

Engineering Note: EN0047 Commissioning a Hydro-Probe with a Command Alkon EZCal Station			
Summary:	Commissioning a Hydro-Probe with a Command Alkon EZCal Manual Station		
Products affected:	Hydro-Probe – Models HP02 & HP04		
Revision Date:	15/02/2023	Author:	S Cook

Introduction

A Hydro-Probe digital moisture sensor can substitute a Command Alkon 7102 moisture sensor when connected to the EZCal manual station.

There are two ways in which to integrate the Hydronix sensors with the EZCal system. Whilst electrically both methods are the same, they differ in how the material calibration is performed.

Option A - Using the Existing Spectrum EZCal Material Calibration Routine.

Once installed there will be no difference in operation from the Alkon sensor therefore no re-training is required. The output from the Hydro-Probe is converted to a moisture percentage using the manual station's own calibration procedure. This procedure allows the operator to adjust the offset, but not the gradient of the calibration line. In this instance the Hydro-Probe will act in exactly the same manner as the Command Alkon sensor but with added benefits such as advanced temperature compensation, linearity and identical sensor characteristics.

Existing users of the Command Alkon system will already be familiar with the EZCal calibration routine, therefore this is not referred to in this document.

Option B - Using the Hydro-Probe Material Calibration Routine.

The Hydro-Probe is internally calibrated to output an actual moisture percentage using a PC running Hydro View or Hydro-Com software (**Use Hydro-Com Version 2.X for the HP04 Sensors**) which is available for free download from the Hydronix website.

This allows the operator to adjust both the offset and the gradient of the calibration line. This will give the best possible accuracy and reliability across all moisture ranges. Once calibrated correctly in this manner the sensor should not require adjustment or recalibration for a given material.

This document describes:-

- Sensor Configuration, for option A or B
- Sensor Connection to the EZCal manual station, common to both option A and B
- Material Calibration, for option B (for option A this is done in the EZCal manual station)

Contents

1	How to configure the Hydro-Probe.....	3
1.1	Option A – Hydro-Com Version 1.X.....	3
1.2	Option B – Hydro-Com Version 1.X.....	3
1.3	Option A – Hydro-Com Version 2.X.....	4
1.4	Option B – Hydro-Com Version 2.X.....	4
1.5	Option B - using the HV04	5
1.6	Option B - using the HV05 or HH01	5
2	Connecting the Hydro-Probe to the EZCal Manual Station (Options A & B)	5
2.1	Connection to latest EZCal manual station, 7 pin terminal connector.....	5
2.2	Connection to older manual station, DB9 connector	7
3	Matching the Hydro-Probe output to the EZCal display (option B only)	8
3.1	Matching output to latest EZCAL manual station (7 pin terminal connector)	8
3.2	Matching output to older manual station (DB9 connector)	10
4	Material Calibration (option B only)	12
4.1	Averaging.....	12

1 How to configure the Hydro-Probe

The Hydro-Probe sensor has digital RS485 capability for direct data exchange. With the use of an adapter, this serial link can be connected to a PC compatible computer enabling communication with the sensor. For more information please refer to the Electrical Installation Guide HD0678 'Wiring a Sensor to a PC'.

Hydronix have written a number of PC based utilities so that users can communicate with the sensor. Most recent of these is the Hydro-Com software which is used for basic diagnostics, configuration and material calibration. This can be downloaded from the Hydronix website. For full information on this utility please refer to the Hydro-Com User Guide.

With the sensor correctly connected to the PC and detected on Hydro-Com, go to the 'Configuration' page and check the configuration is set to the following:

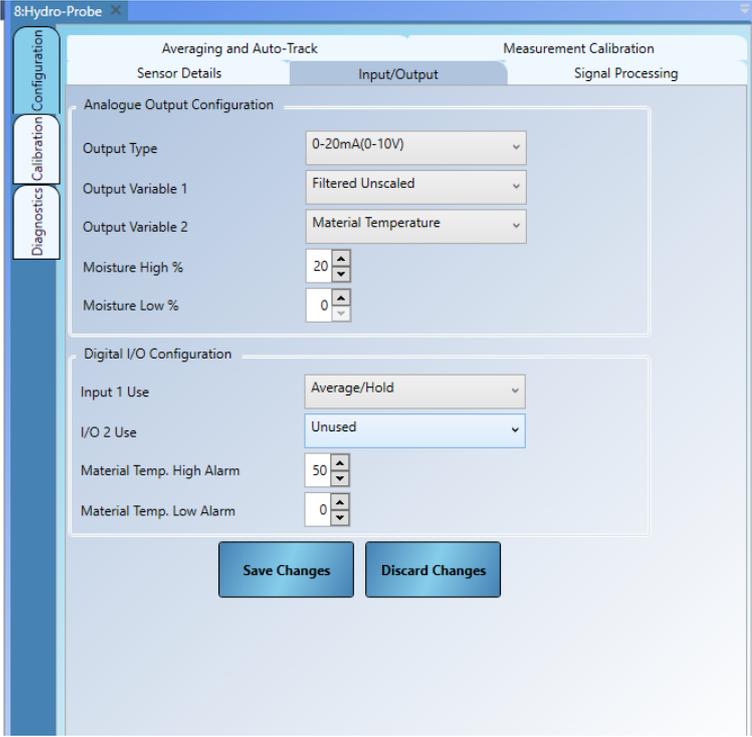
1.1 Option A – Hydro-Com Version 1.X

<p><i>Analogue Output</i></p> <p>O/P Type: 0-20mA (0-10V)</p> <p>O/P variable 1: Filtered Unscaled</p> <p>High %: 20.0 Low %: 0.0</p>	<p><i>Averaging</i></p> <p>Average/Hold Delay: 0.5</p> <table border="1"> <tr> <td></td> <td>Moisture %</td> <td>Unscaled</td> </tr> <tr> <td>High Limit</td> <td>30.0</td> <td>100.0</td> </tr> <tr> <td>Low Limit</td> <td>0.0</td> <td>0.0</td> </tr> </table>		Moisture %	Unscaled	High Limit	30.0	100.0	Low Limit	0.0	0.0
	Moisture %	Unscaled								
High Limit	30.0	100.0								
Low Limit	0.0	0.0								
<p><i>Digital Input/Output</i></p> <p>I/P 1 use: Unused</p> <p>I/O/P 2 use: Unused</p>	<p><i>Signal Processing</i></p> <p>Filtering Time: 1.0</p> <p>Slew Rate +: Light</p> <p>Slew Rate -: Light</p>									

1.2 Option B – Hydro-Com Version 1.X

<p><i>Analogue Output</i></p> <p>O/P Type: 0-20mA (0-10V)</p> <p>O/P variable 1: Filtered Moisture %</p> <p>High %: 20.0 Low %: 0.0</p>	<p><i>Averaging</i></p> <p>Average/Hold Delay: 0.5</p> <table border="1"> <tr> <td></td> <td>Moisture %</td> <td>Unscaled</td> </tr> <tr> <td>High Limit</td> <td>30.0</td> <td>100.0</td> </tr> <tr> <td>Low Limit</td> <td>0.0</td> <td>0.0</td> </tr> </table>		Moisture %	Unscaled	High Limit	30.0	100.0	Low Limit	0.0	0.0
	Moisture %	Unscaled								
High Limit	30.0	100.0								
Low Limit	0.0	0.0								
<p><i>Digital Input/Output</i></p> <p>I/P 1 use: Unused</p> <p>I/O/P 2 use: Unused</p>	<p><i>Signal Processing</i></p> <p>Filtering Time: 1.0</p> <p>Slew Rate +: Light</p> <p>Slew Rate -: Light</p>									

