



Super**Systems**
incorporated

eFLO ELECTRONIC GAS FLOW METER OPERATIONS MANUAL

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Introduction

The **eFlo** instrument is Super Systems Inc.’s electronic flow meter. eFlo works by measuring the differential pressure (the difference in pressure of a gas at two points) of a gas flowing through a specially designed opening in the gas flow assembly. Based on properties of the flowed gas, the differential pressure can then be used to calculate the flow rate of the gas.

The eFlo features built-in high and low flow rate alarms and a flow rate totalizer. The gas flow valve can be operated in manual mode or automatic mode. Automatic mode allows the eFlo to use a flow rate setpoint as a basis for adjusting the valve (and thus the gas flow) using a built-in valve motor. The setpoint can be programmed manually by the user or obtained by the instrument from a 4-20mA analog signal or digital signal over RS485.

eFlo is part of SSi’s Flow Meter lineup, which also includes the FLO-SCOPE® manual flow meter.

This manual also covers the configuration and control software provided with the eFlo meter: SSi **FlowMeterView**.

Safety Information

Observe the following safety requirements when configuring, operating, servicing, or maintaining the eFlo instrumentation.

WARNING!

The eFlo instrument is NOT guaranteed to provide gas shutoff, nor is it designed to do so. For reliable gas shutoff, incorporate a valve that provides positive gas shutoff. Ensure that all gas flow equipment is in compliance with National Fire Protection Agency (NFPA) requirements, including those found in NFPA 86. Failure to follow these requirements could result in flammable gas leaks into the unit.

Ensure that the air and gas mixture ratio settings are within the specifications provided in this manual. Exceeding specified values could result in hazardous conditions.

Specifications

The specifications for the eFlo instrument are as follows.

Power Required	24 VDC @ 400 mA
Accuracy	4%
Repeatability	2%
Turndown Ratio	6:1
Medium Temperature Limits	-10°F to 150°F (-20°C to 65°C)
Ambient Temperature Limits	-10°F to 150°F (-20°C to 65°C)

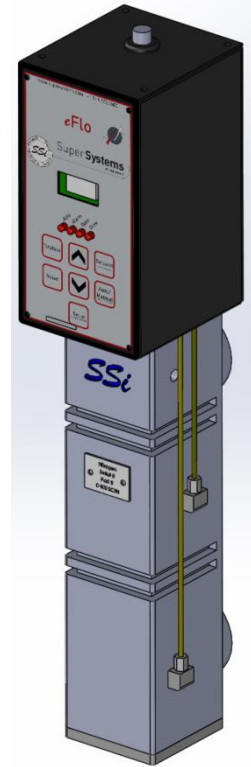


Figure 1 - eFlo 3-dimensional angled view

eFlo Electronic Flow Meter Operations Manual

Flow Output Signal (Linear)	4-20mA
Maximum Output Signal Load	500Ω
Input Control Signal (Linear)	4-20mA
Response Time	1 – 10 seconds
Communications	RS232, RS485
Communication Protocol	Modbus RTU
Pressure Drop @ 100% Capacity <i>See Calibration Report for specific pressure drop.</i>	5" wcg (Standard Model) 10" wcg (Standard Model)
Flow Meter Pressure Limits <i>The pressure will be calibrated to user-specified requirements. See the Calibration Report for more details.</i>	5 psig – maximum allowable

Table 1 - eFlo Specifications

Replacement Parts

Replacement parts can be ordered for the eFlo unit when and if needed. Contact SSi at (513) 772-0060 to order parts.

Part Number	Item	Explanation
33149	Motor and Shaft	Drives the Valve Needle open and closed to maintain the correct gas flow.
34224	O-Ring, eFlo Body & Plate	O-ring that seals the three components of the eFlo Body (upper, lower, and middle), Bottom Plate, and Motor Plate.
37315	O-Ring, eFlo Valve Needle Shaft	O-ring that seals the Valve Needle Shaft against the Motor Plate.
37321	Gasket, eFlo Motor Plate	Gasket that seals the eFlo Motor Plate to the Motor Spacer Block and Motor.
34603	Grommet, Cylinder Adjustment	Grommet on top of the Electronic Housing.
34692	Calibration Test Ports	Two pressure ports located on the side of the Body of the meter. These ports allow the pressure drop to be measured for calibration verification of the meter.

Part Number	Item	Explanation
31182	Pressure Transducer	Measures the pressure drop through the Element and provides that signal to the electronic boards for calculation of the gas flow.
31542	Flow Board	The primary electronics board containing all of the circuitry and input and output pins.
31657	Motor Control Board	The electronics board that controls the operation of the motor.
20824	Cable	6 foot pigtail for RS485, 4-20mA input, 4-20mA output and 24VDC power. Note that use of the cable is not mandatory: connections can be made directly to terminals if desired.

Table 2 - Replacement Parts List

Installation Procedure

Installing the eFlo unit consists of a mechanical installation and an electrical installation. The mechanical installation includes mounting as well as inlet and outlet piping. The eFlo unit will be assembled prior to shipment. Before beginning installation:

- Ensure that all fittings and connections are tightly secured prior to beginning installation.
- Ensure that all expected components are present. Contact SSi at (513) 772-0060 if you have questions.

