F-1000 SERIES
Turbine Flow Meter Configuration
Utility Installation and Operation Guide

ONICON
— Flow and Energy Measurement —

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SECTION 1.0 INSTALLING THE CONFIGURATION UTILITY

1.1 OBTAINING THE CONFIGURATION UTILITY

The ONICON Turbine Meter Configuration Utility was designed to operate with the Windows XP, Windows 7, Windows 8, or Windows 10 operating systems. The utility is available for download from ONICON's website at https://www.onicon.com/products/f1000-series-turbine-flow-meters.
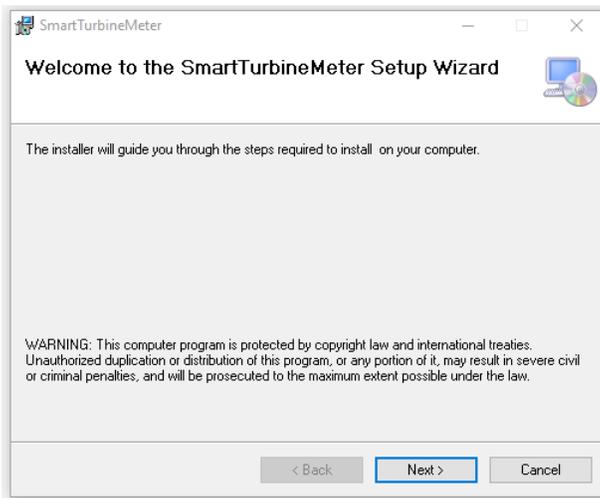
1.2 INSTALLING THE CONFIGURATION UTILITY

Locate and open the folder which was downloaded. Within the folder, locate and open the file named "**SmartTurbineMeter_X.X.X**". The "X.X.X" in the file name will appear as numbers. The specific numbers you see are based on the revision of the software provided by ONICON.

Name	Type	Compressed size	Password ...	Size
Software Drivers	File folder			
onicon_smart_turbine_meter	Security Catalog	5 KB	No	9 KB
onicon_smart_turbine_meter	Setup Information	1 KB	No	3 KB
SmartTurbineMeter_1.2.3	Windows Installer Package	3,369 KB	No	3,829 KB

Once this .msi file is opened, please follow the on-screen prompts to complete the installation of the program on your computer.

1.2 INSTALLING THE CONFIGURATION UTILITY (CONTINUED)

1. Click "Next" to continue the installation.

2. Accept the terms and click "Next" to accept the agreement
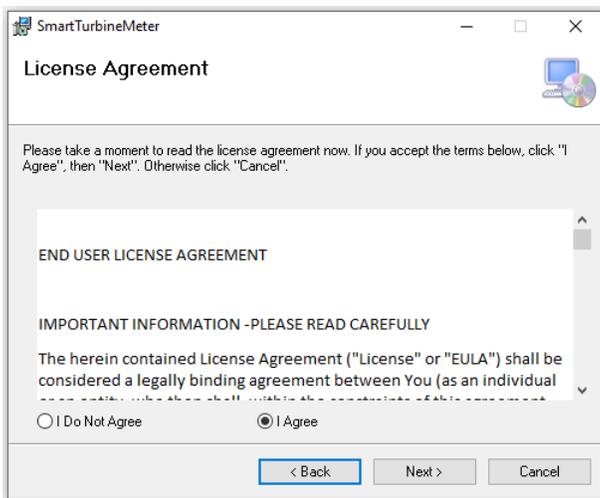
1.2 INSTALLING THE CONFIGURATION UTILITY (CONTINUED)

3.   Select the installation location and click "Next."

4.   Click "Next" to proceed with the installation. The installation may take a few minutes, and once complete, a new screen will appear.

1.2 INSTALLING THE CONFIGURATION UTILITY (CONTINUED)

5. Click "Close" to close the installation wizard.

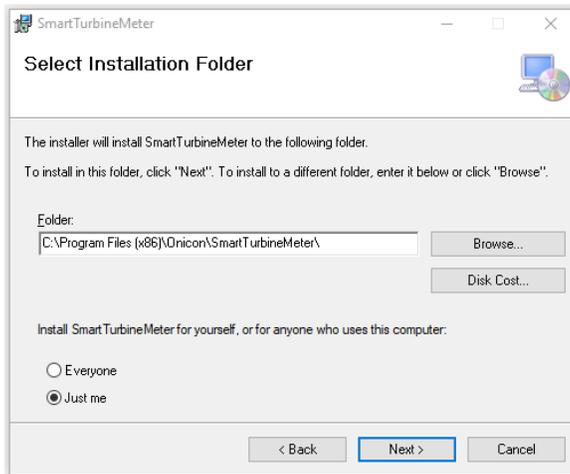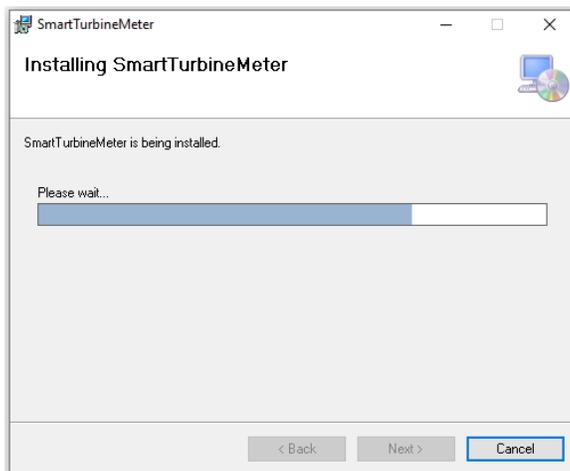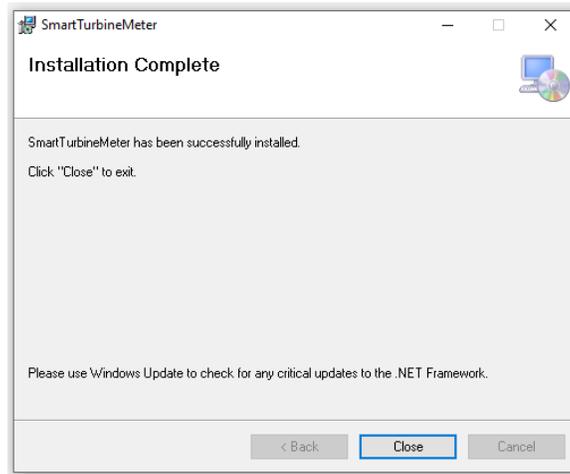You will now have an ONICON "Smart Turbine Meter" Icon on your desktop which can be used to quickly open the utility. You can also locate the configuration utility in the file location specified during the installation process as shown in the installation sequence.
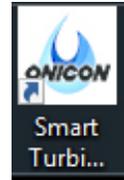
1.3 UPDATING THE CONFIGURATION UTILITY

If at any point you wish to update the Configuration Utility to a newer version, please use the following process.

1. Acquire the newest version of the software from ONICON - **https://www.onicon.com/products/f1000-series-turbine-flow-meters**.

2. Uninstall any current versions of the Configuration Utility from your computer. Use your computer's Add/Remove Programs feature in the Control Panel to remove the Configurator.

    The software will be listed with the name "SmartTurbineMeter" and Publisher "ONICON" in the program list.
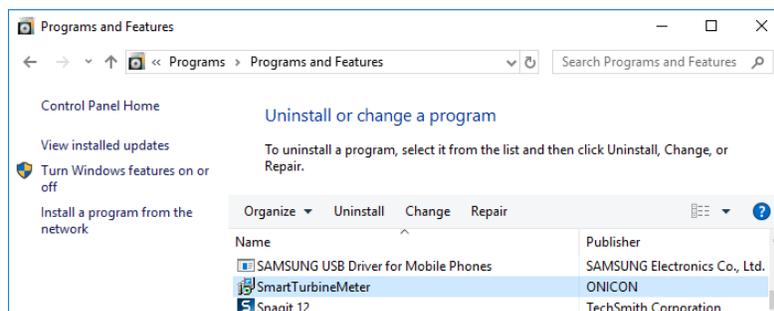
3. Install the Configuration Utility per the procedure in the "Installing the Configuration Utility" section above.

SECTION 2.0 DRIVER INSTALLATION AND USB CABLE

2.1 DRIVER INSTALLATION

At the end of the attempt to automatically install the driver, you will receive either a "Successful" or "Unsuccessful" message. If you received a "Successful" installation, you are ready to proceed to the next section of the manual, "How to Use the Configuration Utility."

If the automatic driver installation was "Unsuccessful", the steps below outline the procedure to manually install the driver for the turbine meter.

Open your Control Panel and access the Device Manager. Once in the Device Manager, open the "Other devices" tree, right-click on the "Turbine Meter," and select "Update Driver Software...":

In the "Update Driver Software" screen, click "Browse..." and select the folder for the Configuration Tool which was provided by ONICON. Make sure the "Include Subfolders" check box is enabled and click "Next".

Driver Location
Selection
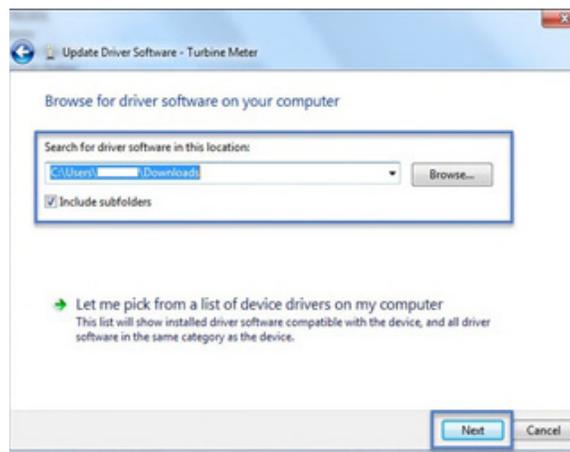
Once the location of the driver is specified, it will install. You will likely be asked by Windows Security to accept the installation, which you must do in order to proceed. Once the driver installation is complete, there will no longer be an error under the Turbine Meter Device in the Device Manager.

