# Fox Thermal

## THERMAL MASS FLOW METER & TEMPERATURE TRANSMITTER

## FT1 View™

Fox Thermal
Precision Mass Flow Measurement
An ONICON Brand

**www.foxthermal.com** | 399 Reservation Road Marina, CA. 93933

106515
Rev. F

# Notice

*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 FT1 Manuals:**
- **Model FT1 Instruction Manual**

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# Introduction



**Introduction**

Thank you for purchasing the Model FT1 Thermal Gas Mass Flow meter from Fox Thermal. The Model FT1 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 new FT1 View™ software allows users to easily display data and configure the FT1 to their specific application parameters. Then, log flow/temperature data to an Excel® file. The software can also access the Gas-SelectX® menu and the CAL-V™ calibration validation diagnostic test.

The Model FT1 is available with two different options: the RS485 Communication option or the Pulse Output option. The FT1 View™ Software has been developed to react intuitively to the type of FT1 meter with which it is interfacing.

This Manual contains the installation and operation instructions for the FT1 View™ Software.

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

# Installation



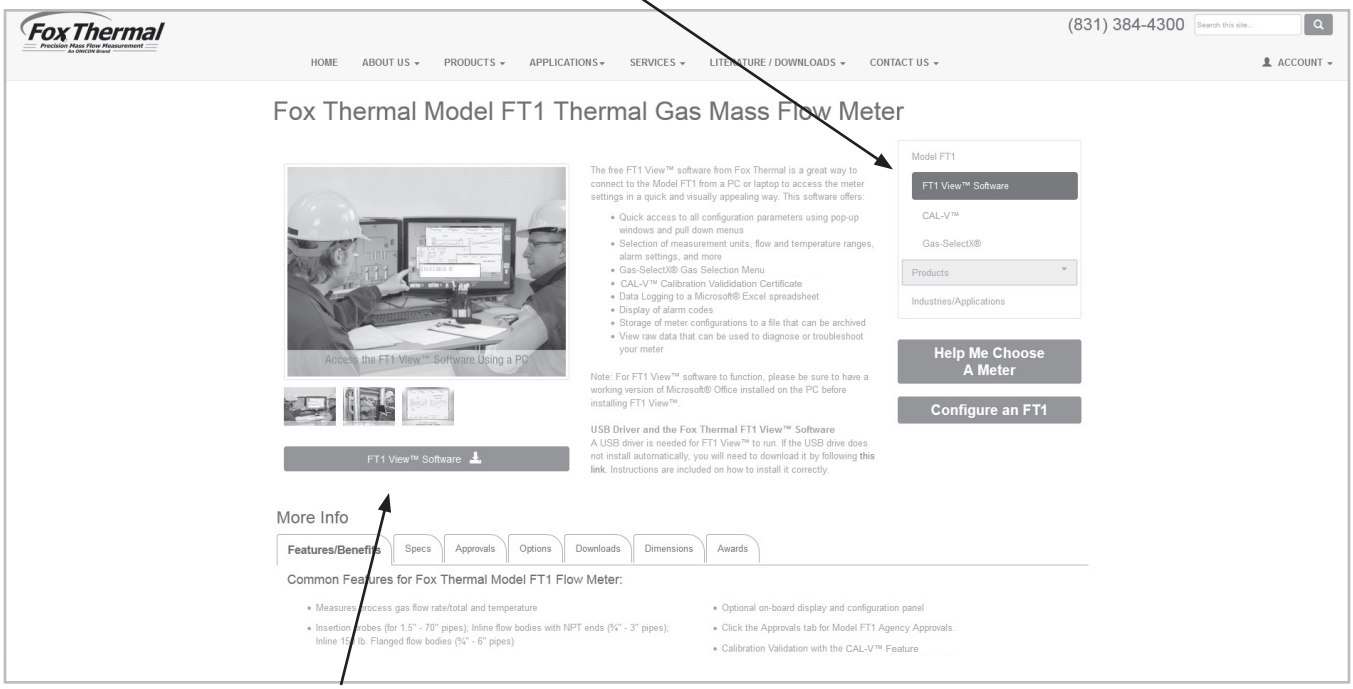
**Installation**

Open the enclosure by unscrewing the enclosure cap, loosen the two captive screws on the display assembly and rotate it open. Connect the FT1 to a PC with a USB (type A, mini 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

**NOTE!** The latest version of the FT1 View™ software is available for download at www.foxthermal.com/products/ft1.php#ft1view

*Fig. 2.1: Online Download Location for FT1 View™ Software*

1 - Choose the FT1 View™ Software Sub-menu

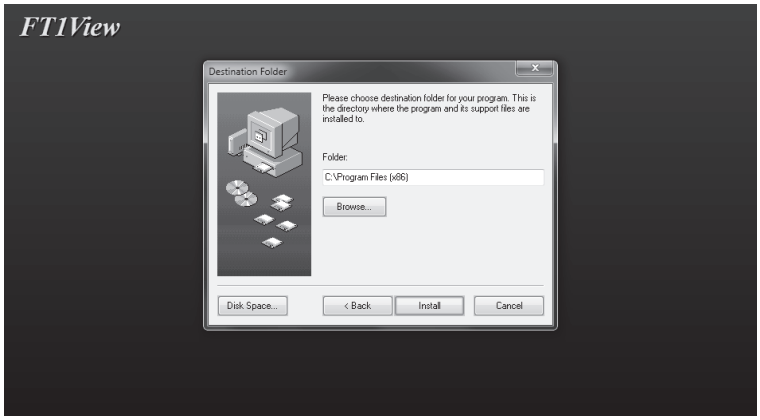



2 - Click the button to download software

# Installation



To install the FT1 View™ program, run the "FT1View_V#.##-setup.exe" file that is located in the downloaded file.  After clicking "Next" the screen will show:




Select the folder in which you wish to install FT1 View™, then click "Install".


