Sensor Configuration Tool

Instruction Manual

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BANNER®

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Contents

1 Sensor Configuration Tool 3
1.1 Menu Bar 3
2 Temperature-Humidity Sensors 5
2.1 Read Sensor Screen 5
2.2 Calibration Screen 6
2.3 Modbus Registers 7
3 Vibration-Temperature Sensors 8
3.1 Z Axis Data Screen 8
3.2 Configuration 8
4 GPS Sensors 10
4.1 Read Sensor Screen 10
5 Ultrasonic Sensors 11
5.1 Read Sensor Screen 11
6 Utilities 12
6.1 Register View Screen 12
6.2 Reprogram Device Screen 13
6.3 Settings Screen 13
7 Banner Engineering Corp. Software Copyright Notice 15

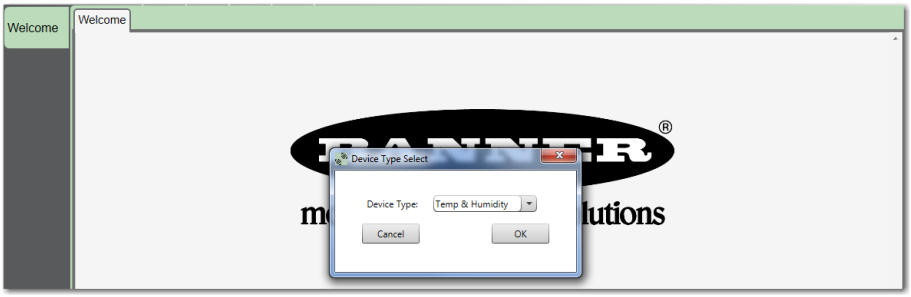
1 Sensor Configuration Tool

The Sensor Configuration Tool offers an easy way to manage sensor parameters, retrieve data, and visually show sensor data from a number of different sensors. The Sensor Configuration Tool software runs on any Windows machine and uses an adapter cable to connect the sensor to your computer.

Download the most recent version of the Sensor Configuration Tool from Banner Engineering's website: *www.bannerengineering.com/wireless*. The Sensor Configuration Tool currently supports the following sensors:

Sensor Type	Model	USB Adapter Cable
Temperature and Humidity	M12FTH3Q and M12FT3Q	Model BWA-HW-006: USB-to-RS-485 adapter cable
	M12FTH4Q and M12FT4Q	Model BWA-USB1WIRE-001: USB-to-RS-232 1-Wire adapter cable
Vibration and Temperature	QM42VT1	Model BWA-USB1WIRE-001: USB-to-RS-232 1-Wire adapter cable
	QM42VT2	Model BWA-HW-006: USB-to-RS-485 adapter cable
GPS	GPS50M	Model BWA-HW-006: USB-to-RS-485 adapter cable AND a field-wireable M12/Euro-style connector or connecter with pigtail
U-GAGE K50U Ultrasonic	K50UX2RA	Model BWA-USB1WIRE-001: USB-to-RS-232 1-Wire adapter cable
	K50UX1RA	Model BWA-HW-006: USB-to-RS-485 adapter cable

Launch the Sensor Configuration Tool and from the drop-down list, select your sensor type and click OK.



1.1 Menu Bar

The COMM port connection status, application status, and the program version number are displayed at the bottom of the Sensor Configuration Tool window.

Application Watcher

Open the Application Watcher window to view all serial data traffic between the PC and the sensor. This is primarily useful for debugging a setup or connection issue.

Advanced Options

Displays a new tab for configuring specific options for a sensor. For example, a vibration sensor has the ability to select various data values that can be put into the Modbus registers.

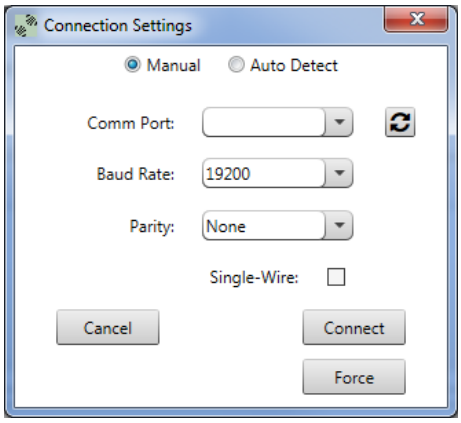
Device

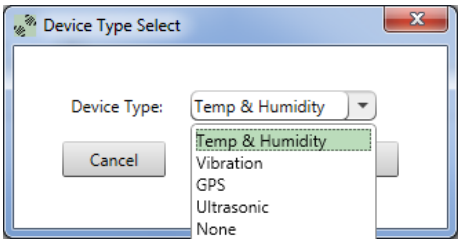
Connection Settings—Use to change the communication settings between the radio device and sensor. The standard default settings for the interface are manual detect, 19200 baud, no parity, and Modbus address 1 for a Modbus device. Set the COMM port to communicate with the sensor. The connection type can be set to auto detect or manual detect. Select the sensor interface type to be Modbus RTU type or a 1-wire. Refer to the specific sensor model number to identify the sensor interface type. Typically the COMM port is selected and the sensor is selected when the Sensor Configuration Tool first launches.

Device Type—Use to change the sensor type after the software is launched.

File

Exit—Closes the COMM port and exits the Sensor Configuration Tool.


