SuperSystems incorporated

eFlo-H & eFlo-L

ELECTRONIC GAS & LIQUID HIGH PRESSURE FLOW METER

OPERATIONS MANUAL

Super Systems Inc.
7205 Edington Drive
Cincinnati, OH 45249
513-772-0060
Fax: 513-772-9466
www.supersystems.com

Super Systems Inc.
USA Office
Corporate Headquarters:
7205 Edington Drive
Shipping Address:
7245 Edington Drive
Cincinnati, OH 45249
Phone: (513) 772-0060
http://www.supersystems.com

Super Systems Europe
Unit E, Tyburn Trading Estate,
Ashold Farm Road, Birmingham
B24 9QG
UNITED KINGDOM
Phone: +44 (0) 121 306 5180
http://www.supersystemseurope.com

Super Systems México
Sistemas Superiores Integrales S de RL de CV
Acceso IV No. 31 Int. H Parque Industrial
Benito Juarez
C.P. 76120 Queretaro, Qro.
Phone: +52 442 210 2459
http://www.supersystems.com.mx

Super Systems China
No. 369 XianXia Road
Room 703
Shanghai, CHINA
200336
Phone: +86 21 5206 5701/2
http://www.supersystems.cn

Super Systems India Pvt. Ltd.
A-26 Mezzanine Floor, FIEE Complex,
Okhla Indl. Area, Phase – 2
New Delhi, India 110 020
Phone: +91 11 41050097
http://www.supersystemsindia.com

Table of Contents

Introduction

The **eFlo-H** (high pressure gas) and **eFlo-L** (high pressure liquid) instruments are Super Systems Inc.'s electronic flow meters for higher pressure applications. eFlo works by measuring the differential pressure (the difference in pressure at two points) of a gas or liquid flowing through a specially designed opening in the flow assembly. Based on properties of the flowed gas or liquid (a.k.a. media), the differential pressure can then be used to calculate the flow rate of the media.

Figure 1: eFlo-L & eFlo-H unit – showing separated units

The eFlo-H & eFlo-L feature built-in high and low flow rate alarms and a flow rate totalizer. The media 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 media 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 a digital signal over RS485.

The eFlo-H & eFlo-L use a mathematical curve to calculate the media flow. This curve can be set up by SSi before the meter is shipped and can also be adjusted by the customer. The eFlo provides the option of an *alternate curve* that can be used with a second media (usually a gas). If the alternate curve is programmed, the alternate media can be flowed through the system. The alternate curve is generally used for specialized applications. See Appendix 2: Primary and Alternate Curves on page 45 for more details.

This manual also covers configuration and control using the eFlo web interface and eFlo PC software (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 media shutoff, nor is it designed to do so. For reliable media shutoff, incorporate a valve that provides positive media shutoff. Ensure that all media 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 media leaks into the unit.

Ensure that the air and gas/liquid 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.

Weight (Including Electronics Housing)	eFlo-H: 6.5 lbs (2.95 kg) eFlo-L: 11 lbs (4.99 kg)
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)
Flow Output Signal (Linear)	4-20mA
Maximum Output Signal Load	500Ω
Input Control Signal (Linear)	4-20mA
Response Time*	1 – 10 seconds*
Communications	RS485, Ethernet
Communication Protocol	Modbus RTU
Pressure Drop @ 100% Capacity *See Calibration Report for specific pressure drop.*	1 psi - liquid 5 psi - gas
Flow Meter Pressure Limits *The pressure will be calibrated to user-specified requirements. See the Calibration Report for more details.*	5 psig gas – minimum allowable 100 psig gas – maximum allowable 5 psig liquid – minimum allowable 50 psig liquid – maximum allowable

**Response time depends on the Gain settings in the meter. Response time from a zero flow set point will be longer due the physical shape of the flow valve.*

Table 1: eFlo-H & eFlo-L Specifications

Installation Procedure

Installing the eFlo-H or eFlo-L 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

Clearance

When installing the device, leave enough room on either side (2" is recommended) to allow users to adjust, remove, and replace the existing fittings. (See Appendix 3)

Mounting

Proper mounting is essential for the successful operation of the eFlo instrument. The eFlo main body and electronic housing can be mounted together or separately depending on the customer's requirements. The main body of the eFlo contains four (4) threaded holes for mounting to a panel. The holes are ¼"-20 threaded and approximately 3/8" deep positioned in a row (see dimensional drawings in Appendix 4). The eFlo assembly can also be supported by pipe without using the mounting holes if desired. However, ensure that the pipe is rigid enough to support the weight of the meter assembly if mounting in this manner.

The electronics enclosure is provided by SSi already attached to the top of the meter main body (see Appendix 3 & 4). The enclosure can be mounted remotely as well (up to 20' away) depending on the customer's requirements. Cabling between the main body and electronic enclosure will need to be lengthened and sized appropriately to prevent signal loss or interference. Please contact SSi if there are any questions or concerns about mounting the electronic enclosure remotely.

The direction of flow through the meter is critical since the pressure transducer has a high pressure and low pressure side specifically required. The meter is designed for flow as-indicated in the figure below.

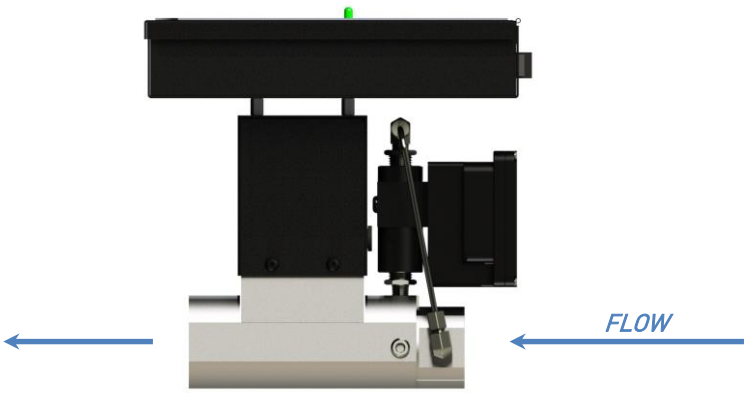


Figure 2: Media flow direction indication

SSi recommends mounting the eFlo vertically with the media flow direction upwards. This is especially important for the eFlo-L used for liquids. If another orientation is required, please contact SSi prior to mounting.

Plumbing

The media inlet and outlet openings have 1/2" NPT connections. The locations of these connections are shown in Appendix 3 & 4. Use of bushings or reducers at these connections is

acceptable as long as the smallest pipe diameter is not smaller than the installed orifice plate. See certification for that meter to determine actual orifice diameter. Contact SSi at (513) 772-0060 for questions about pipe sizing.

Thread Sealants:

Teflon or natural gas-rated pipe tape or pipe dope is acceptable for non-corrosive gases. For corrosive gases, pipe tape is not recommended, unless the manufacturer specifies that it is rated for ammonia or other corrosive gases. SSi uses and recommends Oatey, Gasiola, and X-Pando brands of pipe dope for use with corrosive gases.

NOTE: When installing the device, ensure that excessive tape or dope does not fall into the meter, as this can damage sensors, plug sensor lines, prevent flow through the meter, and prevent the device from functioning properly.

Connection Tightness:

After thread sealant is applied, tighten all connections by hand (3.5-6 turns, depending on pipe size), then use the following Turn Past Finger Tightness guide to complete the tightening process:

NPT Fitting Size	TPFT (Turns Past Finger Tightness)
1/8"	1.5-2.5
1/4"	1.5-2.5
3/8"	1.5-2.5
1/2"	1.5-2.5
3/4"	1.5-2.5
1"	1-2.5
1 1/4"	1-2.5
1 1/2"	1-2.5
2"	1-2.5

NOTE: Never loosen a fitting for correct alignment. Doing so will prevent the thread from maintaining a proper seal.

CAUTION: Do not overtighten the connection. Overtightening can damage threads, pipes, fittings, and the eFlo device.

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 between the eFlo electronics housing and the control/data-logging system for a source of power, communications, and automatic control. The electrical connections are defined in Table 2 below. (An electrical/wiring diagram for the flow control board can be found in Appendix 1: Flow and Motor Control Board: Connection Diagram.)

9-Pin D-Sub Pin Number	Wire-In Color	Signal Type	Description
1	Red	+ VDC	Power Supply 24 VDC (400 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	Brown	+ RS485	Communications Signal provided by Modbus over serial.
8	Yellow	- RS485	
9	Purple	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 2: Electrical Connection Between the eFlo Electronic Enclosure and Power Source/Control System

For flow and motor control board wiring information, refer to Appendix 1: Flow and Motor Control Board: Connection Diagram on page 44.

Leak Checking

Before operation, all plumbed components should be leak checked with a non-flammable, non-corrosive gas/liquid (air, nitrogen, argon, water, etc.). To avoid damage to sensors and other components, check with SSi for the maximum pressure for the sensor in your eFlo device (the installed sensor may vary based on the parameters needed in your particular application).

After completing the above leak check, perform another check using the media which the eFlo is designed to measure. Leaks may occur with the designated media that did not occur with the test gas used initially.

Purging The eFlo-L

The eFlo-L is used for liquid flow applications. After physical installation, all of the air needs to be purged from the eFlo-L main body and pressure transducer plumbing. The presence of gases in the meter can cause false and unstable flow readings.

To purge the meter, the liquid needs to be able to flow through the meter at the specified pressure for at least 30 minutes to remove air from the system. In addition, the tubing from the

meter main body to the high pressure side of the pressure transducer needs to be loosened, until all of the air is allowed to escape and liquid flows from the fitting. The tubing is connected with compression fittings that can be loosened and tightened for this purpose.

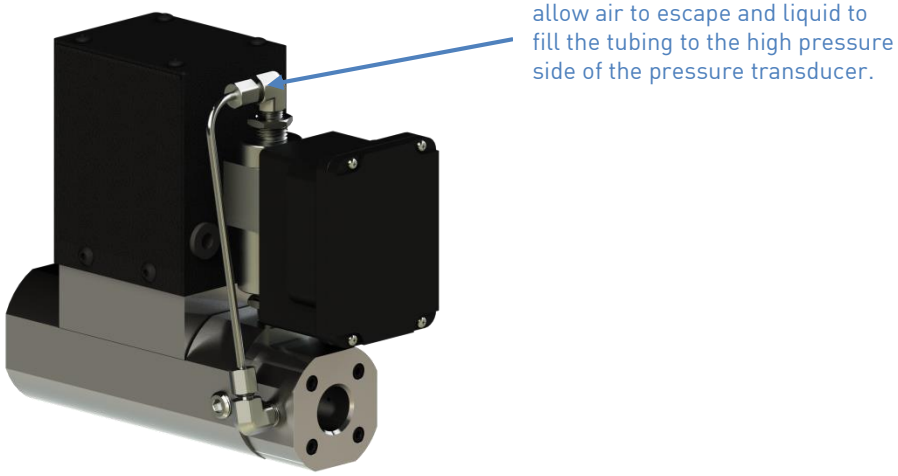


Figure 3: eFlo-L unit – showing compression tube fittings for liquid purging

If the meter exhibits erratic flows or shows flow when the valve is closed and pressure still applied, there is probably still air trapped in the meter. The meter may need to be oriented in different positions to allow the trapped air to escape.