Mechanical Installation

Secure mounting is achieved by correctly and securely installing the required piping in the inlet and outlet connections of the eFlo unit. Note the distance between the centers of inlet and outlet openings is 8.3" (21.1cm). The outlet openings themselves measure 1.25" NPT. The locations of these connections are shown in Figure 2. Use of bushings or reducers at these connections is okay as long as the maximum flow rate can still be achieved. Contact SSi at (513) 772-0060 for questions about pipe sizing.

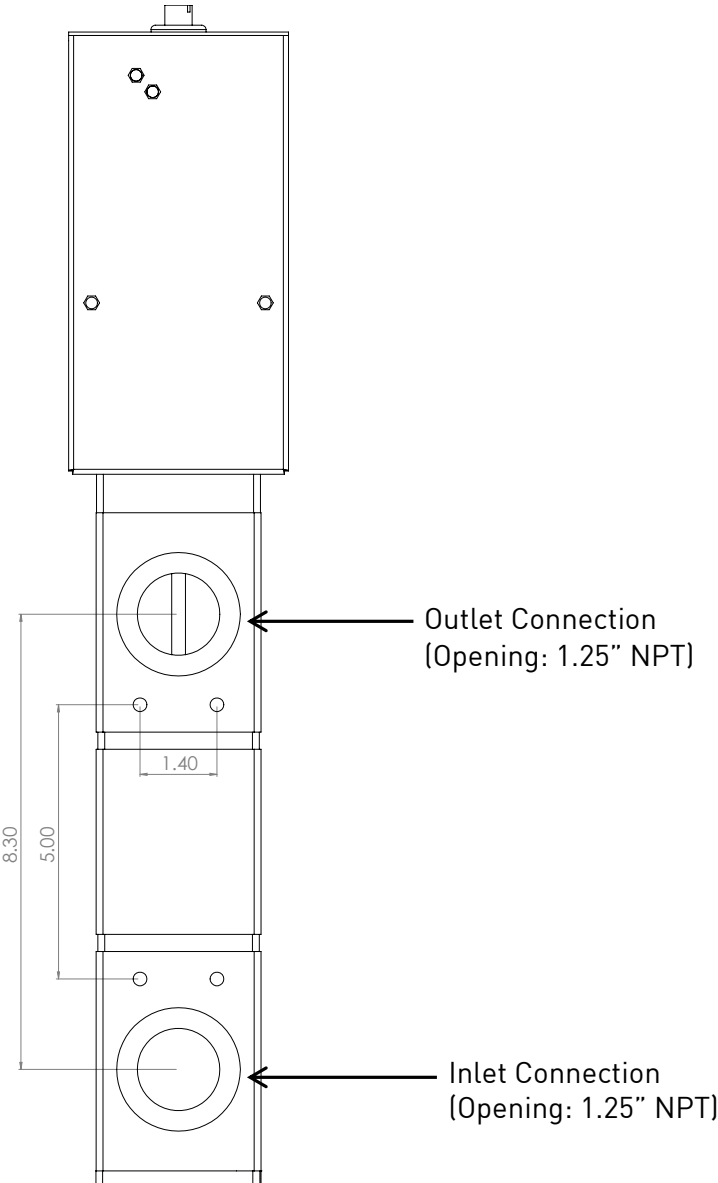


Figure 2 - Flow Outlet and Inlet Connections

IMPORTANT!
Ensure that the inlet pressure is within specified parameters for your eFlo unit.

Electrical Connections

The eFlo unit uses a male 9-pin D-Sub connector for electrical connections. The electrical connections are defined in Table 3 below. (An electrical/wiring diagram for the flow control board can be found in Appendix 1: Electrical/Wiring Diagram.)

9-Pin D-Sub Pin Number	Wire-In Color	Signal Type	Description
1	Red	+ VDC	Power Supply 24 VDC (250 mA)
2	Black	- VDC	
3	Green	+ mA	Output Flow Signal (4 – 20 mA)
4	White	- mA	
5	Orange	+ mA	Input Setpoint Signal (4 – 20 mA)
6	Blue	- mA	
7	Green/Black	+ RS485	Communications Signal provided by Modbus over serial.
8	White/Black	- RS485	
9	Red/Black	24V Sinking Output	Flow Alarm Output NOTE: The alarm current should have a maximum current rating of 100mA. An isolation relay with fly-back diode should be used if the output is driving an inductive load (such as a contactor or horn).

Table 3 - Electrical Connections

NOTE: If RS-232 is needed, an additional 9-pin D-Sub connector can be set up on the eFlo unit prior to shipment.

WIRING NOTICE

You may see a tenth wire on the connector cable. This wire is not used with the eFlo unit's 9-pin connector and should be isolated and properly insulated if exposed.

Modbus Registers

The eFlo Modbus registers are as follows.

