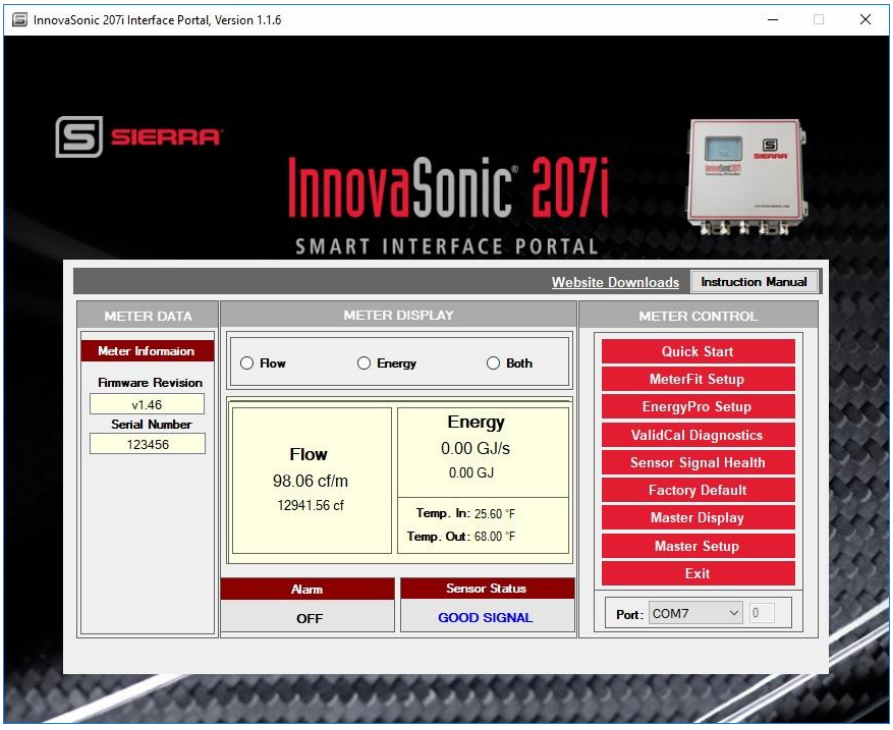
InnovaSonic® 207i

Ultrasonic Flow Meter for Liquids
With Thermal Energy/BTU Capability Meter

Instruction Manual

Smart Interface Portal (SIP)



Part Number: IM-207SIP
Version: C.6/19

SIERRA®

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CORPORATE HEADQUARTERS

5 Harris Court, Building L Monterey, CA 93940
Phone (831) 373-0200 (800) 866-0200 Fax (831) 373-4402
info@sierrainstruments.com
www.sierrainstruments.com

EUROPE HEADQUARTERS

Bijlmansweid 2 1934RE Egmond aan den Hoef
The Netherlands
Phone +31 72 5071400 Fax +31 72 5071401
sales@sierrainstruments.nl

ASIA HEADQUARTERS

Second Floor Building 5, Senpu Industrial Park
25 Hangdu Road Hangtou Town
Pu Dong New District, Shanghai, P.R. China
Postal Code 201316
Phone: + 8621 5879 8521 Fax: +8621 5879 8586

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TRADEMARKS

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Warnings and Cautions

We use caution and warning statements throughout this manual to draw your attention to important information.

Symbol Key		
Symbol	**Symbol Meaning**	**Descripition**
	Warning	"Warning" statements appear with information that is important to protect people and equipment from damage. Pay very close attention to all warnings that apply to your application. **Failure to comply with these instructions may damage the meter and cause personal injury.**
	Caution	"Caution" indicates that failure to comply with stated instructions **may result in damage or faulty operation of the meter.** Read and follow all cautions that apply to your application.
	Note	"Note" indicates that ignoring the relevant requirements or precautions may result in flow meter damage or malfunction.

General Safety Information

Warning!

- Consult the flow meter nameplate for specific flow meter approvals before any hazardous location installation.
- To avoid potential electric shock, follow National Electric Code or your local code when wiring this unit to a power source. Failure to do so could result in injury or death. All AC power connections must be in accordance with published CE directives. All wiring procedures must be performed with the power off.

Caution!

- Calibration must be performed by qualified personnel. Sierra strongly recommends that you return your flow meter to the factory for calibration.
- In order to achieve accurate and repeatable performance, the flow meter must be installed with the specified minimum length of straight pipe upstream and downstream of the flow meter's sensor head.
- The AC wire insulation temperature rating must meet or exceed 85°C (185°F)

Receipt of System Components

When receiving a Sierra flow meter, carefully check the outside packing carton for damage incurred in shipment. If the carton is damaged, notify the local carrier and submit a report to the factory or distributor. Remove the packing slip and check that all ordered components are present. Make sure any spare parts or accessories are not discarded with the packing material. Do not return any equipment to the factory without first contacting Sierra Customer Service.

Technical Assistance

If you encounter a problem with your flow meter, review the configuration information for each step of the installation, operation, and setup procedures. Verify that your settings and adjustments are consistent with factory recommendations. Installation and troubleshooting information can be found in the InnovaSonic 207i Manual, Chapter 2 (Installation) and Chapter 4 (Troubleshooting).

If the problem persists after following the troubleshooting procedures outlined in the InnovaSonic 207i Instruction Manual, Chapter 4, contact Sierra Instruments by fax or by e-mail (see inside front cover). For urgent phone support you may call (800) 866-0200 or (831) 373-0200 between 8:00 a.m. and 5:00 p.m. PST. In Europe, contact Sierra Instruments Europe at +31 72 5071400. In the Asia-Pacific region, contact Sierra Instruments Asia at +8621 5879 8521. When contacting Technical Support, make sure to include this information:

When contacting Technical Support, make sure to include this information:

- The flow range, serial number, and Sierra order number (all marked on the meter nameplate)
- The software version (visible at start up)
- The firmware version display (displayed at meter start up)
- The problem you are encountering and any corrective action taken
- Application information

Additional Resources

Visit Sierrainstruments.com for additional resources. Note: the most current versions of the iSeries documents can be found at www.sierrainstruments.com/downloads/207i.

Chapter 1 | Smart Interface Portal (SIP) Set Up and Installation

This manual provides information needed to install and operate the Smart Interface Portal (SIP) for the InnovaSonic 207i Liquid Flow Meter with Thermal Energy/BTU capability. For your reference, below is the SIP main screen with key functionality. Please note that the data displayed on the graphic below is for illustrating use only. Your data will differ. Please refer to the 207i Instruction manual for more details product installation www.sierrainstruments.com/downloads/207i.

	Watch Video Tutorial – a video tutorial for this function is available on Sierra's website www.sierrainstruments.com/207i-how-to (installation) or www.sierrainstruments.com/207iSIP (SIP).

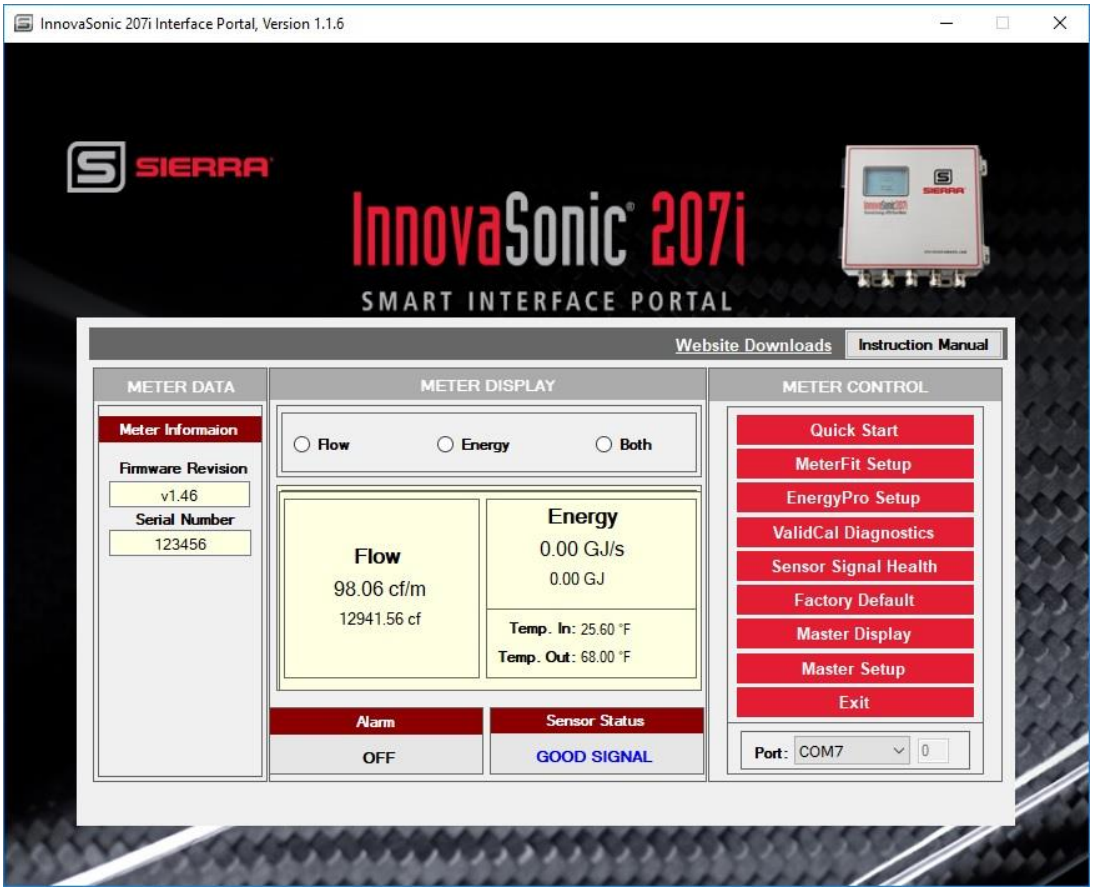


Figure 1. InnovaSonic Smart Interface Portal Home Screen

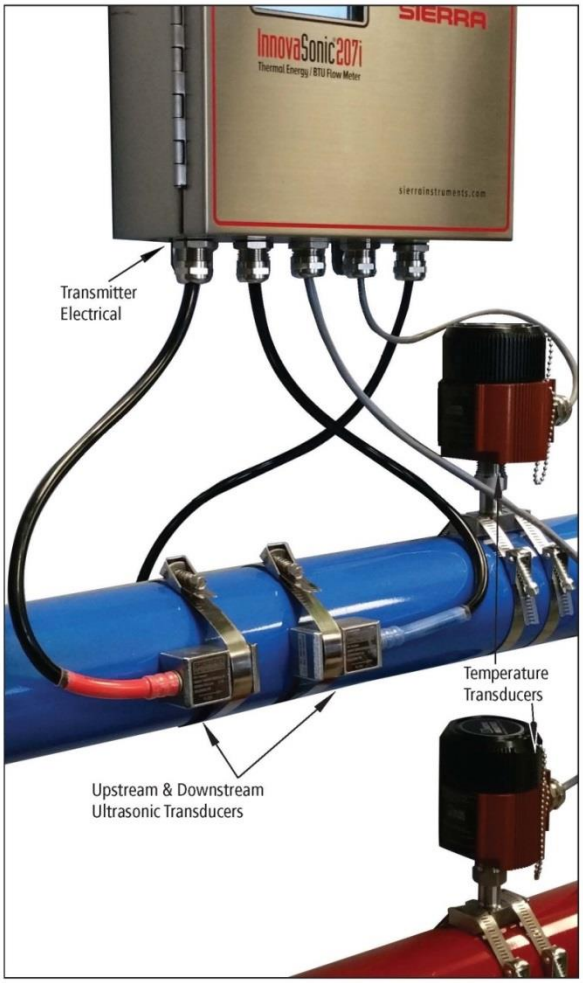


Figure 2. Transmitter Wall Mount with Pictured Transducers and Clamp-on RTDs (strain relief not included)

Installing Your Smart Interface Software (SIP)

System Requirements

Operation System: Windows
The Ultrasonic 207i Sierra Smart Interface Portal is Windows Compatible.

Software & Firmware Updates

If your meter is connected to a computer with internet connection, notifications about SIP software or meter firmware updates will appear when you start your SIP. The notification will inform you if there is a software update to SIP itself or if newer firmware for the meter is available. You will have the option to install or ignore.

If you do not have internet capabilities, we recommend you periodically check this page (www.sierrainstruments.com/downloads/207i) for updates.

SIP Installation Steps Using USB Cable or RS-232

	You must have internet in order to install the Smart Interface Program (SIP). If you do not have internet capabilities the meter will notify you it tried to connect, but wasn't able to. Sierra recommends you periodically check this page (http://www.sierrainstruments.com/products/sip/sip-is.html) for updates.
	Watch Video Tutorial – a video tutorial for this function is available on Sierra's website www.sierrainstruments.com/207i-how-to (installation) or www.sierrainstruments.com/207iSIP (SIP).

Connect your flow meter to your computer using the provided USB male to USB male cable (See Figure 3). Use the provided plug to install the USB to the terminal board (TB) as shown below, and then install power to the meter.

The USB functionally is the same as the RS-232 connection and uses a FTDI chip to emulate a RS-232 COM port connection. The USB connection is the USB "A" type connector so the cable to connect to a PC would be the "A" to "A" type.

Drivers for the internal FTDI chip should automatically load using Windows.

Configuration of COM setting and functions of these follow:

- Baud Rates; 38400
- Data bits 8, stop bits 1
- Parity; None

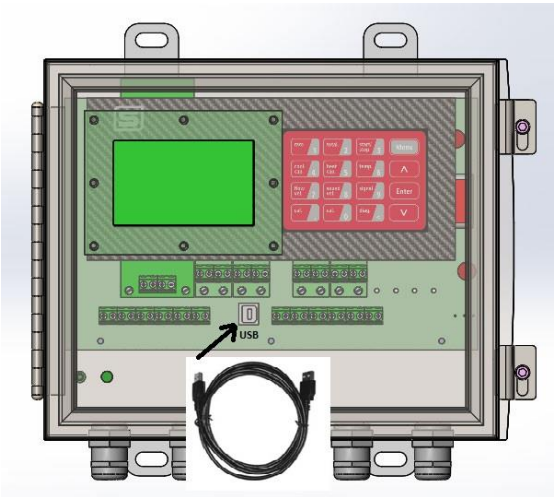


Figure 4. InnovaSonic 207i USB male to USB male cable

Figure 3. InnovaSonic 207i USB Connection

You may also use RS-232 to serial port connection.
The RS-232 connection is a simple 3-wire connection with no handshake connections (Tx, Rx, Gnd).

To download and install the SIP software:

1) Go to http://www.sierrainstruments.com/products/sip/sip-is.html and download the InnovaSonic 207i Smart Interface Portal (SIP) **"InnovaSonic_SIP Setup"** file.

2) Click on the **"InnovaSonic_SIP Setup.exe"** to begin downloading and let the program install the 207i SIP. This file is self-extracting.

3) Follow instructions for installing the files.
Process takes about 1-10 minutes total depending on speed of your computer.

If you have any questions about downloading the files please contact Sierra at: techsupport@sierrainstruments.com.

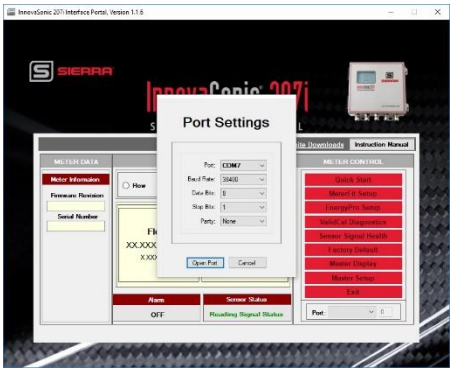
SIP Start-Up & Configuration

The Smart Interface Portal (SIP) allows the user to configure the unit and view all unit parameters.

1) Power up the meter and connect to the computer with the SIP installed via USB or RS-232 (See Figure 3 & 4 for meter USB connection).

2) Click on the InnovaSonic® 207i Sierra "S" Icon on your computer to start the program.

3) Use the dropdown menu to select and configure the appropriate Communications Port.



4) Once the port is selected, the meter data is read into the SIP program. It may take several seconds for all data fields to become populated. If you get an error, make sure you are connected to the correct Com port.

Chapter 2 | Overview of InnovaSonic Smart Interface Portal (SIP)

Once you open the Smart Interface Application (SIP) on your computer and enter in your Port Settings, you will see the SIP Main menu. The data fields on the Main Menu are ready only. All meter updates and adjustments are performed via the Applications or "Quick Keys" under the Meter Control Section. These functions are discussed in later sections. Note the "Website Downloads" in the upper right corner, this links to all technical data, the 207i manual and the quick start guide.

The various areas of the main screen are discussed below.

	Watch Video Tutorial – a video tutorial for this function is available on Sierra's website www.sierrainstruments.com/207i-how-to (installation) or www.sierrainstruments.com/207iSIP (SIP).

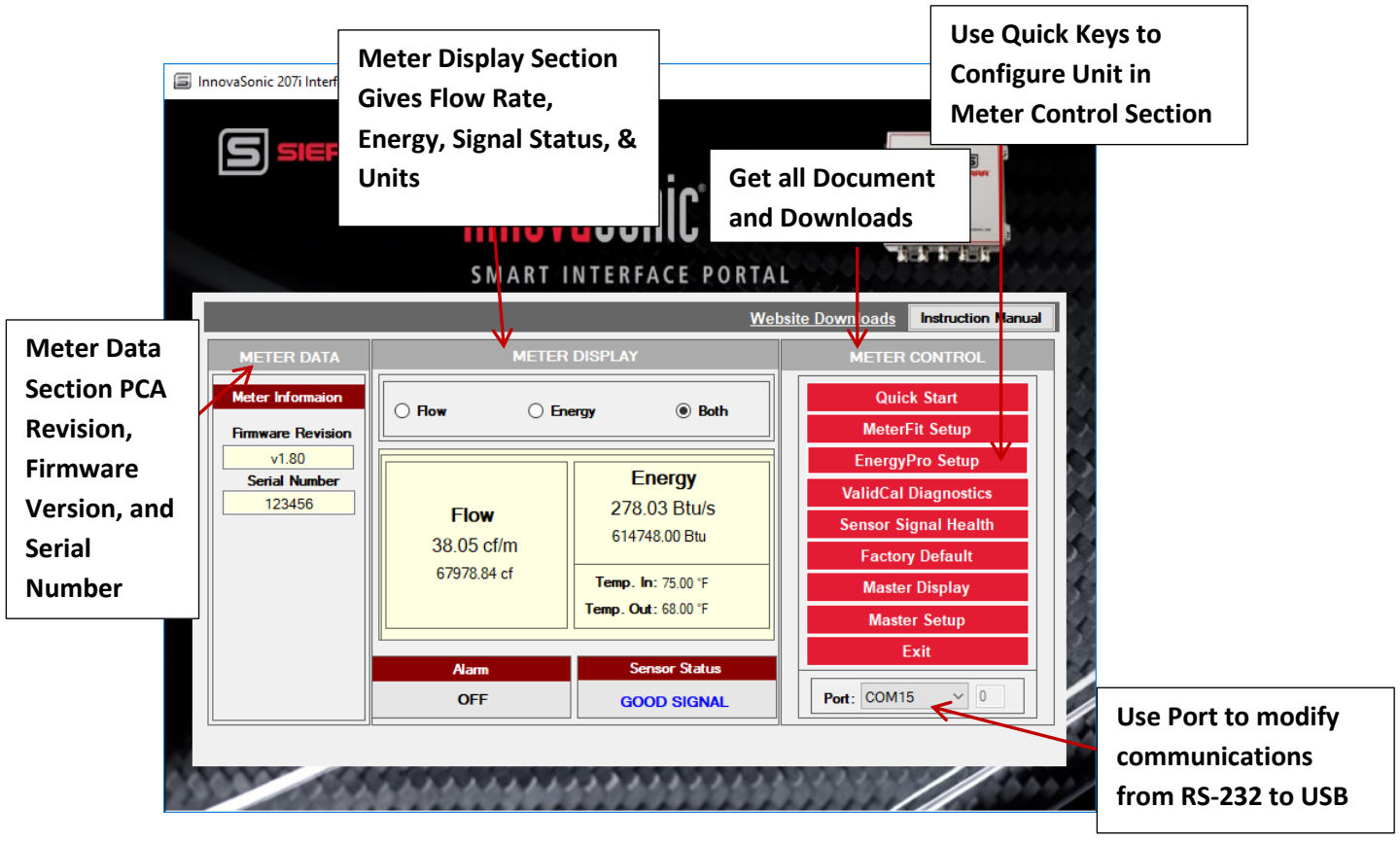


Figure 5. Overview of InnovaSonic Smart Interface Portal (SIP) Main Menu

Main Menu: Meter Data Section

The “Meter Data” section on the main menu displays the basic identifying information of the meter: PCA and Firmware versions, and the meter’s serial. This information is read only (See Figure 6).

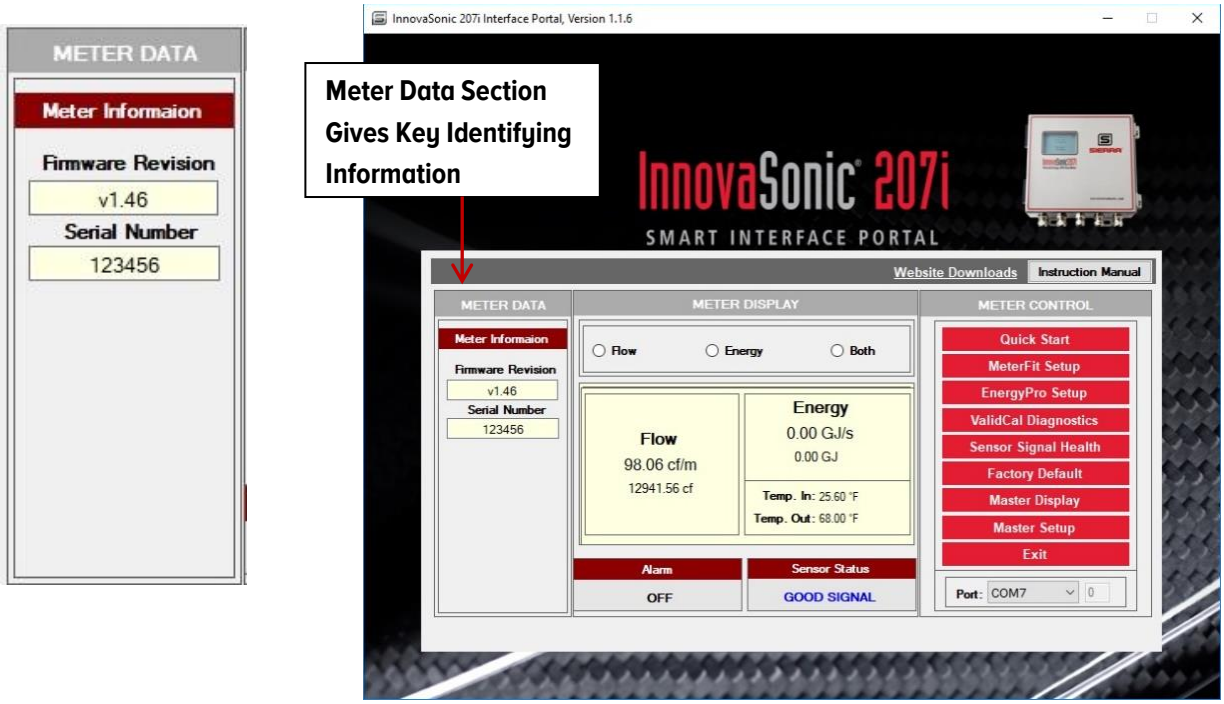


Figure 6. Meter Data Section on SIP Main Screen

Main Menu: Meter Display Section

The “Meter Display” section contains the primary meter output variables. Meter Display (Read Only) shows all the vital data in this section: flow units, energy units, flow rates, energy rates, totalized values, temperature input and output, status of your signal (“Healthy”, “Signal Below Minimum” or “Good Signal”), and any alarms.

