UVM-1000

Universal Valve Module

Installation Guide

LIT-12013155
September 2020

Note: The Venturi Air Valve with UVM1000 Installation Guide supersedes this document. Refer to the Venturi Air Valve with UVM1000 Installation Guide, LIT-12014273, for more information.

North American Emissions Compliance

United States

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference, in which case users will be required to correct the interference at their own expense.

Canada

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

NOTICE

Risk of Property Damage.
Ensure that the power source conforms to the requirements of the equipment. Failure to use a correct power source may result in permanent damage to the equipment.

NOTICE

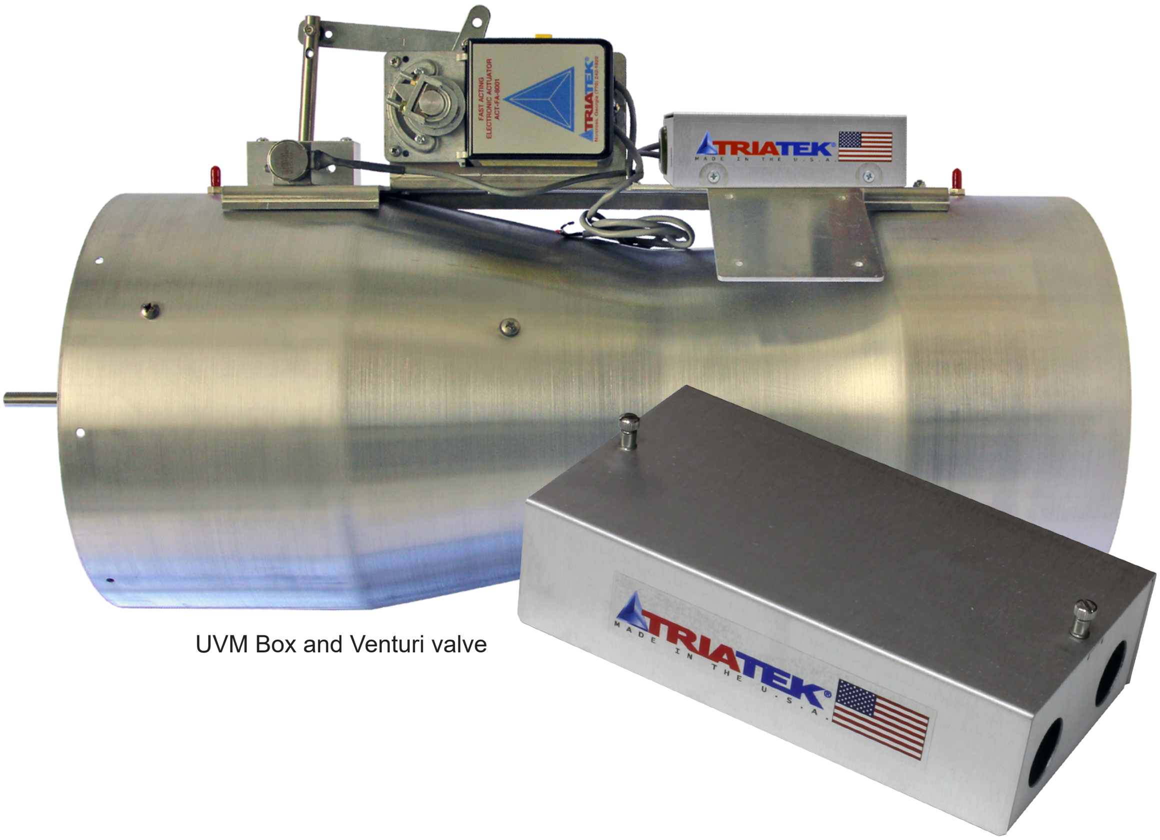
Risque de dégâts matériels.
S’assurer que la source d’alimentation électrique est conforme aux spécifications de l’équipement. L’utilisation d’une source d’alimentation électrique inappropriée risque d’endommager irrémédiablement l’équipement.

IMPORTANT: The UVM-1000 Universal Valve Module must be wired to 24 VAC only. Wiring the unit to 110 VAC will cause serious damange and void the warranty.

Table of contents

Setup Overview

1. Valve is calibrated at Triatek®.
2. The valve label indicates the calibration values at set positions.
3. Set controllers for a 0 V - 10 VDC, or 10 V - 0 VDC depending on the valve actuation type, Normal or Reverse acting.
4. Set the output airflow scale based on your valve size.
5. Set your feedback signal voltage the same as the cfm scale.



UVM Box and Venturi valve

Introduction / Overview of Operation

Introduction

Triatek's Universal Valve Module (UVM) is designed to allow for interoperability between Triatek Venturi valves and third party controllers.

Each Triatek valve is individually calibrated and has its own unique position to cubic feet per minute (cfm) curve. The UVM enables you to create a linearization curve in each controller for each associated valve. It also allows you to span, scale, and linearize the feedback sensor to obtain useful information from it.

Overview of Operation

A diagram of the basic functionality of the UVM is shown in *Figure 1*.

The UVM takes a 0 -10 V signal from the third party equipment, and depending on the scaling setting, interprets this as a 0 – xxxx cfm request signal. The UVM is pre-programmed with the associated valve's linearization curve, and will move the valve's actuator to the correct position for the requested cfm.

Each valve is fitted with an electronic position sensor on the lever arm at the point of entry into the valve body (see *Figure 1*). The electronic position sensor is used to provide actual valve position information to the controllers. This signal is non-linear, and has a random 0 and 100% position voltages.

It converts the sensor signal to a position on the valve and then translates that to a cfm value. The cfm value is in turn output from the UVM as a 0 – 10 V signal at the same scaling as the cfm request signal.

The 0 -10 V signal is processed by the valve's calibration settings as set by the factory. The user has the ability to access and adjust this curve if so desired. The subsequent signal is then converted to an equivalent cfm request value. This value is dependent on settings provided by the factory as applicable for the associated valve size. The user can modify this signal if desired.

The factory default settings relative to valve size are:

8 in. valve 10 V = 800 cfm
10 in. valve 10 V = 1100 cfm
12 in. valve 10 V = 1600 cfm
14 in. valve 10 V = 2300 cfm

The equivalent cfm request value is applied to the calibration curve as entered by the factory for the associated valve and a corresponding valve position value is generated.

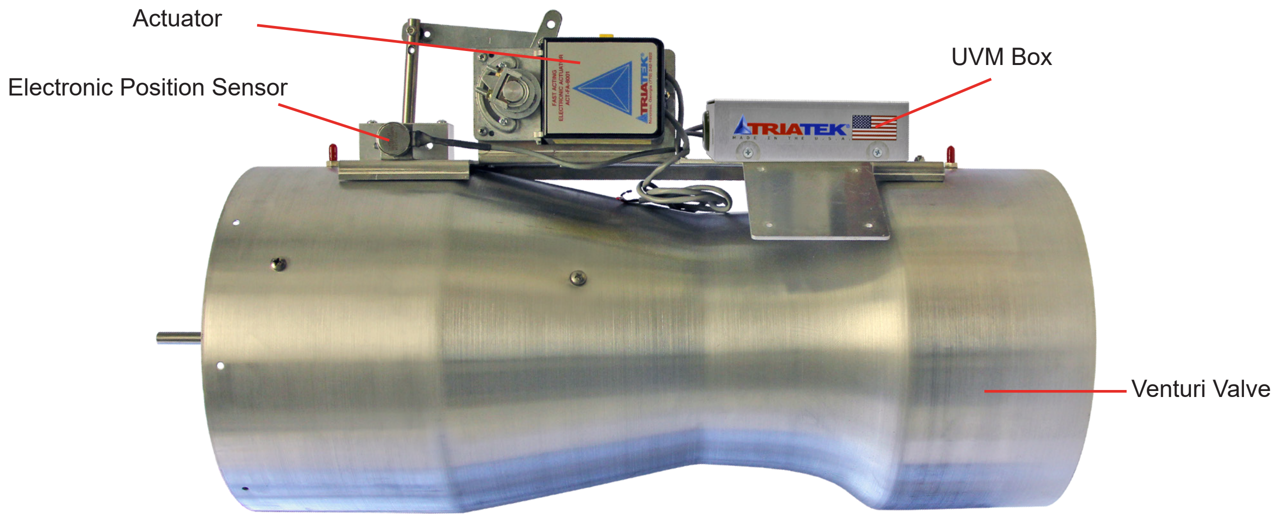
This position value is applied to the actuator output voltage calibration section and output to the actuator. The consequent result is that the actuator will move to the required position so that the valve passes the requested cfm.

As the valve moves to position, the position feedback sensor moves as well. The signal from this sensor is processed by a sensor voltage to position calibration section. The output of this section provides an accurate position value. The position value is applied to the position to cfm mapping table and a corresponding cfm value is output.

This cfm value is then passed through cfm to voltage scaling factor and converted to a voltage value. This value is then passed through the factory set output calibration section and made available to the voltage output for use by the third party equipment as the actual valve cfm.

In certain circumstances the feedback signal may not match the requested cfm signal. If 0 cfm is requested (0V input), and the valve is a partially closed valve, the valve has a minimum cfm that it can attain. This value is not 0 and for a 12 in valve would be around 90cfm. In this case the feedback signal would be the equivalent of 90 cfm or 0.56V for a 10V = 1600 setting.

If a UVM for an 8 in. valve is set with an arbitrary scaling of 10V = 1100 cfm (or 110 cfm / volt), and a request signal of 9 V (or 990 cfm) is input to the unit, then the actuator will end up driving to 100%, as the maximum the valve can do is 700 cfm. The voltage feedback output signal will only be around 6.4 V as the actual valve cfm would be around 700.



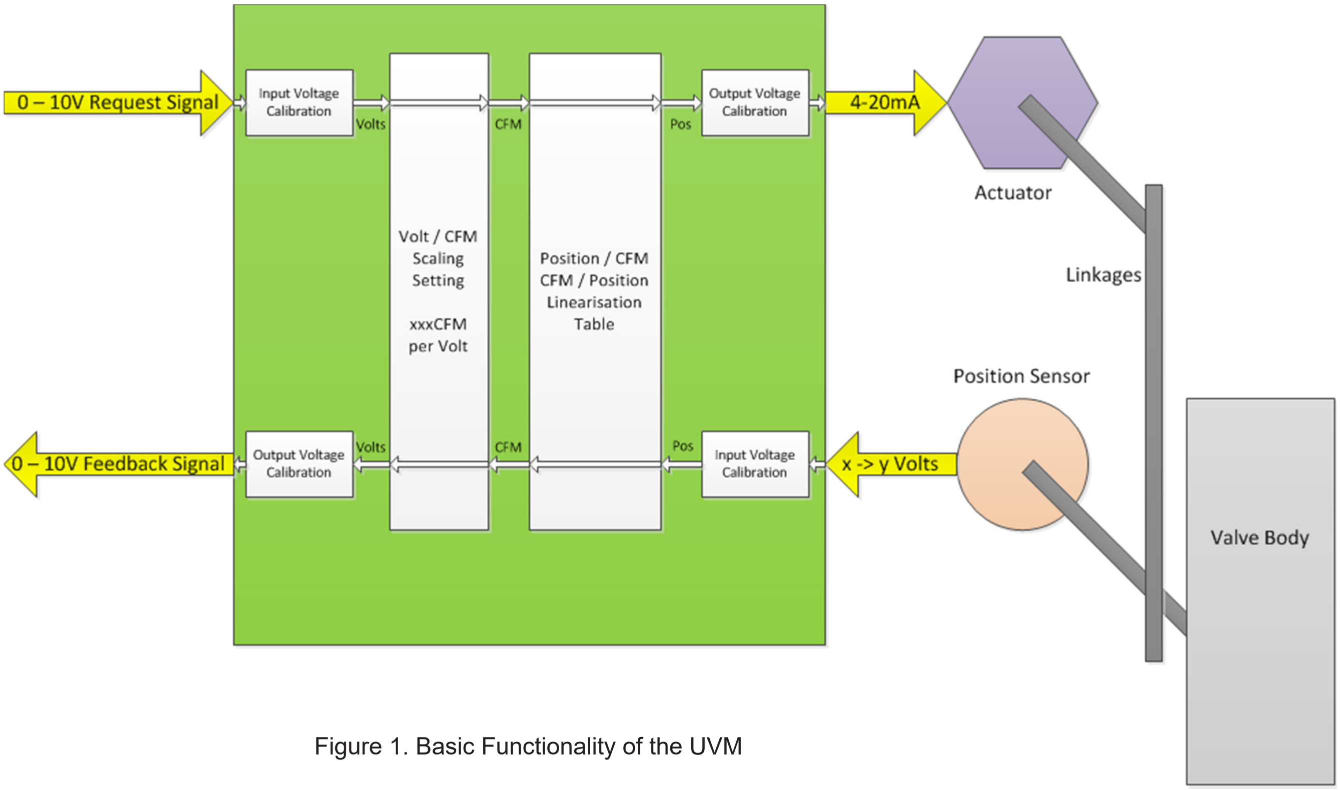


Figure 1. Basic Functionality of the UVM

Overview of Operation

Digital Input DP Switch

The UVM has the ability to accept a digital input DP switch. The pneumatics of the DP switch are connected across the valve, and the factory supplied switch is set to trip at 0.6 in. W.G.

