

Instrumentation Northwest, Inc. (INW)

APPLICATION NOTE

CONFIGURING A PT2X SMART SENSOR TO MONITOR DEPTH-TO-WATER OR GROUNDWATER ELEVATION February 2007

Introduction

Purpose of this document is to provide a simple description for configuring an AquiStar® PT2X Smart Sensor for monitoring depth-to-water or groundwater elevation, using the Aqua4Plus Control Software.

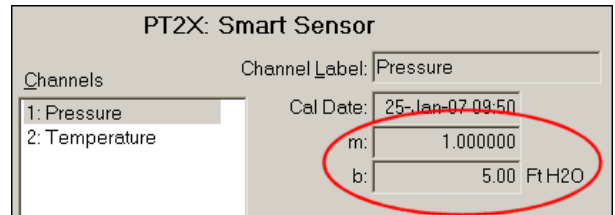
In normal configuration, the PT2X returns a pressure measurement relative to the water above the sensor. This can be expressed in psi, feet of water, inches of mercury, or a number of other units - however, it is always relative to the water above the sensor.

Often an engineer will need to know the depth-to-water or the elevation of the water. Using Aqua4Plus field calibration abilities, the PT2X can be configured to display depth-to-water or elevation.

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Preparation

To configure the PT2X to read either depth-to-water or the elevation of the water, you will need to modify the field calibration slope and offset. To begin, you need to determine and make a record of the current slope and offset.

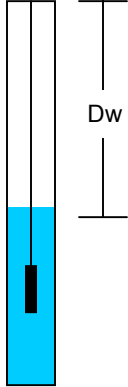


Start Aqua4Plus. From the Options Menu, select what units you will be measuring in, i.e., feet of water, inches of mercury, etc. With the sensor connected to the computer, find the sensor and then select Field Calibration from the Configure Menu. With Pressure highlighted in the left panel, note and write down the current slope (m) and offset (b).

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Monitoring Depth-to-Water

Calculating Offset for Depth-to-water on a Gauge Sensor



Dw = Depth to water (measured with water level indicator)
SR = Sensor reading (from Aqua4Plus, Real Time Monitor)
CurOff = Current offset (b) in Aqua4Plus Field Calibration Window
CurSlp = Current slope (m) in Aqua4Plus Field Calibration Window

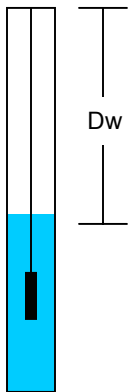
NewOff = Dw + SR - CurOff
NewSlp = -1 * CurSlp

Example:

Dw = 47 feet
SR = 43 feet
CurOff = 5 feet
CurSlp = 1

NewOff = Dw + SR - CurOff = 47 + 43 - 5 = 85 feet
NewSlp = -1 * 1 = -1

Calculating Offset for Depth-to-water on an Absolute Sensor



Dw = Depth to water (measured with water level indicator)
BV = Current barometric pressure
SR = Sensor reading (from Aqua4Plus, Real Time Monitor)
CurOff = Current offset (b) in Aqua4Plus Field Calibration Window
CurSlp = Current slope (m) in Aqua4Plus Field Calibration Window

NewOff = Dw + SR - BV - CurOff
NewSlp = -1 * CurSlp

Example:

Dw = 47 feet
BV = 33.9 feet
SR = 76.9 feet
CurOff = 5 feet
CurSlp = 1

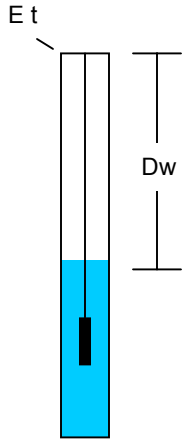
NewOff = Dw + SR - BV - CurOff = 47 + 76.9 - 33.9 - 5 = 85 feet
NewSlp = -1 * 1 = -1

Note: When taking readings on an absolute sensor, you will need to adjust the sensor readings by the current barometric pressure to get elevation. See the *Barometric Compensation Utility Application Note (9B0740ADD-1)* for information on how the Barometric Utility can help automate this process.