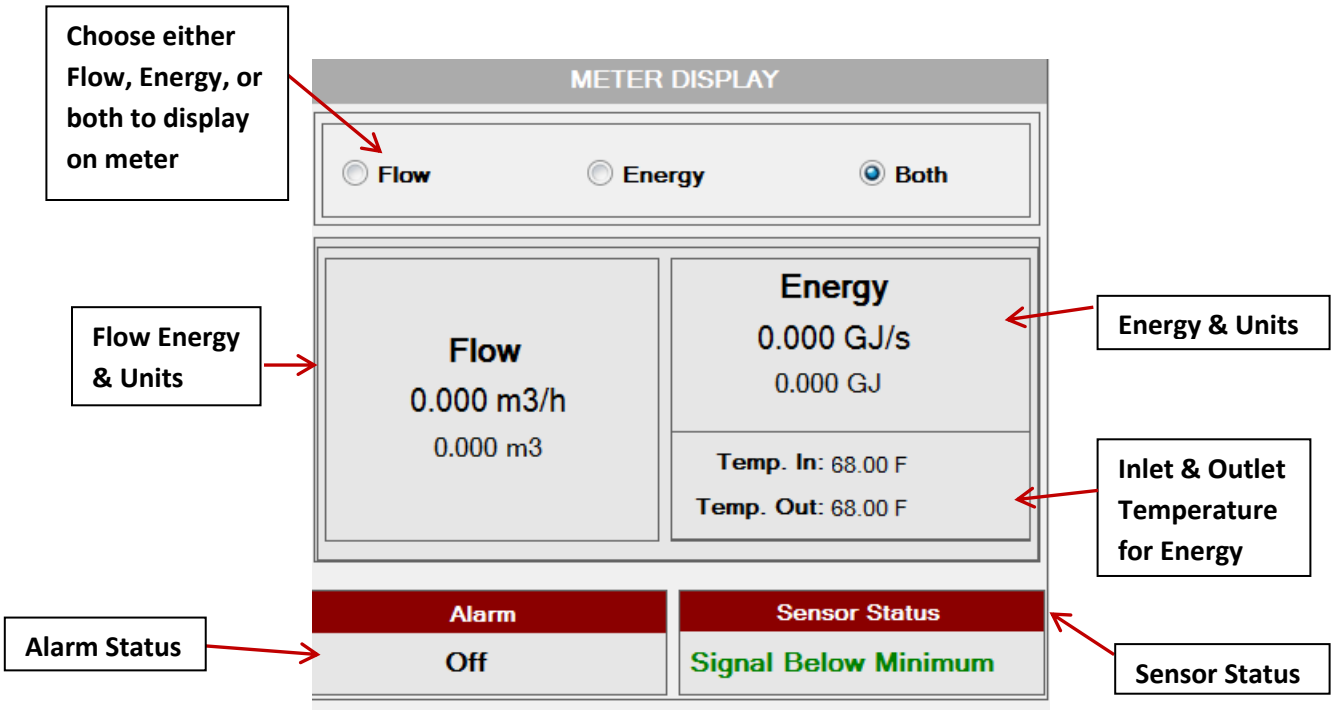


Figure 7. Meter Display Section on Main SIP

Main Menu: Meter Control Section

Meter Control contains the various applications that the 207i can support. They are also called “Quick Keys.” This series of quick keys allow for rapid meter configuration like “Quick Start,” “Meter Fit Setup,” “EnergyPro Setup,” “Validcal Diagnostics,” “Sensor Signal Health,” “Factory Default,” “Master Display,” “Master Setup,” and “Exit.”

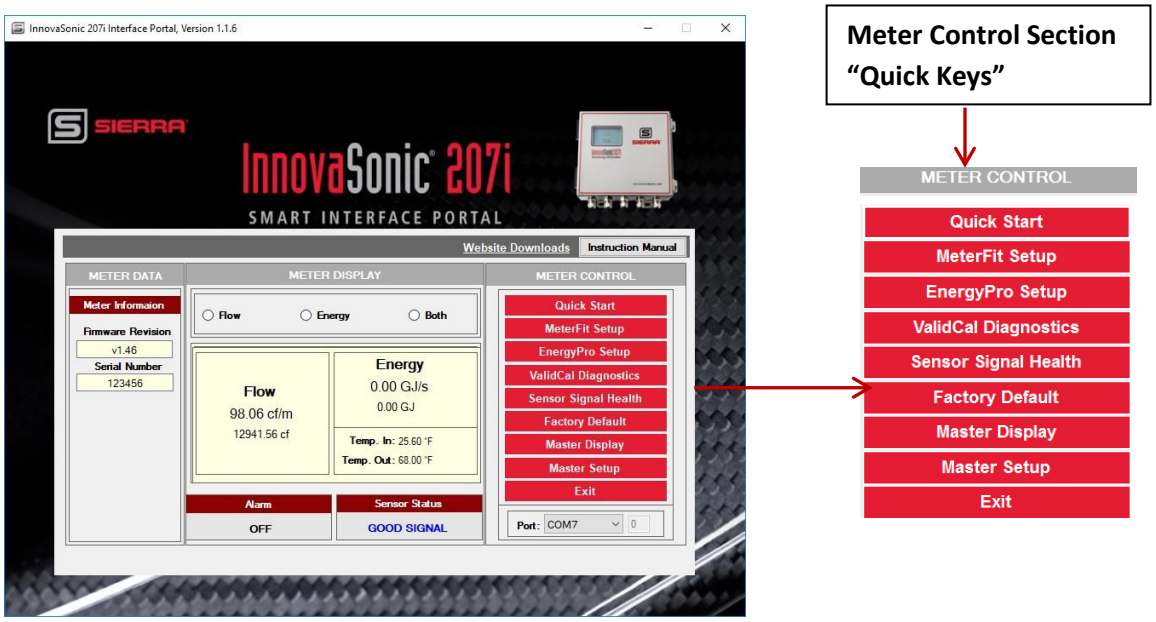


Figure 8. Main Menu Meter Control Section

Main Menu: Port Selection

The “Port Selection” allows users to modify RS-232 or USB communications settings. The port is set up in the port settings menu.

Chapter 3 | Installation with the Smart Interface Portal (SIP) – Quick Start App

Making installation easier – “Quick Start App” via USB. There are two ways to ensure you are installing your meter correctly. You can either use the “Quick Start” menu on the local display or the “Quick Start App” on the 207i Smart Interface Portal (SIP) software. Using the SIP is recommended for easy setup. Instructions below are for SIP software.

Figure 9. Accessing "Quick Start" menu from main SIP screen

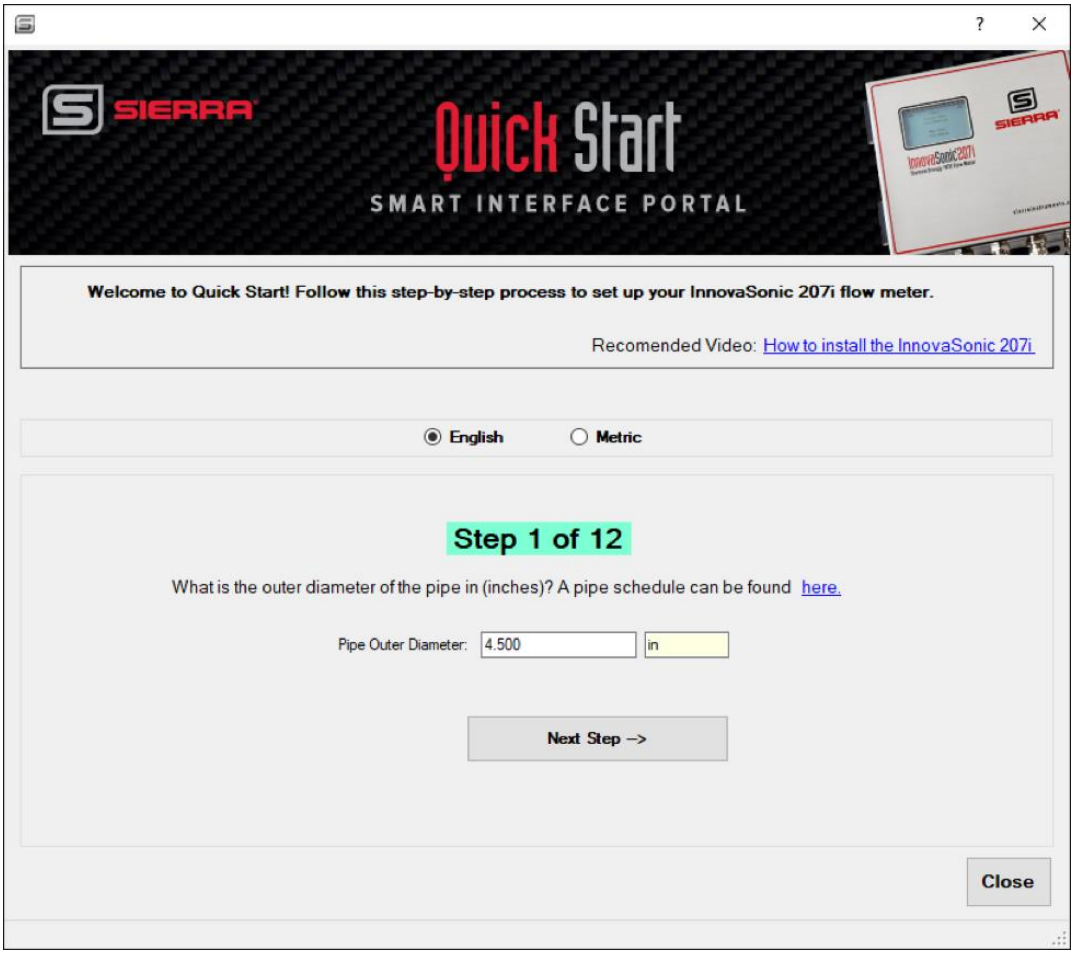


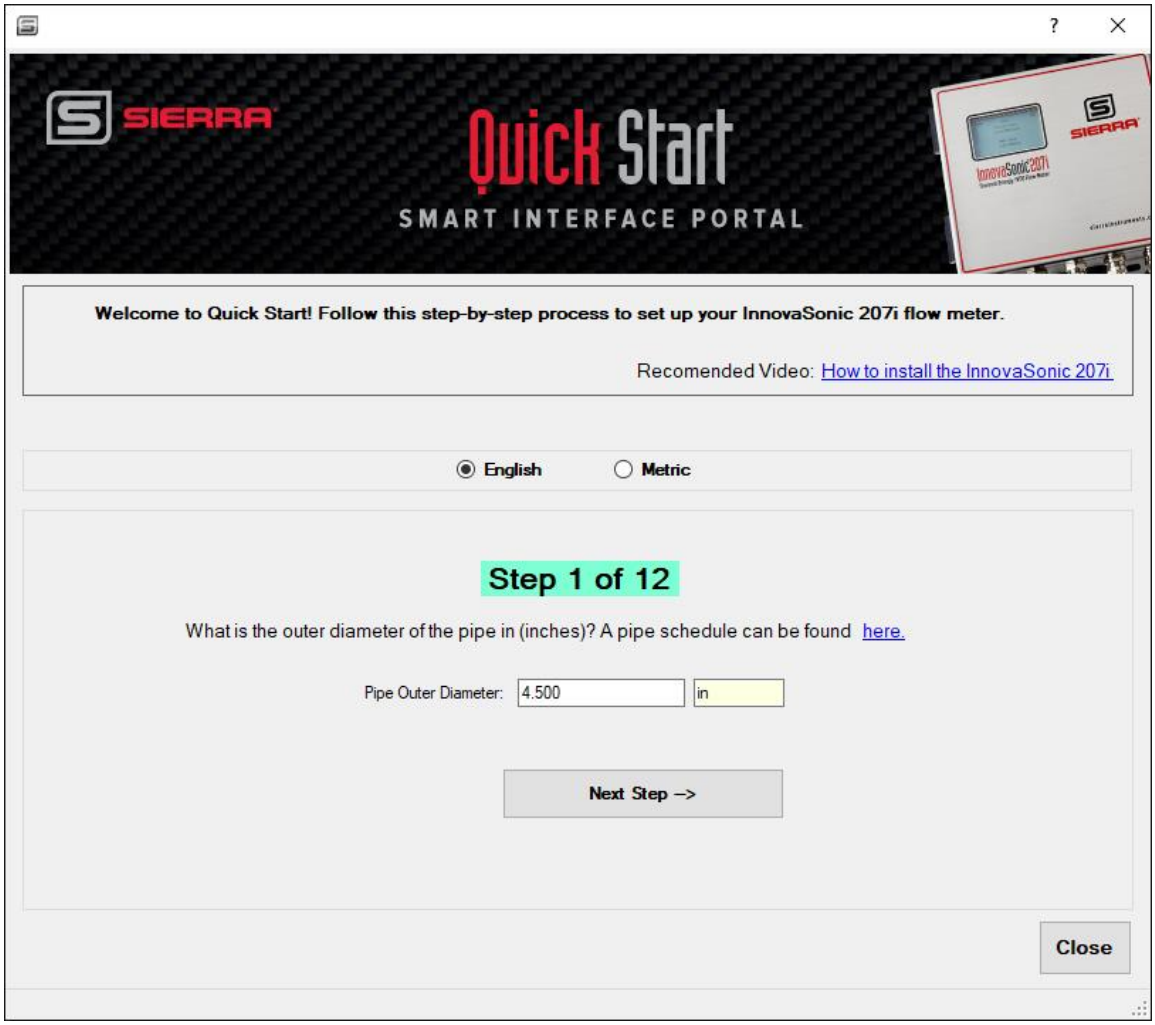
Figure 10. Quick Start App Main Menu

The "Quick Start App" will lead you through the initial set up of the InnovaSonic 207i. There are 12 steps. Enter in the requested data and then select "Next Step."

	Watch Video Tutorial – a video tutorial for this function is available on Sierra's website www.sierrainstruments.com/207i-how-to (installation) or www.sierrainstruments.com/207iSIP (SIP).

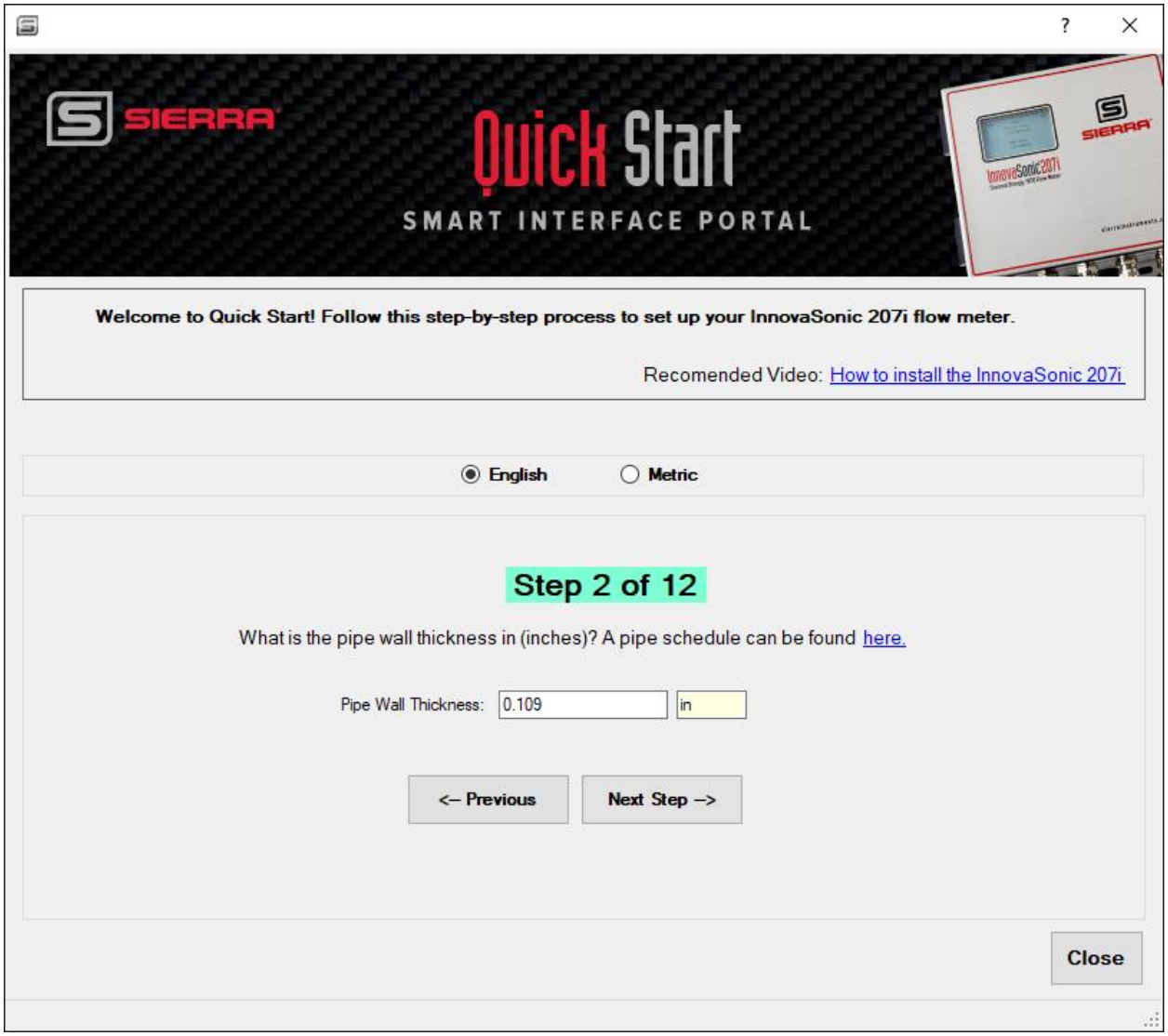
Step 1 of 12: Pipe Outer Diameter

The first screen is the “Pipe Outer Diameter” setting. Enter the Pipe Outer Diameter of your pipe using numeric side of the keys. This is the actual outside diameter, not just the nominal size. Press the “Next Step” key to save and move to the next screen.



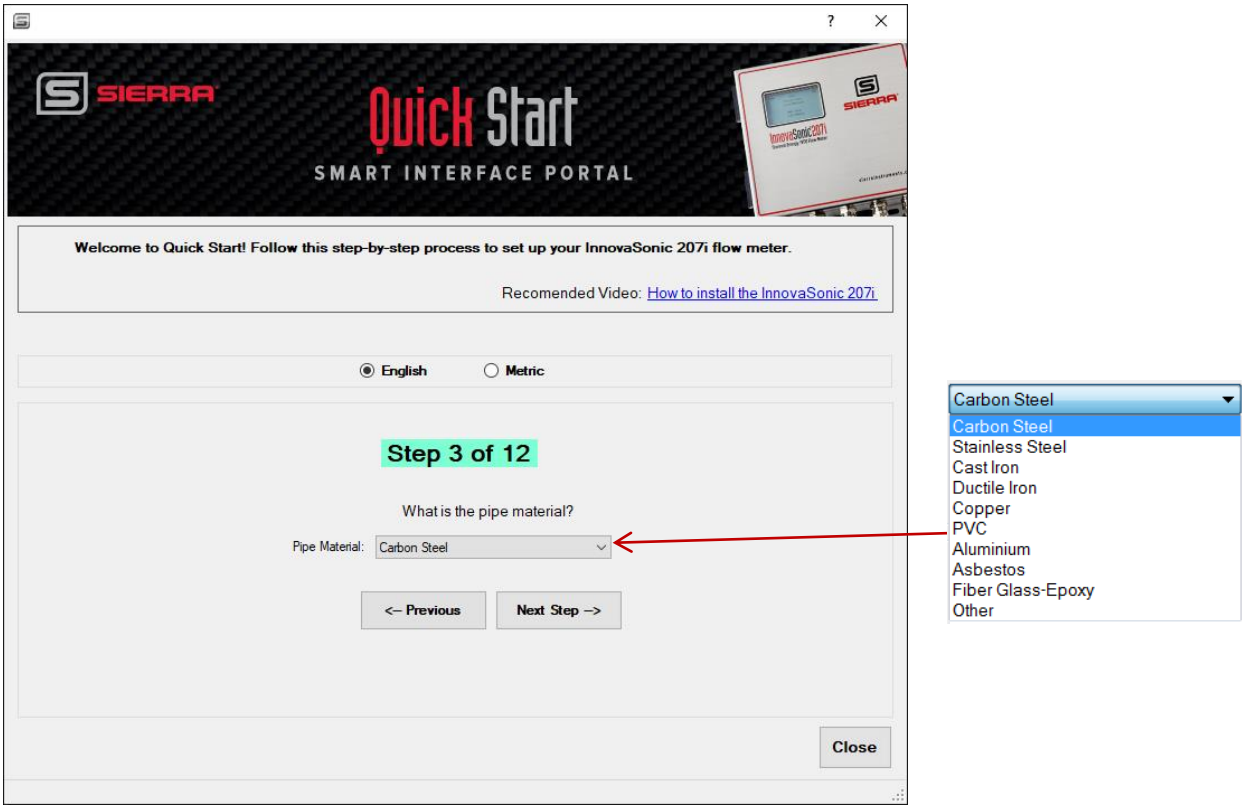
Step 2 of 12: Pipe Wall Thickness

"Pipe Wall Thickness" is the next setting. Enter the pipe wall thickness of your pipe using the numeric side of the keys. Press the "Next Step" button to go to the next screen or press "Previous," if you need to go back to previous screen.



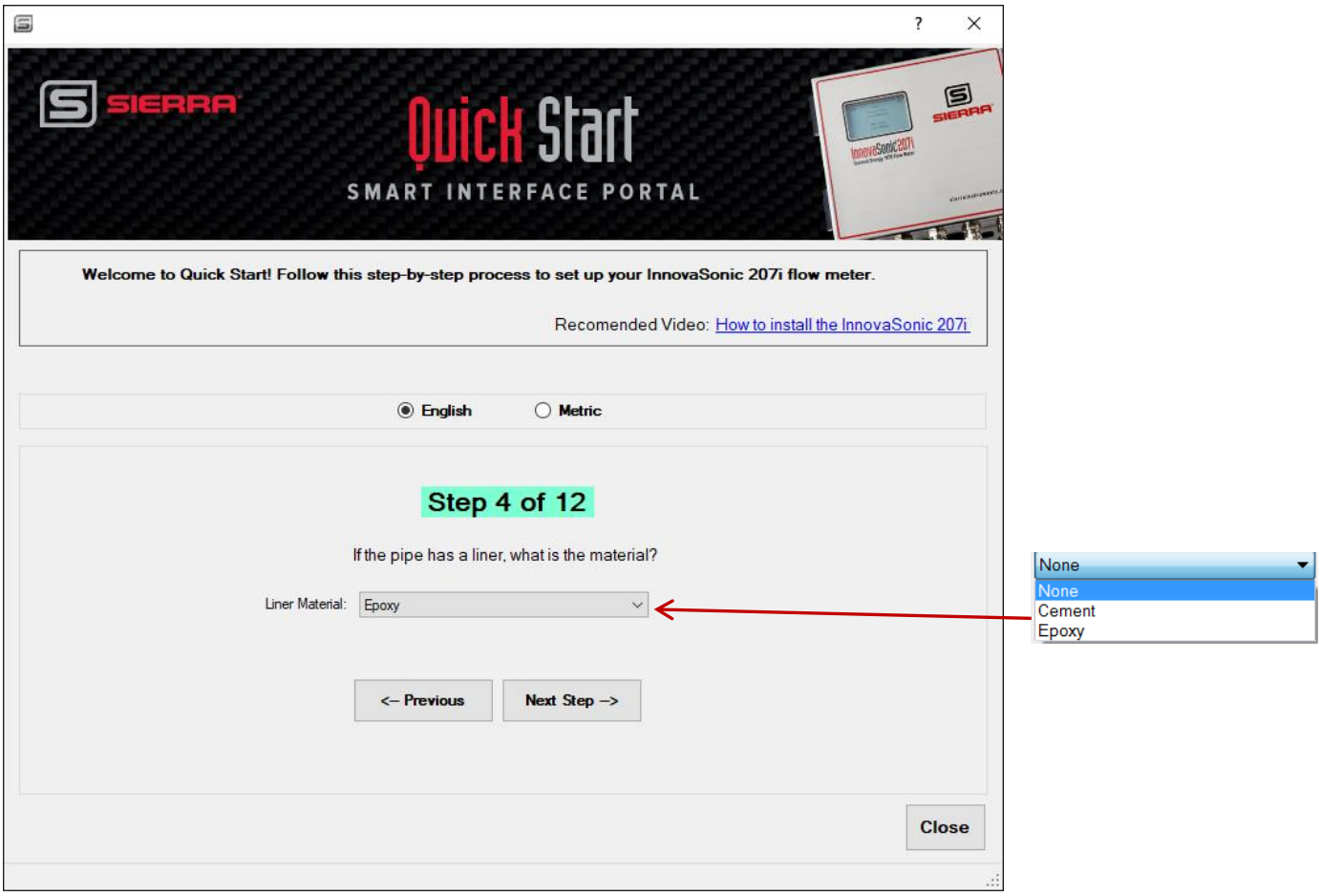
Step 3 of 12: Pipe Material

"Pipe Material" is the next setting. Using the pulldown menu, scroll to the pipe material of your pipe. If your pipe material is not on the list, chose other. You will need to enter the speed of sound of your pipe material. Press the "Next Step" to go to the next screen or press "Previous," if you need to go back to previous screen.



