Hydro-View User Guide

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CUSTOMER RESPONSIBILITY

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

ERRORS IN DOCUMENTATION

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

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

ACKNOWLEDGEMENTS

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1.2.0	1.3.0	Jan 2013	Averaging Mode and Sensor Restore Updated. Calibration section Updated
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Box Contents

Standard Contents:

1	x	Hydro-View Unit
1	x	Mounting Bracket
1	x	RS-485 and Power Adaptor
1	x	Documentation CD
1	x	Quick Installation Guide
1	x	Quick Start Guide

Available accessories:

Part No.	**Description**
0116	24v DC Power Supply 30 Watt
0175	Panel Mount USB Socket
2010	Wall Mounted Enclosure

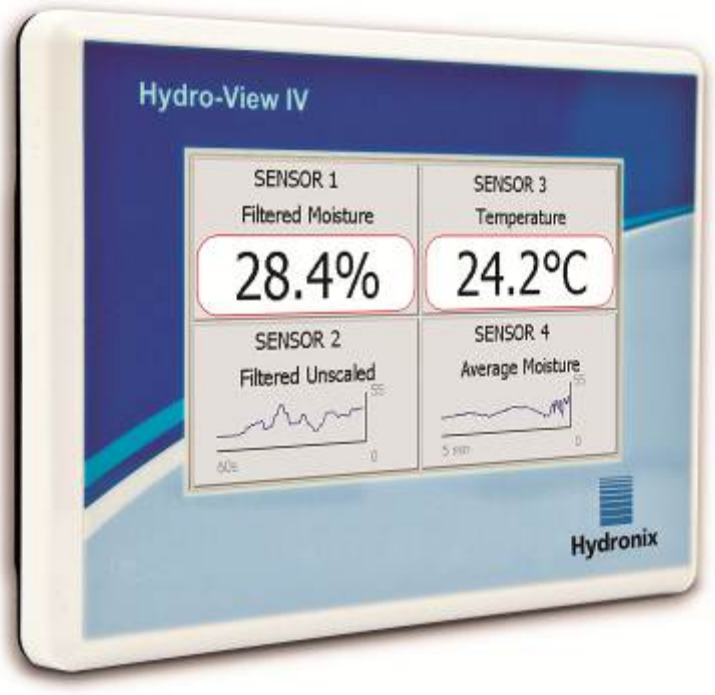


Figure 1: The Hydro-View

This Hydro-View User Guide is only valid for model number HV04 running software version 2.0.0 and above. User guides for earlier Hydro-View model numbers are available from www.hydronix.com

1 Introduction to the Hydro-View (HV04)

The Hydro-View is a touch screen computer based upon the Microsoft Windows CE operating system that has been designed to work with the Hydronix range of sensors to provide a live display of on-line process measurements and enable quick and easy calibration and configuration of the sensors. The Hydro-View can connect to up to 16 sensors at one time.

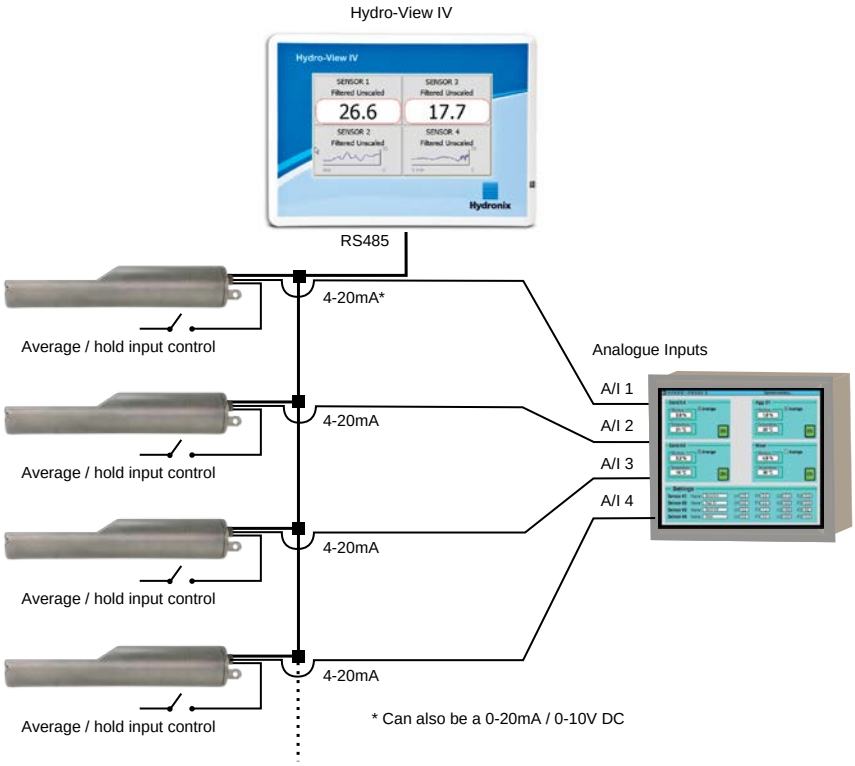
Its main display page supports 1, 2 or 4 screen areas, each of which is configurable to display a trend graph or numeric display of measurements from any connected sensor.

The Hydro-View stores multiple material calibrations for each sensor, allowing rapid re-calibration if the material being measured is changed. The intuitive multi-point calibration feature enables the sensor to be easily and precisely calibrated.

As well as being connected to a Hydro-View, the sensors can also be integrated with a control system via their analogue outputs. Digital inputs and outputs on the sensors allow for averaging start and stop in a batch process.

In order to correctly understand the use of the Hydro-View unit it is important to understand the capabilities of the sensor that is to be attached to the unit. Please read the relevant user guide that is supplied with the sensor. Alternatively please download the user guide from the Hydronix website: www.hydronix.com

All sensor configuration options in this guide reference Hydronix sensors utilising firmware HS0102 or above. Some facilities detailed will not be available with all sensors.



2 About this Manual

This manual is both an installation guide and a user guide.

This manual contains sections on mechanical installation, electrical installation as well as calibrating and configuring Hydronix sensors using the Hydro-View.

3 Safety

The Hydro-View has been designed to meet the requirements of IEC/EN 61010-1: 2001 and ANSI/UL 61010-1 Second Edition.

This equipment is designed to be safe when used for its intended purpose and under the following conditions.

3.1 Intended Purpose

The Hydro-View is intended to be used as a display, calibration and configuration interface for Hydronix sensors in an industrial environment where it should be installed by suitably qualified and competent personnel.

3.2 Precautions

This unit is suitable for indoor use only.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

The final installation should have a means to disconnect the electrical supply to the unit. It should be marked as the disconnecting device and be within easy reach of the operator.

Disconnect all signals from any voltage supply before the unit is opened for any adjustment, maintenance or repair work.

Ensure that only fuses of the correct type and rating are fitted.

Ensure that the Hydro-View is mounted in an environment that will not cause electrical interference.

3.3 Explanation of Symbols and Markings

It is important to understand the meaning of the various symbols and markings on the Hydro-View equipment as follows:

Caution – risk of electric shock.

Caution – refer to accompanying documents.

3.4 Clearance Requirements

It is important to ensure that the Hydro-View has adequate clearance for ventilation and access. The USB socket should be easily accessible.

The minimum clearance for the top and sides of the enclosure is 50mm. It may be necessary to allow more space at the side to allow access to the USB socket.

3.5 IP Rating

When correctly integrated into a suitable enclosure, the front panel and touch screen are designed to be rated to Ingression Protection (IP) rating IP66. This has the American equivalent NEMA 4.

This IP/NEMA rating is only applicable if the unit is installed in accordance with the mechanical mounting procedures detailed in Chapter 2 of this Document.

3.6 Environmental Conditions

The range of environmental conditions for which the equipment has been designed are:

- Indoor Use Only
- Altitude up to 2000m
- Temperature 0°C to 50°C (32°F to 122°F)
- Maximum relative humidity 80% for temperatures up to 31 °C decreasing linearly to 50% relative humidity at 50 °C
- Pollution Degree 3 (Electrical Equipment in industrial or farming areas, untreated rooms and Boiler rooms)

3.7 Lightning Strikes

Consideration should be given to protecting the installation from damage caused by lightning and similar electrical disturbances.

Many installations will be in situations that are particularly prone to damage by lightning, for example:

- Tropical Regions.
- Long cable runs between the sensor and the control panel.
- Tall, electrically conductive constructions (e.g. aggregate bins).

Precautions should be taken to avoid damage by lightning in areas where there is a known risk.

It is recommended to install suitable lightning barriers to all conductors in the sensor extension cable. Ideally, these would be fitted at both ends of this cable to protect the sensor, the Hydro-View and any other equipment connected to it.

It is recommended to install the equipment using screened cables to the specification defined in Chapter 3 Section 4.

3.8 Cleaning

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

Note: Do not direct a water jet at the unit.

4 Application Examples

The Hydro-View may be used to configure and monitor Hydronix sensors in a variety of applications. It is possible to connect the Hydro-View to any of the current range of Hydronix digital sensors. The specific choice of sensor will depend upon the requirements of the application. Individual sensor user guides explain the full functionality of each sensor as well as installation and calibration advice that will be relevant when using the Hydro-View.

Common applications are as follows:

4.1 Batch Averaging

A sensor is used to measure and record an average moisture % of a batch of material released from a bin (silo) over a short period of time. The Hydro-View may be used to configure the averaging parameters of the sensor including enabling the sensor to start and stop averaging during the discharge period. The start and stop signal is given directly to the sensor via a limit switch position on a gate or from a third party control system.

4.2 Mixing Applications

The Hydro-View may be used in conjunction with a Hydro-Mix or Hydro-Probe Orbiter sensor to monitor a mixing process. The sensor is positioned within the mixer and the Hydro-View may be used to display a graph of moisture over time. This is useful to identify the degree of homogeneity in the material. Amongst other configurable parameters in the sensor the Hydro-View may be used to configure high and low moisture level alarms.

4.3 Continuous Monitoring of Material

The Hydro-View may be used to configure and monitor a sensor in a continuous process with the output from the sensor used by third party automation to control the process. Examples are sensors positioned in screw conveyors or on belt conveyors. As with other applications the Hydro-View may be used to configure filtering and smoothing parameters within the sensor to achieve the best possible signal. The Hydro-View may be used to configure high and low moisture level alarms. Refer to the sensor user guide.

For further information on any of the above please refer to the relevant sensor user guide.

Figure 2: Rear view of the Hydro-View

1 Weight and Dimensions

Fascia:	145mm (W) x 104mm (H); (5.7” (W) x 4.1” (H))
Panel Cut Out:	128mm (W) x 94mm (H); (5.1” (W) x 3.7” (H))
Max Panel Thickness:	3mm
Depth:	41mm (1.6”)
Depth behind fascia:	35mm (1.4”)
Weight:	270g

NOTE:

Input / Output connections are made to the base so access needs to be allowed for the cables and connectors.

A USB connection is available on the right hand side of the unit (viewed from the rear). Sufficient space should be left to allow insertion of a USB memory stick, if required. A Panel Mount USB Socket is available as an accessory.

A minimum of 50mm of space should be allowed around the unit for cooling air circulation.

2 Mounting and Installation

2.1 Panel Mounting

The unit can be mounted in a control panel (maximum thickness 3mm) using the mounting bracket supplied. To fit the mounting bracket, locate the bracket holes over the four screws on the rear of the Hydro-View and drop into place. Tighten the eight screws evenly against the panel.

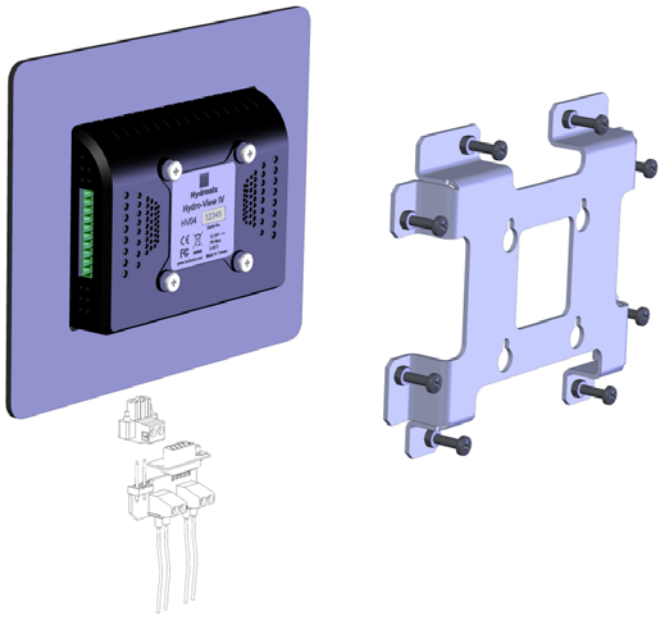


Figure 3: The Hydro-View Mounting Bracket

To install the Hydro-View

- Cut out an aperture in the panel of the correct size. See Figure 4 for a template.
- Remove the mounting bracket from the rear of the unit by lifting it upwards and then unhooking it.
- Insert the Hydro-View through the prepared hole.
- Re-fit the mounting bracket to the unit and tighten the screws evenly to pull the fascia towards the control panel.

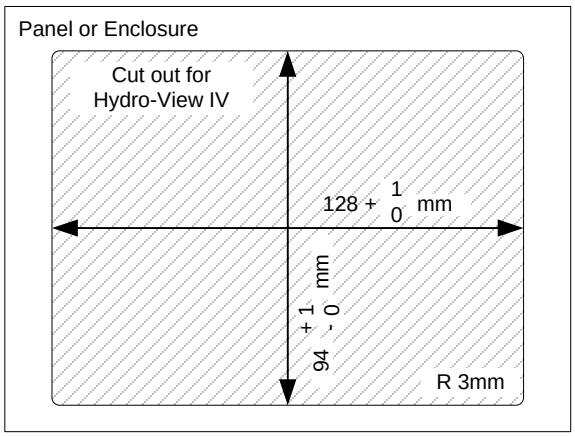


Figure 4: The Panel Cut-Out for the Hydro-View

2.2 Mounting with Hydronix Enclosure

If a suitable control panel or cabinet is not available, the Hydro-View may be mounted in the Hydro-View Wall Mounted Enclosure (part number 2010). The Hydro-View is fitted inside the enclosure as described in section 2.1. The cables supplied in the enclosure are connected to the Hydro-View and tightened in place with their locking screws.

3 Operating Temperature

The unit has been designed to work in ambient air temperatures inside the cabinet of 0 – 50 °C (32 – 122 °F).

Where ambient temperatures vary from this a temperature regulation system may need to be installed.

4 Memory Card

A Micro/Mini SD card is installed in the right hand side of the unit. This should not be removed or interfered with, as this could prevent the correct operation of the Hydro-View.

This chapter explains the configuration of the connectors on the Hydro-View unit and how the wiring should be designed and installed. These connections will vary depending on the configuration and integration requirements of the system design.

The supplied RS485 Adapter should be plugged into the 9-way D plug on the bottom of the unit, and secured in place with the fixing screws.

