# FT-3400

## ELECTROMAGNETIC FLOW METER

## Configuration Utility Installation and Operation Guide


ONICON
Flow and Energy Measurement

DOC-0005991 Rev.A

# SAFETY INFORMATION

This meter was calibrated at the factory before shipment. To ensure correct use of the meter, please read this manual thoroughly.

Regarding this Manual:

- This manual should be passed on to the end user.
- Before use, read this manual thoroughly to comprehend its contents.
- The contents of this manual may be changed without prior notice.
- All rights reserved. No part of this manual may be reproduced in any form without ONICON's written permission.
- ONICON makes no warranty of any kind with regard to this material, including, but not limited to, implied warranties of merchantability and suitability for a particular purpose.
- All reasonable effort has been made to ensure the accuracy of the contents of this manual. However, if any errors are found, please inform ONICON.
- ONICON assumes no responsibilities for this product except as stated in the warranty.
- If the customer or any third party is harmed by the use of this product, ONICON assumes no responsibility for any such harm owing to any defects in the product which were not predictable, or for any indirect damages.

**SAFETY PRECAUTIONS:**

The following general safety precautions must be observed during all phases of installation, operation, service, and repair of this product. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. ONICON Incorporated assumes no liability for the customer's failure to comply with these requirements. If this product is used in a manner not specified in this manual, the protection provided by this product may be impaired.

The following messages are used in this manual:

***WARNING***
***Messages identified as "WARNING" contain information regarding the personal safety of individuals involved in the installation, operation or service of this product.***

***CAUTION***
***Messages identified as "CAUTION" contain information regarding potential damage to the product or other ancillary products.***

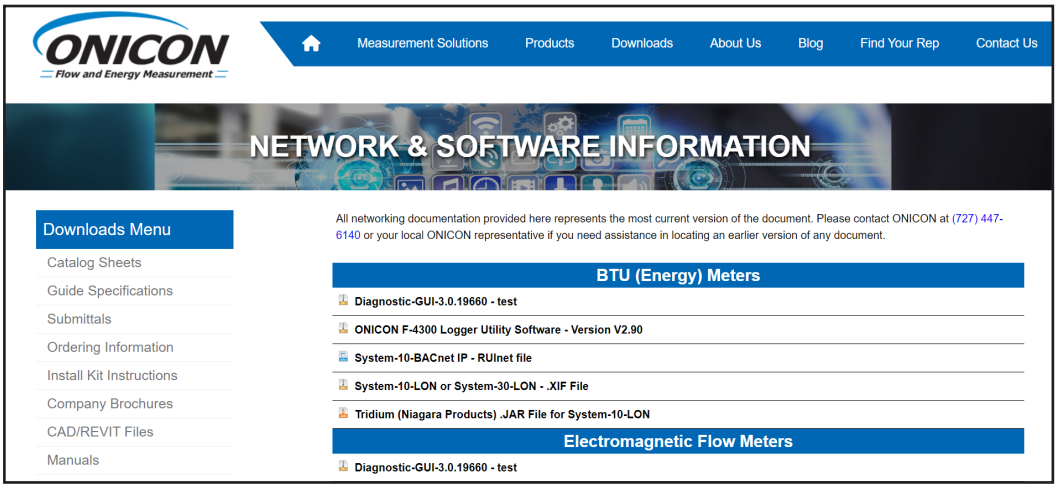
***IMPORTANT NOTE***
***Messages identified as "IMPORTANT NOTE" contain information critical to the proper operation of the product.***

# TABLE OF CONTENTS

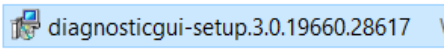
# SECTION 1.0: INSTALLING THE CONFIGURATION UTILITY

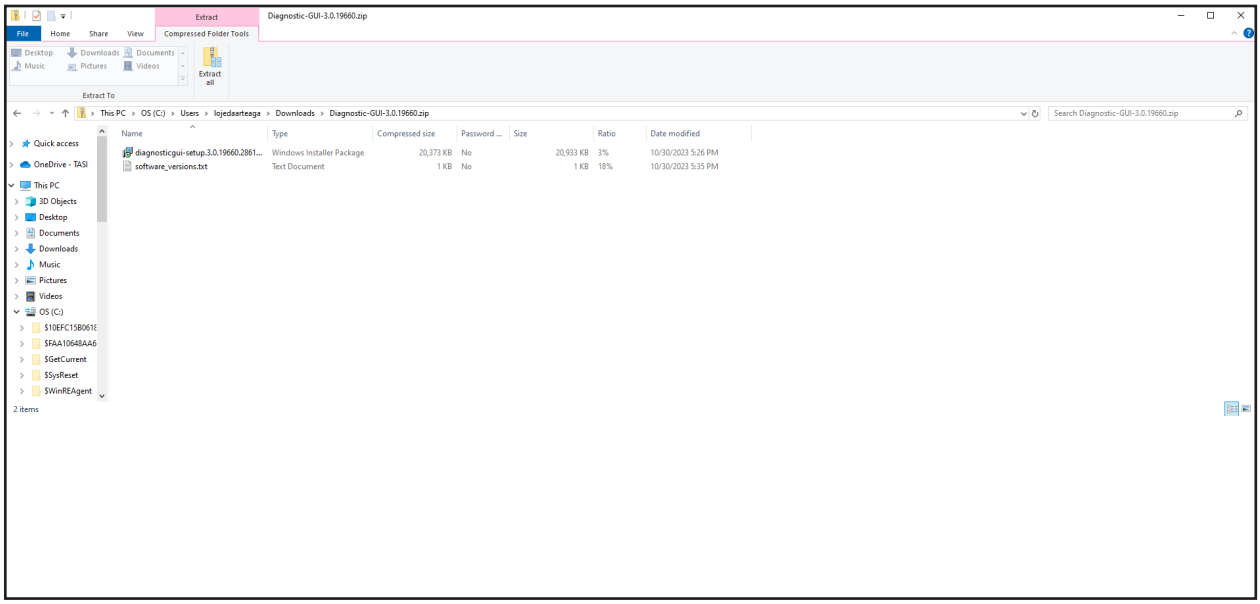
1. Go to www.onicon.com then click on the “Downloads” tab at the top and select “Network & Software Information”.


2. Download the Diagnostic GUI and run the file name Diagnostic-GUI-3.0.19660

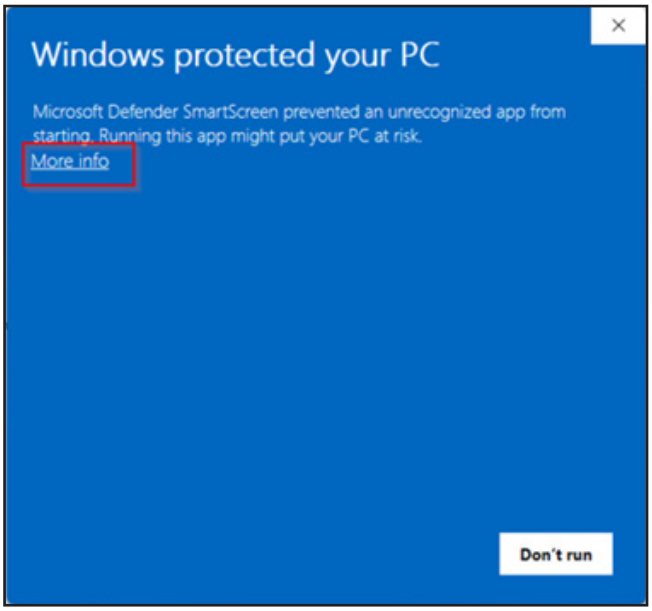


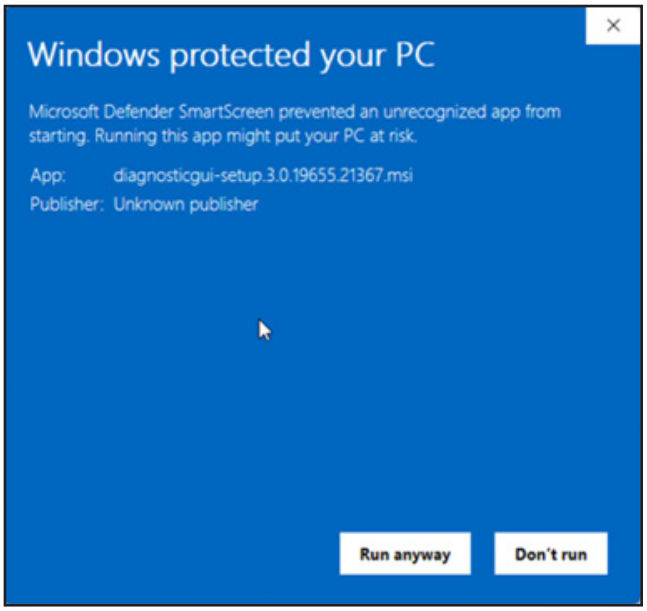
3. Go to your downloads folder and unzip the file

4. Open the Zip folder and Run the Diagnostic GUI 

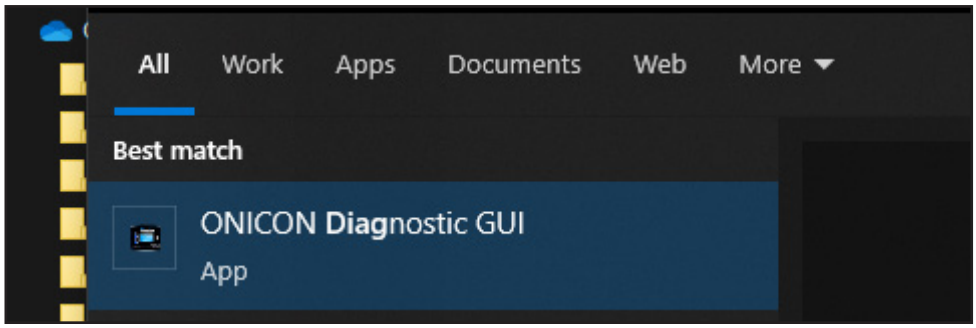




5. For Windowns 11 users a “Windows protected your PC” screen might show up. Please click “More info”, then click “Run anyway”.



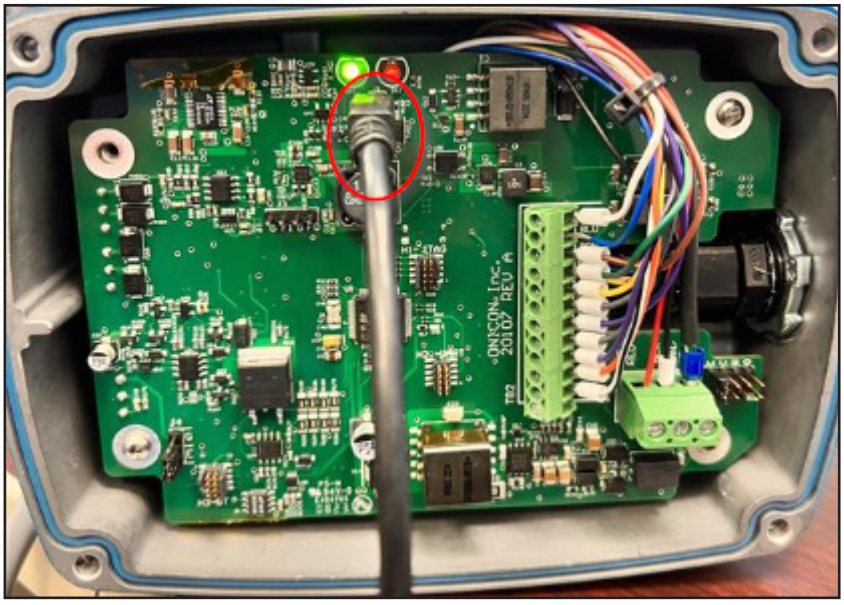
6. Install the program on your PC by clicking next and following the prompts.
7. Once the program is installed search for the "ONICON Diagnostic GUI" App from the Windows start menu and open it.



