SOFTWARE

FT3 VIEW™

Free PC-Based Software Tool

for the FT3 Thermal Gas Mass Flow Meter

Software Instruction Manual

Document #104845
Rev F

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This publication must be read in its entirety before performing any operation. Failure to understand and follow these instructions could result in serious personal injury and/or damage to the equipment. Should this equipment require repair or adjustment beyond the procedures given herein, contact the factory at:

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Download Technical Data Sheets from our website:
www.foxthermal.com

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Fox Thermal FT3 Manuals:

- **Model FT3 Instruction Manual**

All Fox Thermal Manuals and software available in English only.

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Introduction
Thank you for purchasing the Model FT3 Thermal Gas Mass Flow meter from Fox Thermal. The Model FT3 is one of the most technically advanced flow meters in the world. Extensive engineering effort has been invested to deliver advanced features, accuracy measurement performance, and outstanding reliability.

The FT3 View™ software allows users to easily display data and configure the FT3 to their specific application parameters. The software allows users to collect flow/temperature data and export to an Excel® file. The software can access the Zero CAL-CHECK™ and CAL-V™ calibration validation diagnostic tests. The FT3 also offers an optional data logger with date/time stamp.

The Model FT3 is available with two different communication options: RS485 Modbus or HART. The FT3 View™ Software has been developed to react intuitively to the type of FT3 meter with which it is interfacing.

This Manual contains the installation and operation instructions for the FT3 View™ Software.

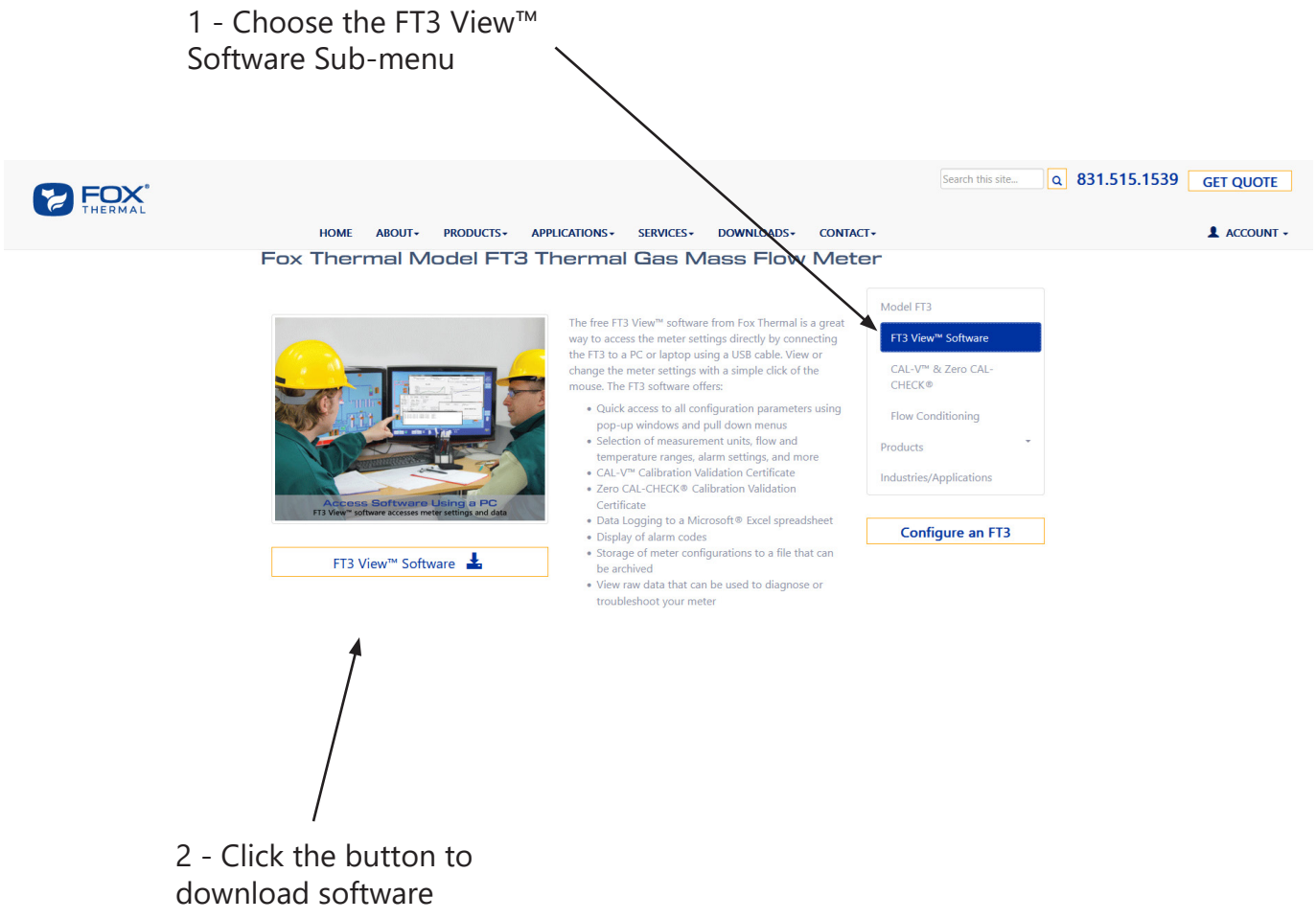
This manual is divided into the following sections: Introduction, Installation, Startup, Operation, Glossary and Index.

Prepare the Flow Meter for Connecting to a PC
Open the enclosure by unscrewing the back enclosure cap. Connect the FT3 to a PC with a USB (Type-A / Mini-B) cable. If the PC is connected to the internet and running Windows®, the PC will try to automatically load the VCP driver. If the driver does not load automatically, download the VCP driver at: www.ftdichip.com/Drivers/VCP.htm

Download the FT3 View™ Software from Fox Website
The latest version of the FT3 View™ software is available for download at www.foxthermal.com/products/ft3.php#ft3view

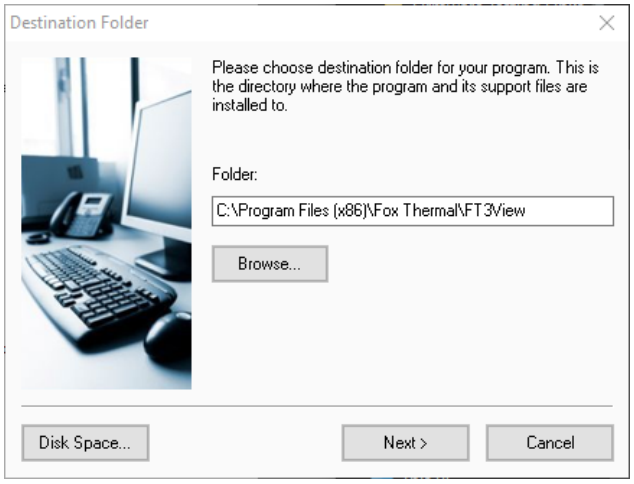
The location of the FT3 View Software download link on the FT3 product webpage is shown below.

Fig. 2.1: Online Download Location for FT3 View™ Software

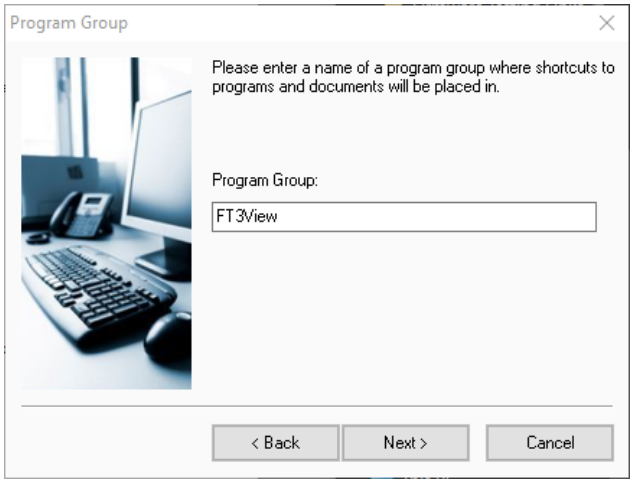


Install the FT3 View™ Software on a PC

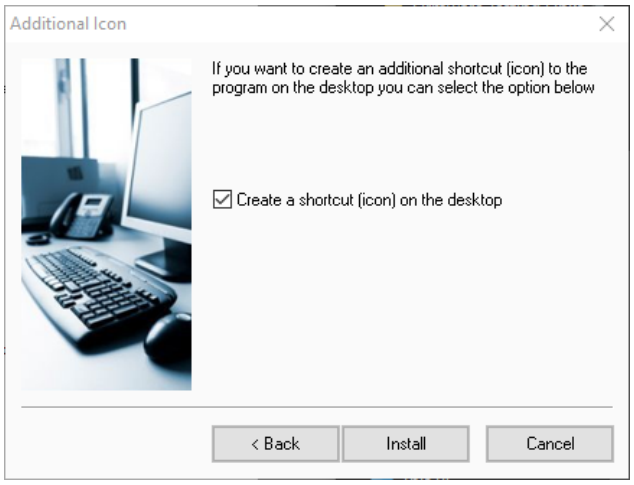
To install the FT3 View™ program, run the downloaded "ft3view-setup.exe" file. After clicking "Next" the screen will show:



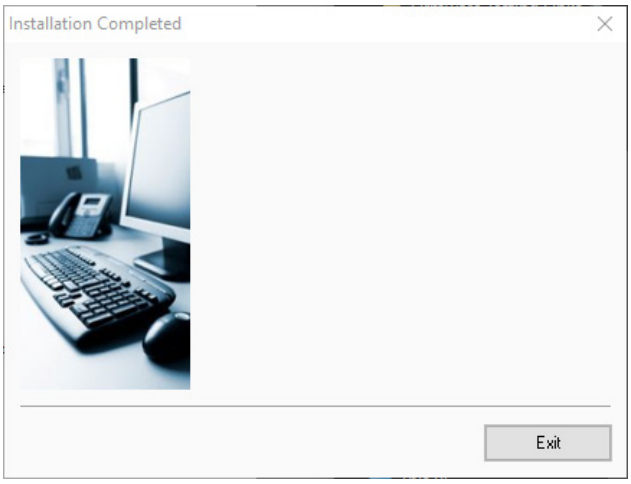
Select the folder in which you wish to install FT3 View™, then click "Next".



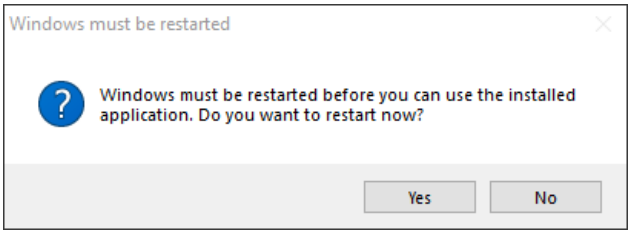
Please enter a name for the Program Group or use the default FT3View name and click "Next".



To find the program easily, you may choose to create a shortcut icon for your PC desktop by placing a check in the checkbox. Click "Install" to continue.



When the program is done installing, click "Exit".



To complete the installation process, close all applications, and restart your computer. The FT3 View™ Software will be ready to use after the computer has rebooted.

Power on the Meter

Refer to the FT3 Instruction Manual for Power input wiring instructions. The FT3 must be powered on to communicate with the FT3 View™ software tool.

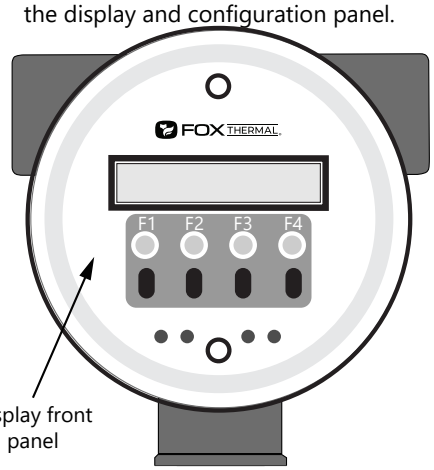
Connect the FT3 to a PC or Laptop via USB

Be sure to have your FT3 flow meter connected by USB to a PC or laptop that has FT3 View™ software successfully downloaded to the operating system. The USB port can be found by removing the rear enclosure cap.

Front Enclosure Cap

No Wiring Access

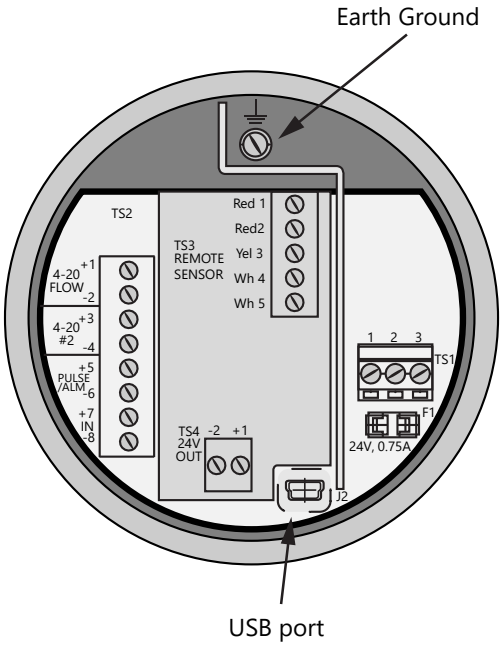
Unscrew front enclosure cap to access the mechanical buttons or change the orientation of the display and configuration panel.



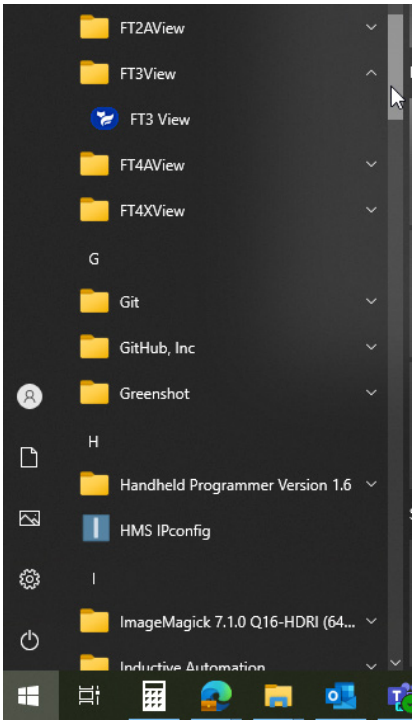
Rear Enclosure Cap

Wiring Access

Unscrew the rear enclosure cap to access wiring terminals for power, 4-20mA and pulse outputs, switch input, USB port, remote sensor, and serial communication options.



Startup FT3 View™ Software
After re-boot and connecting to a PC via USB, startup the FT3 View™ software accessible in the Windows "Start" button or search bar.



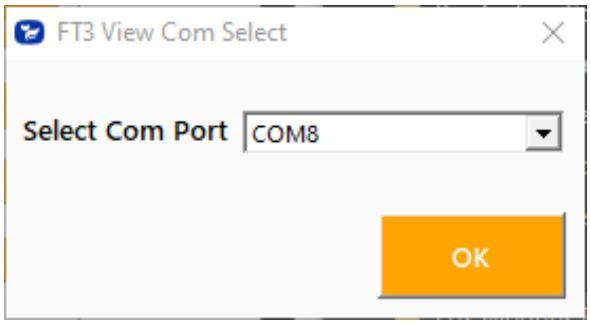
COM Port Assignment
Upon opening FT3 View™ for the first time, Windows® will assign a "virtual COM port". The COM port number that has been assigned will appear automatically in the drop down box.

If the correct COM Port does not appear, go to Control Panel/Device Manager and click on Ports (COM & LPT). The COM port number should be displayed under the USB symbol.

If prompted, enter the assigned COM port in FT3 View™ by using the drop down menu and press **OK**.