Connection Settings
Manual
Auto Detect
Comm Port:
Baud Rate:
19200
Parity:
None
Single-Wire:
Cancel
Connect
Force


Device Type Select
Device Type:
Temp & Humidity
Cancel
Temp & Humidity
Vibration
GPS
Ultrasonic
None

2 Temperature-Humidity Sensors

The only temperature/humidity sensors the software is designed for are Sure Cross® Temperature and Humidity Sensors model M12FTH3Q and M12FTH4Q.

Before launching the application, plug the Banner Engineering USB-to-RS-485 adapter cable for M12FTH3Q sensors or USB-to-RS-232 1-Wire adapter cable for M12FTH4Q sensors into an available USB port on your computer and into ac power, if applicable. Plug the sensor into the adapter and wait for the green LED inside the sensor to flash.

Launch the Sensor Configuration Tool.

The Comm Port list auto-populates from the serial communication ports available for use on your computer. Select the applicable Comm Port, Baud Rate, and Parity to match the settings of the USB serial port in the PC's device manager. When initially installed, the default baud rate is 19200 and parity is none.

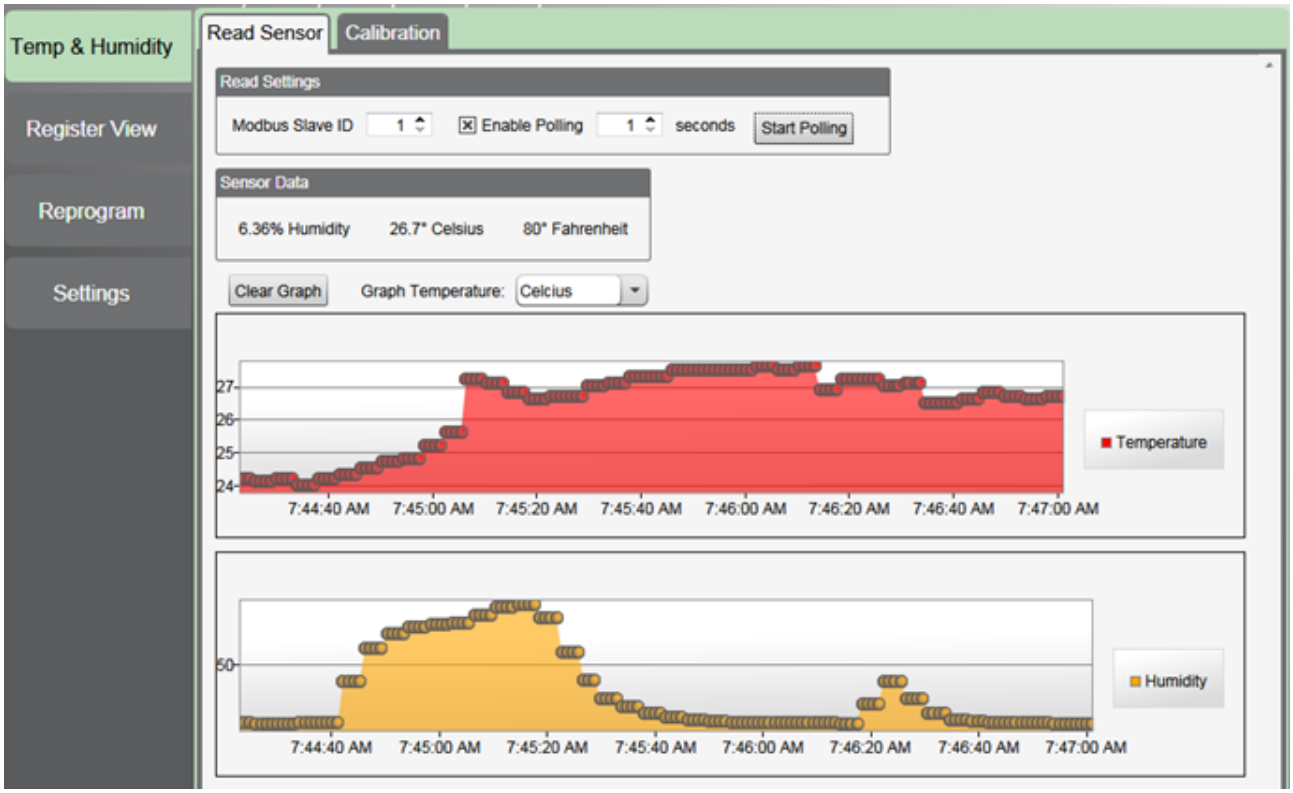
M12FTH*Q sensors support 9600, 19200, and 38400 baud rates as well as parity of odd, even, and none. Select the Single-Wire Device checkbox for M12FTH4Q sensors only.

Click Connect and the configuration tool attempts to communicate with the sensor. If the connection succeeds, the Sensor Configuration Tool main window opens. If the connection fails, select the applicable COM port settings and click on the Connect button again or click on the Exit button to skip the connection process and launch the main screen.

From the Device Type Select drop-down list, select Temp & Humidity.