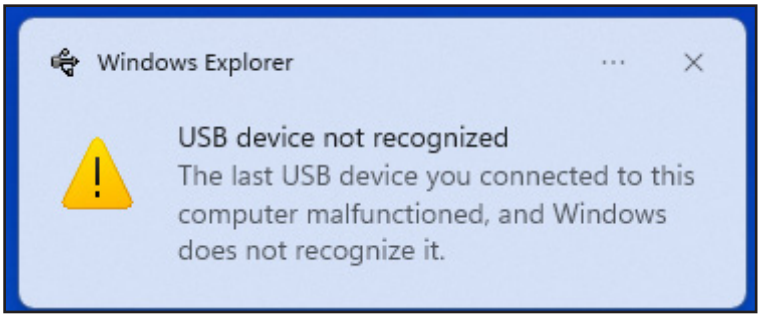
# SECTION 2.0: CONNECTING THE METER TO THE APP

1. Power up the device with a 24V power supply (20 - 28 VDC, 10W or 20 - 28 VAC, 60 Hz, 10 VA) using the wires of the attached 10 ft or 25 ft cable. Red is (+) supply voltage, black is (-) common.

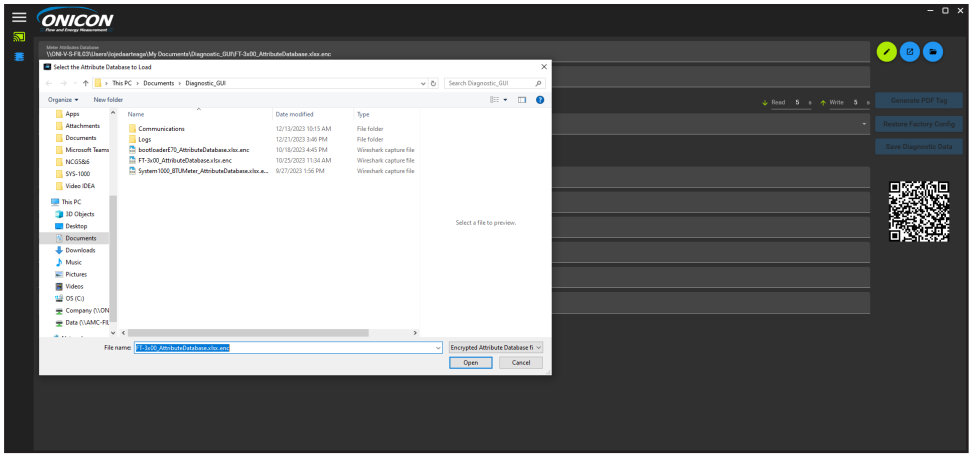
2. Open the top cover and connect using a Micro-USB A or B to USB 2.0 cable.



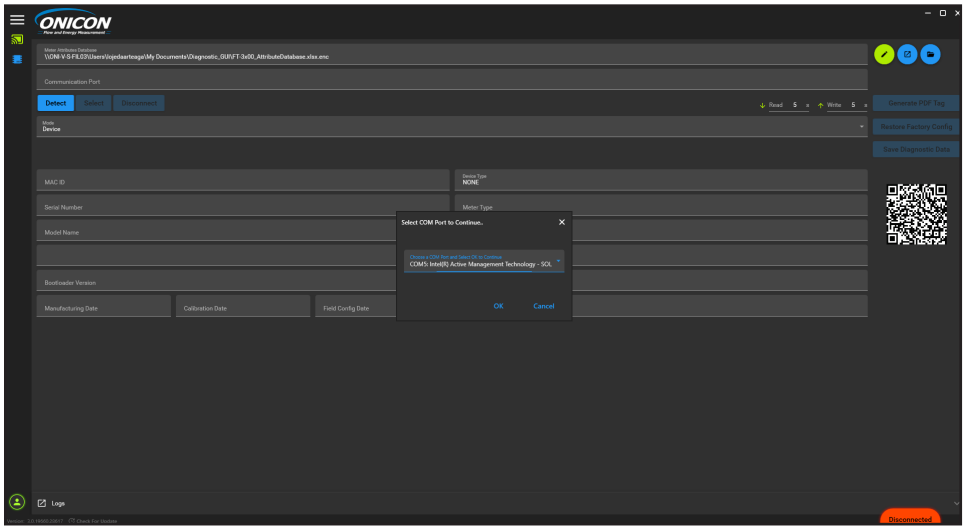
3. If you get this warning below, please try a new USB to Micro-A or B cable and verify the cable type.




4. With the ONICON Diagnostic GUI Open, First load the attributes to the device by clicking the Pencil and then selecting the attribute database file.



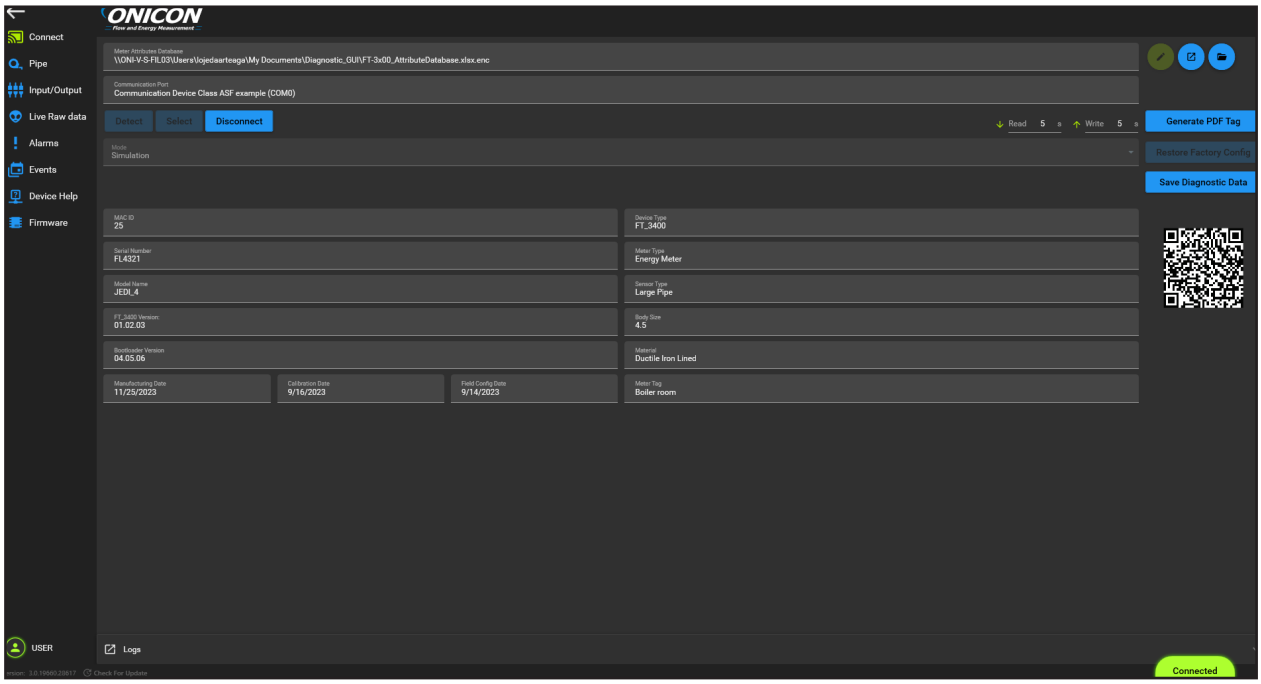
5. Click the select button and then select the USB COM port where the meter is connected amd click on the OK button to connect.



# SECTION 3.0: PROGRAMMING/INFORMATIONAL TABS

The various diagnostic information and configuration options available with the GUI are separated into different section 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 “Live Raw Data” tab allows the user to see the voltage of the electrodes as well as the output signals. Each tab and the information available within each tab are discussed in the following sections.

## 3.1 CONNECT TAB




The Meter Connect tab provides general information about the meter such as its serial number, manufactured/calibrated date, meter type, as well as the date it was manufactured, calibrated, and field configured.

### 3.1.1 MAC ID

Specific identification number of the meter that makes it unique.

### 3.1.2 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.

### 3.1.3 Model Name (Read Only)

Model Name provides the specific built model number of the connected meter. Refer to the catalog sheet for more information about each number on the meter model codification.

### 3.1.4 FT-3400 Version (Read Only)

A firmware version refers to a specific release or iteration of software that is embedded within a hardware device. Firmware serves as the operating system for the device and is responsible for controlling its functions and operations. It is typcially stored in non-volatile memory and is designed to be permanent, allowing the device to retain it functionality even after power cycles or reboots. ONICON often updates firmware versions to introduce new features, fix bugs, enhance performance, or address security vulnerabilities.

### 3.1.5 Bootloader Version

The bootloader version refers to the specific release or iteration of the bootloader software installed on a device. It is responsible for initializing the device while maintaining the device's state and ensuring the necessary components are loaded correctly. It acts as a bridge between the hardware and software, allowing the device to boot into the operating system.

### 3.1.6 Manufacturing Date

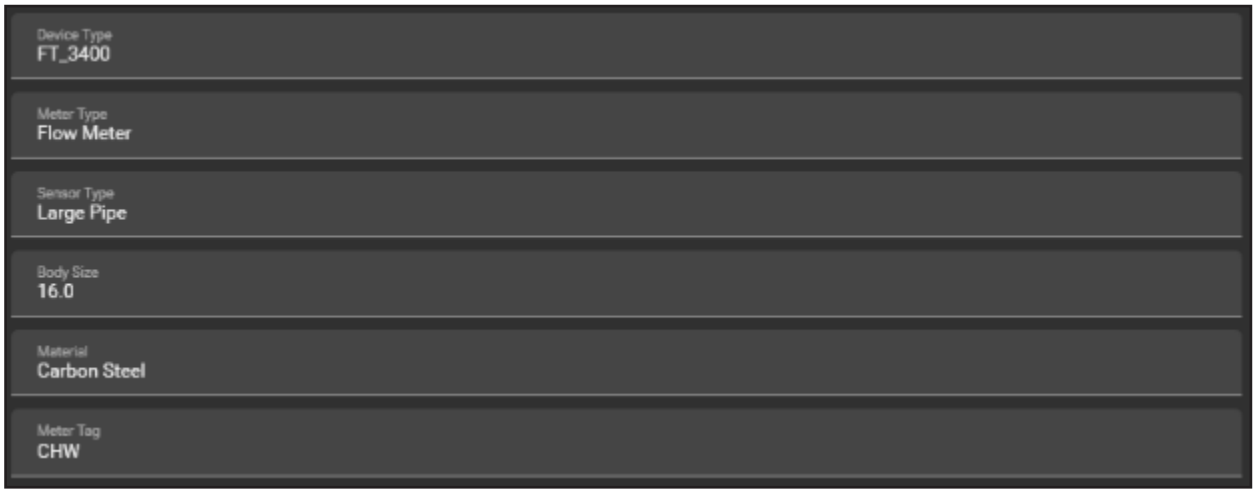
The date that the meter was manufactured at ONICON. This date may not match the calibration date if the meter has been returned to ONICON for recalibration service after the original manufacture date.