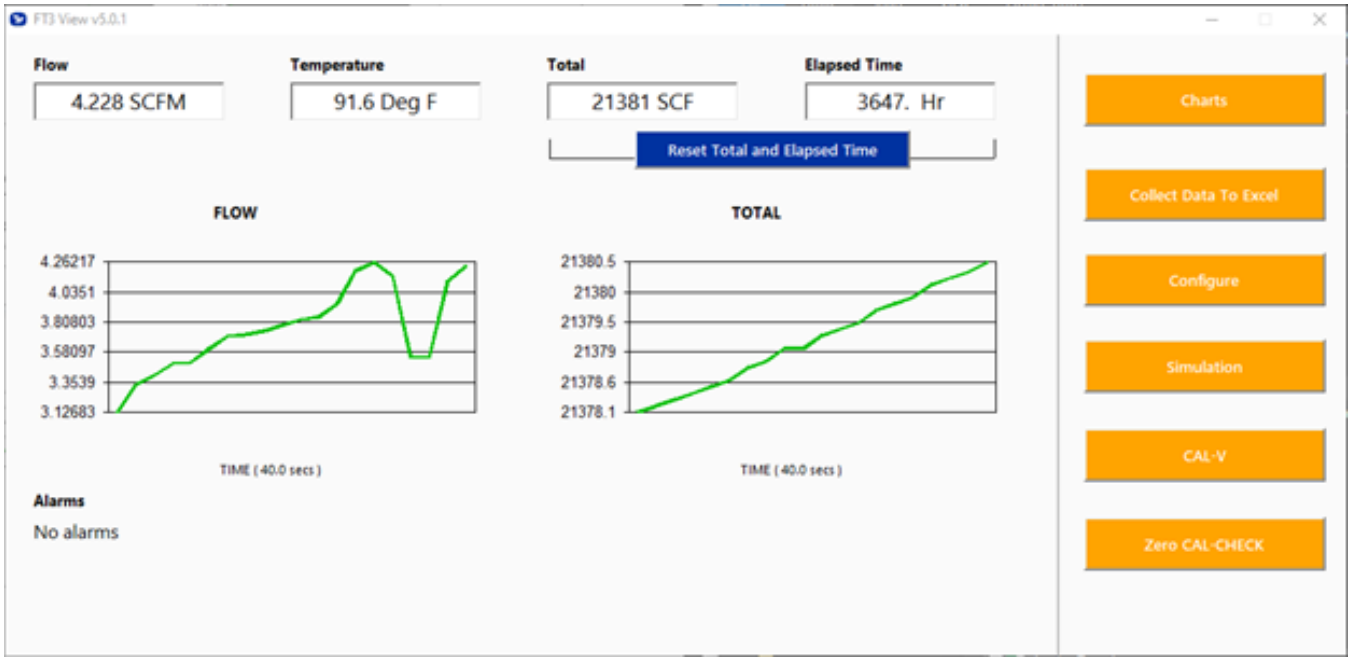
NOTE! The FT3 meter must be plugged into the computer in order for the system to register it.

Fig. 3.1: COM Port Selection Window



Main Screen
The image below depicts the main screen that appears upon entering FT3 View™.

Fig. 4.1: FT3 View™ Main Screen



Flow & Temperature
FT3 View™ will show values for flow and temperature in the pipe in real time based on how the flow meter has been configured (in this case, SCFM and ºF). These values are in the upper left of the screen.

Total & Elapsed Time
Flow total and Elapsed Time are shown in the upper right of the screen and can be reset with the button just underneath the displayed values.

Charts Button
This calls up two charts that can be configured for flow, temperature, or total flow. Each chart can be individually enlarged and rescaled from the original default settings. For more information on how to change the charts settings, refer to p. 12.

NOTE! Data on the screen is refreshed at user selected update rate.

Collect Data to Excel® Button
Selecting the Collect Data to Excel button allows all selected data to be assembled into an Excel® file at the specified sample time. All readings are time/date stamped. For more information on using the data collection function, refer to "Collect Data to Excel" on p. 14.

Configure Button
This allows the operator to set the application parameters. This can be done using the FT3 View™ software or manually using the instrument's display. For more information on configuring application parameters, refer to "Configure" on p. 15.

Simulation Button
This function can be used to verify that all the flow meter outputs are working properly. The easiest way to perform this check is to enter a specific temperature/flow rate. The corresponding analog outputs can be verified using a DMM and using a timer for the pulse. Refer to p. 19 for more information on how to use the Simulation function.

Calibration Validation Diagnostic Test Section

CAL-V™ Button
Calibration validation allows customers to validate the accuracy and functionality of the meter in the field with a push of a button. By performing a simple test, the operator can verify that the meter is running accurately.
The CAL-V™ calibration validation test is explained in greater detail on p. 20.

Zero CAL-CHECK™ Button
The Zero CAL-CHECK™ calibration validation test can be performed while the unit is still in the pipe (if a no flow condition cannot be established) or out of the pipe when zero flow cannot be established. Zero CAL-CHECK™ does the following:

- Validates the zero stability of the meter
- Checks thermal conductivity (heat transfer) repeatability of the sensor

The ZERO CAL-CHECK™ calibration validation test is explained in greater detail on p. 24.

Charts Settings

From the main screen, click on "Charts". Two charts will appear side-by-side. Each chart can be selected for flow, temperature or total flow.

Fig. 4.2: Chart Settings Window - Chart 1

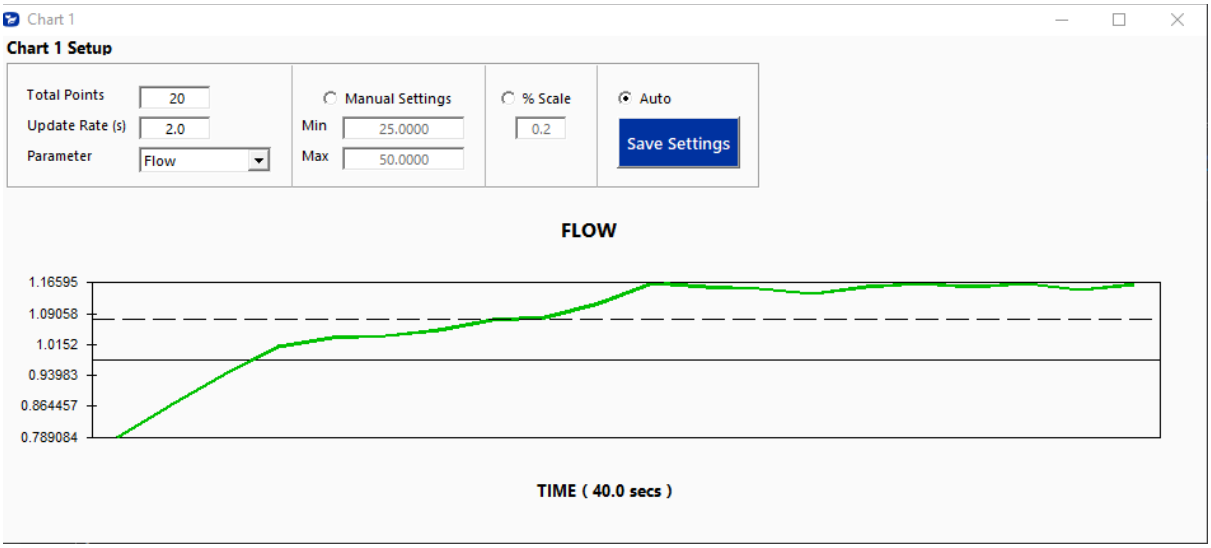
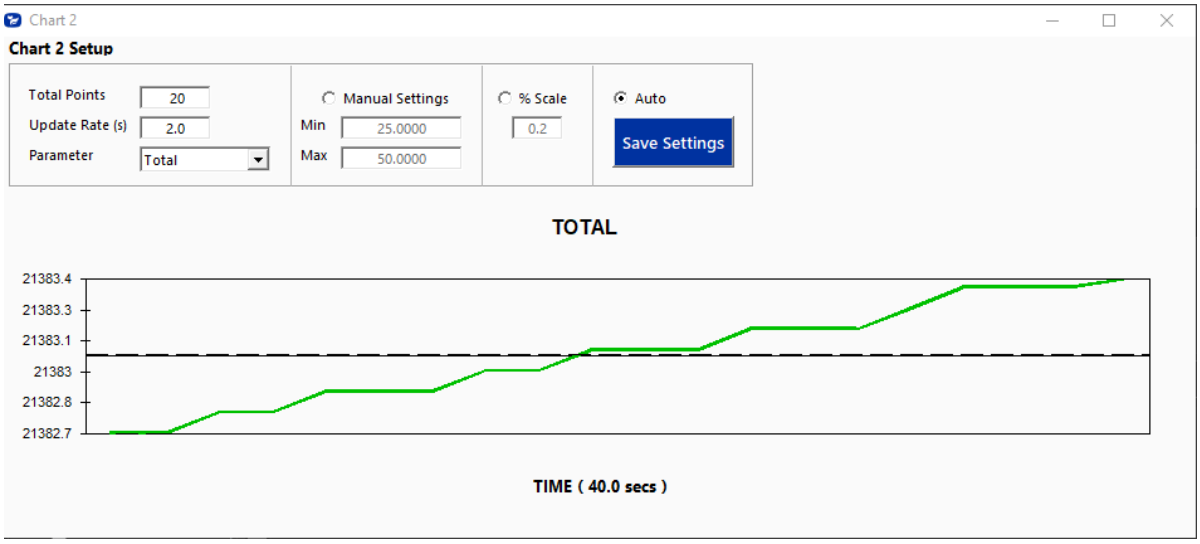


Fig. 4.3: Chart Settings Window - Chart 2



Total Points
The total points specifies the number of points plotted on the graph. Older data is automatically omitted.