Initial Network Configuration

This section is intended for use by persons familiar with Ethernet network setup.

In order to work correctly, the eFlo unit must be properly configured for the network to which it is connected.

NOTE: By default, the IP address of the eFlo unit is static, and DHCP is disabled. These settings can be adjusted through SSi's nLocateIP software (see below), the web interface (see Page 25), or through the eFlo keypad.

If you already know the IP address of the web interface, skip to the Web Interface section on page 25. The network configuration is described in this section.

The eFlo unit will use a default IP address of 192.168.1.200. If the unit is using the default IP address, that IP address can be used to access the web interface (for more information on the web interface, refer to the Web Interface section on page 25.

The IP address of the unit can also be found by using SSi's *nLocateIP* software. This method is described in the following subsection.

nLocateIP Method

Once the eFlo unit is connected to the network, you should be able to locate it on the network using SSi's *nLocateIP* software. This program is available from SSi. To use it in locating the eFlo unit on the network, follow these steps on a Windows-based PC:

1. Ensure that the eFlo unit is connected to the network.
2. Open the *nLocateIP* program.

Figure 4: Opening nLocateIP program

3. Once the program opens, click the **Search** button. The program will begin searching for SSi devices connected to the network.

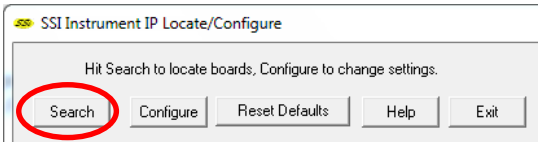


Figure 5: Search button in nLocateIP

4. Look for text similar to the text shown at right. The corresponding IP address is the IP address that you will want to use. In the example, the IP address is 192.168.1.122.

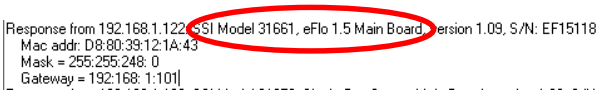


Figure 6: eFlo identification text in nLocateIP

Once you have found the IP address, you can configure network settings using the **Configure** button, or complete any additional network configuration using the web interface. See the Network Configuration section on page 33.

If you are unable to find the eFlo unit in the list of devices, it is possible that a network setting (such as subnet mask) may be different, the eFlo unit may be connected to a different network, or the eFlo unit may not be powered on. Network settings can be adjusted through the eFlo keypad (see Network Configuration section, page 19). Otherwise, SSi recommends consulting an IT engineer or network administrator. If needed, call SSi at (513) 772-0060.

Modbus Registers

The eFlo Modbus registers are as follows.

Modbus Register Number	Description
16	Actual Flow (Primary Scale)
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

Modbus Register Number	Description
24	mA Span Value
25	Deadband for Control
26	Setpoint Zero
27	Setpoint Span
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)
60	Actual Flow (Secondary Scale)

Table 3: Modbus Registers and Descriptions

eFlo Background and Familiarization

The eFlo-H & eFlo-L meters are SSi's high pressure version of the *eFlo Electronic Flow Meter*. It also uses the science of differential pressure to measure media flow through the meter, but it can handle significantly higher supply pressures allowing it to be a more compact device. The meter is calibrated per the customer's specifications including media type, supply pressure, and media temperature. Accuracy of these three properties is critical and directly affects the accuracy of the meter. A certification is included with the meter defining the calibration conditions and customer's requirements. A curve providing the relationship between the differential pressure and the media flow is also indicated on the certification. The eFlo electronics will accept as many as 33 points to characterize the flow curve, but a 20 point curve has proven to provide enough data for accuracy.

The meter assembly is separated into two categories; mechanical and electrical components. The mechanical portion of the meter includes all of the components that perform a mechanical function to create flow. The electrical components include anything that involves electrical power in the function of the meter.

The meter controls the flow of media with the use of a linear stepper motor and valve assembly. As the flow increases, the differential pressure across the orifice plate increases. The differential pressure can be related directly to media flow if other significant properties are known. SSi calibrates every meter to match the characteristics of each fabricated orifice plate. This ensures accuracy of each meter.

Mechanically, the meter contains the following components:

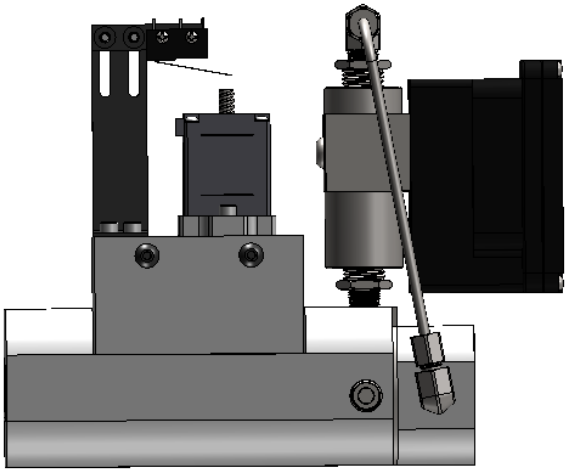


Figure 7: Mechanical Components of eFlo-H & eFlo-L

1. A pressure transducer to measure differential pressure across an orifice.
2. An orifice plate where the differential pressure is created.
3. A flow valve body through which the media flows.
4. A valve assembly to control the flow through the body (not shown).
5. A stepper motor to move the needle valve and control flow.
6. A limit switch to prevent over-travel of the motor lead screw.
7. Pressure tap plugs for calibration verification.

The electrical components of the meter are contained within the electronics housing. The pressure transducer also contains some electronics, which are sealed inside of its housing. The electronics are shown in the figures below.

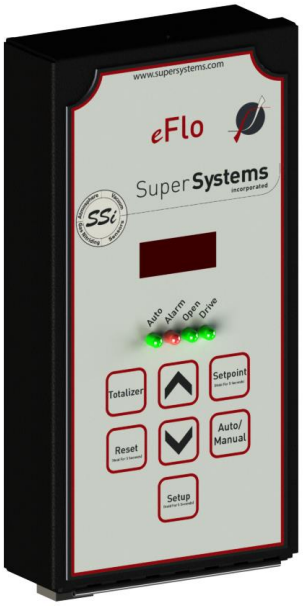


Figure 8: Electronics Housing

Figure 9: Electronic components of eFlo-H & eFlo-L

Operating Instructions

The meter includes a user interface to indicate media flow. The meter has similar features and capabilities as the standard eFlo meter. One difference is that the eFlo-H & eFlo-L meters do not have manual flow control through the use of a hand valve. The meter can be manually controlled through the use of the flow control panel by pushing the Up and Down buttons.

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 10 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.

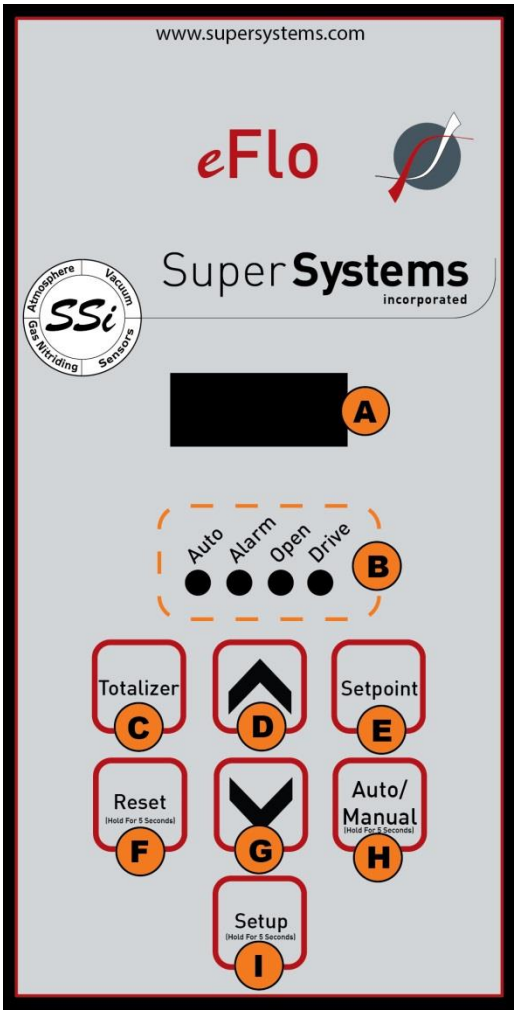


Figure 10: eFlo Flow Control Panel Layout

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

If the meter is in manual mode, the Up button, when pressed and held, will increase the flow rate through the inlet connection by opening the valve. This button is also used to navigate various 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 while holding the Setpoint button. 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 16 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. To confirm the reset, press the Totalizer button to ensure that the value has reset to zero.

G – Down button
The Down button, when pressed and held, will decrease the flow rate through the inlet connection by closing the valve. This button is also used to navigate various 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 buttons.

I – Setup button
The Setup button will open the Setup menu when the button is held for five seconds. **NOTE: The button must be completely covered in order to activate the Setup menu.** 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.

Refer to the Setup section on page 18 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 measured flow rate is lower or higher than the setpoint (and out of deadband), the valve will drive open or closed to control to that setpoint.

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 35)
5. By using the web interface (refer to Main Screen—page 26).

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 value opens too far, damage to the motor could result). A limit switch on the eFlo unit provides this mechanism. This adjustment was completed during calibration of the eFlo instrument. In the event that the limit switch was moved from its factory set position, the steps below describe how to reset the switch to its 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 7/64" hex wrench, loosen the two 6-32 adjustment screws on the limit switch bracket (shown below in the illustration) to allow the limit switch to be moved up and down. Move the limit switch so that the arm is in contact with the drive screw of the motor.
3. Tighten the 6-32 screws on the limit switch bracket to lock its position on the linit switch adjustment arm.
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 limit switch arm and its relation to the motor drive screw.
6. Verify that the drive screw is just making contact with the limit switch arm, indicating the correct position of the limit switch.
7. Ensure that the two 6-32 screws are tightened properly.