Modbus Register Number	Description
16	Actual Flow
17	Flow Sensor mA Input Value
18	Flow Setpoint
19	Decimal Place for Display of Flow and Setpoint
20	Instrument Modbus Address
21	Flow Meter Full Scale Value
22	Control Gain
23	mA Zero Value
24	mA Span Value
25	Deadband for Control
26	Setpoint Zero
27	Setpoint Span

Modbus Register Number	Description
28	Not Used
29	Analog Output Zero in Flow Units
30	Analog Output Span in Flow Units
31	Not Used
32	Low Flow Alarm Setpoint
33	High Flow Alarm Setpoint
34	Alarms
35	Auto (1) / Manual (0) for Control
36	(Not Used)
37	Reset Totalizer Values to Zero
38	(Not Used)
39	Totalizer Units (0 to 9999)
40	Totalizer in 10,000s (0 to 9999 -> 0 to 99,990,000)
41	Totalizer in 10,000,000s (0 to 9999 -> 0 to 999,900,000,000)

Table 4 - Modbus Registers and Descriptions

Operating Procedure

The eFlo system is equipped with a flow rate alarm (high and low), flow rate totalizer, and integrated valve control. The unit can be operated in either manual or automatic mode for flow rate control. This section of the manual provides an explanation of how the unit is operated: valve control modes, flow limit control, flow alarming, flow totalizing, and programming of the unit.

IMPORTANT!

For best long term results, it is recommended that pressure be maintained on the flow meter at all times. Pressure can be maintained when the shut off solenoid/valve is downstream from the outlet of the meter. This will ensure long term calibration and accuracy.

Figure 3 shows the layout of the flow control panel on the eFlo unit. An explanation of the panel's components is provided as well. The panel layout will be referenced further in this section.

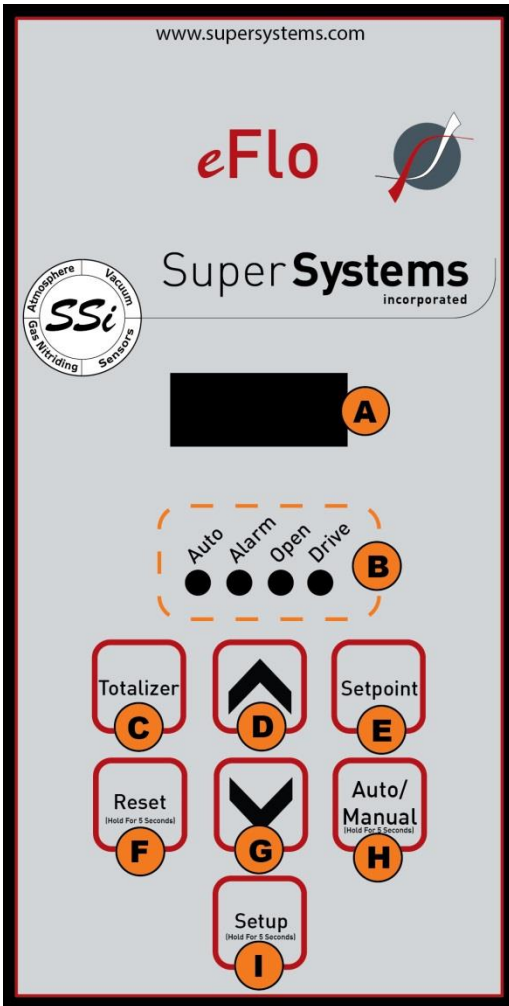


Figure 3 - eFlo Flow Control Panel Layout

A – LED display

By default, the LED display is used to display the current flow. With different button combinations, the LED display can also be used to show the totalizer value, current setpoint, and Setup menu options with associated settings. Alarm status messages may also be displayed.

B – Status indicators

These are four lights that come on in various situations.

Auto – When lit, the eFlo is in Auto valve control mode. When not lit, the unit is in Manual valve control mode.

Alarm – When lit, an alarm is active. This will be a Low Flow Rate Alarm, a High Flow Rate Alarm, or a Limit Switch Alarm.

Open – When lit, the valve is driving open.

Drive – When lit, the valve is driving. If this light is illuminated, but the Open light is not, the valve is driving closed.

C – Totalizer button

When pressed and held, the totalized flow value is shown. After being held for a few seconds, the value will begin to scroll to the left to show the full totalized numeric value.

D – Up button

When pressed and held, the Up button will increase the flow rate through the inlet connection by opening the valve. This button can also be used in conjunction with other items, such as Setpoint and Setup menu options.

E – Setpoint button

When pressed and held, this button will show the current flow setpoint. By default, the setpoint can be changed manually by pressing the up or down arrow to increase or decrease the setpoint while the Setpoint button is being held. It is important to note that the setpoint cannot be manually changed when the eFlo unit is obtaining a remote setpoint from another instrument. The remote setpoint can be obtained using an analog or digital signal; it will overwrite any manual input from the user. See the Setpoint Control and Adjustment on page 12 for more details.

F – Reset button

When pressed and held for five seconds, the Reset button will erase the current totalized flow value and change it to zero.