2.1 Read Sensor Screen

Use the Read Sensor screen to retrieve data from your temperature-humidity sensor. This tab also allows for polling the device, viewing that sensor data, and viewing the sensor data graphically over time



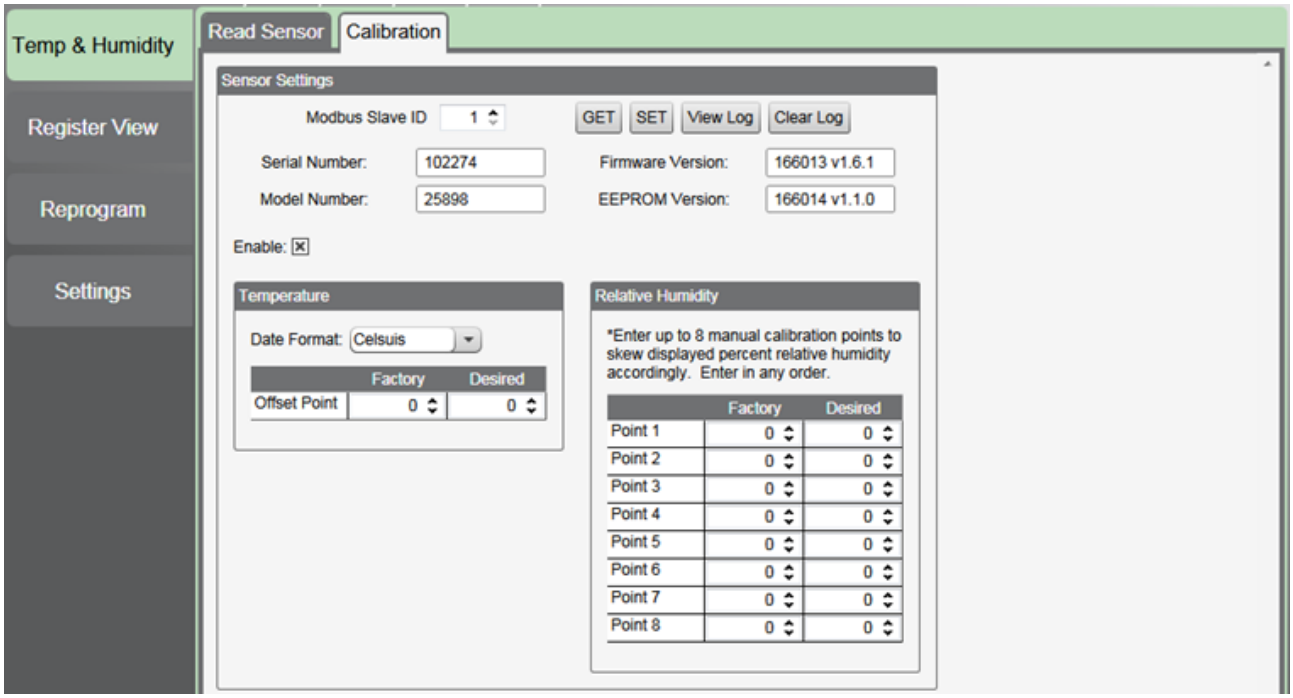
To retrieve the sensor data once, follow these steps:

1. Select the Modbus Slave ID assigned to the temperature-humidity sensor. The default Modbus Slave ID is 1.
2. Select Enable Polling and select how often to poll the sensor.
3. Click Read.

The relative humidity, degrees Celsius, and degrees Fahrenheit display in the Sensor Data area. Temperature and relative humidity are also displayed graphically.

2.2 Calibration Screen

Use the Calibration screen to manually calibrate your temperature-humidity sensors. Up to 8 manual calibration points can be entered to offset the current humidity readings.



To manually calibrate the relative humidity of your sensor, follow these steps:

1. Select the Modbus Slave ID applicable for sensor. (The default Modbus slave ID is 1.)
2. Select an Enable On or Off radio button to enable and disable manual calibration skewing of displayed percent relative humidity and temperature values. Manual calibration can be disabled without clearing factory and desired points.
3. Within the Relative Humidity box, enter up to eight factory readings and desired readings to adjust the sensor percent relative humidity reading. For each point, the Factory reading is the percent relative humidity read from the sensor; the Desired reading is the desired value. Unused points retain a zero value but all factory points must have a corresponding desired point.
4. If a percent relative humidity is not needed for manual calibration, leave all factory and desired values at zero.

To manually calibrate the temperature reading of your sensor, follow these steps:

1. Select the Modbus Slave ID applicable for sensor. (The default Modbus slave ID is 1.)
2. Within the Temperature box, enter the Factory reading and Desired temperature to adjust the sensor temperature readings.
3. Select Celsius or Fahrenheit from the drop-down. Changing units automatically converts the displayed values.

Click Get to read the manual calibration enabled flag, all factory and desired manual calibration points, the sensor's serial number, model number, firmware version, and EEPROM version.

Click Set to write the enable flag and all factory and desired reading points to the sensor. If information writes successfully, all data points and enable flag are automatically logged to the log file, along with device's serial number, model number, Modbus slave ID, firmware version, EEPROM version, and date and time of the write.

Click View Log to view a spreadsheet generated from the logged data in a Log Report Viewer window. In the Log Report Viewer window, click on the Export menu tab and select MS Excel to export the log report data to Microsoft Excel 2003 or newer. To save the log report directly from the Log Report Viewer window, select the Save menu, then select As CSV. The Save As dialog window will prompt you to save as a comma separated value [CSV] file. The CSV file can later be imported into Microsoft Excel or any spreadsheet viewer.

Click Clear Log to clear the log file data. The original log file is renamed with the current data and time appended to name for future reference. The next time the Set button is pressed and manual calibration data is written to a sensor, a new log file is automatically generated.

2.3 Modbus Registers

These are Modbus holding registers (4xxxx).

The temperature values are stored as the active temperature multiplied by 2.

Register	Standard Physical Inputs	Default Value
1	Relative Humidity (%)	
2	Temperature in ºC × 2	
3	Temperature in ºF × 2	

Relative humidity values are stored as the percentage multiplied by 100. Temperature values are stored as the actual temperature multiplied by 20.