Any pressure across the valve below this is to be interpreted as the valve cfm is inaccurate or non-existent. The DP switch signal, when enabled in the UVM, is used to provide a 0 cfm feedback signal should the pressure across the valve drop below the 0.6 in. W.G. threshold.

The DP switch functionality can also be implemented by using a pressure sensor with a 0-5 V output. The UVM can accept the 0-5 V signal and, via user gain and offset settings, convert it to an internal pressure value.

Typically a 0-4 or 5 in. W.G. sensor would be used. When enabled in the UVM, this value can be compared to a minimum pressure value (typically 0.6 in. W.G.) as a threshold below which, as like the DP switch, the cfm feedback signal goes to 0.

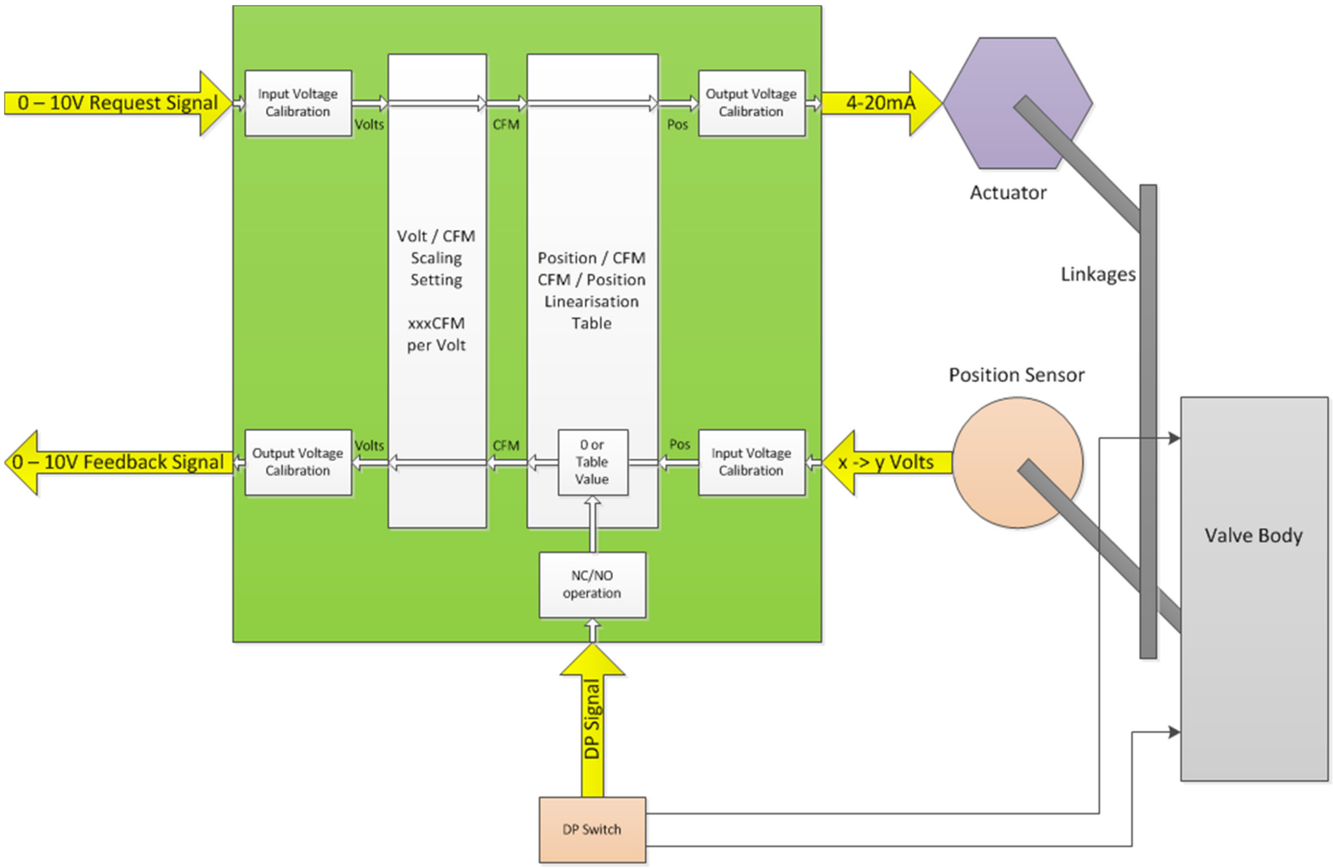


Figure 2. UVM Use with DP Switch

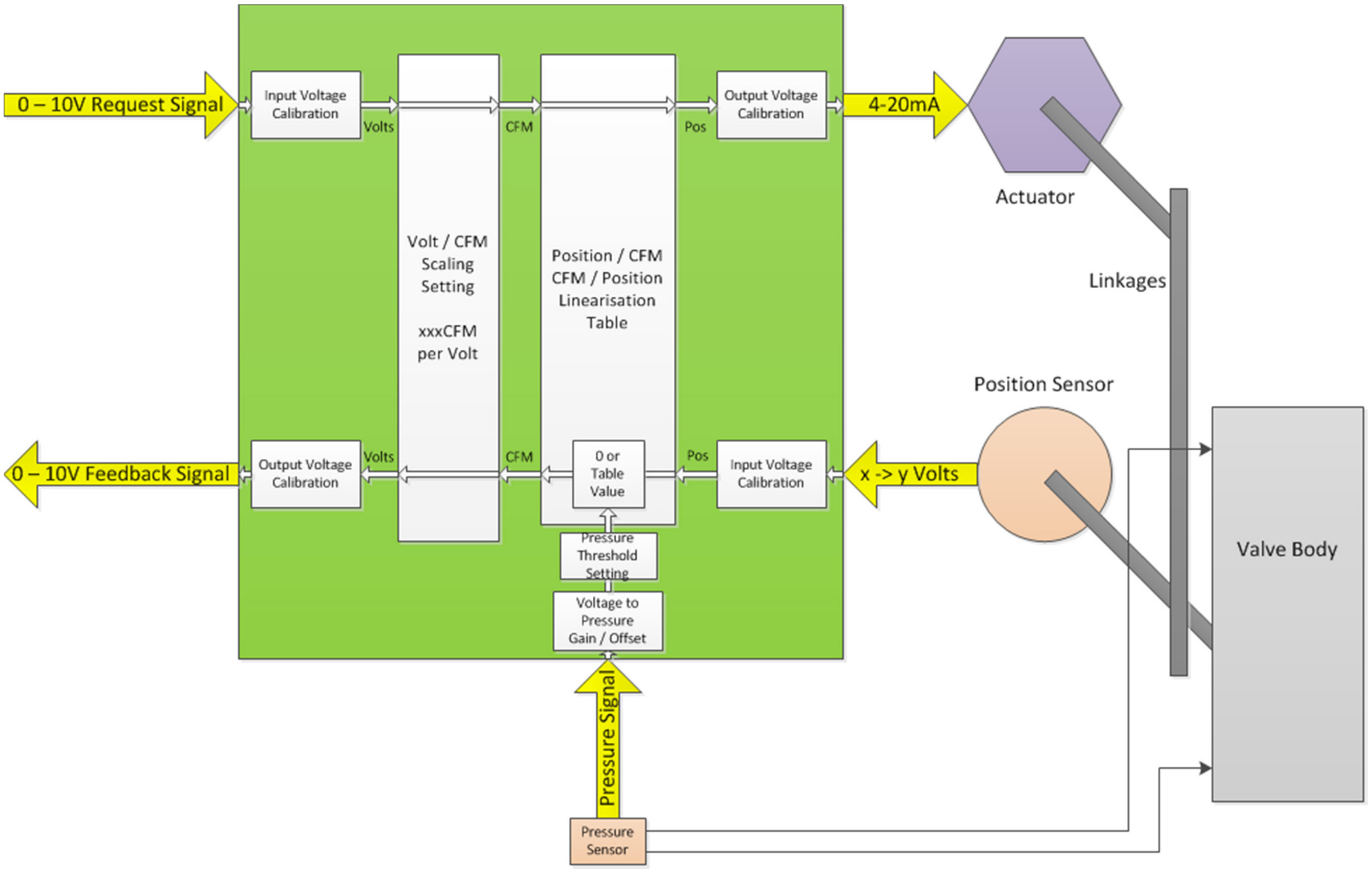


Figure 3. UVM with Pressure Sensor

The UVM can also be made to operate with a variable air volume (VAV) box instead of a Venturi valve. In this case, instead of providing the UVM with a cfm request signal, the input will be interpreted as an actuator position signal where 0-10 V represents a 0 -100% position signal.

This signal only provides positioning information for the VAV box. The feedback sensor signal is replaced by the VAV box flow probe pressure signal. This voltage signal is scaled and converted to an internal pressure value.

The pressure value is then square-rooted and multiplied by a K factor to obtain an internal velocity value. The velocity value is multiplied by a duct area value to obtain an internal cfm value. This cfm value is then scaled to the appropriate voltage, passed to the Vo feedback voltage signal for use by the third party controller. The scaling, K factor, and area can be set by the user with the UVM Configuration Tool.