Update Rate
The update rate controls the data refresh rate.

Parameters
Flow, temperature or total flow can easily be selected for charting.

Manual Chart Setting
The Manual mode allows a user to input min/max values for chart scaling. When entering new values, click on Save Settings for them to take effect.

Percent (%) Scale
This sets the scale to a plus/minus specified percentage from the initial measured value. Typically, the minimum/maximum is scaled at plus/minus 10% of that initial value.

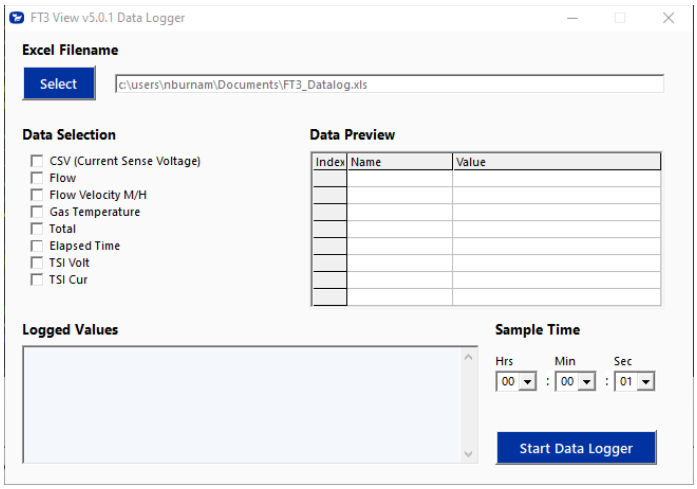
Automatic Chart Setting
Automatic mode lets the program adjust the scaling on a real-time basis based on the entire range of values.

Save Settings
Click the Save Settings button to save the chart settings to the main screen window. These settings can then be closed by clicking on the "X" at the top right corner of the window.

Collect Data to Excel

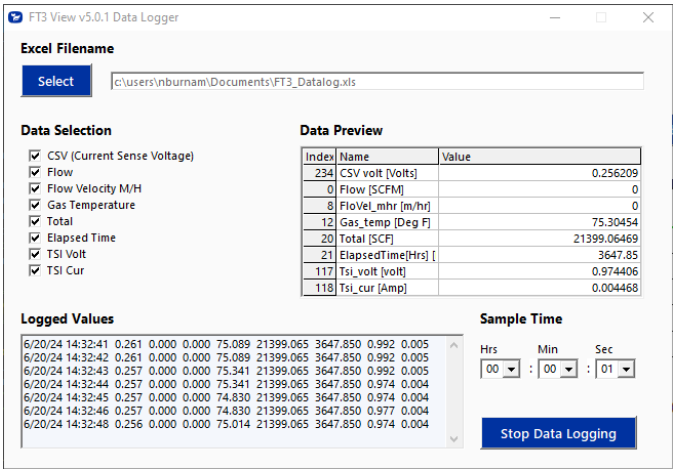
The Data Collection screen can be accessed from the main screen. Clicking the "Collect Data to Excel" function will prompt the user for a password. Enter a Level I (1234) or Level II (9111) password and the Data Collection window will appear.

Fig. 4.4: Data Collection Window - Logging Turned Off



Select the sample time from the drop menu, and then select the required data from the Data Selection list. Select or create a name for the Excel file and then press the "Start Data Logger" button.

Fig. 4.5: Data Collection Window - Logging Turned On

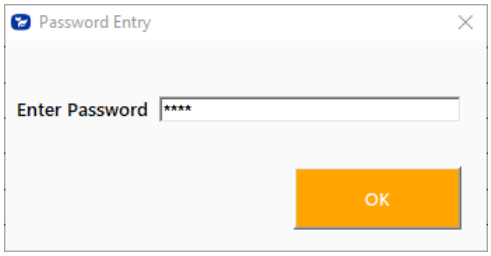


When "Start Data Logger" is pressed, the data is recorded in the specified Excel file - and also displayed in the Logged Values window. Pressing "Stop Data Logger" ends data acquisition.

Configure

From the main menu, click on the "Configure" button and enter the requested password for either Level I (1234) or Level II (9111) access.

Fig. 4.6: Password Window



NOTE! Most users will only need access to the Level I screen to do basic setting of units, alarms and output scaling.

Fig. 4.7: Level I Configuration Screen

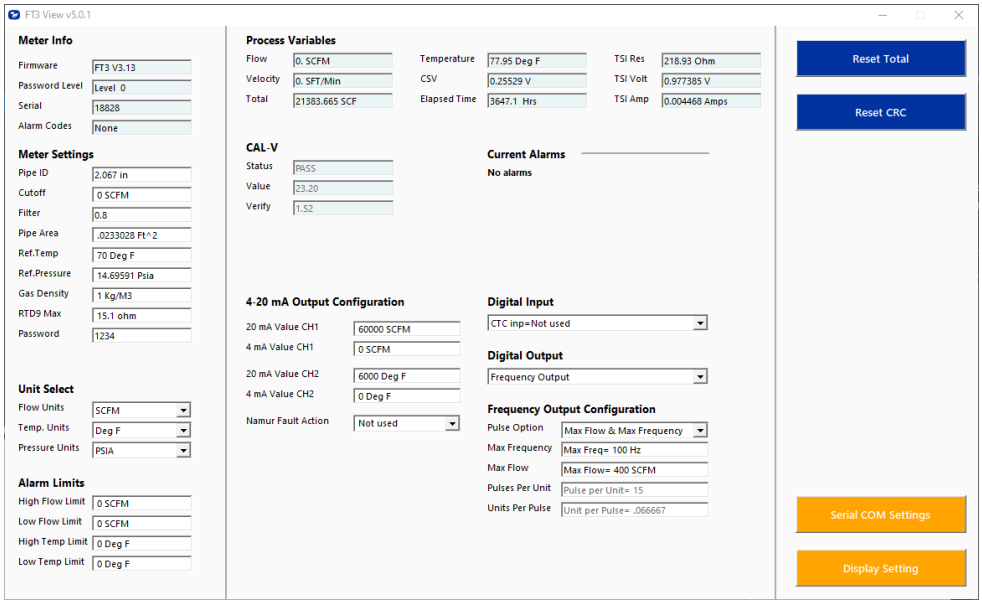
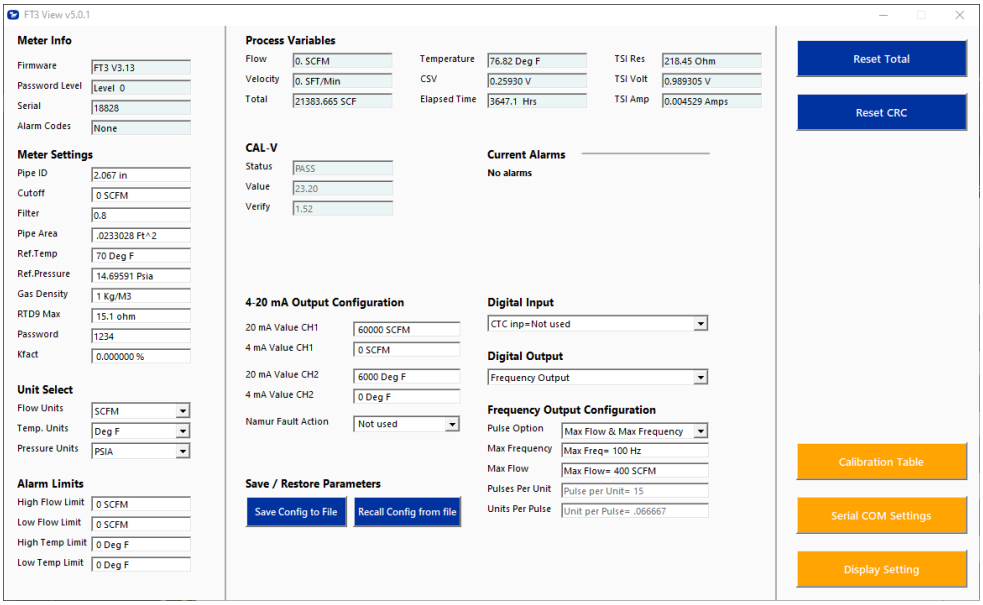


Fig. 4.8: Level 2 Configuration Screen



Meter Info

- **Firmware:** FT3 meter firmware revision level.
- **Password level:** FT3 View Password level entered.
- **Serial Number:** Serial number of the meter (factory set)
- **Alarm Codes:** Displays the alarm codes as described in the meter manual. These codes are written out in the Current Alarms menu.