2.1 DRIVER INSTALLATION (CONTINUED)

1. Driver Installing
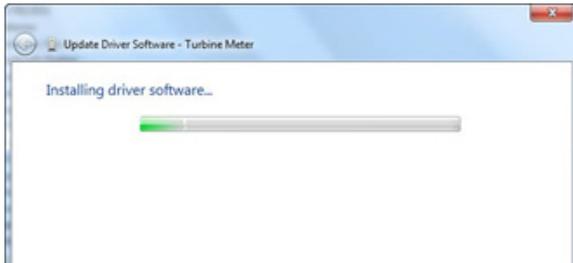
2. Accept Installation

3. Driver Installation Successful
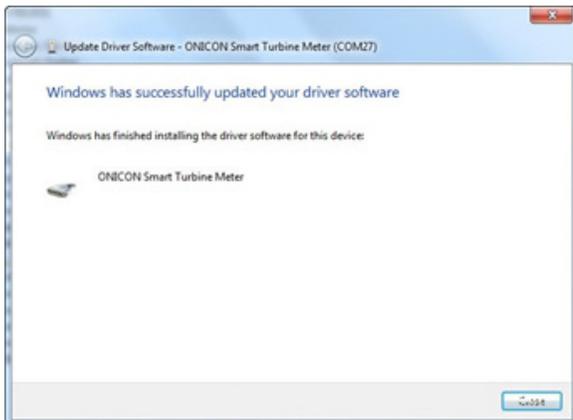
4. "ONICON Smart Turbine Meter" is now installed and assigned a COM port number
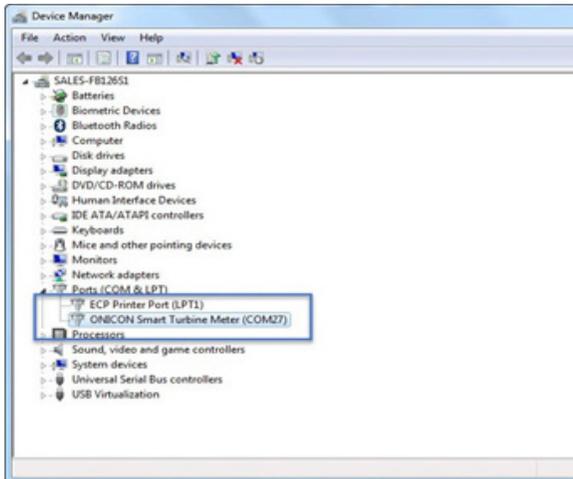
2.1 DRIVER INSTALLATION (CONTINUED)

This completes the process to get your computer ready to run the Configuration Utility and interface with the turbine flow meter.

Please do not hesitate to contact ONICON Technical Support at 727-447-6140, or email at service@onicon.com, if problems persist with the driver installation.

2.2 USB CABLE CONNECTION TO THE TURBINE FLOW METER

The physical interface to the turbine flow meter is a USB Micro Type B Jack. Most computers feature one or more USB Type A Jacks. If your computer has a USB Type A Jack, utilize an "A Male to Micro B Male" cable to connect to the meter.

A Male to Micro B Male USB Cable

The maximum allowable USB cable length, before a powered hub or extender would need to be utilized, is 5 meters, or 16 feet 5 inches.

The USB Micro connection is made at the female connector inside the meter's electronics enclosure.

WARNING
The micro USB connection inside the turbine meter enclosure can be easily damaged if the cable is not plugged straight into the connector – such that a moment force is applied to the connector. Please be sure the cable is only pushed straight in or pulled straight out.

SECTION 3.0 HOW TO USE THE CONFIGURATION UTILITY

3.1 OPENING THE SOFTWARE

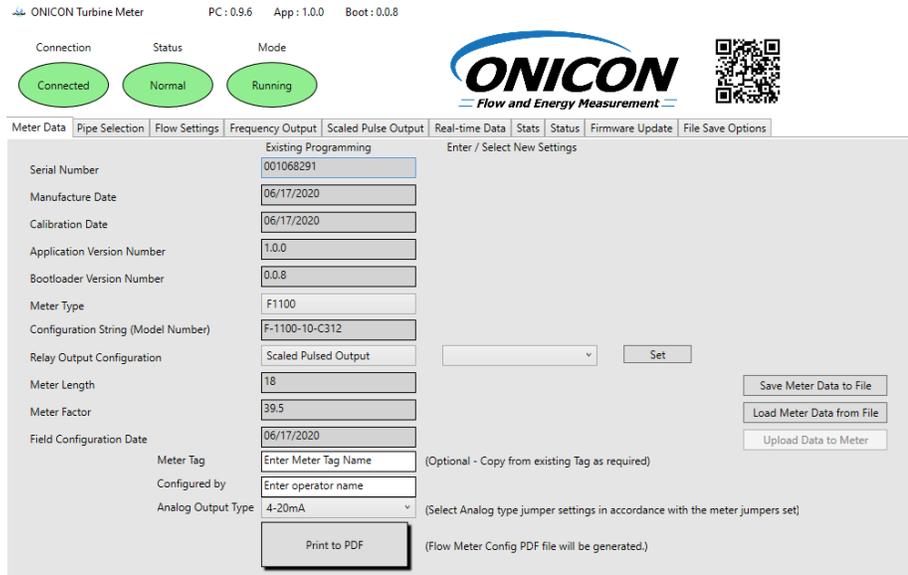Open the "Smart Turbine Meter" software by double-clicking the logo on your computer's desktop or through the .msi located in the folder the program was installed in earlier.

The "ONICON FLOW AND ENERGY MEASUREMENT" splash screen will appear followed by the Configuration Utility opening on the Meter Data tab.

First screen which appears after opening the Configurator

3.2 CONNECTION, STATUS, AND MODE INDICATORS

Three indicators are available on the top portion of the configurator window. Their color and text will change depending on the current operating status of the meter.

A QR code is also available which will link your cellphone to ONICON's website.

3.2.1 CONNECTION INDICATOR

This indicator provides information about the current status of the hardware connection to the turbine meter. Three variations exist.

"Connected" text with green background
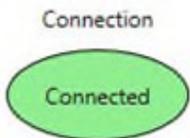
This status is telling the user that the meter is connected and there are no errors.

"Initializing" text with yellow background
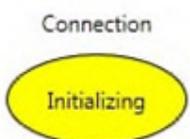
This status appears when the USB cable is re-connected after being disconnected. Once the initialization process ends, either a "connected" or "missing" status will appear.

3.2.1 CONNECTION INDICATOR (CONTINUED)

"Missing" text with red background

This status appears when the USB cable to the turbine meter is disconnected. If the cable is connected and the fault is still present, check the Device Manager as explained in the "Driver Installation" section, and make sure there is no error with the port used for the turbine meter connection. Re-install the driver if there is a fault.

If there is no error with the port in the Device Manager, close the Configuration Utility, remove and re-install the USB cable, and then re-open the Configuration Utility. The meter should initialize and connect normally.

3.2.2 STATUS INDICATOR

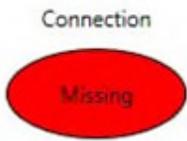This indicator provides information about the current status of the alarms and warnings in the "Status" tab.

"Normal" text with green background
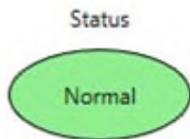
This status indicates that the meter does not have any warnings or alarms.

"ALARM" text with flashing orange background
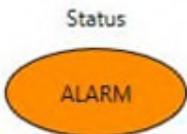
This status indicates that an alarm is present on the meter. If you open the "Status" tab, you will find a complete list of the current alarms.

"Warning" text with flashing yellow background
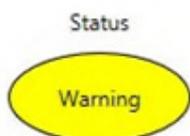
This status indicates that a warning is present on the meter. If you open the "Status" tab, you will find a complete list of the current warnings. More information about the different warnings and their meanings can be found in the "Status" section on pages 30-32.

3.2.3 MODE INDICATOR
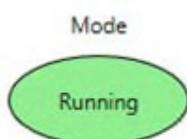
The mode indicator notifies the user if the meter is in "Running" mode or "Calibration" mode. "Calibration" mode is only used by ONICON during a factory calibration. If you receive a meter which states the mode is "Calibration," please contact ONICON immediately.

3.3 PROGRAMMING/INFORMATIONAL TABS

The various diagnostic information and configuration options available with the Configurator Utility are separated into different sections called tabs. Each tab has a different purpose. For example, the "Pipe Selection" tab allows the user to set the pipe size and material that the meter's output is configured for. The "Real-time Data" tab allows the user to see the current status of the turbine rotation as well as the output signals.

Each tab and the information available within each tab are discussed in the following sections.

3.3.1 METER DATA

The meter data tab provides general information about the meter like its serial number, manufactured/calibrated date, meter type, and date it was last programmed.
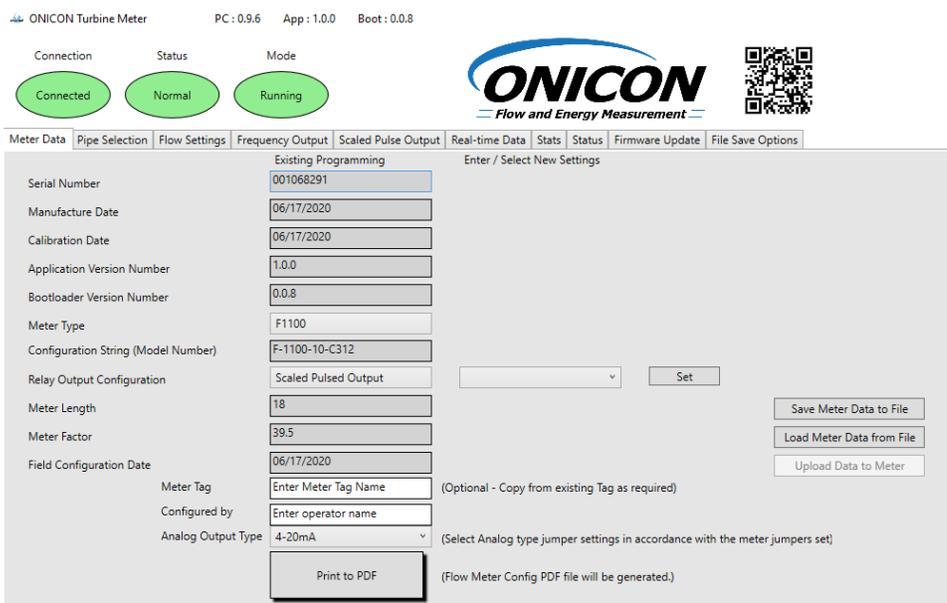
Meter Data Tab

Serial Number (Read Only)

The serial number of the meter is a unique identifier. When contacting ONICON for support or additional questions regarding a meter, please be ready to provide this serial number. If your meter shipped calibrated to a specific pipe size and output range, ONICON can retrieve this original calibration data with the help of the serial number.