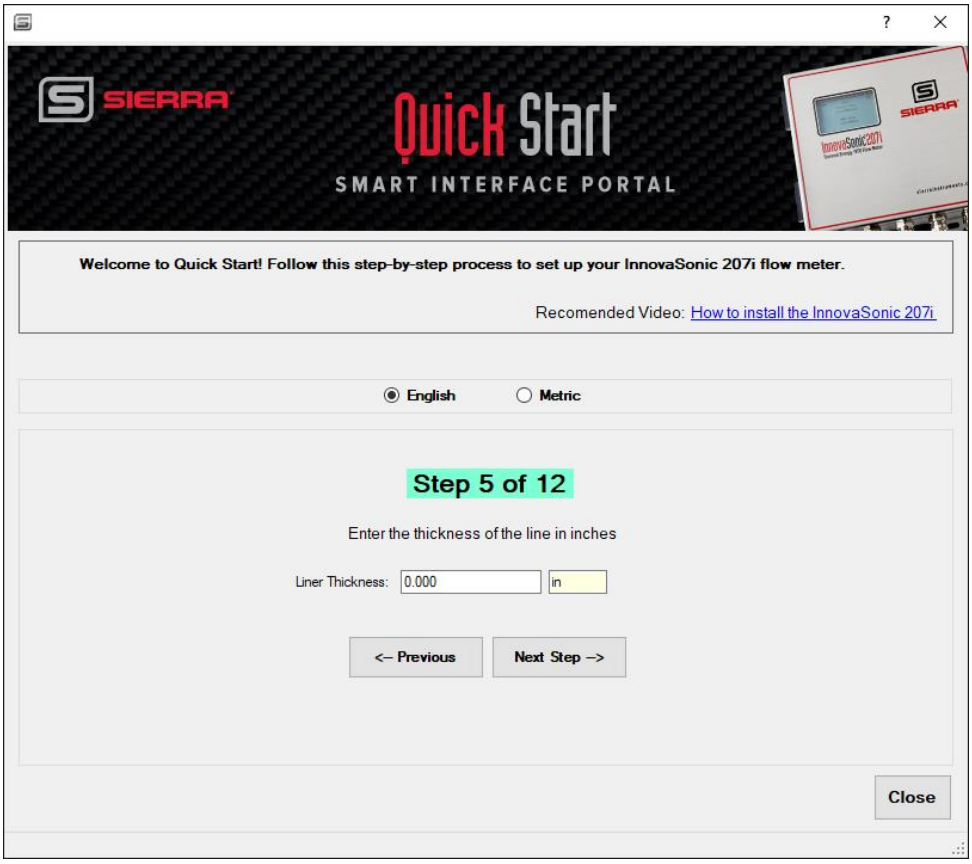
Step 4 of 12: Liner Material

"Liner Material" is the next setting. Using the pulldown menu, select the liner material of your pipe. Press the "Next Step" to go to the next screen or press "Previous," if you need to go back to previous screen. If there is no pipe liner material, you can jump from Step 4 to Step 6 "Fluid Type."



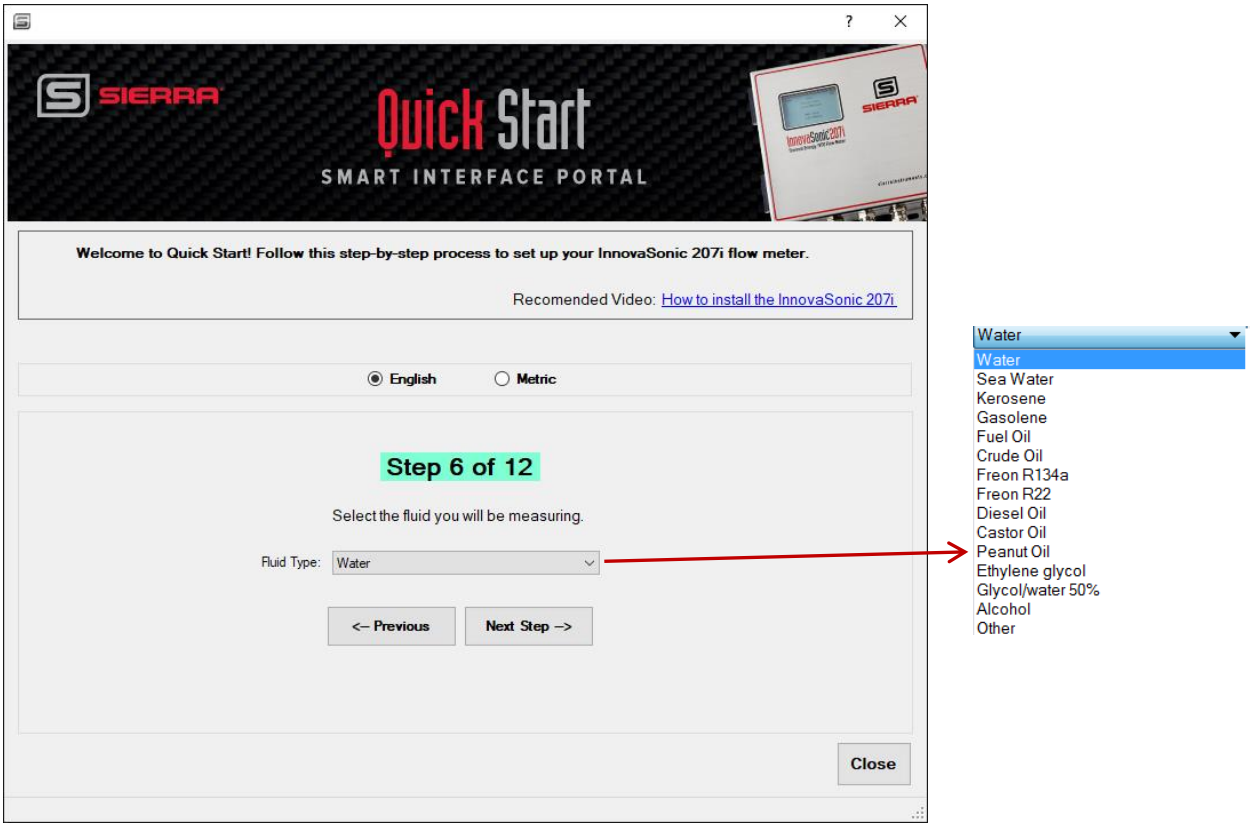
Step 5 of 12: Liner Thickness

"Liner Thickness" is the next setting. Enter in thickness value then press the "Next Step" to go to the next screen or press "Previous," if you need to go back to previous screen.



Step 6 of 12: Fluid Type

"Fluid Type" is the next setting. Using the pulldown menu, select the fluid you are measuring. Usually this is water, but there are lots of different fluids listed. After selecting the fluid, press the "Next Step" to go to the next screen or press "Previous," if you need to go back to previous screen.

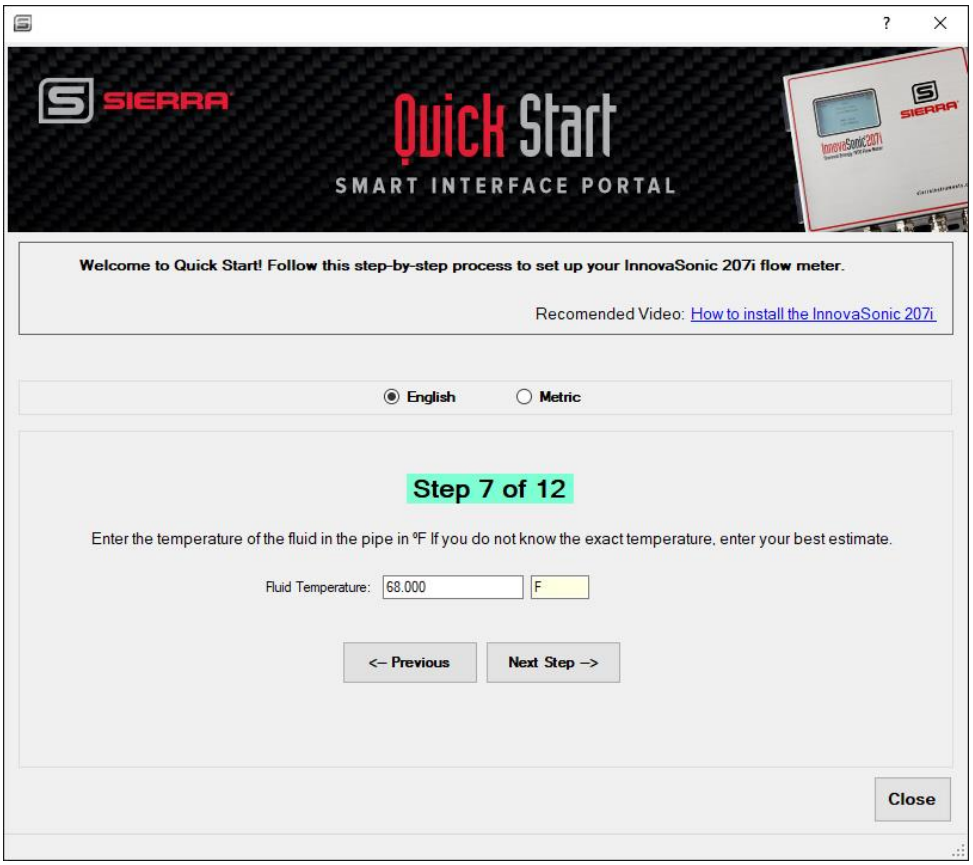


Step 7 of 12: Fluid Temperature

"Fluid Temperature" is the next setting. Enter your approximate fluid temperature then press the "Next Step" to go to the next screen or press "Previous," if you need to go back to previous screen.

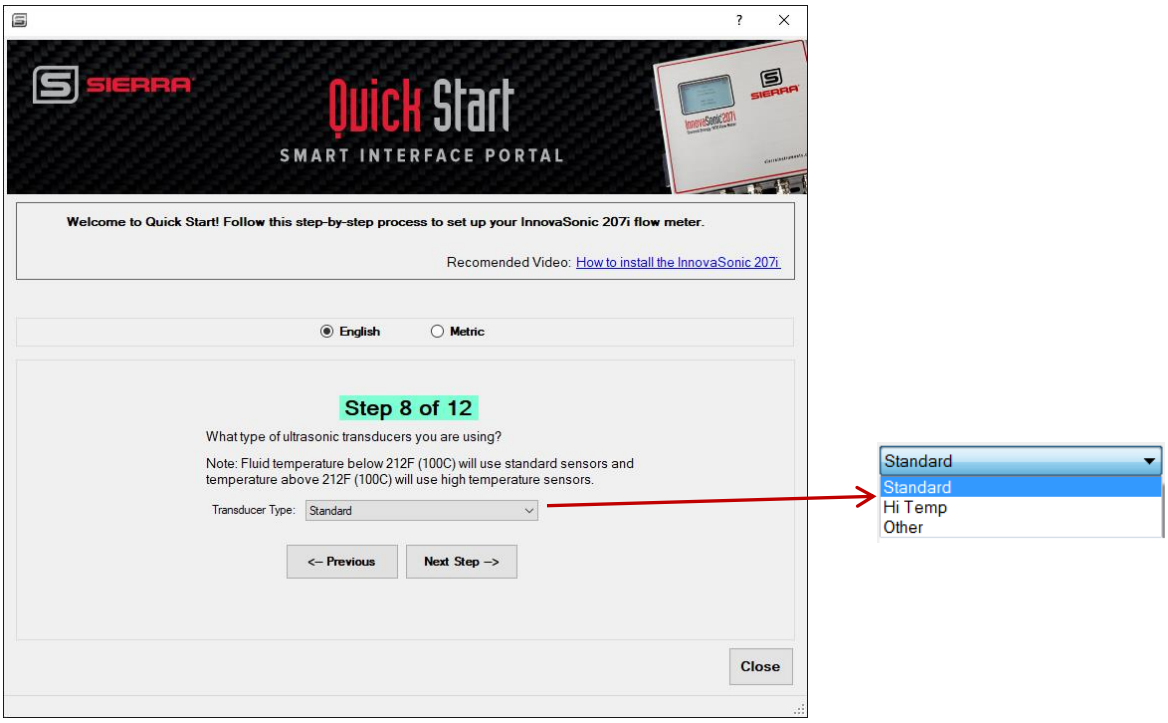
If the meter is fitted for temperature measurement, the actual measured values of temperature will be used, but enter temperature of the fluid in the pipe here (the temperature of the fluid where the **flow** measurement is being made).

	Note: The inlet and outlet temperature measurements may be made far away from where the flow measurement is made, so the temperature at the flow measurement point is most likely somewhere between the two.



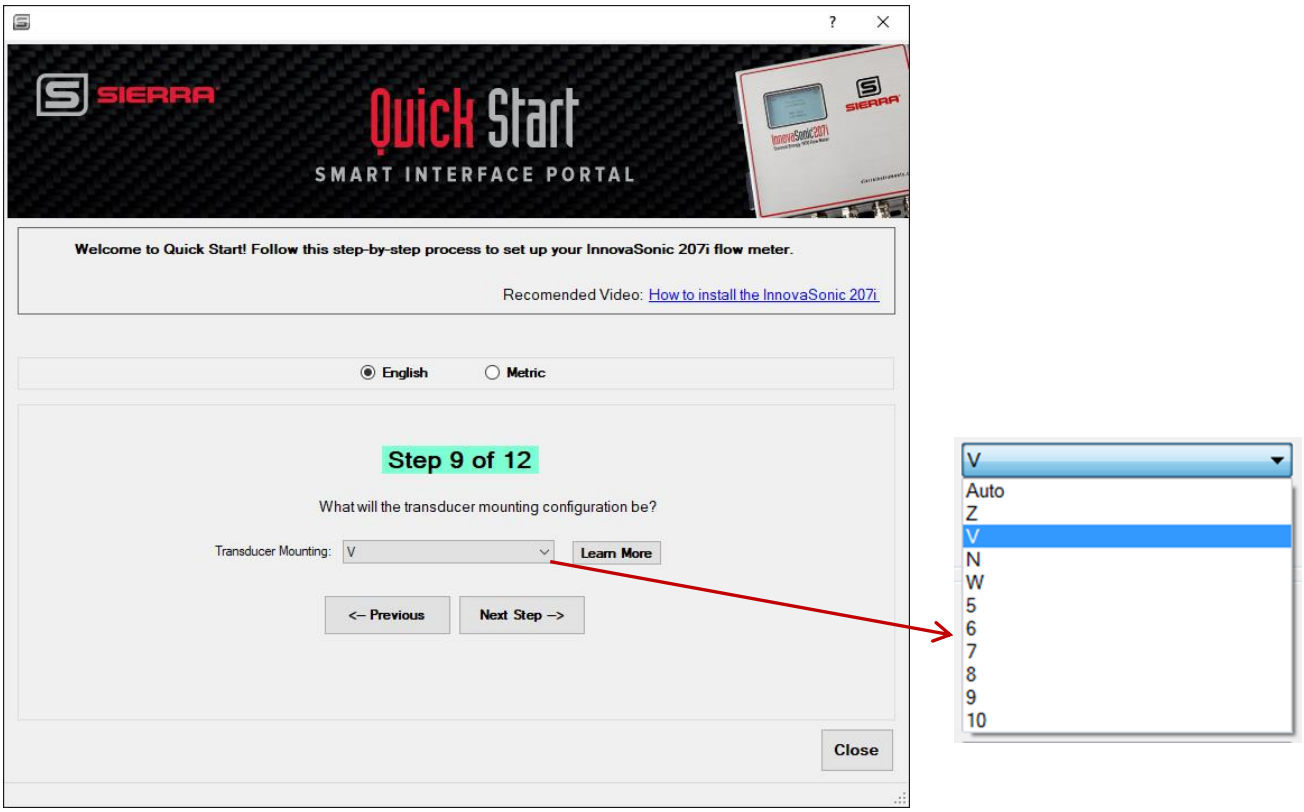
Step 8 of 12: Transducer Type

"Transducer Type" is the next setting. Using the pulldown menu choose the type of meter you have: "Standard," "High Temperature," etc. Your unit most likely was sent with a Memkey matched to the transducer that was sent with the unit.; the correct selection will be highlighted. Press the "Next Step" to go to the next screen or press "Previous," if you need to go back to previous screen.



Step 9 of 12: Transducer Mounting Method

"Transducer Mounting" is the next setting. Using the pulldown menu select "V" indicating the "V" mounting method (see below). This is the easiest and most common mounting for smaller pipes. See Chapter 6 of the InnovaSonic 207i product manual for other options. Press the "Next Step" to go to the next screen or press "Previous," if you need to go back to previous screen.



In most cases you will use the "V" setting. The "V Method" is considered as the standard method. It usually gives a more accurate reading and is used on pipe diameters ranging from 25mm to 400mm (1 inch to16 inches) approximately. Also, it is convenient to use, but still requires proper installation of the transducer, contact on the pipe at the pipe's centerline and equal spacing on either side of the centerline.

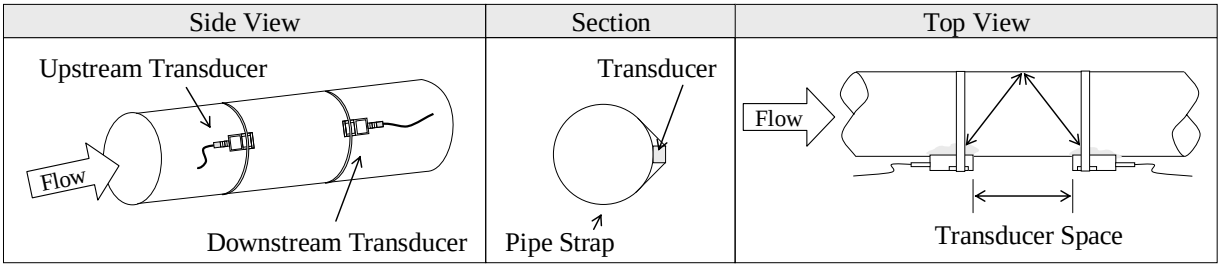


Figure 11. V Installation Method

In big pipes you will use the “Z” Method. The signal transmitted in a “Z Method” installation has less attenuation than a signal transmitted with the “V Method.” This is because the “Z Method” utilizes a directly transmitted (rather than reflected) signal which transverses the liquid only once. The “Z Method” is able to measure on pipe diameters ranging from approximately 100mm to 3000mm (4 inches to 120 inches). We recommend the “Z Method” for pipe diameters over 300mm (12 inches).

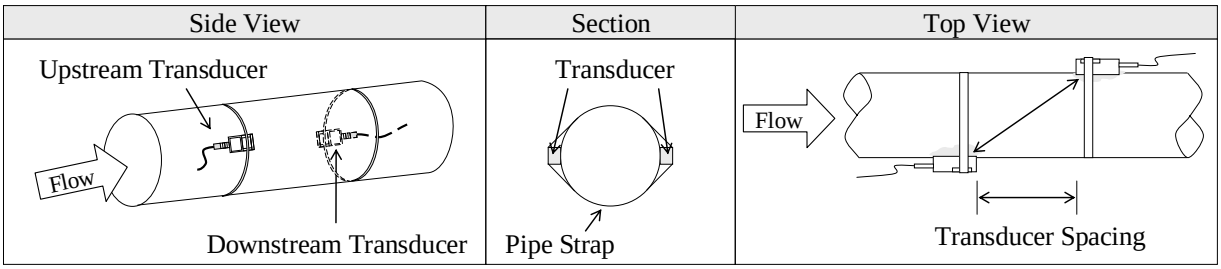


Figure 12. Z Installation Method

In small pipes use the “W Method.” With the “W Method,” the sound waves traverse the fluid four times and bounce three times off the pipe walls. It is suitable for very clean small pipes. The measurement accuracy can be improved by extending the transit distance with the “W Method” (uncommonly used). Because this method requires four passes, the signal needs a very clean small pipe to work. After four passes the signal can be very small.

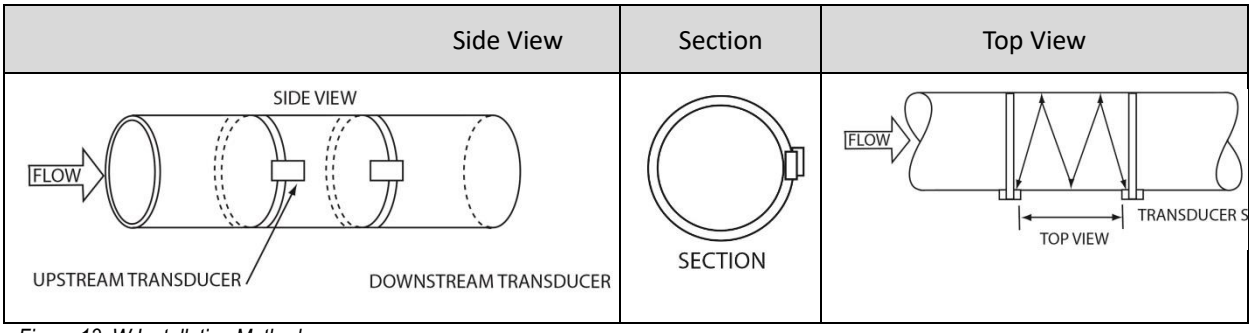


Figure 13. W Installation Method

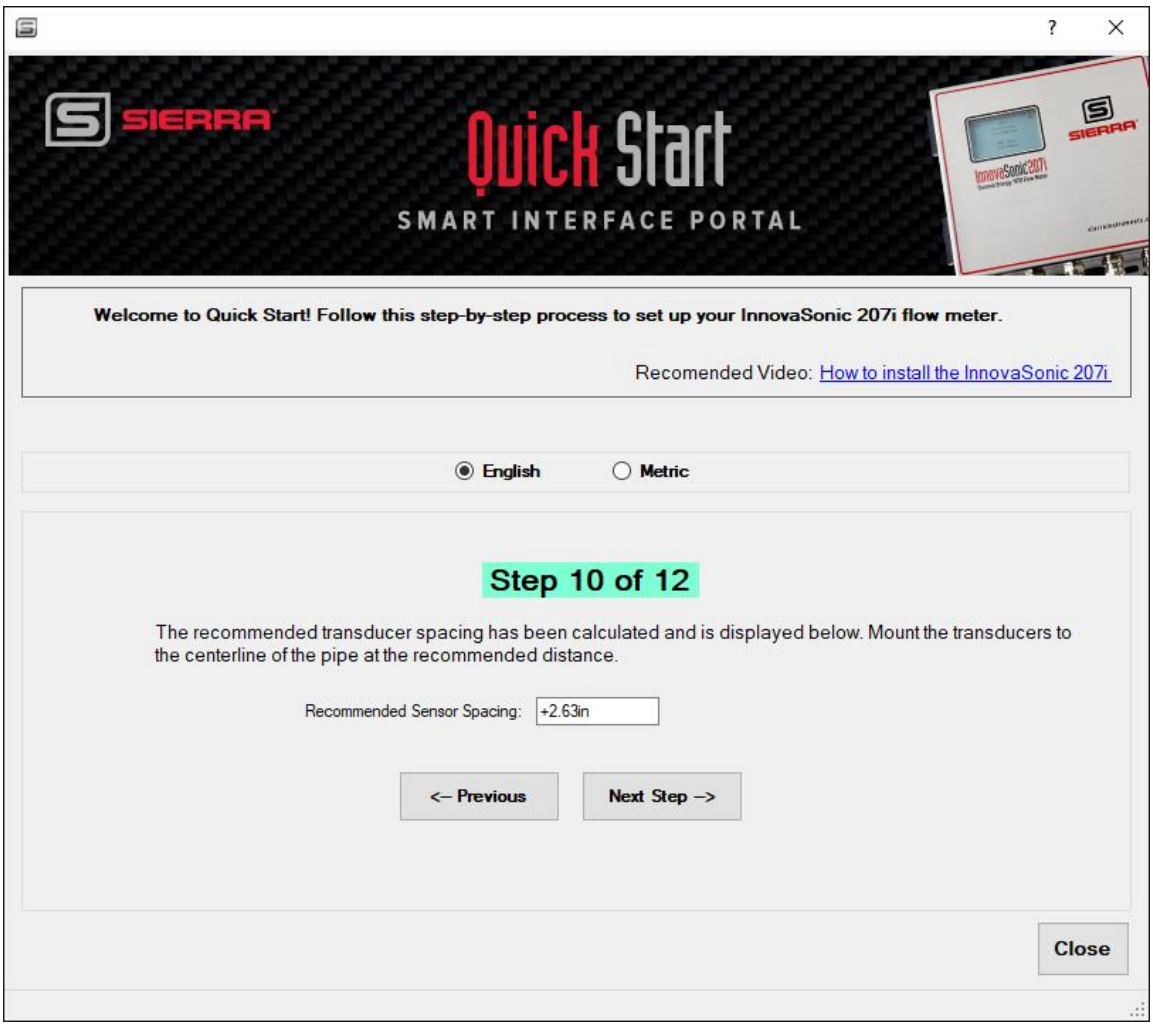
Step 10 of 12: Transducer Spacing

"Transducer Spacing" is the next setting. The meter will consider all the information you put in (Steps 1-9) and tell you how far apart to space your transducers. In this example, the sensor spacing is 2.63 inches apart. This is measured from "end to end" or "face to face".

The easiest way to install is to fix one sensor in place, then reference the measurement to the other sensor from there.