### 3.1.7 Calibration Date

The date that the 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.

### 3.1.8 Field Config Date

After saving or writing a configuration on any of the tabs. The Config Date will be changed to note the latest date the meter was reconfigured.




### 3.1.9 Device Type

This GUI can interact with multiple ONICON products such as FT-4600, SYS-1000, FT-3400, and FT-3500. Device type indicates the meter attribute database file that was loaded into the GUI. See steps on section 2 for more information about the attribute database file.

### 3.1.10 Meter Type

The meter type indicates if it is an Energy Meter or Flow Meter.

### 3.1.11 Sensor Type

Sensor type options are small pipe and large pipe. It will limit the pipe size configuration to 3-72" for large pipe and 1.25-2.5" for small pipe.

### 3.1.12 Body Size

Body size refers to the pipe size the meter is currently configured.

### 3.1.13 Material

Material refers to the pipe material the meter is currently configured. For example, Carbon Steel, Copper, etc.

### 3.1.14 Meter Tag (Writable)

Enter meter tag name. The current tag can be found hanging on the meter.

#### 3.1.14.1 Generate a meter tag


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

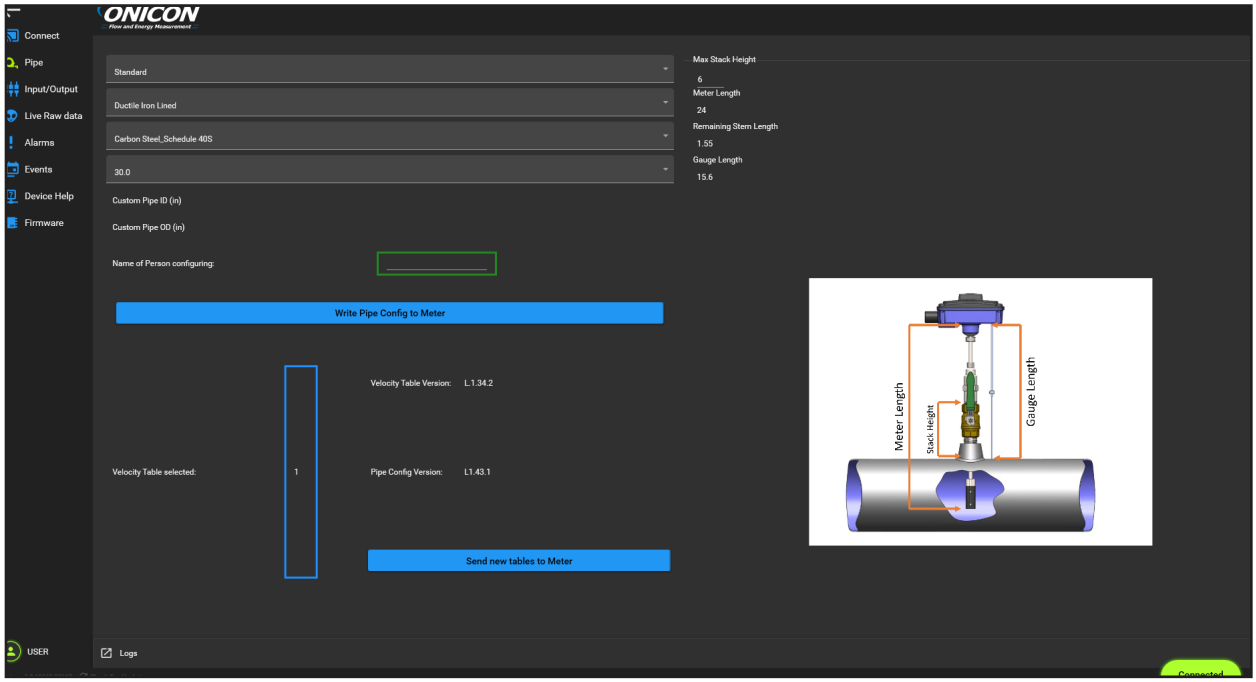
#### 3.1.14.2 Restore Factory Default


If the new configuration is no longer trusted. The restore factor config button helps to reconfigure the meter to the original setting of the meter.

#### 3.1.14.3 Save Diagnostic Data


“Save Diagnostic Data” button is used for downloading a file for the ONICON support team to analyze and troubleshoot any source of noise or configuration issue that might be on the meter.

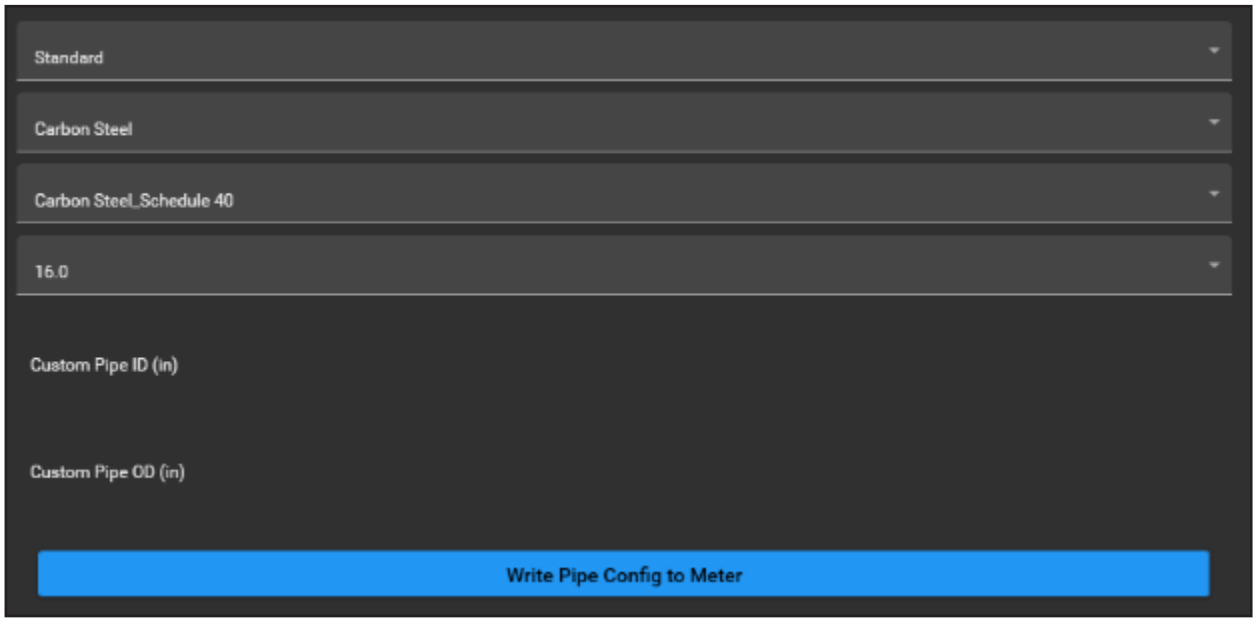
## 3.2 PIPE CONFIGURATION TAB




The pipe selection tab provides the means to modify the pipe size and material of the FT-3400. The accuracy of the volumetric output, whether it is volume rate (Hz, mA or V) or volume total (scaled pulse), is dependent on an accurate pipe ID being programmed in the meter.

### 3.2.1 Pipe Changes

Two options are available for pipe configuration.




#### 3.2.1.1 Standard:

Allow the selection of material, schedule, and size of the most common pipes. For example, Copper, Carbon Steel, PVC, PPR, Ductile Iron, and its schedules from 3” to 72”.

#### 3.2.1.2 Custom:

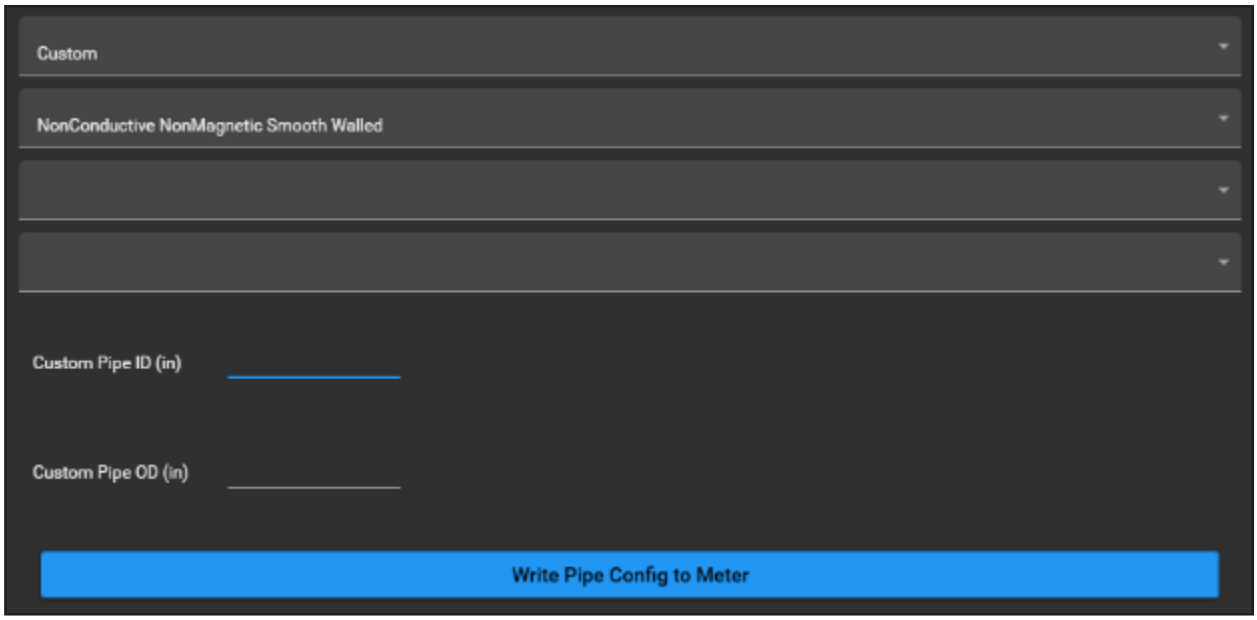
Allow the selection of a specific ID/OD for custom pipe after the type of wall is selected between the following options:

**Conductive Magnetic Semi Rough Walled** pipe is any metallic pipe with an inner material texture that is not smooth providing roughness and more friction for the fluid. For example, pipes with similar properties like carbon steel pipes.

**Conductive Non-Magnetic Smooth Walled** pipe is any metallic pipe with an inner material texture that is not completely smooth providing some degree of roughness for the fluid. For example, pipes with similar properties like carbon pipes.

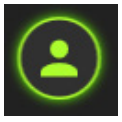
**Nonconductive Nonmagnetic Rough Walled** pipes have a surface texture that is not smooth, and they are made from materials that do not conduct electricity or exhibit magnetic properties. For example, pipes with similar properties like concrete or concrete lined pipes.

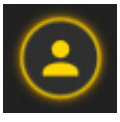
**Nonconductive Nonmagnetic Smooth Walled** pipes have a smooth surface texture, and they are made from materials that do not conduct electricity or exhibit magnetic properties. For example, pipes with similar properties like PVC, PPR, or other plastic pipes.




The password to write a new pipe configuration is 1234.

Click the User icon located at the left bottom corner to enter the password.


View Mode


Edit Mode

## 3.2.2 Installation Changes Based on Pipe Configuration

### 3.2.2.1 Max Stack Height

The allowable distance from the surface of the pipe to the threaded connection of the meter.