Meter Settings

- **Pipe Inner Diameter (ID):** The pipe inner diameter can be entered in either inches or millimeters, depending on whether the flow or mass measurement units selected are metric or US standard. Once entered, the program will automatically recalculate the pipe cross-sectional area for the velocity/flow calculations. A precise ID is required to ensure accurate flow measurement.
- **Cut-off:** A gas flow rate at - or below - the cut-off setting will cause the meter to read zero. Default cut-off is set to 1% of maximum flow value.
- **Filter:** Changing this value will increase or decrease the damping of the flow rate reading. Increase the setting to increase damping. The default setting is 0.8.
- **Pipe Area:** The pipe internal cross-sectional area in square feet or square meters. This value can be entered directly - or it is automatically calculated by entering the pipe ID above.

NOTE! The ID unit is inches/mm, while the pipe area is in square feet/meters.

- **Ref. Temp:** Reference Temperature - Reference temperature and pressure are the standard (or normal) temperature and pressure (STP) for which the flow rate is calculated.
- **Ref. Presure:** Reference Pressure - Reference temperature and pressure are the standard (or normal) temperature and pressure (STP) for which the flow rate is calculated. This is set in the factory according to the customer's original AppID data.

- **Gas Density:** The gas density is required only when the selected output is mass units - either pounds or kilograms..
- **RTD9 Max:** The FT3 probe contains two sensing elements: a PowerPro™ and a precision RTD. The PowerPro™sensor has a maximum resistance (measured in ohms) that corresponds to the maximum temperature/current at which it can operate, before it shuts down (factory set).
- **Password:** The level 1 password can be changed to a new value (number or letter characters up to 4 digits).
- **Kfact:** A K-Factor can be applied to the meter's settings to offset the meter's calibration. The K-Factor is a direct scaling of the meter's output across the entire full scale (requires Level II password).

Unit Select
The "Unit Select" section is used to change the desired units of the flow rate, temperature and reference pressure.

Alarm Limits
Users can set both high/low alarms for both flow and temperature. When a limit is reached, an alarm message is displayed. In addition, if the meter's digital output is activated, breaching the alarm limit automatically activates a discrete output to control an external buzzer, light or some other way to alert the operator.

Process Variables
Flow: Current flow rate in selected units
Velocity: Flow velocity
Total: Cumulative mass or volume flow in selected units
Temperature: Gas temperature (Fahrenheit or Celsius)
CSV: Current sense voltage of sensor measurement circuit
Elapsed Time: Time since the Totalizer was reset
TSI Res: Calculated resistance of the temperature RTD element
TSI Volt: Measured voltage across the temperature RTD element
TSI Amp: Calculated current going through the temperature RTD element

Reset Total Button
The Reset Total button will clear the total and elapsed time.

Reset CRC Button
CRC (Cyclical Redundancy Check) is a value that verifies that all critical values in the meter's database are good. This check is performed once every minute. The Reset CRC button clears and generates a new CRC value.

4-20mA Output: Channels 1 & 2
Channel 1: This analog 4-20mA output is programmed for flow.
Channel 2: This analog 4-20mA output is configurable for either flow or temperature.
Though the FT3 will be scaled for the specific application coming from the factory, FT3 View™ allows the operator to easily re-scale the 4-20mA output as needed.

Digital Input Select
This menu allows the user to choose between Reset Total or None.

Digital Output Select
This menu allows the user to choose between dedicating the Output to Pulse, Alarms, or None.

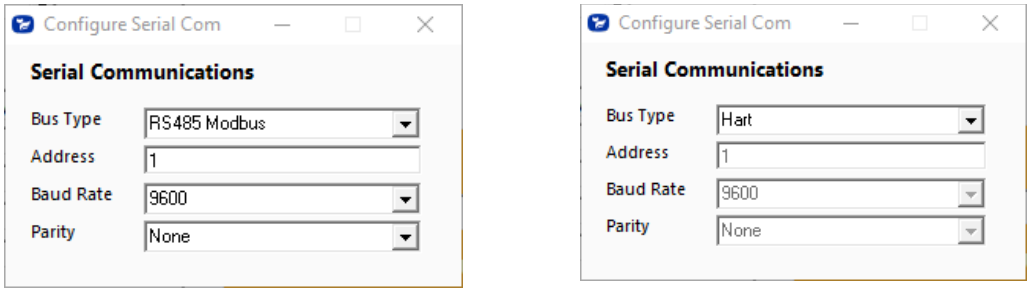
Frequency Output Configuration
This selection configures the FT3 digital output for either pulses (counts) or as an alarm discrete output.

If the pulses (counts) output is selected, it can be programmed in three different ways using the pull-down menu "Frequency Output Configuration".

- Maximum flow and maximum frequency
- Pulses per Unit
- Units per Pulse

Serial COM Settings
Use this function to set the serial communication settings for any of the optional FT3 bus communication boards.

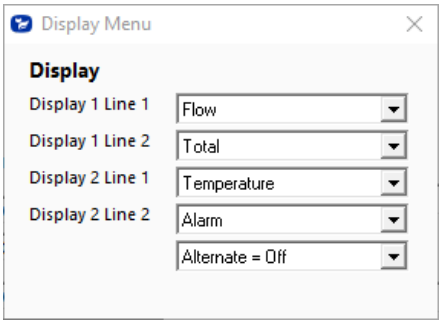
Fig. 4.9: Select Serial Communication Window



NOTE! This is only available on a meter configured for RS485 Modbus RTU or HART.

Display Setting
The information displayed on the front panel of the FT3 can be configured by clicking on the "Display Setting" button in the lower right portion of the Configuration screen. With the top four drop-down boxes, the user can choose the data to display on the meter's LCD display screen. By selecting "Alternate = On", the screen automatically switches between the data screens.

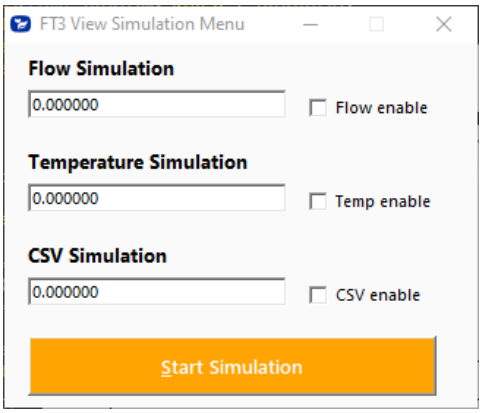
Fig. 4.10: Display Setting



Simulation Mode

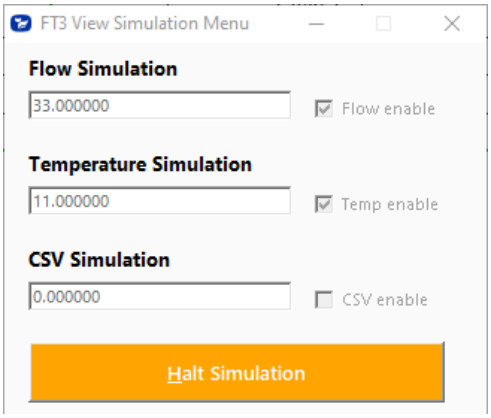
To enter simulation mode, click on the button marked "Simulation" in the Main screen and a password will be requested. Enter the password and then the Simulation screen will be shown.

Fig. 4.11: Simulation Mode Window



The simulation mode simulates flow rate, temperature and/or CSV. Click on the required data and enter a value. Simulation mode allows users to verify the analog output, digital outputs and totalizer at simulated flow rates and temperature. Enter the value, click **OK**, select the corresponding checkbox, and press "Start Simulation".