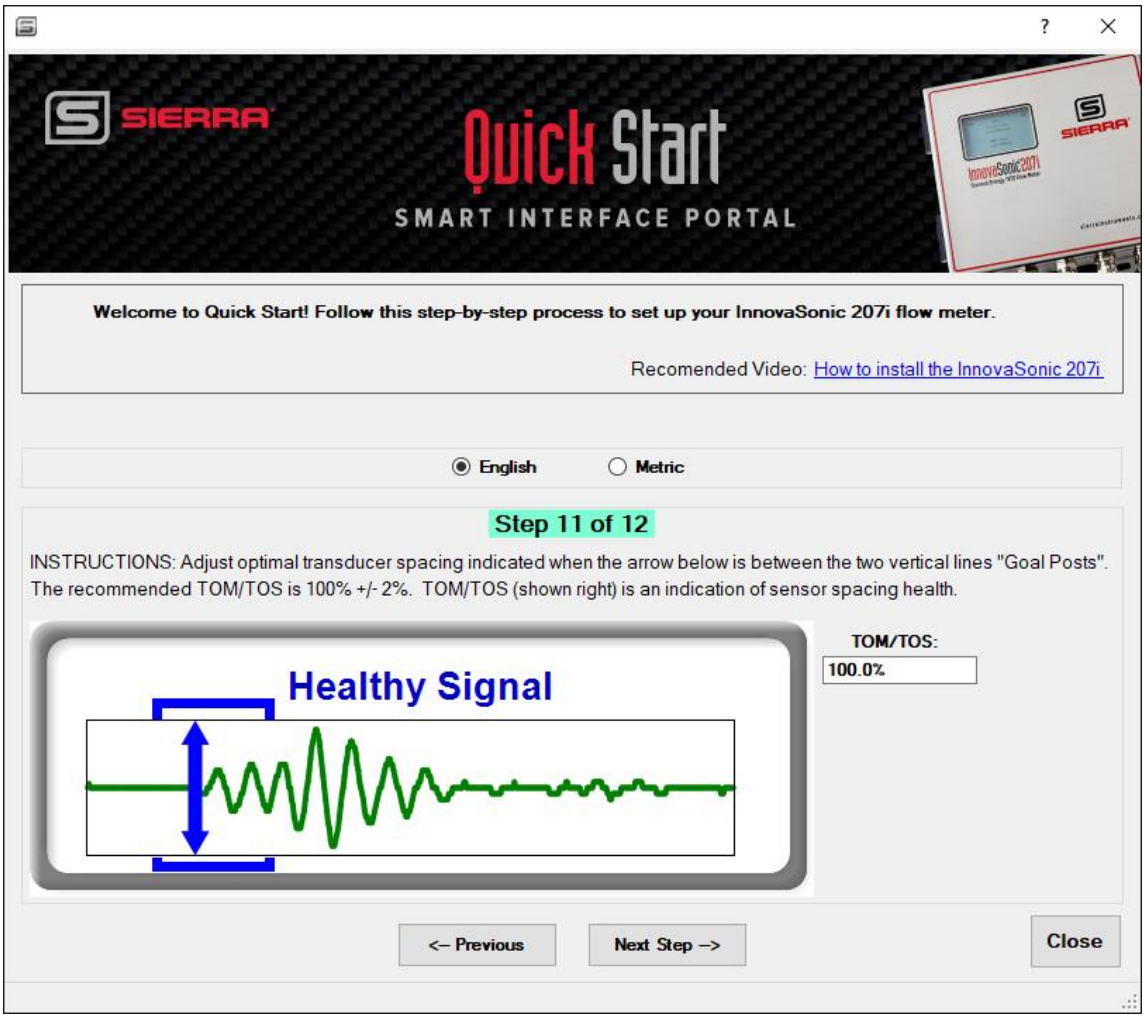
The meter tuning app and the quick start guide give instruction on how to "fine tune" sensor spacing. You can also use the MeterFit™ app on your Smart Interface Portal (SIP) software. See Chapter 4 of this manual.

Press the "Next Step" to go to the next screen or press "Previous," if you need to go back to previous screen.



Step 11 of 12: Getting a Healthy Signal-Goal Posts

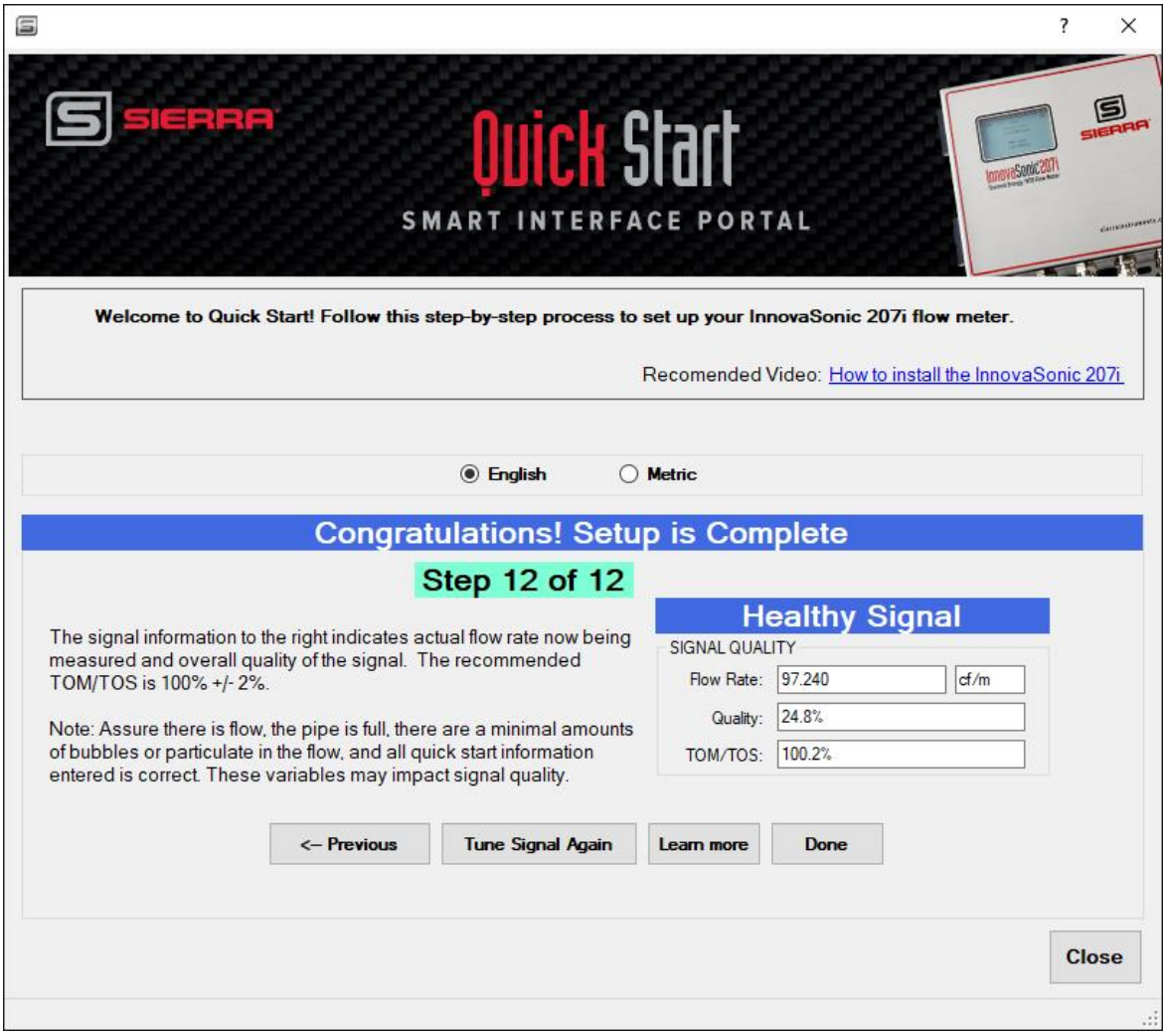
Once your transducers are close to the correct spacing, you will see the waveform of the returning ultrasonic signal on the display as above. You may need to move the transducers closer or further apart (but typically no more than a few inches). The easiest way is to leave one fixed in place and move the other one slowly towards it or away from it. Make sure to maintain a layer of ultrasonic gel between the transducer and the pipe as you move the transducer.



You will see the waveform move across the screen as you adjust the spacing. It may take several seconds for the electronics to adjust as you move it, so don't rush it. Adjust the suggested spacing between the transducers to get the arrival marker between the goalposts *and* to get the TOM/TOS to 100% +/-2%. If all is well, you will see "Healthy Signal" during and after this process. Important: If you do not see a "Healthy Signal," return to step 1 and ensure the set-up is correct. If you do see a "Healthy Signal," press the "Next Step" to go to the next screen.

Step 12 of 12: Set Up is Complete

Congratulations, you should now be seeing the “Flow Rate,” assuming there is flow, the pipe is full and there are minimum amounts of bubbles or particulates in the flow, and all quick start information is entered correctly. “Quality” should be >20%, while “TOM/TOS” should be 100 +/- 2%.
If not, try tuning the signal again and check your set up parameters. If all is correct, click done and close.



Chapter 4 | MeterFit App

The “MeterFit” App may be used to quickly set up the sensor transducers for optimal measurement by more experienced users. This feature also provides a quick look at the sensor signal. For those unfamiliar with setup and tuning, it is recommended you do this through the “Quick Start” App.

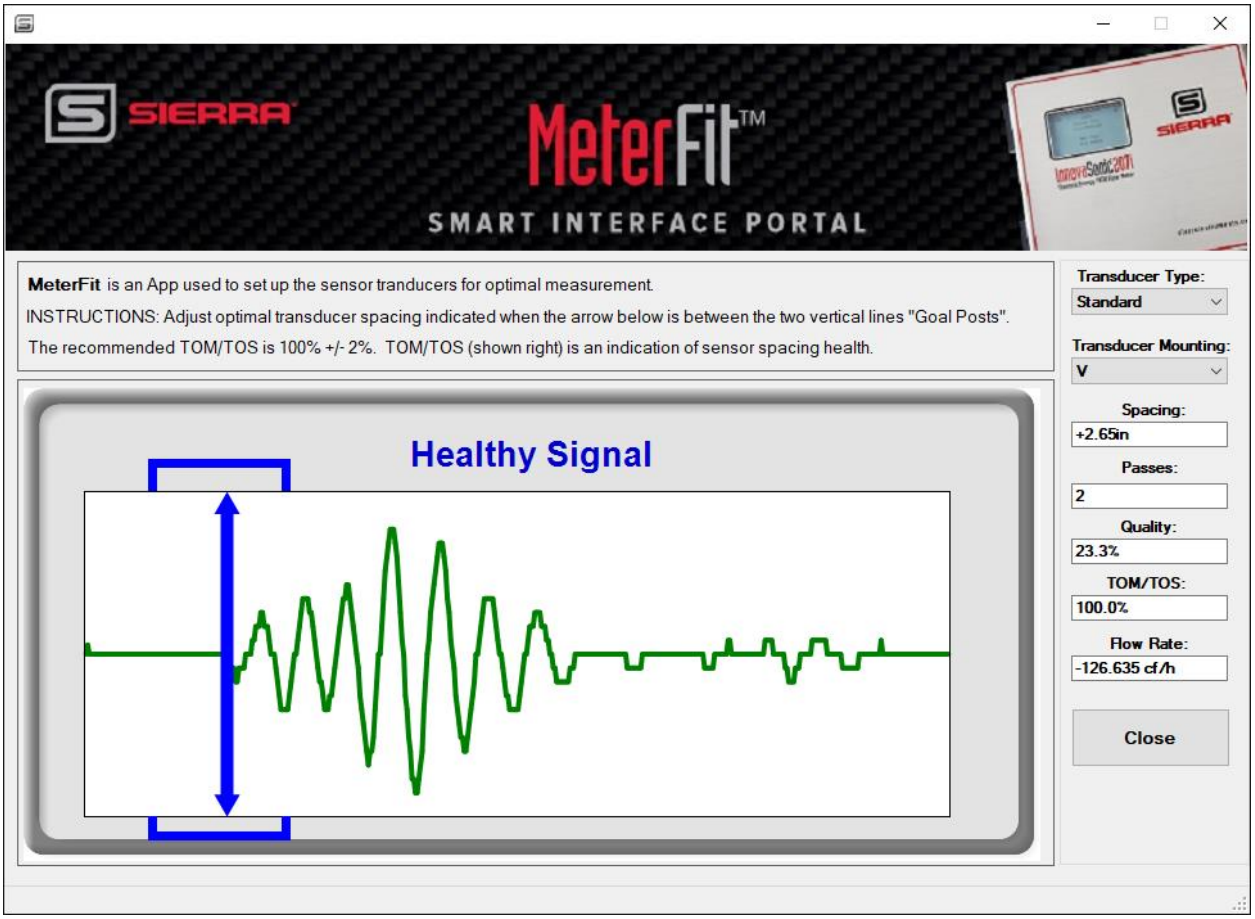


Figure 14. MeterFit App Main Screen

MeterFit Installation Setup Steps:

1. Choose “Transducer Type” by selecting either “Standard” or “High Temperature.”
2. Select your “Transducer Mounting” method using the pull down. Typically, “W,” “V,” or “Z” methods are chosen.
3. The recommended transducer spacing is calculated and shown in the “Spacing” field. Place transducers on the pipe and adjust to fine tune the signal.
4. The number of signal passes is displayed. This is dependent on the signal mounting selected
    a. “W” is 4, “V” is 2, and “Z” is 1.
5. The quality of the signal is displayed. This should be >20%.

6. The “TOM/TOS” is displayed. This should be 100+/- 2% the meter flow rate is displayed
7. If all parameters are within spec, a “Healthy Signal” is displayed. If you do not see this, it is recommended to go through the “Quick Start App” and review the set up and signal tuning.

Chapter 5 | EnergyPro Setup App

The “EnergyPro Setup App” allows the user to configure the 207i for energy measurement. This set up is divided into three steps. Follow the three steps to complete the setup.

	Watch Video Tutorial – a video tutorial for this function is available on Sierra’s website http://www.sierrainstruments.com/quickstart-app (“EnergyPro Setup” 6:13 time stamp)

Step 1 of 3: EnergyPro Setup Basic Information

EnergyPro allows the user to configure the 207i for energy measurements. Follow the steps below to set up EnergyPro app.

Step 1: Set up the energy display, totalizer and methodology used to calculate energy and displays the variables used in the calculation. Select your energy measurement configuration and click “next steps” to continue.

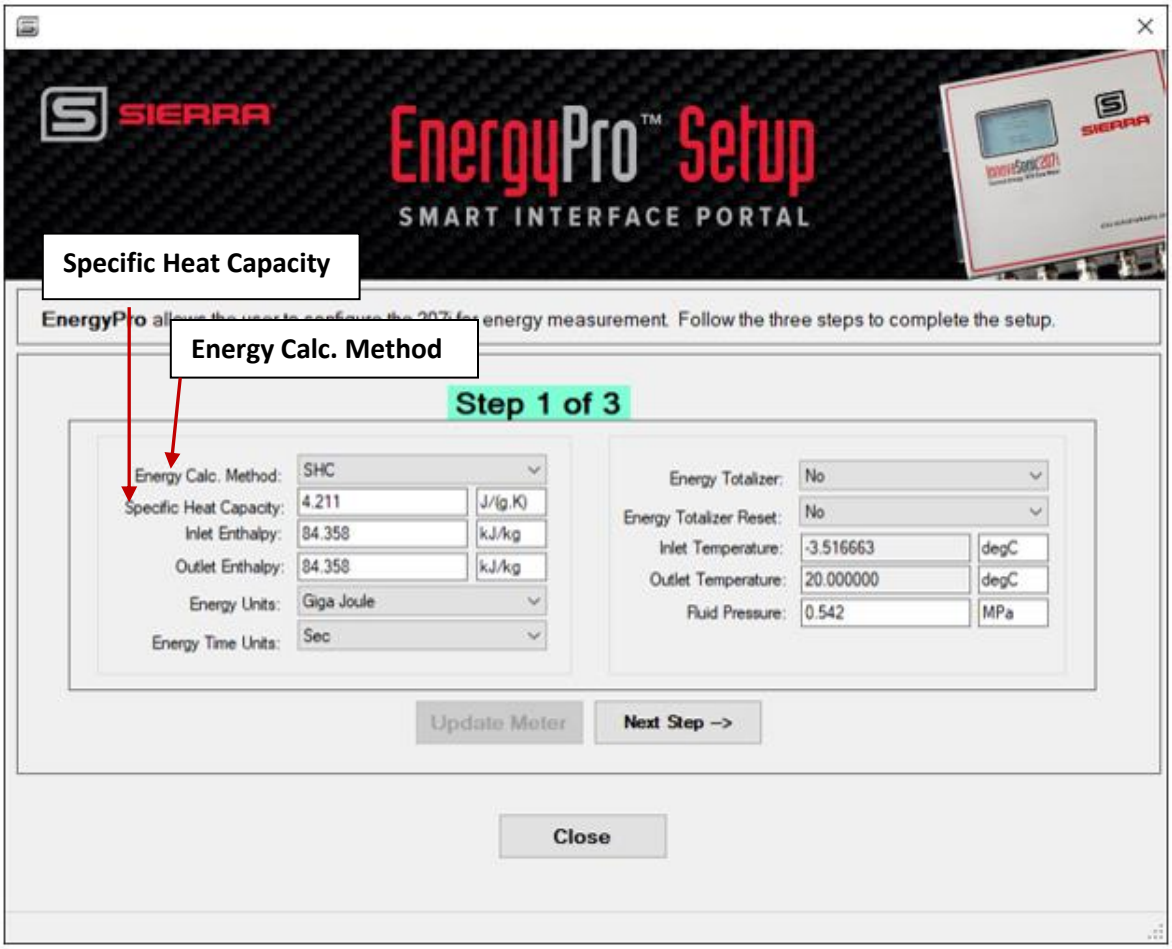


Figure 15. EnergyPro Setup Main Screen

Select parameters for energy configuration:

1. **Select "Energy Calc. Method"**: The user is prompted to select the method to be used when making energy calculations from the dropdown menu: "SHS" (default), "Enthalpy," and "Enthalpy Direct."

2. **Select "Specific Heat Capacity (SHC)"**: The user can enter a value for the "Specific Heat Capacity" of the fluid flowing in the pipe. Allowed values are ranged 0.0 to 10.0J/(g.K). The SHC (default) method requires specific heat value for the fluid. By default, this value is set to 4.2110 J (g.K) which is water at 68°F (20°C). However, other liquids can be used by entering their SHC at 68°F (20°C). To calculate energy (a value for flow rate), specific heat capacity, inlet temperature, and outlet temperature of the fluid are needed. Inlet temperature and outlet temperature can be obtained dynamically from PT100 probes or 4- 20mA temperature transmitters. See "Input/Output" menu for setup.

3. **Select "Inlet Enthalpy"**: If the enthalpy direct method of energy calculation is selected, the user can enter a value for the enthalpy of the fluid flowing in the pipe at the pipe inlet. Allowed values are ranged 0.0 to 1000.0kj/kg, default 83.9kj/kg, water at 68°F (20°C). Otherwise, this value is dynamically updated during measurement using knowledge of "Inlet Temperature" and "Fluid Pressure."

4. **Select "Outlet Enthalpy"**: If the enthalpy direct method of energy calculation is selected, the user can enter a value for the enthalpy of the fluid flowing in the pipe at the pipe outlet. Allowed values are 0.0 to 1000.0 kj/kg, default 83.9 kj/kg, water at 68°F (20°C). Otherwise this value is dynamically updated during measurement using knowledge of "Outlet Temperature" and "Fluid Pressure."

5. **Select "Energy Units"**: Select the desired energy measurement units from the "Energy Units" dropdown menu (choices shown below).

    - Giga Joule (GJ) (Default)
    - Mega Joule (MJ)
    - Kilo Joule (kJ)
    - Kilo Calorie (kcal)
    - Million Btu (MMBtu)
    - Btu (Btu)
    - American Tons (Tons)
    - Metric (Tonnes)
    - Kilo Watt Hour (kWh)

6. **Select "Energy Time Units"**: Under "Energy Time Units" Select the time base from the dropdown menu (shown below).

    - \second
    - \minute
    - \hour (Default)
    - \day

7. **Select "Energy Totalizer"**: Using "Energy Totalizer" turn the totalizer on or off by selecting "Yes" or "No." The default is "No."

8. **Select "Energy Totalizer Reset"**: This feature resets the totalizer by selecting "Yes" or "No."

9. **Select "Inlet Temperature"**: This value is the measured inlet temperature from the PT100. If there is no PT 100, this is the value the user entered for "Fluid Temperature." If this value is used, inlet and outlet temperature will be the same.

10. **Select "Outlet Temperature"**: This is value of the measured outlet temperature from the PT100. If there is no PT100, this is the value the user entered for fluid temperature. If this value is used, inlet and outlet temperature will be the same.

11. **"Fluid Pressure"**: Pressure can be entered manually fixed (see below), or dynamic from a 4-20mA pressure transmitter, and 4-20 mA Input Module (see "Input/Output" section). The user can enter a value for the pressure of the fluid flowing in the pipe. Allowed values are ranged 0.1 to 1.0MPa, default 0.10325MPa. (1 Mega Pascal = 145.04 Psia)

Step 2 of 3 EnergyPro Setup -Choose Temperature Input Source

Step 2: Select the type of temperature inputs used. This may be PT100 RTD's or analog temperature transmitter inputs. Select your "Temperature Input Source" and hit "Next Step" to move to the next setup window.

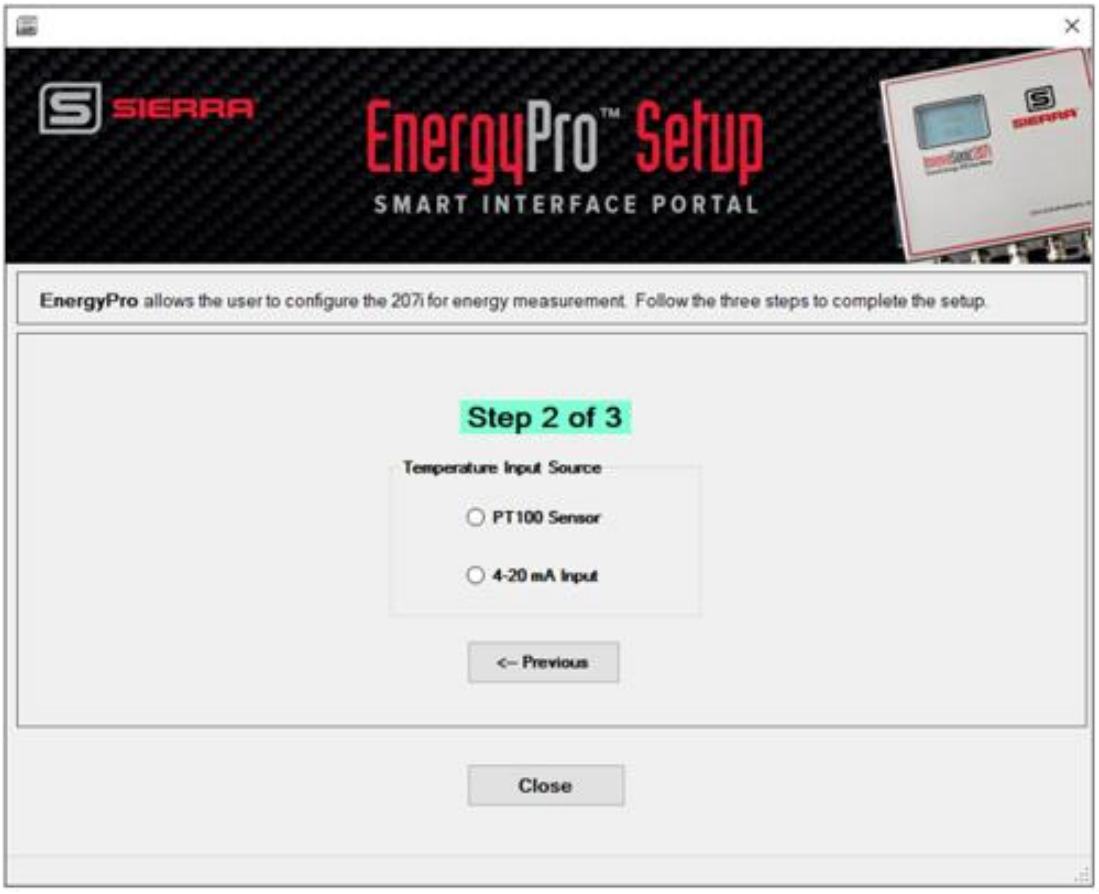


Figure 16. EnergyPro Temperature Input Source

Step 3 of 3: EnergyPro Setup- Configure the PT100

Step 3: Set up the PT100 and select measuring parameters.