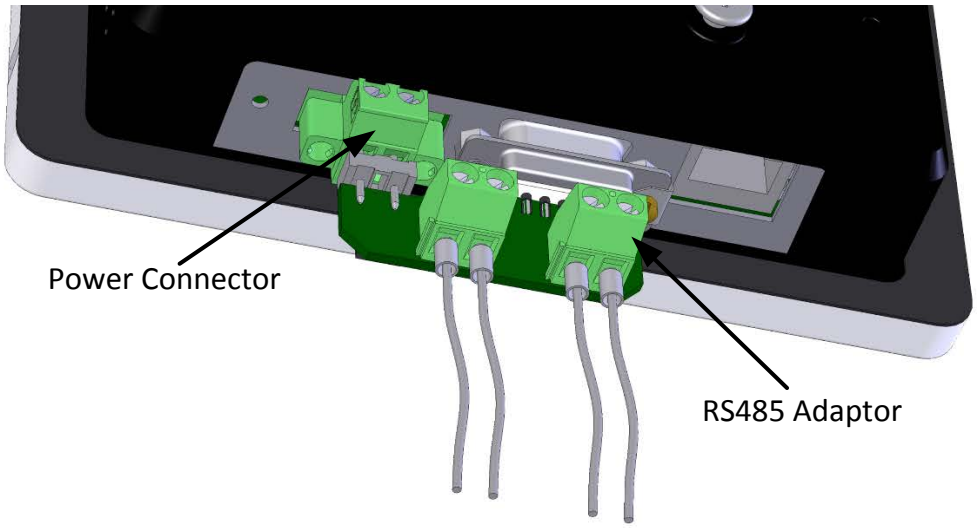


Figure 5: Fitting the RS485 Adapter

1 Connector Pin Assignments

1.1 Power Connector

Pins	Name	Description
+	+24V DC	Positive Supply connection
-	0V	0V Supply connection

1.2 RS485 Adapter

Pins	Name	Description
A	RS485 A	RS485 A data line
B	RS485 B	RS485 B data line

1.3 Wiring Diagram

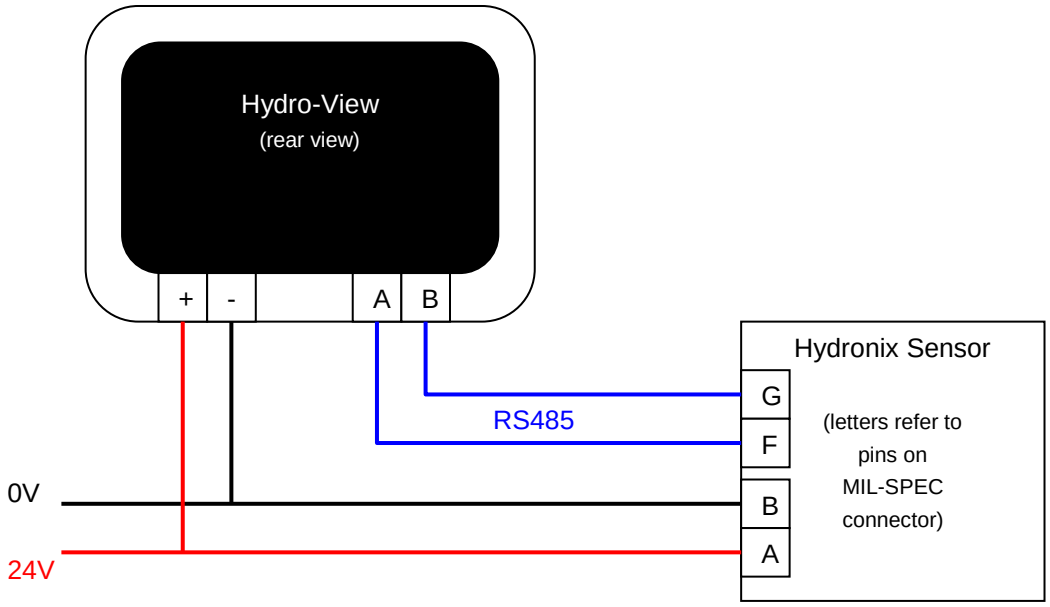


Figure 6: Hydro-View Wiring Diagram

1.4 Wiring Diagram with Hydronix Enclosure

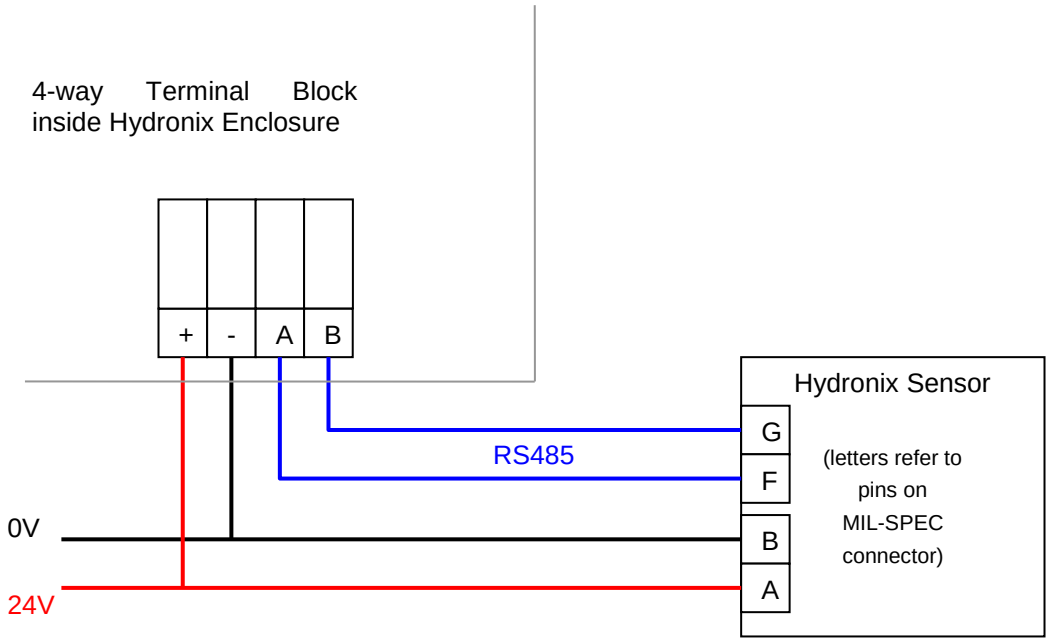


Figure 7: Hydro-View Wiring Diagram (with Hydronix Enclosure)

Using a suitable cable gland, connect a cable into the Hydro-View enclosure and wire to the four way terminal block in the bottom right hand corner as shown in Figure 7. The wires from the top of the terminal block are then wired into the Hydro-View as shown in Figure 8. Additionally, plug the USB cable into the USB port on the Hydro-View.

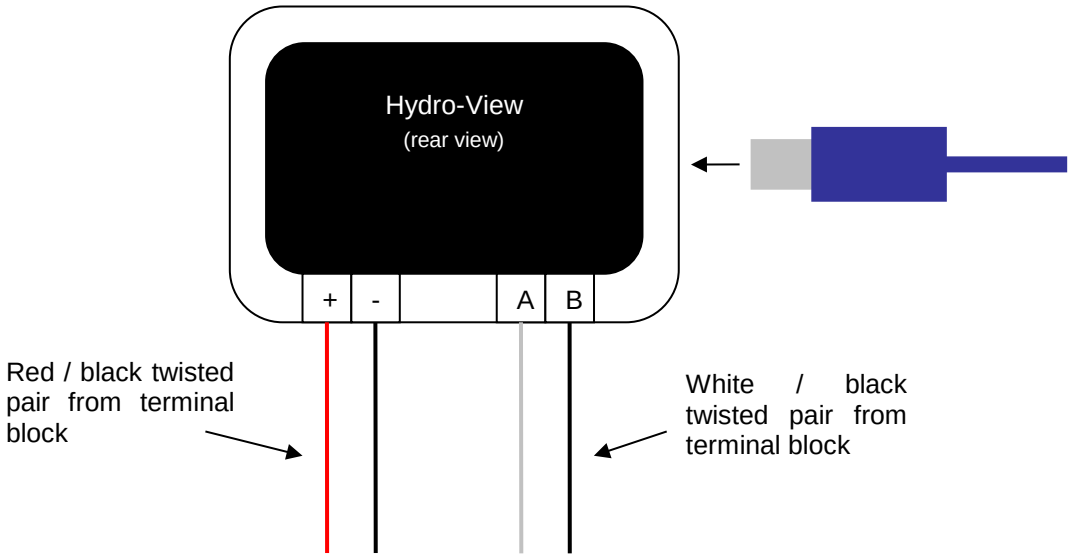


Figure 8: Hydronix Enclosure Internal Wiring

2 Power Supply

The unit uses 24v DC, with a nominal power rating of 7W excluding the sensors.

Minimum supply: 24v DC, 0.2A (5W)

Recommended supply: Hydronix part number 0116

Important: If power is being supplied to more than one sensor from the Hydro-View, a more appropriate, higher powered supply must be specified.

3 Communications

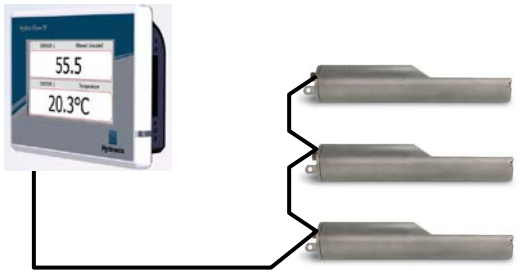
3.1 RS485

The RS485 connection is used for communicating with Hydronix moisture sensors. It is possible to update the material calibration, change operating parameters and carry out sensor diagnostics from the Hydro-View.

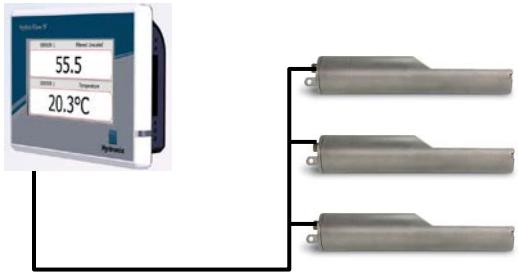
3.2 RS485 Wiring Recommendations

The performance and reliability of a RS485 network can depend significantly on the quality and design of the wiring used. See section 4.1 below for recommended wire specifications.

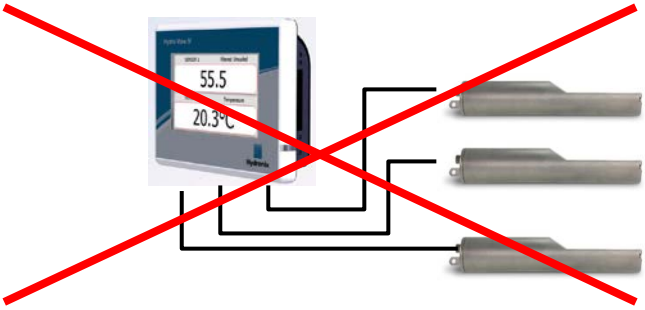
Ideally, sensors on a RS485 network should be connected in a daisy chain arrangement, as shown here:



In practice, this arrangement is hard to achieve, so sensors may be wired using very short stubs:



Although it may appear simpler, wiring in a star configuration with each sensor wired back to the Hydro-View should be avoided.



4 Cables

4.1 Sensor Cable

The sensor must be connected using an extension cable made up from a suitable length of two pairs twisted (4 cores total) screened (shielded) cable with 22 AWG, 0.35mm^2 conductors. It is recommended that a high quality cable with good braid screen and also a foil screen is used in order to minimise the possibility of interference. Recommended cable types are Belden 8302 or Alpha 6373.

For optimum performance (and to comply with relevant safety regulations) all cables, including power and communications cables, must be screened and the screen must be connected to earth at the sensor end only.

The cable from the sensor to the control unit must be distanced from any heavy equipment and associated power cables, particularly the power cable mixers or bin gates. Failure to separate the cables can lead to signal interference.

4.2 Analogue Cables

The analogue cables should be of good quality screened cable. They should be distanced from heavy equipment and power cables to avoid signal interference.

5 USB Port

The Hydro-View has one USB port built into the unit to enable backup, restore and upgrade of the system and sensor logging functions. This accepts a standard USB memory stick of up to 4GBytes.

A panel mounting USB socket with an extension cable is available from Hydronix (Part Number 0175) to provide easier access to the USB socket. This has a 1.5m cable and the panel mounted socket needs a 28mm diameter hole with a 3mm key cut-out. The maximum panel thickness is 5.2mm and a clearance of 22mm is needed behind the panel. Detailed mounting instructions are available from Hydronix.

1 Logging in as Engineer

Commissioning of a system is an advanced function and should be carried out by an engineer with suitable knowledge of the site and application. In order to access all of the necessary functions in the Hydro-View, the engineer should be logged into the Hydro-View with engineer level permissions – see Chapter 5 Section 4. The engineer should also be familiar with the functionality of the sensor that is to be connected to the Hydro-View.

2 Connecting Sensors

Up to 16 Hydronix sensors may be connected to the Hydro-View unit. Each needs to have a unique address between 1 and 16.

All new sensors shipped by Hydronix are set to address 16. For this reason it is recommended to connect sensors one at a time to the Hydro-View. When each sensor is connected its address should be changed, as described in Chapter 5 Section 6.1. It is also recommended to change the name of the sensor to represent its location or function within the system, as this simplifies fault finding and makes the Hydro-View much simpler to use.

Sensors may be added to the system (or removed) at any time. The Hydro-View automatically checks for additional sensors that have appeared, but note that it may take up to a minute for the Hydro-View to find the new sensor.

3 Configuring Sensors

Each sensor should be configured appropriately for the class of application. Page 41 details all the sensor setting options.

4 Configuring the System Settings

Once the sensors are installed and correctly configured, the Hydro-View can be set up to display information relevant to the application.

The first System screen (page 39) enables the selection of the user interface language. The time and date can also be set on this screen.

The second System screen (page 40) enables a choice of a light, dark or standard colour scheme. This may helpful in particularly dark or bright conditions or where the user has a particular preference. This screen also enables the user to configure the overview page.

The third System screen (page 41) displays a backup and restore function. If the Hydro-View is replacing an old unit, a backup from the old unit may be made and restored to the new unit. This will copy all of the settings. If a number of Hydro-View units are being installed in similar applications on one site, then using the backup / restore function may save some time in setting up subsequent units.

Once the Hydro-View is configured, it is recommended that the access PIN codes are changed to prevent inadvertent access and editing of the system. See Chapter 5 Section 4.

If the new PIN numbers are accidentally forgotten, Hydronix technical support can provide a 1-day valid code to allow access to the system. When using this code, the PIN numbers should be changed to a memorable number.

For security reasons, it is not advisable to use PIN codes used elsewhere (e.g. your bank PIN number) as these are stored in the system database and may be accessible by Hydronix technical support staff.

5 Configuring the Overview Screen

If a sensor is connected to the Hydro-View at start-up, the Overview Screen configuration manager will be displayed. This enables the user to configure which values are displayed on the Overview screen. If the overview screen has been previously configured and the same sensors are connected the configuration manager will not be displayed.

The Overview screen (Chapter 5 Section 2) can be manually configured to show 1, 2 or 4 display areas – see page 40. Each of these display areas is configurable. It is possible to select which sensor, which reading and whether this is shown numerically or graphically. A graphical display can be configured to display different time periods and different vertical ranges. See page 40.

Any combination is possible, so with four display areas selected it is possible to show four readings from one sensor, one reading from four sensors, different readings from all four sensors, or the same reading from the same sensor both numerically and graphically. The selection of this setup is entirely down to site requirements and user preferences.

6 Calibrating the Sensors

If the Hydro-View is to show true moisture (rather than the Unscaled reading) or the control system requires an input from the sensor that corresponds to a moisture % then the sensors must be calibrated to the material being measured. As each sensor may be installed in a different manner, it is advised that each is individually calibrated even if they are measuring in similar materials. For this reason, the Hydro-View does not allow calibrations to be copied from one sensor to another.

Detailed information regarding calibration and the calibration procedure is given in Chapter 6.

7 Upgrading the Hydro-View Firmware

From time to time Hydronix will issue updates to the Hydro-View Firmware. These may add new features and functions to the product and are also designed to improve performance.

To upgrade the firmware, proceed as follows:

1. Download the latest version of the Firmware HS0097 from www.hydronix.com.
2. This will be a .zip file, which should be extracted onto the root of a USB Memory stick. Doing this should create a folder called HydroView_IV\Upgrade which contains a number of files.
3. Turn off power to the Hydro-View and plug the memory stick into the USB socket on the side of the Hydro-View, or into the USB Extension socket if this has been installed.
4. Turn power on again, and the Hydro-View will detect the Upgrade files and automatically upgrade itself to the new version.
5. When the upgrade is complete and the Overview screen is shown, the USB Memory stick may be removed.

Removal of the USB Memory stick before the upgrade is complete may damage your Hydro-View and prevent it from starting up.

Removal of power to the Hydro-View before the upgrade is complete may damage your Hydro-View and prevent it from starting up.

8 Backing up the System

Once the Hydro-View is fully configured and the sensors calibrated, it is advisable to carry out a system backup (Page 41) to keep a record of the configuration. This may be useful should the unit fail and need to be replaced in the future. Note that only one backup may be stored on a single USB memory stick, so a backup should be copied to a PC as soon as possible to prevent it being over-written by another backup in the future. The name of the file should not be changed if it is to be used to restore a system. Using a suitable folder structure on the PC will enable backups from a number of Hydro-View units to be stored.

1 Screen Navigation

The Hydro-View is a touch screen device. Navigation of the system is achieved by touching on the screen itself to activate relevant features. This must be done with a finger – tools such as pens and screwdrivers will not work and may damage the surface of the screen (unless supplied with the unit).

1.1 Menu Tree

Figure 9 below shows the entire menu structure of the Hydro-View. Certain screens are only accessible to certain user levels.

