



Engineering Note

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Using a HP02 with a Command Alkon EZCal Manual Station

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Products affected: HP02
Summary: How to commission a Hydro-Probe II moisture sensor to a Command Alkon EZCal manual station

Introduction

A Hydro-Probe II (HP02) 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 HP02 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 hence no re-training required. The output from the Hydro-Probe II 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 II will act in exactly the same manner as the Alkon sensor but with added benefits such as advanced temperature compensation, linearity, 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 II Material Calibration Routine.

The Hydro-Probe II is internally calibrated to output an actual moisture percentage using a PC running the Hydro-Com software (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 & B
- Material Calibration, for option B (for option A this is done in the EZCal manual station)

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1 How to configure the Hydro-Probe II

The Hydro-Probe II 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 engineering note EN0040 '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 <http://www.hydronix.com/software.html>. For full information on this utility please refer to the Hydro-Com User Guide HD0273.

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 For option A

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

1.2 For option B

<p><i>Analogue Output</i></p> <p>O/P Type <input type="text" value="0-20mA (0-10V)"/></p> <p>O/P variable 1 <input type="text" value="Filtered Moisture %"/></p> <p>High % <input type="text" value="20.0"/> Low % <input type="text" value="0.0"/></p>	<p><i>Averaging</i></p> <p>Average/Hold Delay <input type="text" value="0.5"/></p> <table border="0"> <tr> <td></td> <td style="text-align: center;">Moisture %</td> <td style="text-align: center;">Unscaled</td> </tr> <tr> <td>High Limit</td> <td><input type="text" value="30.0"/></td> <td><input type="text" value="100.0"/></td> </tr> <tr> <td>Low Limit</td> <td><input type="text" value="0.0"/></td> <td><input type="text" value="0.0"/></td> </tr> </table>		Moisture %	Unscaled	High Limit	<input type="text" value="30.0"/>	<input type="text" value="100.0"/>	Low Limit	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>
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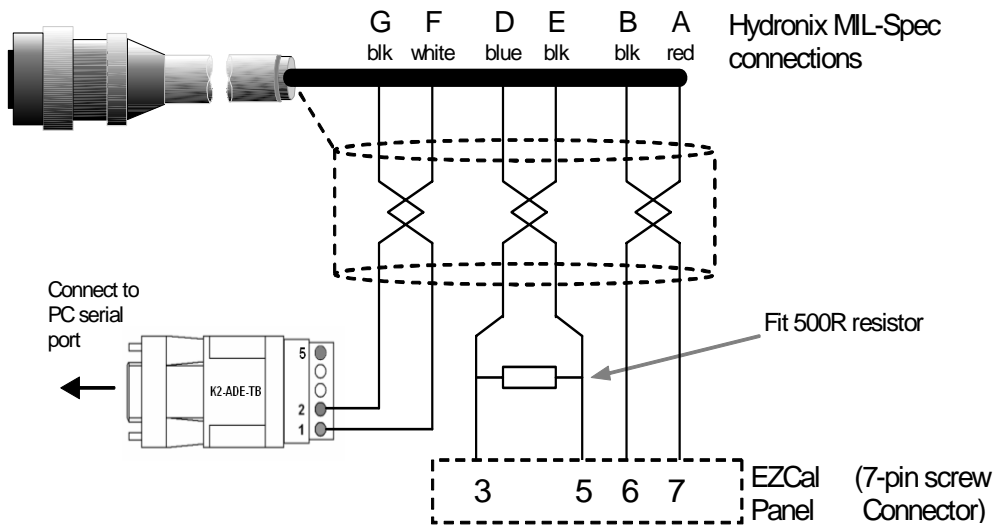
2 Connecting the HP02 to the EZCal Manual Station (options A & B)

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 II can be connected into this terminal strip as shown below. The Hydronix 0090A 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.

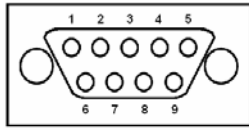
Important: The Hydronix supplied 500-Ohm resistor must be wired as shown, to convert the current loop output to a voltage input to the EZCal manual station.



Hydronix Sensor Cable (Part # 0090A)				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 (-)	5
4	F	White	RS485 A	-
4	G	Black	RS485 B	-

2.2 Connection to older manual station, DB9 connector

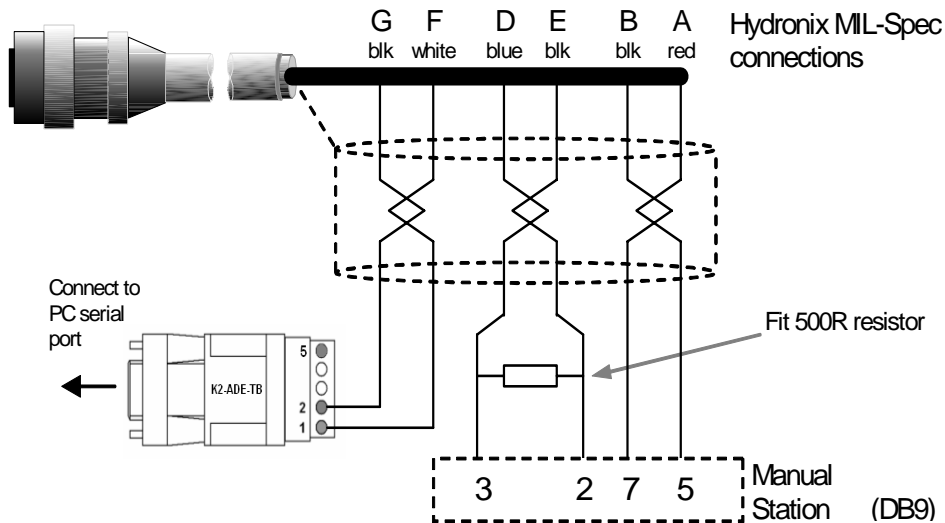
On the older manual stations the Alkon 7102 moisture sensor is connected using a DB9 connector. The wiring detail for the Alkon 7102 sensor in this case is shown below.



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 II can be connected into the manual station as shown below. The Hydronix 0090A 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 (Part # 0090A)				Manual station Connection
Twisted Pair #	MIL-Spec pins	Cable colour	Signal Description	
1	A	Red	+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 HP02 from pins 8 and 9 from the DB9 connector.

3 Matching the HP02 output to the EZCal display (option B only)

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

Using the Hydro-Com software, go to the 'Diagnostics' page and press the 'Analogue Output Test' button. This will enable the user to force the HP02 current loop output to a fixed known value.

Using the slider force the HP02 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 1.21, then press enter. This will set the EZCal display to approximately the same moisture as the output from the HP02 (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 HP02 sensor.

3.2 **Matching output to older manual station (DB9 connector)**

Using the Hydro-Com software, go to the 'Diagnostics' page and press the 'Analogue Output Test' button. This will enable the user to force the HP02 current loop output to a fixed known value.

Using the '0mA' button force the HP02 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 HP02.

4 Material Calibration (option B only)

To obtain an accurate moisture output from the sensor, it will be necessary to calibrate the Hydro-Probe II 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-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 HD0273.

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

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, hence 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-Com can be used when aggregate is feeding so that an average reading is obtainable.

~ End ~