Manufacture Date (Read Only)

The date that your meter was manufactured at ONICON. This date may not match the calibration date if the meter has been returned to ONICON for recalibration service after the original manufacture date.

Calibration Date (Read Only)

Date that your meter was last calibrated at ONICON. This date may not match the manufacture date if the meter has been returned to ONICON for recalibration service after the original manufacture date.

Application Version Number (Read Only)

This is the version number of the ONICON Configuration Utility. This number is also available in the program window. ONICON may ask for this number if you are experiencing problems with the utility.

Bootloader Version Number (Read Only)

This is the version number of the ONICON Turbine Flow Meter firmware. This number is also available on the window of the program. ONICON may ask for this number if you are experiencing problems with the utility or turbine meter.

Meter Type (Read Only)

The meter type defines the number of turbines and whether your meter is an insertion/inline type.
  • F-1100 – Single Turbine Insertion Flow Meter
  • F-1200 – Dual Turbine Insertion Flow Meter
  • F-1101 and F-1134 – Single Turbine Inline Flow Meter

The number of turbines and the body type directly affect the calibration, and whether the pipe data needs to be entered. For these reasons, the meter type is set at the factory and is read-only.

Configuration String (Model Number) (Read Only)

The 11-digit meter model number is the identification number for the meter. Please have this number along with the Serial Number available when contacting ONICON.

Relay Output Configuration (Editable)

The relay output can be configured as:
  • Not Used – Select this option if you do not want to use the scaled or alarm output.
  • Scaled Pulsed Output – Select this option if you want to configure the relay output as a pulse output for volume totalization (Example: 1 pulse = 10 gallons).
  • Alarm Output – Select this option if you want to configure the relay output as an alarm contact. The relay contact changes state depending on the alarm status. The alarm status is indicated near the top of the Configurator's window, or also viewable on the "Status" tab. An alarm output causes the relay contact to close. No alarm causes the alarm contact to be open.

Meter Length (Read Only)

The meter length is the distance between the bottom of the meter's black electronics enclosure and the end of the meter. This distance is used in the calculation of the insertion depth in the "Pipe Selection" tab. This length is invalid when the meter type is set for "F-1101 and F-1134."

Meter Factor (Read Only)

The meter factor has units of pulses per gallon and is the response characteristic of the turbine(s). This value is measured when the meter is wet calibrated at ONICON.

Field Configuration Date (Read Only)

This is the date the meter was last modified via the Configuration Utility.

- Meter Tag (Editable) – Enter meter tag name. The tag can be found on the meter
- Configured By (Editable) – Enter operator name.
- Analog Output Type (Editable) – Select analog type jumper setting in accordance with the meter jumpers set.

Print to PDF

This function will create an electronic copy of the Flow Meter Configuration and save to the drive. When "Print to PDF" button selected, a new "Save Dialog" window will be opened. Select location and change file name as needed.
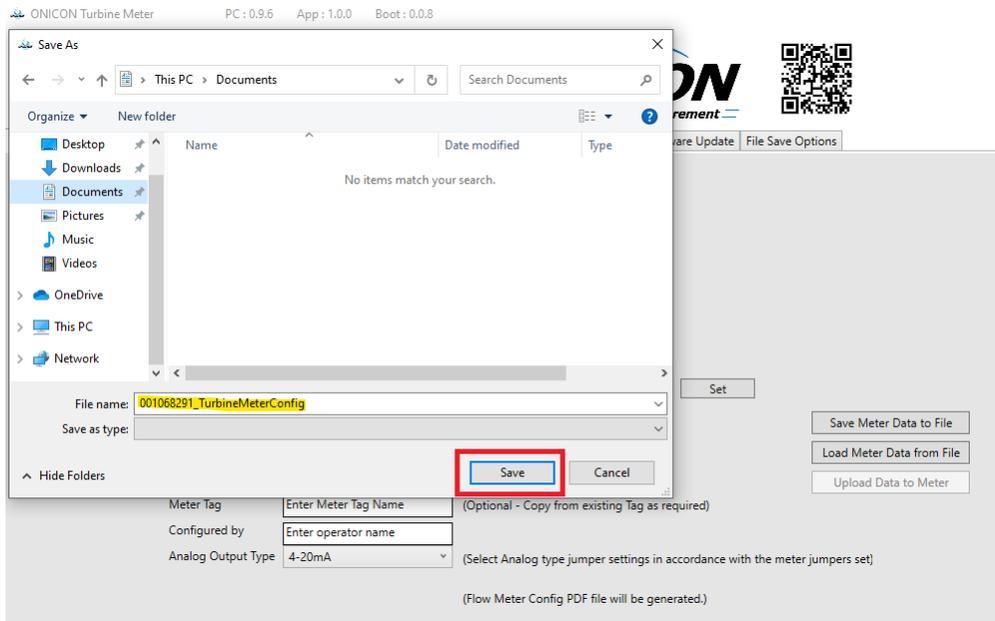
Print to PDF (continued)

After clicking Save, the pop-up window will be opened for printing dialog. Hit OK to print or Cancel if the printer is not available. Either option will give you the PDF file from the previous step.
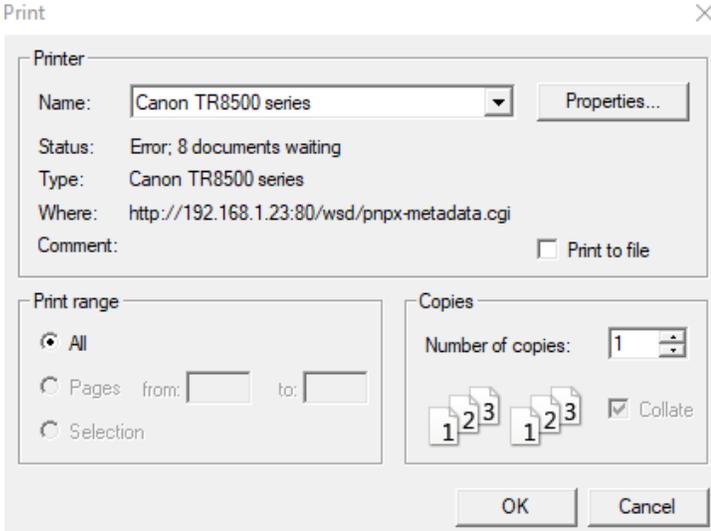
FLOW METER CONFIGURATION		
METER TAG	Enter Meter Tag Name	
MODEL NUMBER	F-1100-10-C312	
SERIAL NUMBER	001068291	
PIPE DATA	Carbon Steel Schedule 40 6 inch (DN 150)	
METER GAUGE LENGTH	15.1250 Inches	
ANALOG OUTPUT RANGE	1800 GPM	
SCALED PULSE OUTPUT VALUE	1000 GALLON	
CONFIGURED METER FACTOR	39.5 PPG	
FACTORY CALIBRATION DATE	06/17/2020	
TAG PRINT DATE	Wednesday, June 17, 2020	
FIELD CONFIGURED BY	Enter operator name	

ONICON Incorporated 11451 Belcher Road South Largo, Florida 33773 +1 (727) 447-6140

Sample PDF output

Save Meter Data to File

This function saves the current Flow Meter Configuration parameters into a file on the local computer. Please note a Smart Turbine meter needs to be successfully connected to the utility program. The file can be emailed to ONICON for trouble-shooting.

Load Meter Data to File

This function uses an existing file name on the local computer to load a previously saved Flow Meter Configuration in the utility. This only loads the data to the utility and does not make any changes to the meter. The file can be one that was created by the same user or can be one emailed from the factory or our service department.

Upload Data to Meter

This function takes the data that was load in the previous step and its currently in the utility and writes it to the meter. This will overwrite the Flow Meter Configuration.

IMPORTANT NOTE
Save/ Load Meter Data to File and Upload Data to Meter functions only available for firmware version 1.0.0 and up.

3.3.2 PIPE SELECTION

The pipe selection tab provides the means to modify the pipe size and material the output of the turbine meter will be scaled to.

The accuracy of the volumetric output, whether it is volume rate (4-20mA) or volume total (scaled pulse), is dependent on an accurate pipe ID being programmed in the meter:

$$Volumetric\ Flow\ Output = Average\ Velocity \times Internal\ Pipe\ Area$$
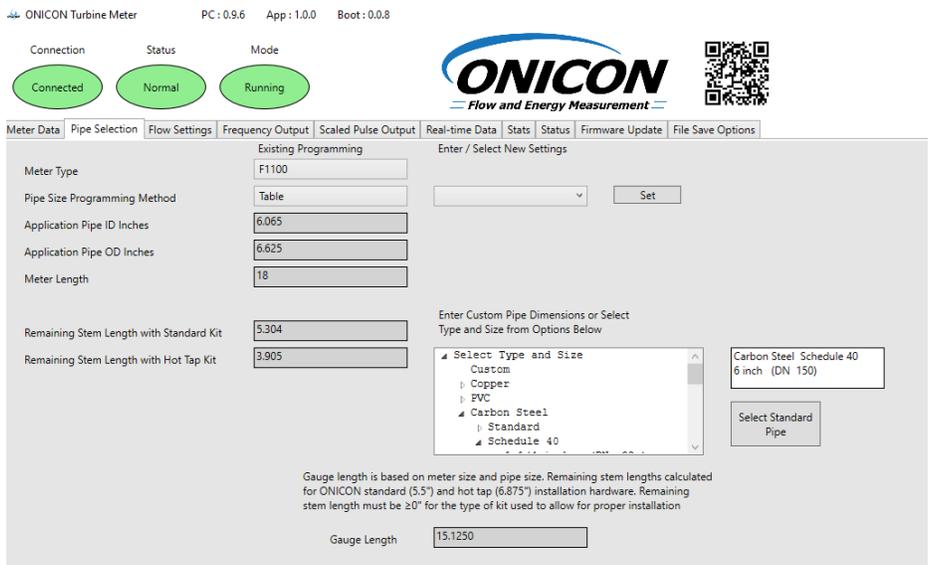
Pipe Selection Tab

Meter Type (Read Only)

The meter type defines the number of turbines and whether your meter is an insertion/inline type.