When the program is done installing, you may exit, then restart your computer.

# Installation



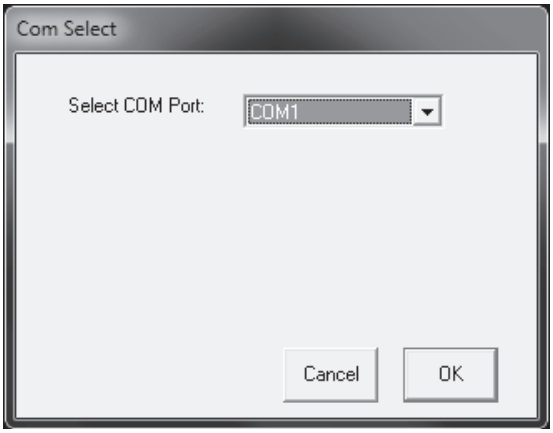
**COM Port Assignment**

Be sure to have your FT1 connected by USB to a PC or laptop before opening FT1 View™. Upon opening FT1 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 FT1 View™ by using the drop down menu and press **OK**.

**NOTE!** The FT1 Meter must be plugged into the computer in order for the system to register it.

Fig. 2.2: COM Port Selection Window



# Operation



## Main Screen

The image below depicts the main screen that appears upon entering FT1 View™.

*Fig. 3.1: FT1 View™ Main Screen*


## Charts Button

This calls up two charts that can be configured for either temperature or flow. Each chart can be individually enlarged and re-scaled from the original default settings. For more information on how to change the charts settings, refer to p. 10.

**NOTE!** The charts are refreshed at user selected update rate. See p. 10 for more information on setting up charts.

# Operation

**Data Log**
This function allows all selected data to be logged to an Excel® file at the specified sample time. All readings are time/date stamped. For more information on using the Data Logger function, refer to "Data Logger" on page 18.

**Configure**
This allows the operator to go in and set the application parameters. This can be done either via the FT1 View™ software or manually via the instrument's display. For more information on configuring application parameters, refer to p. 12.

**Simulation**
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 watch for the pulse. Refer to p. 19 for more information on how to use the Simulation function.

**CAL-V™**
Fox Thermal has developed the CAL-V® Calibration Validation to help our customers avoid sending the meter back for annual or biennial re-calibrations. Calibration Validation allows our customers to validate the accuracy and functionality of the meter in the field with the push of a button. By performing a simple test, the operator can verify that the meter is running accurately. CAL-V® ensures the repeatability, functionality of the sensor and its associated signal processing circuitry, and cleanliness of the sensor.

The CAL-V™ calibration validation test can be performed while the unit is still in the pipe. The CAL-V™ calibration validation test is explained in greater detail on p. 23.

**Alarms**
The unit can be configured for high/low alarms for either flow or temperature. The "alarms window" displays any alarms or warnings.