Register	Manual Calibration Points	Accepted Values	Default Value
2001	Input 1 Manual Calibration Enable	0 = OFF; 1 = ON	0
2002	Factory Temperature Point in ºC × 20		0
2003	Desired Temperature Point in ºC × 20		0
2004	Factory Relative Humidity Point 0 in %RH × 100		0
2005	Desired Relative Humidity Point 0 in %RH × 100		0
2006	Factory Relative Humidity Point 1 in %RH × 100		0
2007	Desired Relative Humidity Point 1 in %RH × 100		0
...			
2018	Factory Relative Humidity Point 7 in %RH × 100		0
2019	Desired Relative Humidity Point 7 in %RH × 100		0

Register	Manufacturing Information	Default Value
4101-4102	Serial Number	
4103-4104	Model Number	
4105-4106	Production Date	

Register	Software Information	Default Value
4301-4302	RF Firmware Part Number	
4303	RF Firmware Version Upper	
4304	RF Firmware Version Lower	
4305	RF Firmware Version Engineering	
4306-4307	RF EEPROM Part Number	
4308	RF EEPROM Version Number Upper	
4309	RF EEPROM Version Number Lower	
4310	RF EEPROM Version Number Engineering	

Register	Serial Communication Parameters	Accepted Values	Default Value
6101	Serial Baud Rate	0 = 9600; 1 = 19200; 2 = 38400	1
6102	Parity	0 = None; 1 = Odd; 2 = Even	0
6103	Modbus Address	1 to 247	1

3 Vibration-Temperature Sensors

Before launching the application, plug the Banner Engineering USB-to-RS-232 1-Wire adapter cable into an available USB port on your computer and into ac power, if applicable. Plug the sensor into the adapter and wait for the green LED inside the sensor to flash.

Launch the Sensor Configuration Tool.

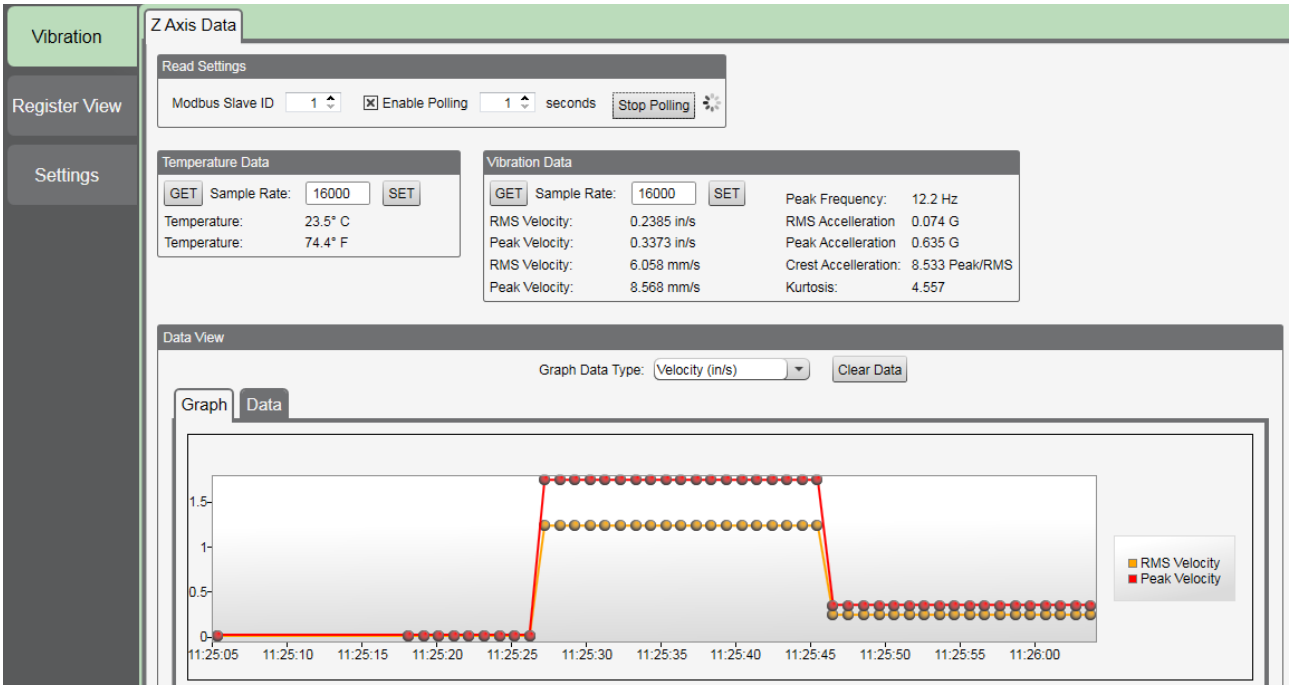
The Comm Port list auto-populates from the serial communication ports available for use on your computer. Select the applicable Comm Port, Baud Rate, and Parity to match the settings of the USB serial port in the PC's device manager. When initially installed, the default baud rate is 19200 and parity is none.

Click Connect and the configuration tool attempts to communicate with the sensor. If the connection succeeds, the Sensor Configuration Tool main window opens. If the connection fails, select the applicable COM port settings and click on the Connect button again or click on the Exit button to skip the connection process and launch the main screen.

From the Device Type Select drop-down list, select Vibration.

3.1 Z Axis Data Screen

Use the Z Axis Data screen to view vibration and temperature data collected by the sensor.