G – Down button

When pressed and held, the Down button will decrease the flow rate through the inlet connection by closing the valve. This button can also be used in conjunction with other items, such as Setpoint and Setup menu options.

H – Auto/Manual button

This button toggles the Valve Control Mode between Auto and Manual. To change the current mode, hold the button in for five seconds.

In Auto Valve Control Mode, the eFlo unit will automatically change the position of the valve. It will drive the valve open or closed depending on the flow needed at any given time (for example, in order to maintain setpoint).

In Manual Valve Control Mode, the position of the valve is determined by the operator using the Up and Down arrows.

I – Setup button

The Setup button will open the Setup menu when the button is held for five seconds. The options are displayed on the LED screen. Scroll through the options by pressing the Setup button. Change the values by pressing the Up and Down buttons. Change the values by pressing the Up and Down buttons.

Refer to the Setup section below for more information.

Valve Control Mode

The Valve Control Mode can be either Auto or Manual. In Auto mode, the motorized valve will be automatically adjusted. If the currently measured flow rate is lower than setpoint, the valve will be driven open. If the currently measured flow rate is higher than setpoint, the valve will be driven closed.

To change Valve Control Mode, hold the Auto / Manual button down for five seconds. The Auto light will show which control mode is active. If the Auto light is illuminated, Auto mode is active. If the light is not illuminated, Manual mode is active.

Setpoint Control and Adjustment

The setpoint can be controlled and adjusted using one of four methods:

1. Manually, by using the Setpoint button
2. By using a remote analog signal (4-20mA)
3. By using a remote digital signal with Modbus serial communications over RS485
4. By using the FlowMeterView software (refer to the Device Menu on page 19).

It is important to note that the remote setpoint setting overwrites any manual setting. Therefore, if manual control of setpoint is desired, ensure that there is no external signal overwriting the manual setting.

Flow Limit Control (Automatic Mode)

IMPORTANT!

Adjusting the flow limit setting can result in erratic operation if the adjustment is performed improperly. For this reason, it is recommended that the adjustment be performed by an SSI technician or with technical support. For more information, contact SSI at (513) 772-0060.

In Automatic Valve Control Mode, a mechanism is needed to prevent the control valve from opening too far (if the valve opens too far, damage to the motor could result). A limit switch on the eFlo unit provides this mechanism (see Figure 4). This adjustment was completed during calibration of the eFlo instrument. In the event that the adjustment collar was moved from its factory set position, the steps below describe how to reset this collar to the proper position. To set the limit switch to a proper setting for your application:

1. In the Automatic Valve Control Mode, set the eFlo control valve to allow for full flow capacity as specified when the instrument was purchased. Allow the valve to reach the maximum flow so that the motor stops moving.
2. Using a 1/8" hex wrench, loosen the adjustment collar and move it so that it is located approximately 1/8" below the limit switch.
3. Tighten the set screw on the adjustment collar to lock its position on the adjustment cylinder.
4. Set the eFlo instrument to zero flow so that the adjustment lowers and the valve closes.
5. Again, set the eFlo instrument to full flow capacity. Observe the adjustment collar's location relative to the limit switch.
6. Verify that the adjustment collar has traveled to the same location (approximately 1/8" from the limit switch), indicating the correct position of the collar.
7. Ensure that the set screw is tightened properly.

The limit switch should now be properly set.