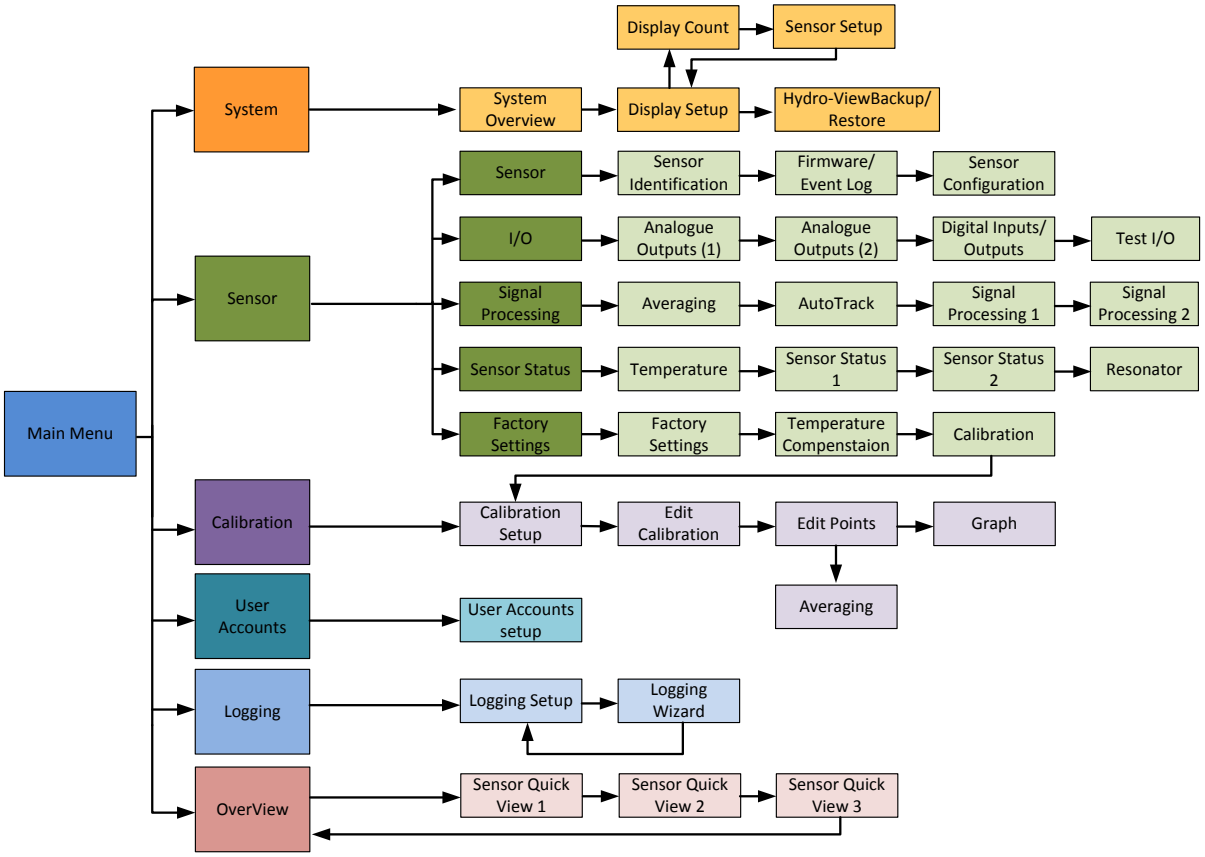


Figure 9: Menu Structure

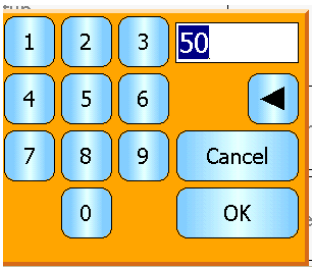
1.2 Applying Power

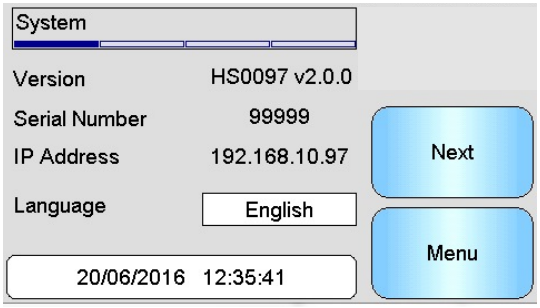
The Hydro-View starts up as soon as power is applied to it. The green light in the bottom right hand corner of the bezel will illuminate and the screen starts with a Hydronix start-up screen and progress indicator.

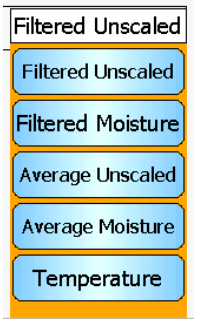
The unit is ready to use when the Overview Screen (Figure 10) is displayed.

1.3 Using the Touch Screen

Any areas on the screen that are white may be selected by touching them. Numeric values are entered using the keypad that pops up with the entered text being shown in the box at the top. Selections from multiple options appear in a list when a selection box is touched, with the current value highlighted in white at the top and if this is selected then the selection box will be cancelled.

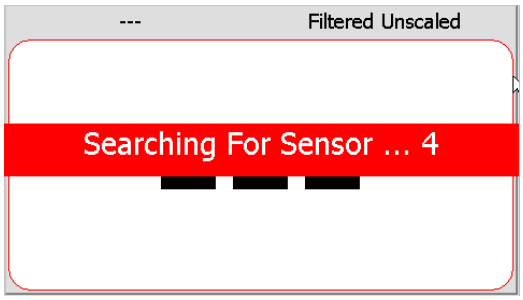






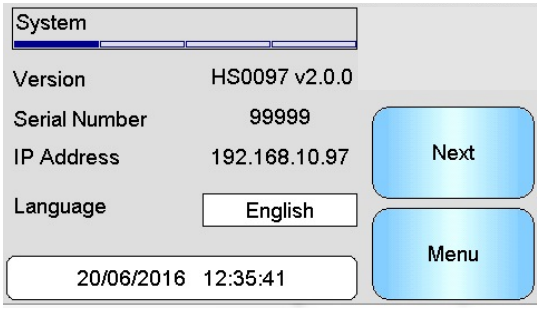
1.4 Selecting your Language

By default, the Hydro-View starts up in English. The language can be changed as shown below, and once this has been chosen, the Hydro-View will always start in the new language.



Touch the overview screen to open the main menu.

Select System from the main menu



Press the current system language name

Select the required language from the list

1.5 Access Levels and Permissions

The Hydro-View provides three User Access levels, each with different permissions. This allows the system to be 'locked down' for the majority of users, allowing only approved users to access the more in-depth system functionality.

If one of the functions described here is not available to you, this is most likely because you are not logged in with sufficient permissions. The default PIN numbers for each user are given in Appendix A and it is recommended that these are changed to prevent inadvertent access to the system.

The table below shows the Access Levels and what is available to each user:

✓ Available

Read Only

✗ Not Available

Function	Operator	Supervisor	Engineer
Overview Screen	✓	✓	✓
Display Setup Screen	✗	✓	✓
Main Menu Screen	✓	✓	✓
User Accounts Screen	✓	✓	✓
System Screens	Read Only	✓	✓
Sensor Screens	✗	Read Only	✓
Calibration Screens	✗	Read Only	✓
Logging Screens	✗	✗	✓

2 The Overview Screen

The Overview Screen is the main screen used for displaying sensor information.

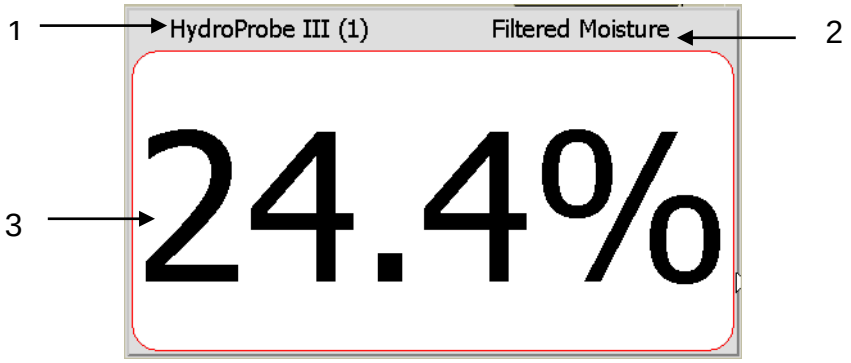


Figure 10: The Overview Screen

The Overview Screen may be configured to display 1, 2 or 4 'areas' each of which may be configured separately. The default display is one area, as shown in Figure 10. Each area may be configured to display any reading from any sensor in the form of a trend graph or numeric display. The layout for each area is arranged in a standard format:

1. The name of the sensor being displayed in that screen area.
2. The name of the sensor reading being displayed.
3. The current value of the reading.

Touching anywhere on the Overview Screen will return to the main menu screen.

The number of areas shown on the Overview Screen is configured in the System section (Page 40).

2.1 Quick View Sensor Details

The Quick View section is only displayed if the Overview Screen has been configured to display a sensor. Press and hold on one of the areas of the Overview Screen and the Quick View Sensor Details page will be displayed for that sensor (Figure 11).

The first page details the sensors name, calibration name, address, ID and current firmware.

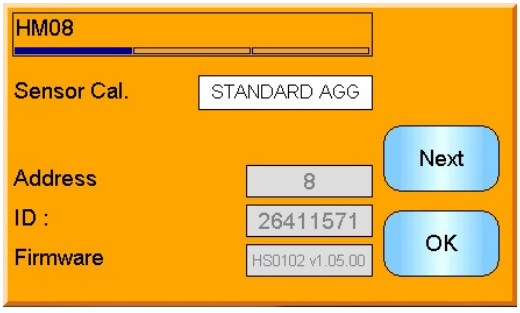


Figure 11: Sensor Quick View First Page

The second page displays the current Filtered Unscaled and Filtered Moisture Values. Averaging can also be started by pressing “Start Average” to display the Average Unscaled and Average Moisture values (Figure 12).

If the connected sensor supports multi Measurement Modes the “Mode >” button can be pressed to display additional Measurement Mode values.

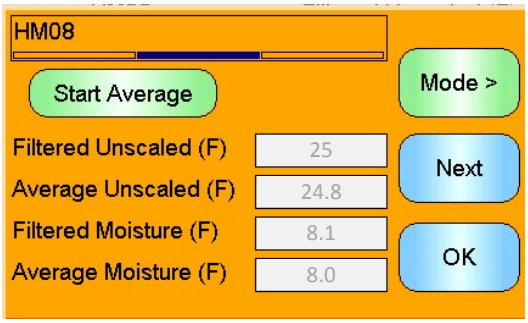


Figure 12: Sensor Quick View Second Page

The third page displays the current available temperature measurements from the sensor (Figure 13).

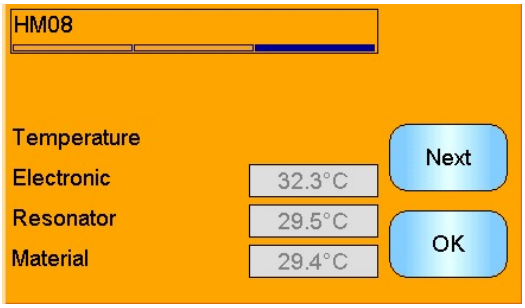


Figure 13: Sensor Quick View Third Page

3 Main Menu Screen

Operator ✓ Supervisor ✓ Engineer ✓

The Main Menu Screen accesses all other parts of the system. Different options will be enabled depending on the access level currently logged in. If no sensors have been found, then Sensor, Calibration and Logging will be disabled, regardless of the access level.

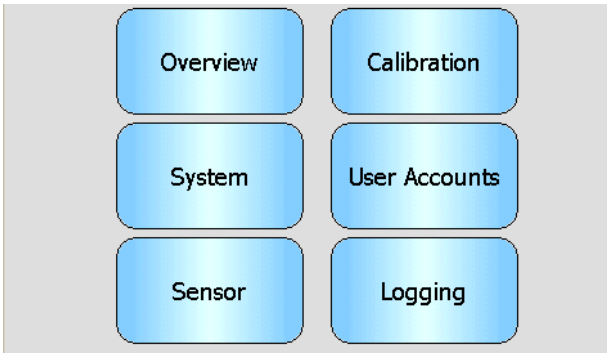


Figure 14: The Main Menu Screen

Overview - Returns to the Overview Screen (Section 2)

System - Accesses the System Setup Screens (Section 5)

Sensor - Accesses the Sensor Setup Screens (Section 6)

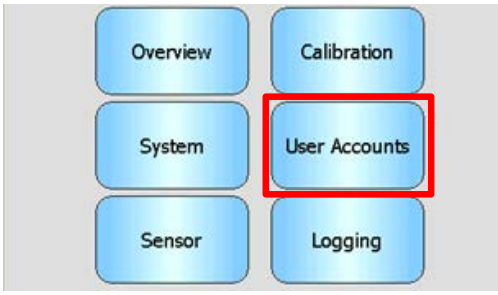
Calibration - Accesses the Material Calibration Screens (Section 7)

User Accounts - Accesses the User Accounts Screen (Section 4)

Logging - Accesses the Sensor Logging Screen (Section 8)

4 User Accounts Screen

Operator ✓ Supervisor ✓ Engineer ✓



The User Accounts Screen allows users to 'log in' to the Hydro-View with different permissions levels. After completing operations as Supervisor or Engineer it is advisable to log out to prevent inadvertent access and changes to the system setup. It is necessary to log out as one user before logging in as a different user. By default the permissions are set to Plant Operator.

Default PIN numbers are given in Appendix A. For added security, it is advisable to change these as soon as the system is commissioned. In the event that a PIN is changed and is subsequently forgotten, contact Hydronix Support for further assistance.

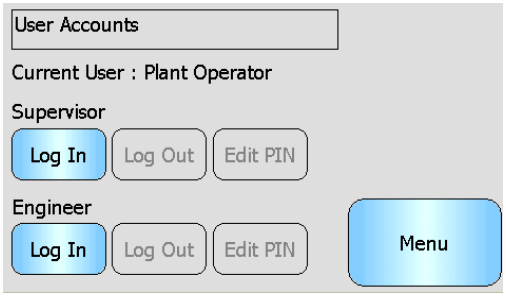


Figure 15: The User Accounts Screen

Current User shows which User is currently logged in.

Supervisor

Log In - Log into Hydro-View with Supervisor level permissions. Enter the 4-digit PIN when the keypad appears. If successful, the Log Out and Edit PIN buttons become active. If the wrong PIN is entered, the system remains logged out.

Log Out - Log out Supervisor.

Edit PIN - Edit Supervisor PIN number. Enter a new 4-digit PIN when keypad appears. When prompted, confirm that the correct PIN has been entered.

Engineer

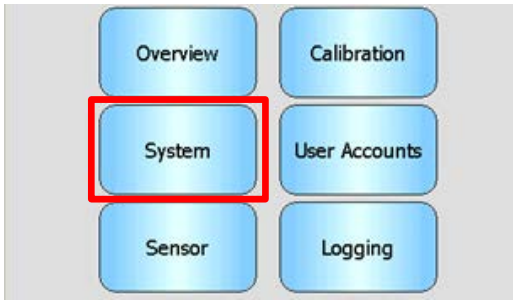
Log In - Log into Hydro-View with Engineer level permissions. Enter the 4-digit PIN when the keypad appears. If successful, the Log Out and Edit PIN buttons become active. If the wrong PIN is entered, the system remains logged out.

Log Out - Log out Engineer.

Edit PIN - Edit Engineer PIN number. Enter a new 4-digit PIN when keypad appears. When prompted, confirm that the correct PIN has been entered.

5 System Screens

There are three System Setup screens which allow the user to configure the user interface of the Hydro-View. Each screen requires different access permission levels.



5.1 System

Operator Supervisor ✓ Engineer ✓

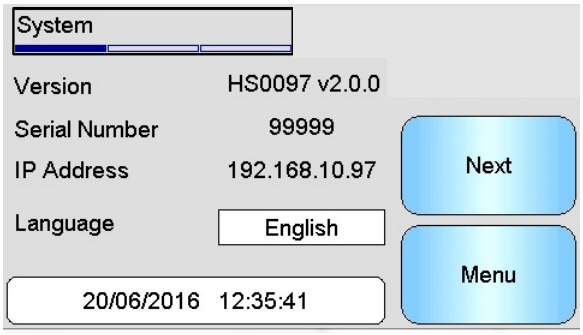


Figure 16: The First System Screen

Version

The current firmware version of the Hydro-View.

Serial Number

The Serial number of the Hydro-View.

Language

The current User Interface language. Touch to change.

IP Address

The IP Address of the Hydro-View if an Ethernet network cable is connected. (not currently in use)

Date and Time

Current date and time. Touch to set this correctly.

5.2 Display Setup

Operator ✗ Supervisor ✓ Engineer ✓

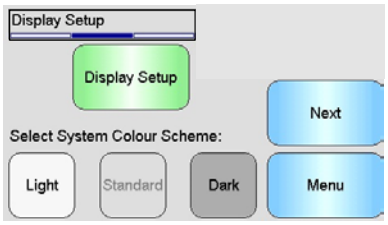


Figure 17: The Second System Screen

5.2.1 Display Setup Configuration

Pressing the Display Setup button will open the Overview Screen setup (Figure 18).

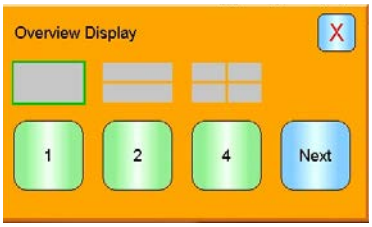


Figure 18: Overview Display Setup

The Overview Screen can be configured to display 1, 2 or 4 sensor values. To configure the screen , select 1, 2 or 4 and press next. This will open the sensor selector section (Figure 19)

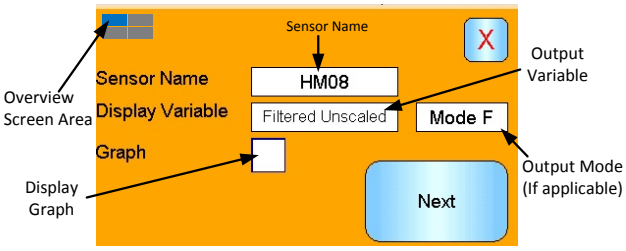


Figure 19: Overview Screen Sensor Selector

Select the required Sensor, Output Type and, if available, Measurement Mode. The display can also be configured to display as a graph. The graph length and height can be set as required. If more than one display area has been selected the current area is shown by the blue square in the top left corner.