- F-1100 – Single Turbine Insertion Flow Meter
- F-1200 – Dual Turbine Insertion Flow Meter
- F-1101 and F-1134 – Single Turbine Inline Flow Meter

The number of turbines and the body type directly affect the calibration, and whether the pipe data needs to be entered. For these reasons, the meter type is set at the factory and is read-only.

If "F-1101 and F-1134" is the meter type, then there will be no further information within the Pipe Selection tab.

Pipe Size Programming Method (Editable)

The programming method defines how the pipe information is input by the user.
Two options are available:

- Table – The application pipe ID, OD, and remaining stem is automatically calculated based on the pipe material, size, and schedule selected from the table on this page.

IMPORTANT NOTE
The "SET" button must be pressed after selecting "Table".
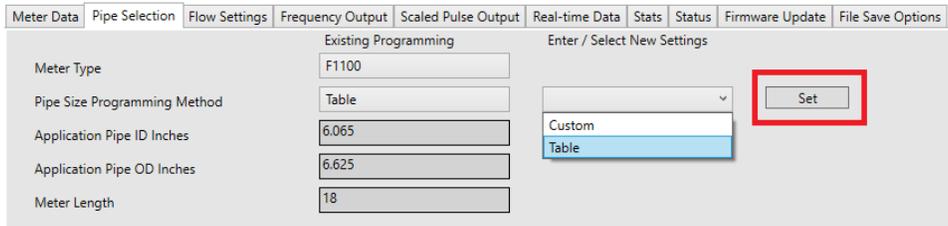
Location of "Set" button

To select a pipe size from the table, open the tree to the specific pipe material, schedule, and size that your meter will be installed in. Click on that pipe size, and then press the "Select Standard Pipe" button.

Once you select the pipe size, the ID, OD, remaining stem lengths, and gauge length will auto-fill with the correct dimensions. The white box above the "Select Standard Pipe" button will auto-fill with the description of the selected pipe:
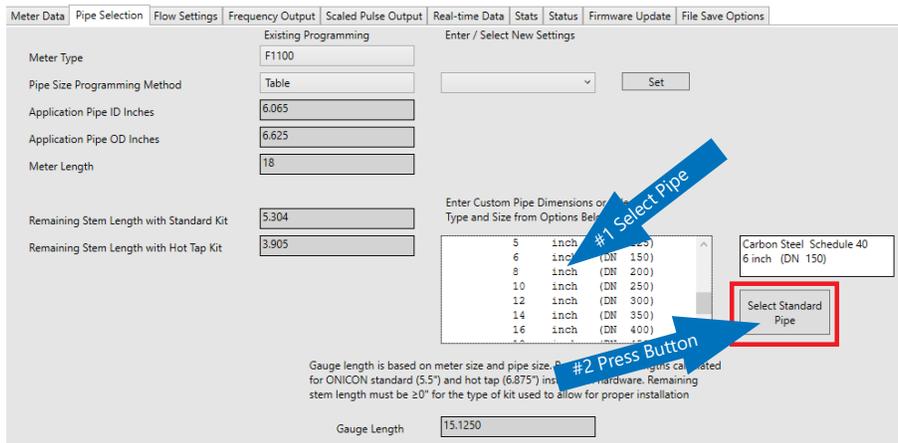
Selecting pipe size and confirming via "Select Standard Pipe" button

- Custom – By selecting custom, two new windows will appear which allow the user to manually enter a pipe ID and pipe OD. A warning status will be triggered if the ID > OD. The units of measurement for the ID and OD are inches.

Pipe Size Programming Method (Editable) (continued)

Like it was for a table entry of the pipe size, the remaining stem dimensions as well as the gauge length will auto-fill after the ID and OD have been configured.

Location of "Set" buttons for Pipe ID and Pipe OD.

IMPORTANT NOTE
The "SET" button must be pressed after entering a pipe ID and OD.

Meter Length (Read Only)

The meter length is the distance between the bottom of the meter's black electronics enclosure and the end of the meter. This distance is used in the calculation of the insertion depth in the "Pipe Selection" tab.
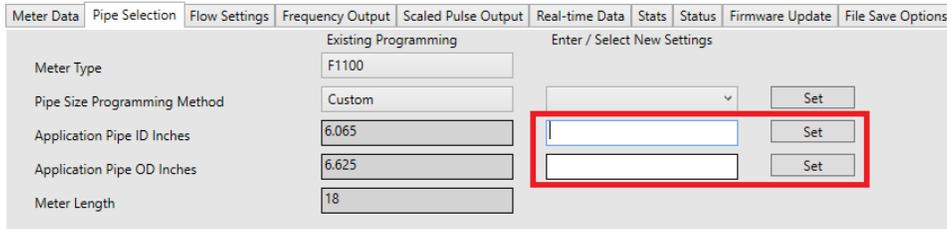
Remaining Stem Length with Installation Hardware (Read Only)

This length is a calculated value of how much insert-able length a meter has left, based on the calculated Gauge Length (proper insertion depth). The remaining stem is a function of the meter length, the pipe ID and OD, and the type of installation kit.

- Dry Tap Installation Hardware is a ball valve assembly designed to be installed during new construction or when the pipe was drained. An example of a "Dry Tap" kit is an ONICON INSTL0001-FMD for carbon steel pipe. The valve assembly height assumed for this calculation is 5.5 inches.

IMPORTANT NOTE
This calculated remaining stem should always be a positive value. If it is negative, that means the meter cannot reach the proper insertion depth with a valve assembly that is 5.5" or taller. If the value is negative, the field will be highlighted yellow, warning you of this.

If you have provided your own valve assembly, calculate the remaining stem with the following equation:

Customer Remaining Stem =
Remaining Stem with Dry Tap Kit - (Customer Valve Assembly Height-5.5)

- Hot Tap Installation Hardware is a ball valve assembly designed to be installed after the pipe was filled, allowing a wet tap drill to cut the pipe without draining it first. An example is an ONICON INSTL0002-FMH for carbon steel pipe. The valve assembly height assumed for this calculation is 6.875.

Remaining Stem Length with Installation Hardware (Read Only) (continued)

IMPORTANT NOTE
This calculated remaining stem should always be positive. If it is negative, then that means that the meter cannot reach the proper insertion depth with a valve assembly that is 6.875" or taller. If the value is negative, the field will be highlighted yellow, warning you of this.

If you have provided your own valve assembly, calculate the remaining stem with the following equation:

Customer Remaining Stem = Remaining Stem with Hot Tap Kit-(Customer Valve Assembly Height-6.875)

The customer valve assembly height is the distance from the outside of the pipe to the top of the 1" outlet that the meter is inserted through:
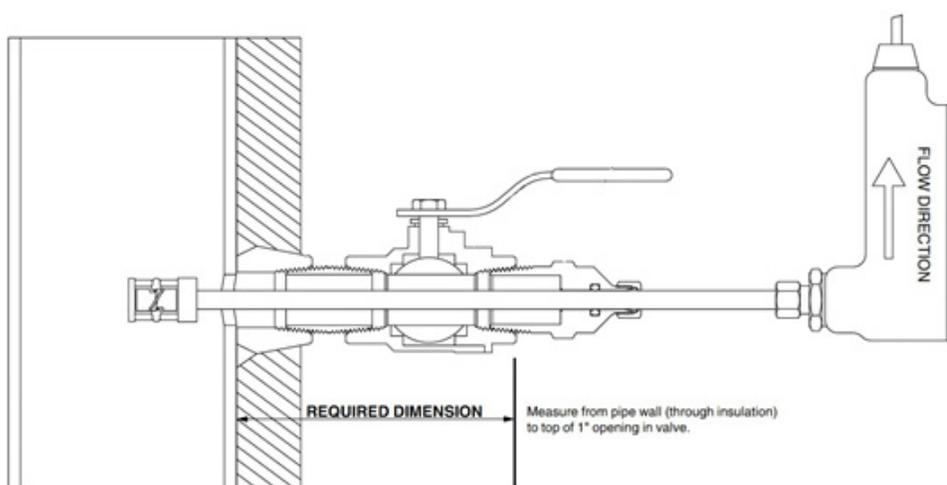
Valve assembly height "Required Dimension" from above

Gauge Length (Read Only)

The gauge length is a calculated value, based on the meter length, pipe ID, and pipe OD. It provides the user with the dimension needed to correctly set the insertion depth of the meter for a specific meter length and pipe size.

Gauge Length (Read Only) (continued)

When inserting the meter into the pipe, push the meter in until the distance from the pipe wall to the bottom of the meter's black electronics enclosure matches the gauge length:
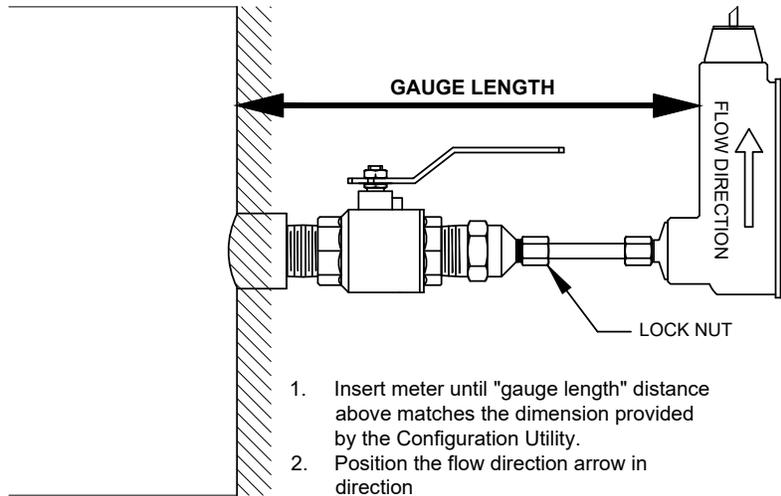
3.3.3 FLOW SETTINGS

The flow settings tab contains configuration parameters which allow the user to set the flow rate and scaled output units, analog output scale, and meter damping.
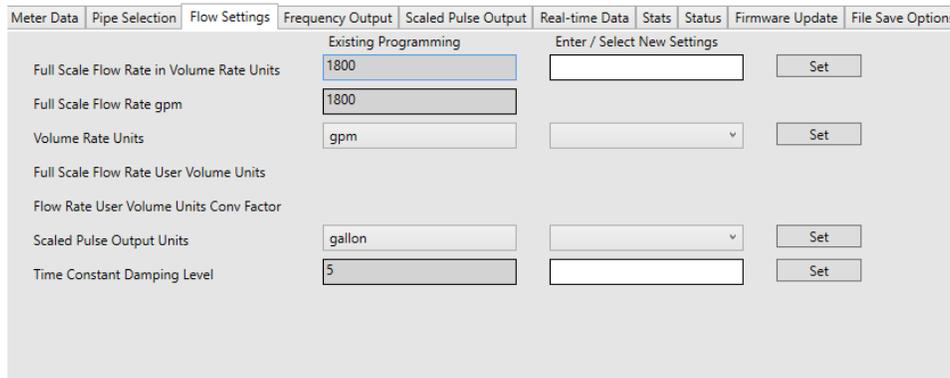
Flow Setting Tab

Full Scale Flow Rate in Volume Rate Units (Editable)

This parameter sets the value for the 20mA/10V/5V analog output full scale, if the meter has an analog output. The units of measurement will match that set in the "Volume Rate Units" parameter also on this tab.