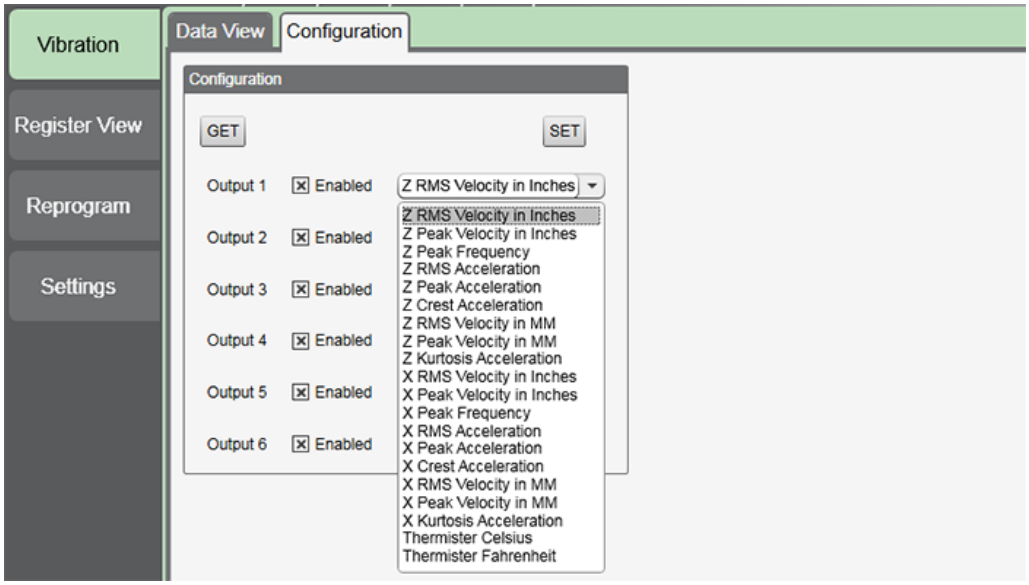
To retrieve the sensor data once, follow these steps:

1. Select the Modbus Slave ID assigned to the temperature-humidity sensor. The default Modbus Slave ID is 1.
2. Select Enable Polling and select how often to poll the sensor.
3. Click Read.

To retrieve the vibration or temperature data from the sensor, click GET. The current values populate the screen. Historical data is graphed at the bottom of the screen. Use the Graph Data Type drop-down list to select which data to graphically display: Velocity (in/s), Velocity (mm/s), Acceleration, Temperature (°F), or Temperature (°C).

3.2 Configuration

To view the Configuration screen, select Device > Advanced Options from the program's menu bar. Use this screen to select which sensor data is associated with the sensor inputs or to reassign the sensor's outputs to the Node's inputs.



When the Configuration screen opens, click GET to read the current configuration from the Vibration/Temperature sensor into the software. The outputs listed on the screen are the sensor's outputs. Up to six sensor outputs may be mapped to the Node's inputs. The sensor's output 1 is automatically mapped to the Node's input 1.

To change which sensor values are mapped to the Node's inputs, select a new value from the drop-down list for each sensor output. When you have selected the outputs for your sensor to transmit to the Node, click SET to save the configuration.

The parameters you can map from the sensor to the Node are:

Crest Acceleration
: Measures how extreme the peaks are in a given waveform.
Derived from acceleration Pk/RMS.

Kurtosis Acceleration
: Statistical indicator used to characterize the pulse character of the signal.
Units: None; typical value = 3

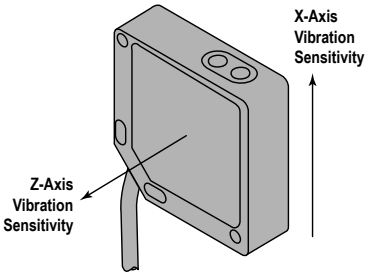
Peak Acceleration
: Maximum absolute deviation from mean of time-domain acceleration.
Units: Gs

Peak Frequency
: Center frequency of the FFT (Fast Fourier Transform) bin with the greatest velocity magnitude.
Units: Hz

Peak Velocity
: RMS Velocity × 2
Units: in/s or mm/s

RMS (Root Mean Squared) Acceleration
: Time-domain measurement AC only (Total RMS- mean).
Units: Gs

RMS (Root Mean Squared) Velocity
: Measure of effective energy produced by the machine within the frequency range measured.
Units: in/s or mm/s



4 GPS Sensors

Before launching the application, field-wire the unterminated ends of the GPS cable into a M12/Euro-style connector. Plug the GPS sensor's connector into the Banner Engineering USB-to-RS-485 adapter cable, then plug the adapter cable into an available USB port on your computer and into ac power, if applicable.

Launch the Sensor Configuration Tool.