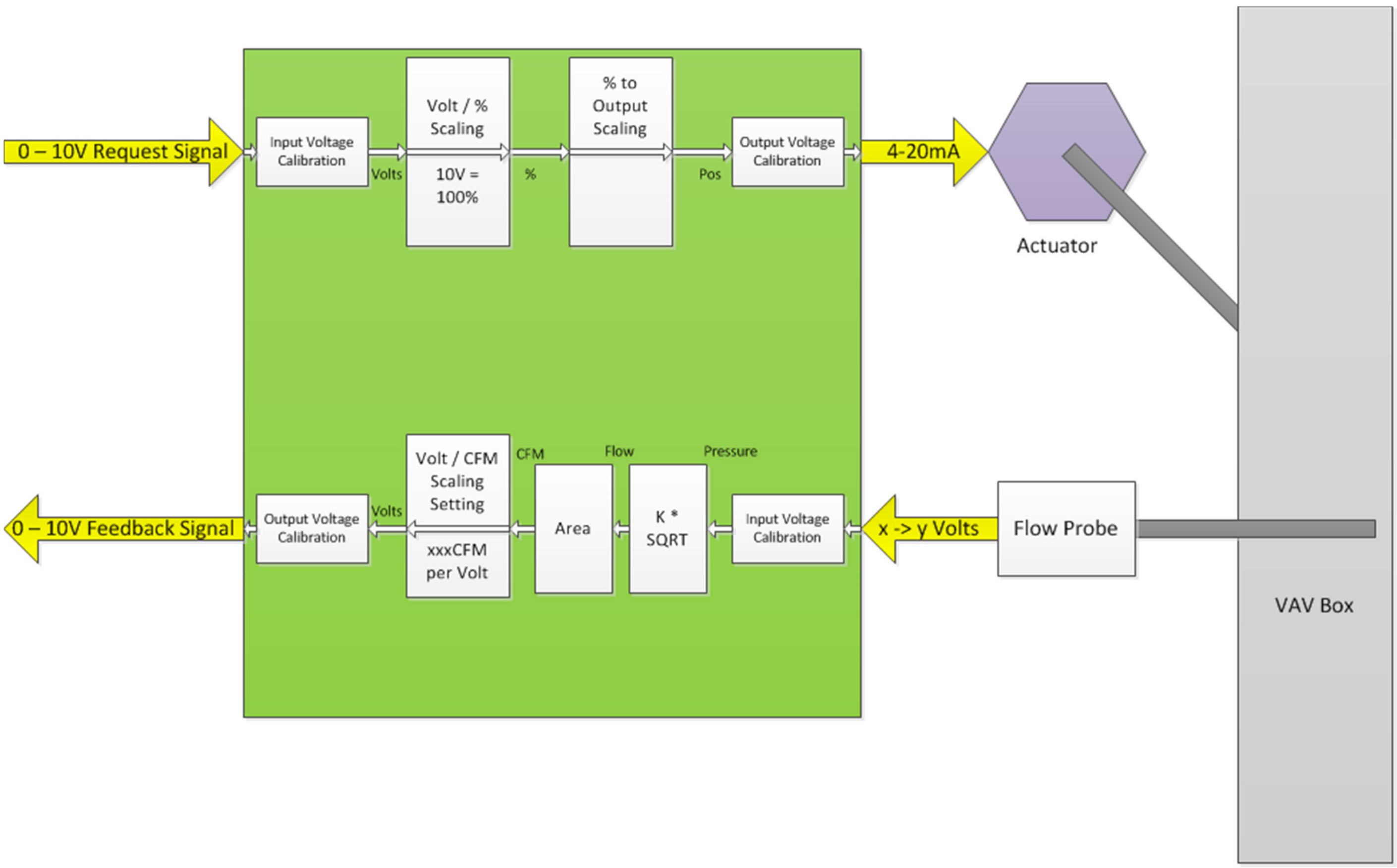


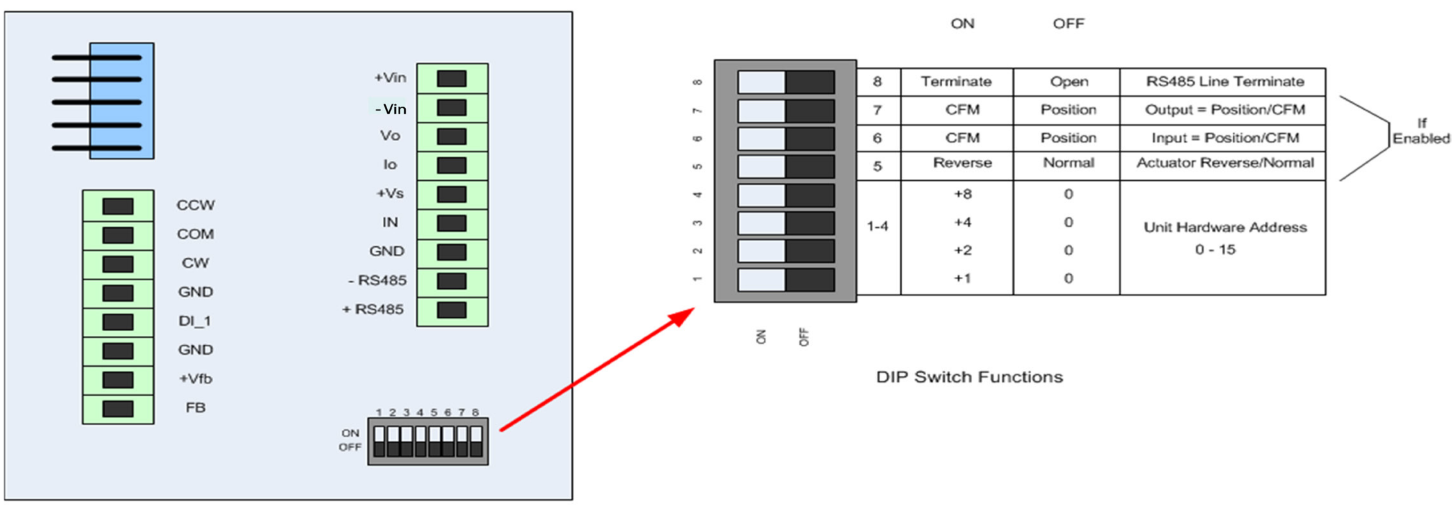
Figure 4. UVM use as a VAV Interface

Other than through the UVM Configuration Tool, the user does not have access to any settings or operating modes of the UVM. The exception is that the input and output signal modes and the normal/reverse operation can be set via the DIP switches if that functionality is enabled in the UVM.

The inputs and outputs can be set to be interpreted as a Percentage (0 – 10 V = 0 – 100%) control or feedback signal, or as a cfm (0 – 10 V = 0 – xxxx cfm) control or feedback signal. DIP switches 6 and 7 are used for this function. DIP switch 5 is Normal Reverse Selection.

The UVM can communicate with the UVM Configuration Tool. To this end, the UVM can reside at one of 16 hardware addresses. These addresses are set via DIP switches 1, 2, 3, and 4. Via the UVM Configuration Tool, the UVM is able to have up to an additional 16 software addresses set for communications use.

Universal Valve Module DIP Switch Functions



	ON	OFF	
8	Terminate	Open	RS485 Line Terminate
7	CFM	Position	Output = Position/CFM
6	CFM	Position	Input = Position/CFM
5	Reverse	Normal	Actuator Reverse/Normal
1-4	+8	0	Unit Hardware Address 0 - 15
	+4	0	
	+2	0	
	+1	0	

Note : DIP Switch function (other than address and termination) can be disabled by internal software setting/ selection

Figure 5. UVM Module DIP Switch Functions

The later version (S series revisions) is capable of being configured to sum cfms over the RS485 network and output the summed equivalent on the Vo of the unit designated to be primary. The primary unit is the unit designated with hardware address 15. Secondary (polled) units are units with address 16 on-wards. The primary unit specifies how many units to poll from address 16 on-wards.

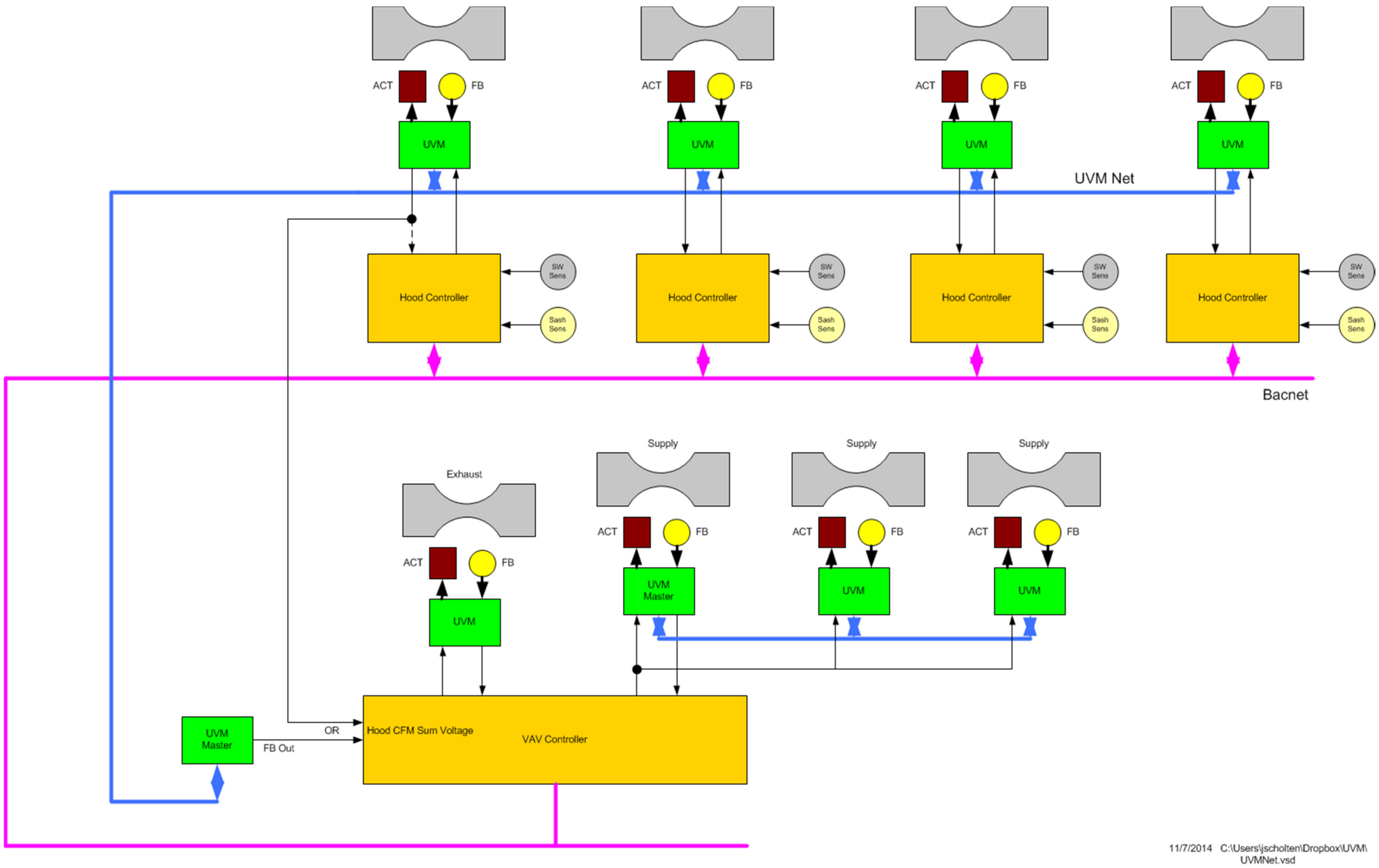


Figure 6. UVM Controller Utilizing UVMNet to sum cfm values

Installation and Setup

The light blue area depicts the UVM housing, and the green area the UVM board. The actuator and feedback sensor are already wired as is the isolation transformer. Connect 24VAC to the supplied power tails. This feeds both the actuator and the isolation transformer.

The 24 VAC supply needs to be capable of providing at least 25 VA, with 20 for the actuator and 5 VA for the UVM. The 0 – 10 V cfm request signal is attached to the IN connection on the UVM board, with the ground lead going to any of the GND connections. The feedback signal is derived from the Vo connection and any of the GND connections.