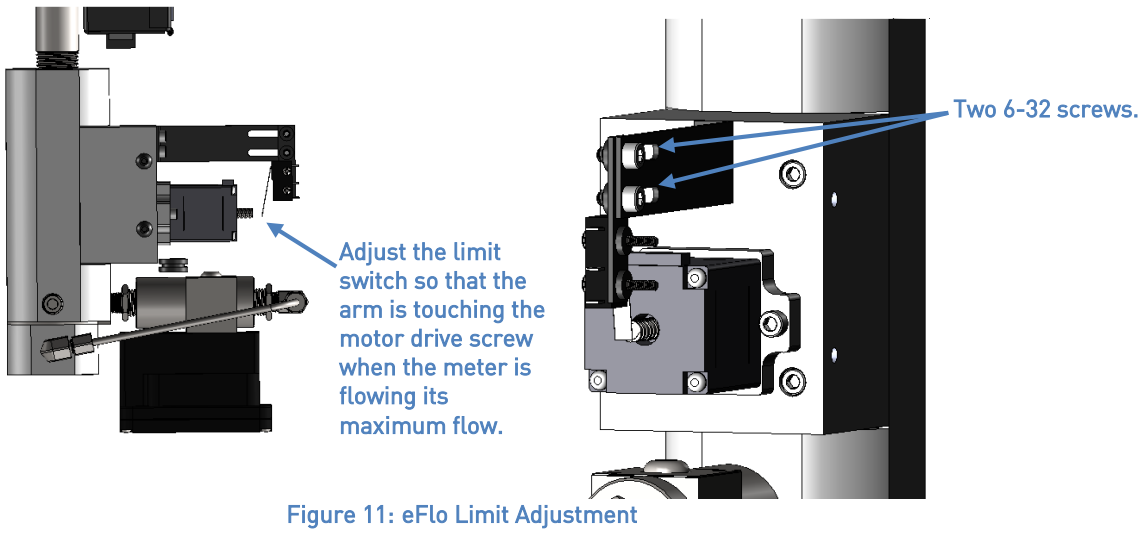


Figure 11: eFlo Limit Adjustment

Flow Alarm

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

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: Flow and Motor Control Board: Connection 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. **NOTE: The button must be completely covered in order to activate the Setup menu.** 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.

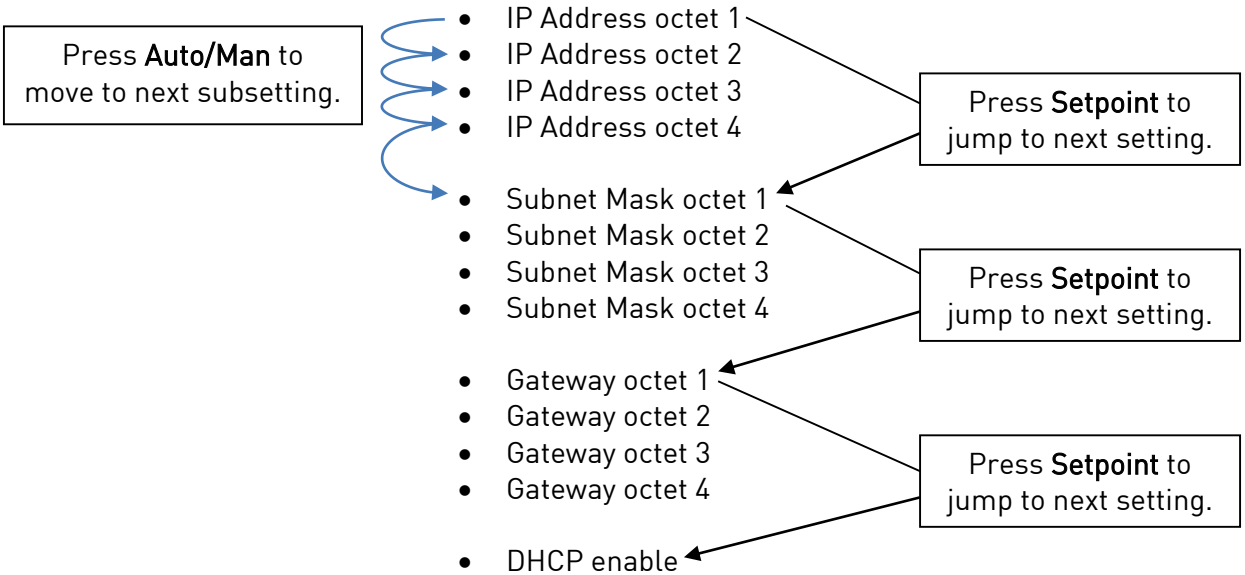
The available options are as follows.

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 Adjustment & Calibration section on page 20.
BAUD: The Baud is the serial baud rate. This value can be 9600 or 19200 (1920 represents 19200).

CUR (Curve Select): This setting allows for the selection of primary curve (0) or alternate curve (1). By default, only one curve will be set up unless two are requested.
DEF (Default Select): This setting determines the default select mode. See Appendix 2: Primary and Alternate Curves for more details.
ALTU (Alternate Units): Units for the alternate curve: scfh, scfm, sccm, custom.
MULT (Alternate Multiplier): The multiplier used with the alternate units custom setting. As an example, if the alternate multiplier is set to 5, the initial measured value will be divided by 1000 and then multiplied by 5.

Network Configuration

To change network settings directly through the eFlo keypad, press and hold the Setup and Setpoint buttons together for five seconds. This is the only way to access the Network Configuration menu. It cannot be accessed through the Setup menu. **NOTE: The buttons must be completely covered in order to activate the Network Configuration menu.** This will bring up the network configuration menu. This menu works the same way as the regular menu system, displaying the menu option and then its value at one second intervals.
There are four settings to adjust from this menu: IP Address (iP), Subnet Mask (Sbn), Gateway (gat), and DHCP. The first three settings are divided into four subsettings, as shown below. To navigate settings, use the Setpoint button; to navigate subsettings, press the Auto/Man button. (See below)



Pressing Setpoint will always move you to the next setting. Pressing Setpoint while in the DHCP option will exit the network configuration menu.

To change a subsetting, simply navigate to that setting as shown above, use the up and down arrows to enter a value between 0-255, and move to the next subsetting. For the DHCP enable option, use the up and down arrows to select Off or On. The settings will be saved when the network configuration menu is exited.

IP Address Conflicts

In certain cases, the eFlo's default address (192.168.1.200) may cause a conflict or be incompatible with another system. In these cases, follow the following procedure:

- Enter the Network Configuration menu by holding the Setup and Setpoint buttons together for five seconds.
- Use the Setpoint button to navigate to the DHCP enable option (as shown above)
- Change the DHCP enable setting to On.
- Wait several minutes while the eFlo device receives a new network address.
- Re-enter the Network Configuration menu. Cycle through the options (listed above) to see the new settings. For example, if:
    - IP Address Octet 1 = 192
    - IP Address Octet 2 = 168
    - IP Address Octet 3 = 1
    - IP Address Octet 4 = 150

  Then the IP address is 192.168.1.150.
- Record these settings for future reference.
- When you reach the DHCP enable option, select Off. This will prevent the settings you just viewed from changing again.
- If this does not work, we suggest you contact your IT professional or Super Systems, Inc. at (513) 772-0060 to troubleshoot the problem.

Maintenance

SSi recommends the following maintenance guidelines for the eFlo meter.

Clean any contamination from pressure transducer high pressure connection tubing as needed. To do this:

1. Loosen the two compression nuts on each end of the tubing to remove from the meter.
2. Apply air to the tubing to "flush" out any contaminants that may have developed. **Do not apply pressure directly to the pressure transducer.**
3. Reassemble the tubing to the pressure transducer and flow meter body. Tighten the compression nuts, until no gas or liquid leaks from the connections.
4. See the *Purging The eFlo-L* section if using the meter for liquid flow to make sure all of the air has been purged from the tubing.
5. The transducer may require a zero adjustment or calibration. See the **Zero Adjustment & Calibration** sections below if the mA reading with no flow and pressure has changed significantly.

Zero Adjustment & 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/liquid 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 and supply pressure is applied to the meter. 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, no flow is present, and the mA reading is less than 4.25mA or greater than 3.75mA, a **zero adjustment** in the field will often be required.
- If the mA zero value reading is greater than 4.25mA or less than 3.75mA, a **zero calibration** is required.

Zero adjustment involves changing the **zero offset** in the electronics 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.

When the mA reading is greater than 4.25mA or less than 3.75mA with pressure applied and the valve closed, a **zero calibration** is recommended. This requires a physical adjustment to the tranducer zero screw terminal. The procedure is as follows:

1. Install the meter in the final location and position in which it will be used. This will help reduce any additional drift in the mA reading.
2. Apply power to the meter and use the web interface, Flowmeter View software, or eFlo user interface to display the mA reading.
3. Verify that the mA zero adjustment is reset so that there is no offset in the mA reading.
4. Remove the cover of the pressure transducer. It is held on by four (4) Phillips head screws.

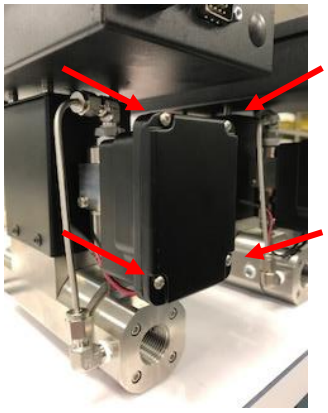


Figure 12: eFlo Pressure Transducer Cover

5. You will see two wires (one red and one black wire) attached to two terminals. Just under those terminals are two access screws. One is labeled "ZERO" and the other is labeled "SPAN." Remove the ZERO access screw only. **Do not adjust the SPAN on the pressure transducer.**

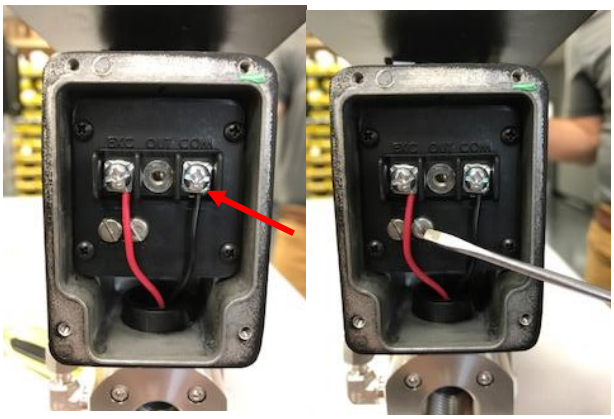


Figure 13: Pressure Transducer ZERO Access Screw

6. This access port allows access to the ZERO screw on the circuit board of the transducer. Using a small flat screwdriver, adjust the ZERO screw and watch the change in the mA reading. Only a slight adjustment to the screw will result in a significant mA change.