After entering the value on this page, press the "Set" button to permanently program the meter with this output scale.

ONICON recommends that the analog output range is set to 1.25 times larger than the maximum realistic flow rate which could occur in the system.

Full Scale Flow Rate gpm (Read Only)

This parameter shows the gpm equivalent of the "Full Scale Flow Rate in Volume Rate Units." If the units of measurement for both parameters is gpm, then they will be identical.

Volume Rate Units (Editable)

This parameter allows the user to set the units of measurement for the analog output, if the meter has one.

After selecting the desired units, press the "Set" button to permanently program the meter with these flow rate units.

There are also three selections for custom units of measurement. If one of these selections is made, the "Flow Settings" tab will populate with two new functions described below.

Full Scale Flow Rate User Volume Units (Read Only or Editable)

If you have already selected volume rate units which weren't "user defined," then this parameter will not be editable. If "user defined" volume rate units were selected, this parameter is used to describe the units of measurement you will be using.

In the example below, "5 Gal Bucket per Hour" was the entered unit. Press "Set" after entering your description to permanently set this value:

Flow Rate User Volume Units Conv Factor (Read Only or Editable)

If you have selected volume rate units which weren't "user defined," then this parameter will not be editable. If "user defined" volume rate units were selected, this parameter is used to describe conversion factor between gpm and your custom unit of measurement.

In the example below, the user defined volume rate had a per hour time frame. The conversion factor was set to 500. The full-scale flow rate in user units was set to 5,000,000. The number is converted to gpm as follows:

$$\text{Full Scale Equivalent (gpm)} = \frac{\text{Full Scale in Defined (units per hour)}}{60 \text{ x Conversion Factor}}$$

Flow Rate User Volume Units Conv Factor (Read Only or Editable) (continued)

For user defined units per minute and per second:

$$Full\ Scale\ Equivalent\ (gpm) = \frac{Full\ Scale\ in\ User\ Defined\ (units\ per\ minute)}{Conversion\ Factor}$$

$$Full\ Scale\ Equivalent\ (gpm) = \frac{60\ x\ Full\ Scale\ in\ User\ Defined\ (units\ per\ second)}{Conversion\ Factor}$$

Scaled Pulse Output Units (Editable)

This parameter sets the units of measurement for the scaled output (volume totalization pulse). If "user defined unit" was selected, the scaled output will be subject to the same conversion factor programmed at the "Flow Rate User Volume Units Conv Factor" parameter.

After selecting the scaled pulse units, press the "Set" button to accept the change.

Time Constant Damping Level (Editable)

This parameter sets the damping level on the meter's analog output. The damping is an algorithm used to smooth the response of the meter's analog output over a period of time. The default is 5 seconds. The allowable range is 1 to 60 seconds. ONICON recommends leaving this value at the default value of 5.

If you change this value, press the "Set" button to accept the change.

3.3.4 FREQUENCY OUTPUT

This tab allows the user to change the settings associated with the frequency output on the turbine meter. The frequency output is available on every version of the turbine meter. The frequency output is typically only used with an ONICON display or BTU meter as a digital input for flow rate and totalization, but it can also be used for diagnostics by measuring the speed (Hz) of the output with a multimeter.

Full Scale Frequency Output Pulses Per Second (Editable)

This parameter sets full scale Hz on the frequency output. The full scale in Hz will match the full scale volume rate.

Example: Setting the full-scale frequency to 200 Hz will cause the meter to output 200 Hz on the frequency output if the flow meter is measuring flow equal to full scale flow rate in the "Flow Settings" tab.

Full Scale Flow Rate <units> (Read Only)

This parameter is a duplicate of the "Full Scale Flow Rate in Volume Rate Units" parameter from the "Flow Settings" tab. It is meant to show you what is already programmed in the meter, as a reference, so that you don't need to return to the "Flow Settings" tab to remind yourself of the setting.

The <units> will populate with whatever flow rate unit was selected on the "Flow Settings" tab.

Full Scale Flow Rate gpm (Read Only)

This parameter is a duplicate of the "Full Scale Flow Rate gpm" parameter from the "Flow Settings" tab. It is meant to show you what is already programmed in the meter, as a reference, so that you don't need to return to the "Flow Settings" tab to remind yourself of the setting.

Scaled Frequency Factor pulses / <units> (Read Only)

This parameter is a calculated value, and it provides the scaling factor for measuring the volume rate from the turbine meter's frequency output. The <units> was selected in the "Flow Settings" tab. If custom units were selected, the conversion factor was already taken into account when the scale factor was calculated.

How to calculate flow rate from the frequency output scale factor:

$$\text{Measured Flow Rate (Volume/Minute)} = \frac{\text{Measured Hz x 60}}{\text{Scaled Frequency Factor}}$$

$$\text{Measured Flow Rate (Volume/Second)} = \frac{\text{Measured Hz}}{\text{Scaled Frequency Factor}}$$

$$\text{Measured Flow Rate (Volume/Hour)} = \frac{\text{Measured Hz x 3600}}{\text{Scaled Frequency Factor}}$$

Scaled Frequency Factor pulses / gallon (Read Only)

This parameter is a calculated value, and it provides the scaling factor for measuring the volume rate from the turbine meter's frequency output. The units of measurement are pulses per gallon (ppg). If gpm units were selected in the "Flow Settings" tab, this value will be a duplicate of the previous parameter.

How to calculate flow rate from the frequency output scale factor in ppg:

$$\text{Measured Flow Rate (Gallon/Minute)} = \frac{\text{Measured Hz x 60}}{\text{Scaled Frequency Factor (ppg)}}$$

$$\text{Measured Flow Rate (Gallon/Second)} = \frac{\text{Measured Hz}}{\text{Scaled Frequency Factor (ppg)}}$$

$$\text{Measured Flow Rate (Gallon/Hour)} = \frac{\text{Measured Hz x 3600}}{\text{Scaled Frequency Factor (ppg)}}$$

IMPORTANT NOTE
The ppg value is referred to as the "Meter Factor" and is a very important value when the turbine meter is used along with a System-10 BTU meter, System-20 BTU meter or D-100/D-1200 flow display. When programming one of these peripherals to be used with an Turbine Flow Meter, you must be prepared to enter this value so that the BTU Meter/Display can properly convert frequency pulses to flow rate and volume.

3.3.5 SCALED PULSE OUTPUT

The scaled pulse output tab provides parameters for configuring the units of measurement and scaling of the relay output. The relay output is available on all versions of the Turbine Flow Meter. The "Relay Output Configuration" in the "Meter Data" tab must be configured as a "Scaled Pulse Output" for this tab to be visible.
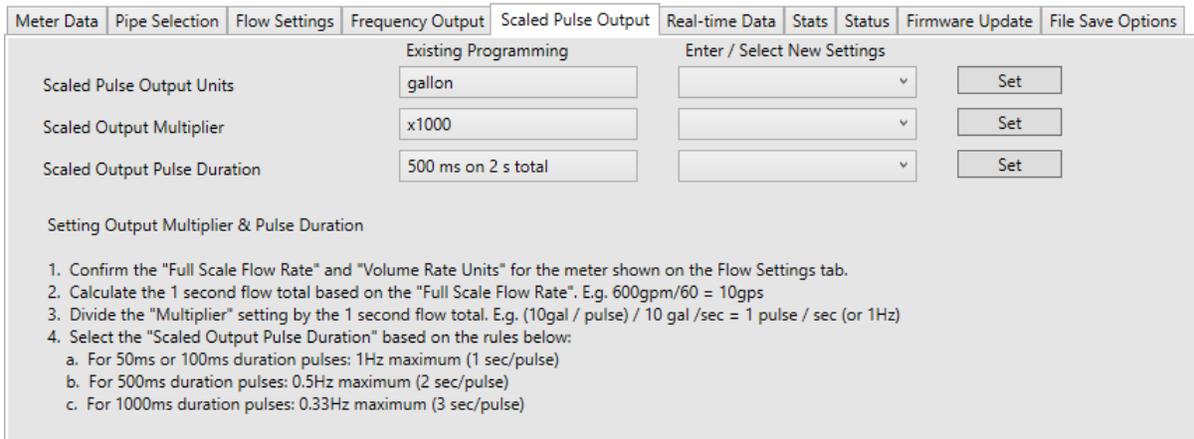
Scaled Pulse Output tab

Scaled Pulse Output Units (Editable)

This parameter allows the user to set the units of measurement for the scaled output. This parameter is a duplicate of the parameter with the same name in the "Flow Settings" tab.

After selecting the units of measurement, press the "Set" button to accept your changes.

Scaled Output Multiplier (Editable)

This parameter allows the user to set the volume that each pulse is worth. The available selections are:
 1, 10, 100, 1000, or 10000 units of volume per pulse.

Press the "Set" button to accept any changes which are made.

The pulse volume along with the pulse duration determine when the meter will enter a "pule overrun" alarm. A pulse overrun occurs when the meter is attempting to provide a scaled pulse faster than the duration allows. Please follow the on-screen instructions for determining if your pulse scaling and duration settings could cause a pulse overrun.