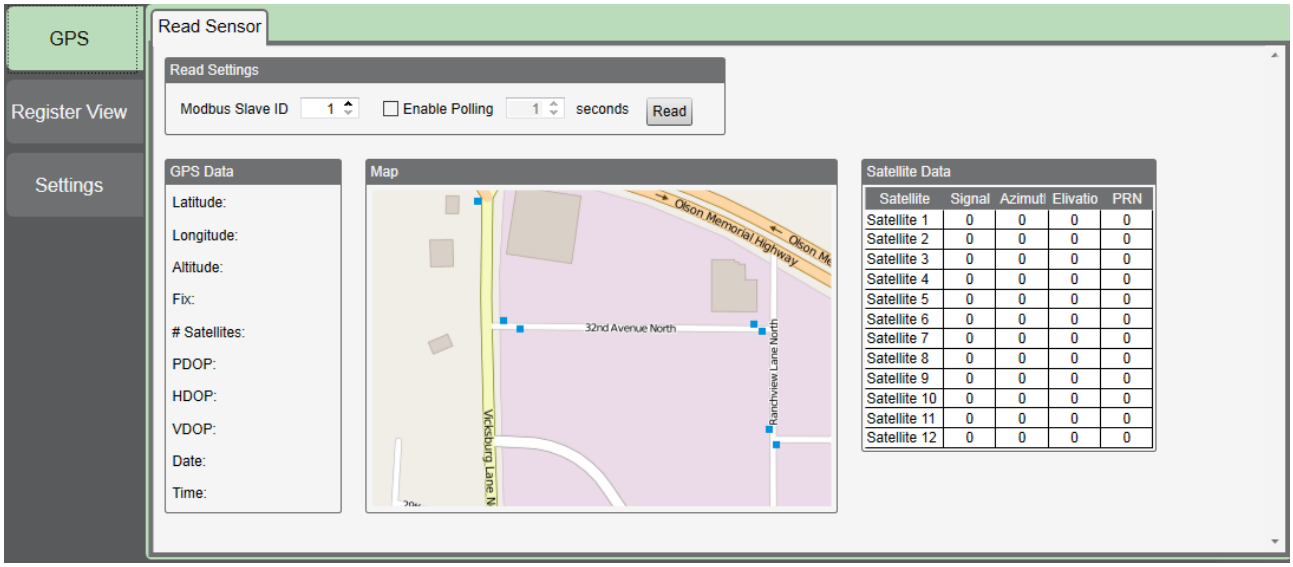
The Comm Port list auto-populates from the serial communication ports available for use on your computer. Select the applicable Comm Port, Baud Rate, and Parity to match the settings of the USB serial port in the PC's device manager. When initially installed, the default baud rate is 19200 and parity is none.

Click Connect and the configuration tool attempts to communicate with the sensor. If the connection succeeds, the Sensor Configuration Tool main window opens. If the connection fails, select the applicable COM port settings and click on the Connect button again or click on the Exit button to skip the connection process and launch the main screen.

From the Device Type Select drop-down list, select GPS.

4.1 Read Sensor Screen

Use the Read Sensor screen to retrieve data from your GPS sensor. This tab also allows for polling the device, viewing that sensor data, and viewing the sensor data graphically over time



To retrieve the sensor data once, follow these steps:

1. Select the Modbus Slave ID assigned to the temperature-humidity sensor. The default Modbus Slave ID is 1.
2. Select Enable Polling and select how often to poll the sensor.
3. Click Read.

The GPS data displayed includes latitude, longitude, and altitude. A map of the location is displayed, as is satellite data.

5 Ultrasonic Sensors

Before launching the application, connect the Ultrasonic sensor to the USB-to-RS-485 adapter cable. Plug the adapter cable into an available USB port on your computer and into ac power, if applicable.

Launch the Sensor Configuration Tool.

The Comm Port list auto-populates from the serial communication ports available for use on your computer. Select the applicable Comm Port, Baud Rate, and Parity to match the settings of the USB serial port in the PC's device manager. When initially installed, the default baud rate is 19200 and parity is none.

Click Connect and the configuration tool attempts to communicate with the sensor. If the connection succeeds, the Sensor Configuration Tool main window opens. If the connection fails, select the applicable COM port settings and click on the Connect button again or click on the Exit button to skip the connection process and launch the main screen.

From the Device Type Select drop-down list, select Ultrasonic.

5.1 Read Sensor Screen

Use the Read Sensor screen to retrieve data from your Ultrasonic sensor. This tab also allows for polling the device, viewing that sensor data, and viewing the sensor data graphically over time

To retrieve the sensor data once, follow these steps:

1. Select the Modbus Slave ID assigned to the temperature-humidity sensor. The default Modbus Slave ID is 1.
2. Select Enable Polling and select how often to poll the sensor.
3. Click Read.

The Ultrasonic sensor data displayed includes distance (mm) and temperature in both °C and °F. The distance is graphically displayed.