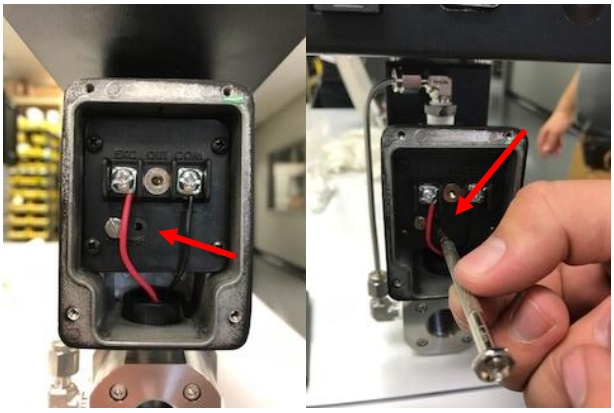


Figure 14: Pressure Transducer ZERO Adjustment Screw

7. When the mA reading is adjusted properly, replace the ZERO access screw and the cover on the transducer to prevent dust and/or liquid from entering the electronics of the transducer.

The transducer should now be calibrated for use.

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 capable of being exposed to the supply pressure at which the meter is being used, a 3/16" allen wrench, two 1/8" NPT threaded fittings to which you can connect the manometer, and the original Calibration Report for the eFlo unit.

1. On the left side and right side of the main body of the flow meter, you will notice two threaded plugs. One is a high pressure port and the other is a low pressure port used for calibration. The high and low pressure ports are shown in the figure below.
2. **CAUTION:** Remove the pressure from the meter by closing the supply gas/liquid main shut-off valve. Manually open the control valve on the flow meter to release the pressure from the meter. Additional valves may need to be opened to release pressure as well. Do NOT attempt to loosen the plugs if the pressure in the meter cannot be verified.
3. Using the 3/16" allen wrench, remove the two plugs on each side of the flow meter main body (figure below). Install the two 1/8" NPT threaded fittings that will be used to connect the manometer to the flow meter.

4. Connect a calibrated manometer to the fittings. Please verify the high pressure and low pressure sides of the meter when connecting the manometer. Secure the tubing to the fittings and manometer to prevent leakage during testing.
5. Apply pressure to the meter.
6. Set the actual flow rate to a value tested on the original Calibration Report.
7. 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 0.06% flow error.
8. If the actual differential pressure is within acceptable limits (±4% of the full scale value), no action is necessary. If the actual differential pressure is not within acceptable limits, contact SSi at (513) 772-0060 for further consultation.

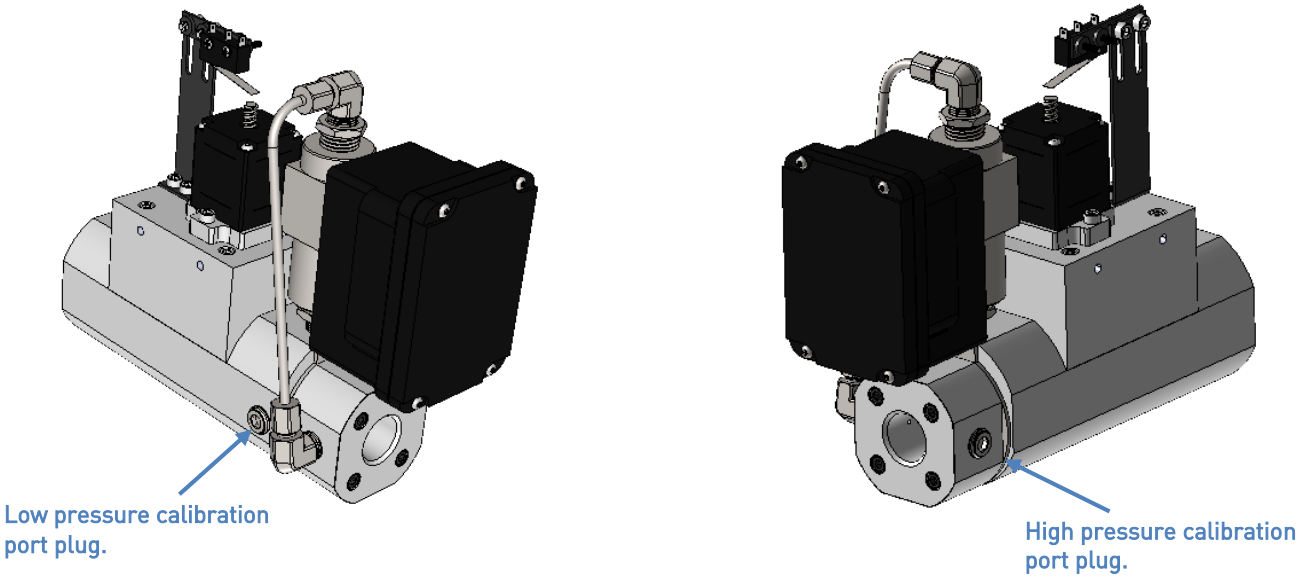


Figure 15: eFlo-H & eFlo-L Pressure Tap Plug Locations

Web Interface

The eFlo meter is equipped with a web interface that can be accessed using an Internet web browser such as Mozilla Firefox, Google Chrome, or Microsoft Internet Explorer.

In order to open the web interface with a web browser, you will need to know either the IP address or the hostname of the web interface. SSi recommends asking an IT engineer or network administrator to set up the web interface prior to use. The following section contains details on how to do this.

Using the Web Interface

To access the web interface, open a web browser, and in the location bar, enter the IP address or name of the webserver. The main screen will then appear, as shown in figure below.

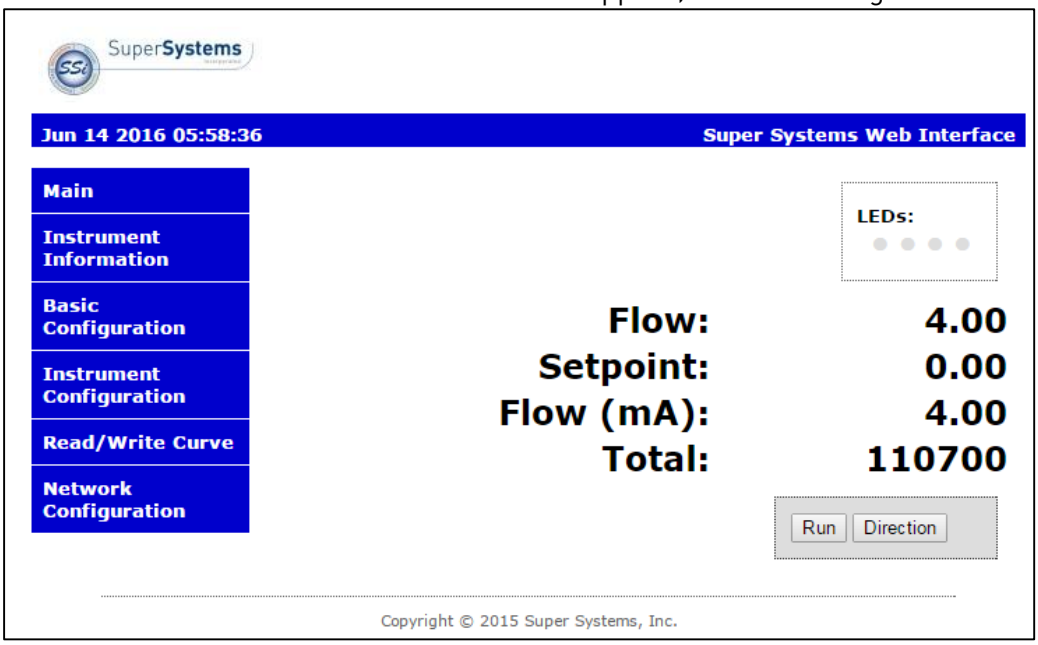


Figure 16: Main Screen of Web Interface

The web interface features several screens. Note that some screens require a login and password. The login is determined by a continuously changing Code of the Day. For access to these screen options, please contact SSi.

- **Main.** This screen shows status information such as flow rate, setpoint, and which LEDs are illuminated on the unit, and the amount of total flow since the previous reset.
- **Instrument Information.** This screen shows eFlo model number, unit serial number, and software version number.
- **Basic Configuration.** The Basic Configuration screen displays, and allows you to change, basic operating parameters for the eFlo unit.
- **Instrument Configuration** (login and password required). The Instrument Configuration screen displays, and allows you to change, operating parameters for the eFlo unit.
- **Curve Read/Write** (login and password required). This screen provides options for adjusting the curve values for the primary and alternate gases, as well as loading previously saved curve files.

- **Network Configuration** (login and password required. Using this screen, you can adjust network settings, such as host name and IP address. Note that if DHCP is enabled

Main Screen

The main screen provides real-time information on the operation of the eFlo unit. The current gas flow process value and setpoint are displayed, as well as the mA value corresponding to the calculated process value. Four circular icons on the screen represent the four LEDs on the front of the unit; these icons will illuminate and darken as the states of the corresponding LEDs change. The **Run** button will drive the motor, and the **Direction** button will change the drive direction.

