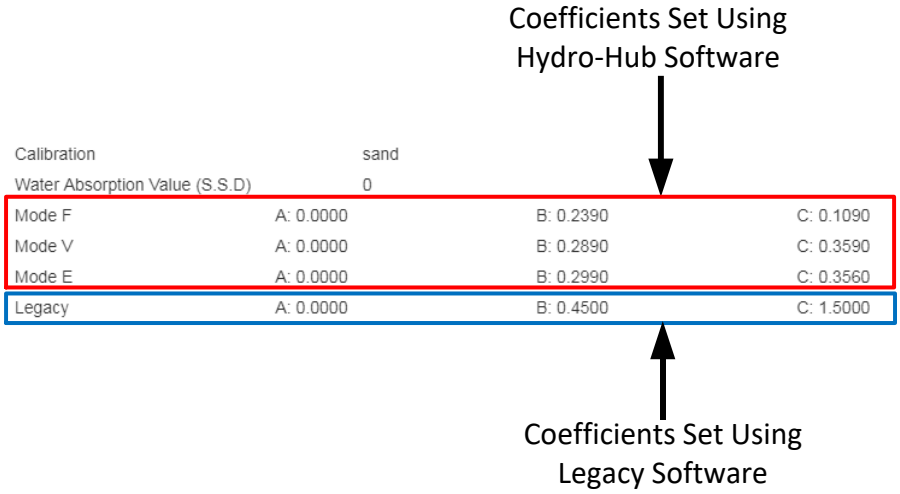


Figure 98: Legacy Coefficients

2.4 Creating a New Calibration

To create a new calibration, click 'New', type a name in the calibration text box and select 'OK'. Dependant on the sensor connected, the available measurement modes and the current calibration coefficients will be displayed.

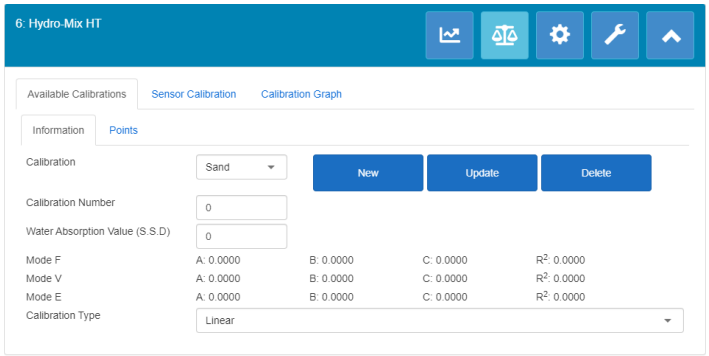


Figure 99: New Calibration

2.5 Adding a Calibration Point

Averaging the output of the sensor over a period of time is essential for representative sampling in most applications. In the case of a Hydro-Probe mounted in a sand bin, once the gate opens the sand starts to flow until the gate closes. As the readings vary during this time the most reliable way in which to obtain a representative Unscaled value is by continuously averaging during the flow.

2.5.1 Averaging Mode

The Averaging Mode used while calculating the Average Unscaled can be set to either 'Raw' or 'Filtered' (Page 56). For applications where mechanical apparatus, such as mixer paddles or screws, pass over the sensor and affect the reading, the use of the 'Filtered' value will remove the peaks and troughs in the signal. If the material flow is stable, for example, when measuring at the output from a silo or on a conveyor belt, the averaging should be set to 'Raw'.

See the Hydronix Sensor Configuration and Calibration Guide HD0679 or the appropriate sensor user guide for more details on how to set the averaging functionality for specific applications.

2.5.2 Automatic Averaging

Digital input 1 can be used to determine when to start the averaging. For a bin installation the sensor input may be generated from the bin-gate switch to give a +24VDC input when the gate is open. The same set-up can be used for other installation such as conveyor belts. A manual switch can be installed to indicate when the sensor should start averaging.

In both cases the configuration of the sensors digital input has to be set to 'Average/Hold' for this purpose (See page 55).

See the Hydronix Sensor Electrical Installation Guide HD0678 or the appropriate sensor user guide for more details on how to wire the digital input.

2.5.3 Remote Averaging

If the installation is without an input that can switch to control the averaging function, Hydro-Net Software has the facility to manually select the start and stop period of averaging. This is called 'Remote Averaging'.

If the averaging is started manually, using the Hydro-Net software, any signals applied to digital input 1 will be ignored during this period.

Figure 100: Remote Averaging

2.5.4 Recording the Average Unscaled

After the averaging has started, either manually or automatically, the Average Unscaled values will change to display the current Average values.

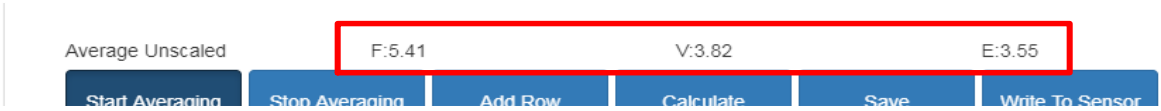


Figure 101: Sensor Averaging Started

Once the averaging has stopped the Average Unscaled values will be held constant. The Unscaled values displayed next to 'Average Unscaled' are the batch average values used in the calibration (Figure 102).