Scaled Output Pulse Duration (Editable)

This parameter configures the pulse duration, or the time that the relay output of the meter is in a closed state, when the scaled pulse output occurs.

There are four settings available:

- "50 ms on 1 s total" – When a scaled pulse occurs, the duration on the relay closure will be 50ms. A scaled pulse cannot occur more than once per second (1 Hz).

- "100 ms on 1 s total" –When a scaled pulse occurs, the duration on the relay closure will be 100ms. A scaled pulse cannot occur more than once per second (1 Hz).

- "500 ms on 2 s total" –When a scaled pulse occurs, the duration on the relay closure will be 500ms. A scaled pulse cannot occur more than once per 2 seconds (1/2 Hz).

- "1000ms on 3s total" – When a scaled pulse occurs, the duration on the relay closure will be 1000ms (1 second). A scaled pulse cannot occur more than once per 3 seconds (1/3 Hz).

The pulse volume along with the pulse duration determine when the meter will enter a "pulse overrun" alarm. A pulse overrun occurs when the meter is attempting to provide a scaled pulse faster than the duration allows. Please follow the on-screen instructions for determining if your pulse scaling and duration settings could cause a pulse overrun.

3.3.6 ROTATION TEST

The rotation test tab allows the user to configure the settings which control the rotation test alarm output. The turbine rotation test is only used with dual turbine meters. Its function is to detect if the top and bottom turbines are not spinning at similar speeds, which would indicate possible damage or debris in the turbines. The meter can be set to continue operating normally if there's an alarm or stop producing an output signal in addition to supplying an alarm to the Configuration Utility. Also, the relay output on the meter can be set to change state if an alarm was present. To enable the relay to close when there is an alarm, enable this feature in the "Meter Data" tab.

If this alarm is enabled and present on your meter, check the "Real-time Data" tab to determine which turbine is not spinning as fast as the other. Then, the meter should be removed, and the turbines should be inspected for damage or debris. Be sure the meter is installed at the correct depth and orientation if this alarm is present at initial installation.
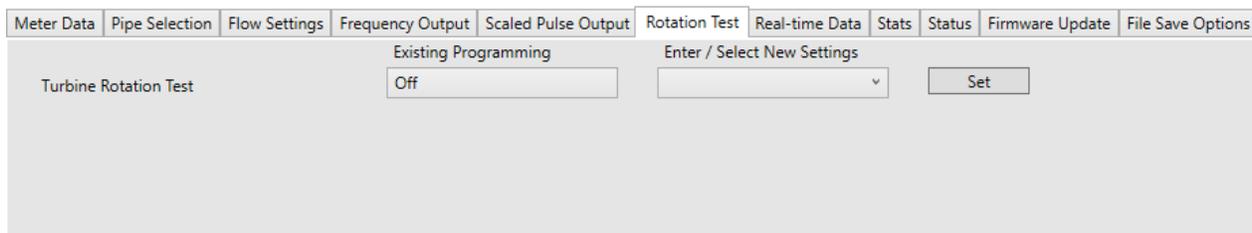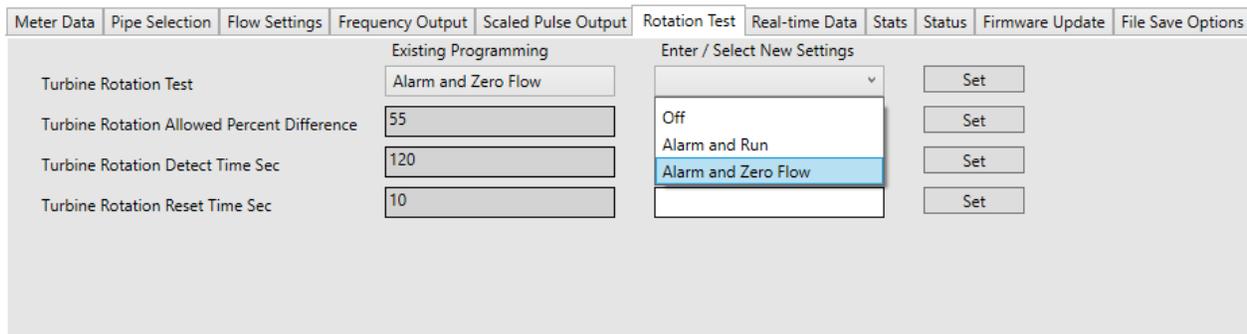

Rotation Test tab

Turbine Rotation Test (Editable)

This parameter defines if the turbine rotation test is active, and what happens to the operation of the meter if the test determines a problem with the turbines. The Configurator provides the following options:

- Off – The turbine rotation test is disabled.
- Alarm and Run – The turbine rotation test will be active in the background. If a problem is detected, the relay output will close (if activated in the "Meter Data" tab) and an alarm will be present in the "Status" tab. The meter will continue to provide a frequency, scaled, and analog output even though it is likely inaccurate because of a turbine problem.
- Alarm and Zero Flow - The turbine rotation test will be active in the background. If a problem is detected, the relay output will close (if activated in the "Meter Data" tab) and an alarm will be present in the "Status" tab. The meter will cease providing a flow rate signal on the frequency, scaled, and analog outputs.

After changing this setting, press the "Set" button to accept the change.

Turbine Rotation Test enable/disable options

Turbine Rotation Allowed Percent Difference (Editable)

This parameter sets the allowed difference in turbine rotation speed before an alarm is enabled. The default value is 55.

Example with "Allowed Percent Difference" set at 55:

- The "Status" tab reports that the top turbine frequency is 60 Hz, while the bottom turbine is 40 Hz. The percent difference in rotation is 33.33%. Turbine rotation alarm is not triggered.

- The "Status" tab reports that the top turbine frequency is 60 Hz, while the bottom turbine is 25 Hz. The percent difference in rotation is 58.33%. Turbine rotation alarm has the potential to be triggered (See "Turbine Rotation Detect Time Sec" on next page).

After the parameter is changed, press "Set" to confirm the changes.

Turbine Rotation Detect Time Sec (Editable)

This parameter set the amount of time that the percent difference in turbine rotation must occur before an alarm is triggered. The default value is 120 sec. This gives the meter a buffer, before going into alarm, in case debris stopped the turbine momentarily.

Example with "Allowed Percent Difference" set at 55 and "Turbine Rotation Detect Time Sec" set at 120:

The "Status" tab reports that the top turbine frequency is 60 Hz, while the bottom turbine is 25 Hz. The percent difference in rotation is 58.33%. Turbine rotation alarm will be triggered after 120 seconds with the meter in this state. If the turbine rotation % difference falls below 55 before 120 seconds is reached, the 120 second counter will reset, and no alarm will trigger.

After the parameter is changed, press "Set" to confirm the changes.

Turbine Rotation Reset Time Sec (Editable)

This parameter sets the time required for the turbine rotation alarm to disable after a turbine rotation alarm has already been enabled. The default time is 10 seconds.

After the parameter is changed, press "Set" to confirm the changes.

3.3.7 REAL TIME DATA

The real time data tab displays data related to the meter's operation. The turbine speeds, output levels, and equivalent flow speed based on pipe size configuration.

The information on this tab is used to diagnose a turbine which is not spinning, and to provide a flow rate reading without having to measure an output signal level on the meter's wires with a multimeter.

Real-time Data tab

Average Pulses Per Second (Read Only)

This parameter reports the average turbine signal pulses per second (Hz). The average is the mean of the top and bottom turbine signal pulses per second.

Top Pulses Per Second (Read Only)

This parameter reports the top turbine signal pulses per second (Hz).

If the bottom turbine reports a Hz value, yet the top shows none, the turbine meter should be inspected for debris or damage.

Bottom Pulses Per Second (Read Only)

This parameter reports the bottom turbine signal pulses per second (Hz).

If the top turbine reports a Hz value, yet the top shows none, the turbine meter should be inspected for debris or damage.

Instantaneous Input Frequency Hz (Read Only)

This frequency is an un-scaled output and requires the meter's "Meter Factor" from the "Meter Data" tab in order to be converted to gpm.

Damped Input Frequency Hz (Read Only)

Identical to the instantaneous frequency, but after the damping level has been applied. The damping is configured in the "Flow Settings" tab.

Output Frequency Hz (Read Only)

This is the scaled frequency output available on the meter's green wire referenced to common (black). The output is scaled based on the Pipe ID and Pipe OD configured in the "Pipe Selection" tab.

Base Flow Rate gps (Read Only)

This value shows the flow rate in gallons per second. This is the flow rate of the meter based on the pipe ID programmed in the "Pipe Selection" tab.

Base Flow Rate gpm (Read Only)

This value shows the flow rate in gallons per minute. This is the flow rate of the meter based on the pipe ID programmed in the "Pipe Selection" tab.

Application Flow Rate <units/minute> (Read Only)

This value shows the flow rate in the user's designated volume unit per minute. This is the flow rate of the meter based on the pipe ID programmed in the "Pipe Selection" tab. If the meter is connected directly to a BMS via the analog output, or connected to an ONICON display or BTU meter, it should be verified that the reading in this parameter matches the BMS/ONICON display or BTU meter. It should also, be confirmed that the units of measurement match between turbine meter and BMS/ONICON display or BTU meter.

Local Velocity fps (Read Only)

Shows the flow velocity, in feet per second, that the average turbine pulses is equivalent to based on the pipe ID configured in the "Pipe Selection" tab. This velocity is not corrected for the amount of pipe area the turbine meter acquires from being inserted in the pipe.

Pipe Velocity fps (Read Only)

Shows the flow velocity, in feet per second, that the average turbine pulses is equivalent to based on the pipe ID configured in the "Pipe Selection" tab. This velocity is also corrected for the amount of pipe area the turbine meter acquires from being inserted in the pipe to the "Gauge Length" position.

3.3.8 STATISTICS

The statistics tab provides some of the data already appearing in the "Real-time Data" tab, and in addition provides historical information about the meter's operation.

Statistics tab

Flow Velocity fps (Read Only)

Shows the flow velocity, in feet per second, that the average turbine pulses is equivalent to based on the pipe ID configured in the "Pipe Selection" tab. This velocity is corrected for the amount of pipe area the turbine meter acquires from being inserted in the pipe to the "Gauge Length" position. Therefore, it is equivalent to the Pipe Velocity fps in the Real-time Data tab.