**Exit**
Exit the application.

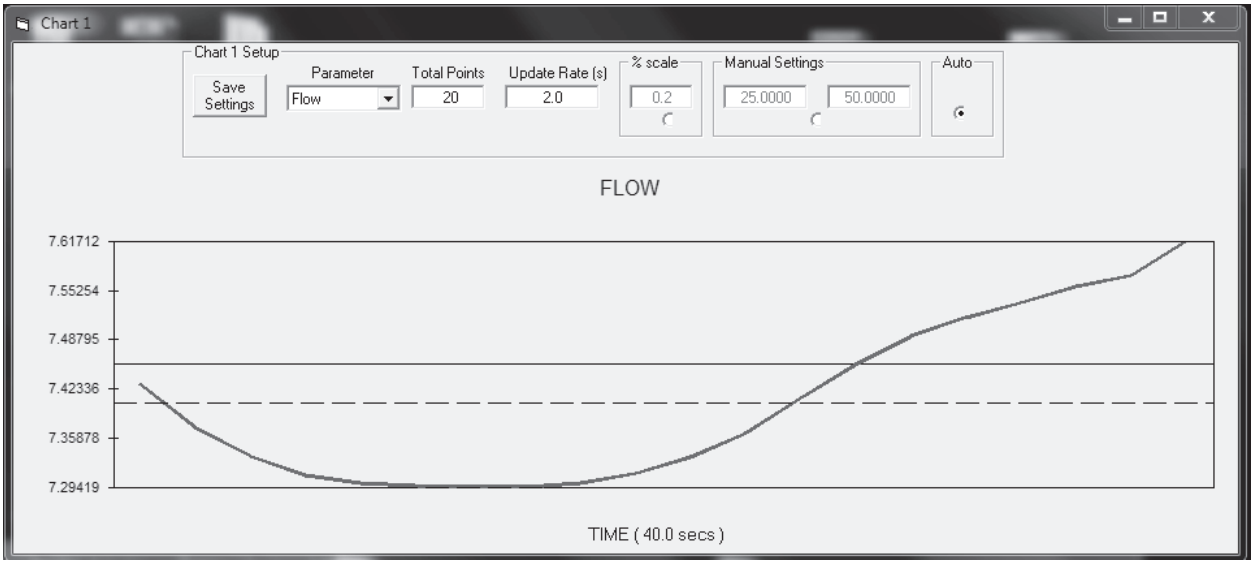
# Operation

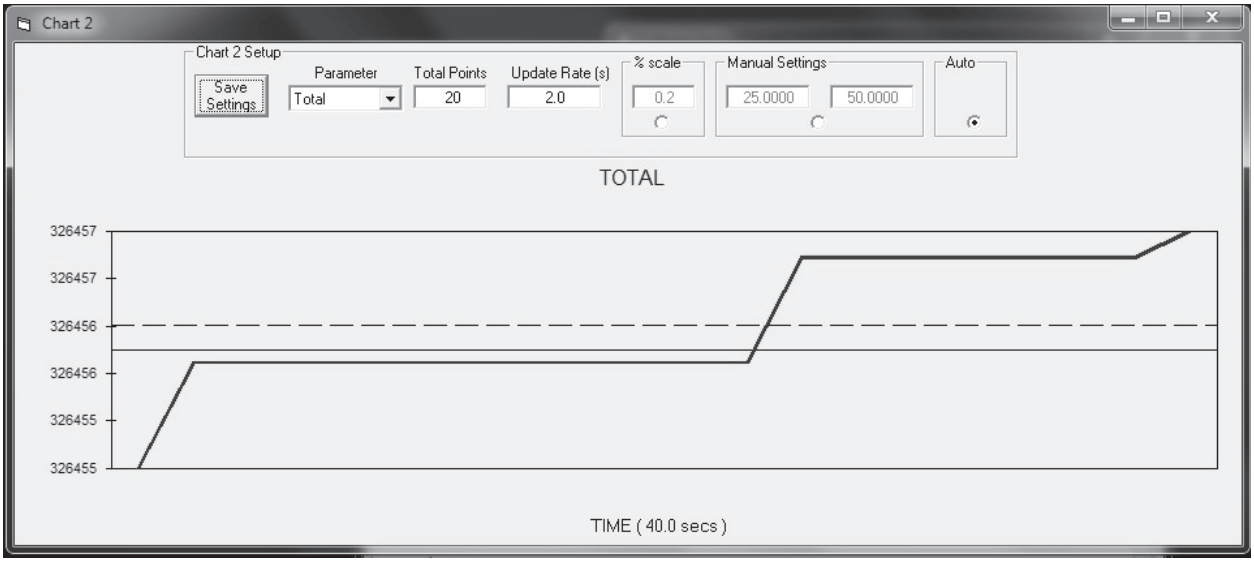


## Charts Settings

From the main menu screen, click on "Charts". Two charts will appear side-by-side. Each chart can be selected for flow, temperature or total flow and scaled in one of three ways: a plus/minus percent scale, inputting min/max values manually, or real-time automatic scaling.

*Fig. 3.2: Chart Settings Window - Charts 1 and 2*



# Operation

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

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

**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.*

**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.*

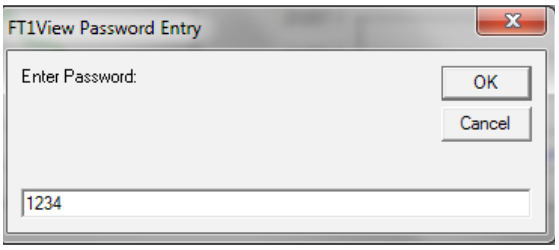
**Manual Chart Setting**
*The Manual mode allows a user to input min/max values for chart scaling. When entering new values, click on Save Settings for them to take effect.*

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

## Configure

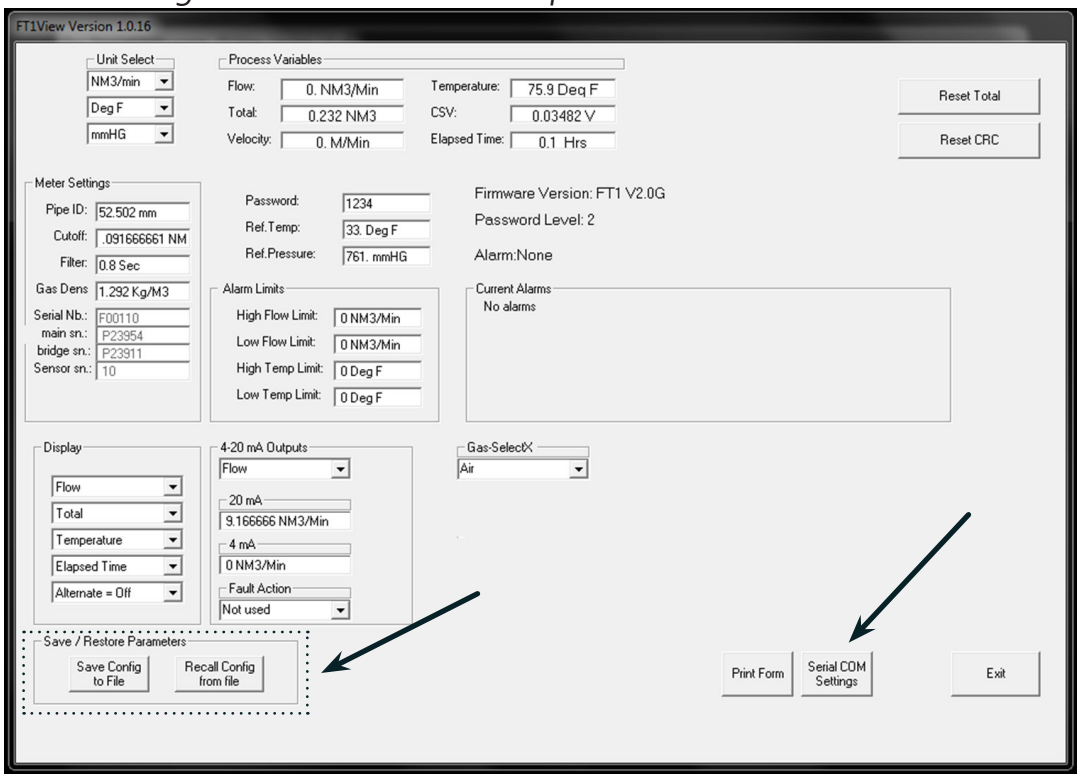
From the main menu, click on the "Configure" button and enter the requested password for either Level I (1234) or Level II (9111) access.