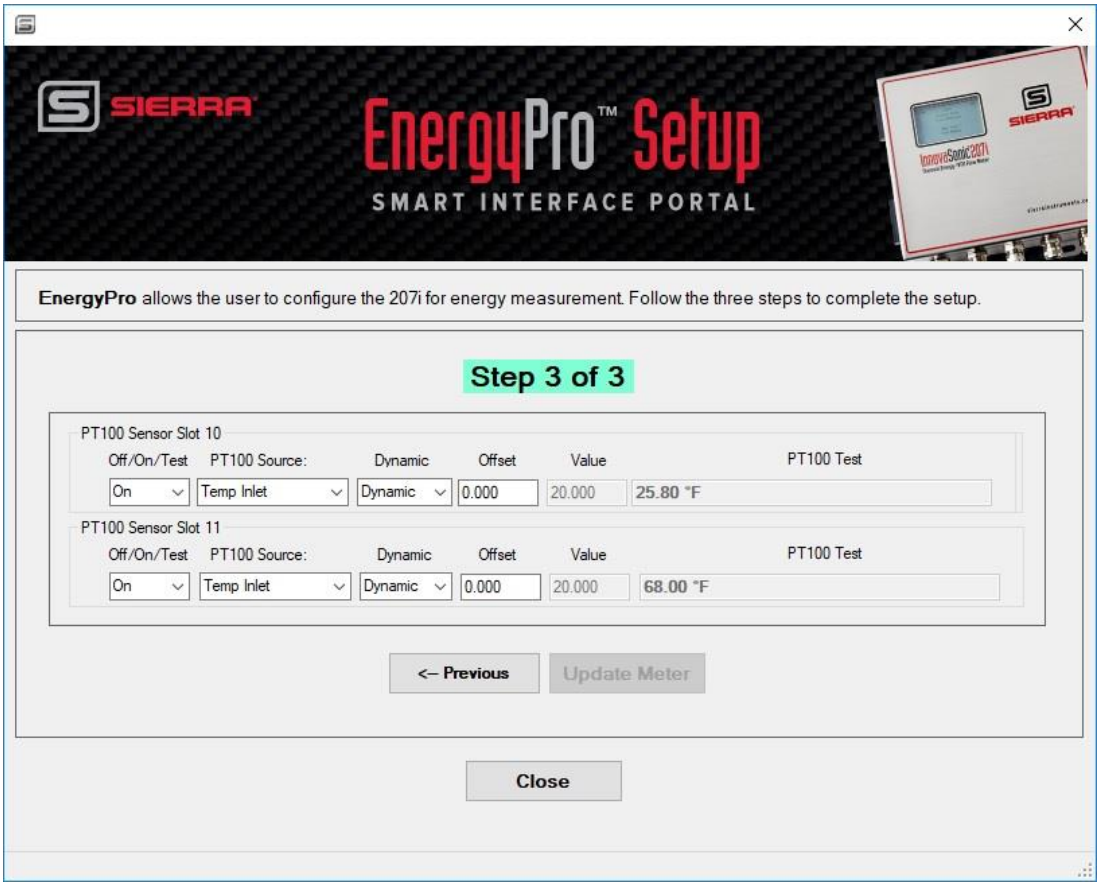


Figure 17. EnergyPro PT100 Configuration

Select Parameters for PT100 Sensor Input

1. **Select the "PT100 Source" in the dropdown.**
    - "Temp Inlet": The temperature of the upstream fluid.
    - "Temp Outlet": The temperature of the downstream fluid.
    - "Temp Pipe": The outside temperature of the pipe at the transducers.
    - "Temp Inlet Plus Temp Pipe": Assumes the temp pipe is the same as the "Temp Inlet."
    - "Temp Outlet Plus Temp Pipe": Assumes the temp pipe is the same as the "Temp Outlet."

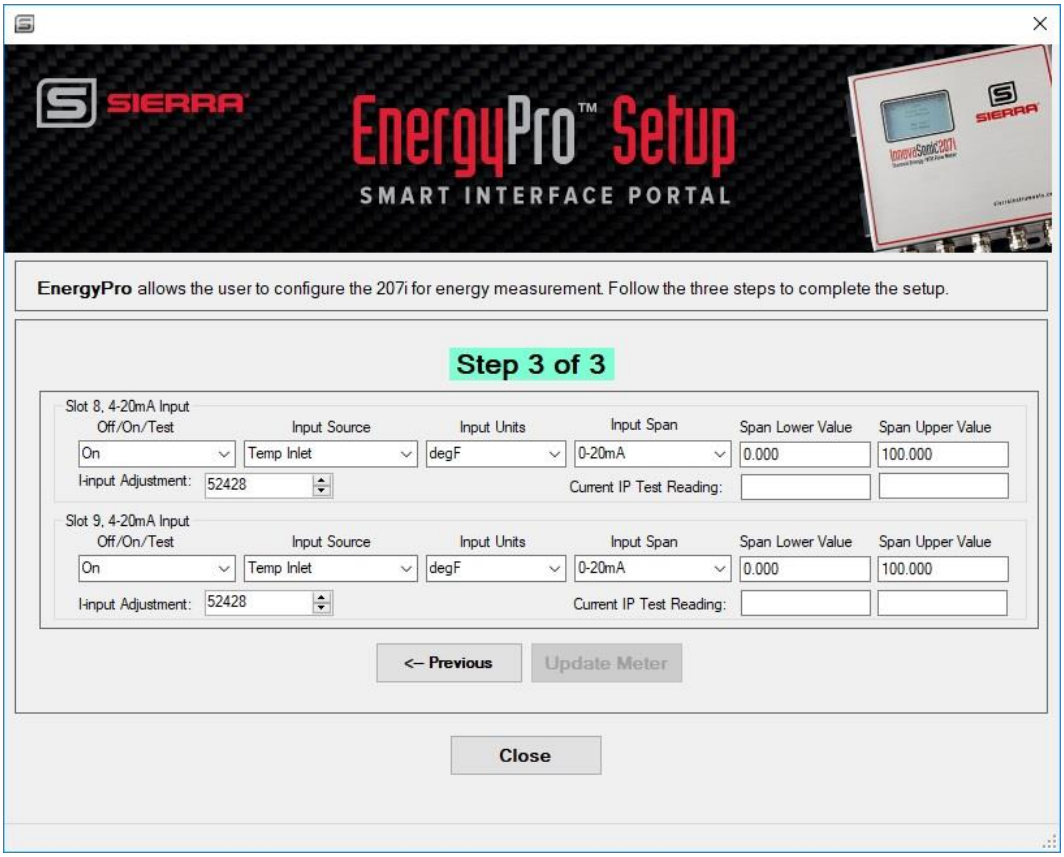
2. **Select "Dynamic" values.** "Dynamic" values are actually measured or "fixed' user inputs.

   Step 1. You select "Dynamic." If you have an "Offset," enter the value in the box "Offset" text box.

   Step 2. If you select "fixed," enter the values in the "value" text box.

For an Analog Temperature Input:

	Note: In addition to temperature, analog inputs can be used for density, pressure and batching so those variables may be configured here as well (if they are used).



1. Select the parameters for the "**Input Source."** Dropdown options are:
   - "Temp Inlet": The temperature of the upstream fluid.
   - "Temp Outlet": The temperature of the downstream fluid.

- "Temp Pipe": The outside temperature of the pipe at the transducers.
- "Temp Inlet Plus Temp Pipe": Assumes the temp pipe is the same as the "Temp Inlet."
- "Temp Outlet Plus Temp Pipe": Assumes the temp pipe is the same as the "Temp Outlet."
- "Pressure": Input from a pressure transducer
- "Density": Input from a density meter
- "A1 Batch": Current input
- "A2 Batch": current input

2. Select the **"Input units"** in the drop down**.**
   The "Temperature" choices are:
   - degC
   - degF
   - K
   - R

   The "Pressure" dropdown choices are:
   - Psi G
   - Psi A
   - Bar G
   - Bar A

   The "Density" dropdown choices are:
   - kg/m3
   - g/cc
   - kg/l
   - Lbs/ft3

3. For "AI1," "A12" Batch: The "Batching" function allows the user start and stop a totalizing process. For example, a PLC could send a 4-20mA signal to the 207i to start counting the batch at the same time it starts a pump. Once the target amount has been reached, the "Relay" on the 207i could signal the PLC to stop the pump.

   Select thru span of the incoming current singal, then select thevalues that represent 0/4 and 20 mA

   Span
   - 0..20mA
   - 4..20mA

   Then
   - Lower Value/Upper Value

Chapter 6 | ValidCal Diagnostics

"Validcal Diagnostics" runs a series of automatic tests on the meter hardware. This allows the user to see a display of diagnostic status of various microprocessor, memory and I/O board slots. "I/O slots" 1-5 are fixed and located on the Mainboard. Slots 6-13 are optional card slots. Below is a display of the standard I/O configuration, plus a "Modbus RTU SLAVE" card in Slot 12. Card slot 13 is not being used and is displayed as "N/A" which is an empty slot. Each item is given a simple Pass/Fail indication.

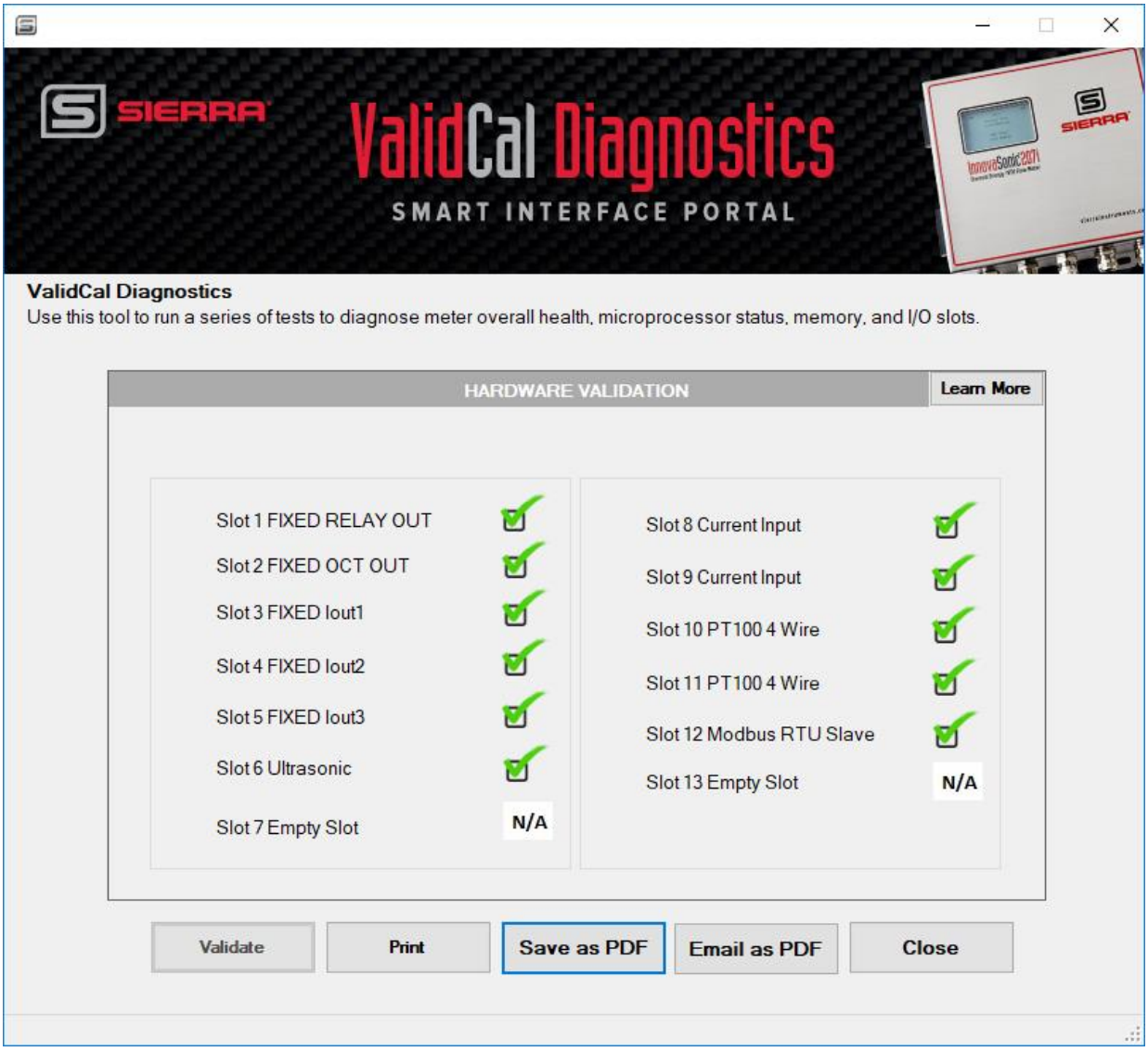


Figure 18. ValidCal Diagnostics Main Screen

Chapter 7 | Sensor Signal Health

The “Sensor Signal Info” is all about the ultrasonic signal and the related flow measurement. It is **read only**. The units will be in English or metric depending on what the user has selected.

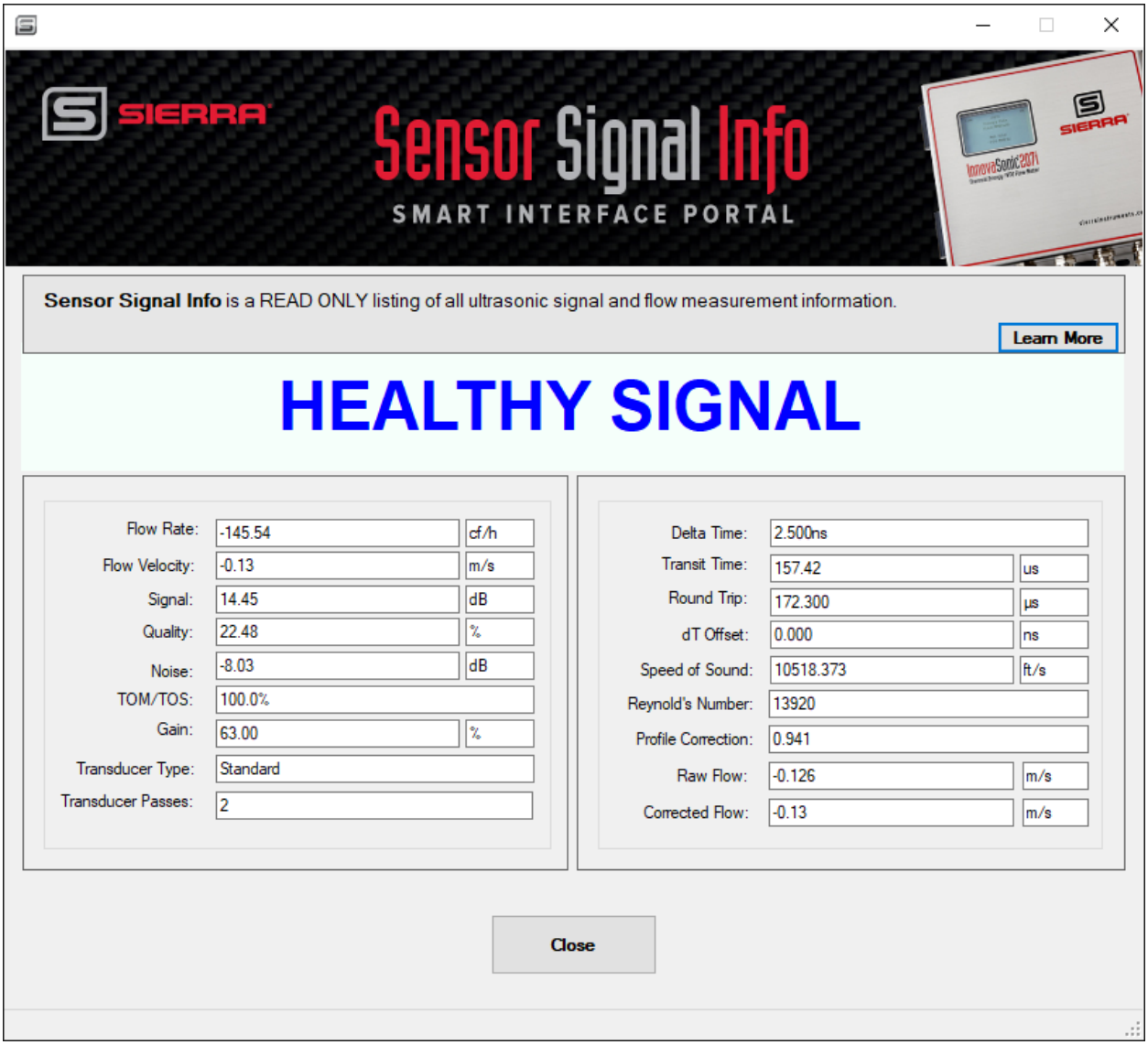


Figure 19. Sensor Signal Health Screen

Overall, signal status is displayed as “Healthy Signal” or “Signal Below Minimum.” If the signal is below minimum, it is recommended to check flowing conditions (i.e. Is there flow?), then set up, then meter tuning.

Below are descriptions for each read only field found on the Sensors Signal Health menu screen.

- “Flow Rate”: Volumetric flow rate is selected units.
- “Flow Velocity”: Velocity of the fluid in selected units.
- “Signal Strength”: “Amplitude/Gain” of the ultrasonic signal in decibels.
- “Signal Quality”: Shape of the ultrasonic waveform as compared to an ideal pulse. It should be >20%.
- “Noise”: Signal to Noise ratio
- “TOM/TOS”: Theoretical verses actual time of flight of the ultrasonic signal
- “Gain”: Amount the raw ultrasonic signal has been amplified
- “Transducer Type”: Standard or high temp
- “Transducer Passes”: Number of transits. Depends on mounting method.
- “Delta Time”: Time differential between upstream and downstream signals.
- “Transit Time”: Time for pulse to be transmitted to received.
- “Round Trip”: Total time for pulse to transmit, bounce off pipe wall, and be received.
- “dT Offset”: A manual offset to transit time that may be entered to offset sensor variability.
- “Speed of Sound”: Speed of sound through the measured fluid.
- “Reynolds Number”: The calculated Reynold’s number.
- “Flow Profile”: The calculated flow profile factor.
- “Raw Flow”: Flow without Re correction.
- “Corrected Flow”: Flow with Re correction.

	In-depth explanations of each of the above variables can be found in the InnovaSonic 207i Instruction Manual.

Chapter 8 | Factory Defaults

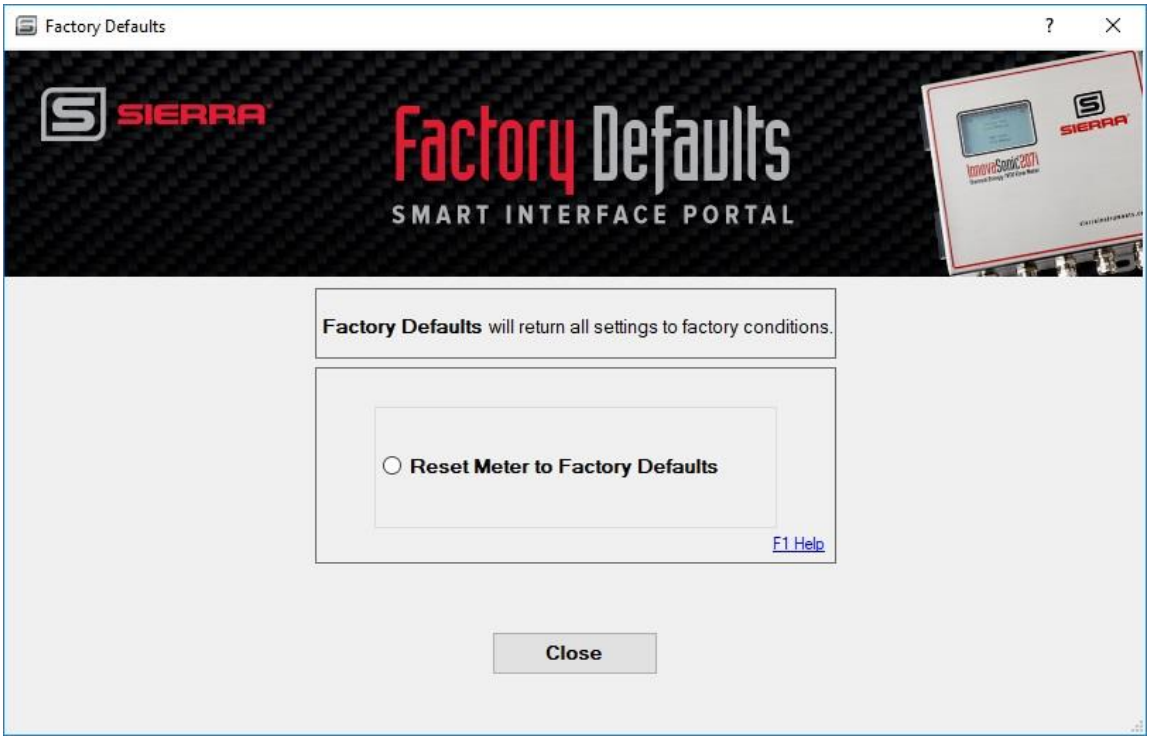


Figure 20. Factory Defaults App

"Factory Defaults" returns all settings to factory conditions. Use this only when you are promoted to reload "Factory Defaults" and return the meter to its factory configuration.

When you select **"Reset Meter to Factory Defaults," a**ll parameters including "Input/Output" settings, "RS-232/USB," and "Datalogger" can be reset to factory defaults.

When you chose reset "Factory Defaults," the following is reset:

- "Display" contrast is reset to the factory default.
- "Tag" and "Identifier" strings are reset to factory values.
- "Key Code" (password) is not defaulted.
- This does not affect datalogger memory. Data is not erased.
- "Totalizers" are reset to zero.
- Saved setups are not affected.
- By default, the "Factory Reset" is not active.
- "Load/Save" Setups Menu

This menu allows the user to save, load and delete up to 10-meter configurations for different applications.

Save Configuration: A list of 10 available configuration spaces is displayed by name. Empty spaces are shown as:

- Scroll through the list of names.
- Select a configuration space to write to or to quit.
- Enter a unique "Tag" and then "Identifier," press
- A complete mirror image copy of all meter parameters is saved to memory.

Load Configurations: A list of 10 available configuration spaces is displayed by name. Empty spaces are shown as *BLANK*.

- Scroll through the list.
- Select a configuration space to load or to quit.
- All meter parameters are over written with the stored configuration read from memory.

Delete Option: A list of 10 available configuration spaces is displayed by name. Empty spaces are already shown as *BLANK*.

- Scroll through the list.
- Select a configuration space to delete or to quit.
- The configuration is deleted and the displayed configuration name (Tag) is changed to *BLANK*.

Chapter 9 | Master Display

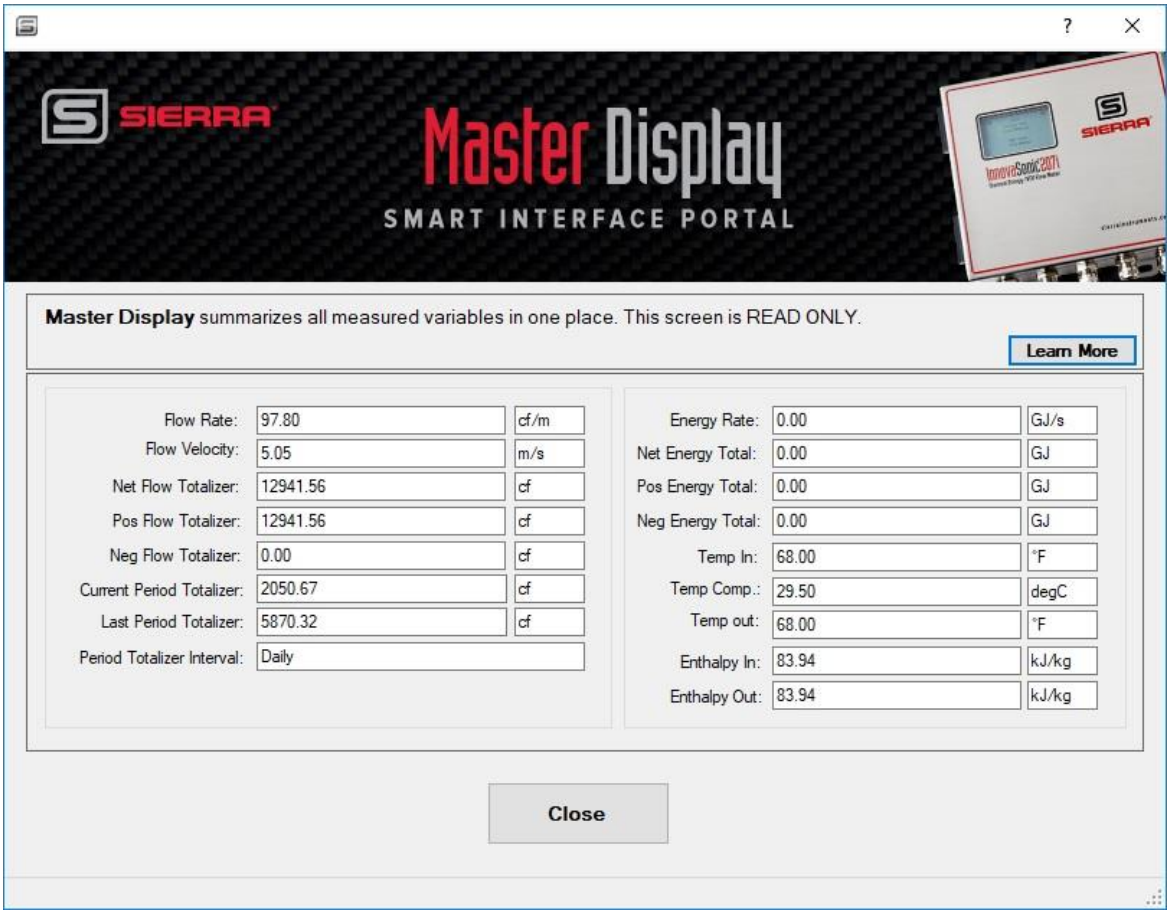


Figure 21. Master Display App

The "Master Display" summarizes all measured variables in one place. It is read only. The units will be in English or metric as the user has selected.