Total Scaled Pulses (Read Only)

This value shows the number of scaled pulses produced by the meter since operation.

This value is useful for troubleshooting the scaled output on the meter. If your BMS is not recording pulses, it should be verified that this value is not incrementing. If it is incrementing, then the problem lies in the wire connection, or the configuration of the BMS input. This value can only be reset at the ONICON factory during recalibration service.

Total Gallons (Read Only)

This value shows the number of gallons measured by the meter since operation.

User Defined Volume Total gallon (Resettable)

This value provides a user-resettable totalizer built-in the turbine flow meter.

By resetting the value to zero, and then verifying the reading after X minutes, this value can be used as a means to compare the flow meter's actual volume measurement over X period of time to a volume measurement acquired through the use of a BMS connected to the scaled output, or the volume reported by a local ONICON display or BTU meter.

Run Seconds (Read Only)

This value displays the length of the time the meter has been operational in seconds.

Run Hours (Read Only)

This value displays the length of time the meter has been operational in hours.

Average Pulses Per Second (Read Only)

This parameter reports the average turbine signal pulses per second (Hz). The average is the mean of the top and bottom turbine signal pulses per second.

Top Pulses Per Second (Read Only)

This parameter reports the top turbine signal pulses per second (Hz).

If the bottom turbine reports a Hz value, yet the top shows none, the turbine meter should be inspected for debris or damage.

Bottom Pulses Per Second (Read Only)

This parameter reports the bottom turbine signal pulses per second (Hz).

If the top turbine reports a Hz value, yet the bottom shows none, the turbine meter should be inspected for debris or damage.

Total Average Turbine Pulses (Read Only)

This value displays the total number of average turbine pulses measured since the turbine meter has been operational. The average turbine pulses is approximately equal to the mathematical mean of the top and bottom total pulses count.

Total Top Turbine Pulses (Read Only)

This value displays the total number of top turbine pulses measured since the meter has been operational. A top turbine pulse occurs when a blade of the top turbine passes the top electrode while the meter is submerged in a conductive medium.

Total Bottom Turbine Pulses (Read Only)

This value displays the total number of bottom turbine pulses measured since the meter has been operational. A bottom turbine pulse occurs when a blade of the bottom turbine passes the bottom electrode while the meter is submerged in a conductive medium.

Peak Average Turbine Pulses (Read Only)

This value displays the largest average turbine pulse speed (Hz) measured by the turbine meter at any point during its operation.

Peak Top Turbine Pulses (Read Only)

This value displays the largest top turbine pulse speed (Hz) measured by the turbine meter at any point during its operation.

Peak Bottom Turbine Pulses (Read Only)

This value displays the largest bottom turbine pulse speed (Hz) measured by the turbine meter at any point during its operation.

3.3.9 STATUS

The status tab displays the current state of errors, warnings, and alarms present on the turbine meter. Any errors, alarms, and warnings will automatically disappear once their cause has been resolved.
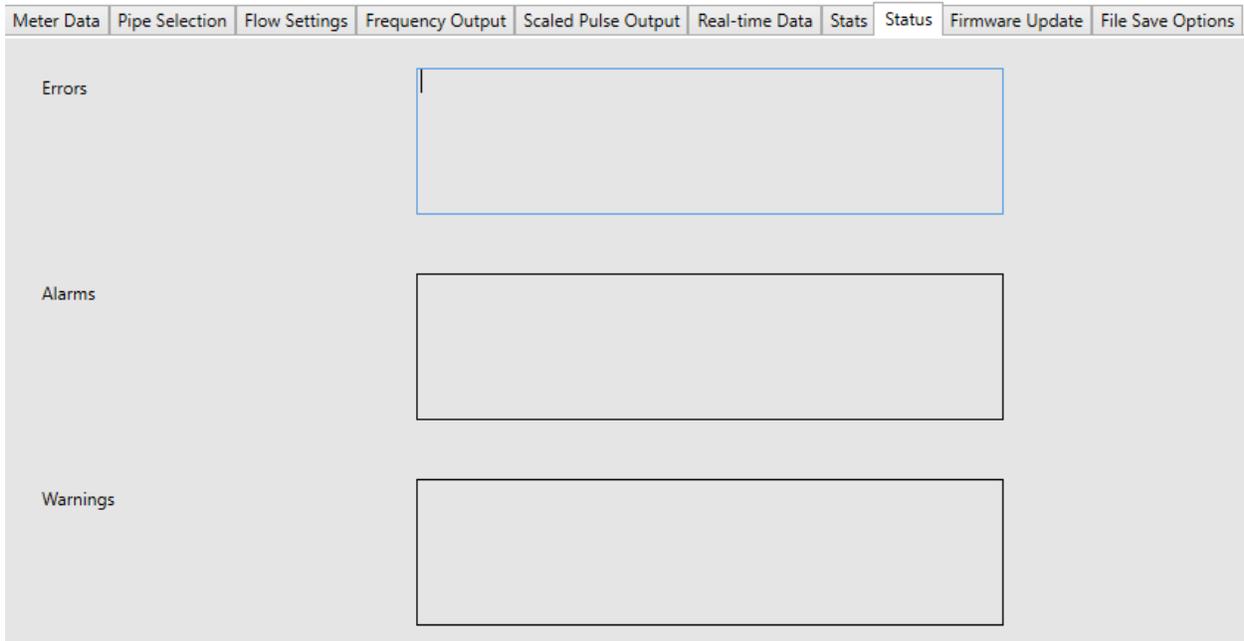
Status tab

Errors (Read Only)

The errors window will populate with messages which signify a problem with the operation hardware inside the turbine flow meter. Please contact ONICON immediately if any error messages appear.

Alarms (Read Only)

When an alarm is present on this page, a message describing the problem will appear, and the status indicator at the top of the page will say "ALARM" with an orange background.

The following is a list of possible alarms, their causes, and what happens when they're present:

- Low Flow – The flow being measured by the turbine meter is outside the 2% of rate accuracy range of the meter (less than 0.4 ft/sec pipe velocity). Low flow is a status alarm and the meter will continue to operate like normal while it is present. If you believe more flow should be present, remove and inspect the turbine for debris or damage. Or, if this is a new installation, be sure the meter is installed at the correct depth and orientation.

- Top Turbine Alarm –With the turbine rotation test enabled, the top turbine is rotating at a speed outside the percent difference allowed by the turbine rotation test configuration. When this alarm is present, the relay output will close if enabled to do so in the "Turbine Rotation Test" tab. Remove the meter and inspect the top turbine for debris if this alarm is present.

- Bottom Turbine Alarm - With the turbine rotation test enabled, the bottom turbine is rotating at a speed outside the percent difference allowed by the turbine rotation test configuration. When this alarm is present, the relay output will close if enabled to do so in the "Turbine Rotation Test" tab. Remove the meter and inspect the bottom turbine for debris if this alarm is present.

- Turbine Average Alarm -With the turbine rotation test enabled, the average turbine signal is measuring a speed outside the percent difference allowed by the turbine rotation test configuration. When this alarm is present, the relay output will close if enabled to do so in the "Turbine Rotation Test" tab. Contact ONICON if this alarm is present.

Warnings (Read Only)

Warnings will occur when the meter is operational, however, the output of the meter is likely unreliable. Warnings will automatically clear once the cause of the warning has been resolved.

- High Flow – This warning will appear when the flow rate being measured by the meter has exceeded the full scale analog range programmed in the "Flow Settings" tab. Increase the full-scale range or lower the flow to clear this warning.

- Supply Voltage Low – The supply voltage to the meter is too low. The input voltage should be 24±4 VAC or VDC.

- Tampered – Please contact ONICON if this warning is present.

- Watchdog Reset – Please contact ONICON if this warning is present.

- Hard Reset – Please contact ONICON if this warning is present.

- Calibration Not Complete – Please contact ONICON if this warning is present.

- Commissioning Not Complete – Please contact ONICON if this warning is present.

- Manufacturing Not Complete – Please contact ONICON if this warning is present.

- Pulse Overrun – This warning occurs when the scaled pulse output for totalization is occurring faster than what is allowed, based on the settings in the "Scaled Pulse Output" tab. To resolve this warning, either the "Scaled Output Multiplier" needs to be increased, or the "Scaled Output Pulse Duration" needs to be set to a shorter duration.
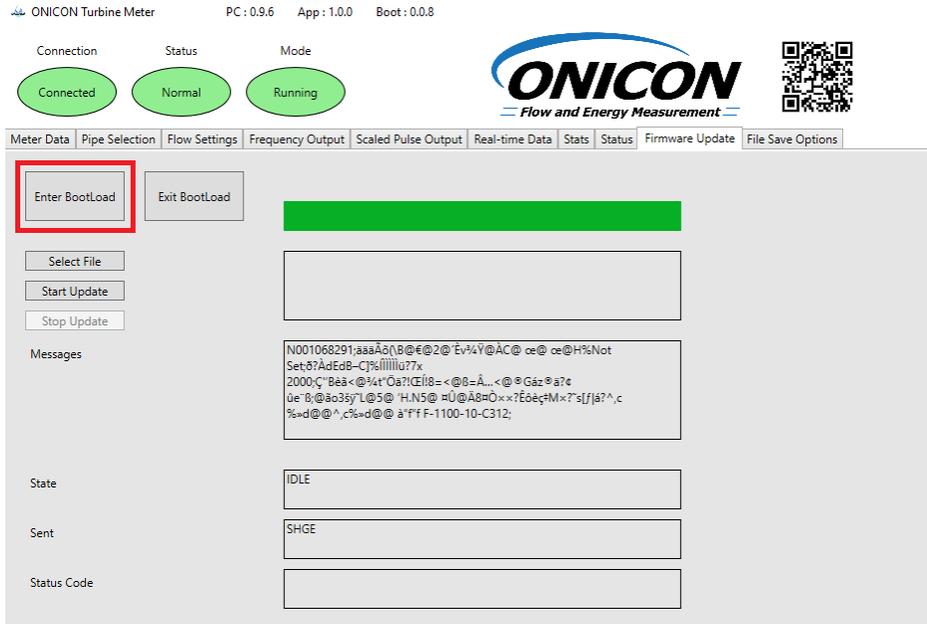
3.3.10 FIRMWARE UPDATE

The firmware update tab is used to update the firmware on the turbine flow meter processor.