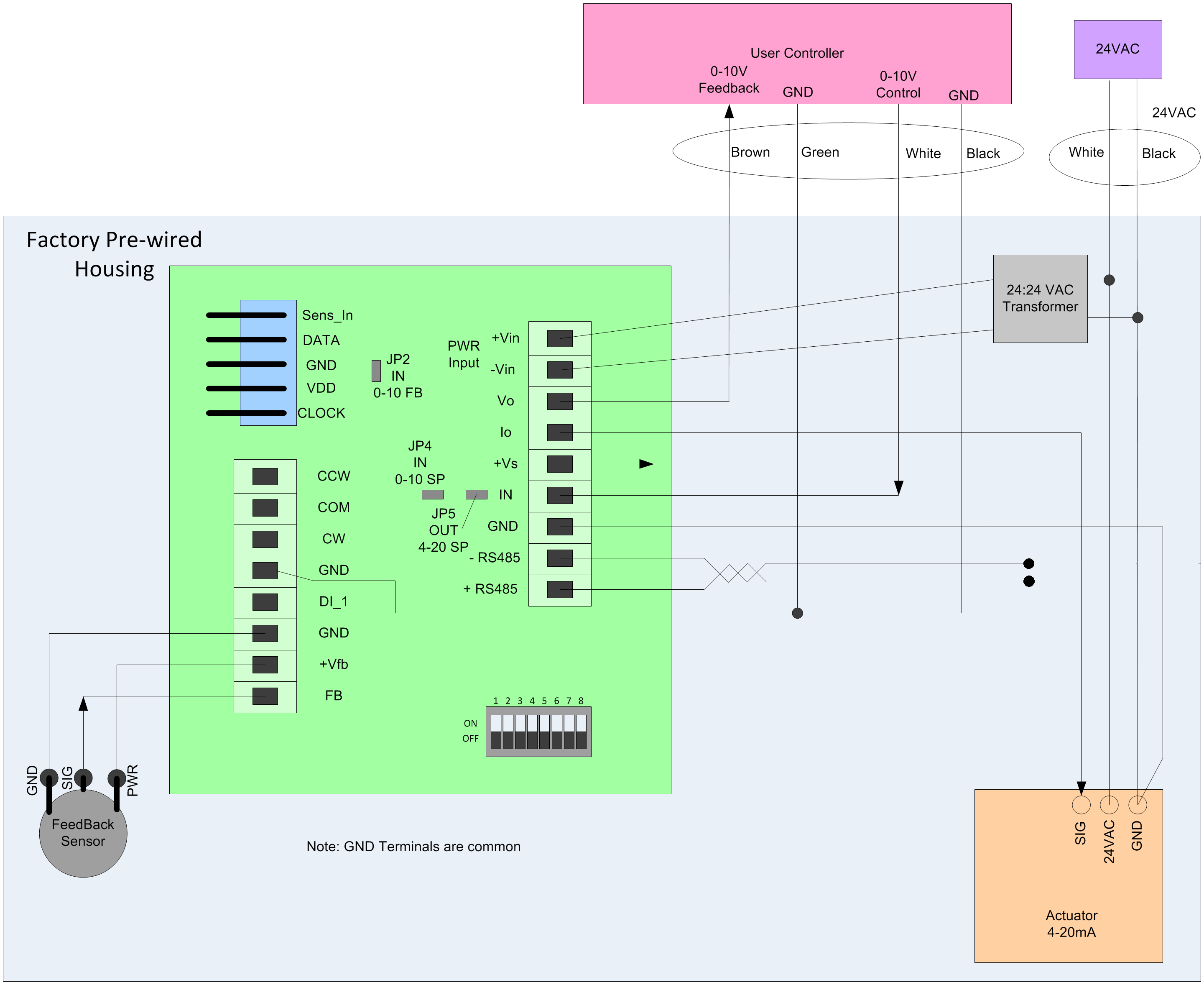


Figure 7. Universal Valve Module Wiring

Normal-Reverse Operation

The valve actuator can be set for normal/reverse operation. This is to ensure that the various desired failsafe actions can be achieved.

The failsafe modes include loss of power and loss of signal. The UVM has a setting, either through the UVM Configuration Tool or by DIP switch (if enabled) to select its Normal-Reverse Mode of operation.

Set the Normal – Reverse acting DIP switch (if enabled), or check/uncheck the reverse operation check box in the Misc Tab of the UVM Configuration Tool to the desired mode of operation.

If the reverse setting is selected, then for revisions 0.75 and upwards, the actuator needs to be set to reverse acting, and the command signal from the third party controller needs to be inverted (reverse operation).

In this case (reverse operation) the signal from the OEM controller will be 10 – 0 V for 0 – xxxx cfm, and the actuator output control signal from the UVM will be 20 – 4 mA for 0 – 100% positioning.

The feedback signal will always be 0 – 10 V for 0 – xxxx cfm, it is never inverted.

For normal operation, typically used for supply valves, the settings shown in Figure 8* are recommended.

For reverse operation, typically used for exhaust and hood valves, the settings shown in Figure 9 are recommended for UVM revisions 0.75 onwards. Earlier revisions do not invert the UVM input signal.

*Figures 8 and 9 are on next the page.

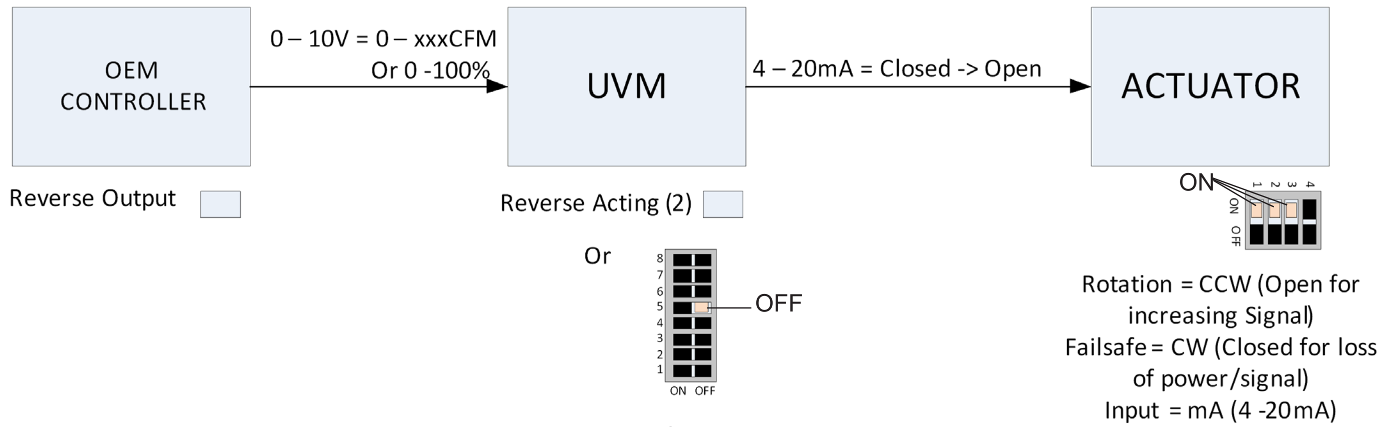


Figure 8. Normal Operating Mode

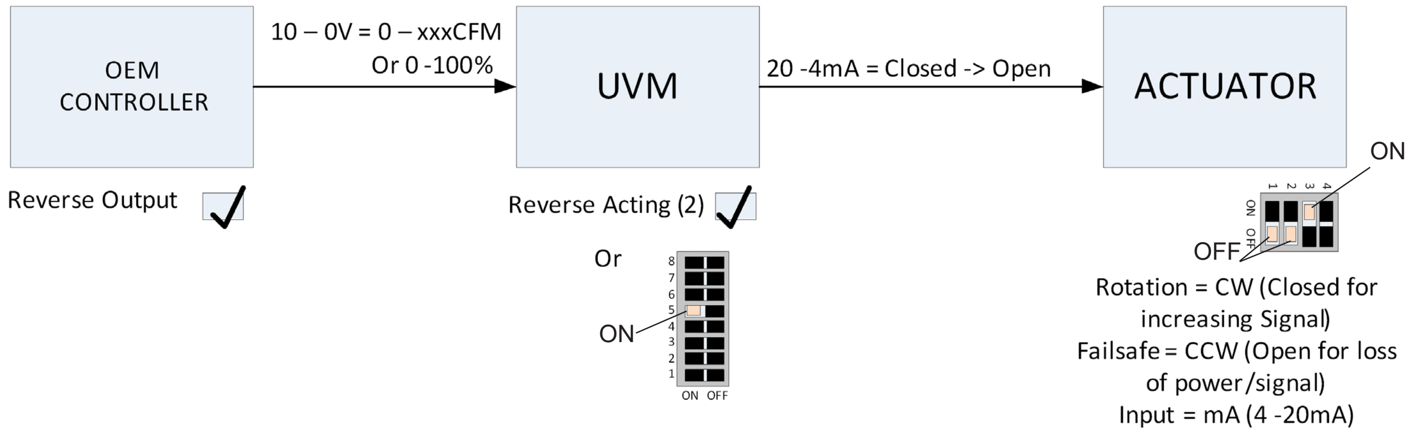


Figure 9. Reverse Operating Mode

cfm / Percentage Selection

There is a DIP switch (when enabled) for each of the control input and the feedback output. The individual DIP switch allows the input or output voltage to be interpreted as cfm signal or position signal. If the switch is set for cfm then the signal represents what ever scaling the UVM is setup for cfms.

So if the cfm at 10 V is set to 1600, then an input voltage of 10 V is a request for the valve to be at 1600 cfm, and a feedback out of 10 V indicates the valve is doing 1600 cfm. If the DIP switch is set to position, then 10 V is a request for the actuator to be at 100%, and with the feedback Vo indicates the actuator is at 100%. There are separate switches for the input IN signal and the output Vo signal.

Valve Flow Integrity (DP Switch)

If a DP switch is to be attached, it is done by connecting voltage free NO or NC contacts between GND and DI. The UVM has an internal 15K pull-up to the internal 3.3 V rail. This input is protected to 15 V for application of over-voltages. NO or NC operating mode can be set in the UVM via the UVM Configuration Tool.

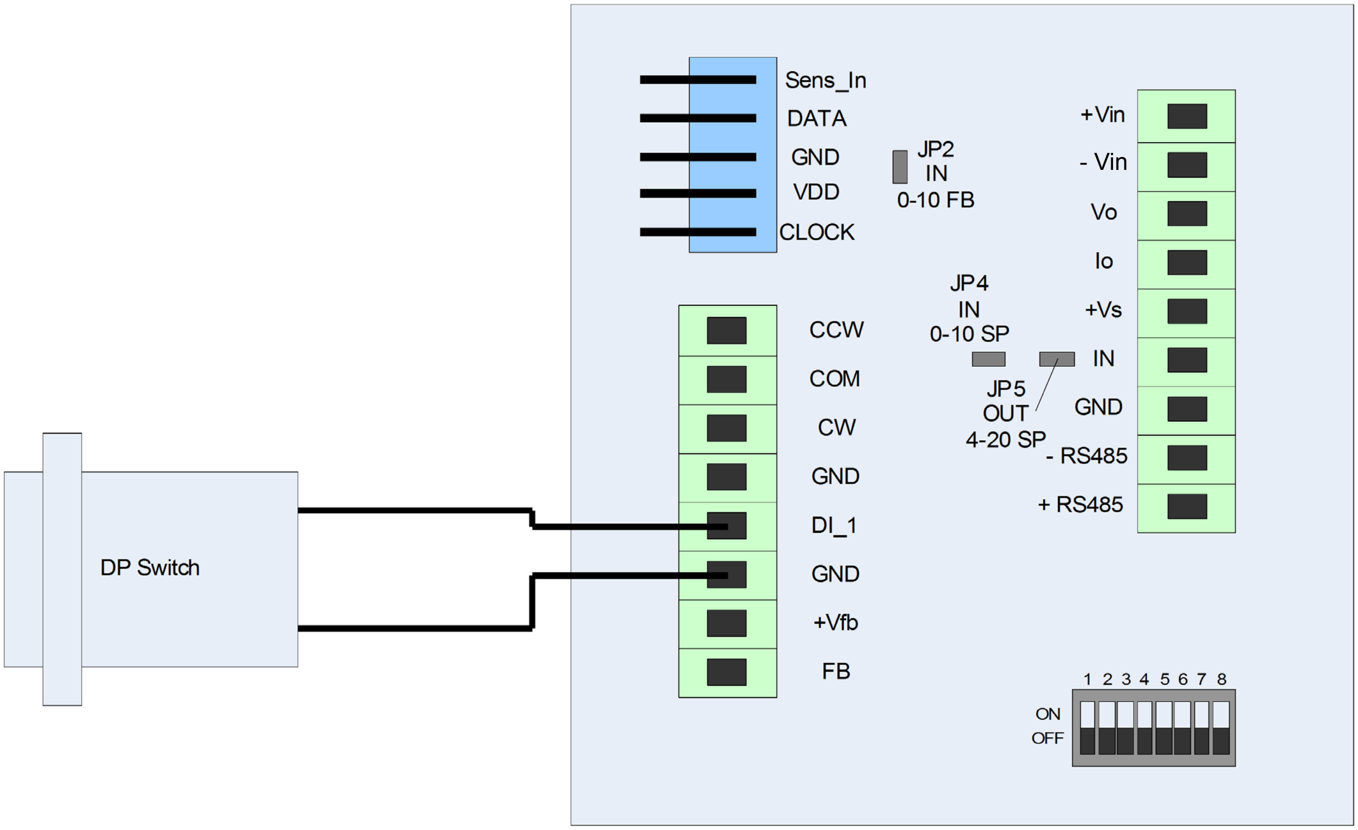


Figure 10. DP Switch Connections

DP Switch Connections

A pressure sensor can also be used to determine the pressure across the valve and 0 the cfm feedback signal when the pressure falls below a preset threshold. The UVM Configuration Tool is used to scale the pressure sensor input, enable the pressure sensor and define the lower pressure threshold. The pressure sensor is wired as shown below.

