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. E

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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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 Instruments. 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 new Gas-SelectX® gas menu and the Calibration Validation diagnostic function using the Zero CAL-CHECK® 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

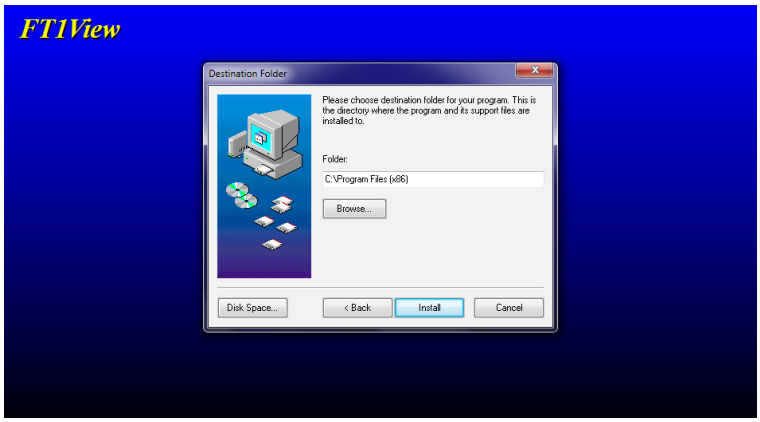
Open the enclosure by unscrewing the enclosure cap, loosen the two captive screws on the display assembly and rotate it open. Connect the FT1 to a PC with a USB (type A, mini cable) to a PC. If the PC is connected to the Internet and running Windows 7/8™, the PC will try to automatically load the VCP 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

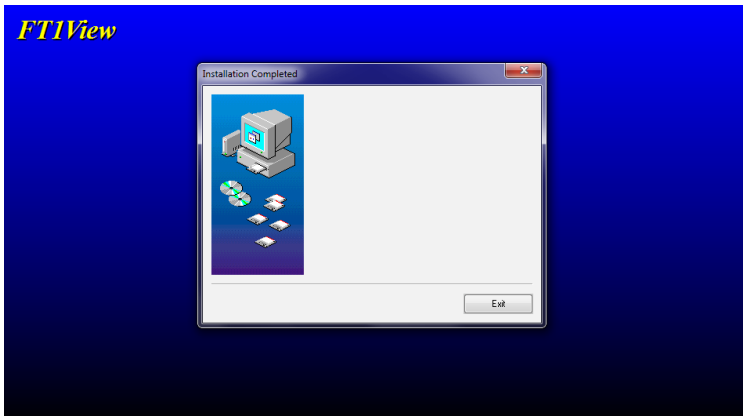
Fig. 2.1: Online Download Location for FT1 View™ Software

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

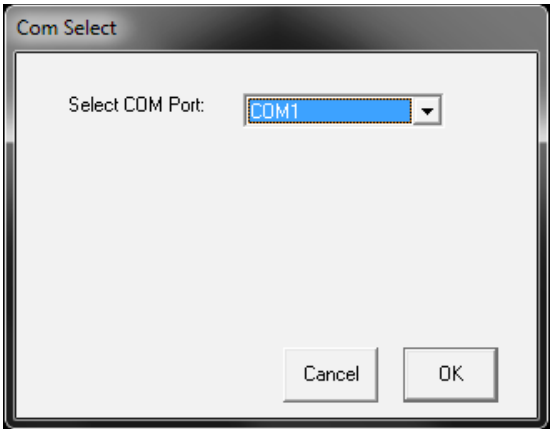
COM Port Assignment

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

NOTE! Data on the screen is refreshed at user selected update rate. See p. 10 for more information on setting up Charts.

Charts Button

This calls up two charts that can be configured for either temperature or 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 "Operation: Chart Settings" on page 10.

NOTE! It can be set for either automatic or manual scaling.

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 "Operation: 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 "Operation: Configure" on page 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 Page 19 for more information on how to use the Simulation function.

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

- Checks for build-up on sensor that could affect calibration
- Further 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. 23.