### 3.2.2.2 Meter Length

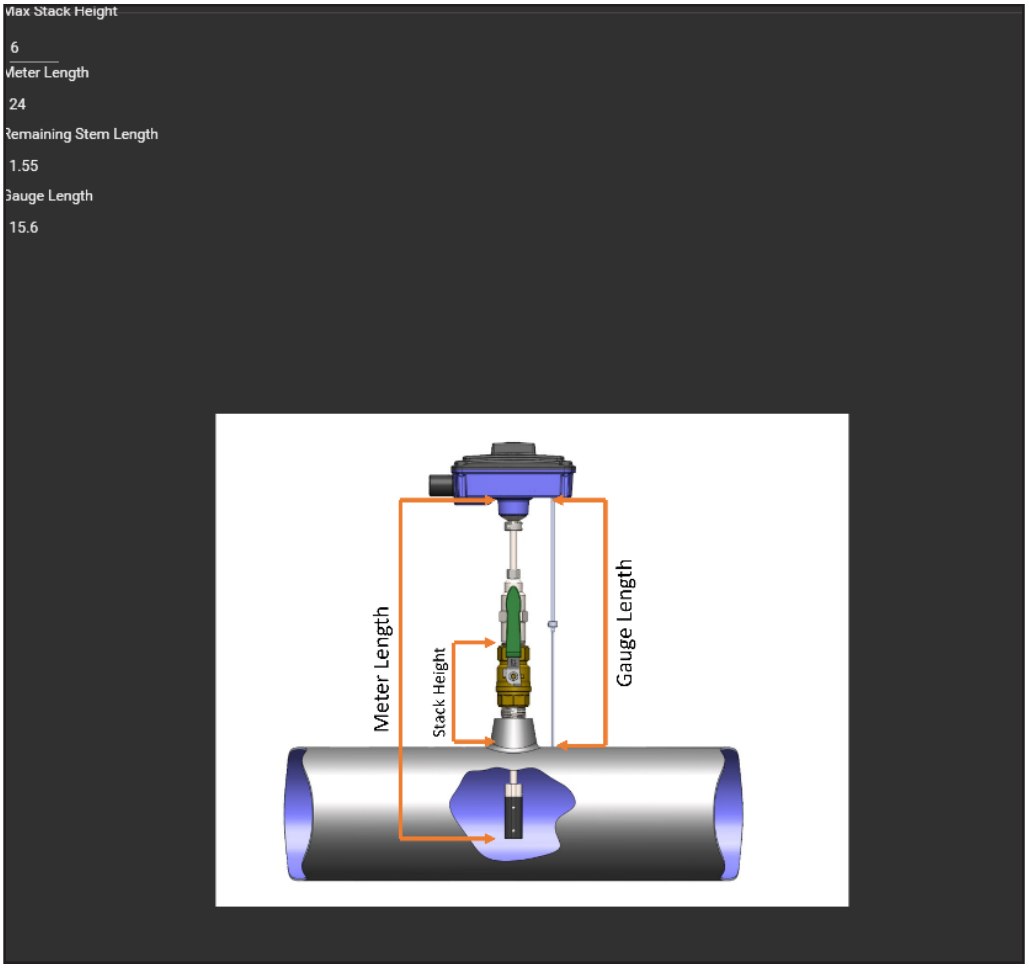
This length refers to the distance from the bottom of the sensor to the bottom of the enclosure.

### 3.2.2.3 Remaining Stem Length

This length is a calculated value of how much insertable 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.

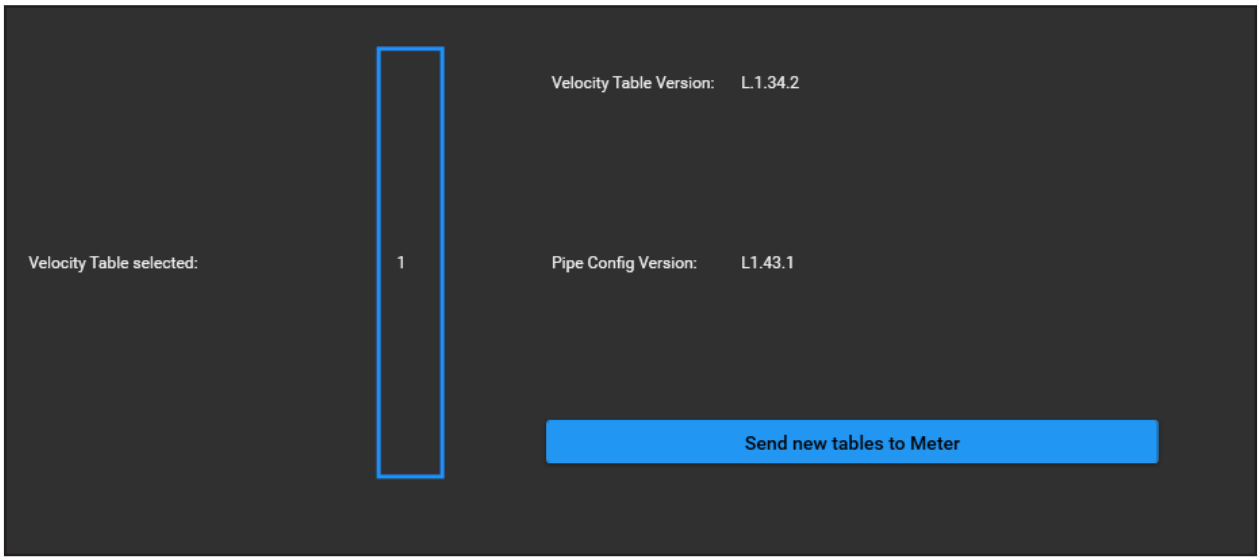
### 3.2.2.4 Gauge Length

The software will automatically recalculate the new gauge length after a new pipe configuration is made. Note: Please take the gauge attached to the meter and match the size with the size provided by the software.



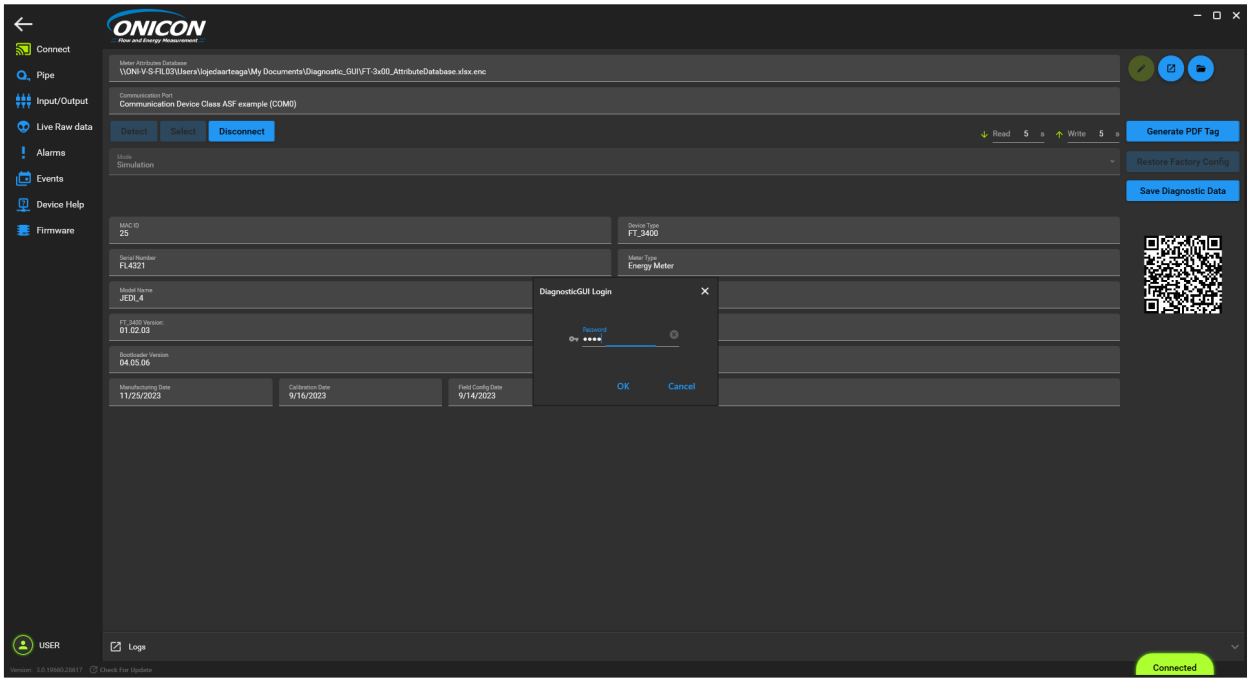
### 3.2.3 Flow Meter Table Version:

The meter will change its table version based on the pipe configuration use.