Below are descriptions for each field found/ displayed on the "Master Display" menu screen:

- "Flow Rate": Instantaneous flow rate
- "Flow Velocity": Instantaneous flow velocity
- "Net Flow Totalizer": Totalized flow. The sum of upstream and downstream flow. Totalizers can be configured and reset from the Totalizer Setup app
- "Flow Totalizer": Flow in the downstream direction
- "Neg Flow Totalizer": Flow in the upstream direction

- “Period Totalizer Interval”: Period over which flow is totalized (hourly, daily, etc.)
- “Current Period Totalizer”: Current accumulated flow total
- “Last Period Totalizer”: Last period’s accumulated flow total
- “Energy Rate”: Instantaneous Energy rate
- “Energy Total”: Totalized Energy
- “Temp In”: Inlet Fluid Temperature
- “Temp Out”: Outlet Fluid Temperature
- “Temp Ambient”: temperature in the surrounding space
- “Pressure Fluid”: Pressure in the pipe
- “Enthalpy In”: Energy content of the inlet fluid
- “Enthalpy Out”: Energy Content of the outlet fluid

Chapter 10 | Master Setup

Figure 22. Master Setup App

The "Master Setup" screen allows users to easily access of all the user setup screens. Simply click on the button to go to the desired setup menu. Note: BACnet MS/TP is grayed out, because it is not installed. If the BACnet was installed instead, the Modbus RTU Setup would be grayed out.

Chapter 11 | Pipe Setup

The “Pipe Setup” App is used to set up the pipe in detail.

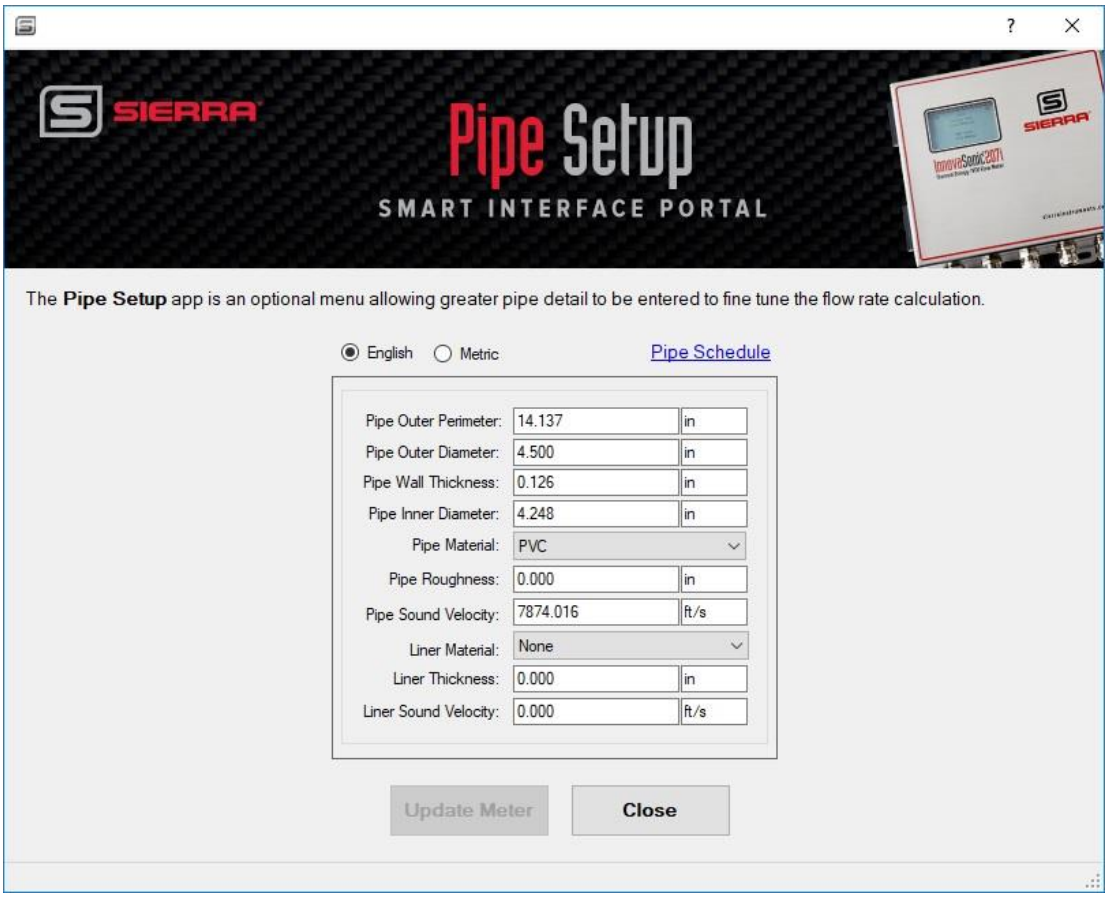


Figure 23. Pipe Setup App

Below are descriptions for each field found in the “Pipe Setup menu:

- **Pipe Outer Perimeter**: Enter the Perimeter (circumference) of your pipe. You can use a tape measure to get this. Make sure you enter with the correct units. Note you must enter either the perimeter here or the outer diameter below. The Pipe Setup app can calculate one if it knows the other.

- **Pipe Outer Diameter:** Enter the outside diameter of your pipe. This is the actual outside diameter, not just the nominal size. Make sure you enter with the correct units. You can look this up, if you know the “schedule” of your pipe (for example ANSI Schedule 40). Schedule tables are available in the InnovaSonic 207i Instruction Manual. Note you must enter either the outer

diameter here or the outer perimeter above. The “Pipe Setup” App can calculate one if it knows the other.

- **Pipe Wall Thickness**: Enter the “Pipe Wall Thickness” of your pipe. Make sure you enter with the correct units. You can look this up if you know the “schedule” of your pipe (for example ANSI Schedule 40). Schedule tables are available in the InnovaSonic 207i Instruction Manual. Note you must enter either the wall thickness d here or the inner diameter below. The “Pipe Setup” App can calculate one if it knows the other.

- **Pipe Inner Diameter:** Enter the inner diameter of your pipe. This is the actual inner diameter, not just the nominal size. Make sure you enter with the correct units. You can look this up if you know the “schedule” of your pipe (for example ANSI Schedule 40). Schedule tables are available in the InnovaSonic 207i Instruction Manual. Note you must enter either the inner diameter here or the “Pipe Wall Thickness” above. The “Pipe Setup” App can calculate one if it knows the other.

- **Pipe Material:** Use the dropdown menu to select the material of your pipe. If your “Pipe Material” is not on the list, chose other. You will then need to enter the speed of sound of your pipe.

- **Pipe Roughness:** Absolute “Pipe Roughness” is a measure of pipe wall irregularities of commercial pipes. The absolute roughness has dimensions of height and is usually expressed in millimeter (mm) or inches (in). The Pipe Setup app will use common engineering values based on the pipe material unless you enter a value.

- **Pipe Sound Velocity:** This will be one of two things: 1) the speed of sound (SOS) through the “Pipe Material” as chosen in the dropdown menu or 2) if “Other” was selected, you will need to enter the value of the SOS for the pipe material you are using.

- **Liner Material:** Use the dropdown menu to select the “Liner Material” of your pipe, if your pipe has a liner (most pipes don’t have a liner). In that case select none.

- **Liner Thickness:** If a “Liner Material” was selected enter the “Liner Thickness. If there is no liner, this value will remain at zero.

- **Liner Sound velocity:** This will be one of two things: 1) the speed of sound (SOS) through the pipe liner material as chosen in the dropdown menu or 2) if “other” was selected, you will need to enter the value of the SOS for the liner material you are using.

Chapter 12 | Fluid & Flow Rate Setup

The “Fluid & Flow Rate Setup” app allows you to set up the fluid and units, plus the fluid temperature.

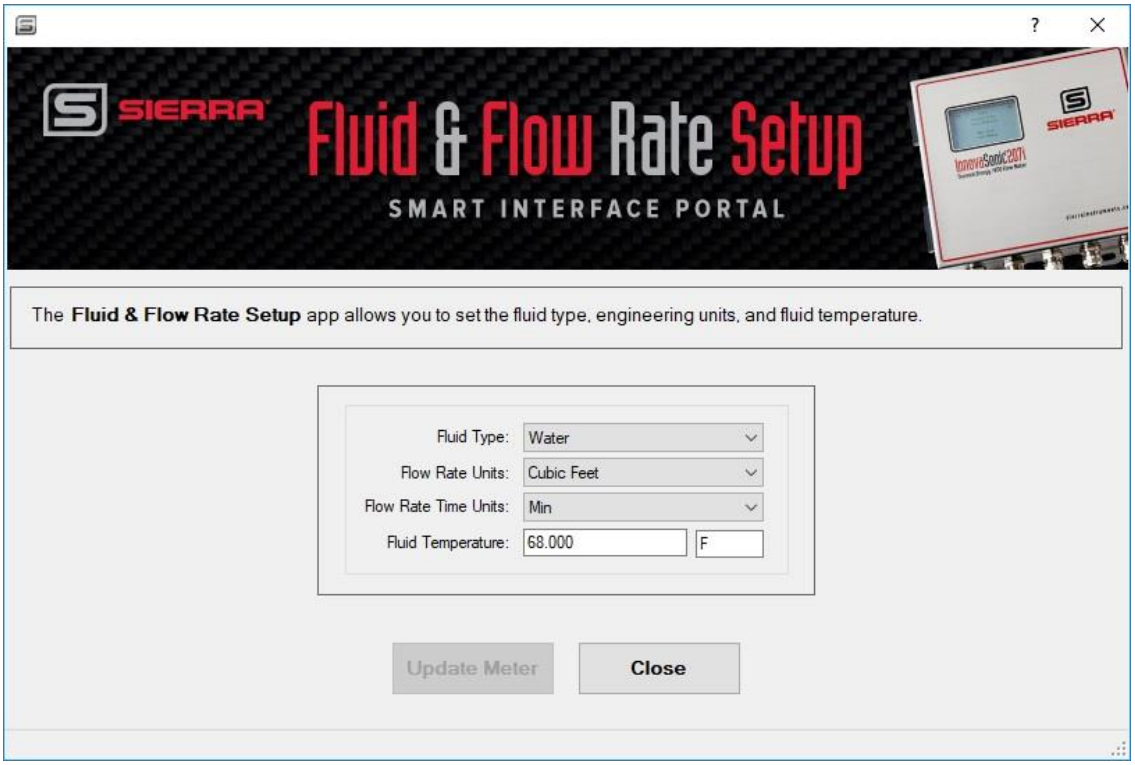


Figure 24. Fluid & Flow Rate Setup

- **Fluid Type:** Use the dropdown menu to select your fluid. If you don’t see your fluid, select “Other.” You will then need to know the speed of sound and enter it.
- **Speed of sound:** If a fluid has been selected, the speed of sound at the entered or measured speed of sound will be displayed. If “Other,” you will need to enter the speed of sound here.
- **Flow Rate Units:** Use the dropdown menu to select your “Flow Rate Units.” Cubic Meters (m3) is the default value.
    - Liters (1)
    - USA Gallons (GAL)
    - Imperial Gallons (Imp gal)
    - Million Gallons (mg)
    - Cubic Feet (cf)
    - USA Barrels (US bbl)
    - Imperial Barrels (Imp bbl)

- Oil Barrels (Oil bbl)

- **Flow Rate Time Units:** Use the dropdown menu to select your flow rate time base
  - \second
  - \minute
  - \hour (Default)
  - \day

- **Fluid Temperature:** Enter the temperature of the fluid in the pipe. If the meter is fitted for temperature measurement, the actual measured values of temperature will be used, but enter the base line temperature of the fluid in the pipe here**.**

Chapter 13 | Flow Totalizer Setup

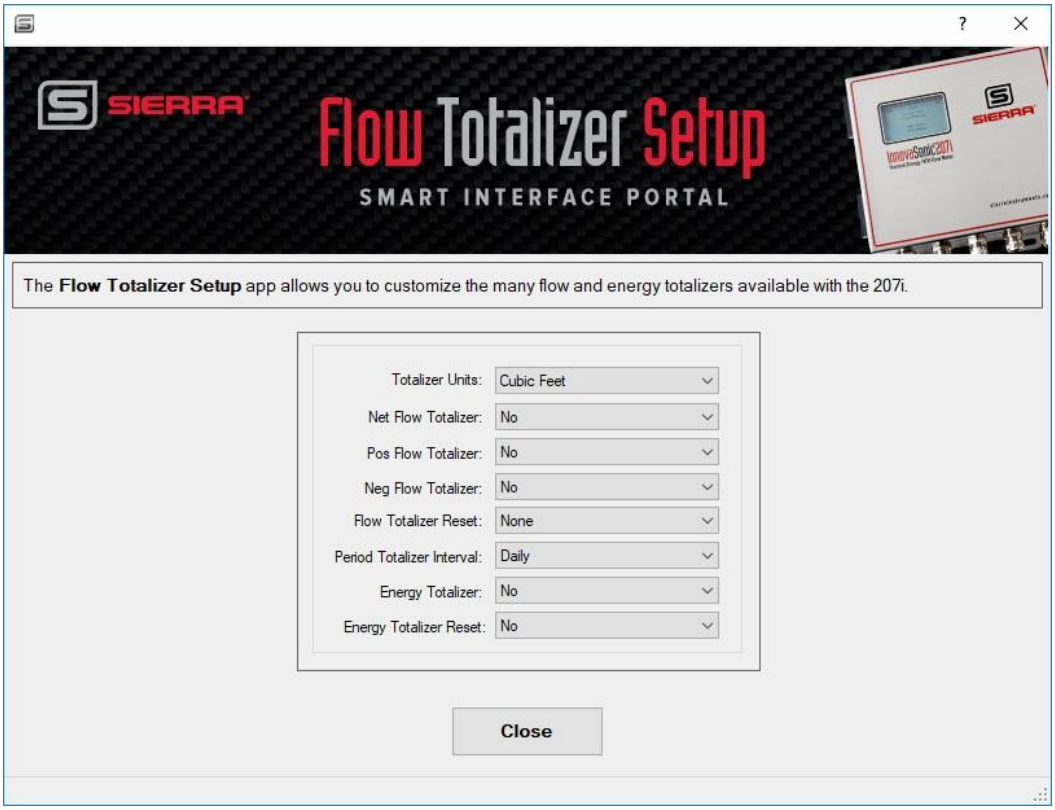


Figure 25. Flow Totalizer Setup App

The "Flow Totalizer Setup" app allows users to customize their flow totalizers.

- **Flow Totalizer Units: Set the desired flow totalizer units from the drop down menu (choices below).**
  - Cubic Meters (m3) (Default)
  - Liters (1)
  - USA Gallons (GAL)
  - Imperial Gallons (Imp gal)
  - Million Gallons (mg)
  - Cubic Feet (cf)
  - USA Barrels (US bbl)
  - Imperial Barrels (Imp bbl)
  - Oil Barrels (Oil bbl)

- **Net, Pos and Neg Flow Totalizer:** Under “Net,” “Pos,” or “Neg Flow Totalizer” menus, select “Yes” to activate or “No” to deactivate. Default value is “No” for all three menus. Net is the sum of upstream and downstream flow. Downstream is positive and upstream is negative.
- **Flow Totalizer Reset:** Under “Flow Totalizer Reset,” the user can reset (zero) flow totalizers by selecting from a dropdown list: “None,” all “Net,” “Pos,” or “Neg”
- **Period Totalizer Interval:** “Period Totalizer Interval” allows time value selected by the user to automatically reset (zero) the totalizer. To use this function, select one of the following time periods to totalize: “Minute,” “Hourly,” “Daily.” The 207i displays the total recorded in the previous period on line 2 and the current value being accumulated in the present period on line 1.

Chapter 14 | Meter Tuning

The “Meter Tuning” app allows users to fine tune the flow reading to the specific application.

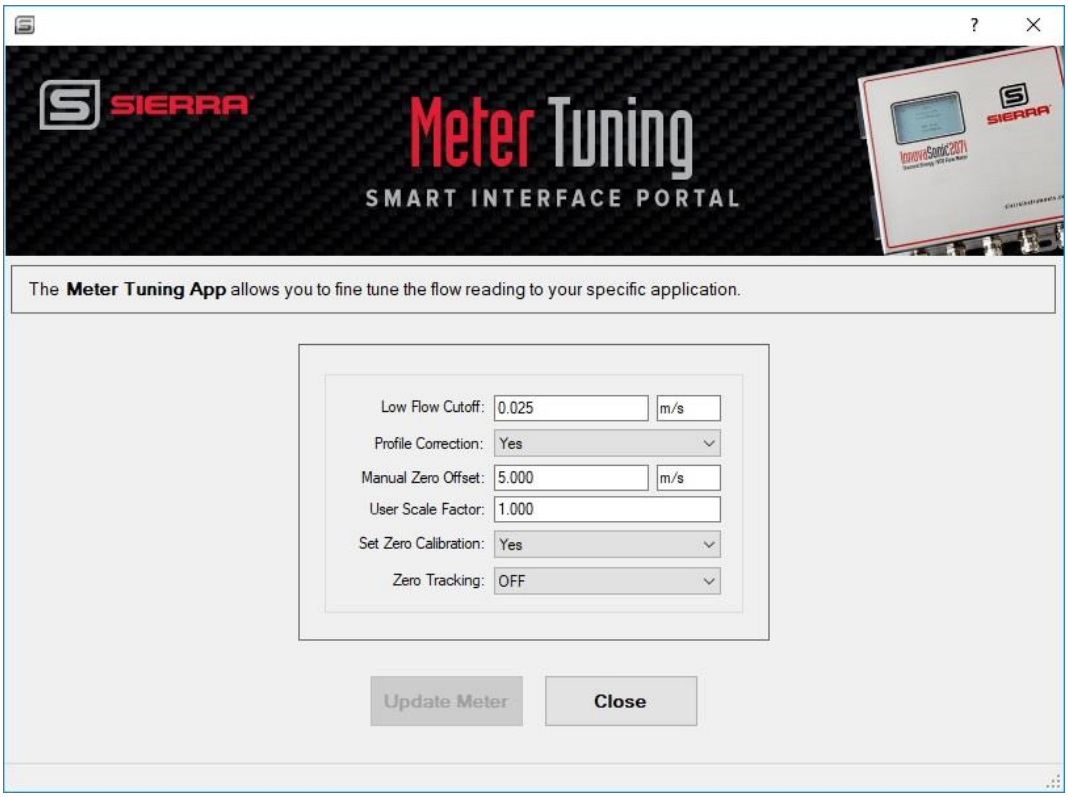


Figure 26. Meter Tuning

- **Low Flow Cutoff Value:** Enter the desired low flow cut-off value in m/s. “Low Flow Cutoff Value” is typically set around .025 m/s. Velocities below this value are forced to zero.

- **Reynold’s Correction:** “Correct Flow” turns on/off the Reynolds correction. Default is set on “On.” When turned “On,” the meter measurements are corrected for flow profile using Reynolds Number and pipe wall internal roughness values. The ability to turn flow “Profile Correction” “Off” is useful for benchmarking different types and makes of flowmeters where the sophistication of the manufacturers’ correction algorithms can lead to different results.

- **Manual Zero Offset:** “Manual Zero Offset” is a manual zero offset method that is not commonly used. It is only suitable for experienced operators to set zero flow velocity in m/s under conditions when it is not preferable to use other methods. Enter the flow velocity value manually

to add to the measured value to obtain the actual value. Allowed values are ranged -30.0 to +30.0m/s, default 0.0m/s.

- **Manual Scaling Factor:** This factor is used to adjust the flow readings to match a known reading. Only use this feature if the actual flow readings are known. The default value is 1.000 which means no change to the factory calibration.

- **Set Zero Calibration:** This should only be used with zero flow in the full pipe. Set to "No" for normal operation. Set to "Yes" to zero the meter. After you enter "Yes," press the

key then press

to start the zero-averaging process. After it is done, it will go back to "Set Zero Calibration".

- **Zero Tracking:** This is a type of automatic zeroing function. When "Yes" is selected, the meter will start setting a new zero, but only while the velocity is insignificant. Default is "On." When measuring extremely low flows, the meter can mistakenly identify a flow from, for example, a real leak as an erroneous zero offset. To avoid the leak being zeroed out, turn "Zero Tracking" to "Off."

Chapter 15 | Meter Display Setup

The “Meter Display App” allows users to format the display to their specifications.

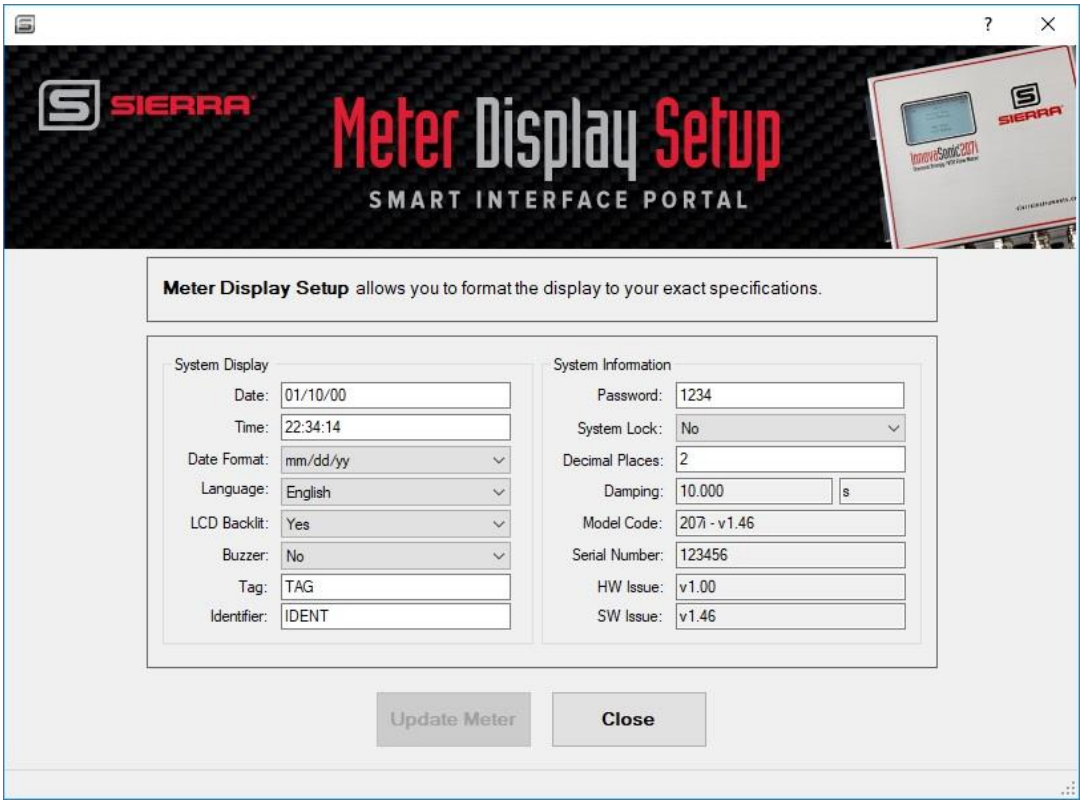


Figure 27. Meter Display App

System Display

Below are descriptions for each field found under the System Display section.

- **Date:** To adjust the “Date,” type in the current date and press “Save.”
- **Time:** To adjust the “Time,” type in the current time and press “Save.”
- **Date Format:** Select the date format you want by choosing between dd/mm/yy, mm/dd/yy, and yy/mm/dd date formats.
- **Language:** To select a different language, chose value from list and press “Enter.”
- **LCD Backlit:** You can have the” LCD Backlit” by choosing either “Yes” or “No” and press “Enter.”
- **Buzzer:** Turn the buzzer on or off by choosing either “Yes” or “No” and then press “Enter.”
- **Tag:** Enter in your tag by typing value and press “Enter.”
- **Identifier:** Type value of the “Identifier” and press “Enter.”

System Information

Below are descriptions for each field found under the System Information section.

- **Decimal Places:** There are two decimal places by default (0-3 accepted).
- **Damping:** Under the "Damping" menu, the user is prompted to enter a display damping/averaging time for flow. This is separate to subsequent "Input/Output" damping which is set elsewhere (see "Input/Output" section). Allowed values are ranged 1 to 255s, default 10s. The damping time can be adjusted to stabilize the flow display. Increasing the damping increases the stability. However, the measurement displayed can be slightly delayed due to over damping. Too much damping may also result in no response to real time fluctuations, especially when flow rate fluctuates wildly. Therefore, damping should be kept at a minimum and increased just enough to reduce the fluctuation to an acceptable degree.
- **Password:** Type password and press Save
- **System Lock:** Chose "Yes" or "No" to lock system and press "Enter."
- **Model Code:** Shows the model of the meter.
  Serial Number: Shows the "Serial Number" of the meter
- **HW Issue:** "HW Issue" shows the version of the hardware.
- **SW Issue:** "SW Issue" shows the current version of the software.

Chapter 16 | Relay Output Setup

The 207i is equipped with one relay output that has both Normally Open (N.O.) and Normally Closed (N.C.) connections. Both may be used at the same time. The relays are rated for 250V AC or DC at 120 mA Max

The “Relay Output” can be used to set up a relay to remotely activate another device (opening and closing a valve for instance). The “Relay Output Setup” App allows this relay to be configured for a variety of functions.