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

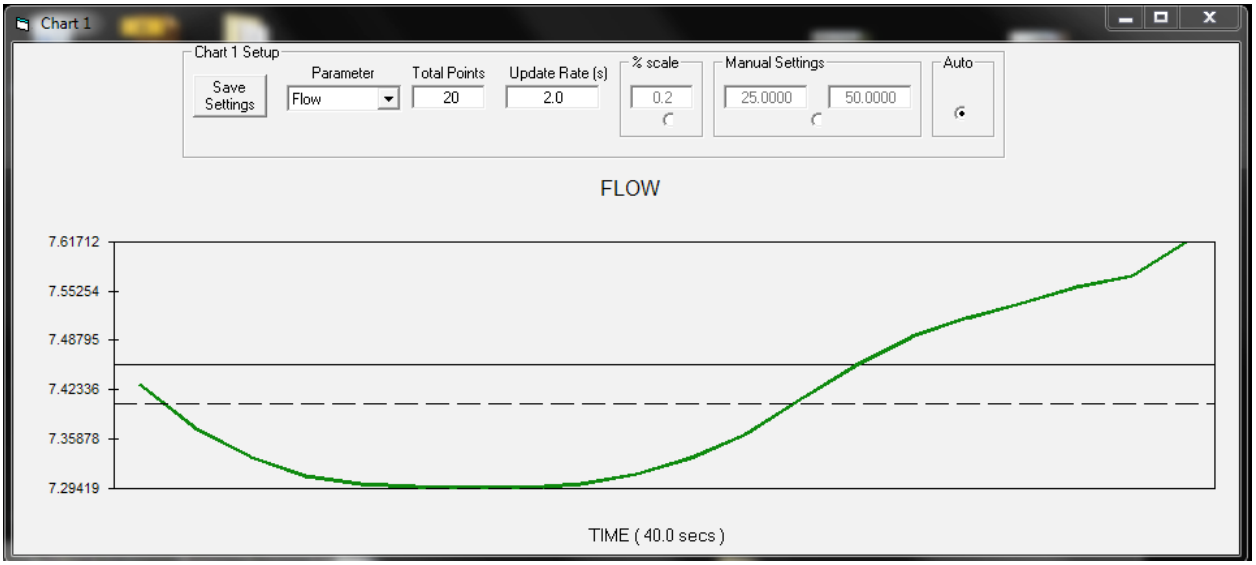
Exit
Exit the application

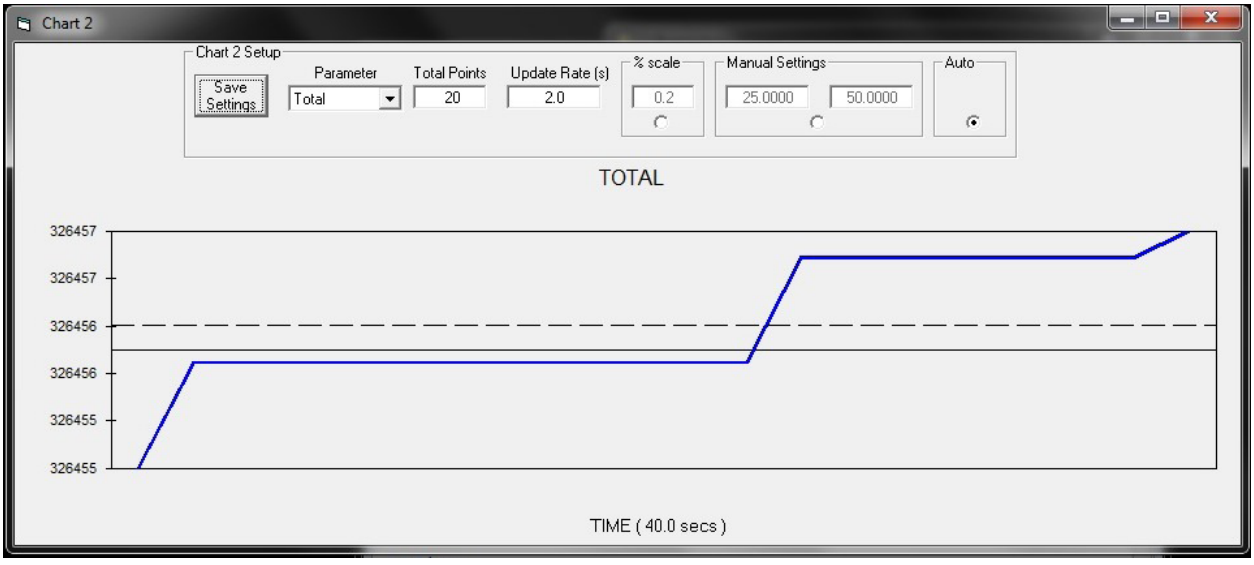
Operation

Charts Settings

From the main menu screen, click on "Charts". Two charts, one for flow and the other for temperature, will appear side-by-side.