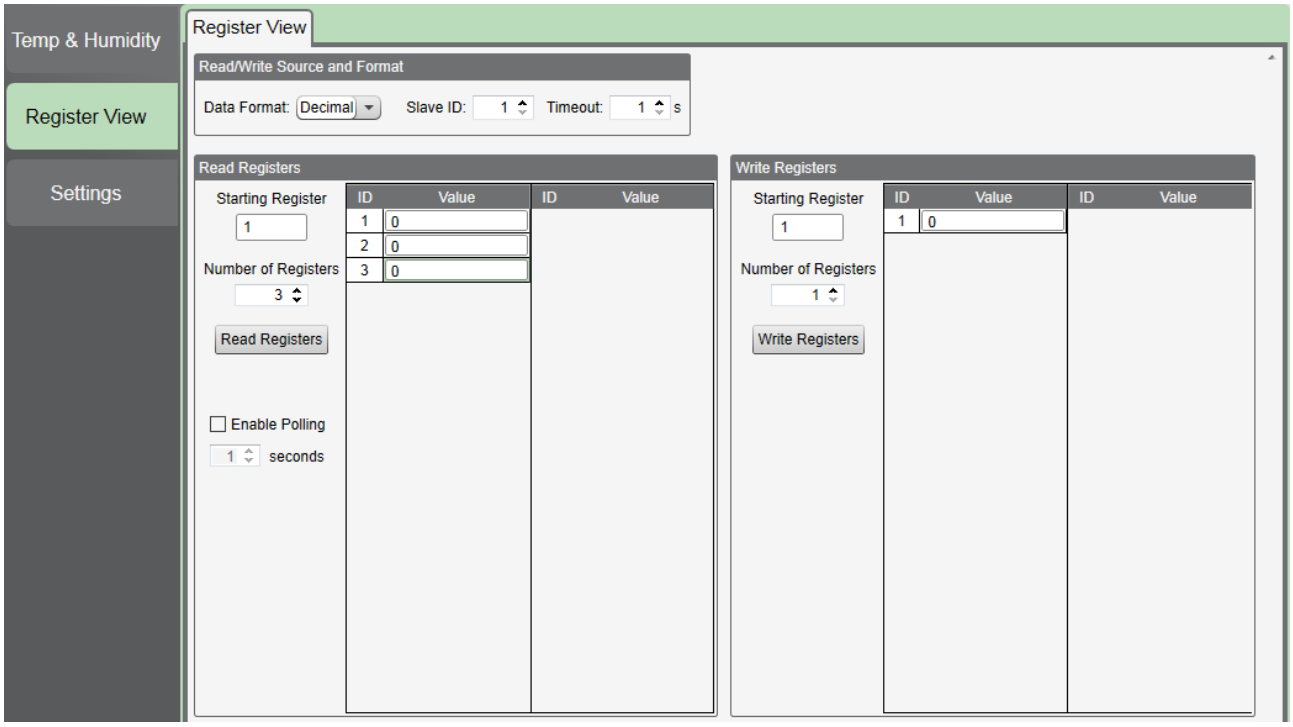
6 Utilities

6.1 Register View Screen

Use the Register View screen to read and write Modbus holding registers within the sensor. Registers are read/written in consecutive order starting with Modbus holding register address 1 to address 25535, up to 40 registers at a time.

One time read or write actions are completed by clicking Read Registers or Write Registers.

To enable constant polling from the device, select Enable Polling. The Read Registers button changes to Begin Polling. Click Begin Polling to start polling at the specified rate.



To read or write to specific registers, follow these steps:

1. Select the Modbus Slave ID of your sensor.
2. Select the data type you are reading or writing: decimal or hexadecimal.
3. To read registers, select the starting register and the number of registers to read. Click Read Registers.
4. To write registers, select the starting register and the number of registers to write to. For each register, enter a value. Click Write Registers. (See Write Registers for details).

Data Type
: Select read/write register data type to display.

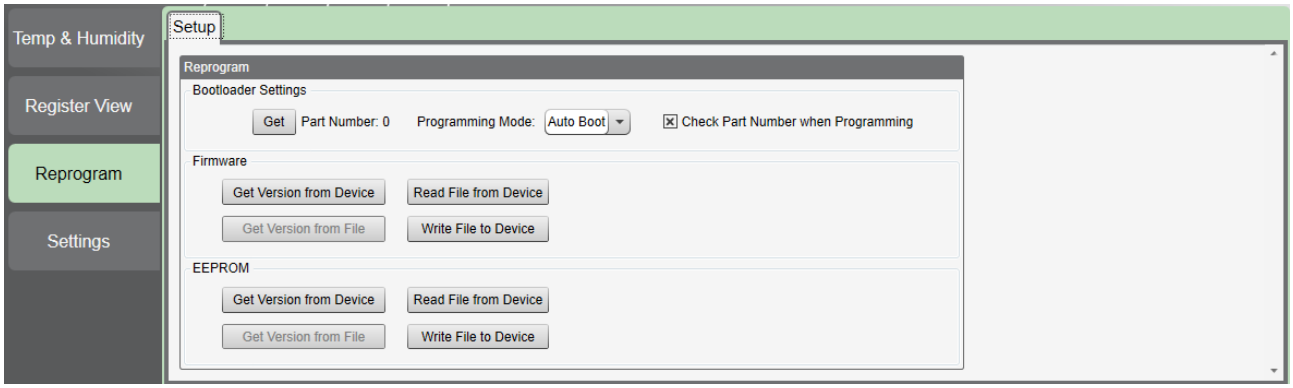
Enable Polling
: Enter a polling frequency in seconds. Click Begun Polling to begin polling the sensor.
The starting register, number of registers, and polling delay can all be changed during polling.

Read Registers
: Within the Register Information section of Read Registers, enter a starting Modbus holding register and the Number of Registers to read. Changing number of registers automatically populates the read information displayed.

Write Registers
: Select the Starting Register and Number of Registers to write to.
Changing the number of registers automatically populates the write information to be input. Enter the data to write to the applicable Modbus holding register. Decimal input values range from 0 to 65535 (FFFF in hex). Click the Write Registers button to write the data to the sensor.

6.2 Reprogram Device Screen

Use the Reprogram screen to read or write firmware and EEPROM files to the sensor. Consult Banner Engineering support for more information.



Write File to Device. To write firmware or EEPROM files to the sensor, follow these steps:

1. Click Write File to Device.
2. Browse to the file location and select the file. Click Open.
3. Accept the warning prompt by clicking the OK button.

Read File from Device. To read firmware or EEPROM files from sensor:

1. Click Read File from Device.
2. Use the Save As dialogue box to navigate to the directory to save the new file to.
3. Enter the name of new file in the file name input field, then click Save. The new file path will show in text field.