*Fig. 3.3: Password Window*




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

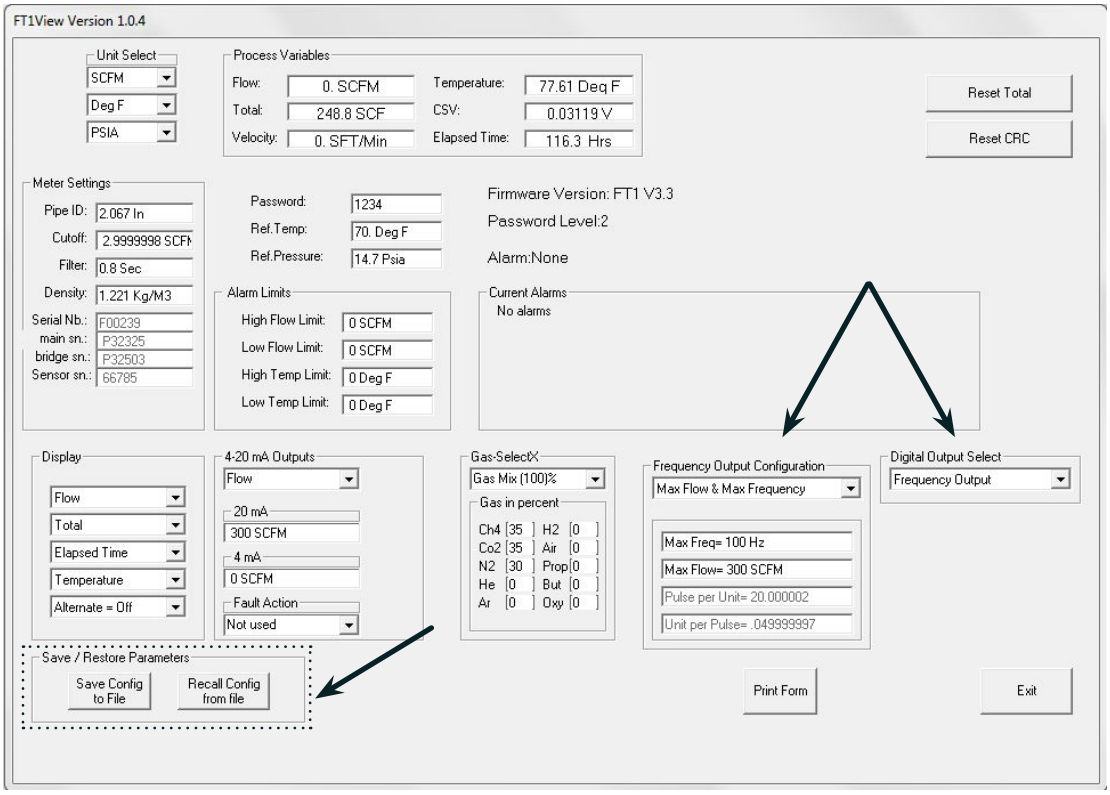
*Fig. 3.4: Level II Configuration Screen - RS485 Option*




**NOTE!** The "Save/Restore Parameter" options in both Figures 3.4 and 3.5 are not available using a Level 1 password.

# Operation

*Fig. 3.5: Level II Configuration Screen - Pulse Output Option*




The FT1 View™ software is an intuitive program that recognizes the meter configuration automatically. The meter configuration determines whether the screen in Fig 3.4 or 3.5 will appear.

The RS485 settings can be accessed by clicking on the "Serial COM Settings" button highlighted by the arrow in Figure 3.4.

The Pulse Output settings can be accessed in the "Frequency Output Configuration" and "Digital Output Select" fields highlighted by the two arrows in Fig. 3.5.

# Operation



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

**Process Properties**

**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 seconds (see FT1 Instruction Manual for more details).

**Serial Numbers:** Serial numbers of the meter, the main board, bridge and sensor (factory set).

**Display**
The four drop-down boxes can be used to select the data to present on Screen 1 and Screen 2 of the flow meter display. By selecting "Alternate", the screen automatically switches between the data screens.