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





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.

Operation

Save Setting
The user can save any new chart settings on the main page window. These settings can then be closed by clicking on the "X" at the top right corner of the window.

Parameters
All meter operating parameters can easily be selected for charting: flow, temperature or total flow.

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.

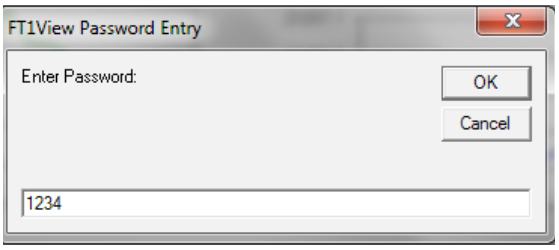
Manual Chart Setting
The Manual mode allows a user to input min/max values for chart scaling. When entering new values, press enter for them to take effect.

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

Configure

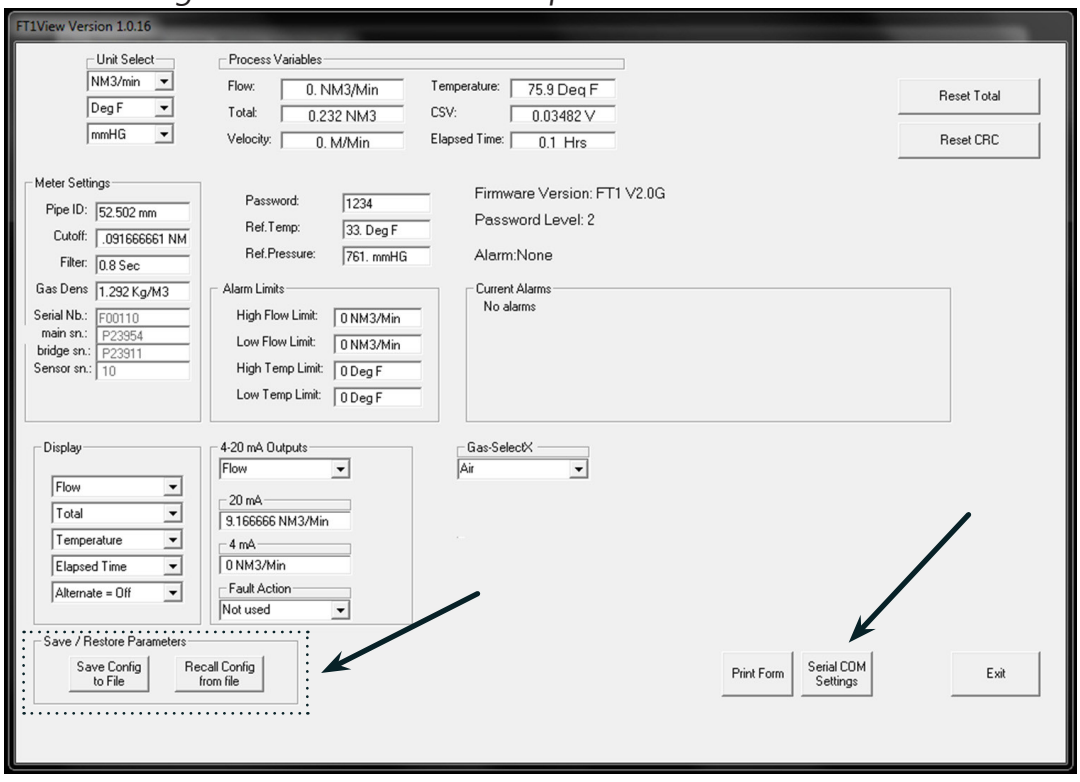
From the main menu, click on the "Configure" button and enter the requested password for either Level I (1234) or Level II (9111) access.

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.