Figure 20: Display Graph

This process is repeated for each display area required.

5.2.2 System Colour

The system colour can be adjusted to suit the installation location.

5.3 Backup/Restore

Operator ✗ Supervisor ✗ Engineer ✓

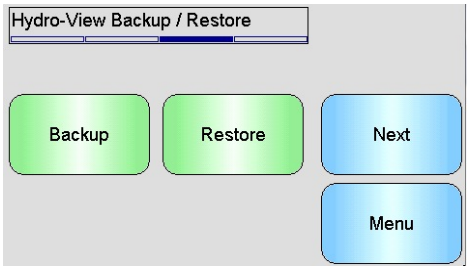


Figure 21: The Third System Screen

Backup

Backs up or “Saves” the System Settings and Calibrations to a USB memory stick. Only one System Backup can be stored on a memory stick, any previous backups will be overwritten.

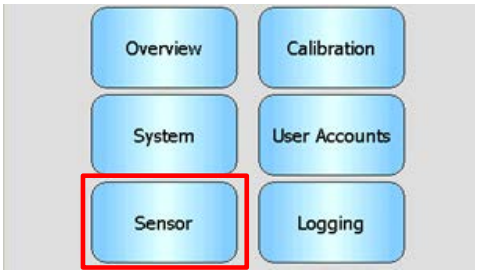
Restore

Restores the System Settings and Calibrations from a USB memory stick. This can be used to recover a Hydro-View that has had its settings changed, or to copy the settings from one unit to another. All settings are overwritten in the unit, and cannot be recovered after a Restore operation.

6 Sensor Screens

Operator ✗ Supervisor Engineer ✓

The Sensor Screens enable the configuration and diagnosis of any attached sensor.



When the Sensor button on the Main Menu is touched, a list of the connected sensors appears (only if more than one is connected). Select the required sensor to access the Sensor Setup screens (Figure 22).

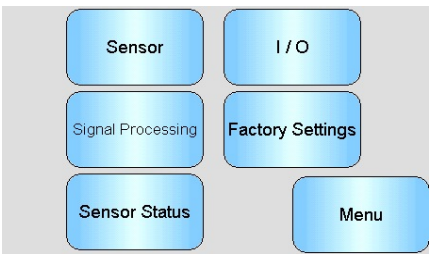


Figure 22: Sensor Setup Screens

Any changes made to the sensor settings are automatically written to the sensor. These are committed to the sensors flash memory when the Sensor Screens are exited, so that they are retained if the sensor is turned off.

6.1 Sensor

6.1.1 Sensor Identification

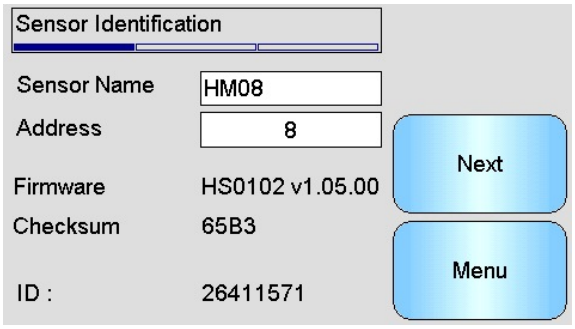


Figure 23: Sensor Identification Screen

Sensor Name

The Name of the sensor. It is helpful to name the sensor to describe its function or location within the system. Touch the box for an Alpha-Numeric keyboard to enter a new name.

Address

The address of the sensor on the RS485 network. Touch to change.

Checksum

The checksum of the firmware currently in the sensor. This is used for support purposes only.

ID

The unique hardware identity of the sensor.

Firmware

The version of firmware currently in the sensor.

6.1.2 Firmware/Event Log

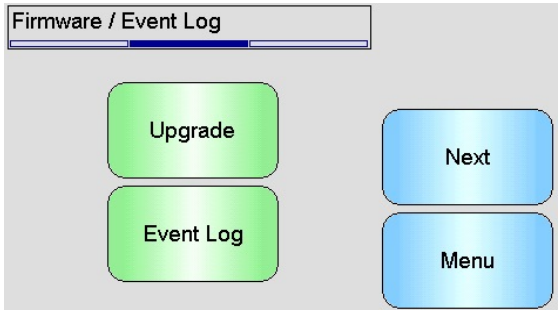


Figure 24: Firmware/Event Log

Upgrade - Upgrade the Sensor firmware. The upgrade is carried out from a Hydro-Com compatible upgrade file (downloadable from www.hydronix.com). This file must be placed on a USB memory stick in a folder \HydroView_IV\FirmwareFiles\. The file can then be selected from a list.

Event Log – Compatible sensors will store any event log in to its internal memory. The event log can be downloaded to a file to enable diagnostics on the sensor to take place. Please contact support@hydronix.com for help using the saved data file.

6.1.3 Sensor Configuration

This screen is used to back up or restore all sensor settings.

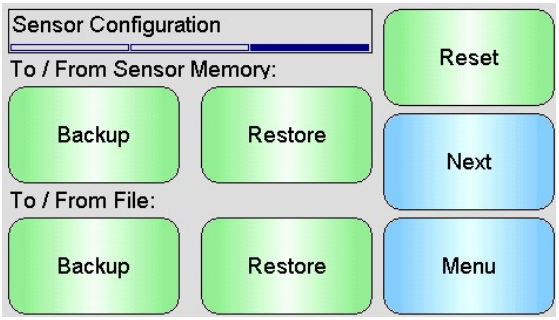


Figure 25: Sensor Backup / Restore Screen

Backup to File - Backup all of the sensors settings to a USB memory stick. Enter a file name when prompted. This file is stored on the USB stick in a folder \HydroView_IV\BackUpFiles\ in a format compatible with Hydro-Com, the Hydronix PC based sensor configuration and calibration software.

Restore from File - The sensors settings may be restored from a Hydro-Com compatible backup file. This file must be on a USB memory stick in the folder \HydroView_IV\BackUpFiles\. The file should then be selected from a list of possible files. Restoring a sensor will overwrite all of its settings.

Backup to sensor memory- All Hydronix sensors utilising firmware HS0102 and above have the ability to store the sensor configuration settings to its 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 From sensor Memory- Restore the sensor using the sensors internal memory

Reset- During manufacture all settings are stored in a reserved memory location to enable the sensor to be restored to default. This facility is only available on selected sensors.

6.2 I/O

6.2.1 Analogue Outputs (1)

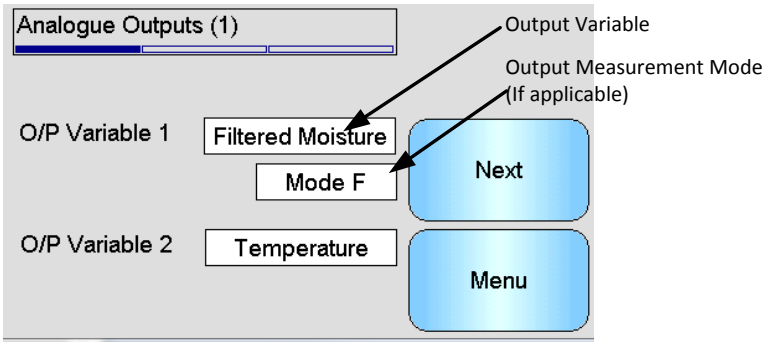


Figure 26: Analogue Output Screen 1

The analogue output is normally configured to be proportional to the percentage moisture reading. However it is possible to make the analogue output represent other types of output variables which are selectable from the O/P Variable 1 and O/P Variable 2 options.

The Measurement Mode, if available, can also be selected (see the Calibration and Configuration Guide HD0679 for details on the different Measurement Modes).

Output 1 Variable: (touch to select)

Select which measurement is to be output on Current Loop 1.

Raw Moisture	This is scaled from the 'Raw Unscaled' variable using the A, B, C and SSD coefficients.
Filtered Moisture	This is scaled from the 'Filtered Unscaled' variable using the A, B, C and SSD coefficients. Recommended output for Continuous Control applications when an absolute moisture reading is required.
Average Moisture	This is scaled from the 'Average Unscaled' variable using the A, B, C and SSD coefficients. Recommended output for Batch Averaging applications when absolute moisture is required.
Raw Unscaled	This is a reading between 0 (Air) and 100 (Water) from which absolute moisture may be calculated.
Filtered Unscaled	This is the 'Raw Unscaled' variable which has been processed using the filtering parameters in the Signal Processing screen. Recommended output for Continuous Control applications when an absolute moisture reading is not required.
Average Unscaled	This is the 'Raw Unscaled' reading processed for batch averaging using the parameters in the Averaging screen. Recommended output for Batch Averaging applications when absolute moisture is not required.
Temperature	Outputs the temperature of the Material being measured as reported by the sensor with a fixed scaling of 0 – 100oC.
Raw Unscaled 2	This is a second Raw Unscaled reading supported by some sensors. Raw Unscaled 2 may be calculated using a different Measurement Mode from Raw Unscaled 1.
Filtered Unscaled 2	This is the 'Raw Unscaled 2' variable which has been processed using the filtering parameters in the Signal Processing screen. Not applicable to HS0102 firmware sensors
Brix	(Applies to Hydro-Probe SE sensors only). This is scaled from the 'Filtered Unscaled' variable using the A, B, C and D Brix coefficients for measurements in sugar based materials.

AutoTrack Value	This is the AutoTrack value calculated by the sensor. See the Calibration and Configuration Guide HD0679 for details on using this value.
AutoTrack Deviation	This is the deviation from the AutoTrack value. See the **Calibration and Configuration Guide HD0679 for details.**

Output 2 Variable - (touch to select)

For sensors with two current loop outputs, select which measurement is to be output on Current Loop 2. Options are the same as for Current Loop 1.

6.2.2 Analogue Outputs (2)

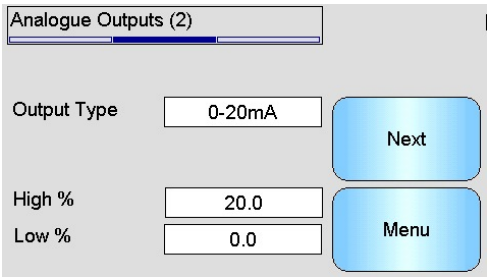


Figure 27: Analogue Outputs Screen 2

Output Type: (touch to select)

The working range of the current loop outputs can be configured to suit the equipment to which it is connected.

0-20mA	This is the factory default. The addition of an external 500R precision resistor converts to 0 – 10 V
4-20mA	This is a standard 4 – 20 mA output
Compatibility	Only available on pre HS0102 firmware sensors. See appropriate user guide for details

High % - The high scale for Moisture output. This is the percentage Moisture represented by 20mA output current.

Low % - The low scale for Moisture output. This is the percentage Moisture represented by 0mA (or 4mA) output current.

The High % and Low % options are only available when at least one of the analogue outputs is set to moisture %.

6.3 Digital Inputs / Outputs

The sensors have one digital input and one digital input / output. These may be configured for a number of different uses.

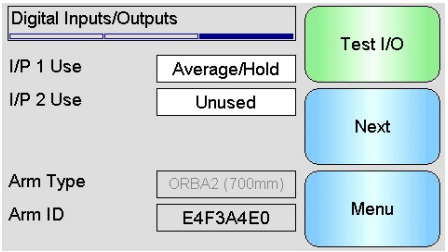


Figure 28: Digital Inputs / Outputs Screen

I/P 1 Use - The current use of Input 1 (Touch to change):

Unused	The digital input is ignored.
Average / Hold	Input is used to control the start and stop period for batch averaging. When the input signal is activated (+24 VDC), the 'Raw/Filtered' values (Unscaled and Moisture) start to average (after a delay period set by the 'Average/Hold Delay' parameter). When the input is then deactivated (0V), averaging is stopped and the average value is held constant so that it can be read by the batch controller PLC. When the input signal is activated once again the average value is reset and averaging commences. This is the recommended setting to use in a Batch Averaging application.
Moisture / Temp	This allows the user to switch the analogue output between the normal moisture variable and temperature. This is useful when the temperature is required whilst still using only one analogue output. With the input low the analogue output will indicate the appropriate moisture variable (Unscaled or Moisture %). When the input is activated the analogue output will indicate the temperature (in degrees centigrade).

I/P 2 Use - The current use of Input / Output 2 (Touch to change):

Unused	The digital input is ignored.
Moisture/Temp	This input allows the user to switch the analogue output between the normal moisture variable and temperature. This is useful when the temperature is required whilst still using only one analogue output. With the input low the analogue output will indicate the appropriate moisture variable (Unscaled or Moisture%). When the input is activated the analogue output will indicate the temperature (in degrees centigrade).
Bin Empty	The sensor output is activated to indicate that the probe is in air, and can be used to indicate a material bin / silo is empty. It is activated when the signals (Moisture% or Unscaled) drop below the low limit parameters in the averaging frame. This may be used in a Continuous Control application. To only use the moisture % value set the Unscaled low limit to zero.
Data Invalid	The output is activated to indicate that the sensor reading (Moisture% and/or Unscaled) is outside the valid range set by 'Low Limit' and 'High Limit' parameters in the averaging frame. This would typically be used on a conveyor application to signal material too wet or too dry.

Sensor OK This output will be active if:

- The frequency reading is between the defined air and water calibration points +/-3%
- The amplitude reading is between the defined air and water calibration points +/-3%
- The temperature of the internal electronics is below the safe operating limit
- The temperature of the RF resonator is above it's safe operating limit
- The internal supply voltage is in range

Material Temp: This alarm will be active if the material temperature is outside the configured high/low limits.

Calibration Out or Range The output will be active if the Unscaled reading, for any of the Measurement Modes, is more than 3 points above or below the range of Unscaled values used in the calibration. This can be used to indicate that another calibration point could/ should be made.

AutoTrack Stable: AutoTrack Stable indicates if the sensor reading is stable. The stability is defined as the deviation of a set amount of data points. Both the deviation value and the amount of data used, in seconds, are configurable in the sensor. The output will be active if the AutoTrack Deviation is below the AutoTrack Deviation threshold

Arm Type - The current type of Sensing Arm fitted if the sensor is a Hydro-Probe Orbiter.

Arm ID- The ID number of the connected Hydro-Probe Orbiter Sensing Arm

Test I/O - Accesses the I/O Test Screen (see I/O Test Screen, section 6.4).

6.4 I/O Test Screen

The I/O Test screen provides a method of testing the I/O, to ensure that the sensor is correctly connected to the control system. Be aware that if the control system is running, manually adjusting the I/O may have unexpected consequences.

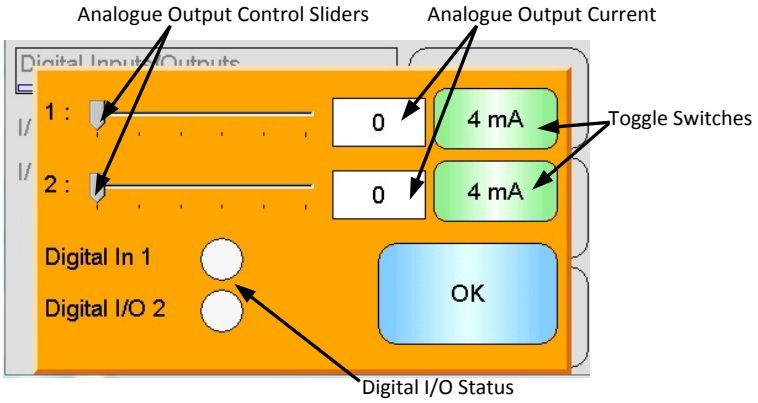


Figure 29: I/O Test Screen

1: - Slider for testing Analogue Output 1. Current mA value is displayed in the box.

2: - Slider for testing Analogue Output 2 (not available on all sensor models). Current mA value is displayed in the box.

Digital In 1 - Light indicates the status of Digital Input 1. Red for active (24V applied); White for inactive.

Digital I/O 2 - Light indicates the status of Digital Input / Output 2 when this is configured to be used as an input. When this is configured to be used as an output only, an ON / OFF button allows the output to be set.

4mA - Pre-defined current output setting for Output 1. Toggles in the sequence:

- 0mA, 4mA, 10mA, 12mA, 20mA

4mA - Pre-defined current output setting for Output 2 if fitted. Toggles in the sequence:

- 0mA, 4mA, 10mA, 12mA, 20mA

OK - Completes the test and closes this screen.

6.5 Signal Processing

6.5.1 Averaging

The Sensor Averaging Screen is used to configure sensor alarms and averaging parameters.