Fig. 4.12: Simulation Running

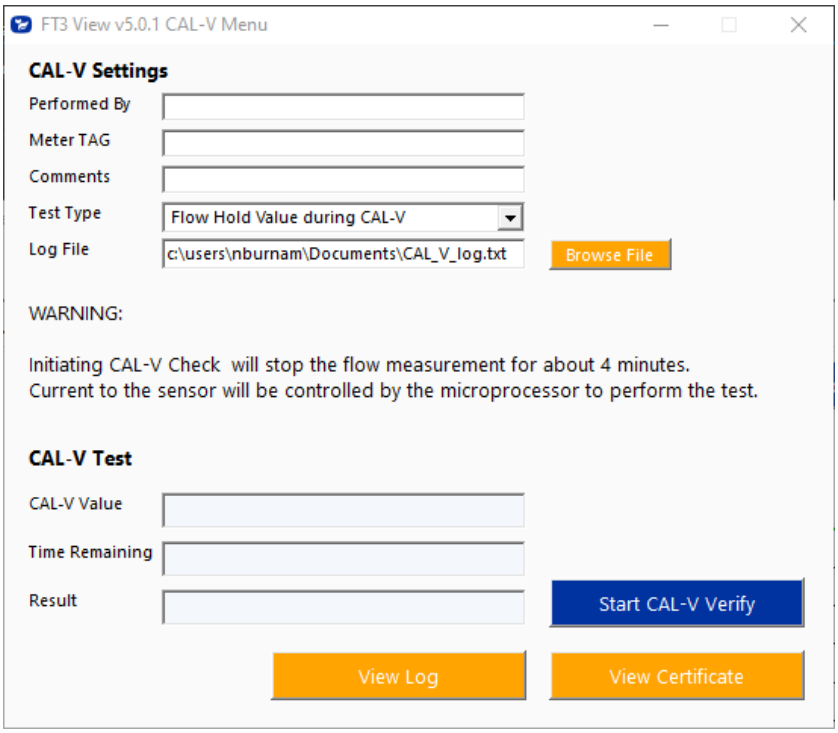


In Simulation mode, all FT3 outputs and the Totalizer respond as if in normal measurement mode. Click "Halt Simulation" to end.

CAL-V™

CAL-V™ is performed to verify the proper operation of the FT3 flow meter. From the Main screen, click on the "CAL-V" button to access the CAL-V™ Menu Window.

Fig. 4.13: CAL-V™ Menu Window



On the CAL-V™ Menu, there are fields to enter information about the person performing the test, meter tag information, and any other important information may be entered into the comments area.

NOTE! Refer to the Calibration Validation section of the FT3 manual for additional information and instructions

A drop-down menu allows the user to choose between these two options:

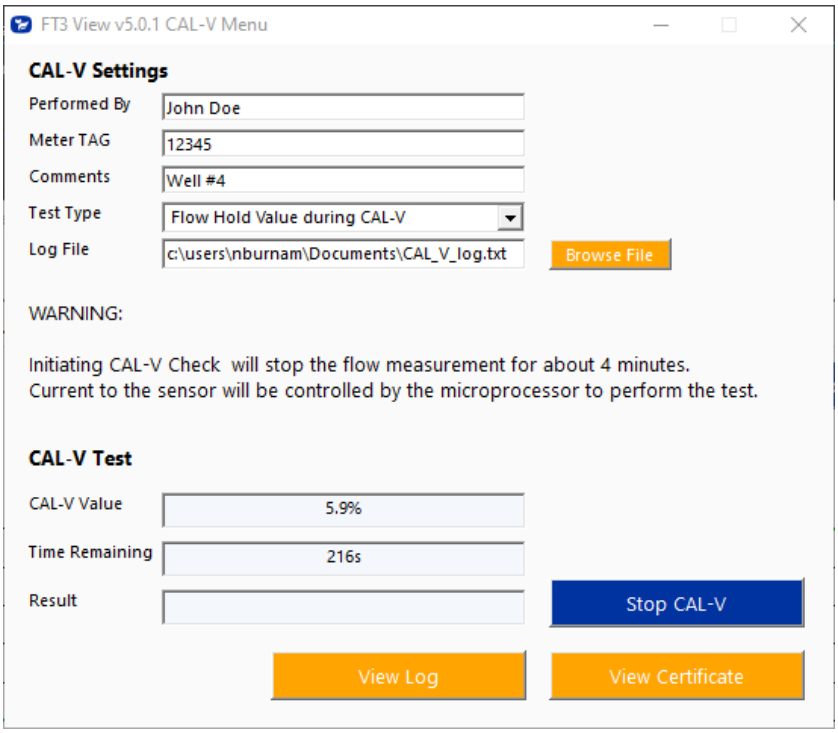
- Flow goes to Zero during CAL-V™
- Flow holds the last value during CAL-V™

The user can also specify a particular folder name and location for the data to be stored in a log to access test results at later times.

Please note that the test will take about five minutes. The flow measurement will stop and go to zero for this period unless the "hold last value" option has been chosen.

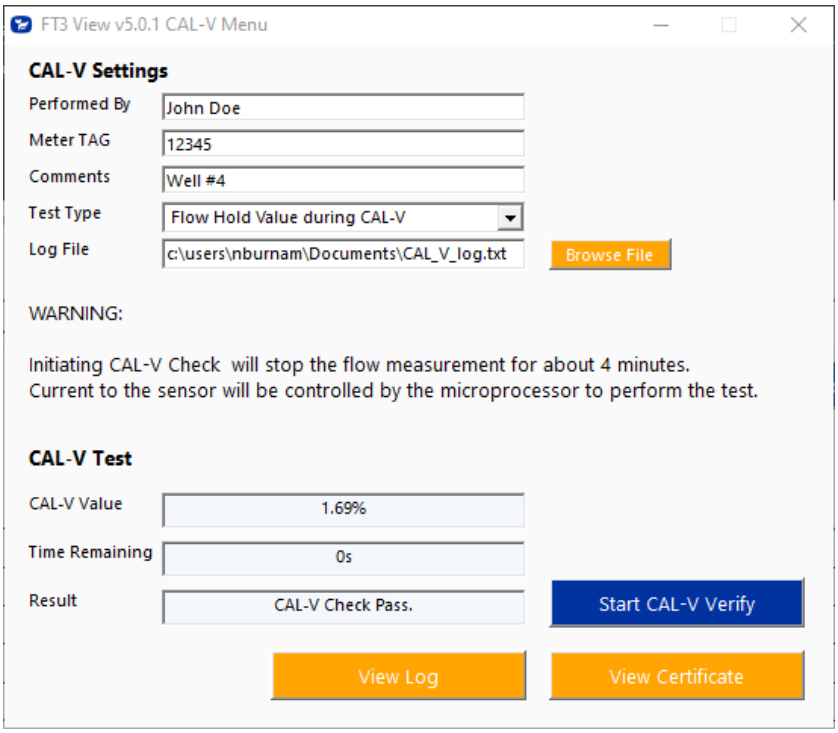
When ready to start, click the "Start CAL-V Verify" button.

Fig. 4.14: Running a CAL-V™ Test



A Pass/Fail message for the CAL-V™ test will be displayed at the test conclusion.

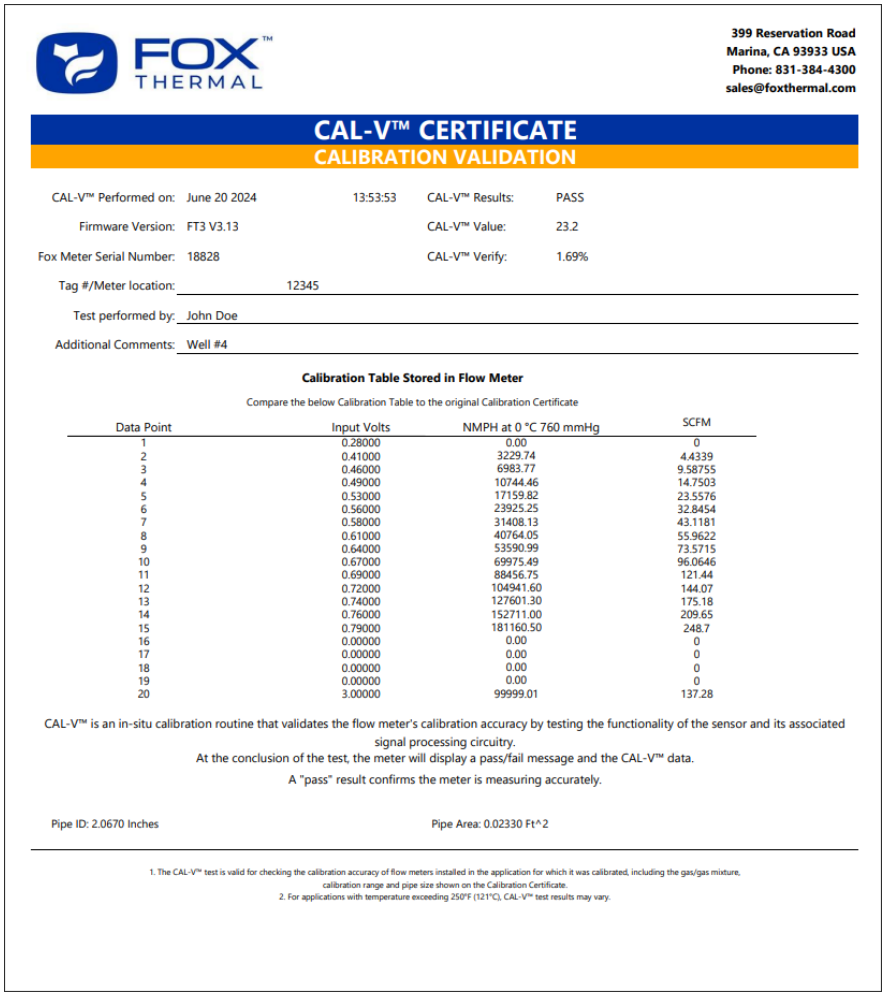
Fig. 4.15: CAL-V™ Results Window



CAL-V™ Certificate

The CAL-V™ View Certificate button will display the latest certification. When performing a CAL-V™ test, all the data is logged into a CAL-V™ log file with all pertinent data, including the serial number. You can choose to create multiple logs by changing the file name and location on the CAL-V™ window. When a CAL-V™ certificate is requested, the program will search the log file for the specific serial number and will display only the last check performed.