1.3 Option A – Hydro-Com Version 2.X



8:Hydro-Probe

Averaging and Auto-Track Measurement Calibration

Sensor Details **Input/Output** Signal Processing

Analogue Output Configuration

Output Type: 0-20mA(0-10V) ▼

Output Variable 1: Filtered Unscaled ▼

Output Variable 2: Material Temperature ▼

Moisture High %: 20 ▲▼

Moisture Low %: 0 ▲▼

Digital I/O Configuration

Input 1 Use: Average/Hold ▼

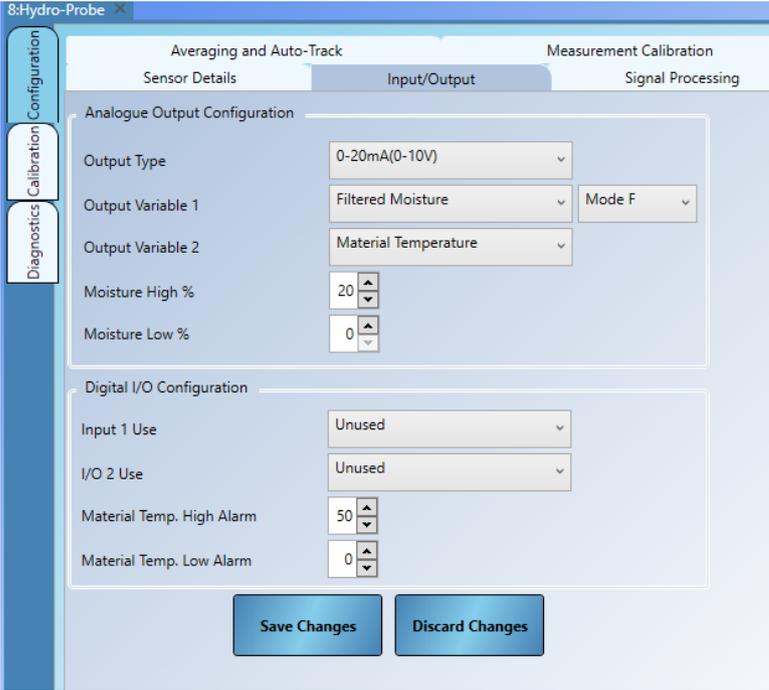
I/O 2 Use: Unused ▼

Material Temp. High Alarm: 50 ▲▼

Material Temp. Low Alarm: 0 ▲▼

Save Changes Discard Changes

1.4 Option B – Hydro-Com Version 2.X



8:Hydro-Probe

Averaging and Auto-Track Measurement Calibration

Sensor Details **Input/Output** Signal Processing

Analogue Output Configuration

Output Type: 0-20mA(0-10V) ▼

Output Variable 1: Filtered Moisture ▼ Mode F ▼

Output Variable 2: Material Temperature ▼

Moisture High %: 20 ▲▼

Moisture Low %: 0 ▲▼

Digital I/O Configuration

Input 1 Use: Unused ▼

I/O 2 Use: Unused ▼

Material Temp. High Alarm: 50 ▲▼

Material Temp. Low Alarm: 0 ▲▼

Save Changes Discard Changes

1.5 Option B - using the HV04

Analogue Outputs	
Output Type	0-20mA
O/P Variable 1	Filtered Moisture %
O/P Variable 2	Temperature
High %	20.0
Low %	0.0

1.6 Option B - using the HV05 or HH01

2: Hydro-Probe

Details
Analogues
Digital I/O
Signal Processing
Averaging and Auto-Track
Factory

Output Type	0-20mA
Output Variable 1	Filtered Moisture
Output Variable 2	Material Temperature
Moisture High %	20
Moisture Low %	0

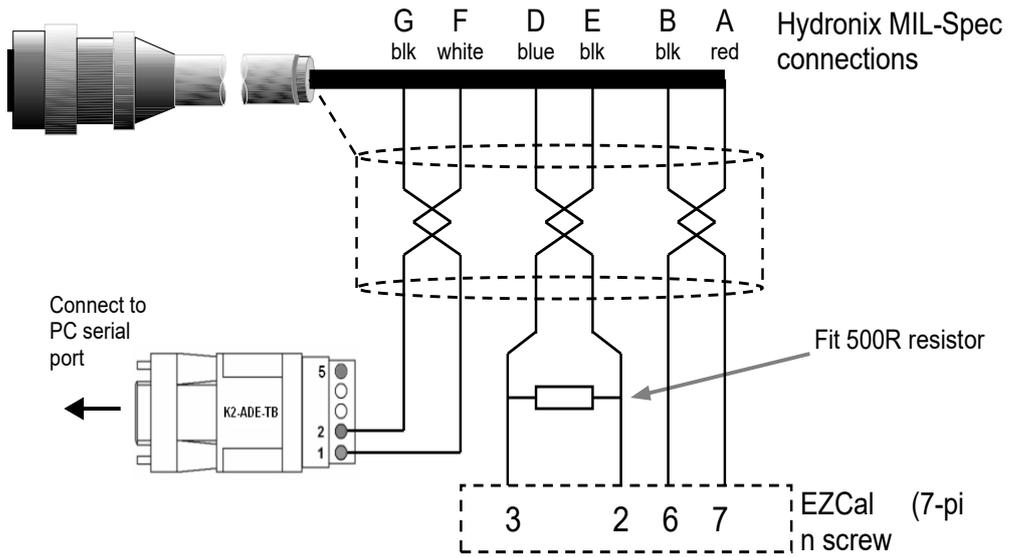
2 Connecting the Hydro-Probe to the EZCal Manual Station (Options A & B)

There are two versions of the moisture sensor analogue boards used in the EZCal manual station. Details for connecting to both are included below.