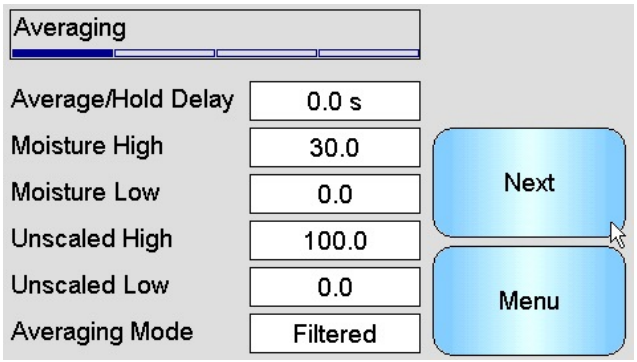


Figure 30: Averaging Screen

Average / Hold Delay - Shows the current Average / Hold Delay.

When using the sensor to measure the moisture content of a material that is discharged from a bin or silo, there is frequently a short delay between the control signal issued to begin the batch and the material beginning to flow over the sensor. Moisture readings during this time should be excluded from the batch average value as they are likely to be an unrepresentative static measurement. The 'Average/Hold' delay value sets the duration of this initial exclusion period. For most applications 0.5 seconds will be adequate but it may be desirable to increase this value.

Options are: 0, 0.5, 1.0, 1.5, 2.0, 5.0 seconds

Moisture High - Shows the current Moisture High value.

The upper limit of moisture values that will be included in the average calculation. If this value is exceeded, the Data Invalid output is set (if selected).

Moisture Low - Shows the current Moisture Low value.

The lower limit of moisture values that will be included in the average calculation. If the moisture falls below this value, the Data Invalid output will be set (if selected) and the Bin Empty output will be set (if selected).

Unscaled High - Shows the current Unscaled High value.

The upper limit of the Unscaled reading that will be included in the average calculation. If this value is exceeded, the Data Invalid output is set (if selected). Leave set to 100 if just an alarm based on the moisture % value is required.

Unscaled Low - Shows the current Unscaled Low value.

The lower limit of the Unscaled reading that will be included in the average calculation. If Unscaled falls below this value, the Data Invalid output will be set (if selected) and the Bin Empty output will be set (if selected).

Leave set to 0 if just an alarm based on the moisture % value is required.

Averaging Mode- Selects the sensor output mode used for averaging during calibration. Selectable between Raw and Filtered. Note that this option is only available with selected sensors. Raw should be selected for most applications. Filtered is suitable for mixer applications where the signal is very noisy, Contact Hydronix for advice in this instance.

6.5.2 AutoTrack

This section is used to configure the AutoTrack values (Figure 31).

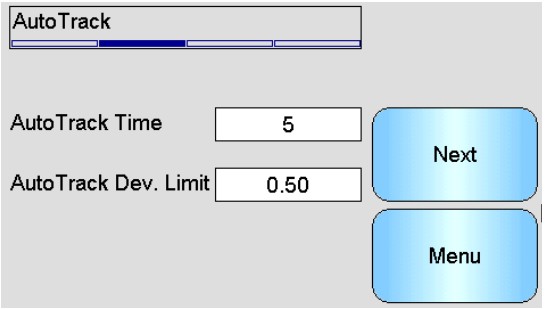


Figure 31: AutoTrack Configuration

AutoTrack Configuration

The AutoTrack output alarm is used to indicate when the deviation in the sensors moisture reading is below the configured limit for a set amount of time. To configure the AutoTrack the user must calculate the maximum deviation that is acceptable. As well as the deviation the user must configure the time period 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.

6.5.3 Signal Processing Screens

The sensors include a number of filtering options to remove noise from the signal. Each has a particular function as described below. The filters should be used in a combination to remove as much noise from the signal as possible, without reducing the response to changes in moisture content. For complex applications data may be logged and an external programme used to optimise these parameters.

Signal Processing screen (1)

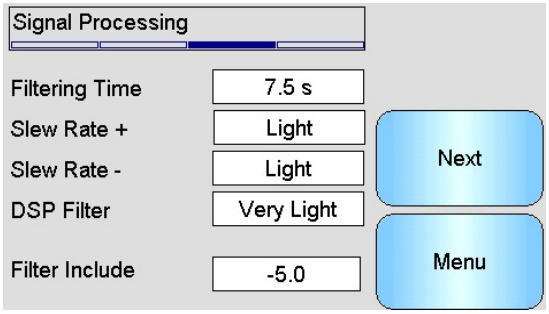


Figure 32: Signal Processing Screen (1)

Filtering Time

This shows the current smoothing time applied to the signal. Touch to change. This is useful when there is a lot of noise or variation in the signal. The options are 0, 1, 2.5, 5, 7.5, 10 and Any seconds.

Slew Rate +

Current Positive Slew Rate filter setting. Sets the rate limit for large positive changes in the 'raw' signal. This is helpful in applications where inherent irregularities in the signal would tend to make it unstable, for example a mixer floor sensor where blades are regularly passing the sensor face. The options are: None, Light, Medium, Heavy and Any.

Slew Rate –

Current Negative Slew Rate filter setting. Sets the rate limit for large negative changes in the 'raw' signal. This is helpful in applications where inherent irregularities in the signal would tend to make it unstable, for example a mixer floor sensor where blades are regularly passing the sensor face. The options are: None, Light, Medium, Heavy and Any.

DSP Filter

The current setting of the Digital Signal Processing Filter. Touch to change. After the Slew Rate filters the signal is passed through a digital filter which uses a special algorithm to filter out the noise. There are six settings for the digital filter: Unused, Very Light, Light, Medium, Heavy and Very Heavy.

Filter Include

When set, only Unscaled values above the set point will be included in the filtered output.

Signal Processing Screen (2)

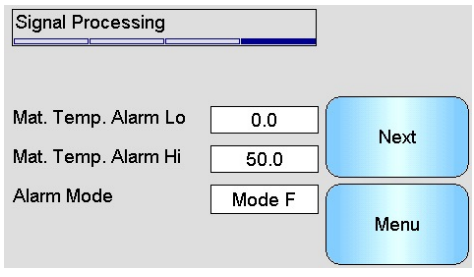


Figure 33: Signal Processing Screen (2)

Unscaled 1 (only shown for selected sensors)

For sensors which support this option, this shows the current Measurement Mode used to calculate the Unscaled 1 reading. Touch to change. For further details of the Measurement Modes, refer to the Calibration and Configuration Guide HD0679.

Unscaled 2 (only shown for selected sensors)

For sensors which support this option, this shows the current Measurement Mode used to calculate the Unscaled 2 reading. Touch to change. For further details of the Measurement Modes, refer to the Calibration and Configuration Guide HD0679.

Material Temperature Alarm Low/High

The Material High and Low Limits are used to configure the Material Temperature alarm. If Digital Input/Output 2 is set to Material Temperature Alarm the output will become active if the material temperature sensor is above the high limit or below the low limit.

Alarm Mode

Configures which Measurement Mode (Mode F, Mode V, Mode E or Legacy) is used to calculate the alarm values. The Alarm Mode is only available for sensors with multi Measurement Mode capabilities. Once configured, the sensor will only calculate the alarm values using the selected Measurement Mode. The Alarm Mode will also configure which Measurement Mode is used to calculate the AutoTrack values.

6.6 Factory Settings Screen

The Calibration and Configuration Guide HD0679 should be read and understood before attempting to change these parameters.

6.6.1 Factory Settings

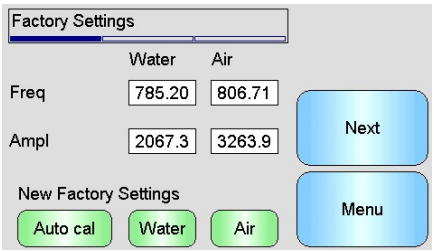


Figure 34: Factory Settings Screen

Water/Air

These show the Air and Water points used to calculate the Unscaled readings. These are set in the factory and should not be manually entered.

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 estimates the water reading based on a constant air-water difference.

When using AutoCal with a Hydro-Probe Orbiter certain arm types require the selection of the type and length before this calibration starts. The arm type and length is set on the Digital Inputs/Outputs Screen (Page 46).

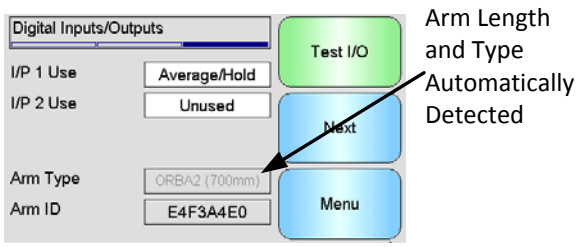


Figure 35: Hydro-Probe Orbiter Arm Selection

If the arm type is not selectable the connected arm is automatically detected by the Hydro-Probe Orbiter Head Unit (Figure 35).

During the AutoCal procedure, the ceramic face must be clean, dry and free from obstruction. Once the 'AutoCal' button is pressed, the AutoCal measurement will start and should take approximately 30 seconds (Figure 36). The sensor will then be ready for use in the mixer.

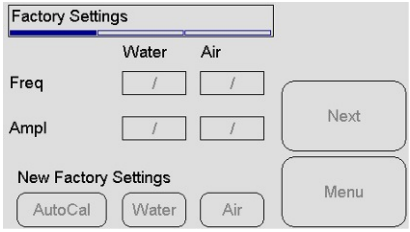


Figure 36: AutoCal in Progress

Water

Starts a Water calibration measurement. Ensure that the sensors measurement face is immersed in water (ideally with 0.5% salt by weight) and is free from other obstructions. Touch the Water button. The sensor then takes a number of readings to establish an accurate reference point in water.

Air

Starts an Air calibration measurement. Ensure that the sensors measurement face is in air, is clean, dry and free from other obstructions. Touch the Air button. The sensor then takes a number of readings to establish an accurate reference point in air.

6.6.2 Temperature Compensation Screen

These settings should not be changed unless advised to do so by a Hydronix trained engineer.

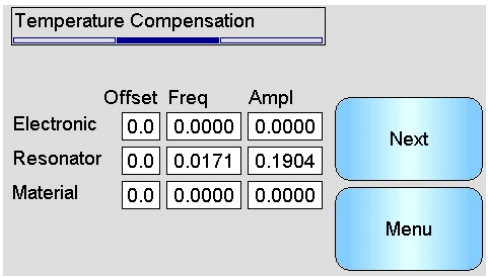


Figure 37: Temperature Compensation Screen

Hydronix sensors include temperature compensation algorithms to provide a consistent reading over a wide temperature range. These coefficients are used to carry out the calculations and are set in the factory, individually to each sensor. These should not normally be changed.

6.6.3 Calibration

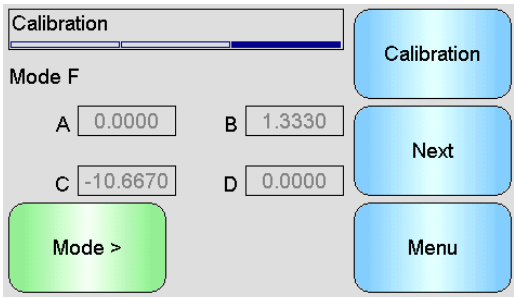


Figure 38: Calibration Screen

A, B, C, D

The current A, B, C and D coefficients used in the material calibration. These may be edited on this screen, but it is advisable to use the built in Calibration functions to ensure an accurate material calibration is achieved. For a Moisture sensor, the Material calibration formula is:

$$\text{Moisture} = A \times \text{Unscaled}^2 + B \times \text{Unscaled} + C - D$$

The D coefficient is the Water Absorption Value (WAV) or Surface Saturated Dry (SSD) property of the material, available from the material supplier.

For a sensor capable of being calibrated to a measurement of Brix instead of moisture, the Brix calibration formula is:

$$Brix = A - B.e^{\left(\frac{C.us}{100000}\right)} + \frac{D.us^2}{1000}$$

Mode

The mode selector enables the user to view the current coefficients for each Measurement Mode stored in the sensor. This is only available with compatible sensors.

Calibration

Accesses the Calibration Screen – the recommended method of adjusting the Calibration coefficients.

6.7 Sensor Status

6.7.1 Temperature

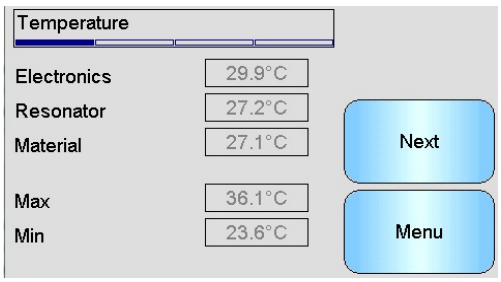


Figure 39: Temperature Screen

Electronics / Resonator / Material

These show the current temperatures being measured by the sensor. Depending on the sensor type not all measurements may be available. These may be higher than the current air temperature due to internal heating of the electronics.

Max / Min

These show the maximum and minimum temperatures experienced by the internal electronics.

6.7.2 Sensor Status (1)

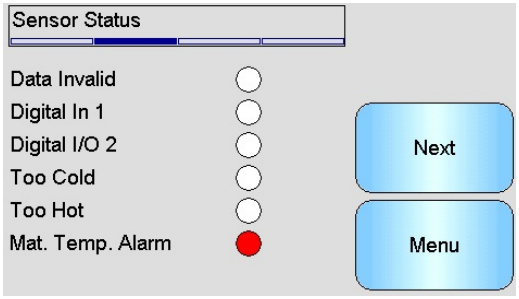


Figure 40: Sensor Status Page 1

Data Invalid

Shows red if the current Moisture or Unscaled readings are outside of the Average Include ranges set on the Averaging Screen.

Digital In 1

Shows red if Digital Input 1 is active.

Digital I/O 2

Shows red if Digital Input 2 is active.

Too Cold

Shows red if the sensor is currently below 0^{o}C, which could indicate that moisture readings are not reliable.

Too Hot

Shows red if the sensor is too hot, which could be causing damage to the internal electronics

6.7.3 Sensor Status (2)

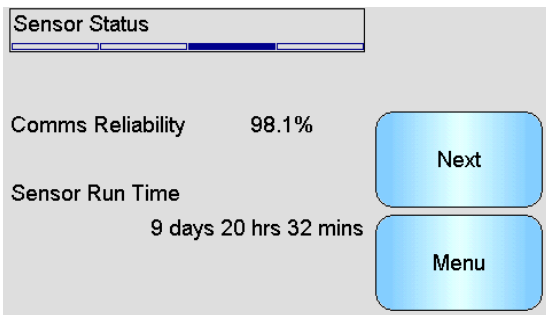


Figure 41: Sensor Status Page 2

Comms Reliability

Indicates the reliability of the communications with the sensor since the Hydro-View was turned on. A value above 95% is expected, and values significantly below 90% should be investigated as this may indicate a problem with the plant wiring which could cause errors or missed readings.

Sensor Run Time

The run time indicates the amount of time the sensor has been powered up.

6.7.4 Resonator

This screen contains advanced sensor diagnostic information that may be of use to Hydronix support personnel.

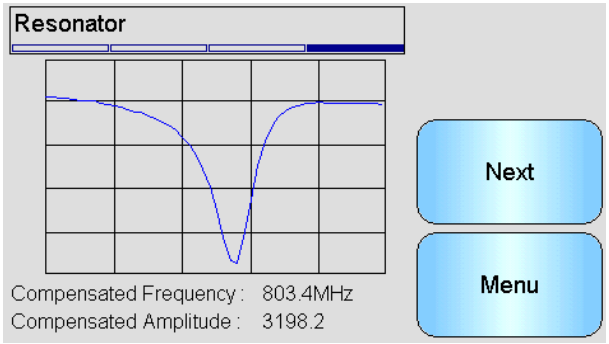


Figure 42: Resonator Screen

Graph

This shows the live resonator response from the sensor.

Compensated Frequency

This shows the live temperature compensated frequency measured by the sensor.

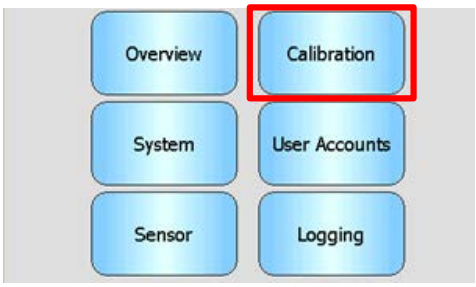
Compensated Amplitude

This shows the live temperature compensated amplitude measured by the sensor.

7 Calibration Screens

Operator ✗ Supervisor Engineer ✓

Full details of the Material Calibration process are given in Chapter 6. This section explains the navigation through the screens. When the Calibration button on the Main Menu is touched, a list of the connected sensors appears (if more than one is connected). Select the sensor to calibrate to access the Calibration screens.



7.1 Calibration List Screen

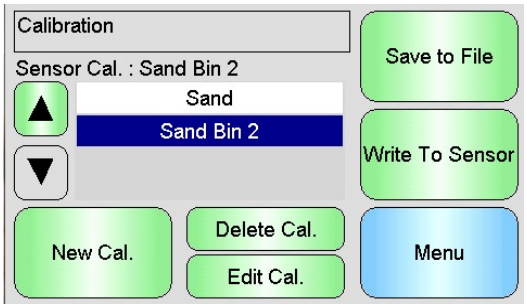


Figure 43: Calibration List Screen

Sensor Cal

Shows the name of the calibration currently in the selected sensor, if this is stored in the Hydro-View and is recognised.