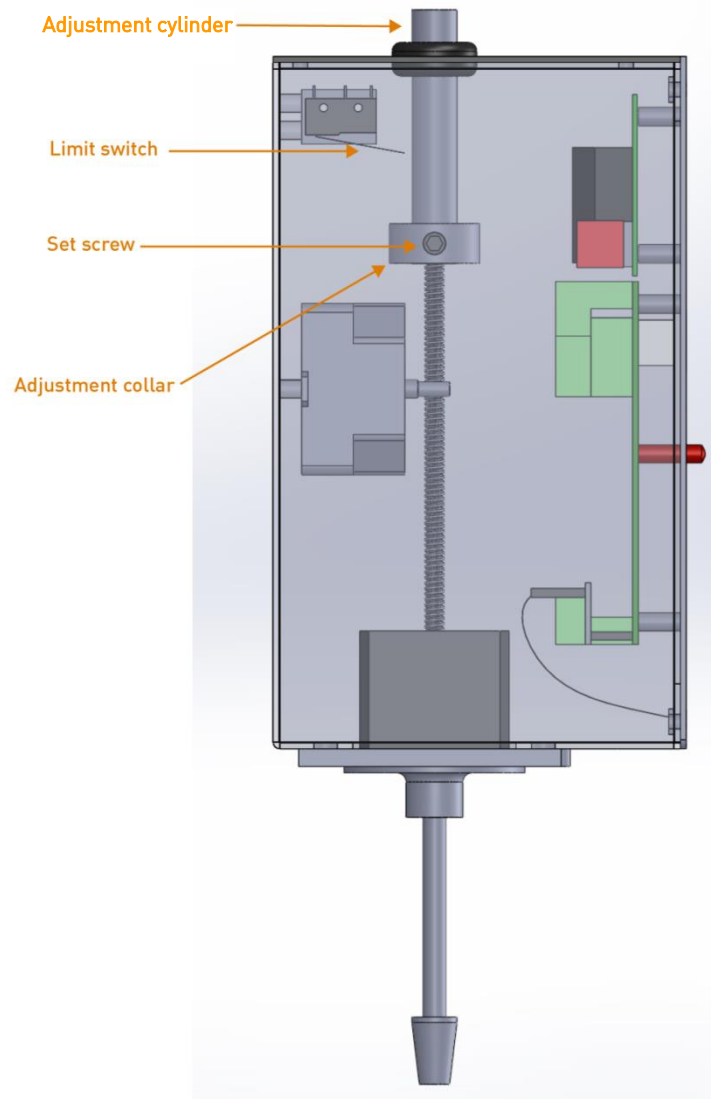


Figure 4 - Location of Manual Adjustment Cylinder, Set Screw, and Adjustment Collar

Flow Alarm

The eFlo meter incorporates a High Flow Alarm and Low Flow Alarm. Setpoints for these alarms are set through a Modbus interface or by using SSI's FlowMeterView software (provided free of charge to eFlo users).

When the alarm is active, the Alarm light will turn on. A warning message will be displayed on the LED screen.

In order to function properly, the flow alarm setpoints must be set prior to use of the eFlo unit, and the alarm must be wired properly. The alarm current should have a maximum current rating of 100mA. An isolation relay with fly-back diode should be used if the output is driving an inductive load (such as a contactor or horn). See Appendix 1: Electrical/Wiring Diagram for more information on wiring.

Flow Rate Totalizer

The eFlo meter's flow rate totalizer records cumulative flow rates measured by the meter. The totalizer is active at all times. The maximum totalized value is 999,999,999,999 (the unit of measurement is any unit of flow measurement). To show the totalized value, press and hold the Totalizer button. The totalized value will begin scrolling across the LED screen if the value is greater than what the screen can display.

To reset the totalizer to zero, press and hold the Reset button for five seconds.

Setup

The Setup button will open the Setup menu when the button is held for five seconds. The options are displayed on the LED screen. Scroll through the options by pressing the Auto/Manual button. Change the values by pressing the Up and Down buttons.

The available options are as follows.

GAIN: Gain is used to control the speed of valve response for automatic control. The higher the value, the more quickly the valve will open and close. The lower the value, the more slowly it opens and closes. The range for this value is 10 to 500.

DEAD (Deadband): Deadband is used to determine the area above and below the setpoint where no control action will occur. If the deadband is too small, the control may oscillate around setpoint. If the deadband is too high, the flow will not reach setpoint. The range for this value is 1 to the full scale flow value.

ADDR (Address): The Address is the RS485 Modbus address of the eFlo unit. The range for this value is 1 to 249.

ZERO: The Zero value is the adjusted mA input from the pressure transducer. This value allows the user to adjust the pressure transducer, which transmits a 4-20mA signal to indicate flow. When no flow is present, the ideal value for the Zero value is 4.00mA (although the value will not always be exactly 4.00). To change the Zero value, use the Up and Down buttons. To reset the Zero value and remove any previous adjustments, press the Up and Down buttons simultaneously. For more information, refer to the Zero Calibration section on page 16.

BAUD: The Baud is the serial baud rate. This value can be 9600 or 19200 (1920 represents 19200).

Maintenance

SSi recommends the following maintenance guidelines for the eFlo meter.

Clean any carbon or water from pressure transducer gas lines as needed. To do this:

1. Remove the rubber tubing from one side of the pressure transducer located in the electronics enclosure. (Note that the two tubes plumbed to the pressure transducer must not be switched; otherwise, the meter will not read properly.) The other end of the tubing should be connected to the stainless steel tubing plumbed vertically along the right side of the meter.
2. Apply air to the tubing to "flush" out any carbon and/or moisture, which may have developed. **Do not apply pressure to the pressure transducer.**
3. Reassemble the tubing to the pressure transducer port and repeat the procedure for the other side of the pressure transducer.

4. Verify gas flow with manometer.

Zero Calibration

When the flow rate is set to zero, it is possible that drift can occur due to a pressure difference on the inlet as compared to the factory calibration pressure setting. This is called **zero drift**. One way to avoid zero drift is to position the shutoff valve or isolation solenoid downstream of the flow meter so that gas flows through the shutoff or isolation solenoid after entering the eFlo inlet. This is the preferred shutoff/isolation method.

In the eFlo meter, there is an adjusted mA input based on the pressure transducer measurement when the flow rate is zero. This mA value is known as the **zero value**; ideally, the zero value will be 4.00mA. In a situation where pressure is applied to the inlet but no flow is present, a **zero calibration** in the field will often be required. Zero calibration involves changing the **zero offset** to account for the pressure applied to the inlet at zero gas flow. The procedure is as follows:

1. Press and hold the **Setup** button until the LED screen displays Configuration mode.
2. Press the **Auto/Manual** button to cycle through options until "ZERO" flashes on the screen.
3. Note the **first mA value** shown on the factory Calibration Report.
4. Using the **Up** and **Down** buttons, change the displayed value to the **first mA value** or a value below the **first mA value**.