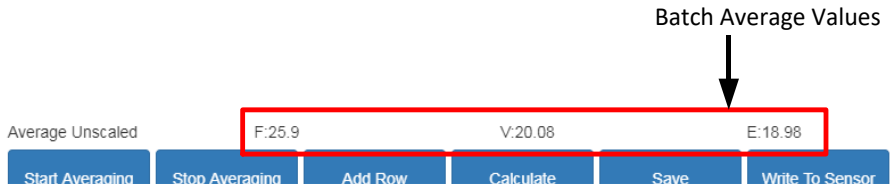


Figure 102: Sensor Averaging Stopped

Average Unscaled values are added to the calibration chart by clicking 'Add Row'.

Figure 103: Add Row

The Unscaled values for all available measurement modes are included in the chart (Figure 104).

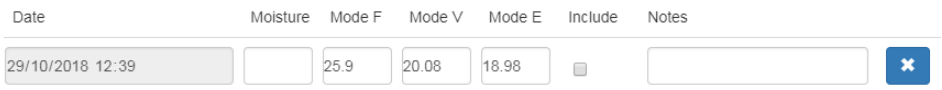


Figure 104: Average Unscaled Added to Calibration Chart

Multiple Unscaled values can be added to the chart as required (Figure 105).

Figure 105: Multiple Unscaled Values

The corresponding moisture % associated with the Unscaled value is added manually in the Moisture % column. The required moisture and Unscaled values can be added to the calibration by clicking the include column for each point (Figure 106).

Date	Moisture	Mode F	Mode V	Mode E	Include	Notes	
29/10/2018 12:39	6	25.9	20.08	18.98	☑		✖
29/10/2018 12:39	9	35.8	30.89	28.89	☑		✖
29/10/2018 12:39	17	54	45.8	42.56	☑		✖

Figure 106: Moisture % Added to Chart

Click Calculate to add the selected points to the calibration graph.

Figure 107: Calculate Calibration

Once the calculation is completed the calibration coefficients are updated and displayed on the information tab (Figure 108). An R^2 value for each measurement modes coefficients is also included. The R^2 can be used to indicate how close the data in the calibration is to the calculated best fit line. An ideal calibration where the best fit line passes through every point will result in an R^2 of 1.

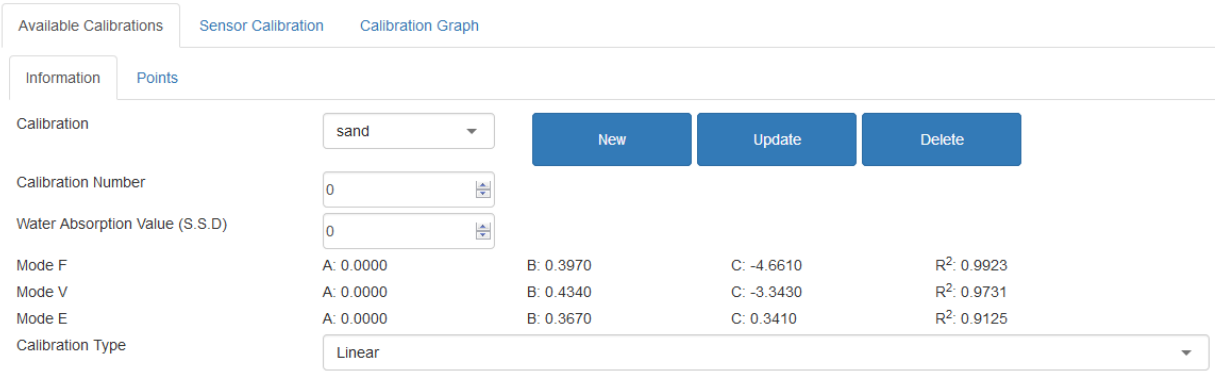


Figure 108: Updated Calibration Coefficients

Click the Calibration graph tab to display the graph (Figure 109).

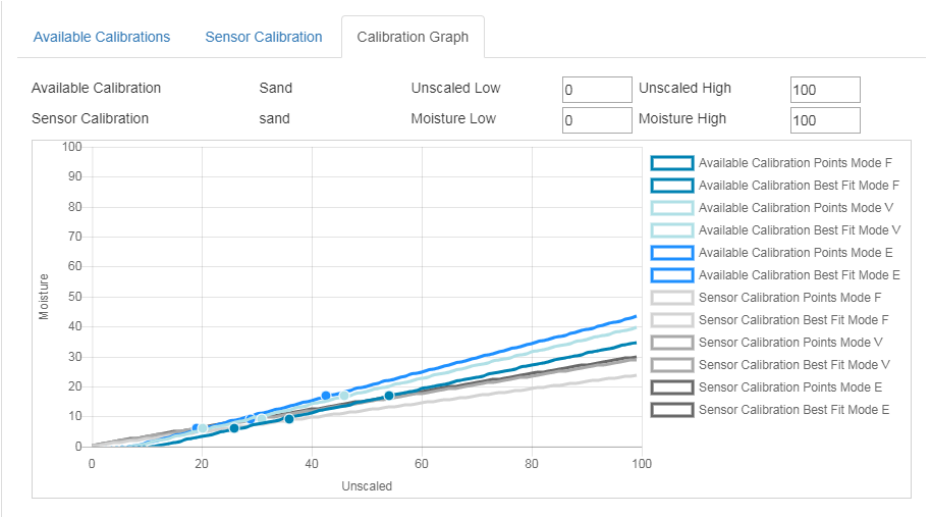


Figure 109: Expanded Calibration Graph

The graph can be configured to display any, or all, of the available measurement modes and best fit lines for the calibration as well as the current calibration points stored in the sensor (not all sensors support this feature). This enables the user to select the most appropriate measurement mode for the application (Figure 110)

See the Configuration and Calibration guide HD0679 for advice on selecting the most suitable measurement mode to use.