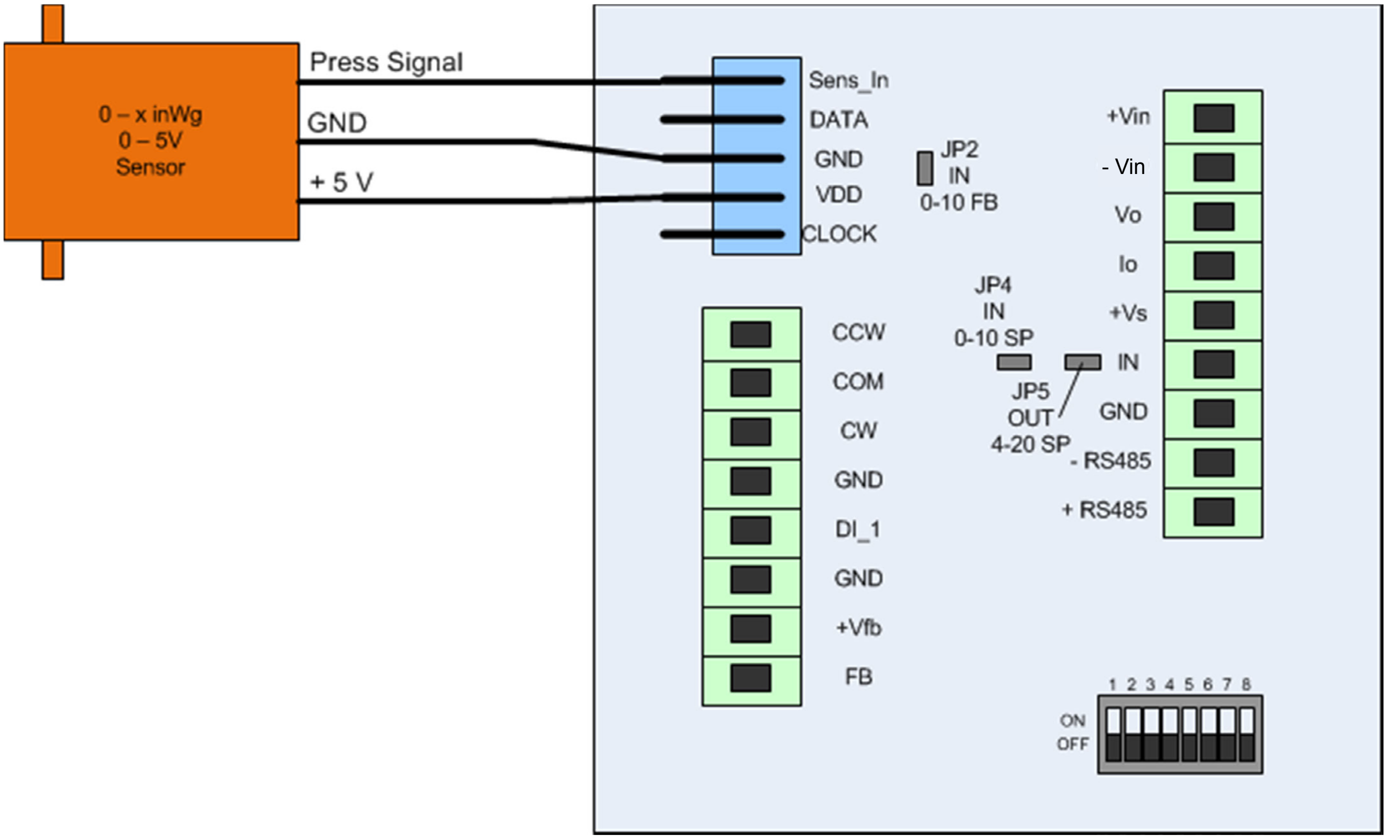


Figure 11. Pressure Sensor Wiring

Should the UVM be supplied without the valve and any pre-wiring, then the following items are required to wired to the unit.

The device requires that Io be connected to an actuator capable of accepting 4 – 20 mA. The connection is from Io and any GND connector. The device also needs a 0 -5 signal from a valve feed back sensor. This is connected to CN3 pins G, +Vfb and FB. G is ground or common, +Vfb is the 5 V power to power the position sensor, and feedback is the signal from the sensor that represents its position.

The actuator and UVM need be isolated from each other by means of a 24/24 isolation transformer.

In the case of dual and other multiple combination valves of the same size, the following wiring is used. The feedback sensors need to have a 1K ohm ¼ W 1% resistor placed in series with the position signal output. Only one of the actuators should have the 4-20 mA setting, the remaining actuators should be set for 2-10 V operation.

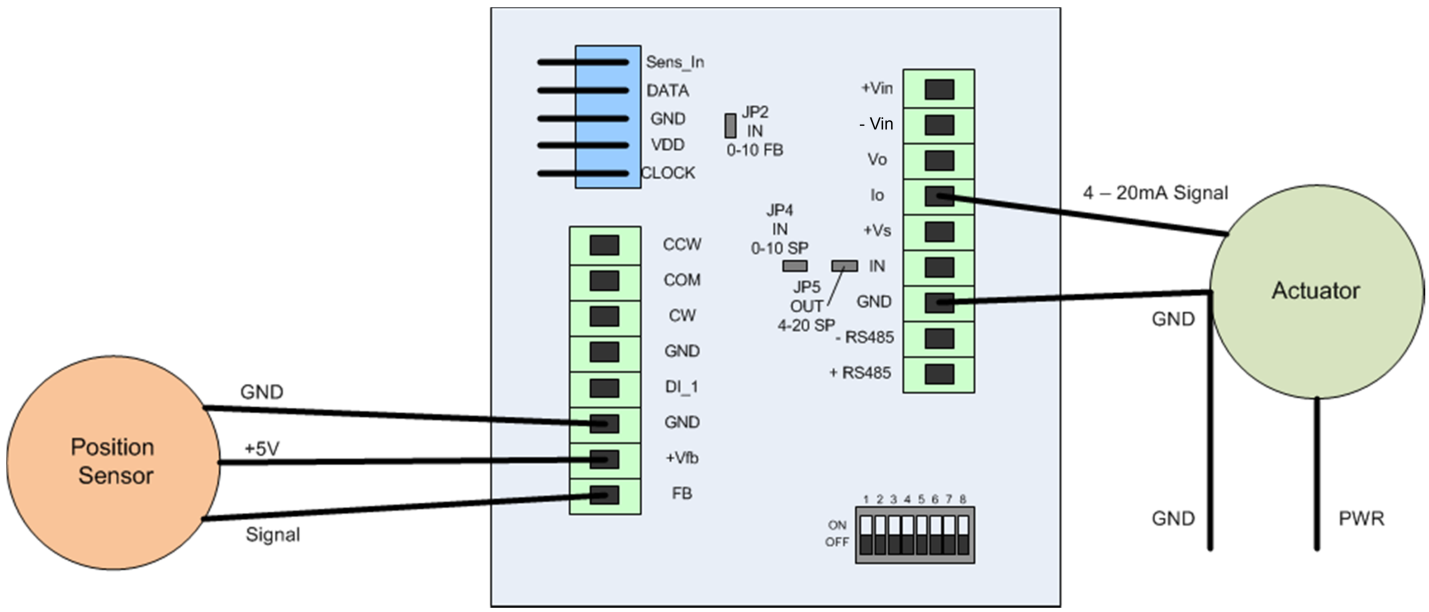


Figure 12. Position Sensor / Actuator Wiring

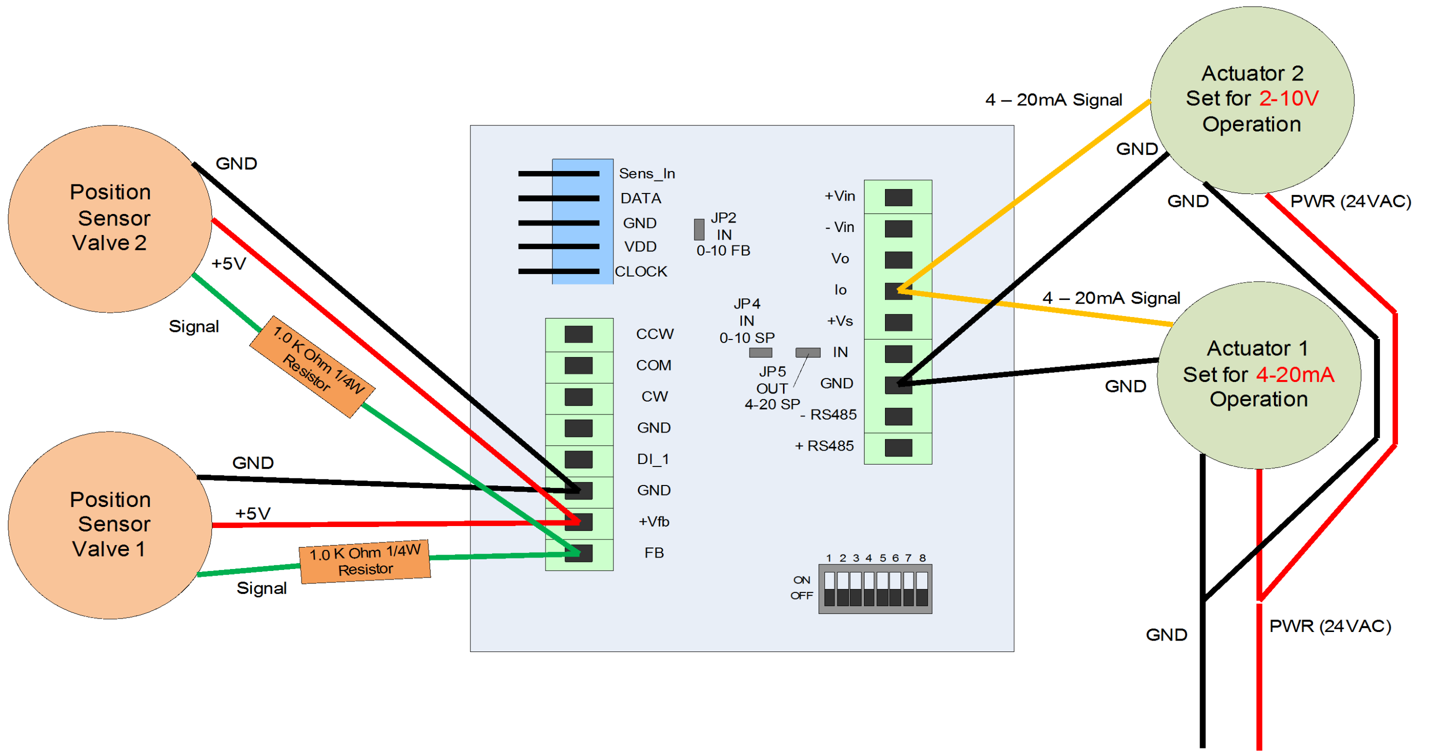


Figure 13. Dual Valve Operation

UVM to FMS165X-S-0-1 Start Up

This guide is specific to the installation of the FMS-1655 Room Pressure Controller with the UVM. The information provided is merely suggestive and does not supersede any data provided in the Triatek Programming and Installation Guides.

1. The controller must be opened by first loosening the four screws in the sides. Then separate the FMS Controller from the back plane.

2. Check Dip Switches in the FMS Controller.

Note: S1 has 8 switches. Switches 1 through 4 are to configure Analog Inputs 1 through 4 as either voltage or current Input while switches 5 through 8 set the signal range of Analog Inputs 1 to 4 as 0-5 VDC or 4-20 mA when selected OFF or 0-10 VDC when selected ON. In other words, switch 5 sets the range for analog input 1. Likewise, switch 6 sets the range for analog input 2. For example, setting switch 1 ON and 5 OFF sets Analog Input_1 as signal type Current (mA) with a range of 4-20 mA. However, setting switch 3 OFF and 7 ON sets Analog Input_3 as signal type Voltage (V) with a range of 0-10 VDC.