2.1 Connection to latest EZCal manual station, 7 pin terminal connector

On the latest EZCal manual station the Alkon 7102 moisture sensor is connected using a 7-pin screw terminal. The Hydro-Probe can be connected into this terminal strip as shown below. The Hydronix sensor cable contains 6 twisted pairs although only 3 pairs are required for connection and calibration of the Hydronix sensor. Two twisted pairs connect into the 7-pin moisture plug in board, one pair for power and one for the moisture output (0-10V). The third twisted pair is the digital RS485 communications which when used with a suitable RS232-485 converter, can be connected into a PC for sensor configuration and material calibration.

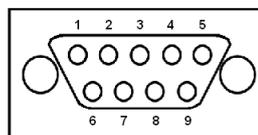
Important: The Hydronix supplied 500-Ohm resistor must be wired as shown, to convert the current loop output to a voltage input to the EZCal manual station.



Hydronix Sensor Cable				EZCal Panel Connection
Twisted Pair #	MIL-Spec pins	Cable colour	Signal Description	
1	A	Red	Supply +15-30Vdc	7
1	B	Black	Supply 0V	6
3	D	Blue	Analogue Positive (+)	3
3	E	Black	Analogue Return (-)	2
4	F	White	RS485 A	-
4	G	Black	RS485 B	-

2.2 Connection to older manual station, DB9 connector

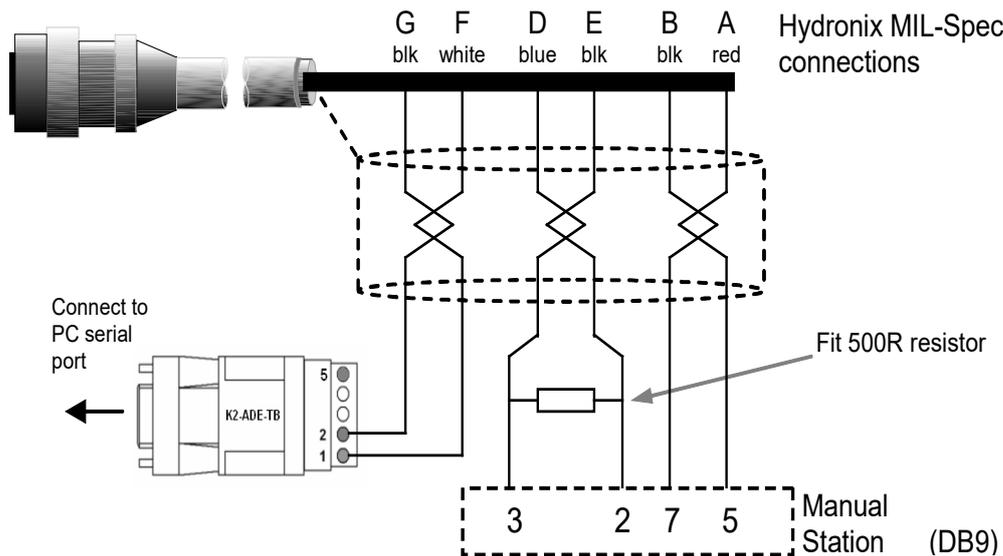
On the older manual stations the Alkon 7102 moisture sensor is connected using a DB9 connector. The wiring detail for the Alkon 7102 sensor in this case is shown below.



Pin 1	n/c	Pin 6	n/c
Pin 2	Sig -	Pin 7	-12VDC
Pin 3	Sig+	Pin 8	+15VDC
Pin 4	n/c	Pin 9	Circuit ground
Pin 5	+12VDC		

The Hydro-Probe can be connected into the manual station as shown below. The Hydronix sensor cable contains 6 twisted pairs although only 3 pairs are required for connection and calibration of the Hydronix sensor. Two twisted pairs connect into the 9-pin moisture plug in board, one pair for power and one for the moisture output (0-10V). The third twisted pair is the digital RS485 communications which when used with a suitable RS232-485 converter, can be connected into a PC for sensor configuration and material calibration.