A list of all of the available Calibrations are displayed for the selected sensor. The list automatically scrolls if there are more Calibrations than fit on the screen.

Scroll Up and Down buttons navigate the list of sensors. A Calibration can also be selected by touching its name in the list.

New Cal

Creates a new Calibration for the selected sensor. A maximum of 10 Calibrations is allowed per sensor. If there are already 10 Calibrations, delete an existing one before creating a new one. Touching this button creates a new Calibration and opens the Edit screen.

Delete Cal

Deletes the selected Calibration from the Hydro-View. This does not affect the Calibration coefficients inside the sensor.

Edit Cal

Shows the Edit Calibration Screen for the selected Calibration.

Save to File

Saves all of the Calibrations in the Hydro-View to a text file on a USB Memory stick.

Write to Sensor

Writes the coefficients for the currently selected Calibration to the sensor.

Menu

Returns to the Main Menu.

7.2 Edit Calibration Screen

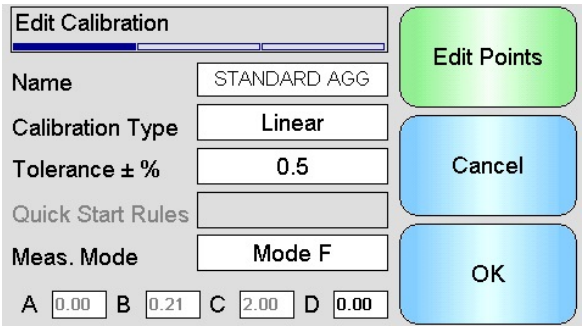


Figure 44: Edit Calibration Screen

Name

Shows the name given to this Calibration.

Calibration Type

Shows the type of best fit line that is used for this Calibration.

Calibration Type	Application
Linear	Best option for the majority of materials, including sands and aggregates.
Quadratic	May be more suitable for certain organic materials.
Brix	Only available for sensors which measure Brix and should be used to calibrate a Brix measurement of dissolved solids in a solution.

Tolerance

Shows the Tolerance associated with this Calibration. Data points that are greater than the tolerance from the best fit line are highlighted in red on the graph screen to assist in identifying good and bad points. Touch to change.

Quick Start Rules

Shows the Quick Start rule selected for the Calibration. Selecting the correct rules for the application material can assist with creating an accurate Calibration, particularly if only a limited number of sample points are available.

The options available are:

- 0-2mm Sand
- 0-4mm Sand
- 4-8mm Gravel
- 8-16mm Stone
- 16-22mm Stone

More information about the Quick Start Rules can be found in Appendix C.

Note this feature is only available for selected sensors

A,B,C Coefficients

Shows the A, B and C coefficients calculated by the best fit algorithm for the entered points. These values are changed by entering Unscaled and Moisture sample points on the Edit Calibration Points screen.

For a Moisture sensor, the Material calibration formula is:

$$Moisture = A \times Unscaled^2 + B \times Unscaled + C - D$$

For a Brix sensor, the Material calibration formula is:

$$Brix = A - B.e^{\left(\frac{C.us}{100000}\right)} + \frac{D.us^2}{1000}$$

The D coefficient

This is the SSD (Saturated Surface Dry) or Water Absorption Value (WAV) property of the material, available from the material supplier, and should be entered here before any sample points are entered if this is to be used in the Calibration. Touch to edit.

Edit Points

Accesses the Edit Calibration points Screen.

Cancel

Cancels the edit of the Calibration.

OK

Accepts the edit of the Calibration, and copies the changes to the Hydro-View database.

7.3 Edit Points Screen

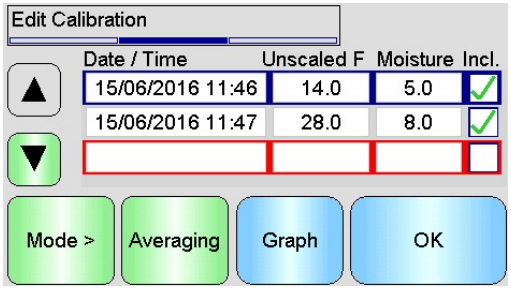


Figure 45: Edit Calibration Points Screen

The main screen

Displays a list of the points currently used in the Calibration. Touch either the Unscaled or Moisture box to edit the value. Touch the Include tick box to include / exclude the point from the calculation of the coefficients. Excluded points are not shown on the graph. A line highlighted in red indicates that data is missing, either because an Unscaled reading has been taken from the sensor and is awaiting a laboratory moisture reading, or because it is the blank line for a new point. Points with missing data are not included on the calculation of the coefficients. A maximum of 20 points is allowed per calibration. A blank line is always present at the bottom of the list for entering new points.

Scroll Up and Down buttons navigate the list of points. The list automatically scrolls if there are more points than fit on the screen.

Averaging

Accesses the Remote Averaging Screen to obtain a representative material sample reading from the sensor. Particularly important in a Batch Averaging application.

Graph

Shows the list of points on a graph to assist with choosing the best points for a good Calibration.

Mode

Switches the Measurement Mode displayed in the calibration points list

OK

Accepts the edit of the Calibration points.

7.4 Averaging Screen

The Remote Averaging function is a convenient way to obtain an averaged reading of a material as it passes the sensor (Figure 46). This is particularly important in batch averaging applications. Remote Averaging works in two different ways, depending on the setting of the sensor's Digital Input.

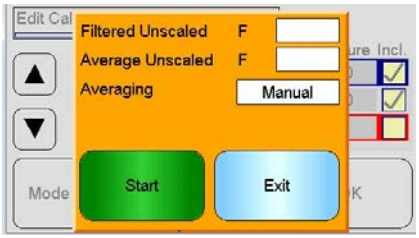


Figure 46: Averaging Screen

7.4.1 Digital Input Set for Average / Hold (typical Batch Average application)

With the Digital Input set for Average / Hold the Averaging Screen will open with the averaging mode set to Automatic (Figure 47).

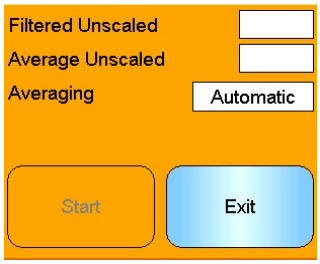


Figure 47: Automatic Averaging

This carries out the Averaging function when the Average / Hold input is switched to active (Figure 48).

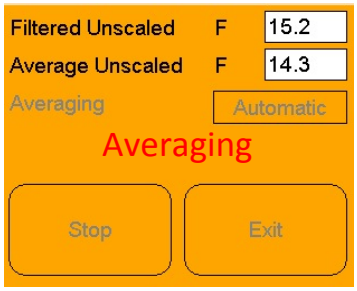


Figure 48: Automatic Averaging Started

When the input returns to inactive a message is displayed giving the option to add a new point to the Calibration (Figure 49).

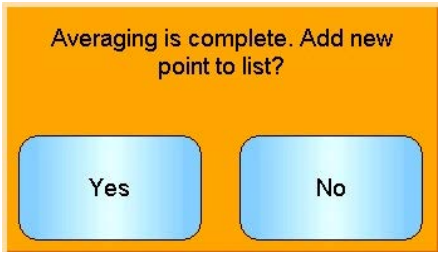


Figure 49: Remote Averaging Stopped

If a valid sample has been taken for a Laboratory measurement, then touch Yes. A new point is added to the list and highlighted in red. Once a Laboratory test result for the relevant batch is complete, the true moisture value can be entered into the corresponding moisture value box.

The Average Unscaled reading is retained until the next averaging period begins. A new Averaging process will start next time the input is switched to active.

When collecting samples it is important not to activate the Average/Hold input for longer than the Average/Hold delay time when doing fine dosing or “jogging”.

7.4.2 Digital Input Not Set for Average / Hold

In this mode, the averaging is started and stopped manually. The timing of this must be coordinated with the gathering of material samples for Laboratory tests.

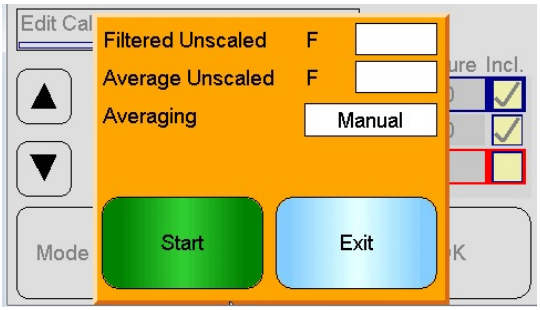


Figure 50: Manual Averaging

Touch Start when the sample collection starts and touch Stop when collection ceases (Figure 51).

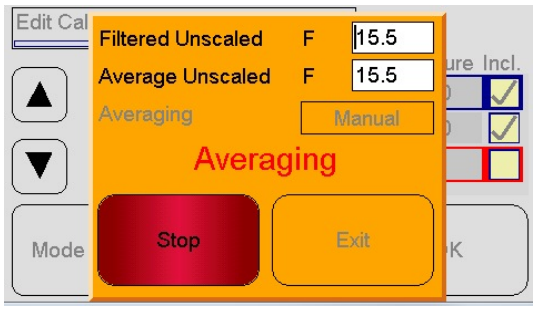


Figure 51: Manual Averaging Started

When averaging completes, a message is displayed giving the option of adding a new point to the Calibration (Figure 52).

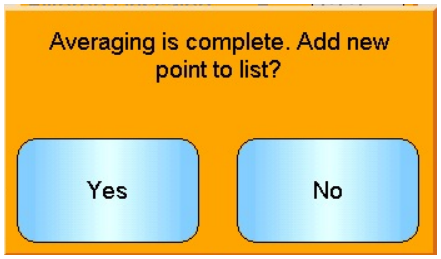


Figure 52: Manual Averaging Stopped

If a valid sample has been taken for a Laboratory measurement, then touch Yes. A new point is added to the list and highlighted in red. Once a Laboratory test result for the relevant batch is complete, the true moisture value can be entered into the corresponding moisture value box.

7.4.3 Manual Averaging When the Digital Input is Set to Average / Hold

It is possible to override the Automatic Averaging facility in the sensor so manual averaging can take place. To temporarily disable the automatic averaging function in the sensor touch the white box next to Averaging and select Manual (Figure 53). The sensor will now disable the digital input and only start the averaging when manually started using the Hydro-View. If the digital input is set to Average/Hold the averaging will go back to automatic once the averaging screen is closed.

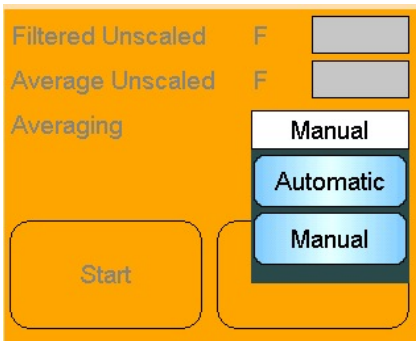


Figure 53: Averaging Configuration

7.5 Edit Points Graph Screen

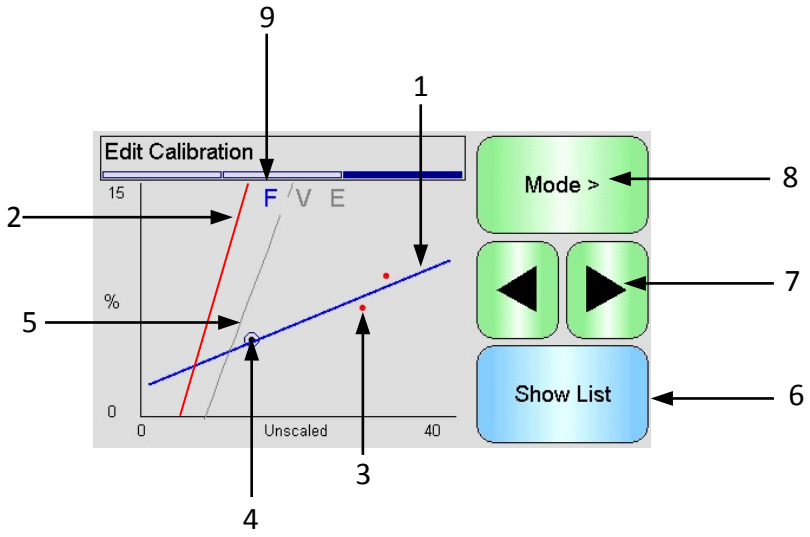
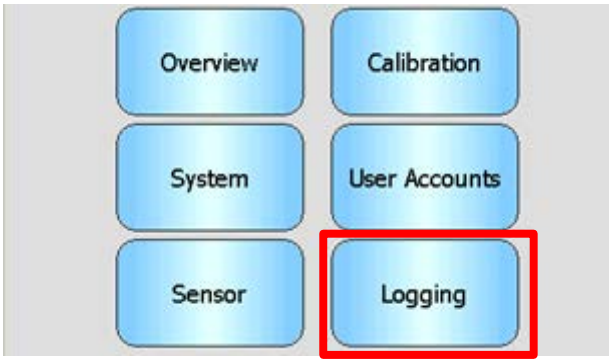


Figure 54: Edit Calibration Points Graph Screen

1. The ‘best fit’ line calculated from the currently included data points.
2. The Calibration limit lines are shown in red if Quick Start Rules are enabled.
3. A point that is further from the ‘best fit’ line than the Tolerance allows is indicated in red.
4. The point currently highlighted in the list is indicated by a circle.
5. The calibration line currently in the sensor is shown in grey.
6. Show List - Returns to the List view of the points.
7. Left and Right scroll buttons move the point selection up and down the graph. This enables an out of tolerance point to be identified in the list view. When returning to the List view, the selected point is highlighted in the list.
8. Change the Measurement Mode calibration displayed on the graph
9. Current Measurement Mode displayed on the graph

8 Logging Screens

Operator ✗ Supervisor ✗ Engineer ✓



The logging function enables the recording of sensor readings over a period of time. This may be useful for commissioning and optimising a system, including choosing the correct filter settings for the sensor. Data is logged directly to a USB stick, which should remain connected to the Hydro-View throughout the logging process. Once logging is started, the logging screen can be exited and other functions carried out, with logging running continuously in the background. Operations that require a large amount of communications with the sensor may cause gaps in the logged data, so these should be avoided.

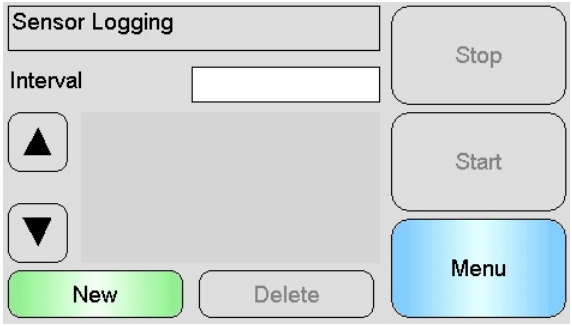


Figure 55: Logging Screen

8.1 Logging Sensor Data

To begin the logging process touch the white box next to “Interval” and select the logging interval required (Figure 56). The shorter the interval the more data the Hydro-View will record.

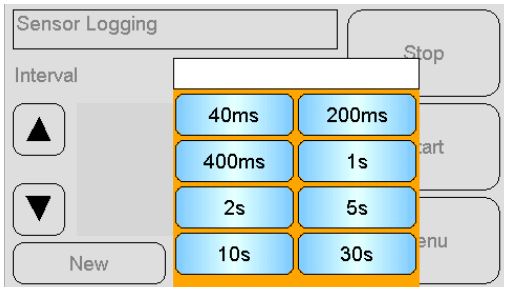


Figure 56: Logging Interval

Select “New” to create a logging list (Figure 57)

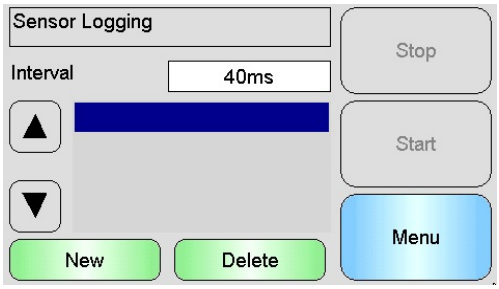


Figure 57: Logging List

Touching the blue box enables the selection the sensor and variable is to be logged (Figure 58).

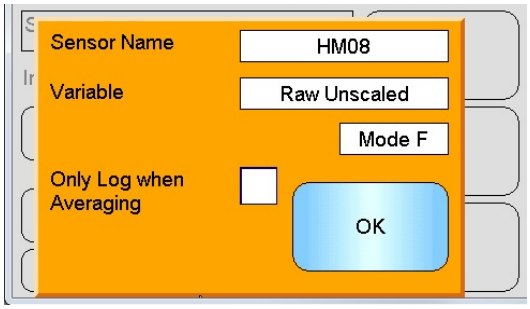


Figure 58: Sensor Logging Setup

Sensor Name

If more than one sensor is connected to the Hydro-View a list will appear when the Sensor Name box is pressed.

Variable

The variable box shows the reading from the sensor that will be logged. If the sensor connected supports multi Measurement Modes the mode selector will appear under the sensor variable when required.