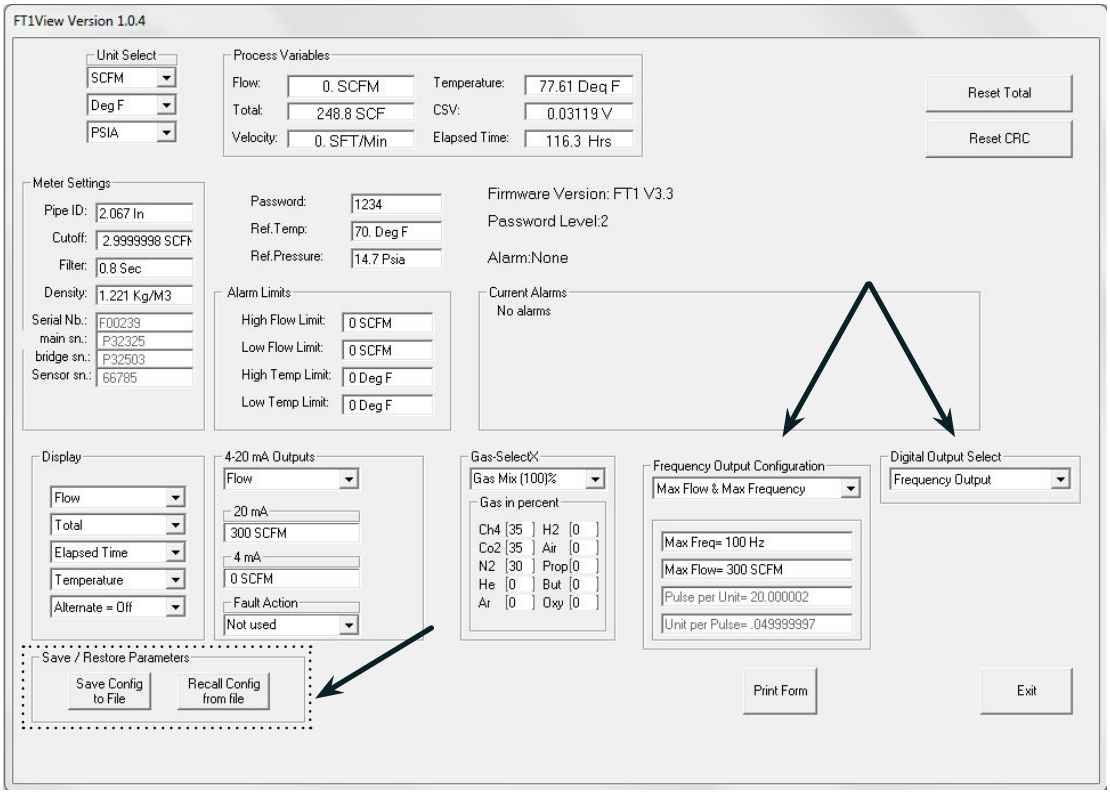
Fig. 3.4: Level II Configuration Screen - RS485 Option



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 (see FT1 Manual for more details).

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

Display
With the top four drop-down boxes, the user can choose the data to 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 to 20 mA
The FT1 has one analog 4 to 20 mA output that is configurable for either flow or temperature. Though the FT1 will already be scaled for the specific application coming from the factory, FT1 View™ allows the operator to easily re-scale the 4 to 20 mA output as needed.

Operation

Process Variables

Flow: Current flow rate in selected units
Total: Cumulative mass or volume flow in selected units
Velocity: Flow velocity
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".

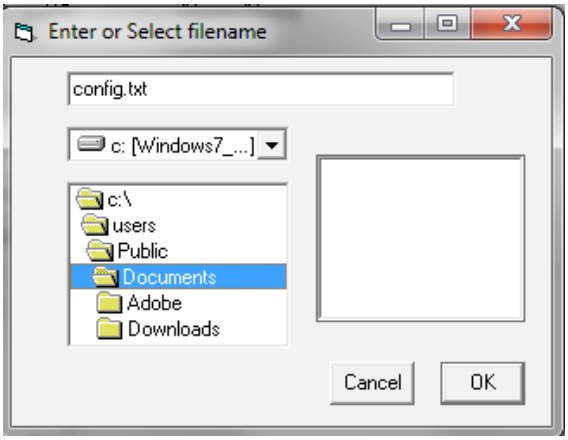
- Maximum flow and maximum frequency
- Pulses per Unit
- Units per Pulse

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.