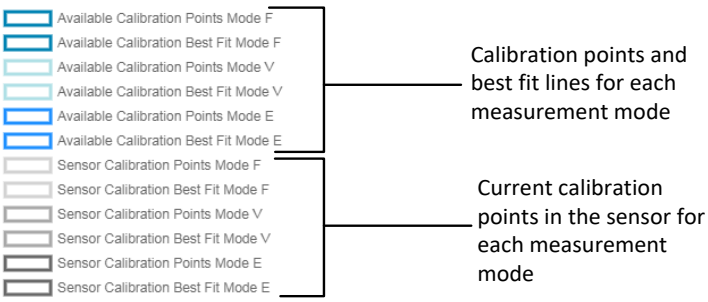


Figure 110: Calibration Graph Selection Panel

2.6 Quick Start Rules

Quick Start Rules are only available with selected sensors. Hydro-Net software will display the 'Quick Start Rules' selection box if it is available with the connected sensor (Figure 111).

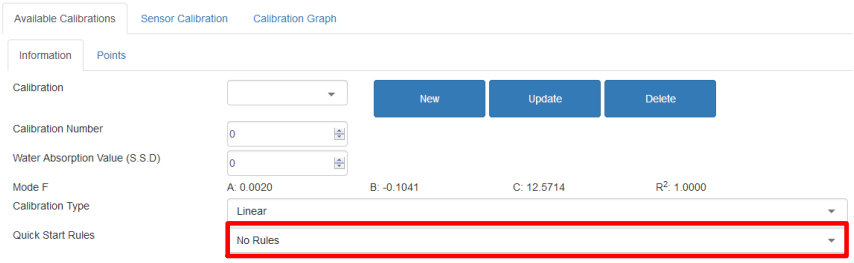


Figure 111: Quick Start Rules Selector

The calibration data points define a mathematical best fit line and it is this line, described using the variables A, B and C, which defines the calibration. The effect of the Quick Start Rules is to improve this calibration line if the calibration data does not satisfy the criteria as described in Appendix A. In such cases the mathematical best fit line is modified. The Quick Start Rules can be used where the calibration samples taken do not result in a large enough moisture variation to produce an accurate calibration. When the moisture in the material changes enough to enable calibration samples to be taken over a greater moisture spread the Quick Start Rules should no longer be used.

It should be noted that the Quick Start Rules have been designed around a sensor mounted at the suggested angle. See the individual sensor user manuals for more information.

Hydro-Net software enables the selection of one of five Quick Start material types:

- 0-2mm Sand (No.8)
- 0-4mm Sand (No.4)
- 4-8mm Gravel (3/8”)
- 8-16mm Stone (0.5”-0.75”)
- 16-22mm Stone (1”)

If, however, different materials are being measured or the installation is different from the suggested method, then the Quick Start Rules should be disabled. This is application specific and should be determined by the engineer commissioning the equipment.

In the graph below, three calibration points have been entered into the table with the Quick Start Rules enabled. The data does not satisfy the complete criteria and as a result, a warning message is displayed as shown. The B and C calibration coefficients that describe this line have been modified.

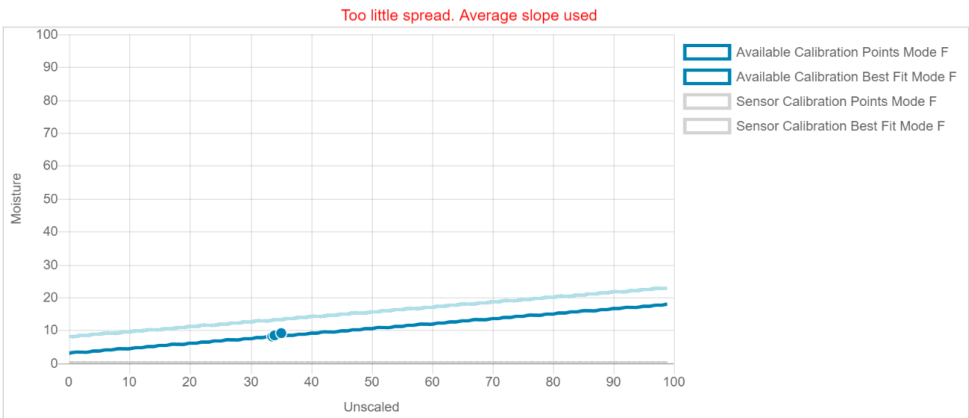


Figure 112: Quick Start Rules Applied

3 Calibration Procedure

The following procedure details the process for calibrating a sensor in mineral based materials. If calibrating to organic products or substances that contain volatile material the locally recognised standards for testing must be followed. The recoding of the sensor value and collection of the samples is the same for all materials.