Only Log When Averaging

If checked, data will only be added to the log file when Averaging is in progress. Requires Digital Input to be set as Average/Hold, otherwise nothing will be logged. This feature is useful in Batch Averaging applications for recording the material when it is flowing, without recording large amounts of data when it is not. A Batch Average reading is added to the log file at the end of each batch. When logging using this option a new batch will be recorded each time the Average/Hold input is activated. If this input is triggered by a limit switch positioned on the bin (silo) gate a new batch will be recorded. If the gate is opened between batches for weight correction purposes this will be recorded on multiple batches is quick succession.

Once the logging details have been entered the sensor will be added to the list (Figure 59).

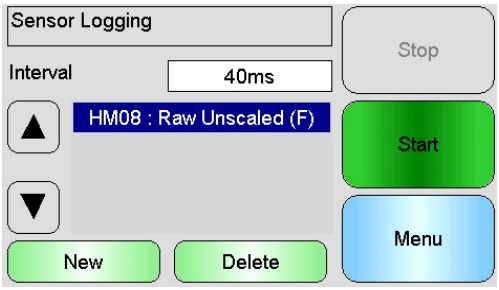


Figure 59: Sensor Added to Logging List

Additional sensors values can be added to the list as required (Figure 60).

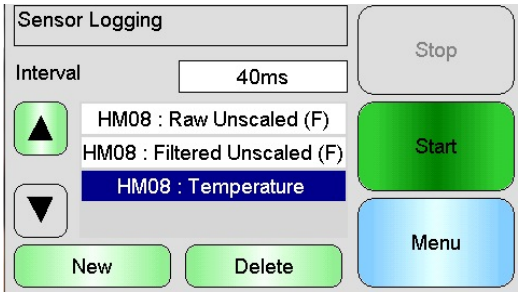


Figure 60: Multiple Sensor Log

Due to the available communications 'bandwidth', it may not be possible to log with all of the available options simultaneously. If the limit has been reached the Hydro-View will not allow any additional logging values to be added. Increasing the logging interval can help to reduce the data load.

Selected logging values can be removed from the list by pressing "Delete".

To start the logging select Start and enter a file name. Press OK to accept

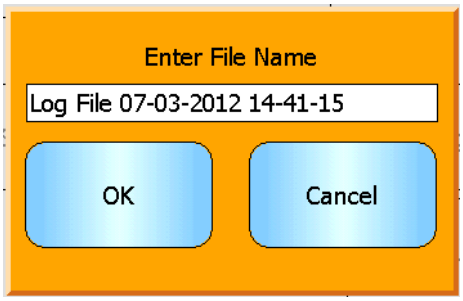


Figure 61: File Name

The logging will continue until "Stop" is pressed (Figure 62).

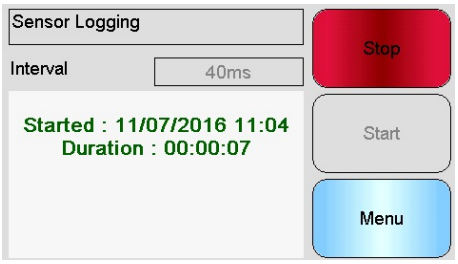


Figure 62: Sensor Logging Started

Ensure that the following message is not displayed before removing the USB memory stick (Figure 63).

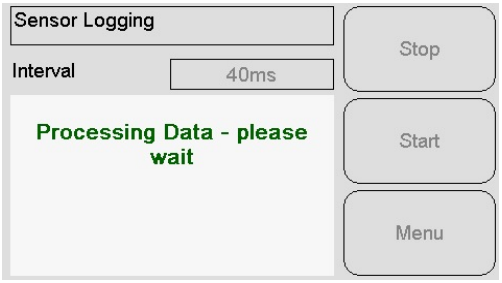


Figure 63: Processing Data Message

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-View calibration facility is used to capture Unscaled values and to compare 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 Hydro-Control and not by the Hydro-View.

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 Measurement Mode to create the coefficients.

When the Hydro-View 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 each Measurement Mode simultaneously. With all Measurement Modes calibrated it is possible to select the most appropriate Measurement Mode to use for a given material without requiring the calibration process to be re-done. The sensor stores the coefficients internally for each Measurement Mode enabling the sensor to output the Moisture % for any Measurement Mode as required.

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 sensors 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 / Time	Unscaled F	Moisture	Incl.
08/07/2016 12:50	21.3	8.0	✓
08/07/2016 12:50	40.3	15.0	✓
08/07/2016 12:52	49.0	18.0	✓

Figure 64: Calibration Data Table

2.3 Creating a New Calibration

To create a new calibration, enter the calibration section and press “New Cal”. Type a name in the calibration name text box. Select the Calibration Type, the options available (depends on the connected sensor) are: Linear, Quadratic or Brix. Select the required Tolerance and the Measurement Mode to display (All modes are calibrated at the same time but only one is displayed).

Select the “Edit Points” button to start creating the calibration.

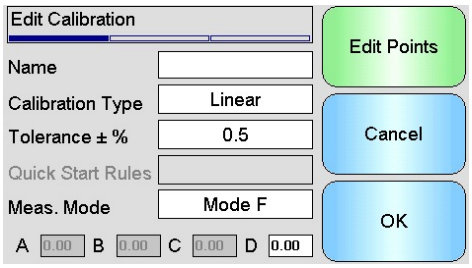


Figure 65: New Calibration

2.4 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 Averaging Mode

The Averaging Mode used while calculating the Average Unscaled can be set to either ‘Raw’ or ‘Filtered’ (Page 48). 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.

2.6 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 (Page 46).

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

2.7 Remote Averaging

If the installation is without an input that can switch to control the averaging function, Hydro-View has the facility to manually select the start and stop period of averaging. This is called ‘Remote Averaging’ (Page 46).

2.8 Recording the Average Unscaled

To record an Average Unscaled value, select Averaging on the Edit Calibration page (Figure 66).

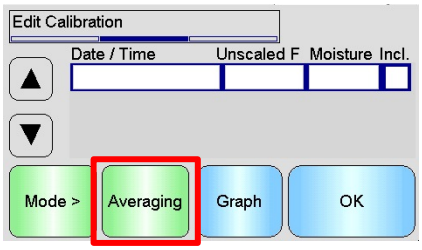


Figure 66: Edit Calibration Screen

The averaging can be started automatically or manually, depending on the current sensor set-up. See page 46 for details.

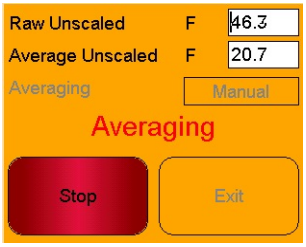


Figure 67: Averaging

Once the averaging has stopped the values can be added to the calibration by selecting “Yes” on the pop up screen.

The Unscaled values for all available Measurement Modes are added to the chart and can be viewed by selecting the “Mode>” button.

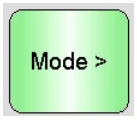


Figure 68: Mode Selection

Multiple Unscaled values can be added to the chart as required (Figure 69).

Date / Time	Unscaled F	Moisture	Incl.
13/07/2016 14:59	31.0		
13/07/2016 15:04	18.5		
13/07/2016 15:04	22.3		

Figure 69: Multiple Unscaled Values

The corresponding moisture % associated with the Unscaled value is added manually in the Moisture % column. Click on the row to open the Points Details screen (Figure 70).

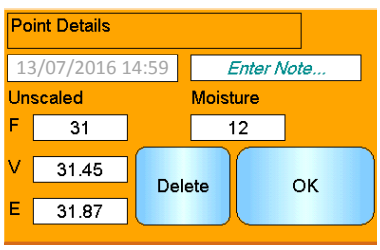


Figure 70: Points Details Screen

The required moisture and Unscaled values can be added to the calibration by clicking the include column for each point (Figure 71).

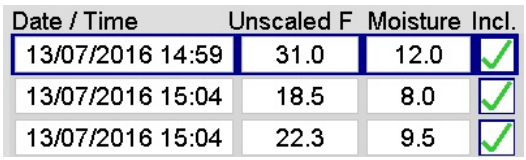


Figure 71: Moisture % Added to Chart

Click “Graph” to display the calibration graph (Figure 72).

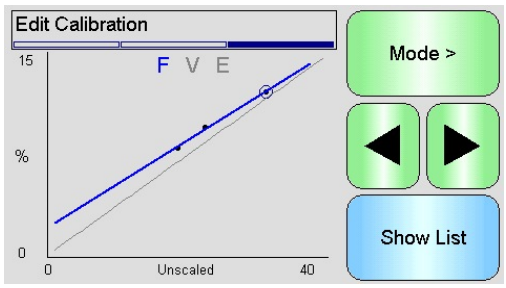


Figure 72: Expanded Calibration Graph

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 stored in the sensor (grey line, current selected Measurement Mode). This enables the user to select the most appropriate Measurement Mode for the application. Press the “Mode >” button to change the displayed Measurement Mode.

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

Select “Show List” to return to the calibration points list. Select “OK” to view the calculated calibration coefficients for the entered points (Figure 73).

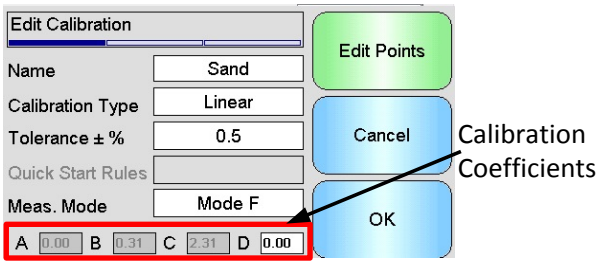


Figure 73: Calibration Coefficients

3 Quick Start Rules

Quick Start Rules are only available with selected sensors. Hydro-View will display the ‘Quick Start Rules’ selection box if it is available with the connected sensor (Figure 74).

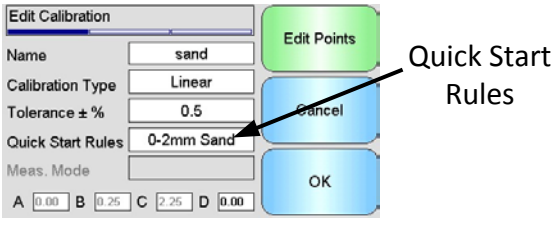


Figure 74: Quick Start Rules Selector

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 C. 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-View enables the selection of one of five Quick Start material types:

- 0-2mm Sand
- 0-4mm Sand
- 4-8mm Gravel
- 8-16mm Stone
- 16-22mm Stone

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, two 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.

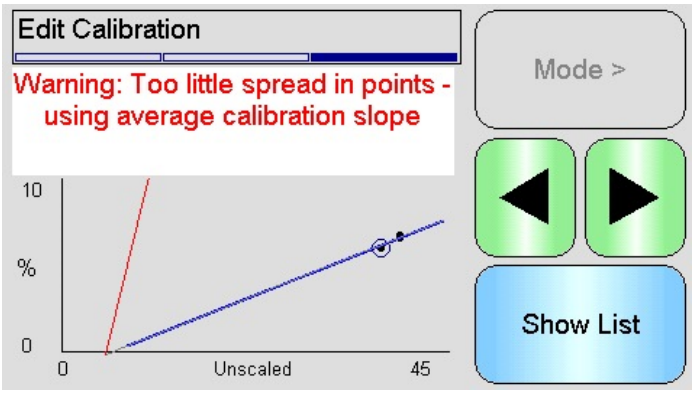


Figure 75: Quick Start Rules Applied

4 Calibration Procedure

4.1 Equipment Required

To collect calibration samples the following equipment is required:

- Microwave oven or alternative heat source
- 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

4.2 Handling Collected Material Samples

To create an accurate calibration it is necessary to collect samples of the material as it passes over the sensor and, at the same time, record the Average Unscaled value from the sensor during the material collection period. To ensure the material collected is accurately analysed to determine the moisture content it is imperative that the material is collected as close to the sensor as possible and sealed in an air tight container/bag immediately after collection. If the material is not sealed in an air tight container/bag moisture will be lost before it is analysed. The container/bag must only be opened when the laboratory tests are to be performed.

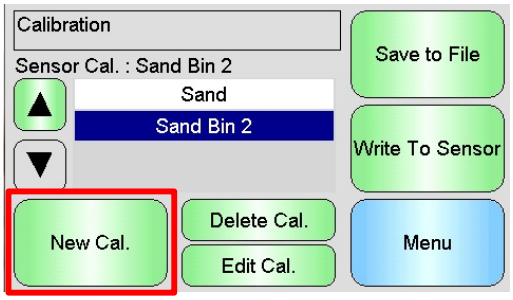
If collecting hot material (i.e. from the outlet of a dryer or in hot environments) the material **MUST** be sealed into the container/bag and allowed to cool to room temperature before it is analysed. Once it has cooled the container/bag must be shaken to enable any moisture on the surface of the container to be mixed back into the material. Removing the material before it has cooled will result in moisture loss due to evaporation and will introduce potential errors to the calibration.

4.3 Collecting Samples

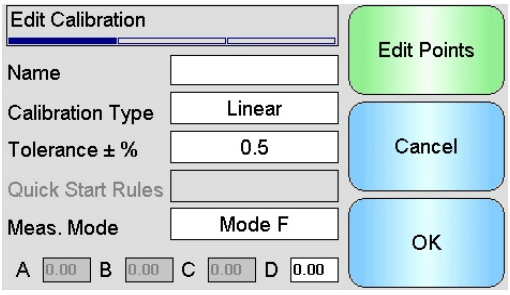
To collect samples and record the associated Average Unscaled values from the sensor follow the procedure detailed below:

1. Connect to the sensor using Hydro-View and open the calibration section. If more than one sensor is connected select from the list displayed.

2. Create a new calibration by selecting “New Cal”.

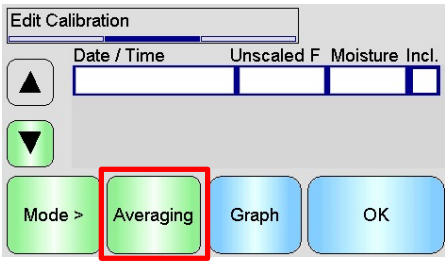


3. Enter a calibration name and configure the Calibration Type, Tolerance, Measurement Mode (if available) and Quick Start Rules (if applicable).

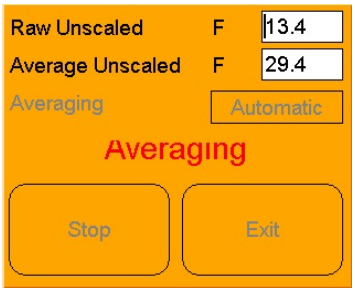


4. Select the “Edit Points” button to start entering the calibration data.

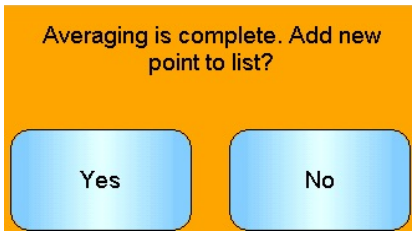
5. Select “Averaging” to open the Averaging section.



6. If automatic averaging using the bin gate signal is in use confirm that ‘Averaging’ is displayed on the calibration page when the bin gate opens.



7. When the gate is closed confirm that the “Averaging is Compete” pop up window is displayed.



If manual averaging is to be used ensure that the averaging is only started once the material is flowing and is stopped when the gate is closed or the flow stops.

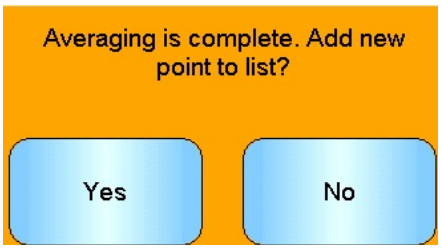
Note: If a bin gate is used to trigger the averaging the gate must not be jogged after the main dose otherwise the averaging will be re-started.

8. 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 and therefore the sensor reading relates to the particular batch of material passing the sensor.

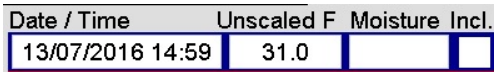
   Ensure the sensor Averaging is started and stopped at the same time as the material was collected.

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

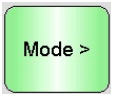
10. Once the sensor Averaging is complete add the values to the chart.



11. The Average Unscaled for each available Measurement Mode is displayed on the Calibration Screen.



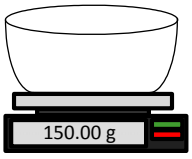
Select the “Mode>” button to display each of the Measurement Mode data points.



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

If the material is hot (above room temperature) store it in the sealed container until it has fully cooled before starting any moisture checks.

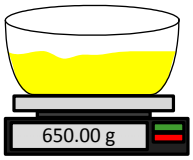
13. Weigh a clean empty heat proof bowl.



14. Place a minimum of 500g of the material in the bowl. All other material must remain in the air tight container until required.

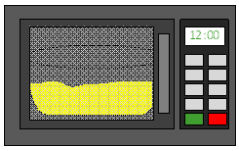
15. Some materials, such as grain, might require grinding before analysis. If grinding is required industrial standards should be followed using a suitable grinder.