3. Switch 1 of S1 should be ON for Current (mA) signal input when using Triatek Digital sensors due to the Differential Pressure output type being 4-20 mA.

4. Please consider the additional devices such as UVM feedback signals for type and range on designated inputs. For Example: Supply UVM (Vo to Ground) feedback should be on Analog Input 3. The input must be set as Voltage by setting S1 switch 3 OFF with a 0-10 VDC range with switch 7 ON. If the FMS is expected to control for volumetric offset, then the Exhaust MUST be controlled by Analog Output 4 (0-10 VDC). Therefore, the feedback of the Exhaust should be on Analog Input 4. The input must be set as Voltage and 0-10 VDC by setting S1 switch 4 OFF and switch 8 ON.

5. Analog Output should be set to determine the voltage range preferred for the UVM Input signal. The UVM is designed for a 0-10 VDC control Input signal. Therefore, dip switch S4 should be set for 0-10 VDC for outputs controlling UVM devices. Set all S4 switches to OFF for 0-10 VDC outputs of analog outputs 1-4.

6. Next is the Protocol switch. S3 switch 5 should be OFF while all other switches are ON for BACnet protocol and no network termination required of FMS165X controller.

7. At this point, the FMS controller hardware settings have been completed. However, the software configurations must be completed for proper operation of controller. Also, the wiring of the controller must be verified for correct device terminations of inputs and outputs.

Wiring

Power
The FMS Controller is powered by (fused) 24 VAC.

IMPORTANT: Do not power both FMS Controller and valve actuator with the same Triatek issued isolation transformer.

Analog Inputs
Most Common Configuration with Triatek devices for volumetric offset control.

Analog Input 1 (AI_1): 3 Wire mA output sensor is wired to AI1. Three wires are Sensor Power (DIGITAL SNS_PWR), Ground (GND) and ANALOG_INput 1 (AI_1). The sensor should be wired as follows from Controller to Sensor: DIGITAL SNS_PWR to +Vin; GND to GND; AI_1 to Io.

GND and Io. Io is the 4-20 mA output to controller termination.

Note: A third party sensor can be used. However, the sensor range must be entered correctly. Be sure to convert the sensor pressure range from Pa to in. W.C. as the scale is in. W.C. by default.

Analog Input 2 (AI_2): Temperature Sensor should be wired here AI_2 to GRND.

Analog Input 3 (AI_3): 2 Wires from Supply UVM VO and ground for a 0-10 VDC feedback signal to the FMS165x Analog Input_3 and ground. This connection is important for the display of Airflow Value on AI_3 for Supply.

Analog Input 4 (AI_4): 2 Wires from the Exhaust UVM VO and ground for a 0-10 VDC feedback signal to the FMS165x Analog Input_4 and ground. This connection is important for the display of Airflow Value on AI_4 for Exhaust.

Note: If volumetric offset control is preferred, then Analog Input_3 must be configured first for Flow. Then configure Analog Input_4 for flow and the volumetric offset option will be made available. The volumetric offset option is only made available in the menu of analog input 4 if analog input 3 has been configured for flow.

Analog Outputs
The output wiring (control signal) goes from FMS back plane CN3 Analog Outputs 1-4 to UVM IN and Ground. Be sure to map the correct input to output for expected control. I recommend mapping analog output 4 to analog input 4. Also, analog output 3 should be mapped to analog input 3. This mapping is accomplished in the Main Menu >> System Setup >> Next >> Ai/Ao Mapping.

Analog Output 4: 2 Wires to the UVM Control Board IN and Ground of valve being controlled to track for volumetric offset control. Typical with BMS controlling Supply or Exhaust and the FMS is expected to regulate Supply or Exhaust by tracking for volumetric offset control.

Auxiliary Outputs
The auxiliary outputs are provided for the following voltages:
- 5 VDC
- 10 VDC
- +V = 32 VDC Typically used to power Occupancy Sensor

Network
BMS wiring goes on connector CN4 of backplane. It is polarity sensitive. Uniformity of positive to positive and negative to negative must be maintained throughout the network.

Software Settings
This is only a reference as programming the settings in most cases isn't sequence dependent with the exception of controllers programmed for VOC (Volumetric Offset control). Enter Isolation set point.

Note: it is recommended that the Room Isolation preference be set before entering the settings for analog input 1.

Main Menu >> Unit Setup >> Room Setting >> Begransat lage >> Select Primary, then select preferred Isolation Mode.

Go to Main Menu
1. System Setup >> Analog Inputs >> Analog Input 1
2. Sensor Input Settings >> Select Linearization Disabled and Select Input Mode Normal (If the differential pressure [DP] sensor is installed backwards, then select Inverted Mode to reverse the input as needed.)
3. Engineering Units >> Pascals Select Range 4-20 mA for Triatek Sensor
4. AI-1 Sensor Range >> ± 0.25 in. W.C.
5. Enter ISO Set point.

Note: Be sure to indicate (-) for negative isolation set point. Ex: -2.49

6. Enter Dead band and Select Finish

The same process will be required for all analog inputs. Please note that feedback signals Vo and Ground from UVM supply and exhaust should be on AI-3 (Supply) and AI-4 (Exhaust) of the FMS165X controller. Therefore, FMS165x analog inputs 3 and 4 should be configured respectively. These are Flow Inputs with Flow Sensor Type. The maximum Flow must be equal to the UVM 10 VDC flow Ex: 10 in. valve UVM is set for 1100 cfm at 10 VDC. Therefore, the Maximum Flow is also 1100 cfm. Also, the range in this analog input must be set for 0-10 VDC. Enter set point and dead band as preferred.

Note: The Maximum Flow at 10 VDC is standardized based on the Venturi Valve Size.

14 in. valve = 2300 cfm
12 in. valve = 1600 cfm
10 in. valve = 1100 cfm
8 in. valve = 800 cfm

UVM Board

The UVM Controller is preconfigured for the Venturi Valve it's associated with. Therefore, you should only need to do three things:

1. Provide power 24 VAC to the factory supplied 24/24 Isolation transformer
2. Connect wiring from the FMS Controller Analog Output to UVM Controller IN-GRND for control signal
3. Connect wiring to the FMS Controller Analog Input from the UVM Controller Vo-GRND

Dip Switch/Jumper Settings (Preconfigured at Factory)

SW1 on UVM Board is an 8 switch dip. Switch 5 (Actuator Direction) will be set ON (Reverse) for Exhaust. Switch 5 will be set OFF (Normal) for Supply. Switches 1-4 (Module Address) should be OFF. Switches 6 and 7 (Operation Mode) will be set ON for cfm. Switch 8 (Comms Termination) will be OFF.

Jumpers are preset at the factory
JP2-ON
JP-4 ON
JP-5 OFF

Wiring

As previously mentioned, you will only need to connect:
1. Power (24 VAC)
2. IN and Ground (Control Signal 0-10 VDC)
3. Vo and Ground (Feed Back 0-10 VDC)

Actuator (Neptronic Fast Acting)

IMPORTANT: The actuator must not be wired as a load with any Triatek controllers. The 24 VAC required may be wired in parallel with an isolation transformer Line side. The actuators consume 15 VA and 24 VA Peak of power.

The Neptronic Fast Acting actuator has a 4 switch dip switch. This dip switch is preconfigured in the factory. However, please note Switches 1 and 2 are typically off with switch 3 ON for Exhaust. While switches 1,2 and 3 are ON for Supply.
We don't use switch 4.

1. Switch 1 Rotation CW/CCW
2. Switch 2 Fail Safe at 0 or 90
3. Switch 3 Control Signal Voltage or Current.

The UVM control signal to the actuator is 4-20 mA.

UVM Configuration Tool

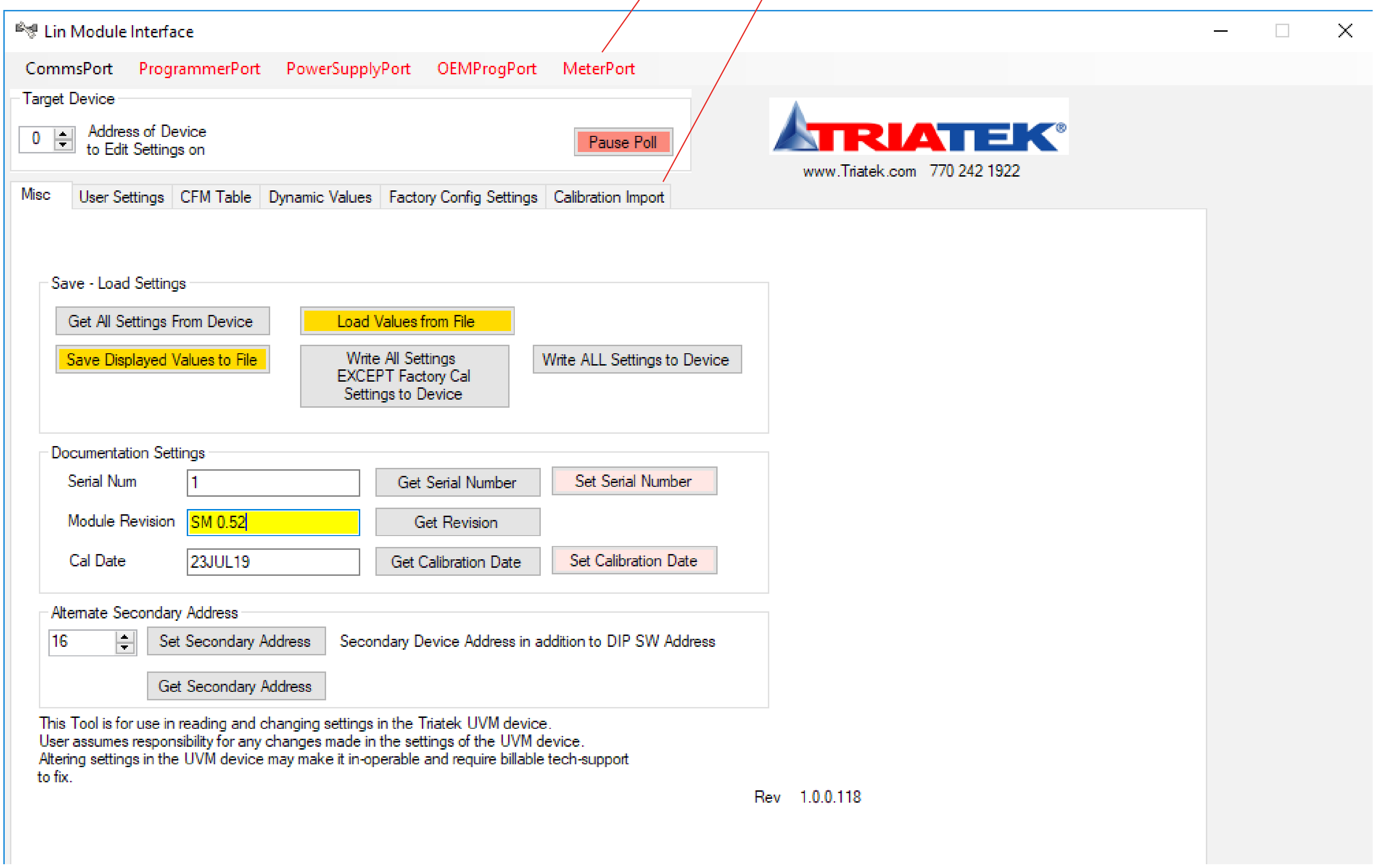
Before you begin

Requirements to set up your Universal Valve Module (UVM) Configuration Software:

1. Link to UVM Configuration Tool file
2. jZip
3. Microsoft.Net
4. Internet connection (if you need to download Microsoft.Net)
5. USB-RS485
6. Visual Basic Power Pack 10

This manual will take you through the initial UVM Configuration Tool installation process, and then through each tab, where you will enter in data specific to your application.

Overview of Lin Module Interface



Installation

1. Open the UVM folder and run the Setup.exe program. The program will first try to install VB Powerpack 10. If this fails to install, use the link below to manually install it (internet connection is required):

http://go.microsoft.com/fwlink/?LinkID=145727&clcid=0x804

The software utilizes the Microsoft.Net architecture, and if it is not installed on your computer, the setup program will instigate a download of Microsoft.Net and install it (internet connection is required).