3.1 Equipment Required

To collect calibration samples the following equipment is required:

- Microwave oven
- Weigh scales 2kg accurate to 0.1g
- Microwave safe bowls
- Metal spoon
- Heat proof gloves and eye protection
- Heat resistant mat, placed on the scales to protect it from the heat of the bowl

3.2 Collecting Samples

To collect samples and record the associated Average Unscaled values from the sensor follow the procedure detailed below:

1. Connect to the sensor and open the calibration section.

2. Create a new calibration by clicking New and enter a name into the calibration name text box and clicking OK.

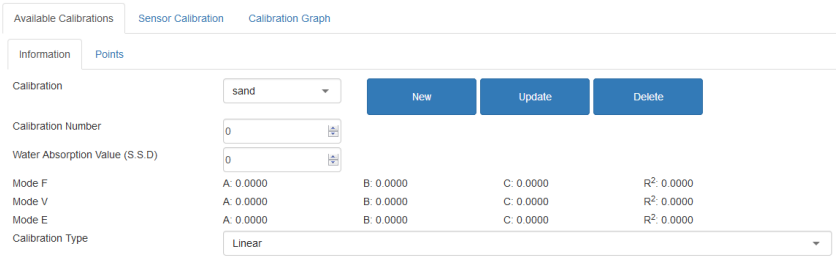


Figure 113: New Calibration

3. If automatic averaging, using the bin gate signal, is in use confirm that ‘Averaging’ is displayed on the Points page when the bin gate opens and ‘Hold’ is displayed when the gate is closed. If manual averaging is to be used ensure that the averaging is only started once the material is flowing and is stopped before the gate is closed or the flow stops.

   Note: If a bin gate is used to trigger the averaging the gate must not be jogged after the main dose otherwise the averaging will be re-started.

4. Once the system has been checked and is confirmed to be working correctly, take a sample of the material. Using a suitable collection method collect a series of small samples from the flow of the material, aim to collect around 5kg in total of material. The material must be collected at a position close to the sensor so the sensor reading relates to the particular batch of material passing the sensor. At the same time the sensor must be set to record the Average Unscaled. If the averaging is to be started manually press “Start Averaging” as soon as the sample collection begins. Press “Stop Averaging” as soon as the sample collection finished, ensure this is before the material flow stops.

5. Place all collected material in an air-tight bucket or bag to ensure no moisture is allowed to escape.

Figure 114: Collection Bucket

6. The Average Unscaled for all available measurement modes is displayed on the calibration page.

Filtered Unscaled	F:12.64	V:9.73	E:8.77	
Average Unscaled	F:12.63	V:9.74	E:8.77	**Hold**

Figure 115: Average Unscaled Values Taken During Averaging

7. Add the Unscaled values to the chart by clicking ‘Add Row’.

Figure 116: Add Calibration Row

Date	Moisture	Mode F	Mode V	Mode E	Include	Notes
2019-01-15T13:24		12.63	9.74	8.77		

Figure 117: Average Unscaled Values Added to Chart

8. Thoroughly mix the collected material to ensure the moisture is evenly distributed.

9. Weigh a clean empty heat proof bowl.

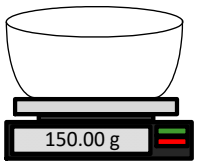


Figure 118: Clean Bowl

10. Place a minimum of 500g of the material in the bowl. All other material must remain in the airtight container until required.

Figure 119: Air-Tight Seal

Some materials, such as grain, might require grinding before analysis. If grinding is required industrial standards should be followed using a suitable grinder.

11. Weigh the bowl and wet material.

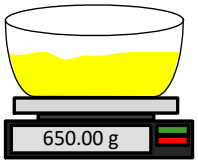


Figure 120: Weigh Wet Material

12. Heat the material in the microwave for approximately five minutes. Weigh the bowl and record the result. Laboratory standards must be followed when heating especially if the material is organic as high temperatures can cause other constituents of the material to be burnt off. Check industry standards for the maximum temperature suitable for the material.

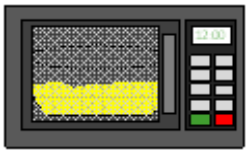


Figure 121: Heat Material

13. Carefully break up any lumps of material using a metal spoon. Do not allow any material to be lost from the bowl or to stick to the spoon. Only break up lumps once the material surface is dry.

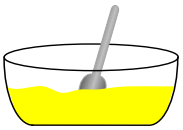


Figure 122: Break-Up Lumps

14. Re-heat the material in the microwave for another five minutes. Weigh the material and record the result.

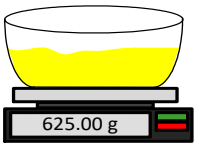


Figure 123: Weigh Material Again

15. Continue to re-heat and weigh the material until the weight remains constant between two heating cycles. This indicates that the material is fully dry.

16. Repeat steps 9-15 for two more samples taken from the collected material.

Note: If using a conventional oven instead of a microwave the same procedure can be followed except the time required to heat the material must be increased accordingly. All three samples can be dried at the same time to speed up the process.