Important: The Hydronix supplied 500-Ohm resistor must be wired as shown, to convert the current loop output to a voltage input to the manual station.



Hydronix Sensor Cable				Manual Station Connection
Twisted Pair #	MIL-Spec pins	Cable colour	Signal Description	
1	A	Red	Supply +15-30Vdc	5 **
1	B	Black	0V	7 **
3	D	Blue	Analogue Positive (+)	3
3	E	Black	Analogue Return (-)	2
4	F	White	RS485 A	-
4	G	Black	RS485 B	-

** If the power supply is inadequate or not working properly it is possible to power the Hydro-Probe from pins 8 and 9 from the DB9 connector.

3 Matching the Hydro-Probe output to the EZCal display (option B only)

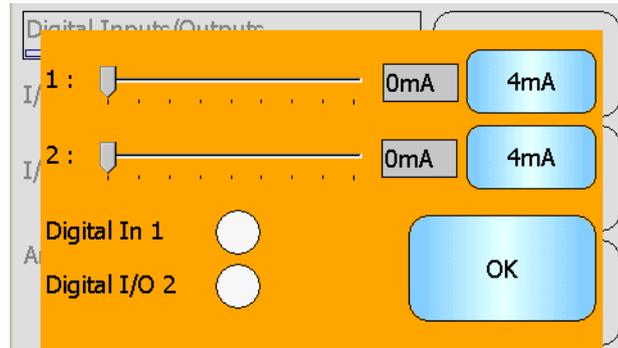
3.1 Matching output to latest EZCAL manual station (7 pin terminal connector)

Using the Hydro View IV or Hydro-Com software, go to the 'Diagnostics' page and press the 'Analogue Output Test' button. This will enable the user to force the Hydro-Probe current loop output to a fixed known value.

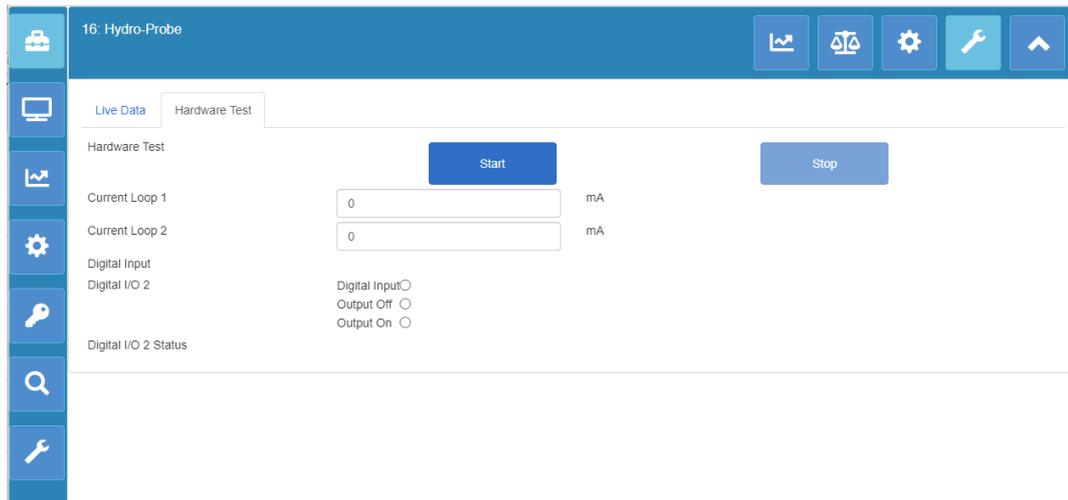
Using the slider force the Hydro-Probe current loop output to 10mA (5V). Step through the calibration sequence on the EZCal manual station and set the calibrated moisture to 10%, and the probe (slope) factor to .62 then press enter. This will set the EZCal display to approximately the same moisture as the output from the Hydro-Probe (in fact this will be 0.01% at 0mA, 10.02% at 10mA (5V) and 15.03% at 15mA (7.5V)).

Note: the EZCal manual station is set for a range of 20% and cannot go any higher despite the output from the Hydronix Hydro-Probe sensor.