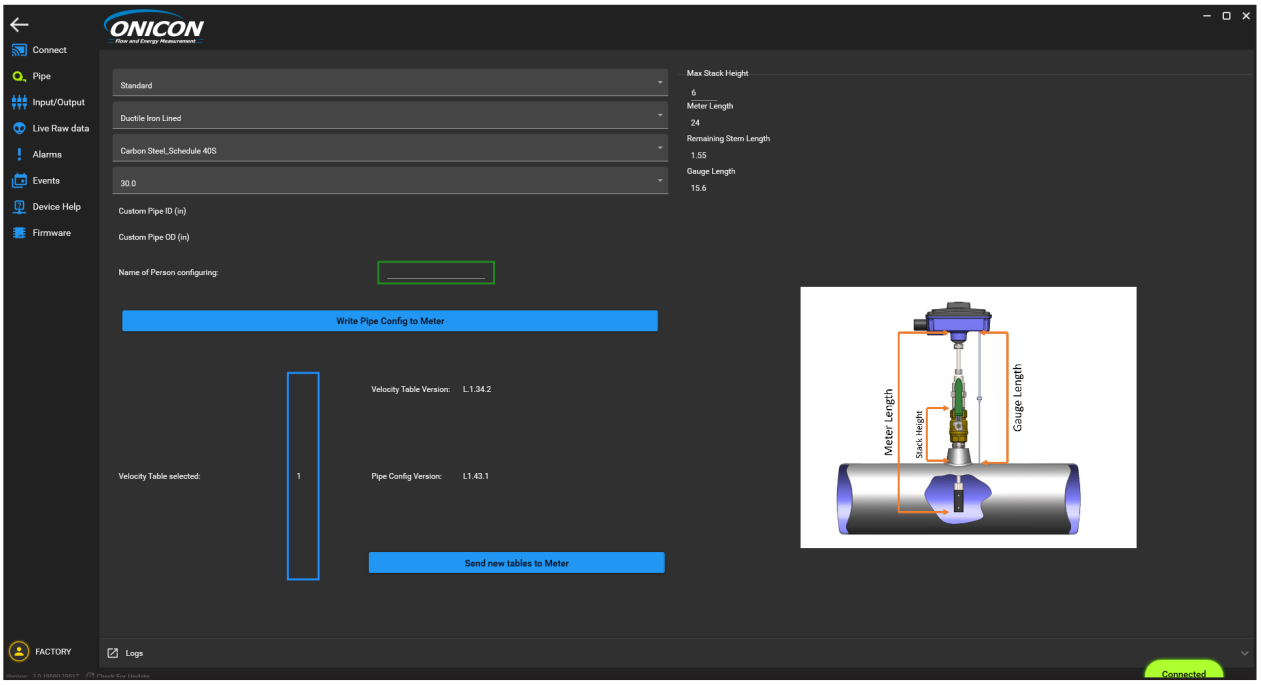


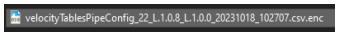

### 3.2.4 Loading a New Table Version

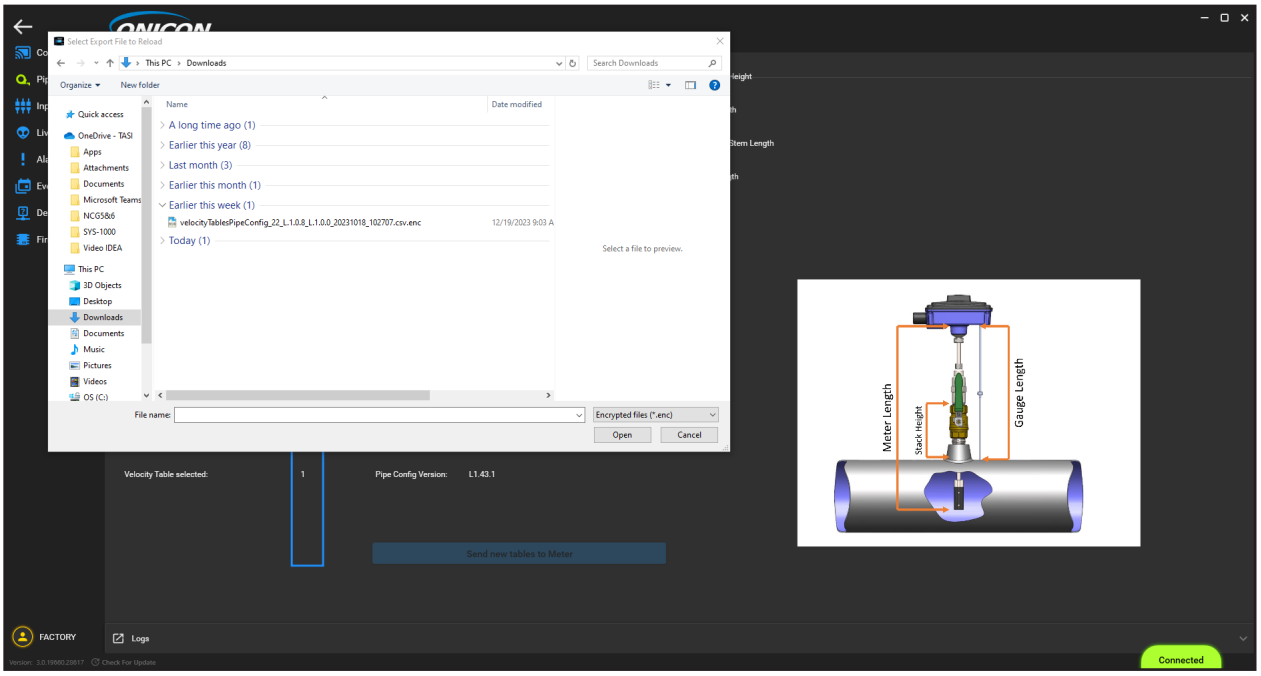
1. Click on the Diagnostic Login Icon on the bottom left corner and enter password “1234”.



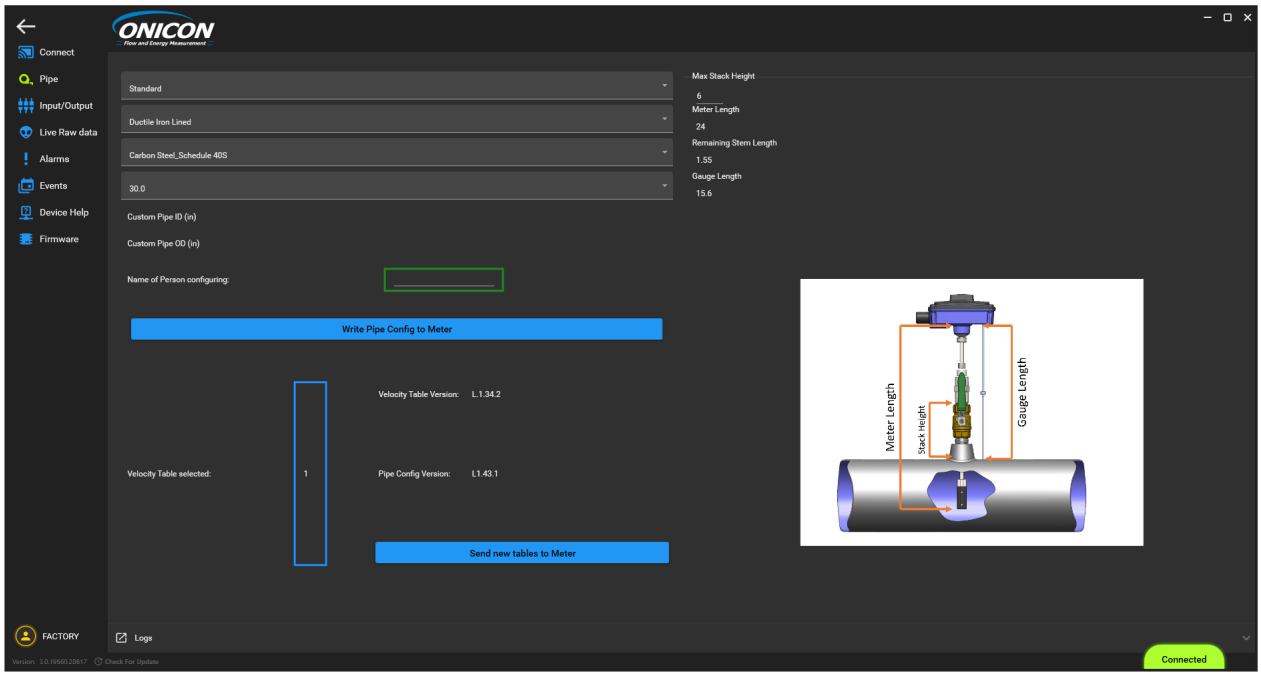
2. Go to the “pipe configuration” page  and select the button “send new table to meter” 

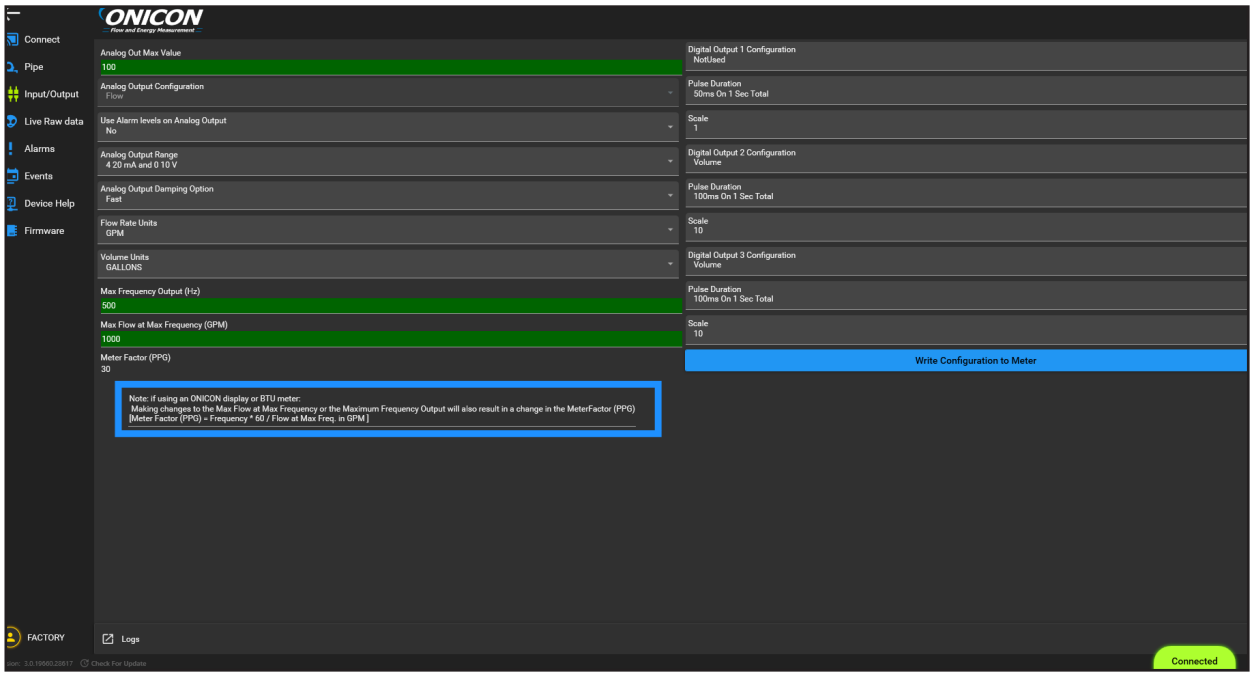

3. Select and load the new table file provided by the factory. 

4. Confirm table version is load in “pipe configuration” page




## 3.3 INPUT/OUTPUT CONFIGURATION TAB




### 3.3.1 **Analog Out Max Value:** Refer to the Full-Scale Flow Rate of the meter.

### 3.3.2 **Analog Output Configuration:** Limited as Flow only for the FT-3400

**3.3.3 Use Alarm Level on Analog Output:** Activate the 2mA on 4-20mA, 1V on 2-10V or 0.5V on 1-5V to alert the user if there are any errors with the meter or flow alarms.

**3.3.4 Analog Output Range:** Select between 4-20mA and 2-10V or 4-20mA and 1-5V

**3.3.5 Analog Output Damping Options:** Selection between Fast, Medium, and Slow respond to the instantaneous analog out.

**3.3.6 Flow Rates Units:** Options are GPM, CF/S, L/S, L/Min, CM/H, FT3/S, or M3/S

**3.3.7 Volume Units:** Options are Gallons, Liters, Cubic Meters

**3.3.8 Max Frequency Output (Hz):** Typical signal used to connect to ONICON peripheral. Max allowed input is 500hz.

**3.3.9 Max Flow at Max Frequency:** This parameter sets the value for the flow at the max frequency scale. Which is then used on the Meter Factor.

**3.3.10 Meter Factor:** Calculated value of Max Freq x 60 / Max flow at Max Freq. This value is entered in any of the ONICON peripherals.

**3.3.11 Pulse Duration:** 50ms on 1 Seconds Total, 100ms on 1 Seconds Total, 500ms on 2 Seconds total, or 1000ms on 3 Seconds Total.

The 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 or 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 wil be 500ms. A scaled pulse cannot occur more than once per 3 seconds (1/3 Hz).

“1000 ms on 3 s 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.