17. Calculate the moisture % of the three sub-samples using the following equations:

Dry weight Moisture Content

If the control process in use requires the moisture % to be based on the dry weight (Md) of the material (Common in the construction industry), the following calculation can be used:

$$Moisture\ \%\ (Md) = \frac{(B - C)}{(C - A)} x\ 100$$

Where A = Weight of the empty bowl

B = Weight of the bowl and wet material

C = Weight of the bowl and the dry material

In the above example the moisture % calculated as:

$$Moisture\ \%\ (Md) = \frac{(650 - 625)}{(625 - 150)} x\ 100$$

$$Moisture\ \%\ (Md) = \frac{25}{475} x\ 100$$

$$Moisture\ \%\ (Md) = 5.26\%$$

Wet Weight Moisture Content

If the control process in use requires the moisture % to be based on the wet weight (Mw) of the material (Common in the Agricultural and Food industries), the following calculation can be used:

$$Moisture\ \%\ (Mw) = \frac{(B - C)}{(B - A)} x\ 100$$

In the above example the moisture % calculated as:

$$Moisture\ \%\ (Mw) = \frac{(650 - 625)}{(650 - 150)} x\ 100$$

$$Moisture\ \%\ (Mw) = \frac{25}{500} x\ 100$$

$$Moisture\ \%\ (Mw) = 5\%$$

18. If all three sub-samples are within 0.3% moisture, take an average of the three results. If the sub-samples are not within 0.3% moisture the test must be repeated. Variations in the results indicate possible sampling or laboratory errors.

19. Manually add the moisture % result to the calibration chart

Date	Moisture	Mode F	Mode V	Mode E	Include	Notes
2019-01-15T13:24	6	12.63	9.74	8.77		

Figure 124: Moisture Added to the Data Table

20. Repeat the process to collect sample at different moisture %. The aim of the calibration process is to collect samples that cover the entire expected moisture range of the material.

Date	Moisture	Mode F	Mode V	Mode E	Include	Notes
2019-01-15T13:24	6	12.63	9.74	8.77		
2019-01-15T13:25	8	16.54	15.4	14.95		
2019-01-15T13:25	10.5	21.2	20.8	19.5		

Figure 125: Several Calibration Points

Hydro-Net software will only display 3 calibration points at a time, to view additional points use the pagination arrows to search.

Figure 126: Pagination

21. After the calibration points have been calculated selecting the 'Include' column will add the points to the calibration graph.

Date	Moisture	Mode F	Mode V	Mode E	Include	Notes
2019-01-15T13:24	6	12.63	9.74	8.77	☑	
2019-01-15T13:25	8	16.54	15.4	14.95	☑	
2019-01-15T13:25	10.5	21.2	20.8	19.5	☑	

Figure 127: Selected Points

22. Click Calculate to refresh the graph with the selected points. Calculate

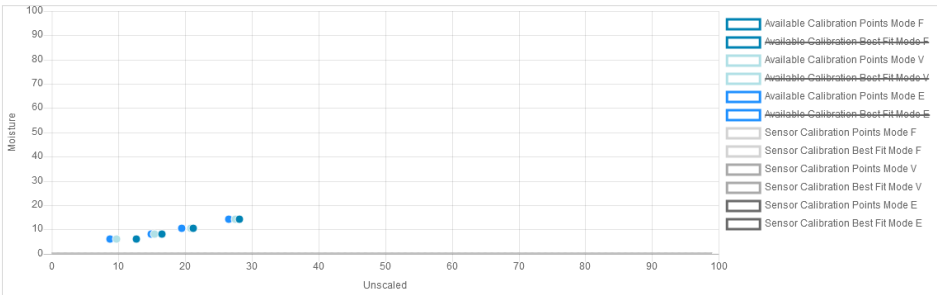


Figure 128: Calibration Points Added to the Graph

23. It is now possible to evaluate the points and to inspect the best fit line that has been generated. The output from Hydronix moisture sensors is linear to moisture change so accurately collected and analysed samples should be on, or very close, to the best fit line. All available Measurement Modes can be displayed at the same time to enable comparisons to take place.