**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.

**Analog 4-20mA**
The FT1 has one analog 4-20mA output that is configurable for either flow or temperature. Though the FT1 will be scaled for the specific application coming from the factory, FT1 View™ allows the operator to easily re-scale the 4-20mA output as needed.

# Operation

**Process Variables**

**Flow:** Current flow rate in selected units
**Total:** Cumulative mass or volume flow in selected units
**Velocity:** Massflow
**Temperature:** Gas temperature (Fahrenheit or Celsius)
**CSV:** Current sense voltage
**Elapsed Time:** Time since the Totalizer was reset

**Reference Conditions**

Reference temperature and pressure are the standard (or normal) temperature and pressure (STP) for which the flow rate is calculated.

**Gas-SelectX®**

This menu allows the user to choose from a list of gases. More information on Gas-SelectX® can be found on p. 21.

**Digital Output Select**

This selection configures the FT1 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

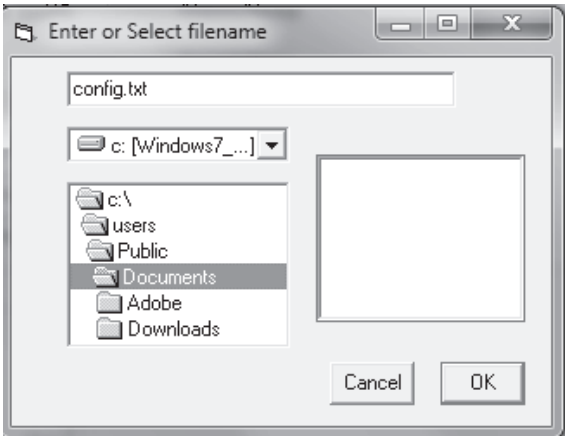
**NOTE!** This is only available on a meter configured for Pulse Output. If RS485 option has been ordered, the Pulse option is not available.

# Operation



**Save Current Configuration to File**
The current configuration parameters are saved to a text file.

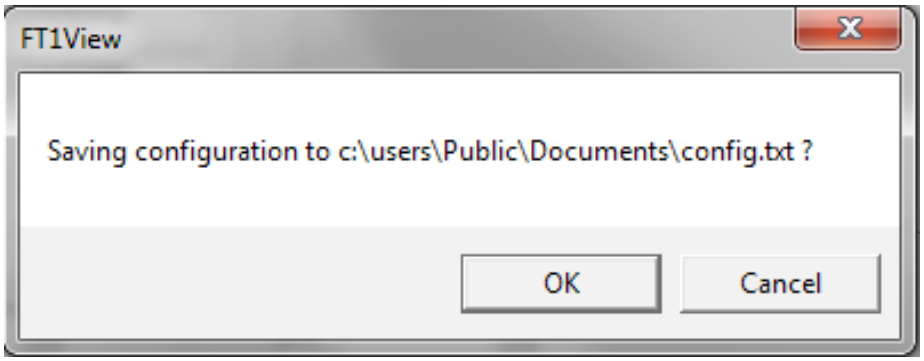
*Fig. 3.6: Save Current Configuration to File Window*




Select an existing file to overwrite or a new file name and then press **OK**. A confirmation window will be shown.

**NOTE!** This feature is only accessed with a Level II password.

*Fig. 3.7: Confirmation of Saved Configuration Window*



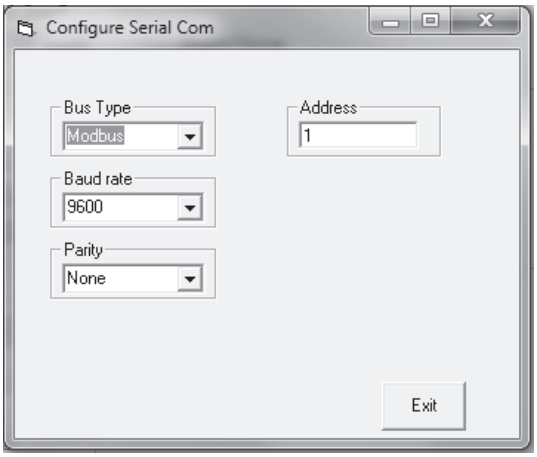

**Recall Configuration to File**
This allows the operator to recall an existing FT1 configuration file.

**NOTE!** This feature is only accessed with a Level II password.

# Operation

**Serial COM Settings**
Use this function to set the serial communication settings for any of the optional FT1 bus communication boards.

Fig. 3.8: Select Serial Communication Window




**NOTE!** This is only available on a meter configured for RS485 Modbus RTU or BACnet MS/TP. If the Pulse Output option has been ordered, the RS485 Modbus RTU or BACnet MS/TP option is not available.