Monitoring Groundwater Elevation

Note: There is no change in slope (m) when configuring to monitor by elevation.

Calculating Offset for elevation on a Gauge Sensor



Et = Elevation at top of casing (given)
Dw = Depth to water (measured with water level indicator)
SR = Sensor Reading (from Aqua4Plus, Real Time Monitor)
CurOff = Current offset (b) in Aqua4Plus Field Calibration Window

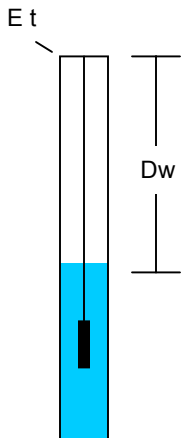
$$\text{NewOff} = \text{Et} - \text{Dw} - \text{SR} + \text{CurOff}$$

Example:

Et = 500 feet
Dw = 47 feet
SR = 43 feet
CurOff = 5 feet

$$\text{NewOff} = \text{Et} - \text{Dw} - \text{SR} + \text{CurOff} = 500 - 47 - 43 + 5 = 415 \text{ feet}$$

Calculating Offset for elevation on an Absolute Sensor



Et = Elevation at top of casing
Dw = Depth to water (measured with water level indicator)
BV = Current barometric pressure
SR = Sensor reading (from Aqua4Plus, Real Time Monitor)
CurOff = Current offset (b) in Aqua4Plus Field Calibration Window

$$\text{NewOff} = \text{Et} - \text{Dw} - \text{SR} + \text{BV} + \text{CurOff}$$

Example:

Et = 500 feet
Dw = 47 feet
BV = 33.9 feet
SR = 76.9 feet
CurOff = 5 feet

$$\text{NewOff} = \text{Et} - \text{Dw} - \text{SR} + \text{BV} + \text{CurOff} = 500 - 47 - 76.9 + 33.9 + 5 = 415 \text{ feet}$$

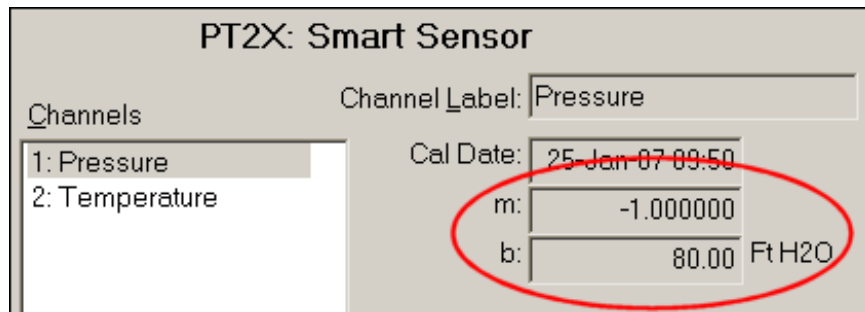
Note: When taking readings on an absolute sensor, you will need to adjust the sensor readings by the current barometric pressure to get elevation. See the *Barometric Compensation Utility Application Note (9B0740ADD-1)* for information on how the Barometric Utility can help automate this process.

Entering New Slope and Offset

The new slope (m) and offset (b) must be entered into Aqua4Plus and saved to the sensor.

- Be sure the units in Aqua4Plus are the same as the units you used when measuring, above. If not, then change using the Units selection under the Options Menu.
- Click on the Configure Menu, and then select Field Calibration.
- Highlight “Pressure” in the left panel.
- For the ‘m’ value, enter the slope (NewSlp) as calculated above.
- For the ‘b’ value, enter the offset (NewOff) as calculated above.
- Click OK to save the new values to the sensor.

All readings will now be as either depth-to-water or elevation.



The screenshot shows the 'PT2X: Smart Sensor' configuration interface. On the left, a 'Channels' list shows '1: Pressure' selected and '2: Temperature'. On the right, the 'Channel Label' is 'Pressure', the 'Cal Date' is '25-Jan-07 09:50', the slope 'm' is '-1.000000', and the offset 'b' is '80.00 Ft H2O'. A red oval highlights the 'm' and 'b' input fields.

Instrumentation Northwest appreciates any comments you may have regarding this application note. Please contact:

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