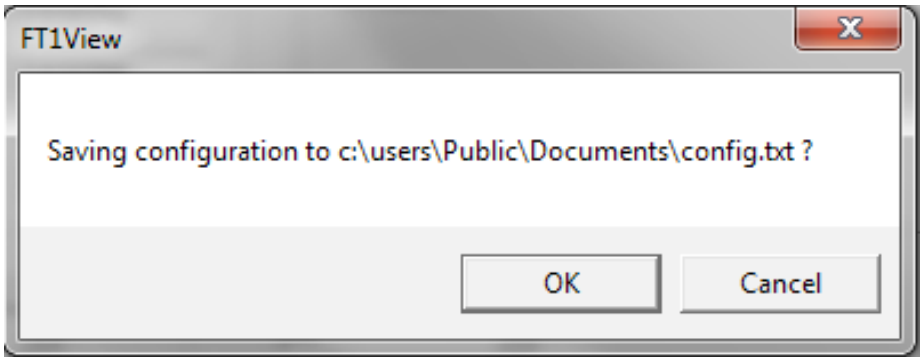
Fig. 3.6: Save Current Configuration to File Window



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



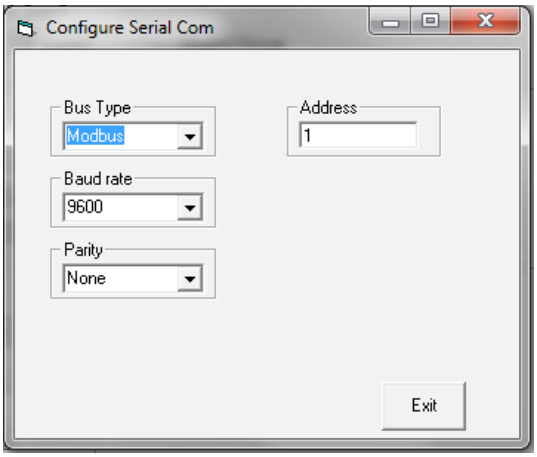
Recall Configuration to File
This allows the operator to recall an existing FT1 configuration file.

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



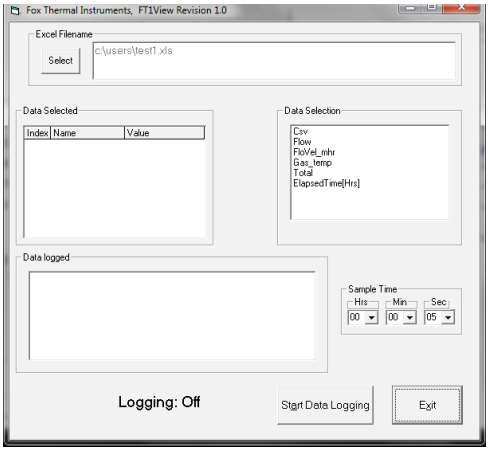
NOTE! This is only available on a meter configured for RS485 Modbus RTU or BACnet MS/TP. If the Pulse Output option has been ordered, the RS485 Modbus RTU or BACnet MS/TP option is not available.

Operation

Data Logger

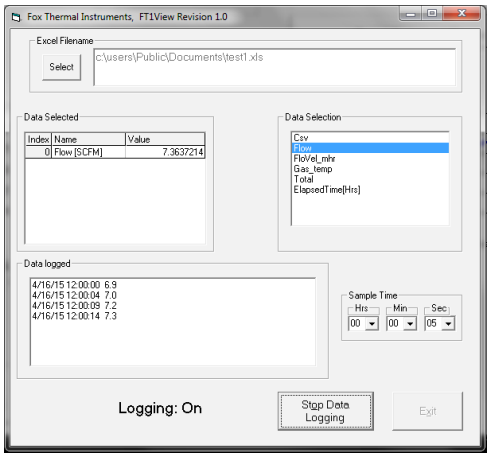
The Data Logger screen can be accessed from the main screen. Clicking the "Data Logger" function will prompt the user for a password. Enter a Level I or Level II password and the Data Logger window will appear.