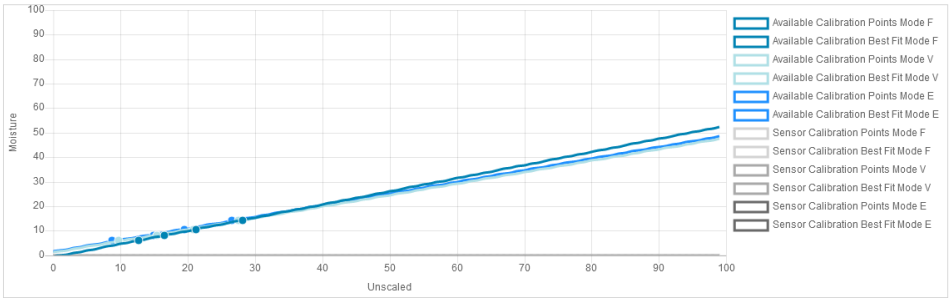


Figure 129: Calibration Graph Displaying All Available Measurement Modes

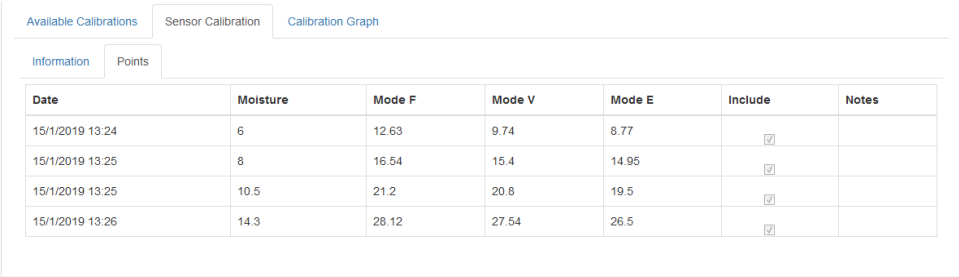
See the appropriate sensor user guide for advice on which Measurement Mode to select.

24. Save any changes made to the calibration.

25. Once a calibration has been completed successfully the data can be written to the sensor. All available Measurement Mode coefficients will be updated and if the sensor supports the facility the calibration points (Unscaled and Moisture %) will also be transferred to the sensor.

    Select write to sensor to update the sensor.

Once updated the current calibration data will be available in the ‘Sensor Calibration’ tab.



Date	Moisture	Mode F	Mode V	Mode E	Include	Notes
15/1/2019 13:24	6	12.63	9.74	8.77	☑	
15/1/2019 13:25	8	16.54	15.4	14.95	☑	
15/1/2019 13:25	10.5	21.2	20.8	19.5	☑	
15/1/2019 13:26	14.3	28.12	27.54	26.5	☑	

Figure 130: Sensor Calibration Tab

4 Copy a Calibration from the Sensor to the Database

If the connected sensor’s calibration data is not stored in the Hydro-Net database it is possible to copy the data points and coefficients from the sensor to the database. This enables the user to make a copy of a calibration created on a different version of Software. As the data in the Sensor Calibration tab is read only, if the calibration requires updating or adjustment the data has to be copied to the database. Once the calibration is updated to the database it can be modified.

To update the calibration open the Sensor Calibration Tab and select Update Calibration.

Once updated the calibration data can be viewed in the available calibration tab by selecting it from the calibration selector.

1 Quick Start Rules

- Limiting slopes (B) for any calibration will be a maximum of 2.0 and a minimum of 0.06.
- One-point calibrations:
  - The calibration slope will be set to be the average of the two known sand calibrations.
  - If the Unscaled value at zero moisture is less than 5, the Unscaled value at zero moisture will be set to be 5 and a new calibration slope calculated through this point and the single point entered.
  - If the Unscaled value at zero moisture is greater than 50, the Unscaled value at zero moisture will be set to be 50 and a new calibration slope calculated through this point and the single point entered.
  - If the resulting slope is greater than the maximum or less than the minimum calibration slopes, then no calibration will be carried out and the user will be informed of this.
- More than 1 point calibration – spread in points: Moisture < 1% or Unscaled < 2
  - A single point calibration will be carried out.
- More than 1 point calibration – spread in points: Moisture < 3% or Unscaled < 6
  - If the calculated slope is greater than the selected materials quick start calibration slope, set the calculated slope to the quick start calibration slope - If the calculated slope is less than the selected quick start calibration slope, set the calculated slope to the quick start calibration slope – otherwise leave the slope as it is. (Recalculate intercept value from average from all points)
  - If the Unscaled value at zero moisture is less than 5, the Unscaled value at zero moisture will be set to be 5 and a new calibration slope calculated through this point and the average of the points entered.
  - If the Unscaled value at zero moisture is greater than 50, the Unscaled value at zero moisture will be set to be 50 and a new calibration slope calculated through this point and the average of the points entered.
  - If the resulting slope is greater than the maximum or less than the minimum calibration slopes, then no calibration will be carried out and the user will be informed of this.
- More than 1 point calibration – spread in points: Moisture > 3% and Unscaled > 6
  - Calibration slope is calculated, and the user is warned if:
    - If the Unscaled value at zero moisture is less than 5.
    - If the Unscaled value at zero moisture is greater than 50.
    - If the resulting slope is greater than the maximum or less than the minimum calibration.

This Appendix provides instructions for retrieving and changing the IP configuration of the Hydro-View and Hydro-Hub when the device's IP settings are unknown and accessing the device's standard user interface is not possible.

This feature is available from Hydro-Net version 1.13.0.0 onwards.

1 Retrieving the Device's IP configuration

A blank USB memory stick must be used.

To determine the device's current IP configuration settings, connect a blank USB memory stick to one of the ports on the underside and reboot the device by disconnecting the power supply for ten seconds and then reconnecting.

During initialisation, the device outputs its IP configuration settings into a file named InterfaceSettings.json, and saves it onto the connected USB memory stick under the following path: *USB_root* > *HydroHub_Files* > *SystemFiles* (see Figure 131).

Figure 131: IP Configuration File Path

The file can be opened and viewed using a basic text editor using a PC or laptop.