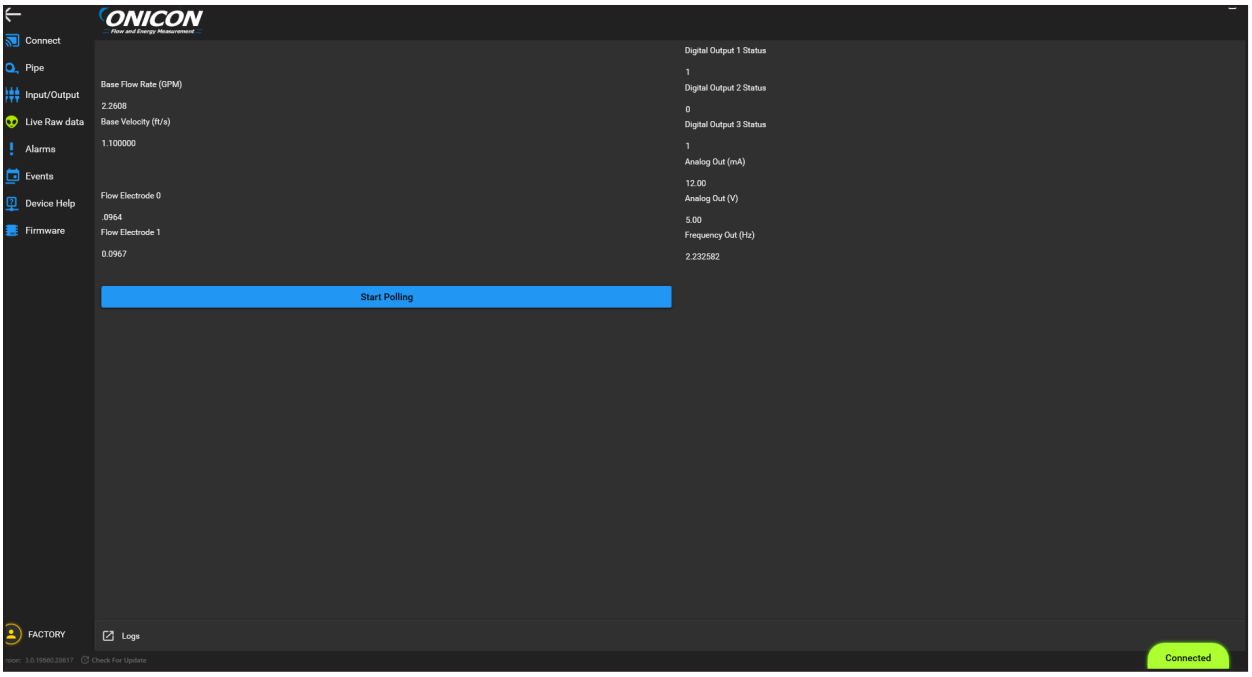
**3.3.12 Digital Output Configuration:** Options are Volume Forward, Volume Reverse, Alarm, Mode Status, Warning.

**3.3.13 Scale Pulse Output:** If the digital output configuration is selected as volume, volume forward or reverse, then scale pulse output options are 1, 10, 100, 1000, 10K, 100K, 1M


Click Write Configuration to Meter after all needed changes to the input/output of the meter are made to save the new configuarion in the meter.

## 3.4 LIVE RAW DATA TAB

The LIVE RAW DATA tab displays real-time data related to meter's operation. The velocity, output levels, and equivalent flow rate are based on pipe size configuration. The information on this tab is used to diagnose a signal or configuration is not functioning properly without having to measure an output signal level on the meter's wires with a multimeter. Click "start polling" to see live data.




### 3.4.1 Base Flow Rate (GPM)

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

### 3.4.2 Base Velocity (ft/s)

Shows the flow velocity, in feet per second from the average electrodes and it is equivalent to based on the pipe ID configured in the Pipe Selection tab. This velocity is not correct for the pipe area the turbine meter acquires from being inserted in the pipe.

### 3.4.3 Flow Electrode 0 (V)

Shows the voltage reading from the left side sensor. (meter positioned parallel to the flow direction)

### 3.4.4 Flow Electrode 1 (V)

Shows the voltage reading from the right side sensor. (meter positioned parallel to the flow direction)

### 3.4.5 Digital Output 1 Status

The screen shows a number 1 every time the contact closes and a number 0 when the contact is open.

### 3.4.6 Digital Output 2 Status

The screen shows a number 1 every time the contact closes and a number 0 when the contact is open.

### 3.4.7 Digital Output 3 Status

The screen shows a number 1 every time the contact closes and a number 0 when the contact is open.

### 3.4.8 Analog Out (mA)

This is the current output available on the meter's blue and brown wires.

### 3.4.9 Analog Out (V)

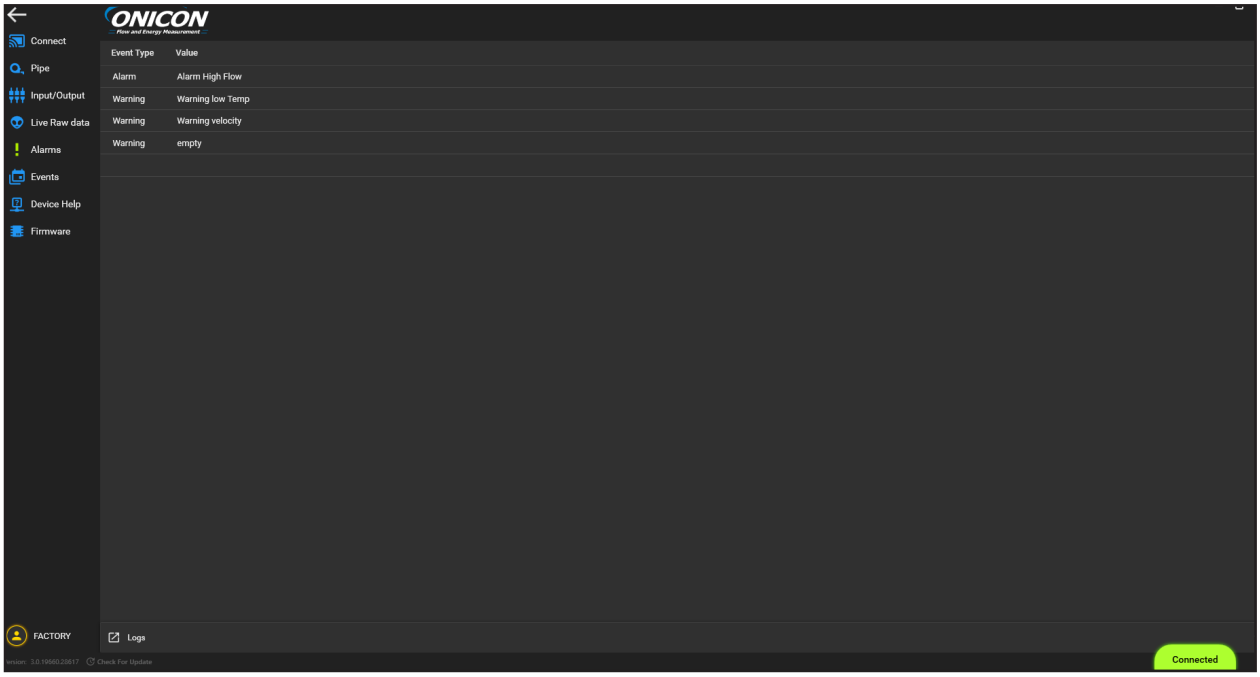
This is the voltage output available on the meter's white and brown wires.

### 3.4.10 Frequency Out (Hz)

This is the scaled frequency output available on the meter's green and yellow wires.

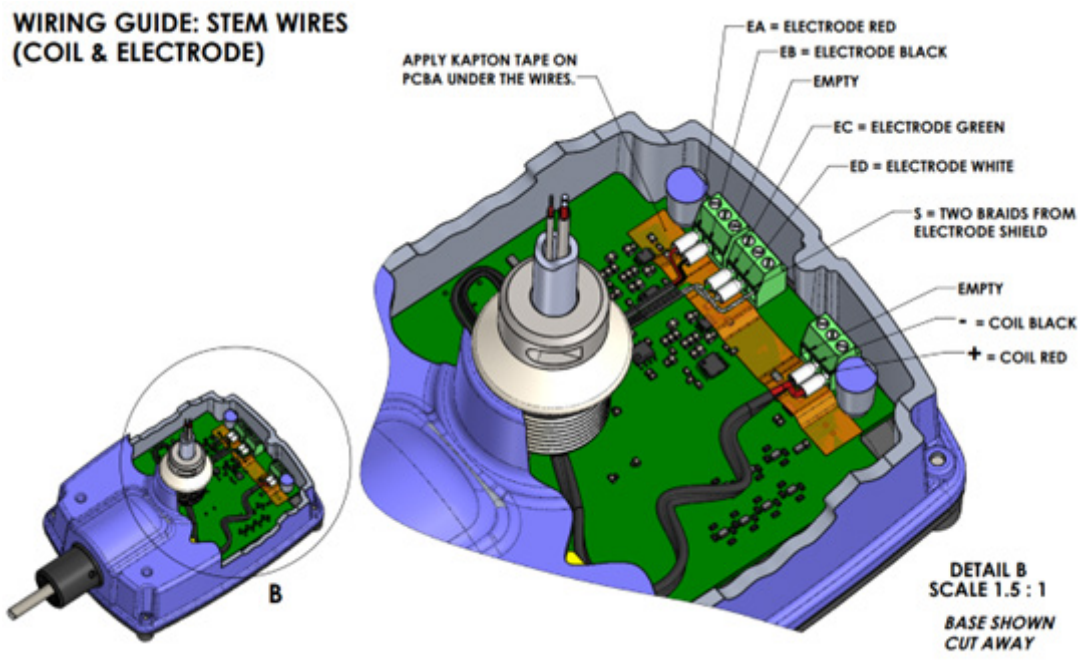
## 3.5 ALARMS, ERRORS & WARNINGS TAB

This tab provides comprehensive information about specific warnings, alarms, or errors. Refer to the table below for their meanings. This additional resource will help you gain a deeper understanding of any issues and guide you in taking the appropriate actions to maintain the meter's functionality and accuracy. Please note that prompt attention to alarms, errors, and warnings is essential to ensure the reliable and accurate operation of the FT-3400 meter.



### 3.5.1 List of Error

| ERRORS | | |
|---|---|---|
| **STATUS** | **POTENTIAL ISSUE** | **POSSIBLE SOLUTIONS** |
| **Error Elec 1 Bad DC Offset** | Possible electrode 1 disconnected | • Power off the unit<br>• Carefully remove the electronic and check electrode wires are connected as per the image below.<br>• Power on the unit and the error should disappear.<br>• Contact ONICON if the error is still present. RMA Needed. |
| **Error Elec 2 Bad DC Offset** | Possible electrode 2 disconnected | • Power off the unit<br>• Carefully remove the electronic and check electrode wires are connected as per the image below.<br>• Power on the unit and the error should disappear.<br>• Contact ONICON if the error is still present. RMA Needed. |
| **Error Elec 1/2 Diff Outrange** | Possible electrode 1 or 2 disconnected | • Power off the unit<br>• Carefully remove the electronic and check electrode wires are connected as per the image below.<br>• Power on the unit and the error should disappear.<br>• Contact ONICON if the error is still present. RMA Needed. |
| **Error Coil Fail** | No measurement from the Coil | • Open the enclosure and check the DS1 LED light is ON.<br>• If the DS1 LED light is off, power off the unit and carefully remove the electronics and check coil wires are connected as per the image on page 29. Power on the unit and error should disappear.<br>• Contact ONICON if the error is still present. RMA needed |
| **Error Cfg Corrupt** | Incorrect voltage to velocity table loaded | Contact ONICON. RMA needed |
| **Error Empty Pipe Init Fail** | Empty Pipe was unable to initialize due to disconnected electrode 1 | • Power off the unit<br>• Carefully remove the electronic and check electrode wires are connected as per the image below.<br>• Power on the unit and the error should disappear.<br>• Contact ONICON if the error is still present. RMA Needed. |