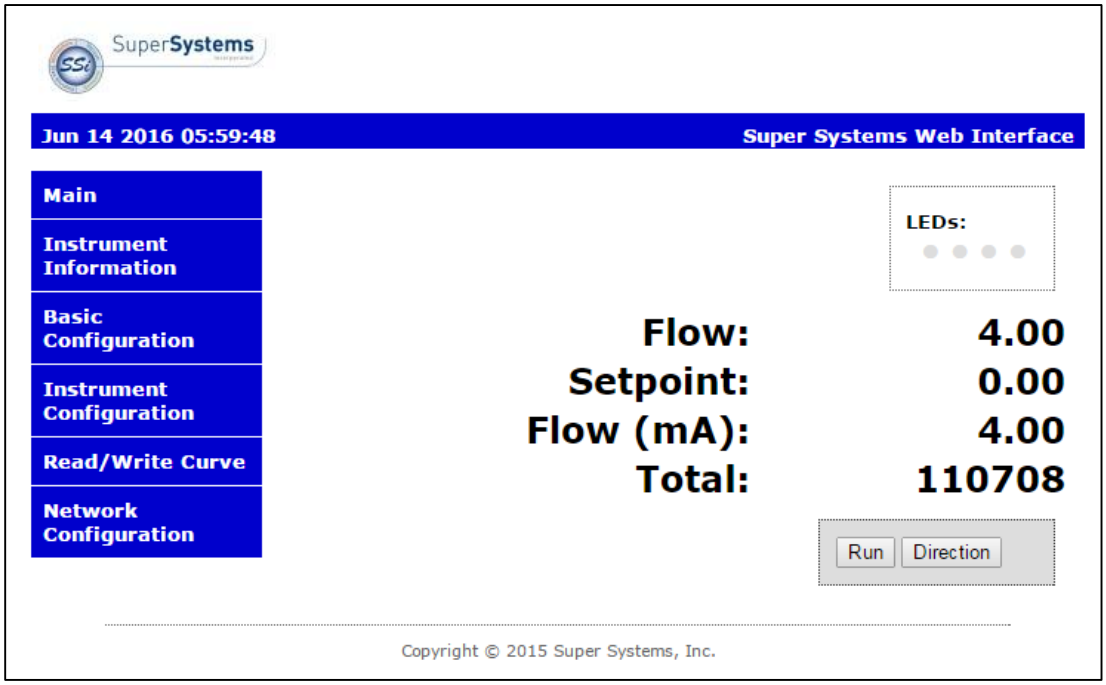


Figure 17: Enlarged Main Screen of Web Interface

Instrument Information

The Instrument Information page displays the SSi part number and specific serial number of the eFlo unit. The current version of the software is also shown.

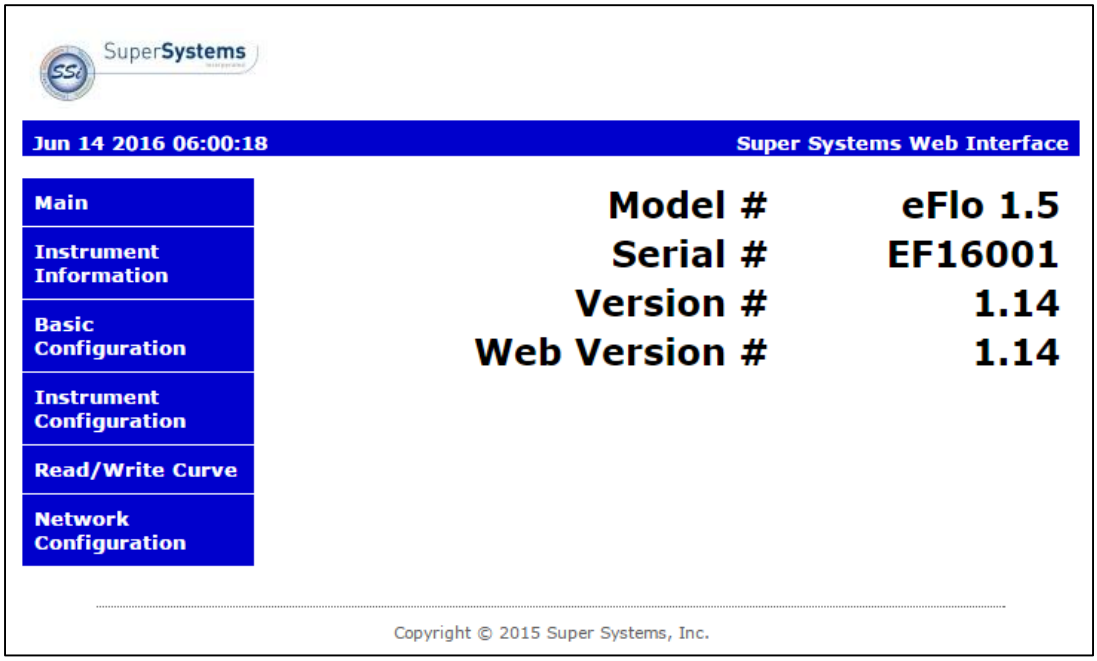


Figure 18: Instrument Information Web Page

Basic Configuration

The Basic Configuration page displays current basic parameter values and provides the ability to set, select, and reset values. The parameters are described in more detail below.

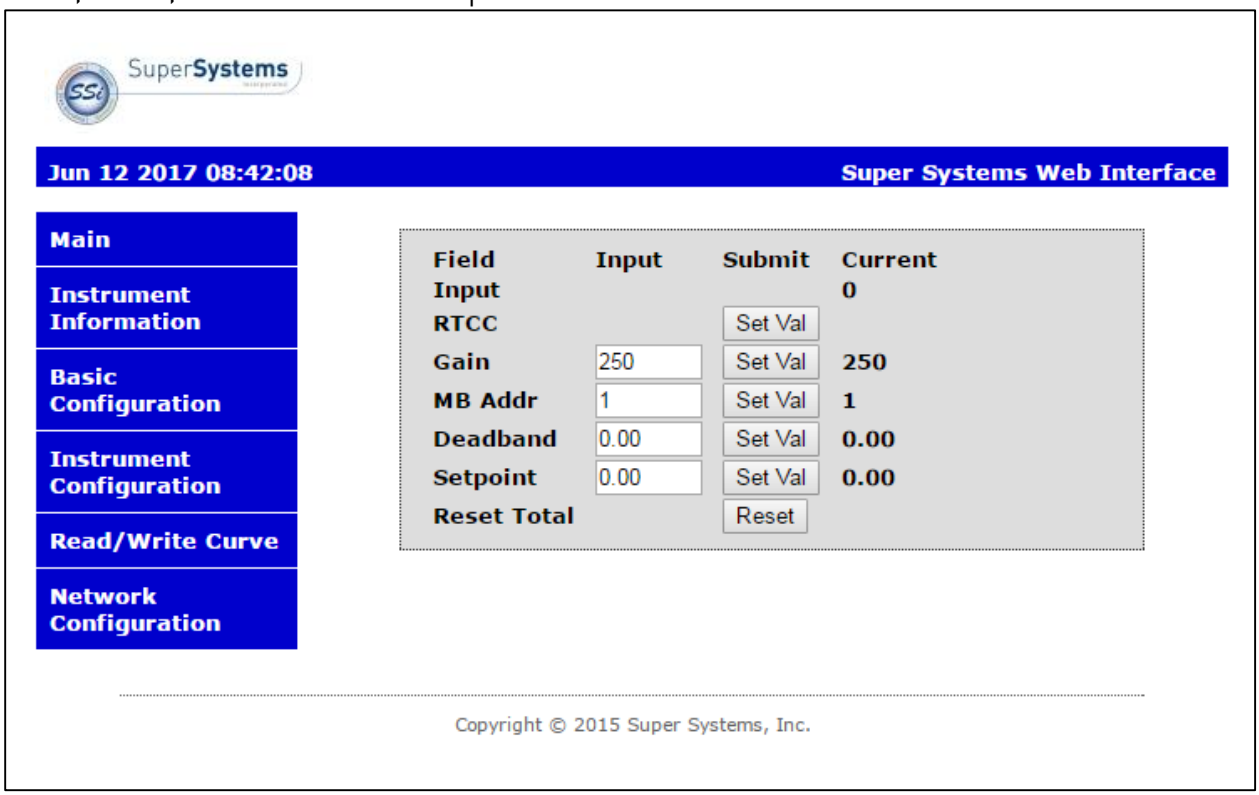


Figure 19: Basic Configuration Web Page

Parameter	Description
RTCC	Sets the date/time (real time calendar clock)
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 will open and close.
MB Address	The Modbus address of the device and is a number from 1-247. The device will respond to 250 universally.
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.)
Setpoint	The current flow setpoint
Reset Total	Resets the totalized value

Table 4: Parameters and Descriptions for Instrument Configuration

Instrument Configuration

The Instrument Configuration page displays current parameter values and provides the ability to set, select, and reset values. The parameters are described in more detail below.