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



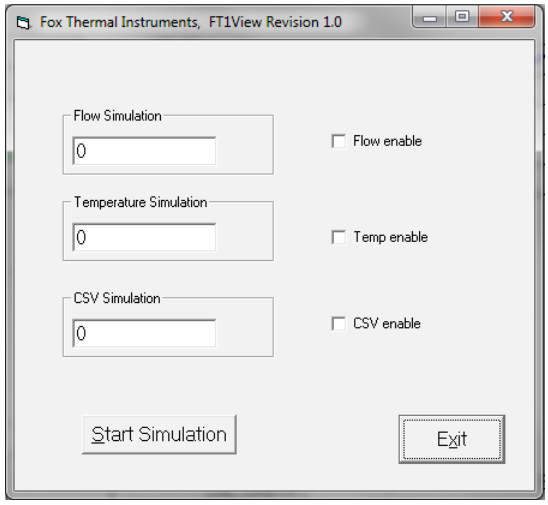
When "Start Data Logging" is pressed, the data is recorded in the specified Excel file - and also displayed in the Data Logged window. Pressing "Stop Data Logging" ends data acquisition.

Operation

Simulation Mode

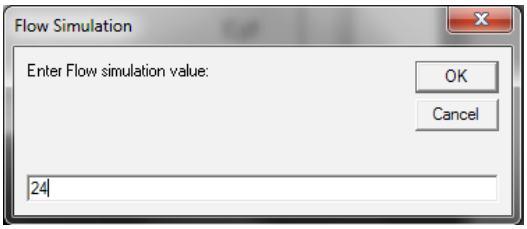
After clicking on "Simulation", a password will be requested. Enter the password and then the Simulation screen will be shown.

Fig. 3.13: Simulation Mode Window



The simulation mode simulates flow rate, 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.

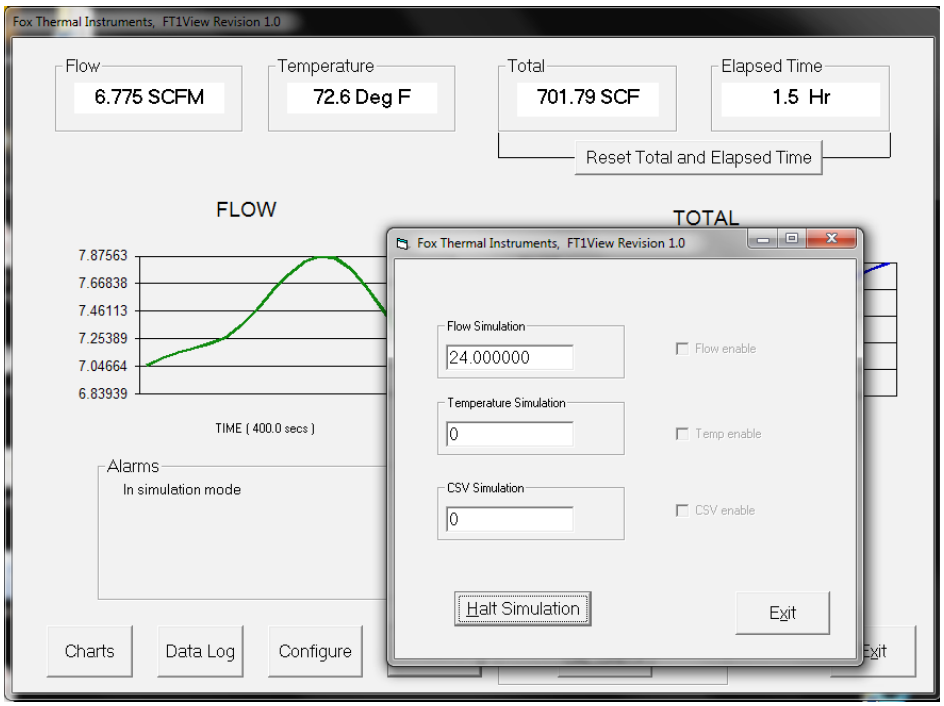
Fig. 3.14: Entering a Simulation Value



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.