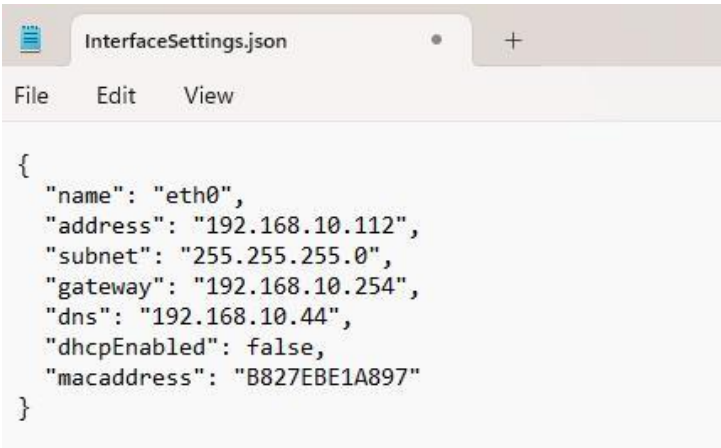


Figure 132: Current IP configuration details

If the "dhcpEnabled" flag is ‘false’, the device is set to static IP and the configuration settings saved in the device are shown above the "dhcpEnabled” flag row (see Figure 133).


```
{
  "name": "eth0",
  "address": "192.168.10.112",
  "subnet": "255.255.255.0",
  "gateway": "192.168.10.254",
  "dns": "192.168.10.44",
  "dhcpEnabled": false,
  "macaddress": "B827EBE1A897"
}
```


Figure 133: Static IP configuration

If the "dhcpEnabled" flag is ’true’, the device is set to a dynamic IP and the last IP configuration settings issued to the device by the DHCP server are shown above the "dhcpEnabled flag row (see Figure 134).


```
{
  "name": "eth0",
  "address": "192.168.10.112",
  "subnet": "255.255.255.0",
  "gateway": "192.168.10.254",
  "dns": "192.168.10.44",
  "dhcpEnabled": true,
  "macaddress": "B827EBE1A897"
}
```


Figure 134: Dynamic IP configuration

2 Modifying the Device’s IP Configuration

To modify the device’s IP settings:

1. Modify the InterfaceSettings.json file that the device saves onto a USB memory stick.
2. Apply the desired changes to the device using the memory stick and the modified file.

The file can be edited using a basic text editor using a PC or laptop.

2.1 Changing Configuration from Static to Dynamic

To change the device's IP configuration from Static to DHCP, the "dhcpEnabled" flag in the InterfaceSettings.json file must be changed to 'true' (see Figure 135).

The file must be saved in the same location and under the same name.

No other changes are necessary. Once the file is edited and saved, proceed to Section 2.3, Applying Configuration Changes to the Device.

```
{
  "name": "eth0",
  "address": "192.168.10.112",
  "subnet": "255.255.255.0",
  "gateway": "192.168.10.254",
  "dns": "192.168.10.44",
  "dhcpEnabled": true,
  "macaddress": "B827EBE1A897"
}
```

Figure 135: DHCP/Static IP Configuration flag in .json File

2.2 Changing Configuration from Dynamic to Static

To change the device's IP configuration from DHCP to Static, the "dhcpEnabled" flag must be changed to 'false' (see Figure 136) and the IP configuration settings in the four rows above the "dhcpEnabled flag row must be edited to the desired values (see Figure 137).

The file must be saved in the same location and under the same name.

Once the file is edited and saved, proceed to section 2.3, Applying Configuration Changes to the Device.

```
{
  "name": "eth0",
  "address": "192.168.10.112",
  "subnet": "255.255.255.0",
  "gateway": "192.168.10.254",
  "dns": "192.168.10.44",
  "dhcpEnabled": false,
  "macaddress": "B827EBE1A897"
}
```

Figure 136: DHCP/Static IP Configuration flag in .json File

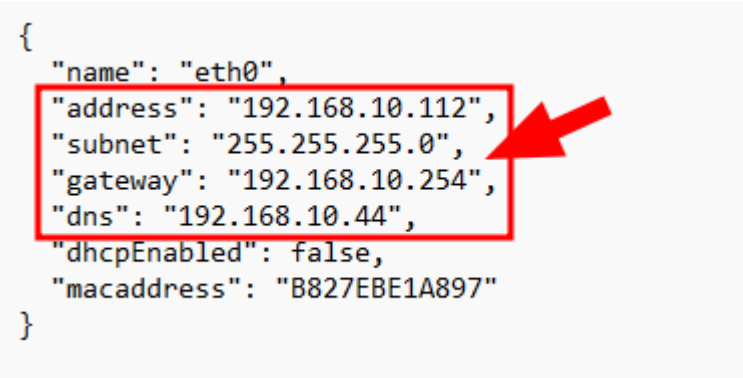


Figure 137: Example IP Configuration Settings

2.3 Applying Configuration Changes to the Device

Connect the USB memory stick with the modified InterfaceSettings.json file stick to one of the ports on the underside of the device. The file must have the original path and name.

Reboot the device for the changes to take effect by disconnecting the power supply for ten seconds and then reconnecting. Do not remove the USB memory stick during reboot.

If the file was modified correctly, the device will accept the new configuration set in the InterfaceSettings.json file.