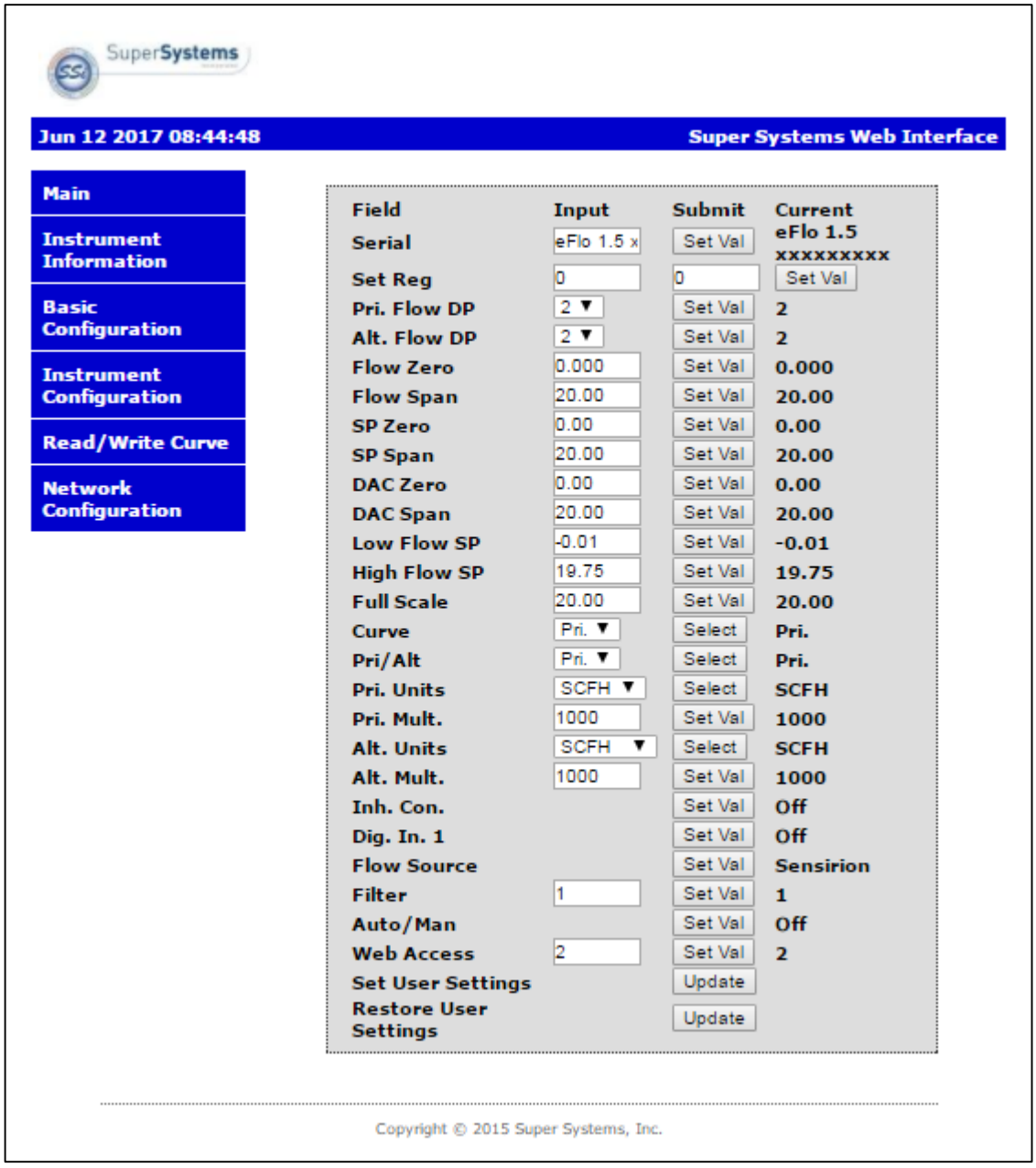


Figure 20: Instrument Configuration Web Page

Parameter	Description
Serial	The serial number of the device
Set Reg	Sets a register value. The first field is the register value to set; the second field is the value to set it to.
Primary Flow DP	The primary decimal point value. It can be any number from 0-3 inclusive. It is tied to the stored curves.
Alternate Flow DP	The decimal point setting from 0-3 inclusive (used with alternate units).
Flow Zero	Constants that are used to correctly adjust the input flow reading. They are changed so that the measurement instrumentation will read exactly 4.00 mA at what is believed to be 4.00 mA, 20.00 mA at 20.00 mA, etc. These constants have units of mA.
Flow Span	
SP Zero	The lowest flow rate value for a remote setpoint of 0. This value will correspond to approximately 4mA.
SP Span	The highest flow rate value for the remote setpoint flow. This value will correspond to approximately 20mA.
DAC Zero	Constants used to ensure that the output current loop will correctly retransmit the flow reading in mA. DAC stands for "Digital to Analog Converter" and is integral to the process of properly outputting current. These constants have units of mA.
DAC Span	
Low Flow SP	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.
High Flow SP	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.
Full Scale	A constant (mA units) that is used to correctly calculate valve speed. The Full Scale reading ensures an appropriate rate of movement. Call SSi for further assistance with this setting.
Curve	A selector used to choose between the primary and alternate curve. It has values from 0-1 inclusive, where 0 = primary and 1 = alternate. It is set to primary by default. Also, by default, only one curve will be set up unless two are requested.
Primary/Alternate	The default unit select. Primary is set by default.
Primary Units	Units for the primary curve (scfh or scfm)
Primary Mult.	The number by which the primary flow value will be multiplied
Inh. Con. (Inhibit Control)	Stops the meter from being able to be switched to auto mode
Digital Input 1	Enables or disables the digital input 1. 0 is disabled; 1 is enabled. 0 is the default setting.
Flow Source	This setting is set by SSi and should not be changed.

Parameter	Description
Filter	A number from 0-32000, in ms (milliseconds). By default, the device averages (filters) over 500 ms. This value will add to that number. Suppose the value entered is 9500. In this scenario, 500 + 9500 = 10000 ms, or 10 s. The device would change flow readings once every 10 seconds, and there would be more readings averaged into the calculation.
Automatic/Manual	Switches between automatic and manual control mode
Web Access	The numeric code used to access administrative functions with the username **admin**. Default is 0.

Table 5: Parameters and Descriptions for Instrument Configuration

Read/Write Curve

The Read/Write Curve page allows you to change curve values as well as saving curves to the device or an external disk and loading them from the device or an external disk.

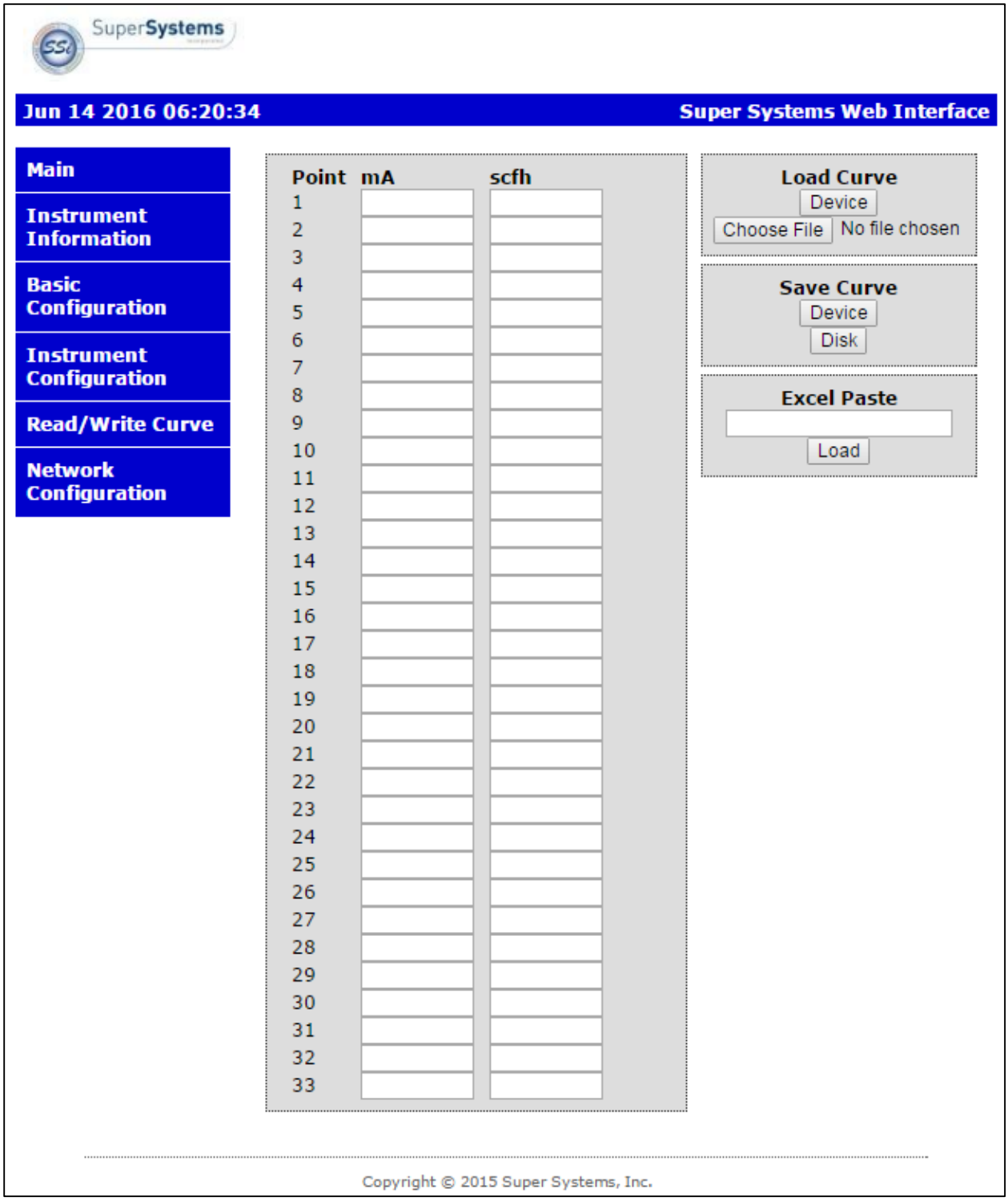


Figure 21: Read/Write Curve Web Page

Each **Point** corresponds to a value on the gas flow curve. The **mA** value is the analog input value from the transducer, while the **scfh** value is the corresponding value in scfh (or scfm, or customer units if selected). **Load Curve** allows you to load a previously saved curve file from the

Device (eFlo unit) or a disk (by using the **Choose File** option). **Save Curve** allows you to save curve data to a file either on the **Device** or on an external disk (**Disk**).

The **Excel Paste** option allows for the pasting of values from Excel into the field. When Load is pressed, those values will be loaded into the **mA** and **scfh** columns.

Network Configuration

The Network Configuration page allows you to view network settings and change certain settings as well. **SSi recommends consulting an IT engineer or network administrator before changing any of these settings.**