NOTE: To remove any previous adjustments, press the **Up** and **Down** buttons at the same time.

The zero offset is now adjusted.

Flow Rate Calibration

The following procedure is used for calibration of flow rate for the purpose of eFlo certification.

IMPORTANT!

To ensure consistency and quality, it is recommended that this procedure be performed by SSi personnel. SSi takes no responsibility for calibrations performed by non-SSi personnel. If you have any questions, please contact SSi at (513) 772-0060.

For this procedure, you will need a calibrated manometer, a small standard screwdriver, and the original Calibration Report for the eFlo unit.

1. On the left side of the unit (when facing it), you will notice two barb fittings. One is a high pressure port and a low pressure port used for calibration. The high pressure port is the lower port; the low pressure port is located above the high pressure port.
2. Using a small standard screwdriver, turn the small valve located in each pressure port counterclockwise one full turn.
3. Connect a calibrated manometer to the test ports. Remember that the high pressure port is the lower port; the low pressure port is located above the high pressure port.
4. Set the actual flow rate to a value tested on the original Calibration Report.

5. Using the manometer, measure the actual differential pressure at the selected flow rate. Compare the differential pressure to the differential pressure shown on the Calibration Report.

NOTE: Typically, a 0.5" wc deviation equates to 5% flow error.

6. If the actual differential pressure is within acceptable limits ($\pm 4\%$ of the full scale value), no action is necessary. If the actual differential pressure is not within acceptable limits, adjust the zero/span potentiometers inside the differential pressure transducer. The pressure transducer is located inside the black enclosure on top of the unit.

Configuration and Control Software: FlowMeterView

SSi's FlowMeterView software is used to configure and control the eFlo meter via a serial connection (RS232 or RS485). This software is provided free of charge to eFlo customers. If you have an eFlo meter and need to obtain FlowMeterView, please contact SSi at (513) 772-0060.

Prerequisites and Installation

To run properly, FlowMeterView must be run on a computer with Windows XP or higher. Windows 7 or higher is recommended. The computer on which FlowMeterView is running must have a working serial port (either RS232 or RS485) for communication with the eFlo meter. Finally, the eFlo meter must be configured for the serial communications standard that is being used: RS232 or RS485.

To use FlowMeterView with the eFlo unit, you first need to install the software. To do this, run the file *setup.exe*. This is an installation and setup program and is usually supplied on a CD shipped with the eFlo unit. When you run the program, you will be prompted with a series of steps. Administrator access may be required for proper installation of the program. Contact your IT system administrator with system-related questions or SSi at (513) 772-0060 if you have questions about the installation procedure.

Operation

IMPORTANT!

Before running FlowMeterView, ensure that the eFlo unit is connected to the computer using an RS232 or RS485 connection. Take note of the COM port number that the eFlo unit is connected to on the computer. Also, make sure that the toggle switch on the eFlo board is set to the appropriate comm mode (See Appendix 1: Electrical/Wiring Diagram)

To run the software, open FlowMeterView from the Windows Start menu. The shortcut for FlowMeterView is typically found in the SuperSystems program group.

Once the software is running, you will see a window similar to the one pictured in Figure 5. The FlowMeterView interface is designed to be straightforward. On the left-hand side of the window, you will see menu options: **Device**, **Curves**, **Updates**, and **About**. To select a menu option, double-click on it. The default menu is **Device**; this menu is used to view and change settings and values on the eFlo meter. The **Curves** menu allows you to adjust Calibration Curve points, save curves to the local computer, download the active curve from the meter, and upload a curve to the meter. The **Update** menu, when selected, will cause the software to check for software updates and, if available, give you the option to download and install any updates. The **About** menu shows version information for the software as well as a change log.

At the top of the FlowMeterView window, you will see a connection **Status** as well as a drop-down menu, **Selected Port**, that allows you to select the COM port for communication with the

eFlo meter. The correct COM port must be selected in order for the software to be able to communicate with the meter.

The menus are described in more detail in the following sections.

Device Menu

Using the **Device** menu, you can view and change settings and values on the eFlo meter.



Figure 5 - FlowMeterView Device Menu

The settings and values that can be accessed in this menu are as follows:

- **Flow.** The current flow rate read from the eFlo unit.
- **Totalizer.** The current totalized flow. **Reset Totalizer** resets the value to zero.
- **mA In.** The current milliamp value of the analog input signal.
- **Setpoint.** The current flow setpoint. **Edit Set Point** allows you to change the setpoint value.
- **Auto/Manual.** The current setting for valve control mode: Auto or Manual. **Toggle Auto Manual** changes the mode between Auto and Manual.
- **Decimal Point.** The number of decimal places used in the flow display. **Edit Decimal Point** allows you to change this value.
- **Address.** The RS485 Modbus address of the eFlo unit. **Edit Address** allows you to change that value.
- **Full Scale.** The maximum flow value to be measured by the meter. **Edit Full Scale** allows you to change this value.