Fig. 4.16: CAL-V™ Certificate



FOX THERMAL

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sales@foxthermal.com

CAL-V™ CERTIFICATE
CALIBRATION VALIDATION

CAL-V™ Performed on:	June 20 2024 13:53:53	CAL-V™ Results:	PASS
Firmware Version:	FT3 V3.13	CAL-V™ Value:	23.2
Fox Meter Serial Number:	18828	CAL-V™ Verify:	1.69%

Tag #/Meter location: 12345

Test performed by: John Doe

Additional Comments: Well #4

Calibration Table Stored in Flow Meter

Compare the below Calibration Table to the original Calibration Certificate

Data Point	Input Volts	NMPH at 0 °C 760 mmHg	SCFM
1	0.28000	0.00	0
2	0.41000	3229.74	4.4339
3	0.46000	6983.77	9.58755
4	0.49000	10744.46	14.7503
5	0.53000	17159.82	23.5576
6	0.56000	23925.25	32.8454
7	0.58000	31408.13	43.1181
8	0.61000	40764.05	55.9622
9	0.64000	53590.99	73.5715
10	0.67000	69975.49	96.0646
11	0.69000	88456.75	121.44
12	0.72000	104941.60	144.07
13	0.74000	127601.30	175.18
14	0.76000	152711.00	209.65
15	0.79000	181160.50	248.7
16	0.00000	0.00	0
17	0.00000	0.00	0
18	0.00000	0.00	0
19	0.00000	0.00	0
20	3.00000	99999.01	137.28

CAL-V™ is an in-situ calibration routine that validates the flow meter's calibration accuracy by testing the functionality of the sensor and its associated signal processing circuitry.
At the conclusion of the test, the meter will display a pass/fail message and the CAL-V™ data.
A "pass" result confirms the meter is measuring accurately.

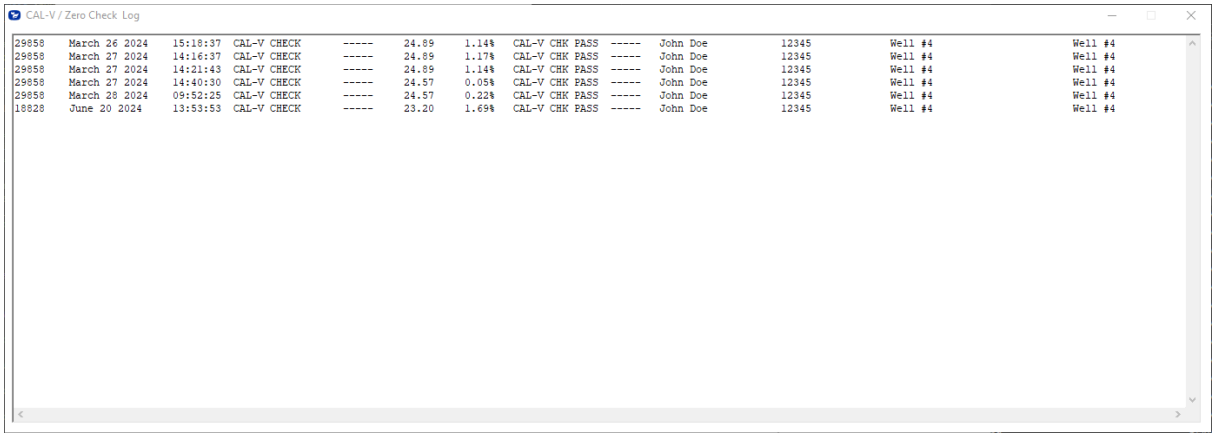
Pipe ID: 2.0670 Inches Pipe Area: 0.02330 Ft^2

1. The CAL-V™ test is valid for checking the calibration accuracy of flow meters installed in the application for which it was calibrated, including the gas/gas mixture, calibration range and pipe size shown on the Calibration Certificate.
2. For applications with temperature exceeding 250°F (121°C), CAL-V™ test results may vary.

CAL-V™ Log

The CAL-V™ View Log button allows the operator to view a log of previous CAL-V™ checks that have been run on the meter. Be sure to access the correct log by choosing the correct file name in the CAL-V™ Log File box.

Fig. 4.17: CAL-V™ Log

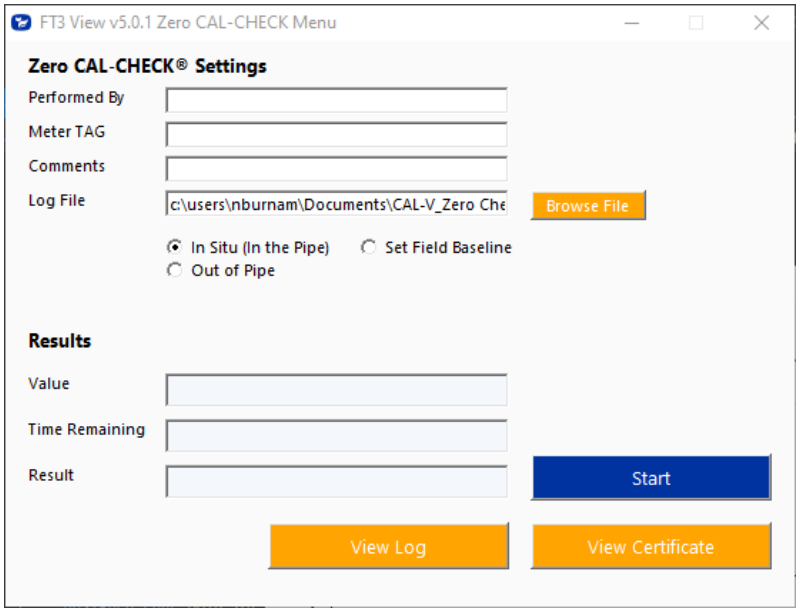


Zero CAL-CHECK™
Zero CAL-CHECK is performed to verify the proper operation of the FT3 flow meter.

NOTE! Refer to the Calibration Validation section of the FT3 manual for additional information and instructions.

From the main screen, click on the "Zero CAL-CHECK" button to access the Zero CAL-CHECK™ Test Menu Window.

Fig. 4.18: Zero CAL-CHECK™ Test Menu Window



On the Zero CAL-CHECK™ Test Menu, there are fields to enter information about the person performing the test, meter tag information, and any other important information may be entered into the comments area.

Two test options are available when performing a Zero CAL-CHECK™ test:
In-Situ (In the Pipe): use only if zero flow can be established
Out of Pipe: use when zero flow cannot be established

WARNING! Before performing the In-Situ (In the Pipe) test for the first time, the "Field Baseline" must be set. Any test performed after the first time does not require the Field Baseline to be set. See instruction manual for more information.

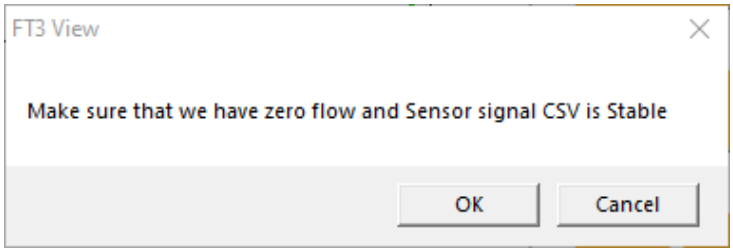
Choose the appropriate test option based on your ability to achieve a "zero flow" or "no flow" condition in the pipe. You may also use the In-Situ (In the Pipe) test if you are using a Fox retractor assembly to remove the meter from the flow.