Hydro-View IV, Page 4 of the Sensor Tab, Digital Inputs/Outputs

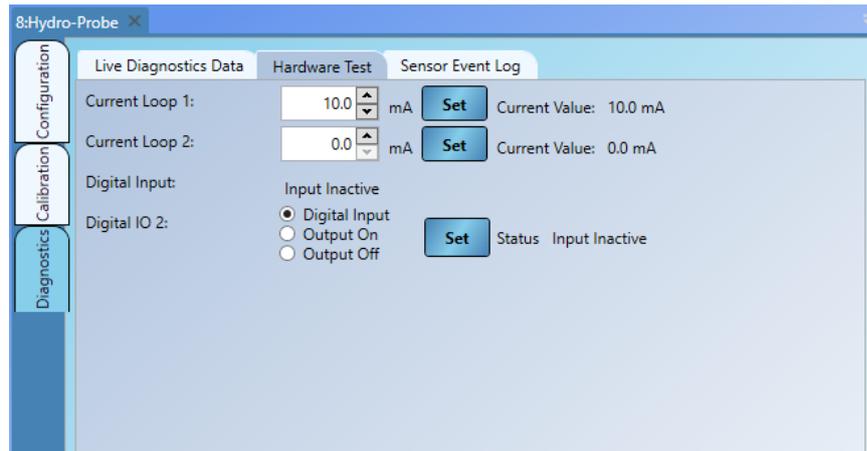


Hydro-View (Model HV05) and Hydro-Hub (Model HH01), Diagnostics, Hardware Test tab



Hydro-Com Version 2.X Go to Diagnostics>Hardware Test.

Using the Current Loop 1 Field Set the Hydro-Probe current loop output to 0mA (0V). Then set the panel display to '0' by adjusting the offset pot with a small screwdriver. Once set, force the output to 10mA (5V) by entering it into the Field and Hitting Set. Change the Manual Station display on the panel to read 10% using the gain pot. This process might have to be repeated a few times to get a satisfactory 0V=0% and 5V=10%. This will set the manual station to approximately the same moisture as the output from the Hydro-Probe.

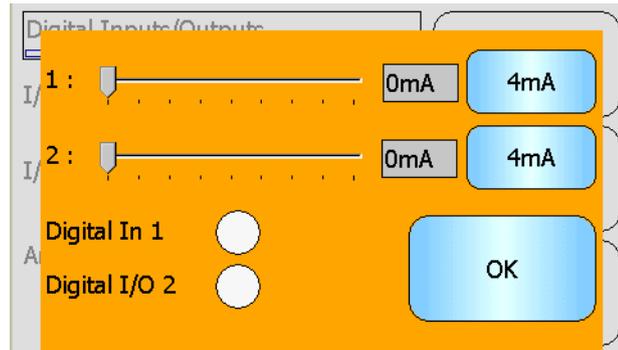


3.2 Matching output to older manual station (DB9 connector)

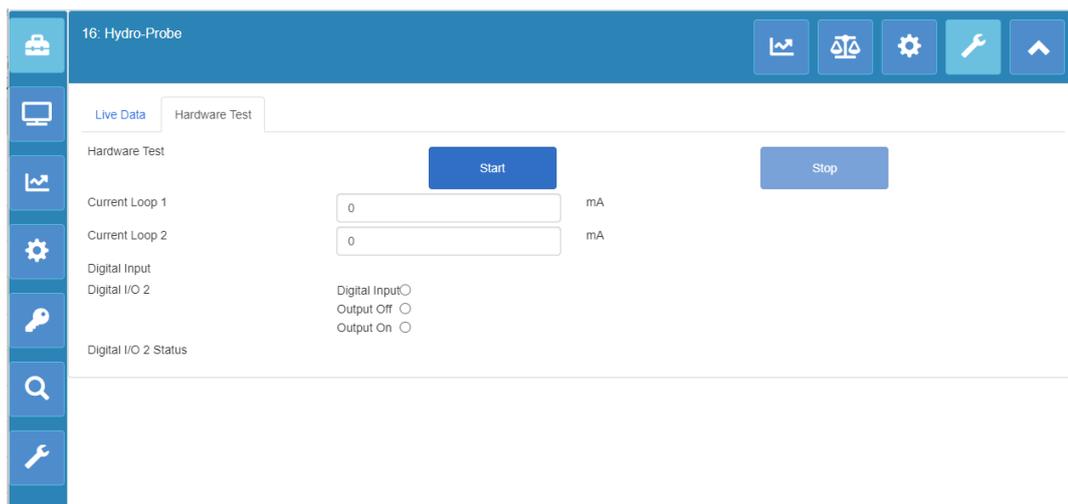
Using the Hydro View IV or Hydro-Com software, go to the 'Diagnostics' page and press the 'Analogue Output Test' button. This will enable the user to force the Hydro-Probe current loop output to a fixed known value.