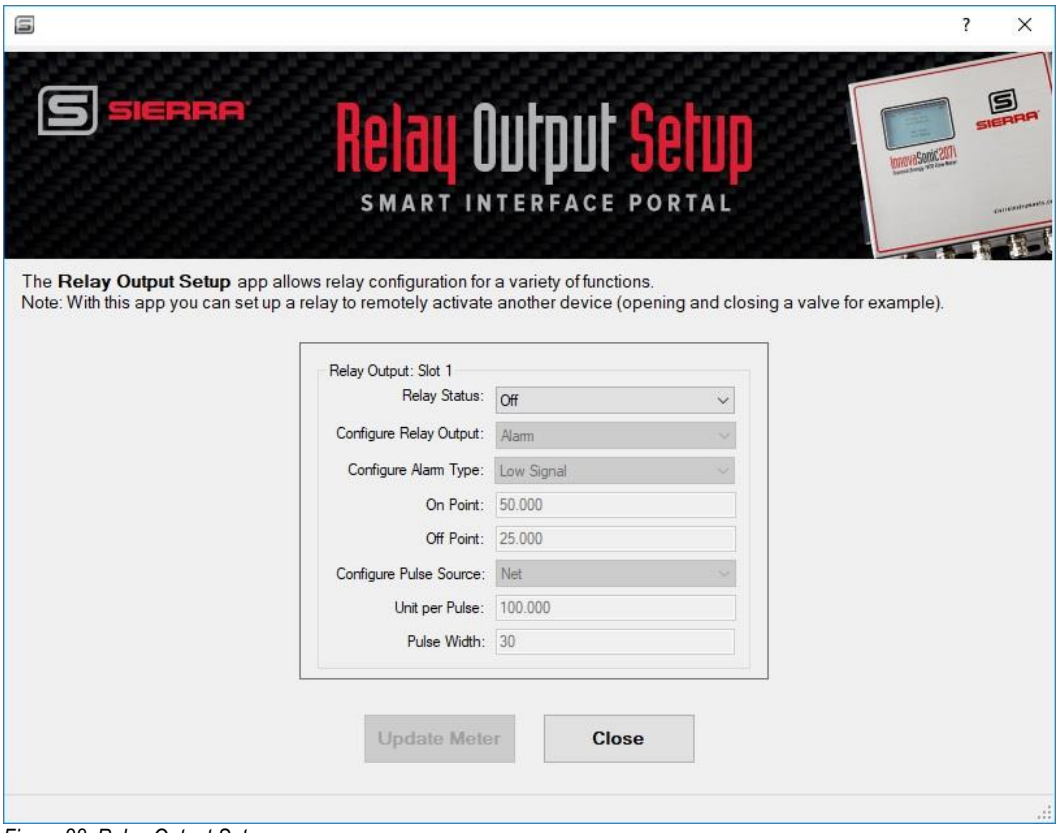


Figure 28. Relay Output Setup

1. **Relay Status:** Turn the relay “on” or “off.” You can also select “Test” to check relay operation.

2. **Configure Relay Output:** Determines what measurement will activate the relay. Below are the choices.
    - Alarm: Relay activates on a certain alarm
    - Pulse: Relay opens and closes with the associated totalizer
    - Frequency: Relay opens and closes with flow rate
    - Batch: Relay opens and closes once a certain flow has accumulated

3. **Configure Alarm Type:** If "Alarm" is selected, the "Configure Alarm Type" shows the type of alarm the meter will give. Choices of alarm types below.
    - Low Signal
    - Not Ready
    - System
    - Velocity
    - Rate
    - Energy

4. **On Point/Off Point:** If "Velocity," "Rate," or "Energy" is selected, at what reading does the alarm turn on and off?
    - On Point (enter value for the alarm to turn on)
    - Off Point (enter value for the alarm to turn off)

5. **Configure Relay Pulse Source:** If Pulse is selected, for what totalizer do you want the relay to track?

    - Net
    - Pos
    - Neg
    - Energy

6. **Unit Per Pulse/Pulse Width:** If "Pulse" is selected, how much do you want to accumulate before the relay activates and how long do you want the relay to remain activated?

    - Step (enter the units per pulse)
    - Duration (enter the pulse width in ms)

7. If "**Batch"** is selected, at what accumulation do you want the relay to activate? **This value is set up in the Batch Output Setup" app.**

Chapter 17 | OCT Output Setup

The 207i is equipped with one opto-isolated OCT (Open Collector Transistor) output. This OCT output has many of the same functions of the relay output but can also be operated at speeds up to 10 KHz and can be used as a frequency output.

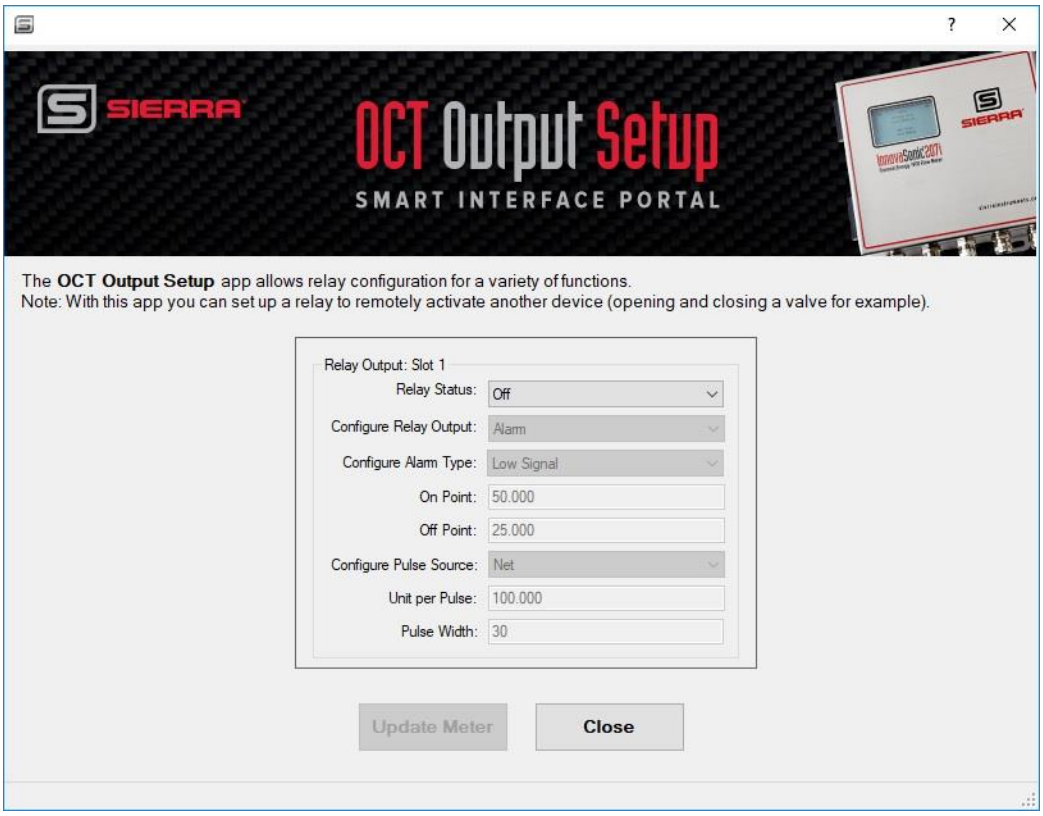


Figure 29. OCT Output Setup

1. **Pulse Output Status:** Turn the pulse on or off. You can also select test to check pulse operation.

2. **Configure Pulse Output:** Determine what measurement will activate the pulse:
   - Alarm: Pulse activates on a certain alarm
   - Pulse: Pulse opens and closes with the associated totalizer
   - Frequency: Pulses with velocity, flow or energy rate
   - Batch: pulses once a certain flow has accumulated

3. **Configure Alarm Type:** If "Alarm" is selected, what is the alarm? Below are the choices.
   - Low Signal
   - Not Ready
   - System
   - Flow Velocity
   - Flow Rate

- Energy

4. **On Point/Off Point:** If “Velocity,” “Flow Rate” or “Energy” is selected, at what reading does the alarm turn on and off?

    - On Point (enter value for the alarm to turn on)
    - Off Point (enter value for the alarm to turn off)

5. **Configure Pulse Source:** If “Pulse” is selected, for what totalizer do you want the pulse to track? Below are the choices for this field.

    - Net
    - Pos
    - Neg
    - Energy

6. **Unit Per Pulse/Pulse Width:** If Pulse is selected, how much do you want to accumulate before the relay activates and how long do you want the relay to remain activated? Below are the choices for this field.

    - Step (enter the units per pulse)
    - Duration (enter the pulse width in ms)

7. If **Frequency** is selected, what do you want to monitor? Below are the choices for this field .

    - Flow Velocity
    - Flow Rate
    - Energy

8. What is the lower value, upper value and damping?

    - Set a lower value for the pulse to turn on
    - Set an upper limit for the pulse to turn off
    - Set a value for the damping in seconds

Chapter 18 | Analog Output Setup

There are three analog current outputs available in the “Analog Output Setup” app. The may be used for flow velocity, flow rate and flow energy. The “Analog Output Setup” app allows these outputs to be configured and tested.

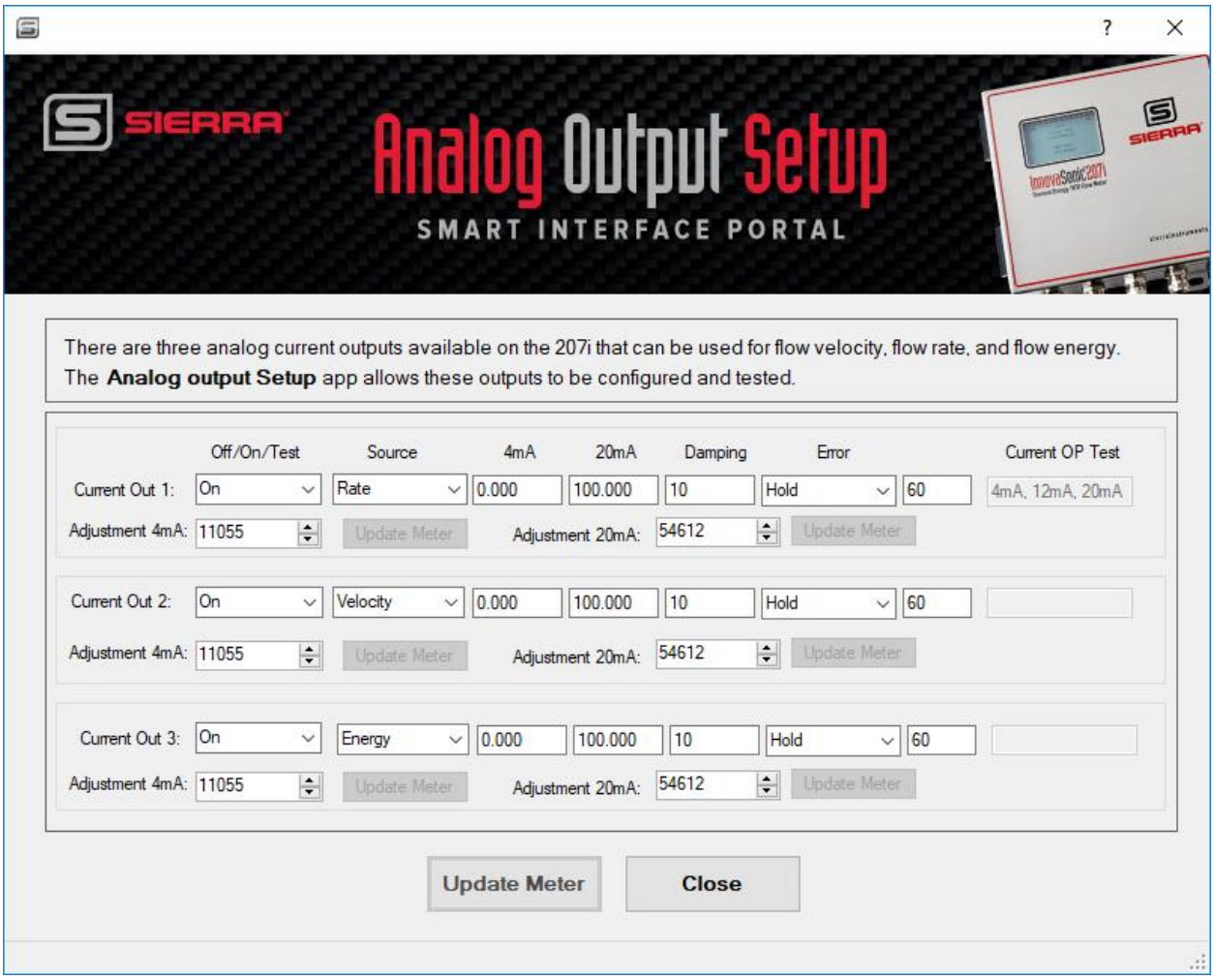


Figure 30. Analog Output Setup

1. Turn the current output on, off or test.
2. Set up the output source: flow velocity, flow rate and flow energy.
3. Set the” 4mA” value and the “20mA” value.
4. Set the “Damping” value in seconds.
5. Set the “Error” signal output. It will hold at present value for a given time, then go to an “Error” signal value. Select the Error signal behaviour below.

- Hold (holds last value for Hold time, then drops to 4.00 mA.)
- 3.8mA/Off (holds last value for Hold time, then drops to 3.80 mA.)
- 21.0mA/On (holds last value for Hold time, then rises to 21.00 mA.)
- Hold time (enter time)

6. If “Test” is selected, the current output is forced to 4, then 12, then 20mA and displays this in the “Current OP test” box.
7. The 4mA and 20mA output calibration has been set at the factory and should not need adjustment. However users can adjust these if needed by adjusting the “Adjustment 4mA” and “Adjustment 20mA” values. These values are the 16 bit D/A conversion values that represent 4mA and 20 mA.

Chapter 19 | Analog Input Setup

The “Analog Input Setup” app allows for up to 2 optional analog 0/4 -20 mA inputs for temperature, pressure and density. You can also set up the current output to control a batch process.

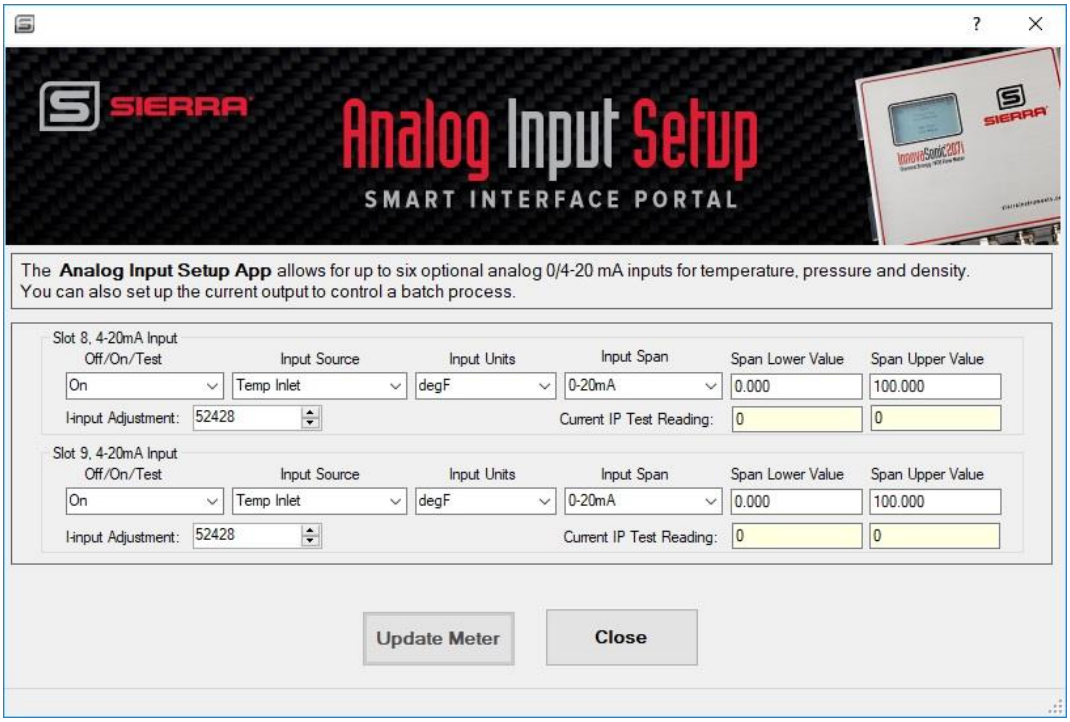


Figure 31. Analog Input Setup

1. Turn on the “4-20mA Input” by selecting Off/On/Test. If “Test” is selected, the input current will be displayed in A/D counts and mA. values.
2. Select the Input Source. Your choices are:
    - Temp Inlet: The temperature of the upstream fluid
    - Temp Outlet: The temperature of the downstream fluid
    - Temp Comp (: The outside temperature of the pipe at the transducers
    - Temp Inlet Plus Temp Pipe: Assumes the temp pipe is the same as the Temp Inlet
    - Temp Outlet Plus Temp Pipe: Assumes the temp pipe is the same as the Temp Outlet
    - Pressure: Input from a pressure transducer
    - Density: Input from a density meter
    - A1 Batch: current input
    - A2 Batch: current input

3. Select the **Input Units:**
   For Temperature, your choices are:
   - degC
   - degF
   - K
   - R

   For Pressure, your choices are:

   - Psi G
   - Psi A
   - Bar G
   - Bar A

   For Density, your choices are:

   - kg/m3
   - g/cc
   - kg/l
   - Lbs/ft3

   For AI1, A12 Batch: The “Batching” function allows the user start and stop a totalizing process. For example, a PLC could send a 4-20mA signal to the 207i to start counting the batch at the same time it starts a pump. Once the target amount has been reached, the Relay on the 207i could signal the PLC to stop the pump.
   Select the span of the incoming current singal. Either 0-20mA or 4-20mA may be used. The values that represent 0/4 and 20 mA span in units are not inportant for batching inputs.

4. “I-input Adjustment” The 0/4-20mA inputs are calibrated at the factory and do not normally need adjustment. However the user can adjust the A/D span (20mA point). This value is in 16 bit digital counts and not in engineering units.

Chapter 20 | Data Logger Setup

The 207i has a 16MB internal flash data logger memory. The “Data Logger Setup” App allows user to configure and download the data logger.

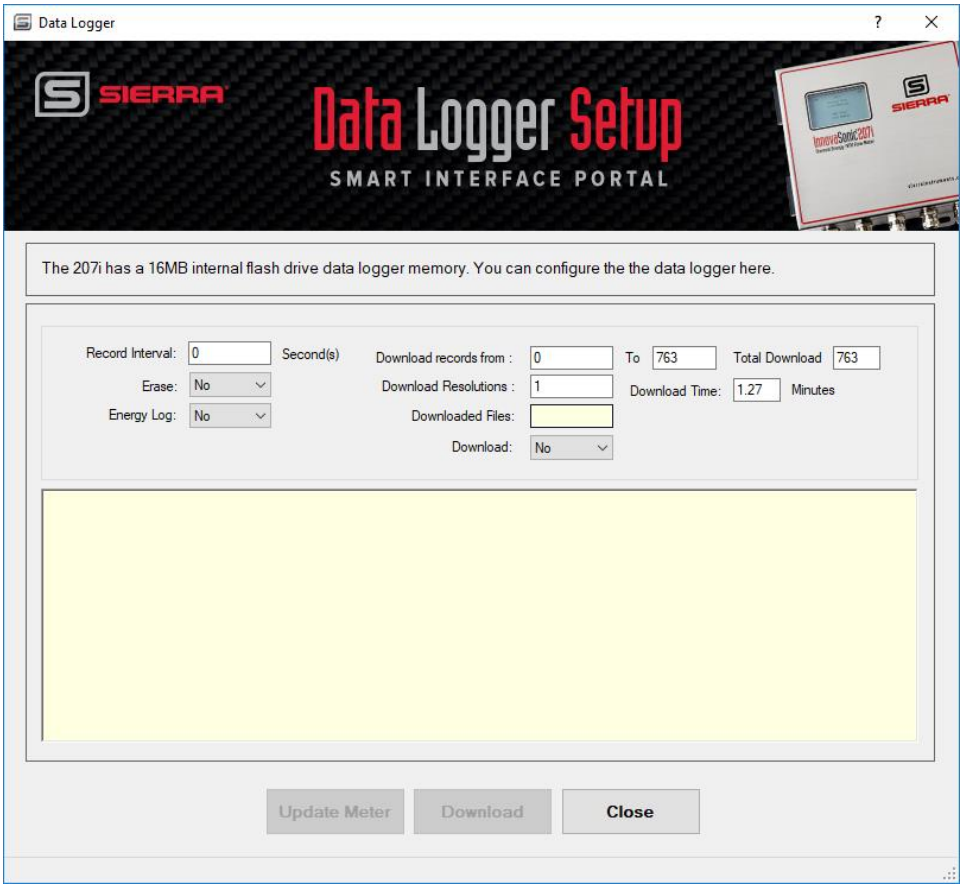


Figure 32. Data Logger Setup

Below are descriptions for each box found under the “Data Logger Setup” section:

- **Record Interval:** The user is prompted to enter a datalogger interval. Entering a value for “Interval” starts data logging. An interval of zero turns the datalogger off. When the interval is met then all meter measurement/diagnostic values are written to the datalogger memory. Allowed values are ranged 0 to 255s, default 255s.

- **Erase:** The user is prompted to erase the datalogger memory by selecting “On” or “Off.” By default memory is not erased.

- **Energy Log** The user is prompted to turn logging of energy rate and energy totalizers “On” or “Off.” By default energy rate and totalizers are not logged.

- **Download records from: ____ To ____:** The data logger can hold up to 65,500 records at 256 bytes per record. At a **Record Interval** of 60 seconds per record that's 45.5 days. The SIP app will allow you to only download the records of interest. Downloading the entire log file can take hours. The estimated download time is calculated and displayed in the **Download Time** box.

- **Download Resolutions:** This feature allows you skip records. For example: A setting of 10 will download every 10th record, which will decrease the download time.

- **Downloaded Files:** This box display the progress of downloaded records.

- **Download:** Set to "Yes" to download log file, normally set to "No" to do not download log now. If you set the Download selection to "Yes", the Download button will turn green.

- **Download Button** at the bottom of the screen will turn green when you are ready to download the log file. Click the "Download" button and a browse window will appear. Browse to the location you wish to store the log file in, and provide a name for the .cvs file. Click Save.

- **Close** returns to the Master Setup screen.

Example of downloading the data logger:

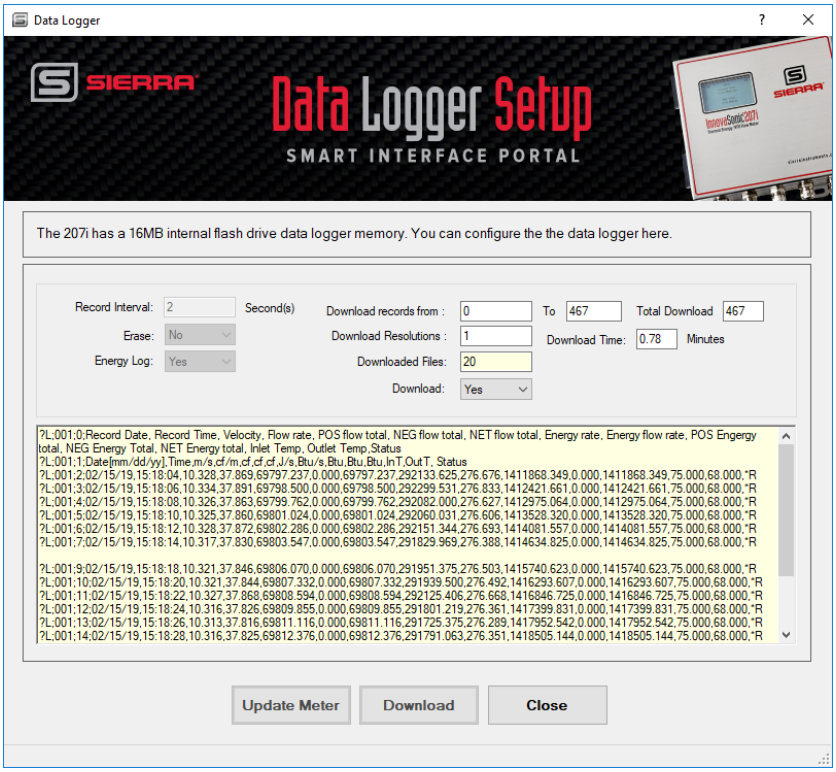


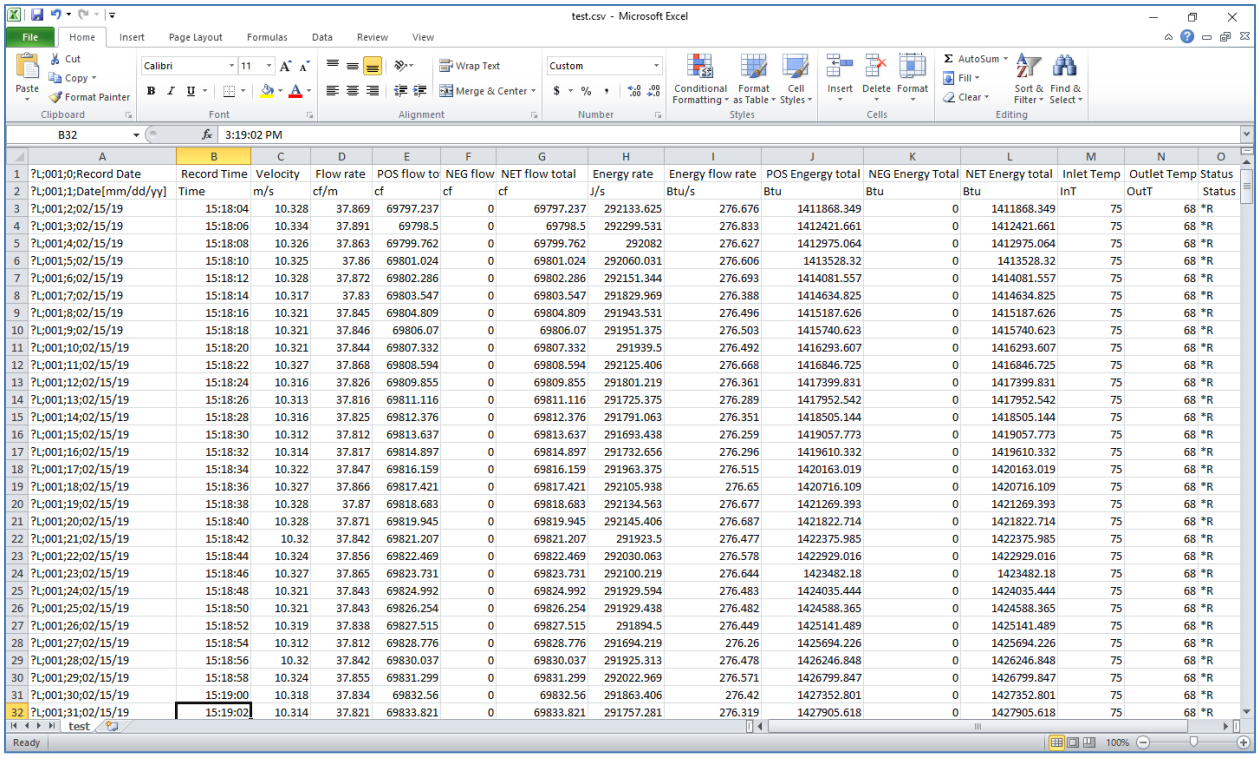
Figure 30. Data Logger Setup screen after a download

The data logger file will be saved by the name and location you entered when the Download button was clicked. The window in the screen displays the data logger file progress. When done downloading you can view records by scrolling up or down.