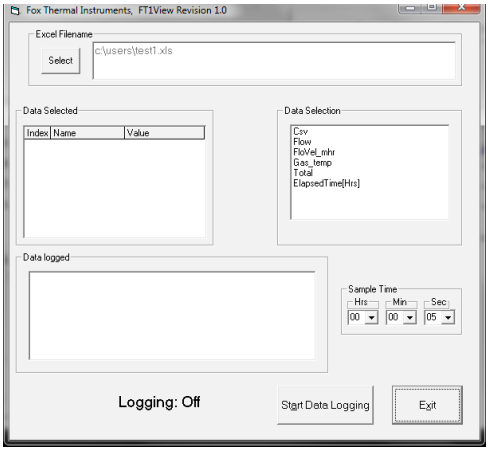
# Operation



## Data Logger

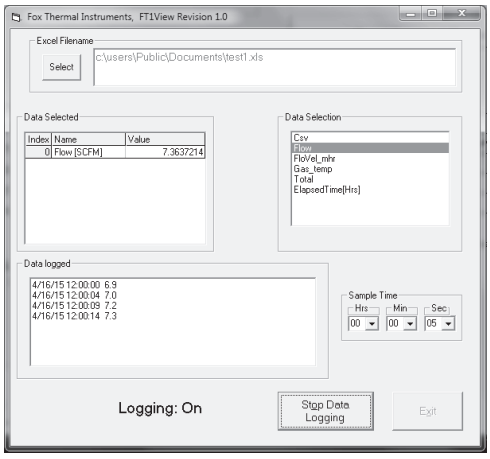
The Data Logger screen can be accessed from the main screen. Clicking the "Data Logger" function will prompt the user for a password. Enter a Level I or Level II password and the Data Logger window will appear.

*Fig. 3.11: Data Logger Window - Logging Turned Off*




Select the sample time from the drop down 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 Logging" button.

*Fig. 3.12: Data Logger Window - Logging Turned On*



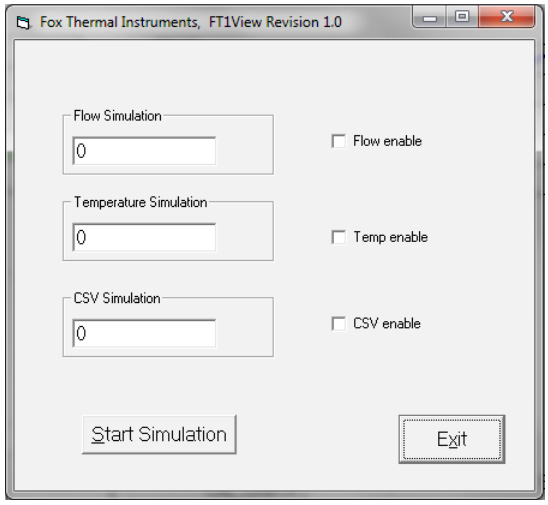

When "Start Data Logging" is pressed, the data is recorded in the specified Excel® file - and also displayed in the Data Logged window. Pressing "Stop Data Logging" ends data acquisition.

# Operation

**Simulation Mode**

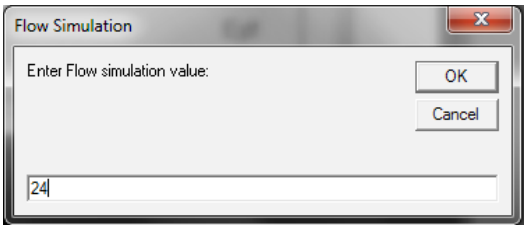
After clicking on "Simulation", a password will be requested. Enter the password and then the Simulation screen will be shown.

*Fig. 3.13: Simulation Mode Window*




The simulation mode simulates flow rate or temperature. Click on the required data and enter a value. Simulation mode allows users to verify the operation of the analog output, digital outputs and totalizer at simulated flow rates and temperature.

*Fig. 3.14: Entering a Simulation Value*

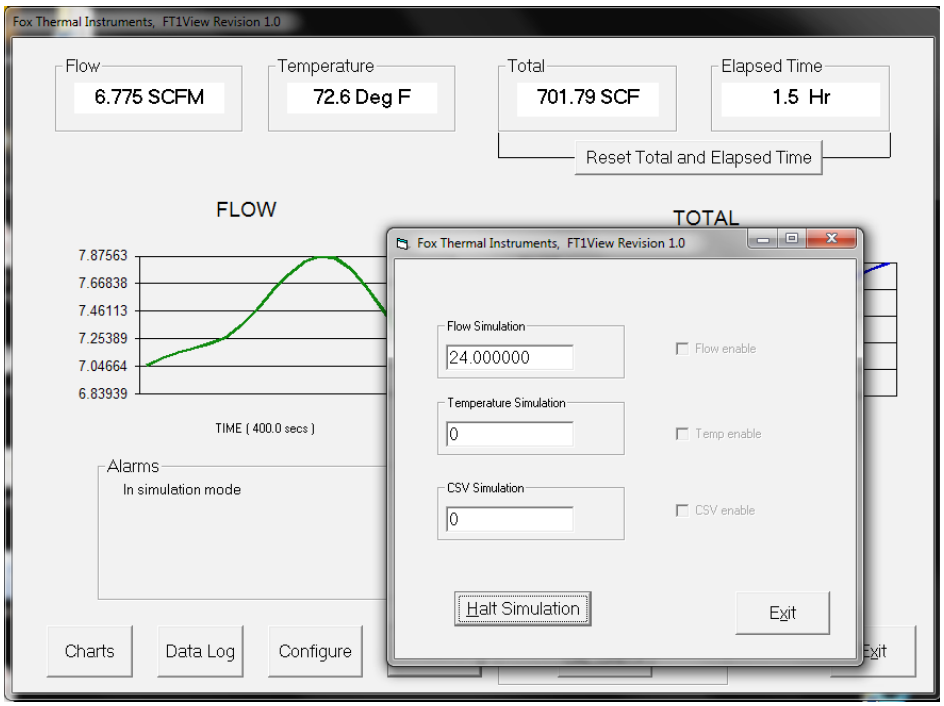



Enter the value, click **OK**, select the corresponding checkbox, and press "Start Simulation".