The user can also specify a particular folder name and location for the data to be stored in a log to access test results at later times.

Please note that the test will take about five minutes.

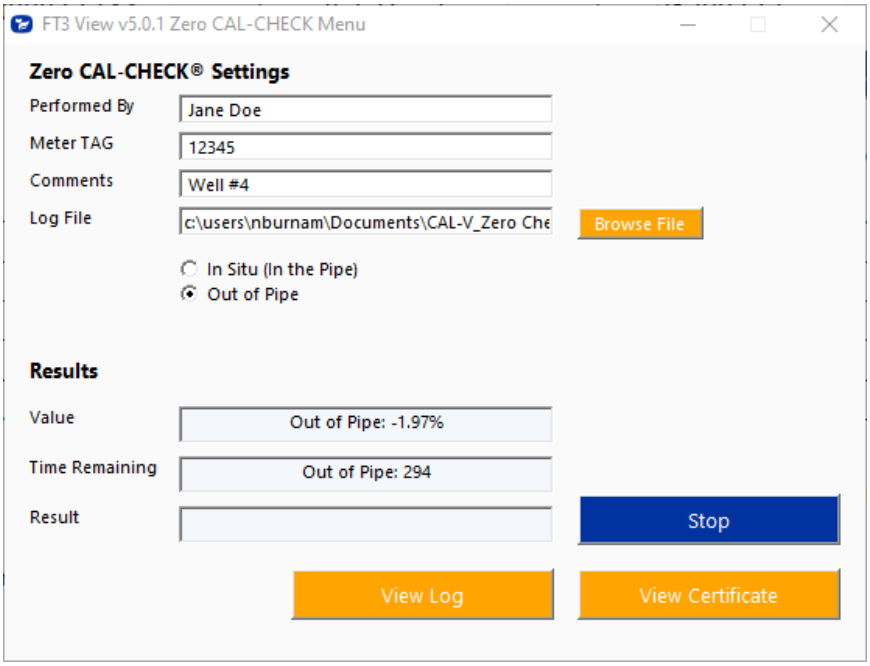
When ready to start, click the appropriate "Perform Zero CAL-CHECK™" button.

Fig. 4.19: Stable Conditions Confirmation Window



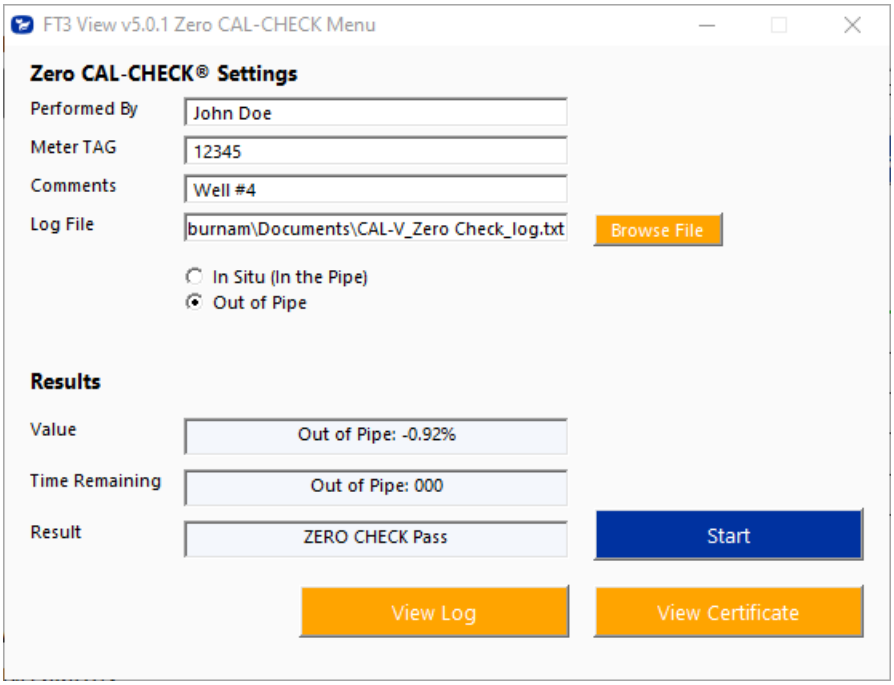
During the test, the Zero CAL-CHECK™ button will display the current calculated value and a countdown time of seconds left on the test.

Fig. 4.20: Running a Zero CAL-CHECK™ Test (Out of Pipe Example)



As with the CAL-V test, a Pass/Fail message for the Zero CAL-CHECK™ test will be displayed at the test conclusion.

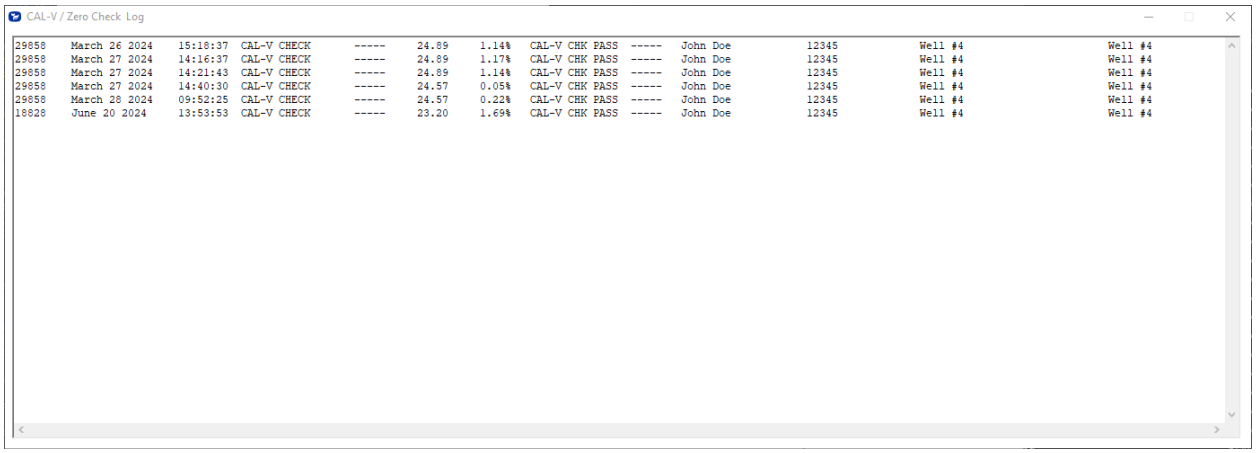
Fig. 4.21: Zero CAL-CHECK™ Results Window



Zero CAL-CHECK™ Log

The "View Log" button allows the operator to view a log of previous Zero CAL-CHECK™ tests that have been run on the meter.

Fig. 4.22: Zero CAL-CHECK™ Log



Zero CAL-CHECK™ Certificate

The Zero CAL-CHECK™ Certificate function displays the latest certification. When performing a Zero CAL-CHECK™ test, all the data is logged into a log file with all pertinent data, including the serial number. A laptop can be used to perform the Zero CAL-CHECK™ test on a different FT3 meter. When a Zero CAL-CHECK™ certificate is requested, the program will search the log file for the specific serial number and will display only the last check performed.

Fig. 4.23: Zero CAL-CHECK™ Certificate

FOX THERMAL™

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Zero CAL-CHECK® CERTIFICATE
CALIBRATION VALIDATION

Zero CAL-CHECK® Performed on: June 20 2024 2:21:21 PM
Firmware version: FT3 V3.13
Fox Meter Serial Number: 18828
Zero CAL-CHECK® Results: PASS
Zero CAL-CHECK®: -1.81%
Test Temperature 76.5 F
Tag #/Meter Location: 12345
Test performed by: John Doe
Additional Comments: Well #4

Zero CAL-CHECK® is a calibration routine that validates the flow meter's calibration accuracy by testing the following:

* Sensor free of residue or film
* Zero Stability of the meter
* Thermal Conductivity (heat transfer) repeatability of the sensor

At the conclusion of the test, the meter will display a pass/fail message and the Zero CAL-CHECK® data.

A "pass" result confirms the meter is measuring accurately.

Glossary of Terms and Definitions

COM	Communication
CRC	Cyclical Redundancy Check
CSV	Current Sense Voltage
DMM	Digital Multimeter
ID	Inner Diameter
mA	Milliamps
PC	Personal Computer
RTD	Resistance Temperature Detector
STP	Standard Temperature and Pressure
TSI	Temperature Sense Current

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Definition of Terms

NOTE! is used for Notes and Information

WARNING! is used to indicate a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION! is used to indicate a hazardous situation which, if not avoided, could result in minor or moderate injury.

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