Understanding the data file

The data is stored in a common .csv file format which can be opened with Excel. The first 2 rows (records) are the header information showing the description and engineering units. Row 3 to the last show the data values recorded. Anytime the meter is stopped and started a new header is added to the file.

Example in Excel:



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	?L;001;0;Record Date	Record Time	Velocity	Flow rate	POS flow to	NEG flow	NET flow total	Energy rate	Energy flow rate	POS Engergy total	NEG Energy Total	NET Energy total	Inlet Temp	Outlet Temp	Status
2	?L;001;1;Date[mm/dd/yy]	Time	m/s	cf/m	cf	cf	cf	J/s	Btu/s	Btu	Btu	Btu	InT	OutT	Status
3	?L;001;2;02/15/19	15:18:04	10.328	37.869	69797.237	0	69797.237	292133.625	276.676	1411868.349	0	1411868.349	75	68	*R
4	?L;001;3;02/15/19	15:18:06	10.334	37.891	69798.5	0	69798.5	292299.531	276.833	1412421.661	0	1412421.661	75	68	*R
5	?L;001;4;02/15/19	15:18:08	10.326	37.863	69799.762	0	69799.762	292082	276.627	1412975.064	0	1412975.064	75	68	*R
6	?L;001;5;02/15/19	15:18:10	10.325	37.86	69801.024	0	69801.024	292060.031	276.606	1413528.32	0	1413528.32	75	68	*R
7	?L;001;6;02/15/19	15:18:12	10.328	37.872	69802.286	0	69802.286	292151.344	276.693	1414081.557	0	1414081.557	75	68	*R
8	?L;001;7;02/15/19	15:18:14	10.317	37.83	69803.547	0	69803.547	291829.969	276.388	1414634.825	0	1414634.825	75	68	*R
9	?L;001;8;02/15/19	15:18:16	10.321	37.845	69804.809	0	69804.809	291943.531	276.496	1415187.626	0	1415187.626	75	68	*R
10	?L;001;9;02/15/19	15:18:18	10.321	37.846	69806.07	0	69806.07	291951.375	276.503	1415740.623	0	1415740.623	75	68	*R
11	?L;001;10;02/15/19	15:18:20	10.321	37.844	69807.332	0	69807.332	291939.5	276.492	1416293.607	0	1416293.607	75	68	*R
12	?L;001;11;02/15/19	15:18:22	10.327	37.868	69808.594	0	69808.594	292125.406	276.668	1416846.725	0	1416846.725	75	68	*R
13	?L;001;12;02/15/19	15:18:24	10.316	37.826	69809.855	0	69809.855	291801.219	276.361	1417399.831	0	1417399.831	75	68	*R
14	?L;001;13;02/15/19	15:18:26	10.313	37.816	69811.116	0	69811.116	291725.375	276.289	1417952.542	0	1417952.542	75	68	*R
15	?L;001;14;02/15/19	15:18:28	10.316	37.825	69812.376	0	69812.376	291791.063	276.351	1418505.144	0	1418505.144	75	68	*R
16	?L;001;15;02/15/19	15:18:30	10.312	37.812	69813.637	0	69813.637	291693.438	276.259	1419057.773	0	1419057.773	75	68	*R
17	?L;001;16;02/15/19	15:18:32	10.314	37.817	69814.897	0	69814.897	291732.656	276.296	1419610.332	0	1419610.332	75	68	*R
18	?L;001;17;02/15/19	15:18:34	10.322	37.847	69816.159	0	69816.159	291963.375	276.515	1420163.019	0	1420163.019	75	68	*R
19	?L;001;18;02/15/19	15:18:36	10.327	37.866	69817.421	0	69817.421	292105.938	276.65	1420716.109	0	1420716.109	75	68	*R
20	?L;001;19;02/15/19	15:18:38	10.328	37.87	69818.683	0	69818.683	292134.563	276.677	1421269.393	0	1421269.393	75	68	*R
21	?L;001;20;02/15/19	15:18:40	10.328	37.871	69819.945	0	69819.945	292145.406	276.687	1421822.714	0	1421822.714	75	68	*R
22	?L;001;21;02/15/19	15:18:42	10.32	37.842	69821.207	0	69821.207	291923.5	276.477	1422375.985	0	1422375.985	75	68	*R
23	?L;001;22;02/15/19	15:18:44	10.324	37.856	69822.469	0	69822.469	292030.063	276.578	1422929.016	0	1422929.016	75	68	*R
24	?L;001;23;02/15/19	15:18:46	10.327	37.865	69823.731	0	69823.731	292100.219	276.644	1423482.18	0	1423482.18	75	68	*R
25	?L;001;24;02/15/19	15:18:48	10.321	37.843	69824.992	0	69824.992	291929.594	276.483	1424035.444	0	1424035.444	75	68	*R
26	?L;001;25;02/15/19	15:18:50	10.321	37.843	69826.254	0	69826.254	291929.438	276.482	1424588.365	0	1424588.365	75	68	*R
27	?L;001;26;02/15/19	15:18:52	10.319	37.838	69827.515	0	69827.515	291894.5	276.449	1425141.489	0	1425141.489	75	68	*R
28	?L;001;27;02/15/19	15:18:54	10.312	37.812	69828.776	0	69828.776	291694.219	276.26	1425694.226	0	1425694.226	75	68	*R
29	?L;001;28;02/15/19	15:18:56	10.32	37.842	69830.037	0	69830.037	291925.313	276.478	1426246.848	0	1426246.848	75	68	*R
30	?L;001;29;02/15/19	15:18:58	10.324	37.855	69831.299	0	69831.299	292022.969	276.571	1426799.847	0	1426799.847	75	68	*R
31	?L;001;30;02/15/19	15:19:00	10.318	37.834	69832.56	0	69832.56	291863.406	276.42	1427352.801	0	1427352.801	75	68	*R
32	?L;001;31;02/15/19	15:19:02	10.314	37.821	69833.821	0	69833.821	291757.281	276.319	1427905.618	0	1427905.618	75	68	*R

Figure 31. Data Logger .csv file opened in Excel.

You may now use Excel to manipulate the data as you wish to make graphs, sort or print data.

Chapter 21 | Meter RS-232 / USB Setup

The “RS 232/USB Setup App” allows the user to change serial communication settings for the “RS-232” and “USB” ports. These ports are used to connect to the Smart Interface Portal only.

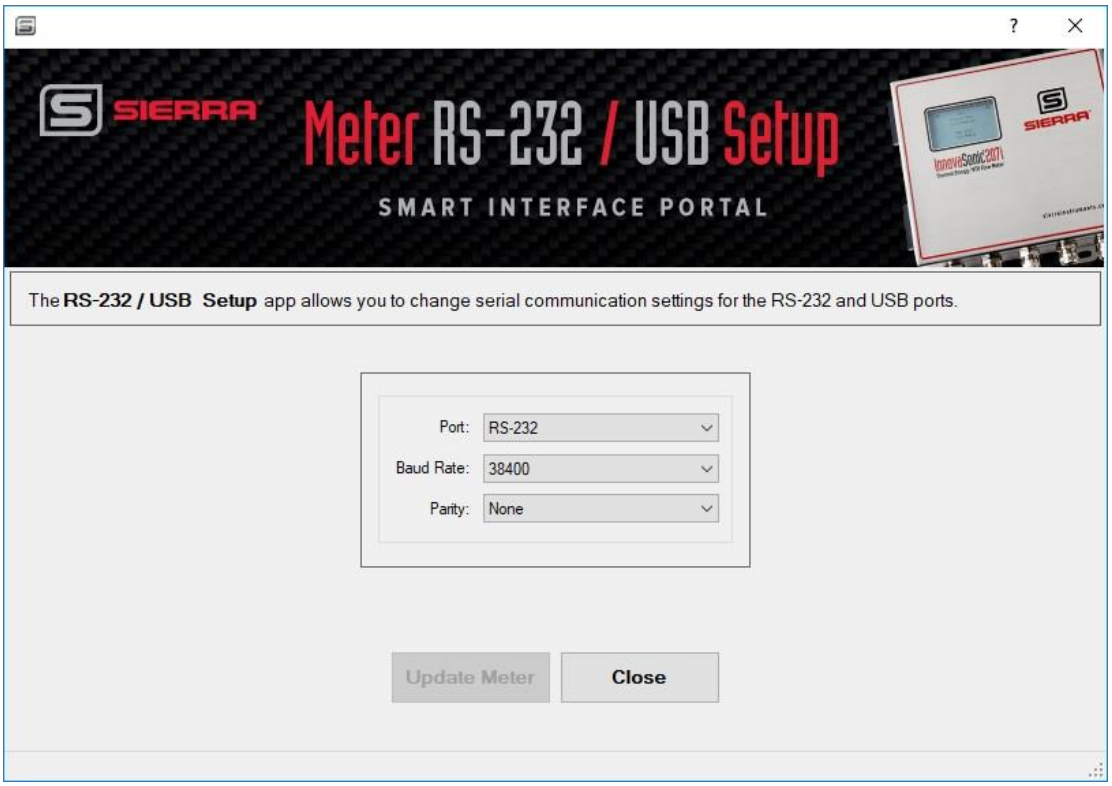


Figure 33. Meter RS-232/ USB Setup

Below are descriptions for each field found under the “Meter RS-232 / USB Setup” App.

- **Port:** The user can select which of the two available serial ports are used for communication from the following list:
    - Off (Default)
    - USB
    - RS-232

- **Mode:** The user is prompted to select the mode for the “RS-232/USB” from the following list:

- "None" (Default) turns the "RS-232/USB" transmit off. The "RS-232/USB" can still receive.
- "Line Printer" streams measurement values out on the "RS-232/USB."
- "Diagnostics" streams key diagnostic values on the "RS-232/USB."
- "Other" is to be decided, future option.

- **Baud:** The user is prompted to select the communication baud rate from the following list:

  - 9600 (Default)
  - 19200
  - 57600
  - 115200

- **Parity:** The user is prompted to select the communication parity from the following list:

  - None
  - Even (Default)
  - Odd

Chapter 22 | PT100 Setup

The InnovaSonic 207i can accept two PT100 inputs. You can configure the PT100 inputs on the “PT100 Setup” screen.

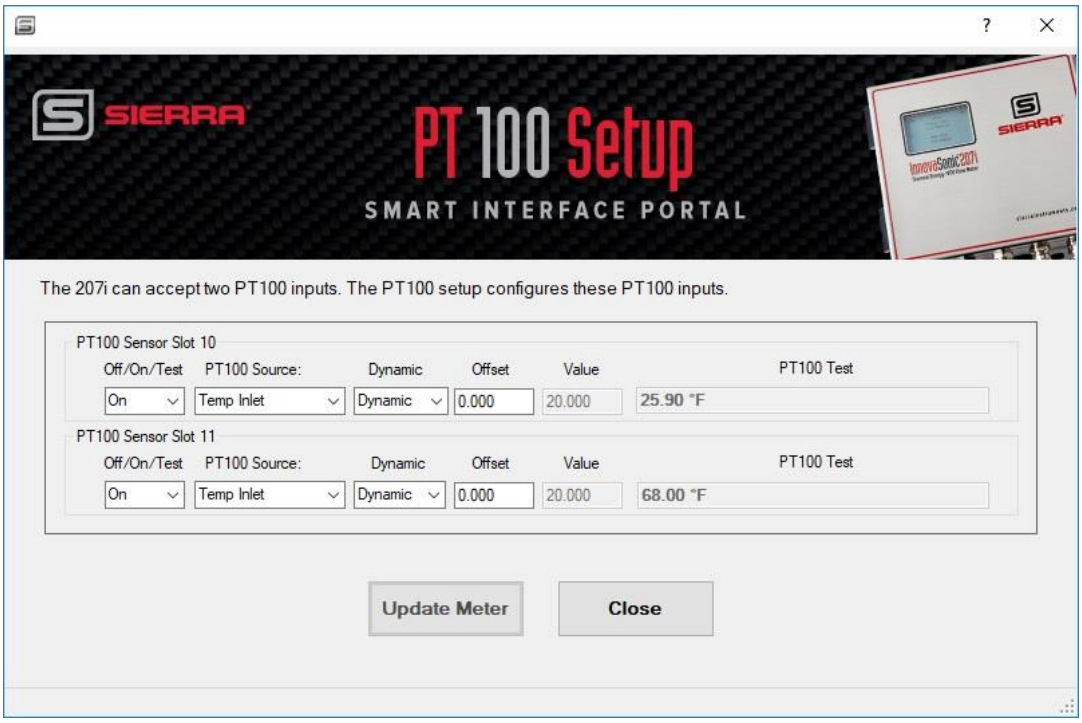


Figure 34. PT100 Setup

Below are descriptions for each field found under the “PT100 Setup” section slot 10 & 11:

3. Off/On/Test:
4. PT100 Source:
    - Temp Inlet: The temperature of the upstream fluid
    - Temp Outlet: The temperature of the downstream fluid
    - Temp Comp: The outside temperature of the pipe at the transducers
    - Temp Inlet + Comp: The transducer are mounted on the Inlet pipe
    - Temp Outlet +Comp: The transducers are mounted on the Outlet pipe
5. Dynamic:
    - Select whether these are Dynamic values (actually measured) or Fixed (user input)
    - Offset : If Dynamic, is there a calibration offset ? If so enter it here.
    - Value : If Fixed, enter user input values here.

Chapter 23 | Modbus RTU or BACnet MS/TP Setup

The 207i supports Modbus or BACnet digital communication. Whichever digital communication is not installed will be grayed out.

If “Modbus RTU Setup” is highlighted:

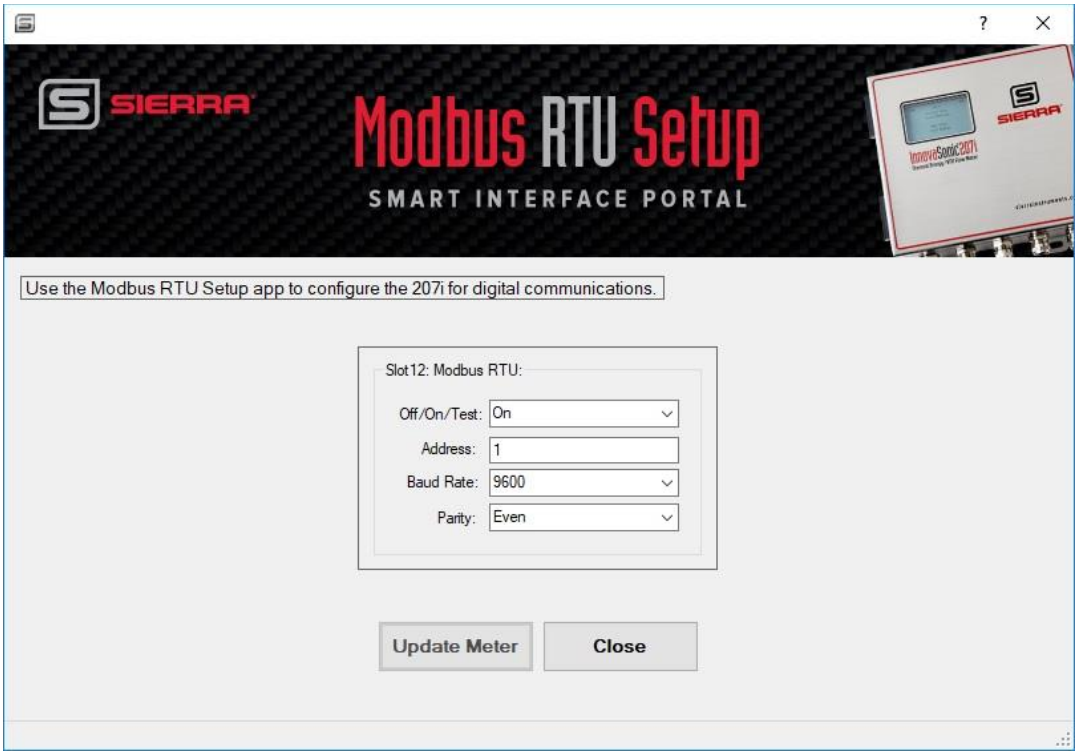


Figure 35. Modbus RTU Setup

Off/On/Test:
Address: 1-247
Baud:

- 9600
- 19200

Parity:

- None
- Even
- Odd

If “BACnet MS/TP” Setup is highlighted:

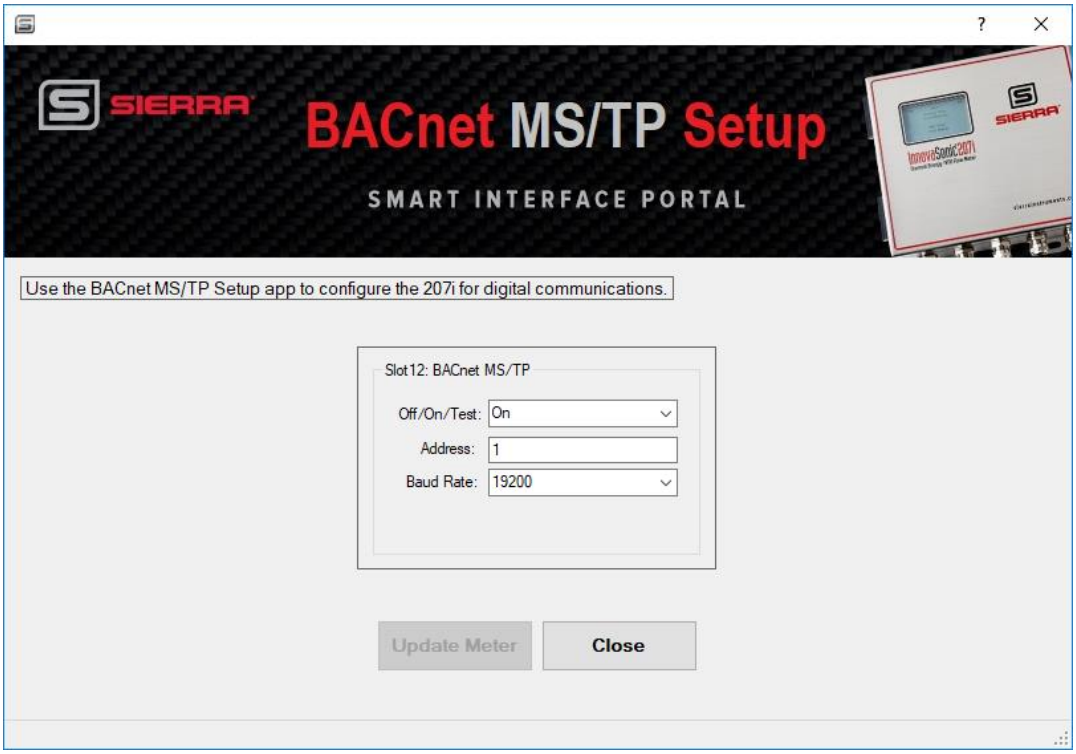


Figure 36. BACnet MS/TP Setup

Off/On/Test:
Address: 1-127

Baud:

- 9600
- 19200
- 38400

Note: Parity not used, pre-set to “None” on BACnet.

Chapter 24 | Flow Batching Setup

Flow batching allows the user start and stop a totalizing process. You can use the “Relay Output,” the Pulse output to provide the output signals to an external device to take action, or you can use the analog inputs to accept inputs from an external device to turn flow batching on/off.

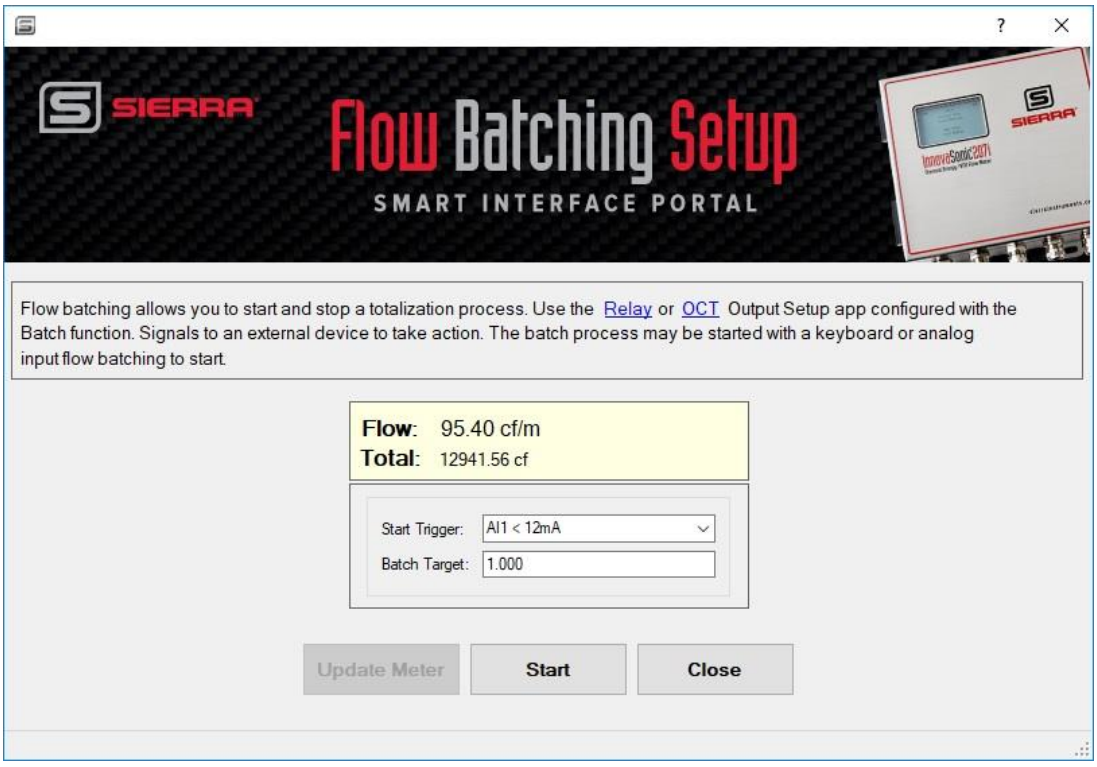


Figure 37. Flow Batching Setup

Below are descriptions for each field found under the “Flow Batching Setup” App.

- **Flow Batch CTRL:** The user can select how the batch process is started from the following list:
    - Key Input (Default)
    - AI1 Up Edge
    - AI1 Down Edge
    - AI2 Up Edge
    - AI2 Down Edge

If AI1 or AI2 is selected, the totalizer will start on a signal from a current input module, see “Input/Output” section.

Depending on whether the trigger is up or down, the totalizer starts as the input current passes through 12 mA going up to 20 mA or down to 0 mA respectively.

- **Flow Batch Target:** The user is prompted to enter a target value for the batch controller. The value is in the user selected totalizer units, see above. When the batch totalizer reaches this target then a relay or open collector output can be activated, select “BATCH” in the Relay or OCT in the “Input/Output” menus.

Allowed values are ranged 1.0 to 100000.0, default 1.0.

- **Key Input:** Press “Start” to begin the batch. The batch will accumulate until the setpoint is reached