**TURN POWER OFF BEFORE REMOVING THE BOARD.**

**DO NOT CONNECT OR DISCONNECT WIRES WITH THE POWER ON.**

### 3.5.2 List of Alarms

| ALARMS | | |
|---|---|---|
| **STATUS** | **POTENTIAL ISSUE** | **POSSIBLE SOLUTIONS** |
| **Alarm High Flow** | The actual flow is greater than the volumetric flow rate at 20 ft/s | Nonideal flow rate condition. Contact ONICON if a short high flow rate test is needed. |
| **Alarm AOUT High Flow** | Flow is higher than the Analog Output Full Scale | • Confirm the analog output full scale is equal to or greater than the design max flow of the system.<br>• Use the PC App to adjust the full scale of the meter |
| **Alarm Frequency High Flow** | Flow is higher than the Max Frequency | • Confirm the maximum frequency and flow at max frequency is equal to or greater than the design max flow of the system.<br>• Use the PC App to adjust the maximum frequency output and flow at max frequency. |
| **Alarm Reverse Flow** | The flow meter orientation does not match the flow direction | • Check the orientation of the meter and flow direction arrow.<br>• Rotate the meter to match the flow direction. |
| **Alarm Empty Pipe** | The pipe is not full or the meter is grounded | Confirm the pipe is full of water and the meter is properly ground according to section 3.5. |
| **Alarm Warm-Up Delay** | The alarm is only present for the first 3 minutes or less after the meter is powered up. Meter electronics are initializing. | • If 3 min have passed, power cycle the unit and wait 3 more min for the alarm to clear off.<br>• Contact ONICON if the alarm is still present. RMA needed. |
| **Alarm Pulse 1 Overrun** | This alarm is present whenever the volume flow rate causes the incremental volume total to accumulate at a rate that is too fast. | • Confirm the flow rate data and pipe diameter data on the tag attached to the meter corresponds with the actual flow and actual pipe diameter.<br>• Any mismatch between the calibrated and actual flow rates or the calibrated and actual pipe diameter will cause this alarm message to appear.<br>• Contact ONICON for assistance in correcting this condition. |
| **Alarm Pulse 2 Overrun** | | |
| **Alarm Pulse 3 Overrun** | | |

### 3.5.3 List of Warnings

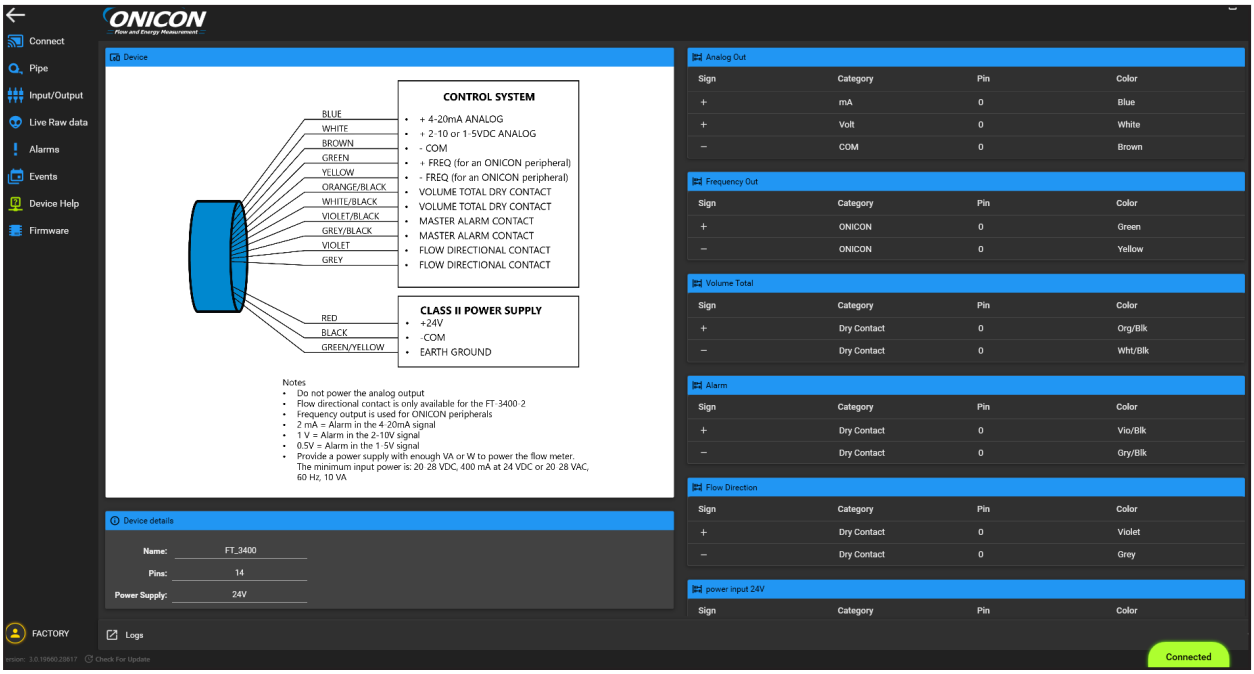
| WARNINGS | | |
|---|---|---|
| **STATUS** | **POTENTIAL ISSUE** | **POSSIBLE SOLUTIONS** |
| **Warn Reverse Flow** | Not an actual issue present. The warning is present as a message when the flow is going in the opposite direction for bidirectional meters. | |
| **Warn Low Flow** | Flow is below low flow cut-off in FPS | The meter cut-off is 0.1 ft/sec. Increased flow and warning will clear. |
| **Warn AOUT Low Flow** | Flow is below 5% of analog output full-scale | Increased flow and warning will clear. |
| **Warn AOUT High Flow** | Flow is between 95% to 100% of analog output full scale | Decrease flow and warning will clear. |
| **Warn Freq. High Flow** | Flow is between 95% to 100% of the maximum frequency output | Decrease flow and warning will clear. |
| **Warn Flow Sample Overrun 1** | Sampling not optimal | Contact ONICON. |
| **Warn Flow Sample Overrun 2** | | |
| **Warn Flow Sample Transient E** | | |
| **Warn Flow Sample Near Full** | | |

## 3.6 DEVICE HELP (WIRING AND TERMINAL BOARD TAB)

This tab provides all connections to the attached 10 ft or 25 ft cable. The most common causes of electronic failures are mis-wired connections during installation. When adding additional cable, record and carefully document any substitution of wire colors. An additional cable may be purchased from ONICON that will allow you to maintain the existing color coding. All electrical connections to the FT-3400 must be made through the 10 ft or 25 ft cable provided with the meter. Special care is required to ensure that the FT-3400 is connected to earth through the green/yellow earth wire. This connection is required to prevent random electrical noise from interfering with the operation of the meter.

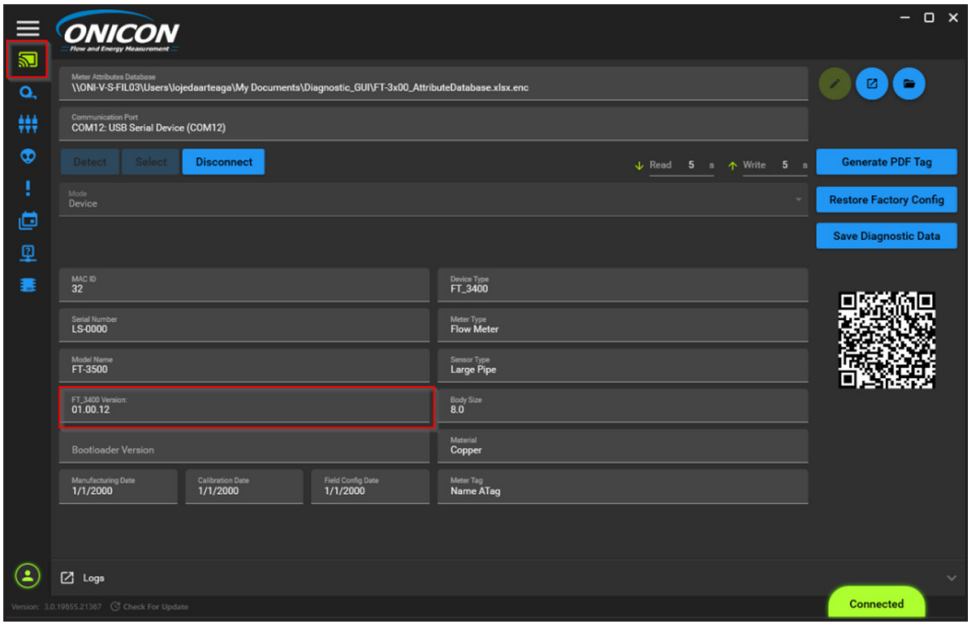
***CAUTION***

***Only qualified personnel should attempt to make electrical connections to the FT-3400. Failure to properly connect the FT-3400 power, signal, or earth connections to the FT-3400. Failure to properly connect the FT-3400 power, signal, or earth connections may reslt in damage to the FT-3400 and/or to associated peripheral equipment.***

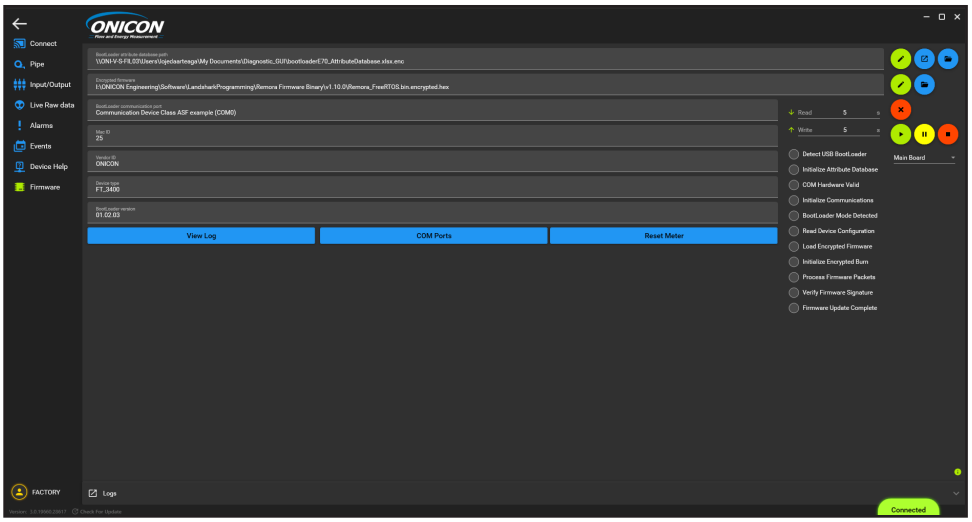


## 3.7 UPDATING FIRMWARE

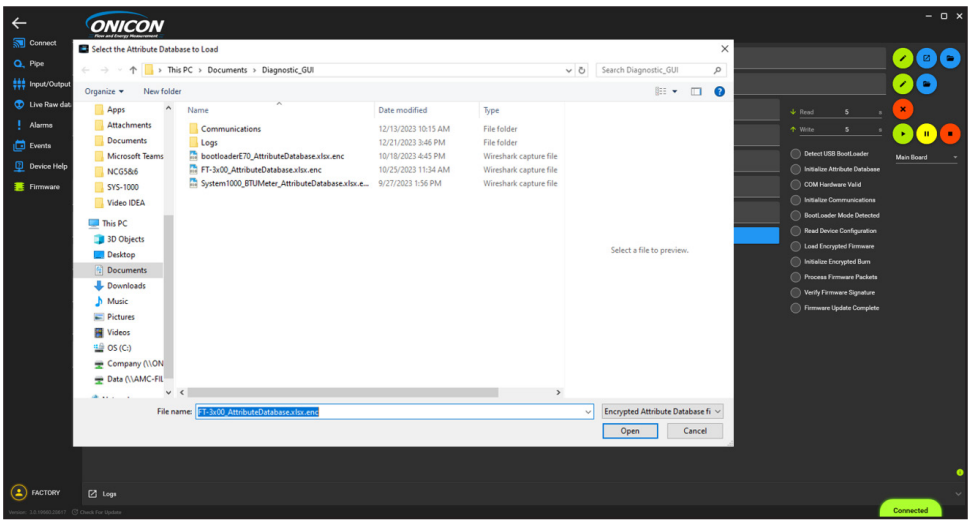
1. The “Connect” page  should show the current FW version of the meter and the meter information.