- **Gain.** The current gain. This value controls the speed of valve response for automatic control. The higher the value, the more quickly the valve will open and close. The lower the value, the more slowly it opens and closes. **Edit Gain** allows you to change the value.
- **Deadband.** The value defining the area above and below the setpoint where no control action will occur. If the deadband is too small, the control may oscillate around setpoint. If the deadband is too high, the flow will not reach setpoint. The range for this value is 1 to the full scale flow value.) **Edit Deadband** allows you to change the deadband value.
- **Pressure Transducer mA Zero.** The adjusted mA input from the pressure transducer. This value allows the user to adjust the pressure transducer, which transmits a 4-20mA signal to indicate flow. When no flow is present, the ideal value for the Zero value is 4.00mA (although the value will not always be exactly 4.00). **Edit PT mA Zero** allows you to adjust the zero value. **NOTE:** This achieves the same result as using the eFlo keypad to change the zero value—a procedure described in more detail in the Zero Calibration section on page 16.
- **Pressure Transducer mA Span.** The highest value of the mA range sent by the pressure transducer. For instance, if 20mA is the highest value that the transducer will send, the mA span value is 20. **Edit PT mA Span** allows you to change this value.
- **Analog Input Setpoint Zero.** The lowest flow rate value for a remote setpoint of 0. This value will correspond to approximately 4mA. **Edit AI SP Zero** allows you to change this value.
- **Analog Input Setpoint Span.** The highest flow rate value for the remote setpoint flow. This value will correspond to approximately 20mA. **Edit AI SP Span** allows you to change this value.
- **Analog Output Zero.** The lowest flow rate that will be transmitted by an analog output signal from the eFlo meter. This value will correspond to approximately 4mA. If the flow range is 0 to 100, the Analog Output Zero value will be 0. **Edit AO Zero** allows you to change this value.
- **Analog Output Span.** The highest flow rate that will be transmitted by an analog output signal from the eFlo meter. This value will correspond to approximately 20mA. If the flow range is 0 to 100, the Analog Output Span value will be 100. **Edit AO Span** allows you to change this value.
- **Low Flow Setpoint.** The value that will trigger a Low Flow Rate Alarm. The alarm will be active as long as the flow rate is less than or equal to this value. **Edit Low Flow Setpoint** allows you to change this value.
- **High Flow Setpoint.** The value that will trigger a High Flow Rate Alarm. The alarm will be active as long as the flow rate is greater than or equal to this value. **Edit High Flow Setpoint** allows you to change this value.

Curves Menu

The **Curves** menu (Figure 6) allows you to adjust Calibration Curve points, save curves to the local computer, download the active curve from the meter, and upload a curve to the meter.

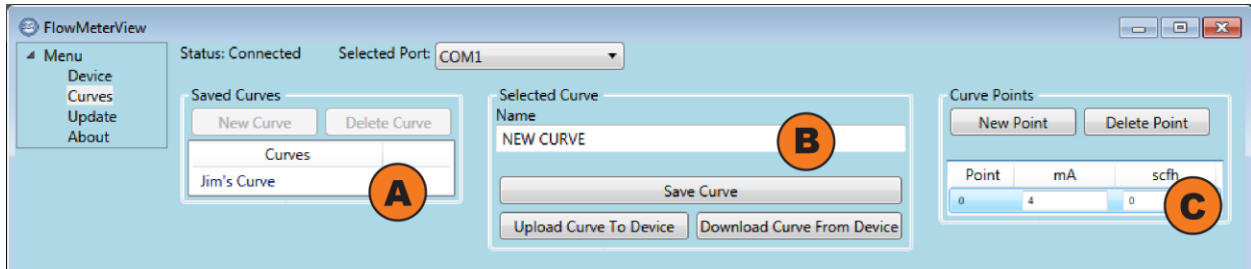


Figure 6 - Curves Menu

The window has three sections related to the Calibration Curve: **Saved Curves** (Section “A” in Figure 6), **Selected Curve** (Section “B” in Figure 6), and **Curve Points** (Section “C” in Figure 6). These sections are described in more detail below.

- **Saved Curves** (“A”). This section of the window displays a list of saved Calibration Curves. It also allows you to begin work on a new curve (by clicking on “New Curve”) and to delete a selected curve (by clicking on “Delete Curve”). To select a curve, single-click on the name of the curve.
- **Selected Curve** (“B”). This section displays the name of the curve selected from the **Saved Curves** area. It also provides the ability to save the current curve to a file on the local computer (“Save Curve” button), upload the current curve to the eFlo unit (“Upload Curve To Device”), and download the curve that is currently loaded in the eFlo unit (“Download Curve From Device”).
- **Curve Points** (“C”). This section allows you to define new points on the currently selected Calibration Curve and to delete existing points on that curve. Flow values correspond with milliamp signal values produced by the eFlo unit; each point denotes where these values coincide on the Calibration Curve. New points are defined with the “New Point” button. Selected points are deleted with the “Delete Point” button.