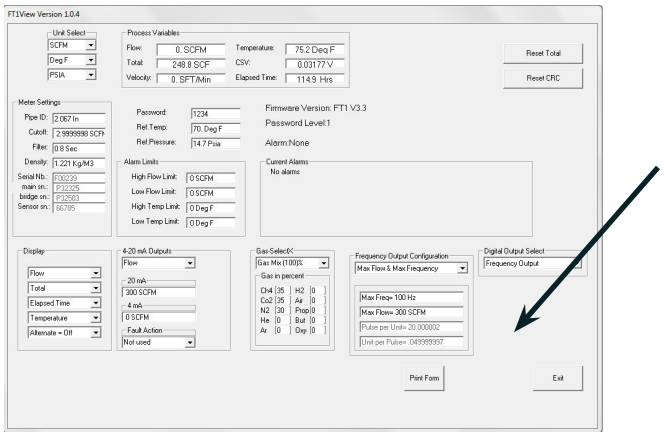
Operation

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)

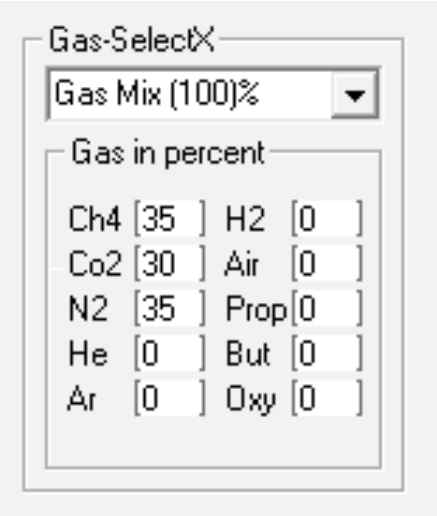
Fig. 3.16: Gas-SelectX® Menu



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

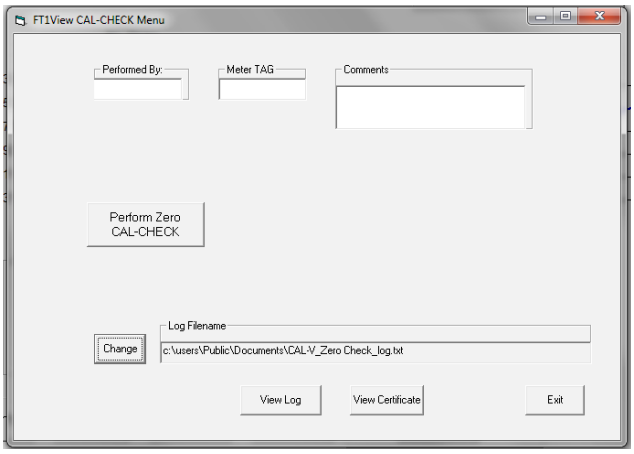
Zero CAL-CHECK®

Zero CAL-CHECK® is performed to verify the following:

- Checks for build-up on sensor that could affect calibration
- Further validates the zero stability of the meter
- Checks thermal conductivity (heat transfer) repeatability of the sensor

From the Main Screen, click on the "Zero CAL_CHECK" button to access the Zero CAL-CHECK® Test Menu Window.

Fig. 3.22: Zero CAL-CHECK® Test Menu Window



On the Zero CAL-CHECK® 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.

The user can also specify a particular folder name and location to save this data. The data will be stored in a log that can be accessed at a later time.

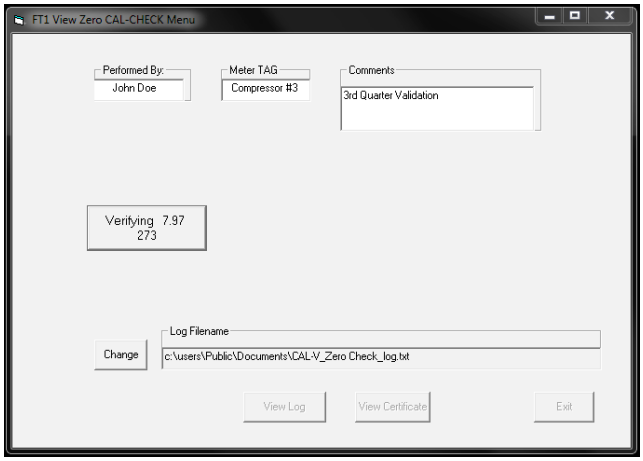
Please note that the test will take about five minutes.