IMPORTANT NOTE
This tab should not be used unless you are specifically instructed to do so by ONICON. Check with the factory to see if newer firmware is required and available.

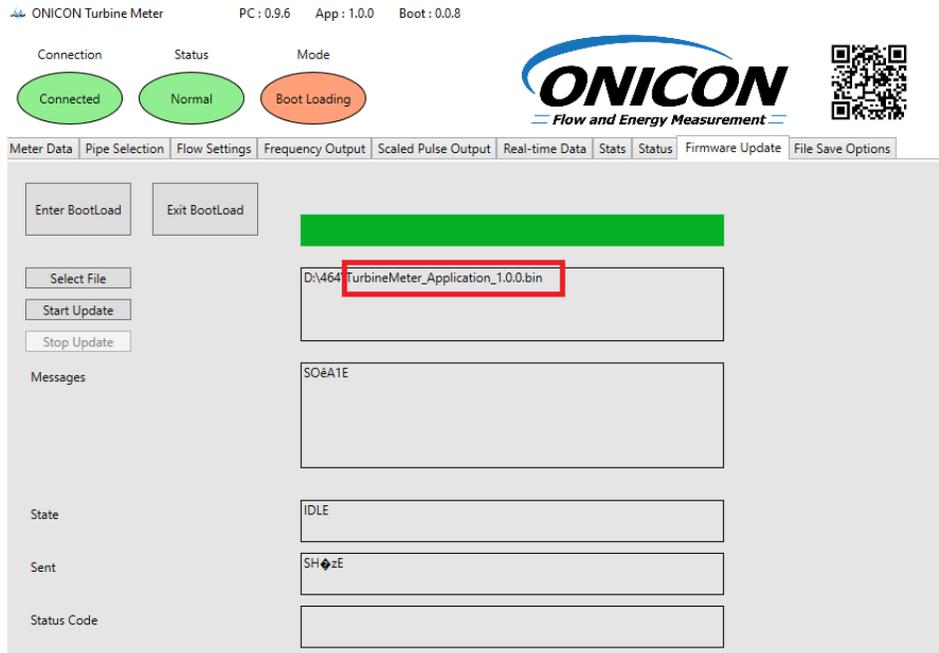To start update, under "Firmware Update" tab, click "Enter BootLoad".

Once "Enter BootLoad" is selected, the Mode Indicator will change to "Boot Loading". Click on "Select File".
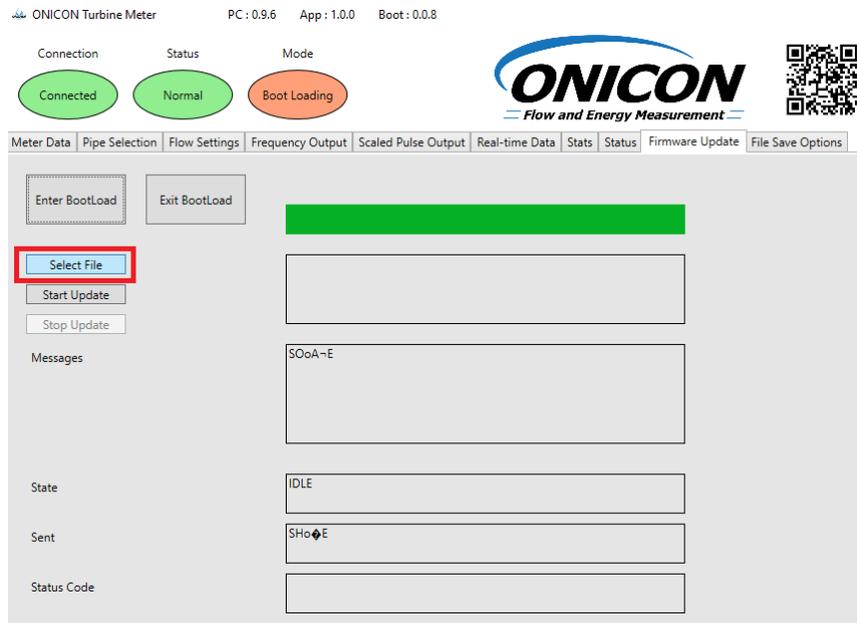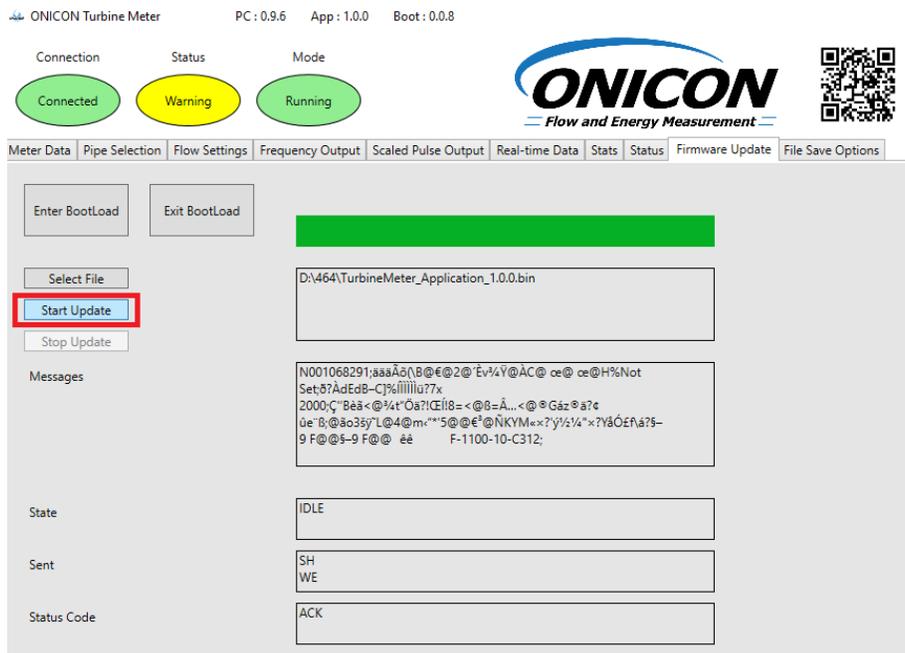
3.3.10 FIRMWARE UPDATE (CONTINUED)

Use the standard Windows File Explorer to navigate to the new firmware binary file. The selection will appear in the box as highlighted below.
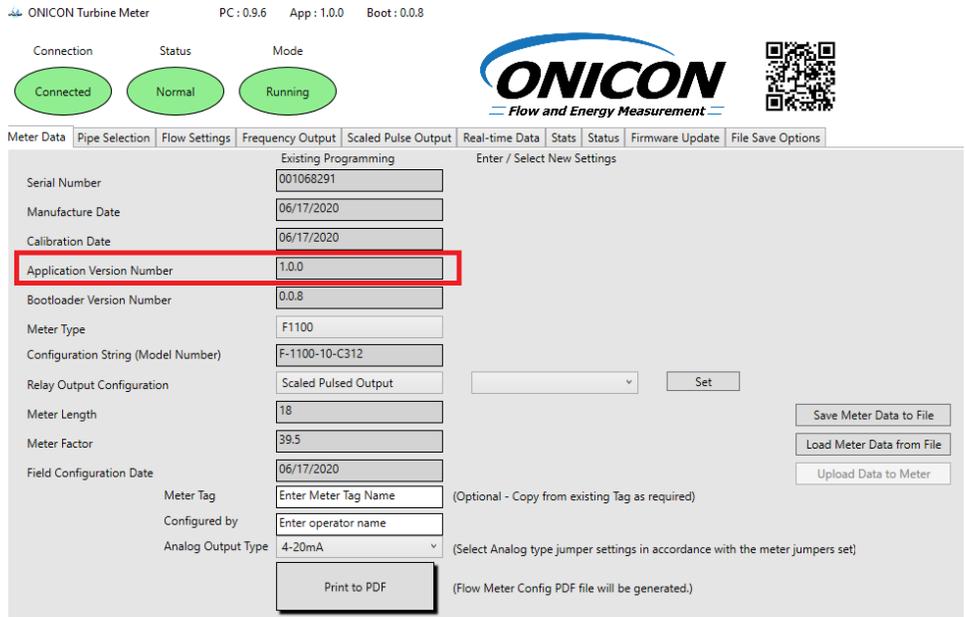

Click on "Start Update", and the progress bar will indicate progress. It takes about 20 to 30 seconds to upgrade the firmware.

3.3.10 FIRMWARE UPDATE (CONTINUED)

When the download is complete, the device reboots automatically and the process is complete.

IMPORTANT NOTE
Make sure no Warning messages are received under "Status" tab, otherwise, power cycle the device to remove the Warning messages.

3.3.11 FILE SAVE OPTIONS

The file save options tab is used to autosave device configuration. By default, checkboxes for "Automatically save config when a meter is connected" and "Prompt before overwriting the data into meter" will be on when the Turbine Meter Configuration Utility is first being installed.
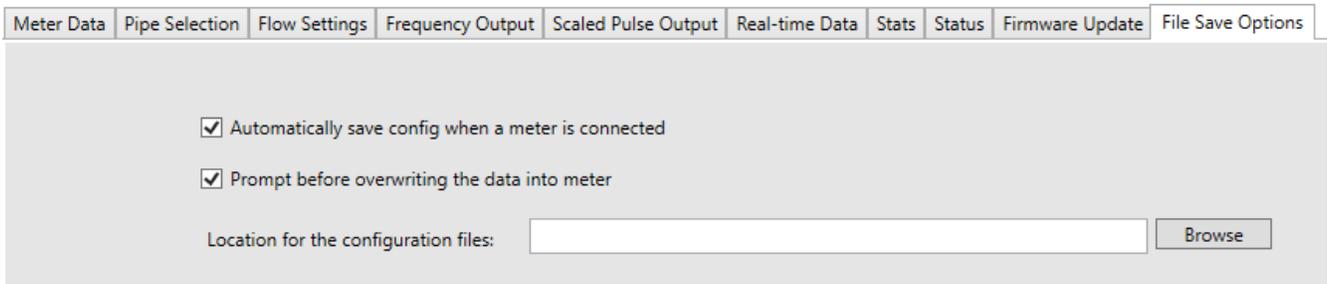
IMPORTANT NOTE
If the checkbox's state is changed, a directory or folder location needs to be selected on the computer, where the configuration file will be saved to "Meter Data" tab.