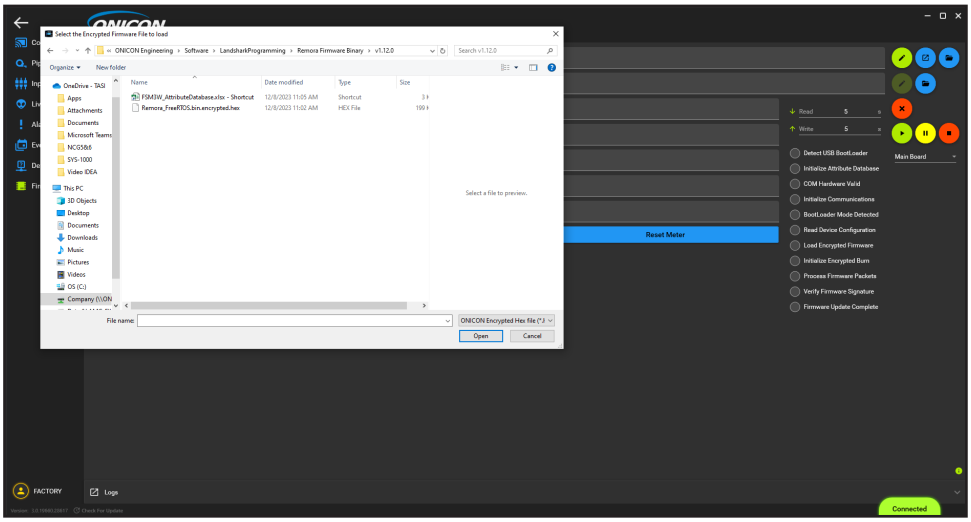

2. Go to the “Firmware” page by clicking this icon  on the left side of the screen



3. Next load the bootloader information by clicking the top pencil and then selecting the appropriate bootloader attribute file

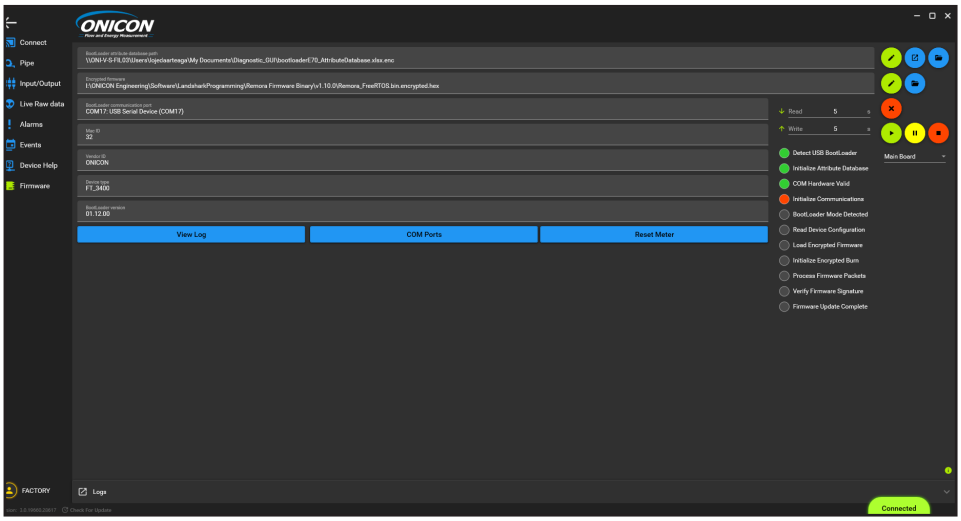



4. Next load the firmware, the ".encrypted.hex" file by clicking the second pencil  from the top and then select your file

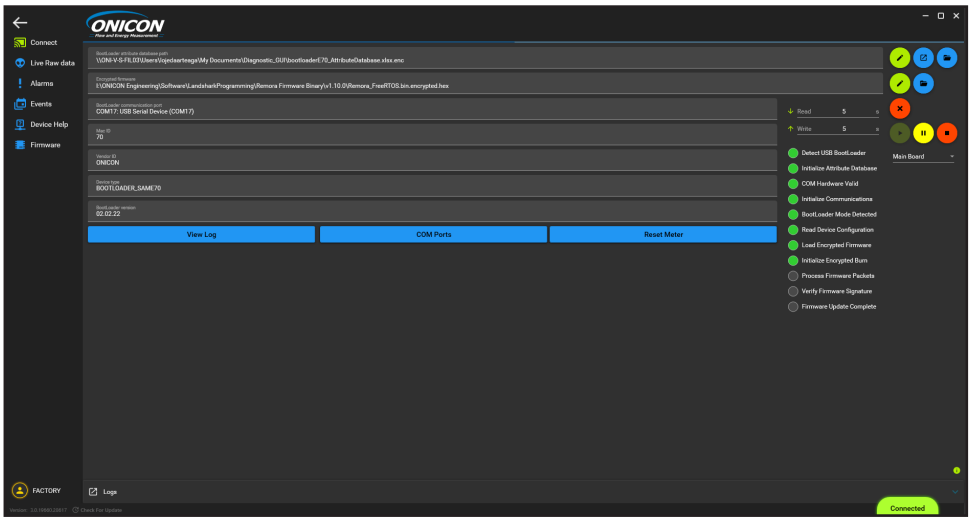


5. **PLEASE STOP FOR A MINUTE AND READ STEPS 5-8**. If you do this incorrectly you will have to restart the software and start from step 1 again. **You have 40 seconds to do the next steps** once you click "reset meter". Once you are familiar with the next set of instructions, please proceed.
6. Reset the meter using the "Reset Meter" button 

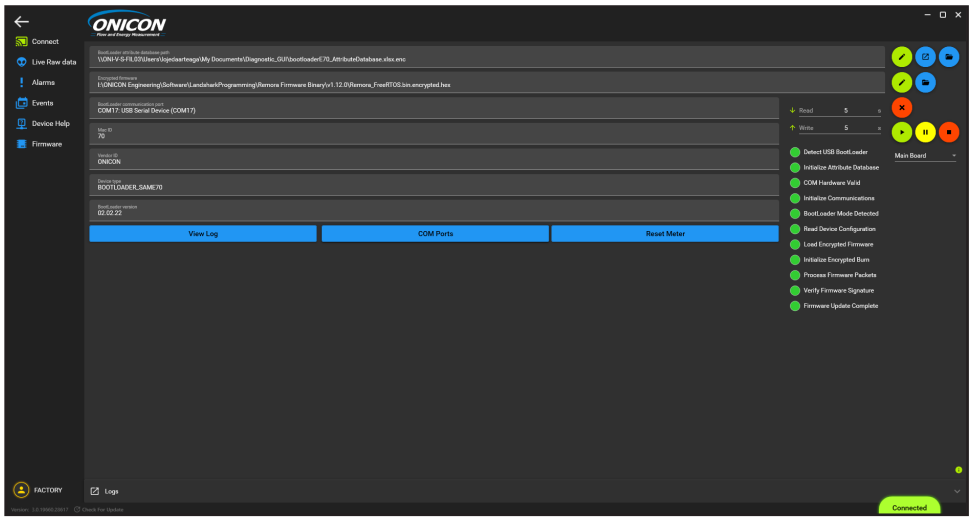
7. Press  to disconnect and then go again to the "firmware" section to load the new firmware




8. Click the "firmware"  page on the left. Then press the "connect" button  and then the "play" button  to update the firmware.

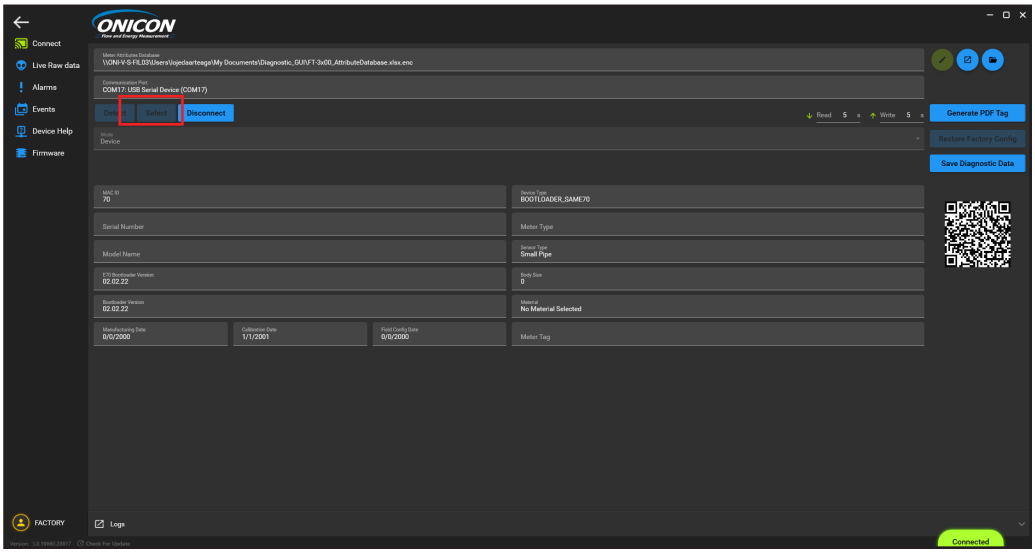


9. All the statuses should be green after the firmware is loaded properly.



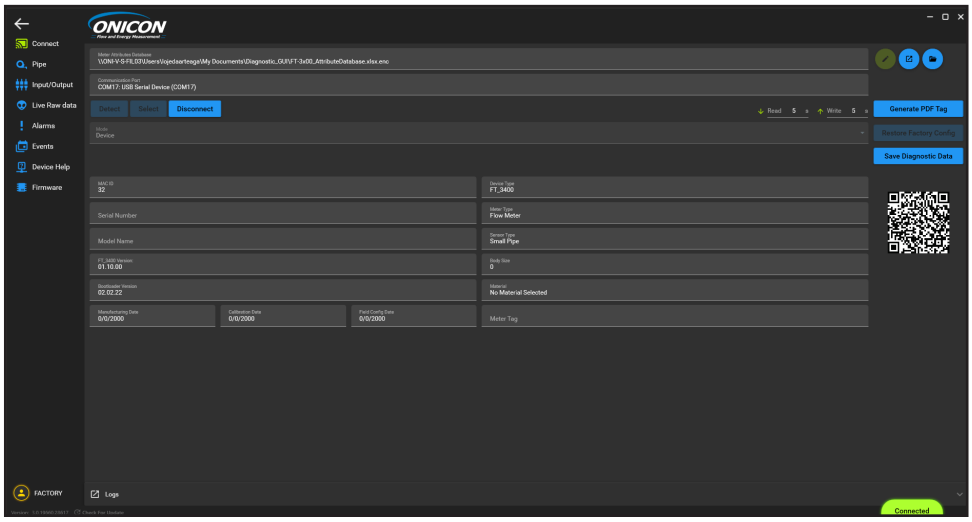

10. Unplug the USB from the PC and disconnect  the meter from the App.





11. Plug the USB back and connect the meter one more time to the PC app. (refer to step 5 c  "how to connect to the app" section if help is needed on this step.

12. After the meter is connected, confirm the new firmware is shown on the "connect" page




13. Now you can shut down the program and safely remove the USB.