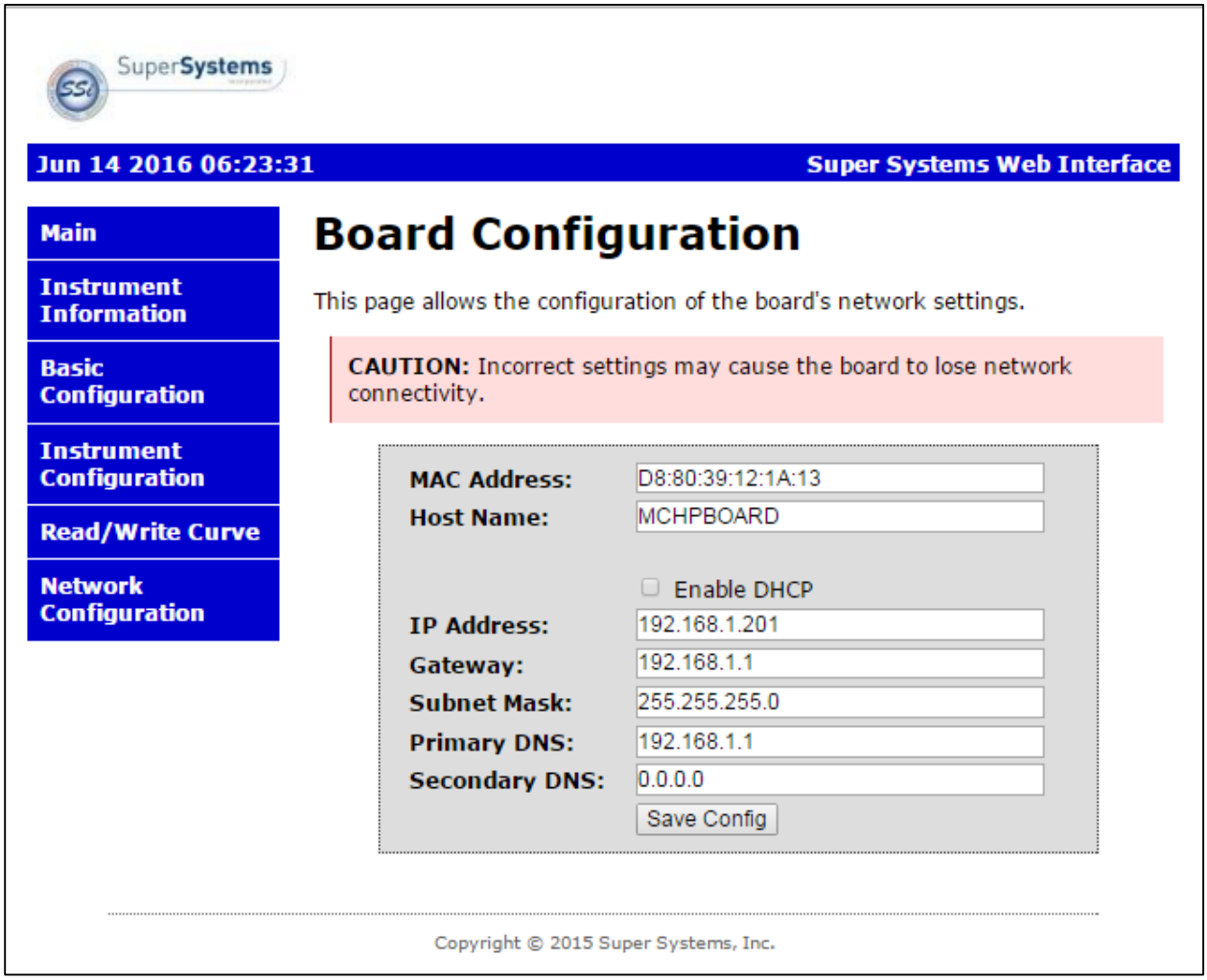


Figure 22: Network Configuration Web Page

The first two fields on the page show the MAC address and Host Name. The MAC address should not be changed. The Host Name can be changed as needed.

To enable dynamic assignment of IP addresses, click on the **Enable DHCP** checkbox. Dynamic assignment means that the eFlo unit's IP address on the network will be assigned automatically, preventing IP address conflicts. The network must support dynamic IP assignment in order for this to work.

If Enable DHCP is not checked, IP and other settings can be changed manually. **These settings should be verified with your network administrator before being changed.** Failure to do so could result in IP conflicts and other network issues.

Configuration and Control Software: FlowMeterView

SSi's FlowMeterView software is used to configure and control the eFlo meter via a serial connection (RS485), USB, or Ethernet. 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 RS485), USB, or Ethernet for communication with the eFlo meter. Finally, the eFlo meter must be configured for RS485 serial communications.

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 RS485, USB, or Ethernet connection. If using RS485, take note of the COM port number that the eFlo unit is connected to on the computer.

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 23. 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,** a **Type** drop-down menu that allows you to select 1.0 USB, 1.5 Ethernet, or 1.5 USB. For the second generation eFlo unit, 1.5 Ethernet or 1.5 USB must be selected. If you are going to connect to the unit with an Ethernet network connection, select 1.5 Ethernet. If you are going to connect to the unit with a USB connection, select 1.5 USB.

When 1.5 Ethernet is selected, the correct IP address of the eFlo unit must be entered in the **IP Address** field.

When 1.5 USB is selected, the **Selected Port** drop-down menu will appear, allowing 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 23: FlowMeterView Device Menu

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

Parameter	Description
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.

Parameter	Description
Primary Flow DP	The primary decimal point value. It can be any number from 0-3 inclusive. It is tied to the stored curves.
Alternate Flow DP	The decimal point setting from 0-3 inclusive (used with alternate units).
MB Address	The Modbus address of the device and is a number from 1-247. The device will respond to 250 universally.
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.)
Flow Zero	Constants that are used to correctly adjust the input flow reading. They are changed so that the measurement instrumentation will read exactly 4.00 mA at what is believed to be 4.00 mA, 20.00 mA at 20.00 mA, etc. These constants have units of mA.
Flow Span	
Setpoint Zero	The lowest flow rate value for a remote setpoint of 0. This value will correspond to approximately 4mA.
Setpoint Span	The highest flow rate value for the remote setpoint flow. This value will correspond to approximately 20mA.
DAC Zero	Constants used to ensure that the output current loop will correctly retransmit the flow reading in mA. DAC stands for "Digital to Analog Converter" and is integral to the process of properly outputting current. These constants have units of mA.
DAC Span	
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.
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.
Full Scale	A constant (mA units) that is used to correctly calculate valve speed. The Full Scale reading ensures an appropriate rate of movement. Call SSi for further assistance with this setting.
Setpoint	The current flow setpoint

Parameter	Description
Filter	A number from 0-30000, in ms (milliseconds). By default, the device averages (filters) over 500 ms. This value will add to that number. Suppose the value entered is 9500. In this scenario, 500 + 9500 = 10000 ms, or 10 s. The device would change flow readings once every 10 seconds, and there would be more readings averaged into the calculation.
Curve	A selector used to choose between the primary and alternate curve. It has values from 0-1 inclusive, where 0 = primary and 1 = alternate. It is set to primary by default
Primary/Alternate	The default unit select. Primary is set by default.
Primary Units	Units for the primary curve (scfh or scfm)
Primary Multiplier	The number by which the primary flow value will be multiplied
Alternate Units	Units for the alternate curve (scfh, scfm, or custom units)
Alternate Multiplier	The number by which the alternate flow value will be multiplied
Automatic/Manual	Switches between automatic and manual control mode
Inh. Con. (Inhibit Control)	Stops the meter from being able to be switched to auto mode
Flow Source	Selects between Sensirion and Setra. It is now Sensirion by default. It allows the user the option to use either source to measure flow.
Reset Total	Resets the totalized value

Table 6: Device Parameters Accessible in FlowMeterView

Curves Menu

The **Curves** menu (Figure 24) 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.

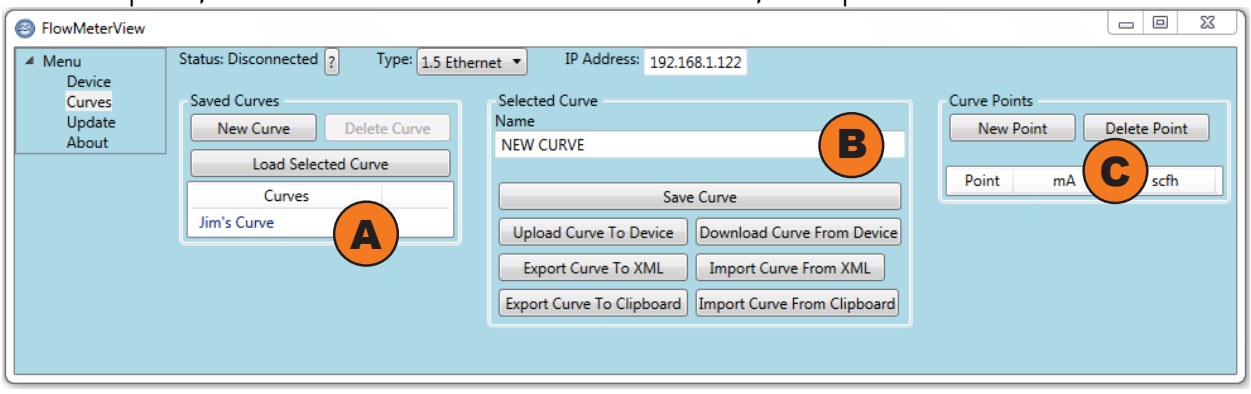


Figure 24: Curves Menu

The window has three sections related to the Calibration Curve: **Saved Curves** (Section "A" in Figure 24), **Selected Curve** (Section "B" in Figure 24), and **Curve Points** (Section "C" in Figure 24). 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"), download the curve that is currently loaded in the eFlo unit ("Download Curve From Device"), export and import curve data to an XML file ("Export Curve To/Import Curve From XML"), and export and import curve data to the computer's electronic clipboard where copied information is stored temporarily ("Export Curve To/Import Curve From Clipboard").
- **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 25) will cause the software to check for software updates and, if available, give you the option to download and install any updates.

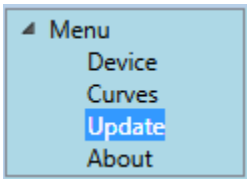


Figure 25: Update Menu

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	Adjust regulator using a manometer to set correct pressure while gas is flowing and meter is open
	Meter may not be the correct size	Call SSi at (513) 772-0060 to discuss a different size (model) of flow meter
	Meter may not be calibrated for correct gas	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.
	Gas piping may be too small for required flow	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)	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.
	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.	• 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 Adjustment & Calibration section on page 20 for more details.

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 indicates that pressure is dropping as flow increases.	Insufficient gas flow to maintain constant pressure.	Verify that there is sufficient gas supply to the meter to maintain a constant pressure
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 Insufficient pressure may be supplied	Verify gain is high enough; adjust bias as needed Adjust the pressure to the pressure indicated on the meter and the Calibration Report. Verify the pressure at the high pressure port.
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 7: 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	07-31-2017	2220
A	Fixed labels on page 13	7/3/2018	2236
B	Adjusted minimum pressure of H specs	12/19/2018	2248
C	Changed login code info	1/11/2019	2251