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

Fig. 3.23: Stable Conditions Confirmation Window

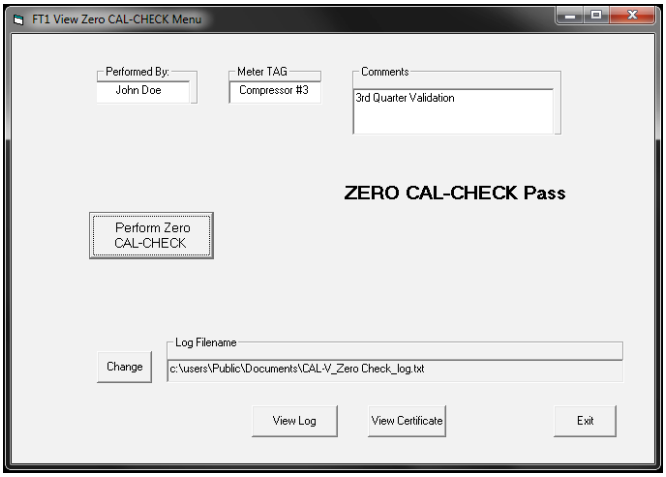
During the test, the Zero CAL-CHECK® button will display the current calculated value and a countdown timer of seconds left on the test.

Fig. 3.24: Running a Zero CAL-CHECK® Test



A Pass/Fail message for the Zero CAL-CHECK® test will be displayed at the test conclusion.

Fig. 3.25: Zero CAL-CHECK® Results Window

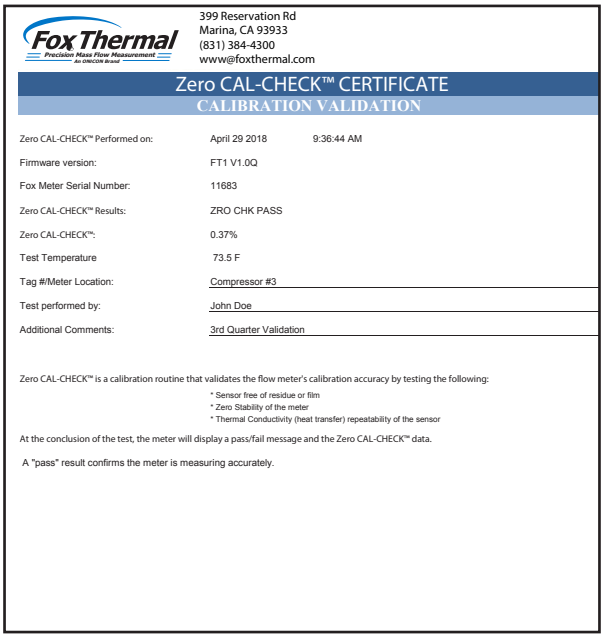


Operation

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 or PC can be used to perform the Zero CAL-CHECK® test on the FT1 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. 3.26: Zero CAL-CHECK® Certificate



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Zero CAL-CHECK™ CERTIFICATE

CALIBRATION VALIDATION

Zero CAL-CHECK™ Performed on:	April 29 2018	9:36:44 AM
Firmware version:	FT1 V1.0Q	
Fox Meter Serial Number:	11683	
Zero CAL-CHECK™ Results:	ZRO CHK PASS	
Zero CAL-CHECK™:	0.37%	
Test Temperature	73.5 F	
Tag #/Meter Location:	Compressor #3	
Test performed by:	John Doe	
Additional Comments:	3rd Quarter Validation	

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

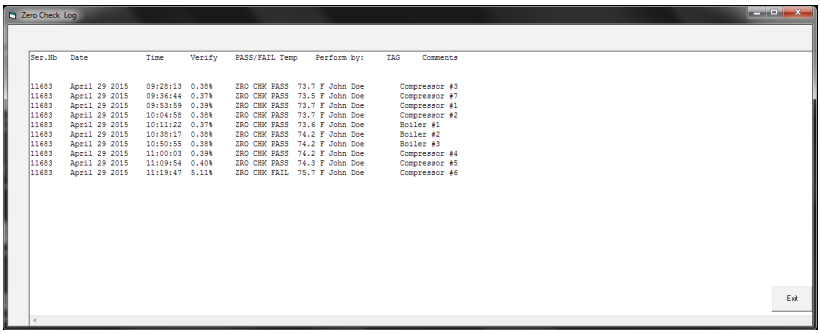
At the conclusion of the test, the meter will display a pass/fail message and the Zero CAL-CHECK™ data.

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

Zero CAL-CHECK® Log

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

Fig. 3.27: Zero CAL-CHECK® 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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Definition of Terms

Troubleshooting Tips