1 Specifications and Ratings

Unless stated otherwise, the technical specifications apply to both the Hydro-View and the Hydro-Hub.

1.1 Weight and Dimensions (Hydro-View)

Bezel:	290mm (11.4”) (W) x 192 (7.6”) (H) x 5mm (0.2”) (D)
Panel Cut-out:	265mm (10.4”) (W) x 168 (6.6”) (H)
Max Panel Thickness:	3mm (0.12”)
Depth:	72mm (2.8”)
Depth Behind Bezel:	67mm (2.6”)
Weight:	2.2kg (4.9lbs) (approximately)

1.2 Weight and Dimensions (Hydro-Hub)

Depth:	63mm (2.5”) (including DIN rail mount)
Width:	262mm (10.3”)
Height:	93mm (3.7”) (excluding Connectors)
Weight:	1.1kg (2.4lbs) (approximately)

1.3 Electrical Ratings

Maximum Power Consumption (without sensors):	40W
Supply Voltage Range:	20 to 28 VDC
Expansion Card Input Voltage Range:	20 to 28 VDC
Alarm Output Voltage Supply Range	20 to 28 VDC

1.4 Wiring specification

The wiring used to make electrical connection to the device must meet the minimum criteria listed below:

Max working voltage:	1000V AC
Min. Insulation Resistance @ 20ºC:	10MΩ.km
Radial thickness of insulation:	0.3mm
Conductor rated temperature:	85 ºC

Power supply Conductors: 24AWG, 7/0.2mm, minimum cross-sectional area: 0.22mm^2

I/O Conductors:

For Output Current <= 0.5A: 24AWG, 7/0.2mm, minimum cross-sectional area: 0.22mm^2

Protective Earthing Conductor minimum cross-sectional area:

2.5 mm² if the PE conductor is mechanically protected,

4 mm² if the PE conductor is not mechanically protected

1.5 Power Supply System

Recommended supply: The power supply unit used must meet power consumption requirements of Hydro-View/Hydro-Hub and must be IECEE certified.

Minimum supply: 24VDC, 40W + 4W per connected sensor

Important: The power supply designated to supply Hydro-View / Hydro-Hub must not be used to power any external circuit to reduce the likelihood of interference between the two systems.

Overcurrent Protection: A suitable circuit breaker must be installed

Overvoltage Category: Category II (up to 300V)

Disconnection: A disconnection device (i.e. Circuit breaker or switch) must be installed. The OFF position of the disconnect device must be clearly marked. The disconnect device must be mounted near Hydro-View/Hydro-Hub device, easily accessible and not require tooled access.

The external circuits must have their own power supply and circuit breaker and not be supplied via the circuit breaker designated for the Hydro-View/Hydro-Hub.

1.6 Environmental Conditions

Operation Temperature Range:	0°C to +50°C (32°F to 122°F)
Storage Temperature Range:	-20°C to +75°C (-4°F to 167°F)
Maximum Altitude:	2000 m
Intended Use Location Type:	Indoor Use Only
Maximum Relative Humidity:	80%*
Pollution Degree:	2**
Ventilation Clearance:	Minimum 60mm at the sides and rear
IP/NEMA Rating:	IP65/NEMA3*** Indoor Use Bezel Seal (Hydro-View only)

NOTE: Where ambient temperatures vary, a temperature regulation system may need to be installed.

* for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C

** (Electrical equipment in industrial or farming areas, untreated rooms and boiler rooms)

***Hydro-View bezel seal only, when correctly installed with 4X mounting brackets in a suitable enclosure.

1.7 Software

Operating System:	HS0117
Application Software:	HS0113

1 Document Cross Reference

This section lists all of the other documents that are referred to in this User Guide. You may find it beneficial to have a copy available when reading to this guide.

Document Number	Title
HD0678	Sensor Electrical Installation Guide
HD0679	Sensor Configuration and Calibration Guide
HD0865	Hydro-View / Hydro-Hub Profibus Configuration Guide
HD0922	Hydro-View / Hydro-Hub EtherNet/IP Configuration Guide
HD0801	Hydro-Net API Developers Guide
HD0682	Hydro-Com User Guide

1 Risk Assessment

Information in this section aims to assist with risk analysis.

Severity Group	People	Equipment / Facility	Environment
Catastrophic	Once or more fatalities	System or facility loss	No catastrophic environmental impact
Severe	Disabling injury/illness	Major subsystem loss of facility damage	N/A
Moderate	Medical treatment or restricted work activity.	Minor subsystem loss of facility damage	N/A
Minor	First aid only	Non-serious equipment or facility damage	N/A

Table 2: Severity of Harm

Likelihood	Expected rate of occurrence
Frequent	More than five times a year.
Likely	More than once per year, but not more than five times a year.
Possible	More than once in five years, but not more than one a year.
Rare	More than once in ten years, but no more than one in five years.
Unlikely	No more than once in ten years.

Table 3: Probability of Harm

Risk assessment / Risk category			
Risk	**Probability of Harm**	**Severity**	**Remark**
Electric shock	Unlikely	Minor	The device is supplied with 24VDC will not cause harm.
Cuts (Hydro-View only)	Unlikely	Minor	The device must not be used when the device's screen is damaged.

Table 4: Risk Category

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