2. When the Setup.exe program installation is complete the Triatek Configuration Program will run.

3. To use the software, you will need a USB-RS485 adaptor cable installed on the computer (Triatek part number 5-300102 or commercially, USB-RS485-WE-1800-BT).

4. Take note of the CommsPort to which the RS485 cable is installed. This can be done by going to Control Panel > Device Manager > Comm Ports. Pull the USB plug out to see which CommPort disappears, and then reappears when the USB is plugged in again.

5. Run the Configuration Program, and if any of the port(s) are not present, the associated port tab will be highlighted red (see Figure 3).

6. To manually change the RS485 CommsPort settings or the ProgrammerPort settings, click either the CommsPort, ProgrammerPort, PowerSupplyPort, OEMProgPort, or MeterPort option on the Main Menu. (see Figure 3).

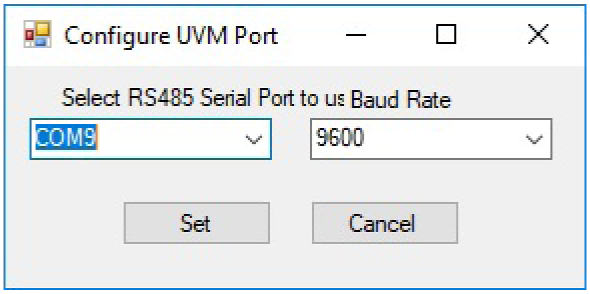


Figure 1. Comms Port dialogue box

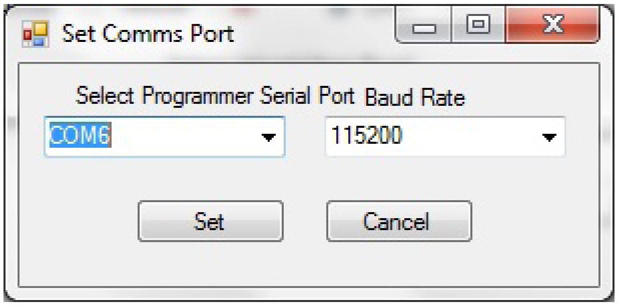


Figure 2. Comms Port for MSP-GANG Programmer

7. Within the CommsPort dialogue box, select the communications port that the RS485 is connected to and set the Baud Rate to 9600. Click Set (see Figure 1).

Note: Optional if a re-flash is required. The ProgrammerPort is for a USB connection to a MSP-GANG Programmer by Elprotronics. This programmer and connection is used to flash the MSP430 microprocessor with the UVM operating code. This is already done by the factory, but certain circumstances may require the module to be re-flashed to a later revision.

8. Select the appropriate CommsPort that the MSP-GANG Programmer is connected to. Set the Baud Rate to 115200 (see Figure 2). Click Set to use the selected settings, or Cancel to ignore use of this port (most cases). The other CommsPorts are relevant to factory calibration equipment and may be ignored.

Misc Tab

1. On the Misc Tab of the program (see Figure 3), set the address of the UVM module that you will be interacting with. Addresses 0 -15 are derived from the DIP switches on the unit (see the UVM Installation Manual for DIP switch settings).

There may also be an already-set internal soft address (from 16 – 255) that the unit will respond to as well. The units will be set to hardware address 0 when shipped from the factory.

2. Click the Get Revision button to confirm that Comms is present. The revision number will appear in the Misc Tab Module Revision box.
Ideally, click the Get All Settings From Device to retrieve what is already set in the controller. This may take about 15 seconds to complete.

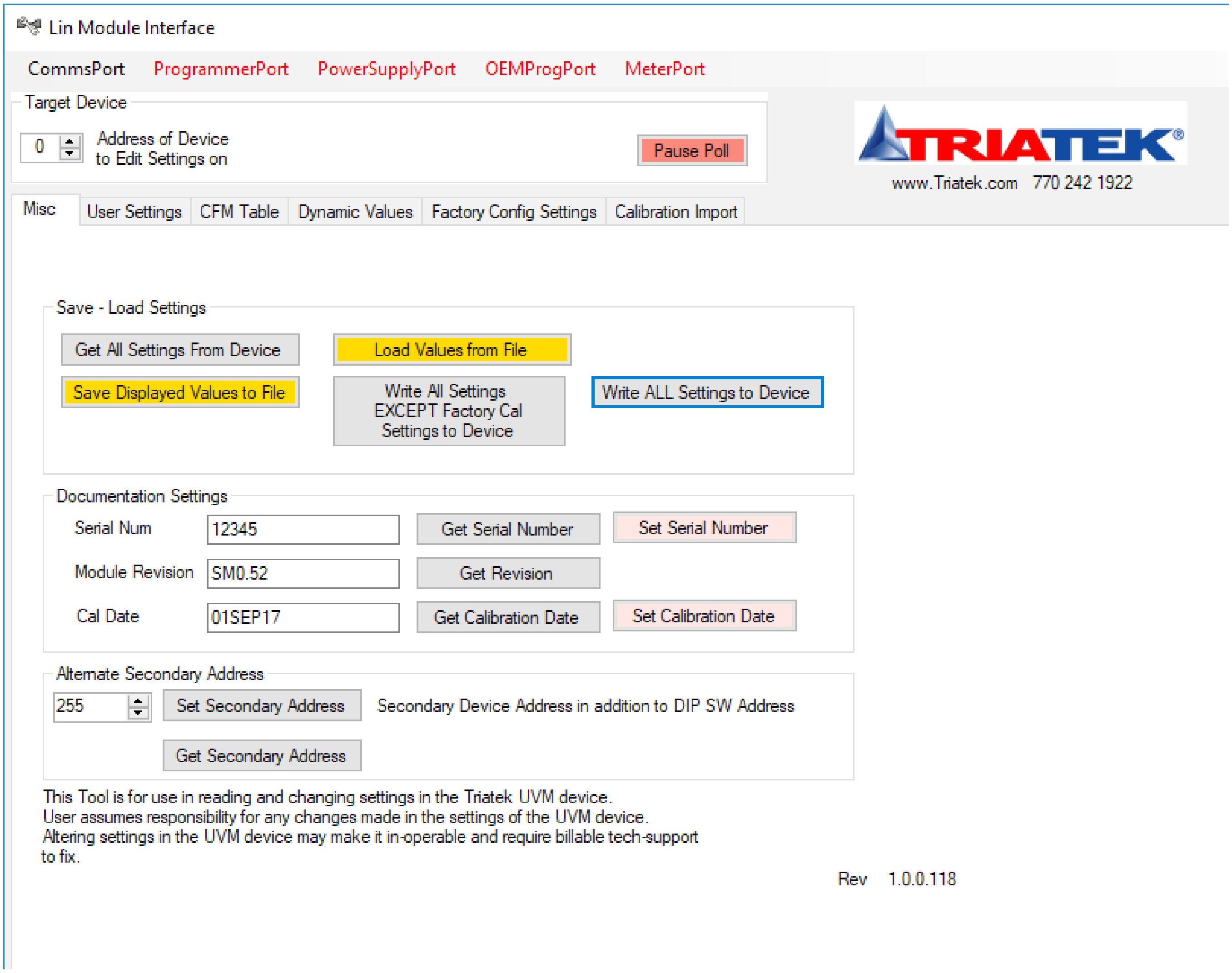


Figure 3. Main Menu / Misc Tab

Misc Tab

3. A copy of these settings can be saved to your computer by clicking the Save Displayed Values to File button (see Figure 4).

Note: This will save the values shown in the fields on the configuration software, not what is in the UVM, unless the Get All Settings From Device button has been clicked and the process of getting the setting has completed (see Figure 4).

On the Misc Tab page, the serial number, module revision, and calibration date can be viewed.

The serial number and calibration date can be changed and programmed into the unit by clicking the Set Serial Number or Set Calibration Date buttons (these buttons are cropped from the Figure 4 screen shot).

The alternate address of the module can be set as well. The unit will respond to both the DIP switch set address and the software set alternate address. The DIP address can be used for initial setup and small clusters of UVMs. If more than 16 units are on the bus, use the software alternate address.

The Misc Tab also allows the user to read all the settings from the UVM with the Get All Settings From Device button, or write all relevant user settings to the device with the Write All Settings EXCEPT Factory Cal Settings to Device button. If the Write ALL Settings to Device button is used instead, all the settings, including the factory calibration settings will be over-written in the device. **The factory calibration data is specific to each board and should not be overwritten with values from another board.** Previously saved vales can be re-loaded with the Load Values from File button, and values read from the UVM and present in the Configuration Tool can be saved with the Save Displayed Values to File button.

A typical sequence would be to connect a UVM, select Get All Settings From Device and then Save Displayed Values to File. This provides a backup copy of the current settings on the device prior to making any changes. A device can be restored to previous saved values by using Load Values from File and then Write All Settings Except Factory Cal Settings, or Write All Settings to Device.

IMPORTANT: Take care when using Write All Settings to Device on a new device, as you may overwrite existing calibration information already in the new device.

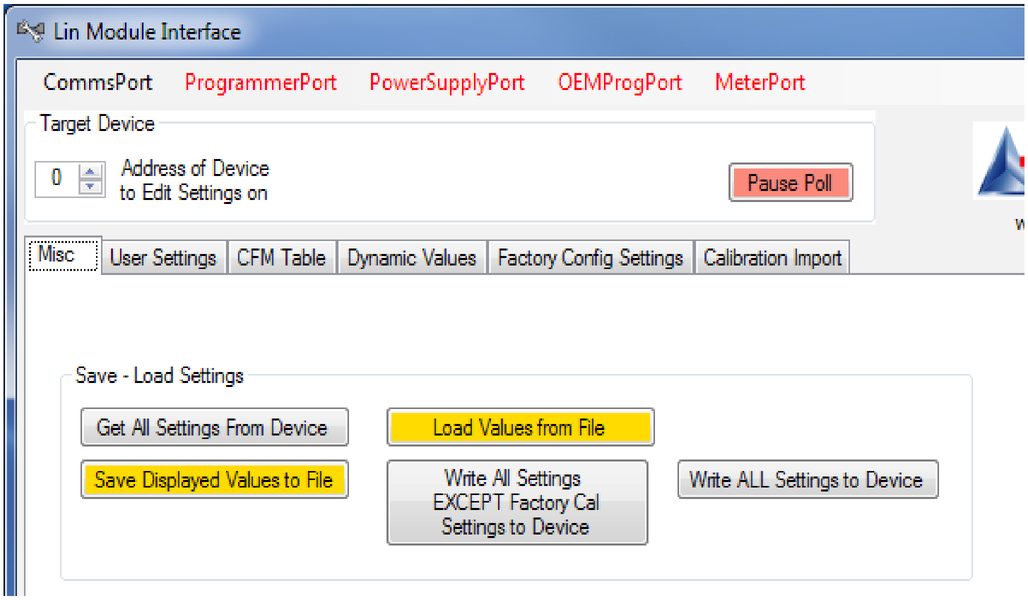


Figure 4. Misc Tab

User Settings Tab

The User Settings Tab (see Figure 5) page is the main tab for the user to configure settings for the UVM, depending on which mode of operation is required and what options are to be enabled.

Use the individual Set buttons for the specific information required to be loaded to the controller.

Note: There is unique factory calibration values already in the UVM for the AI and AO ports that should not be overwritten.