Update Menu

The **Update** menu (Figure 7) will cause the software to check for software updates and, if available, give you the option to download and install any updates.

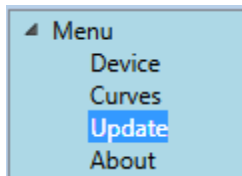


Figure 7 – Update Menu

About Menu

When selected, the **About** menu will bring up a window showing the software version (Application Version) and a change log (Revision Notes).

Troubleshooting

WARNING!

When troubleshooting, follow all proper safety precautions. Use proper eye protection and hand protection at all times.

Problem	Possible Causes	Possible Corrective Actions
Unit is not reaching higher flow setpoint	Pressure may be less than pressure specified on order Meter may not be the correct size Meter may not be calibrated for correct gas Gas piping may be too small for required flow	Adjust regulator using a manometer to set correct pressure while gas is flowing and meter is open Call SSi at (513) 772-0060 to discuss a different size (model) of flow meter Verify Calibration Report for gas calibration. If the gas is different than the gas you are flowing through the meter, contact SSi at (513) 772-0060 to discuss a recalibration. Verify that the plumbing is adequate for the maximum flow required through the meter.
Unit is indicating that there is gas flow when no flow should be present	Zero value is not set on the meter (if gas supply is shut off) The shutoff valve may be located upstream of the flow meter. This causes a zero drift condition since there is no pressure on the meter.	Verify that the hand valve for gas supply is closed. If flow is still showing, perform the zero calibration procedure as shown in the manual. <ul style="list-style-type: none"> • SSi recommends that the shutoff valve be moved downstream of the meter so that gas pressure on the meter is always available. The error will correct itself when gas pressure is supplied to the meter. • Another option is to perform a Zero Calibration. See the Zero Calibration section on page 16 for more details.

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Problem	Possible Causes	Possible Corrective Actions
Unit is indicating that there is no gas flow when calling for a flow setpoint	Hand valve for gas supply may be closed If a solenoid is used, solenoid may not be energized Restrictions may be present downstream in the gas supply	Open hand valve. Ensure that solenoid is energized. Check for issues such as exhaust gas outlet restriction, and correct any problems.
Unit is not communicating	Communications may not be configured correctly	Verify RS485 wire polarity Verify address and baud rate Verify that only one meter has address set to 1 on the RS485 loop
Unit is not reaching setpoint	There may be insufficient gain	Verify gain is high enough; adjust bias as needed
Setpoint cannot be changed directly from the eFlo control panel	An analog setpoint signal may be wired and overwriting manual setpoint A master device wired to the eFlo may be overwriting manual setpoint	Ensure that an analog input signal to the eFlo is not wired and overwriting manual setpoint Ensure that no device is actively writing the setpoint via communications

Table 5 - Troubleshooting

If you experience problems and cannot find the solution after troubleshooting, please call SSi Technical Support at (513) 772-0060.

Warranty

Limited Warranty for Super Systems Products:

The Limited Warranty applies to new Super Systems Inc. (SSI) products purchased direct from SSI or from an authorized SSI dealer by the original purchaser for normal use. SSI warrants that a covered product is free from defects in materials and workmanship, with the exceptions stated below.

The limited warranty does not cover damage resulting from commercial use, misuse, accident, modification or alteration to hardware or software, tampering, unsuitable physical or operating environment beyond product specifications, improper maintenance, or failure caused by a product for which SSI is not responsible. There is no warranty of uninterrupted or error-free operation. There is no warranty for loss of data—you must regularly back up the data stored on your product to a separate storage product. There is no warranty for product with removed or altered identification labels. SSI DOES NOT PROVIDE ANY OTHER WARRANTIES OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME JURISDICTIONS DO NOT ALLOW THE LIMITATION OF IMPLIED WARRANTIES, SO THIS LIMITATION MAY NOT APPLY TO YOU. SSI is not responsible for returning to you product which is not covered by this limited warranty.

If you are having trouble with a product, before seeking limited warranty service, first follow the troubleshooting procedures that SSI or your authorized SSI dealer provides.

SSI will replace the PRODUCT with a functionally equivalent replacement product, transportation prepaid after PRODUCT has been returned to SSI for testing and evaluation. SSI may replace your product with a product that was previously used, repaired and tested to meet SSI specifications. You receive title to the replaced product at delivery to carrier at SSI shipping point. You are responsible for importation of the replaced product, if applicable. SSI will not return the original product to you; therefore, you are responsible for moving data to another media before returning to SSI, if applicable. Data Recovery is not covered under this warranty and is not part of the warranty returns process. SSI warrants that the replaced products are covered for the remainder of the original product warranty or 90 days, whichever is greater.

Revision History

Rev.	Description	Date	MCO #
-	First release	3/23/2015	2160
A	Wiring information updates	5/23/2016	2177
B	Correction to part number for pigtail cable	6/2/2016	2182
C	Updated board diagram, added explanation of RS232/RS485 Toggle switch.	10/3/2016	2195

Appendix 1: Electrical/Wiring Diagram

Flow Board: Connection Diagram