# Operation



*Fig. 3.15: Simulation Running*




In Simulation mode, all FT1 outputs and the Totalizer respond as if in normal measurement mode.  Click "Halt Simulation" to end.

# Operation

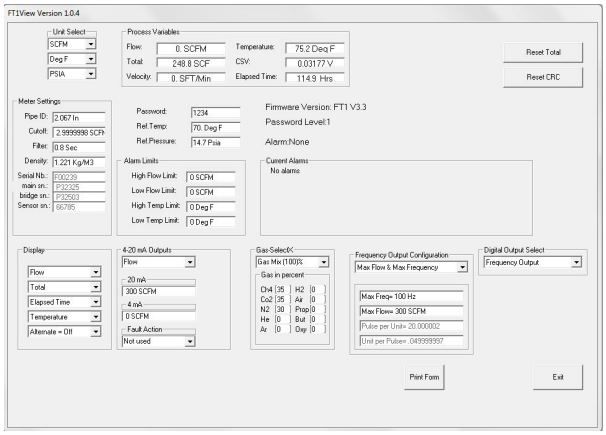


### Gas-SelectX® Gas Menu

Each FT1 flowmeter is calibrated in the factory and pre-programmed with a list of available pure and mixed gas calibrations. To choose what gas or gas mixture flow for the FT1 to monitor, choose from the list of gases under "Gas Select":

- Air
- Argon
- Butane
- Carbon Dioxide
- Methane
- Natural Gas
- Nitrogen
- Oxygen
- Helium
- Hydrogen
- Propane
- Custom 5-Gas Mix (Any pure gas from list above, excludes Natural Gas)

*Fig. 3.16: Gas-SelectX® Menu*

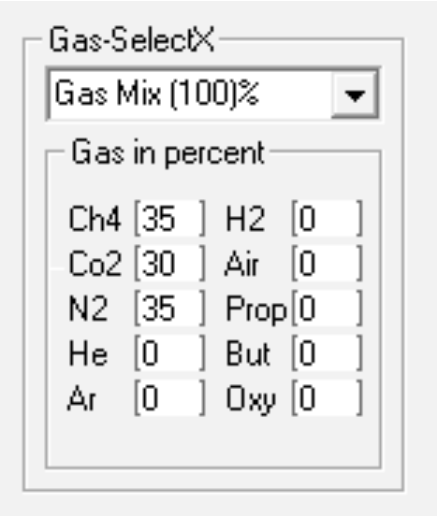



**NOTE!** A list of pure and mixed gases available on the FT1 flowmeter are kept on the Fox website at www.foxthermal.com.

# Operation



*Fig. 3.17: Setting the Gas-SelectX® Custom Gas Mixture*




When the "Custom Mix" option is chosen, a series of additional gas concentration fields will appear. These fields are labeled "CH4%", "CO2%", "N2%", etc. A default amount will appear in each field, but any five (5) of these can be changed to any percentage between 1 and 100. All remaining gases not used in the 5-Gas Mix must be changed to 0. The total for the five (5) gases chosen for the mix must equal 100% or an error will occur.

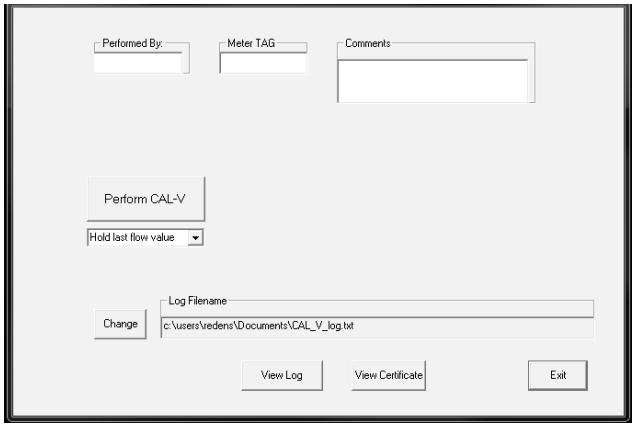
**NOTE!** If the total of the five (5) gases is greater or less than 100%, an alarm will show. Adjust the percentages until 100% is achieved.

# Operation

**CAL-V™**

CAL-V™ is performed to verify the proper operation of the FT1 flow meter. From the Main menu, click on the "CAL-V" button to access the CAL-V™ Menu Window.

*Fig. 3.18: CAL-V™ Test 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.

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

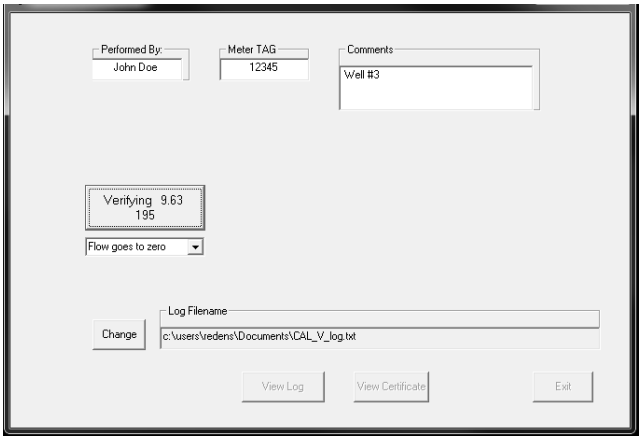
- Flow goes to Zero during CAL-V™
- Flow holds the last value during CAL-V™

Please note that the test will take about four minutes.  If the "go to zero" option is chosen, the flow measurement will stop and go to zero for this period. If the "hold value" option has been chosen, the totalizer will continue to increment..