Appendix 1: Flow and Motor Control Board: Connection Diagram

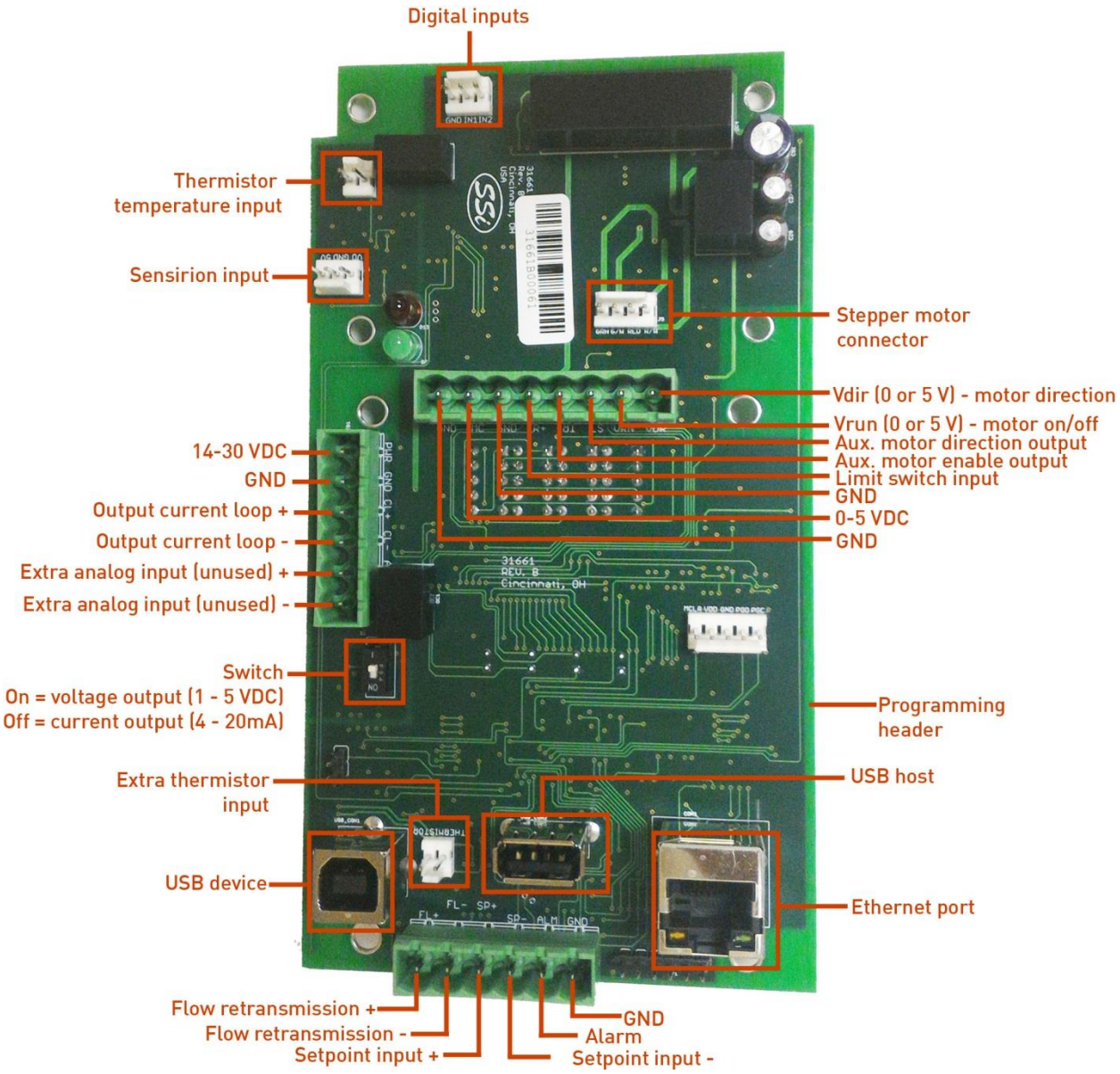


Figure 26: Flow and Motor Control Board with Wiring Layout

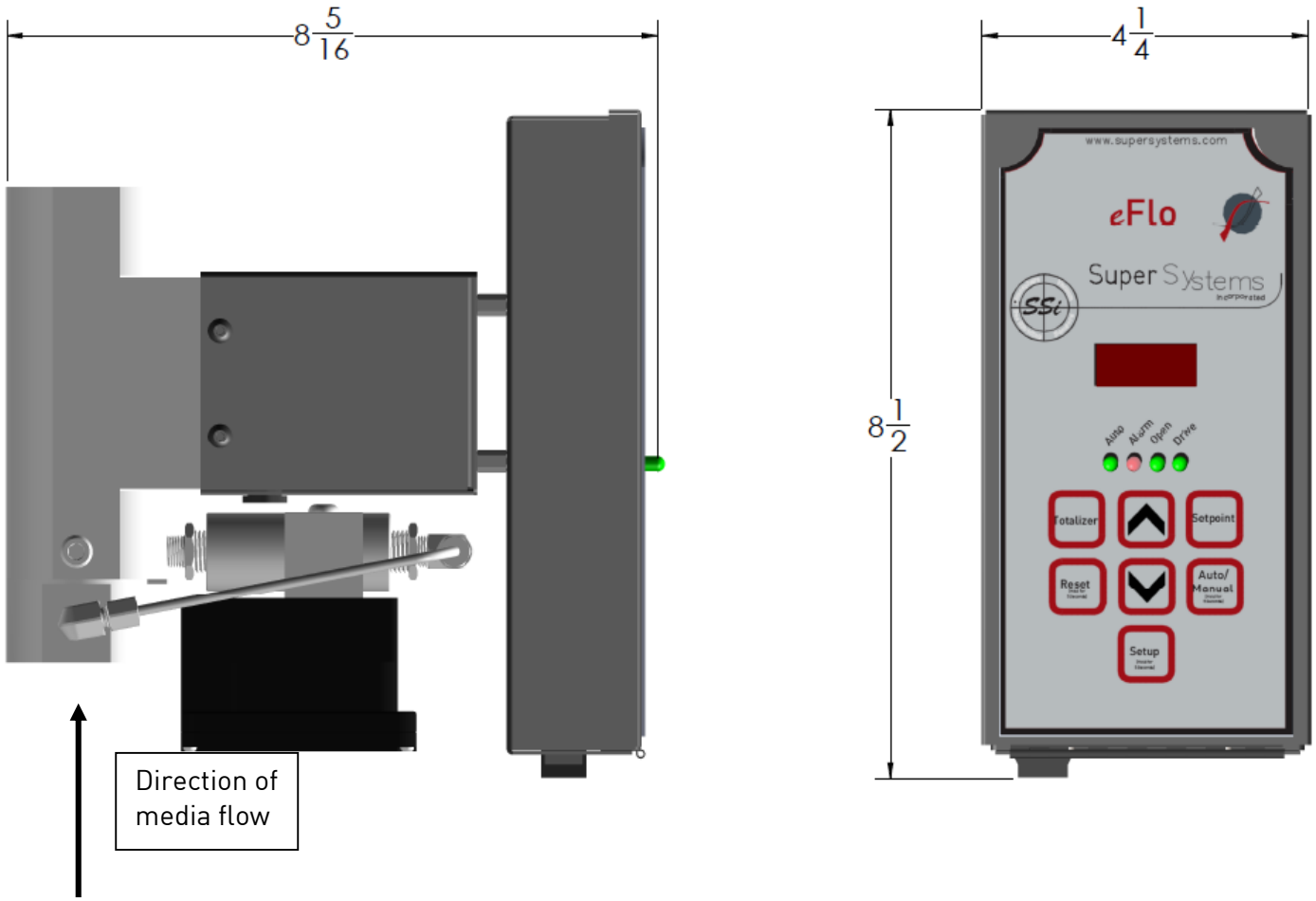
Appendix 2: Primary and Alternate Curves

The second generation eFlo has up to two curves used for flow calculation: a primary curve and alternate curve. The primary units and decimal place apply to any curves that are stored in the flow meter. The primary and alternate unit settings may be toggled by pressing the up and down arrow buttons at the same time. As an example: Suppose that the primary units are English and the alternate units are metric. By pressing the up and down arrow buttons at the same time, the display will show metric units. Letting go with bring the display back to English.

There are two settings to control how values are displayed: **curve select** and **default select**. The curve select determines which underlying curve is used and the default select determines whether the device will power up with the primary or alternate settings as default. As an example: Again, assume that the primary units are English and the alternate units are metric. Suppose that the **default select** setting was set to alternate. Then, upon powering up, the units would be metric, holding the up/down arrow keys would display English, and letting go of the arrow keys would show metric.

Appendix 3: Overall Dimensions of Assembled Meter

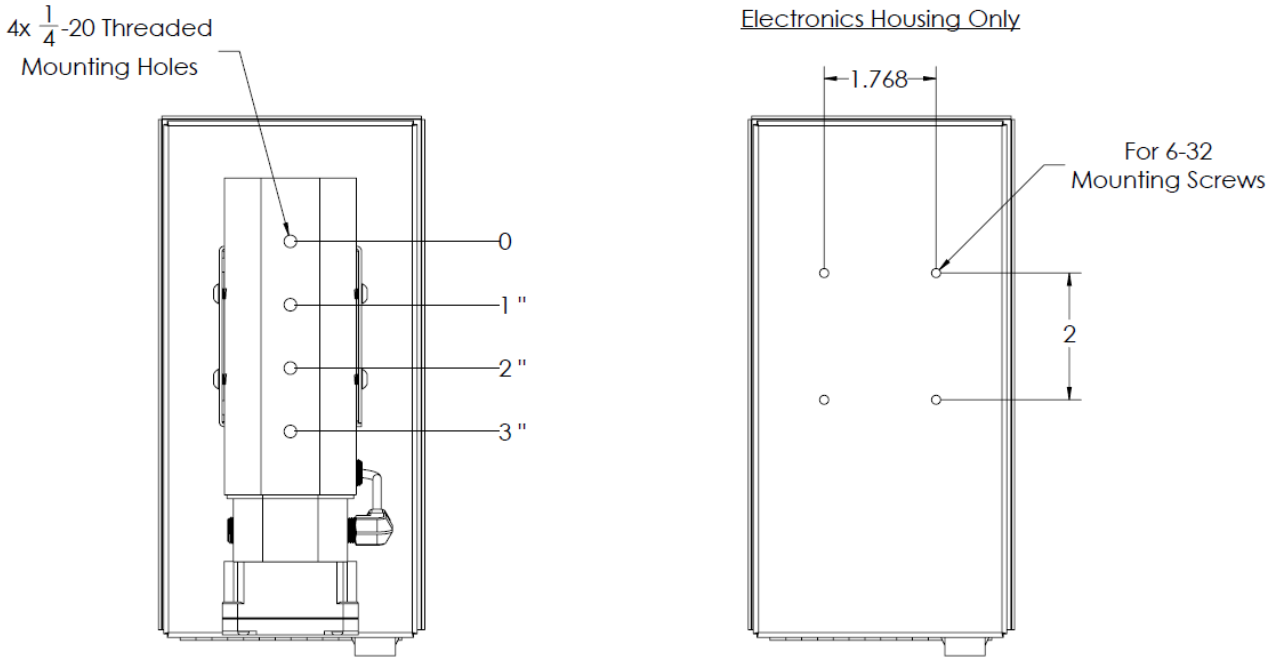
Note: The meter assembly should be mounted so that there is a minimum of 2" of clearance around the meter.



The direction of media flow is up as-shown in the figure.

Appendix 4: Mounting Hole Location Details

Note: The electronic enclosure is made to mount directly to the flow meter motor housing (as-shown in the figure to the left). The four (4) ¼"-20 threaded holes in the meter main body (figure to the left) are to mount the assembly to a panel. The electronics housing can be remotely mounted and has four (4) holes in the back of the panel for 6-32 screws.



Appendix 5: Component Details of the Assembly