16. Weigh the bowl and wet material

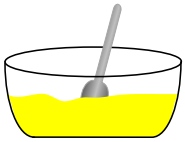


17. Heat the material in the microwave for approximately five minutes. Weigh the bowl and record the result. Laboratory standards must be followed when heating especially if the material is organic as high temperatures can cause other constituents of the

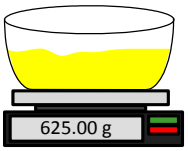
material to be burnt off. Check industry standards for the maximum temperature suitable for the material.



18. 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.



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



20. 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.

21. Repeat steps 13-29 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.

Specialist moisture analysis equipment can be used to perform the moisture testing, please follow any associated instructions for the specific machine.

22. Calculate the moisture % of the three sub-samples using the following equation:

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

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:

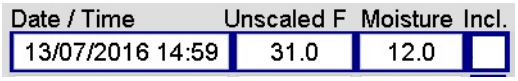
$$Moisture\ \%\ (Dry\ weight) = \frac{(650 - 625)}{(625 - 150)} x\ 100$$

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

$$Moisture\ \%\ (Dry\ weight) = 5.26\%$$

23. 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.

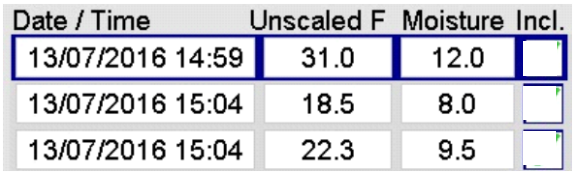
24. Manually add the moisture % result to the calibration chart



Date / Time	Unscaled F	Moisture	Incl.
13/07/2016 14:59	31.0	12.0	

Figure 76: Moisture Added to Data Table

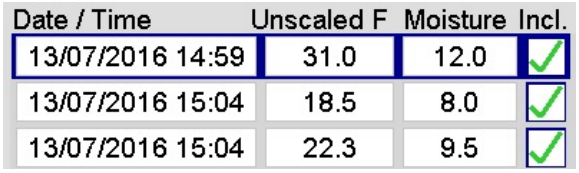
25. Repeat the process to collect sample at different moisture %. The aim of the calibration process is to collect samples that cover the entire expected moisture range of the material.



Date / Time	Unscaled F	Moisture	Incl.
13/07/2016 14:59	31.0	12.0	
13/07/2016 15:04	18.5	8.0	
13/07/2016 15:04	22.3	9.5	

Figure 77: Several Calibration Points

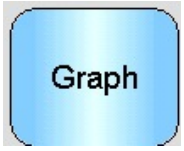
26. After calibration points have been calculated selecting the ‘Include’ column will add the points to the calibration graph.



Date / Time	Unscaled F	Moisture	Incl.
13/07/2016 14:59	31.0	12.0	✓
13/07/2016 15:04	18.5	8.0	✓
13/07/2016 15:04	22.3	9.5	✓

Figure 78: Selected Points

27. Click “Graph” to display all of the selected points on a graph



28. It is now possible to evaluate the points included 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. The latest Hydronix moisture sensors (excluding the Hydro-Probe) have the ability to switch the Measurement Mode used and this can be viewed on the graph. All Measurement Modes can be displayed individually or simultaneously by pressing the “Mode>” button.

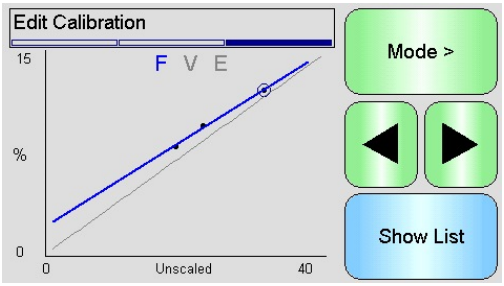


Figure 79: Calibration Graph

See the Calibration and Configuration Guide HD0679 for details about the Measurement Modes.

29. 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.

To write to the sensor select “OK” on the next two screens to return to the main calibration page.

Select the required calibration from the list and click “Write to Sensor”.

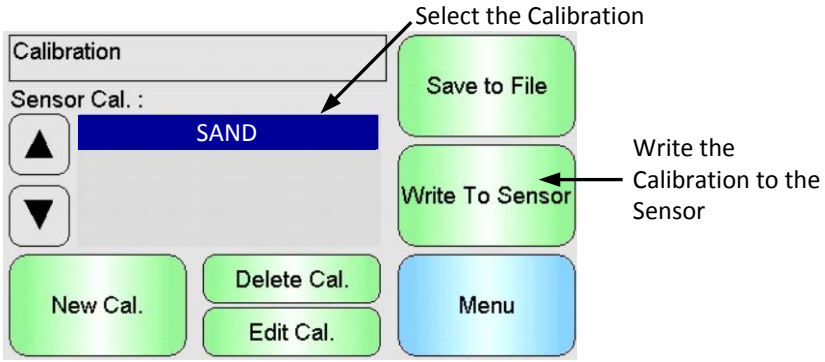


Figure 80: Write Calibration to the Sensor

Once the calibration data has been written the Sensor calibration will be displayed on the calibration page.

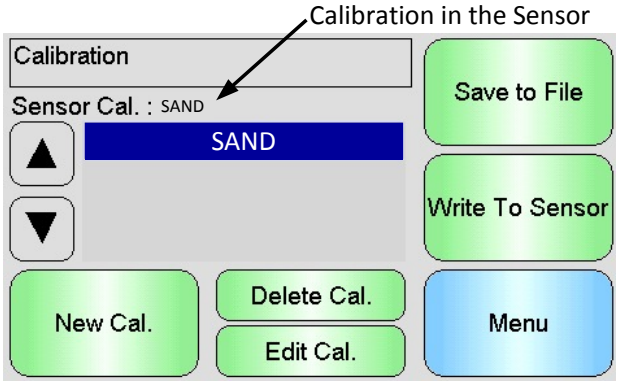


Figure 81: Sensor Calibration

Appendix A Default PIN Codes

When the Hydro-View is first powered up, the following PIN codes are set as standard:

User Level	**Default PIN Code**
Supervisor	3737
Engineer	0336

It is recommended that these are changed once the system is commissioned to prevent inadvertent access to the system and settings.

Appendix B USB Memory Stick file format

A number of operations in the Hydro-View utilise an external USB Memory stick that is plugged into the unit. To simplify the use of the Hydro-View, a specific file layout is used on the USB Memory stick. It most cases, it is not necessary for the user to know this in detail, but in order to find exported data (Log files, Sensor Backups etc) and to place data required by the Hydro-View in the correct place, refer to Figure 82.

The maximum size of Memory Stick supported by Hydro-View is 4GByte.

All the folders are within a top level folder called HydroView_IV which must be in the root of the drive. The diagram below shows the structure of the file system on a typical memory Stick.

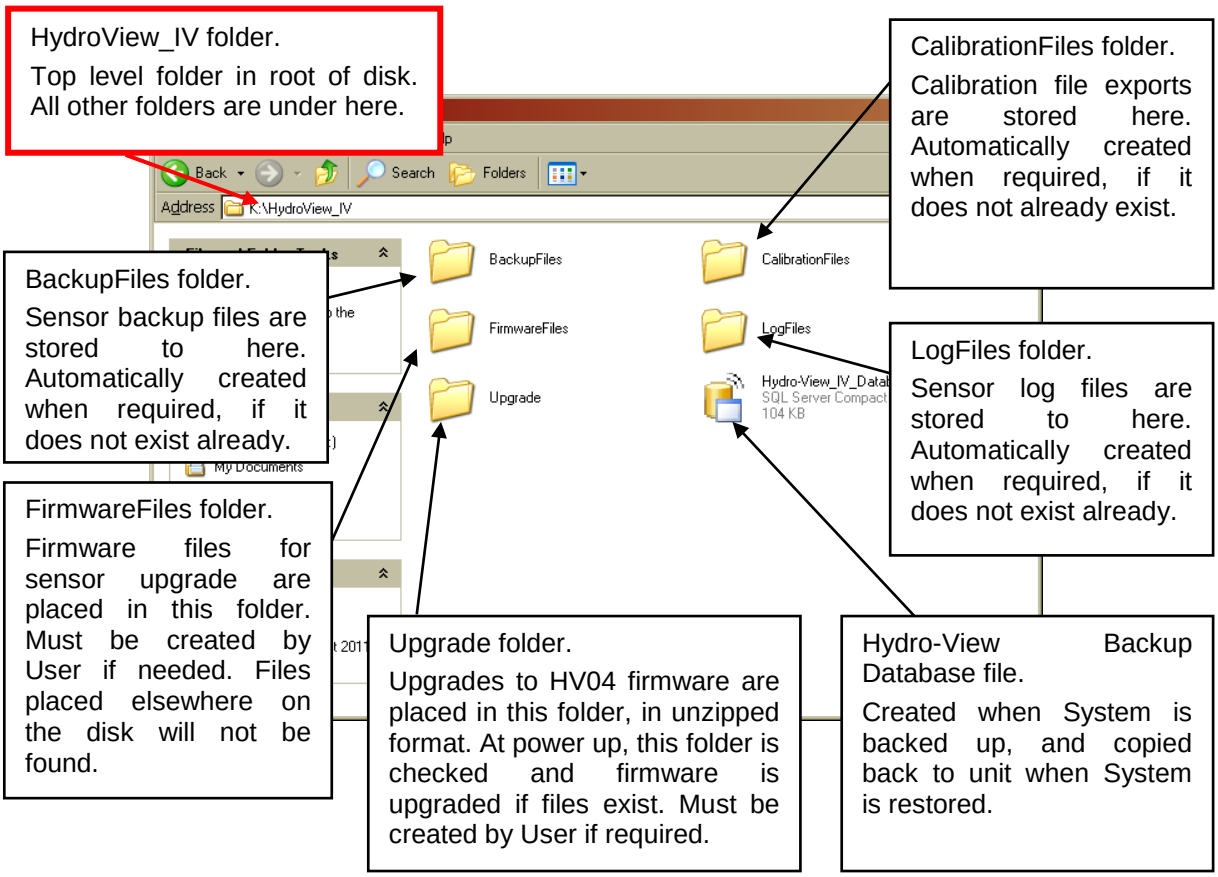


Figure 82: USB Memory Stick File Layout

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.

Appendix D Frequently Asked Questions

Q: *The Hydro-View continually displays "Searching for Sensor … xx"*

A: This message indicates that there is a problem with the communication between the Hydro-View and the sensor. The first thing to check is cabling between the sensor and the Hydro-View. Try switching off power, this would reset the sensor and the Hydro-View. If the problems still exist, see Appendix E for more details on communication diagnostics.

– – –

Q: *How do I recalibrate the touch screen?*

A: The touch screen on a Hydro-View cannot be recalibrated. If you are looking at the display from above or below or one side, the screen calibration may appear to be incorrect due to the thickness of the display glass. In this case, try to view the Hydro-View 'face on'.

– – –

Q: *Can I adjust the contrast on the display?*

A: There is no way of adjusting the contrast of the display on a Hydro-View. If either the backlight or the contrast is faulty, then the unit will need to be repaired by Hydronix.

– – –

Q: *We had a lightning strike and now the unit doesn't work properly, can I do any onsite repairs?*

A: It is not possible to do any repairs onsite, and any attempts of onsite repairs will invalidate any warranty outstanding. In such cases the equipment should be sent back to Hydronix for repair. See Chapter 1 Section 3.7 for details of reducing the risk due to lightning strikes.

– – –

Q: *The LCD screen has lines running through it. Can I replace the screen without sending the unit back to Hydronix?*

A: It is not possible to repair damaged screens onsite. The Hydro-View should be sent back to Hydronix for repair by a qualified technician.

– – –

Q: *How do I know what firmware version I have?*

A: The firmware version running on the Hydro-View can be checked in the System Setup screen (Page 39)

– – –

Q: *How do I upgrade the Hydro-View firmware?*

A: See page 30

– – –

Q: *I have changed the sensing arm on my Hydro-Probe Orbiter. Do I need to recalibrate anything?*

A: It will be necessary to calibrate the new sensing arm to the sensor electronics, so that the air and water factory calibration settings are correct. This process is fully detailed in the Hydro-Probe Orbiter User Guide. The calibration can be performed using the Hydro-View from the Sensor Configuration Factory Settings screen (Page 51)

– – –

Q: *How do I calibrate my Hydro-View to display real moisture?*

A: To display real moisture, the sensor needs to be calibrated to the material being measured, as described in Chapter 6. The Overview screen can then be configured to show Filtered Moisture (Page 40).

Appendix E Diagnostics

The following tables list the most common faults found when using the Hydro-View. If you are unable to diagnose the problem from this information, please contact your system installer or Hydronix reseller.

Symptom: Displays shows 'Searching For Sensor' - no output from sensor

Possible explanation	Check	Required result	Action required on failure
No power to sensor.	Power supply output	+24v DC	Locate fault in power supply/wiring
Sensor has temporarily locked up	Power down and re-power sensor	Sensor functions correctly	Check sensor connector pins
Sensor MIL-Spec connector pins are damaged	Disconnect the sensor cable and check if any pins are damaged.	Pins are bent and can be bent to normal to make electrical contact.	Check sensor configuration by connecting to a PC.
Internal failure or incorrect configuration	Connect the sensor to a PC using the Hydro-Com software and a suitable RS485 converter.	Digital RS485 connection is working.	Digital RS485 connection is not working. Sensor should be returned to Hydronix for repair.

Symptom: Incorrect sensor readings

Possible explanation	Check	Required result	Action required on failure
Sensor Unscaled readings are incorrect	Select Filtered Unscaled as Display Variable on Display Setup screen	Readings should be the following: Sensor exposed to air = close to zero. Hand on sensor = 75-85	Contact your system installer or Hydronix reseller for more details.
Sensor Moisture readings are incorrect	Material Calibration is incorrect. Select Filtered Unscaled as Display Variable on Display Setup screen	Readings should be the following: Sensor exposed to air = close to zero. Hand on sensor = 75-85	Contact your system installer or Hydronix reseller for more details.

Possible explanation	Check	Required result	Action required on failure
Incorrectly configured Display Area on Overview screen	Use the Display Setup screen to verify that the correct sensor and variable is selected – especially if sensors have not been clearly renamed.	Display Configuration is corrected	Contact your system installer or Hydronix reseller for more details.

Symptom: Faulty display contrast

Possible explanation	Check	Required result	Action required on failure
Faulty internal power supply to backlight.	-	Contact your system installer or Hydronix reseller for repair details.	-
Backlight has failed	-	Contact your system installer or Hydronix reseller for repair details.	-

Symptom: Green indicator illuminates but Hydro-View fails to start up

Possible explanation	Check	Required result	Action required on failure
Mini/Micro SD card has been dislodged	Check that card is fully inserted	Correct boot-up	Contact your system installer or Hydronix reseller for repair details.
Hydro-View power up test has failed	Remove power and re-apply	Correct boot-up	Contact your system installer or Hydronix reseller for repair details.
System SD card has become corrupted			Contact your system installer or Hydronix reseller for repair details.

Appendix F Glossary

Analogue Output

The analogue outputs are continuously variable voltages or currents that can be configured to output the sensor's moisture or unscaled output to a control system using an analogue input module.

Automatic Calibration (AutoCal)

To simplify repeating the factory calibration, some Hydronix sensors can be automatically calibrated. This sets the air and water values for the sensor or connected sensing arm. The sensor face must be clean, dry and obstruction free to run the automatic calibration. Note that the result of this AutoCal is not as precise as carrying out a full Air and Water calibration.

Averaging

In a batch averaging process, a sensor can be configured to average the reading of the material seen during the entire batch, thereby providing a very accurate indication of the moisture.

Backup/Restore Settings

All of the Hydro-View System Setting (including Calibrations) can be backed up to allow them to be restored at a later time. The same applies to the sensor settings.

Calibration

Calibration is the process of relating the Unscaled reading taken by the sensor to a true moisture content of a given material.

Material

The material is the physical product in which the sensor is measuring moisture. The material must be flowing and must completely cover the sensor's ceramic faceplate.

Micro/Mini SD card

A format of compact data storage using Flash memory. The Hydro-View has a single Mini/Micro SD card that stores its operating software as well as its system database.

Moisture

The water held in the material. Moisture is defined in either dry weight or wet weight and is given as a percentage.

Probe

See Sensor.

RS485

This is the serial communication protocol that the sensors use to communicate digitally with the control system.

RS485 Address

As more than one sensor can be on a RS485 network together, the address determines which sensor is which. The sensors leave the factory set to address 16 by default.

SD card

See Micro/Mini SD card

Sensor

The sensor is the physical device that is used to measure moisture in materials. The sensor consists of a stainless steel case containing the electronic components connected to a resonator which sits behind a ceramic faceplate.

Unscaled

This is the raw value of the sensor, and is a value that changes linearly with the amount of moisture in the material being measure. It is pre-set in the factory for each sensor and is between 0 (in air) and 100 (in water).

USB

The Universal Serial Bus is an interface that can be used to attach external devices, such as memory sticks, to the Hydro-View.

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
HD0679	Sensor Configuration and Calibration Guide
HD0678	Sensor Electrical Installation Guide

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