Get Version from Device. To read the EEPROM part number with major, minor, and engineering version numbers from a EEP file:

1. Click Get Version from Device.
2. The current version of the firmware or EEPROM is reported back.

6.2 Bootloader Settings

During the normal sensor programming process, the Auto Boot option should always be selected within the Programming Mode drop-down list. This allows the reading and writing of firmware and EEPROM files to and from the device and the reading and firmware and EEPROM version number from the files and sensors without having to unplug and plug sensor into the adapter. The Check Part Number when Programming option should also be selected; this verifies the firmware or EEPROM file being written is the correct part number.

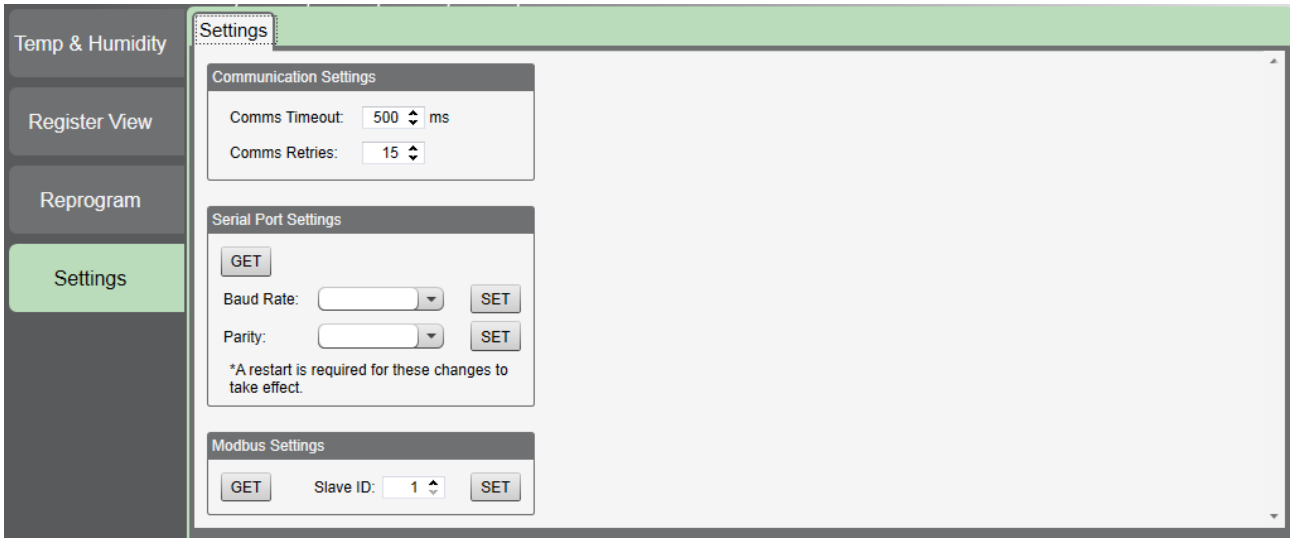
If the sensor is unresponsive, the firmware and EEPROM files can be force-loaded into the device. To force-load the firmware or EEPROM, follow these steps:

1. Unplug the sensor from the adapter connection.
2. Select the Manual Boot programming mode and unselect the Check Version when Programming option.
3. Use the Browse button to locate the file to load into the device and press the corresponding Write to Device button.
4. Accept the warning prompt then immediately plug the sensor into the adaptor connector.

Force-loading the firmware and EEPROM files to unresponsive sensors can take multiple attempts.

6.3 Settings Screen

Use the Settings screen to configure computer communication settings, serial power settings, and Modbus system parameters.



6.3 Computer Settings

Communication Retry

The communication parity determines how many attempts are taken to send a command to the sensor before the communications port generates an error.

The default communication retry setting is 15.

Communication Timeout

The communication timeout value determines how long the configuration tool attempts to communicate with the sensor before timing out the connection.

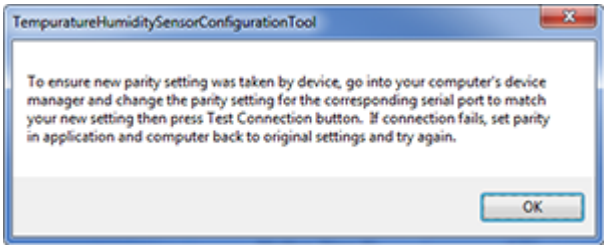
The default communication timeout is 500 milliseconds.

6.3 Serial Port Settings

Click Get to retrieve the sensor's baud rate and parity settings. The retrieved settings are displayed in the Baud Rate and Parity drop-downs lists. Use this button if the connection to the sensor is failing and the baud rate or parity has been changed on computer or device. The baud rate and parity on the computer and the sensor should be the same.

To change the sensor baud rate, select 9600, 19200, or 38400 from drop-down list and click the corresponding Set button. Set the computer serial port to the same rate to ensure communication.

To change the sensor parity option, select NONE, ODD, or EVEN from drop-down list and click the corresponding Set button. Set the computer serial port to the same parity to ensure communication.



After changing either the baud rate or the parity, a prompt displays, requesting that you verify the new baud rate or parity was updated to the device properly. Follow the instructions on the screen to test the connection.

6.3 Modbus Settings

Click Get to retrieve the Slave ID from a device if the Slave ID is unknown. Click Set to change the sensor's Modbus Slave ID to the value selected. Valid Modbus Slave IDs range from 1 to 247.

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