Using the '0mA' button force the Hydro-Probe current loop output to 0mA (0V). Then set the panel display to '0' by adjusting the offset pot with a small screwdriver. Once set, force the output to 10mA (5V) using the slider and set the display on the panel to read 10% using the gain pot. This process might have to be repeated a few times to get a satisfactory 0V=0% and 5V=10%. This will set the manual station to approximately the same moisture as the output from the Hydro-Probe.

Hydro-View IV, Page 4 of the Sensor Tab, Digital Inputs/Outputs

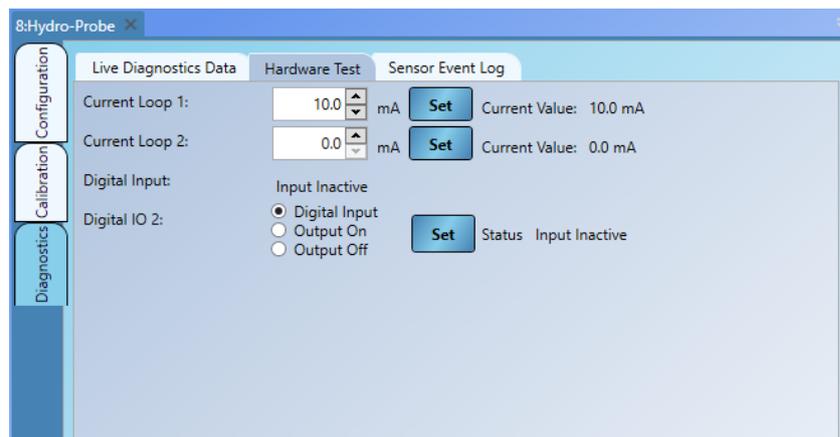


Hydro-View (Model HV05) and Hydro-Hub (Model HH01), Diagnostics, Hardware Test tab



Hydro-Com Version 2.X Go to Diagnostics>Hardware Test.

Using the Current Loop 1 Field Set the Hydro-Probe current loop output to 0mA (0V). Then set the panel display to '0' by adjusting the offset pot with a small screwdriver. Once set, force the output to 10mA (5V) by entering it into the Field and Hitting Set. Change the Manual Station display on the panel to read 10% using the gain pot. This process might have to be repeated a few times to get a satisfactory 0V=0% and 5V=10%. This will set the manual station to approximately the same moisture as the output from the Hydro-Probe.



4 Material Calibration (option B only)

To obtain an accurate moisture output from the sensor, it will be necessary to calibrate the Hydro-Probe to the material. The calibration simply correlates raw (unscaled) readings measured by the sensor, to actual moisture of the material determined in the laboratory by drying samples. The calibration calculates a set of coefficients which are stored in the sensor and used to output actual moisture. These coefficients are determined using the calibration page in the Hydro View IV or Hydro-Com software.

The Hydro-Com calibration page is accessed from the configuration page. This page is similar to the dedicated Hydronix calibration utility 'Hydro-Cal'. There is no extra functionality in Hydro-Cal so Hydro-Com users do not need to download Hydro-Cal for calibration purposes.

For full details on the material calibration using Hydro-Com, refer to the Hydro-Com User Guide.

For full details on the material calibration using Hydro-View IV, refer to the Hydro-View IV User Guide HD0531.

Note that if free moisture is required the SSD moisture should be filled in with the appropriate absorption moisture of the specific material.

4.1 Averaging

Averaging the output of a sensor over a period of time is essential for representative sampling in most applications. The EZCal system averages the moisture signal from the sensor over the aggregate feed time therefore it is not necessary to average in the sensor during normal operation. For this reason the digital input as described above is set to 'Unused'. However, during any calibration sequence it is advisable to average the 'Filtered Unscaled' reading. This is possible using remote averaging. The 'Start'/'Stop' button on the 'Calibration' page of Hydro View IV or Hydro-Com can be used when aggregate is feeding so that an average reading is obtainable.