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.

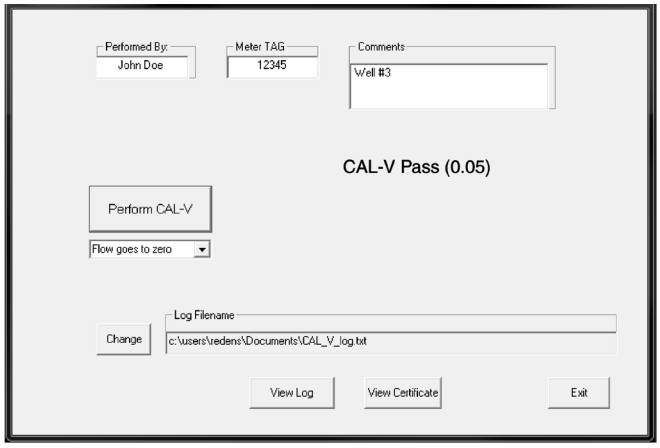
When ready to start, click the "CAL-V Verify" button.

*Fig. 3.19: Running a CAL-V™ Test*




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

*Fig. 3.20: CAL-V™ Results Window*




**CAL-V™ Certificate**

The CAL-V™ Certificate function displays the latest certification. When performing a CAL-V™ test, all the data is logged into a log file with all pertinent data, including the serial number. A laptop or PC can be used to perform the CAL-V™ test on the FT1 meter. 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.

# Operation

*Fig. 3.21: CAL-V™ Certificate*

Fox Thermal
Precision Mass Flow Measurement
An OMEGA Brand

399 Reservation Road
Marina, CA 93933 USA
Phone: 831-384-4300
Fax: 831-384-4312
sales@foxthermal.com

**CAL-V™ CERTIFICATE**
**CALIBRATION VALIDATION**

CAL-V™ Performed on: January 06 2020 1:31:24 PM
Firmware version: FT1 V5.5
Fox Meter Serial Number: ----
CAL-V™ Results: CAL-V WARNING
CAL-V™ Value: 0.83%
Test Temperature 21.8 C
Tag #/Meter Location: _____
Test performed by: _____
Additional Comments: _____

CAL-V™ 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

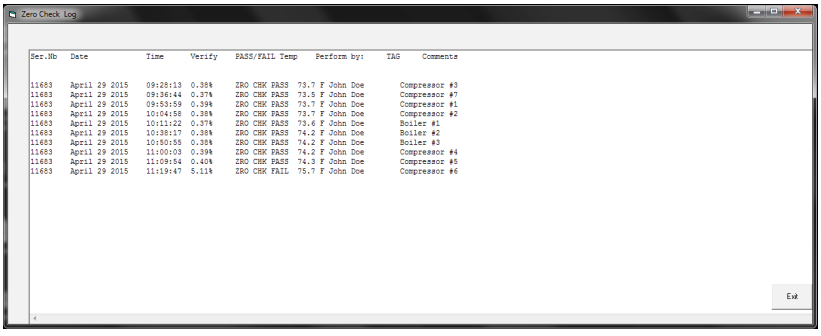
At the conclusion of the test, the meter will display a pass/fail message and the CAL-V™ data.

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

## CAL-V™ Log

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

*Fig. 3.22: CAL-V™ Log*



Zero Check Log

| Ser.Nb | Date | Time | Verify | PASS/FAIL Temp | Perform by: | TAG | Comments |
|---|---|---|---|---|---|---|---|
| 11683 | April 29 2015 | 09:28:13 | 0.38% | ZRO CHK PASS 73.7 F | John Doe | | Compressor #3 |
| 11683 | April 29 2015 | 09:36:44 | 0.37% | ZRO CHK PASS 73.5 F | John Doe | | Compressor #7 |
| 11683 | April 29 2015 | 09:53:59 | 0.39% | ZRO CHK PASS 73.7 F | John Doe | | Compressor #1 |
| 11683 | April 29 2015 | 10:04:58 | 0.38% | ZRO CHK PASS 73.7 F | John Doe | | Compressor #2 |
| 11683 | April 29 2015 | 10:11:22 | 0.37% | ZRO CHK PASS 73.6 F | John Doe | | Boiler #1 |
| 11683 | April 29 2015 | 10:38:17 | 0.38% | ZRO CHK PASS 74.2 F | John Doe | | Boiler #2 |
| 11683 | April 29 2015 | 10:50:55 | 0.38% | ZRO CHK PASS 74.2 F | John Doe | | Boiler #3 |
| 11683 | April 29 2015 | 11:00:03 | 0.39% | ZRO CHK PASS 74.2 F | John Doe | | Compressor #4 |
| 11683 | April 29 2015 | 11:09:54 | 0.40% | ZRO CHK PASS 74.3 F | John Doe | | Compressor #5 |
| 11683 | April 29 2015 | 11:19:47 | 5.11% | ZRO CHK FAIL 75.7 F | John Doe | | Compressor #6 |

Exit

# Definitions

| | |
|---|---|
| COM | Communication |
| 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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## Notes and Information


## Definition of Terms