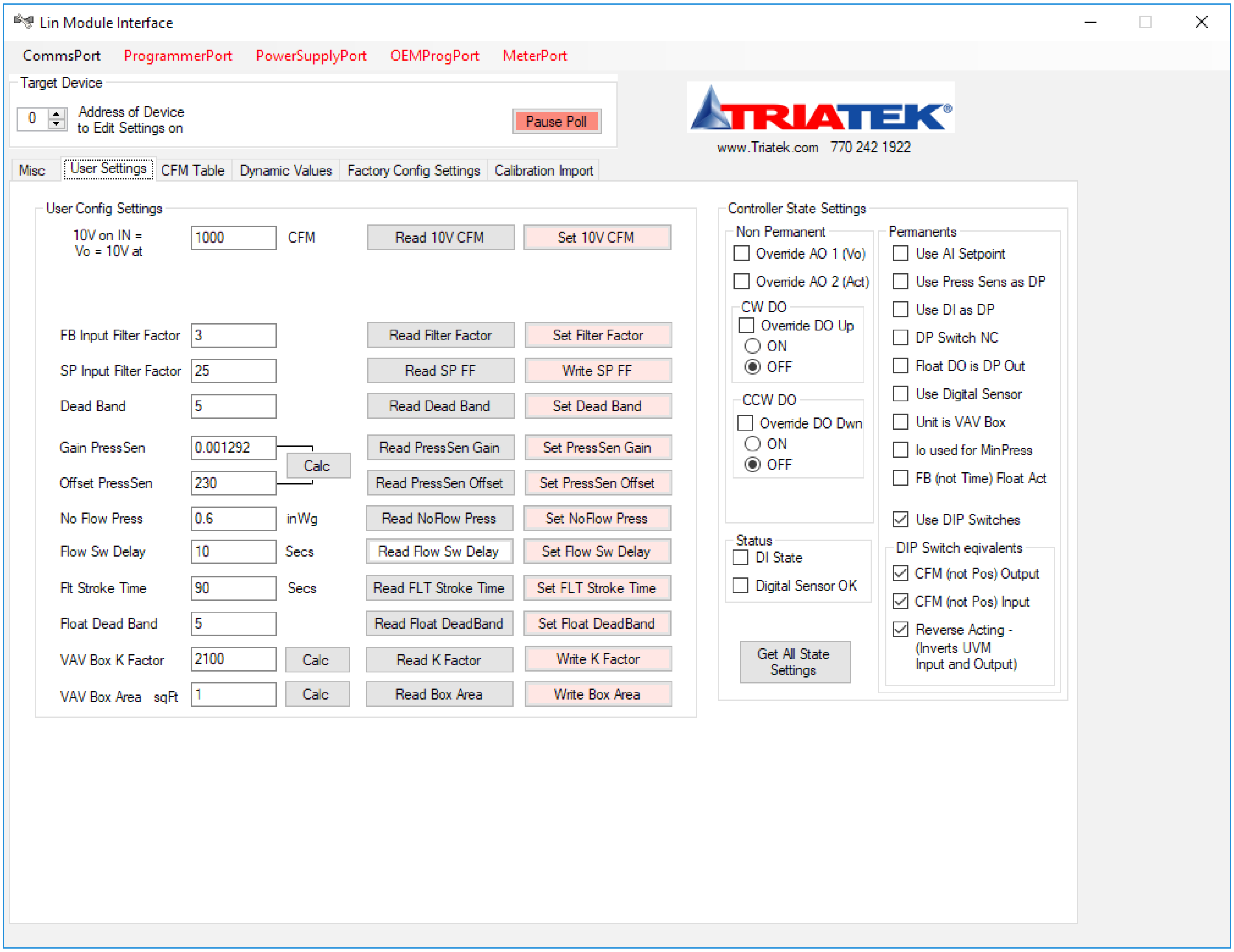


Figure 5. User Settings Tab

User Config Settings

The *cfm/Press at 10 V* field (see *Figure 5*) sets the control signal and feedback signal scaling into and out of the UVM. If the UVM is configured to operate with a Venturi valve (most cases) then this value represents what cfm the 10V input and output signals represent.

For example, if a value of 1500 is entered, then a 10 V signal applied to the IN connection specifies a cfm of 1500 cfm is requested, and a 10 V signal from the Vo connection indicates the valve is providing 1500 cfm. This value is set initially by the factory and is matched to the size of the valve attached to the UVM. Typical values are:

8 in. = 800
10 in. = 1100
12 in. = 1600
14 in. = 2300

The *FB Input Filter Factor* is a filtering or dampening factor applied to the raw feedback signal from the position feedback sensor on the valve. The typical value is 3.

The SP Input Filter Factor is a filtering or dampening factor applied to the raw control signal applied to the IN connection of the UVM. It has been found that some third party controllers use a PWM method to produce their AO signals. This typically results in a signal that varies by up to 0.5 V at 10 Khz. The UVM is sensitive to this and results in the actuator jittering between various positions as it follows the (moving) input control signal. This value is typically 10-20, but can be higher (50 or more) for third party controllers with unsteady AO signals. Note that the higher this value, the less responsive the UVM is to sudden changes in the control signal.

The *Gain PressSen* and *Offset PressSen* fields are used to scale an optional external pressure sensor so that the sensors output voltage range converts to the appropriate pressure range on the UVM. The use of a pressure sensor as a DP monitor is only active when the *Use Press Sens as DP* selection is active or checked. The pressure sensor can be used to monitor the DP pressure across the valve and give a 0 cfm output voltage if the pressure falls below the value set in the *No Flow Press* field (typically 0.6 in. W.G.).

When using an analog pressure sensor with a voltage output connected to the Sens_In pin (see *UVM Installation Manual*), the following scaling should be used:

The scaling is derived from : 0 V = 0 counts, 5 V = 4095 counts = x Press = (x – Offset) * Gain

$$\text{Gain} = ((Ph - Pl) / (Vh - Vl)) * (5 / 4095)$$

$$\text{Offset} = (4095 / 5) * (Vh - (Ph * ((Vh - Vl) / (Ph - Pl))))$$

Where Vh is the sensor voltage at the high pressure Ph, and Vl is the low voltage at the low pressure Pl.

Clicking the *Calc* button (see *Figure 5*) allows this calculation to be done automatically.

This brings up a calculation dialog (see *Figure 6*) where the sensor pressure range and output voltages can be entered. The *Compute* button calculates the *Gain* and *Offset* and enters these values in the *Gain PressSens* and *Offset PressSens* boxes. If these values are correct, click the *Set PressSens Gain* and *Set PressSens Offset* button to send the values to the controller.

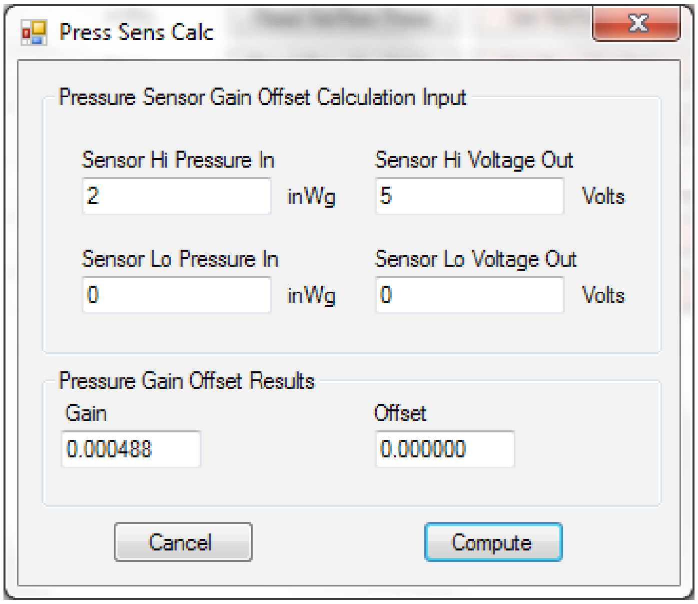


Figure 6. Press Sens Calc dialogue box

The pressure, in in. W.G. below, which the flow in the valve is deemed to be invalid, and should produce a 0 cfm flow feedback signal, is entered in the *No Flow Press field* (see *Figure 5*). For Triatek standard flow valves, this value should be 0.6 in. W.G.

The *Flow Sw Delay* setting (see *Figure 5*) is used in instances when a DP switch is used with the valve to detect when there is insufficient DP across the valve to produce a reliable cfm. The delay value is in seconds and is the time between when the DP switch detects a low flow and when the UVM zeros out the cfm feedback signal. This value is only relevant when the *Use DI as DP* or *Use Press Sens* as *DP* selection is active or checked.

The *Flt Stroke Time* (see *Figure 5*) is for instances when a “floating” (drive up, drive down) actuator is used with the UVM. The actuator counter clockwise (CCW) and clockwise (CW) inputs are connected to the CCW and CW outputs of the UVM. The actuator common and the UVM COM are connected to the “active” and “neutral” respectively of a 24 VAC supply. The *Float DO* is *DP Out* selection should be un-selected. The *Fit Stroke Time* is the stroke time of the floating actuator, typically 60 or 90 seconds. It should be noted that floating actuators are not very accurate for using a stroke time to determine position, and as such actual requested cfm and achieved cfm may not match.

The floating actuator can also be used with the feedback sensor, where the valve position is determined entirely by the feedback value and not the stroke time of the actuator. To enable this mode of operation, check the FB (*not Time*) *Float Act* selection.

The *Float Dead Band* (see Figure 5) is the dead band associated with the floating actuator positioning. This value is requested cfm change before the actuator moves to new position.

When the UVM is used with a VAV box, the K factor for the box and the area of the VAV Box are set in the *VAV Box K Factor* (see Figure 5) and *VAV Box Area* fields. The use of a UVM with a VAV box is enabled by setting the *Unit* is *VAV Box* check box. The pressure sensor input on the UVM is used to provide the flow pressure from the VAV box flow probe. Again, the *Gain PressSen* and Offset PressSen fields need to be set to calibrate the used pressure sensor.

See the *UVM Installation Manual* on how to wire the pressure sensor to the UVM. The *Use Press Sens* as *DP* check box needs to be **un-selected.** The UVM is not designed to autonomously control a VAV box. It will accept a 0 -10 V control signal from an OEM controller and interpret this as a 0 - 100% position signal for the actuator, and position the actuator as such (cfm *(not Pos) Input* should be **un-selected**).

The UVM will use the flow pressure sensor to provide a 0 – 10 V as 0 – xxx cfm feedback signal. It is up to the OEM controller to modulate the actuator and monitor the cfm signal to obtain the desired cfm value. Dynamic pressure, velocity, and flow values can be observed on the Dynamic Values Tab.

Controller State Settings

This area (see *Figure 5*) selects the various operational states of the UVM. Within this group are Permanent, Non-Permanent, and Status states.

The Permanent settings are settings that can be set/un-set in the UVM and are stored in EEPROM. They retain their state across power losses.

The Non-Permanent states can be set from the tool, but reset back to un-selected when the power to UVM is cycled. They are typically used for overriding and testing.

The Status states are advisory states and are used for debugging.

Permanents

The *Use AI Setpoint state* (see Figure 5) selects whether the cfm/ Positional Setpoint is derived from the *Analog **IN*** connection or from a value set by the Configuration Tool. When selected, the value is derived from the appropriately scaled *Analog **IN*** value. This would be the typical mode of operation. When de-selected, the setpoint value can be set via the *Setpoint* field on the Dynamic Values Tab. The ***IN*** voltage is ignored in this case.

The *Use Press Sens* as *DP* state (see Figure 5) selects whether a connected pressure sensor (see *UVM Installation Manual* for sensor wiring) is to be used to measure the DP across the valve and determine when the DP is invalid and as such zero the cfm feedback signal. If this state is enabled, then the *Gain PressSen*, *Offset PressSen*, and *No Flow Press* values also need to be valid and set. *Use DI as DP*, *Use Digital Sensor*, and *Unit* is *VAV Box* need to be un-selected.

If DP monitoring is required, but a DP switch is to be used in lieu of a pressure sensor, then the *Use DI* as *DP* (see Figure 5) check box should be selected and the *Use Press Sens as DP* should be un-selected. In this case a suitably calibrated DP switch would monitor the pressure across the valve and make/break contact when the pressure fell below the specified valve minimum operating pressure.

The normally closed / normally open (NC / NO) mode of operation for the switch can be set with the state of the *DP Switch NC*. When selected, it is inferred that the DP switch is normally closed and opened when the pressure falls below the specified value.

The *Float DO* is *DP Out* (see *Figure 5*) setting is used to allow the pressure sensor, when used to monitor DP, or the DP sensor state to be reported. This would typically be used to create a pseudo DP switch with a pressure sensor.

Here the pressure sensor and the UVM pressure settings would allow the DO act as the output of a DP switch for use on other controllers to 0 the cfm reading. When this is selected, the floating actuator output control cannot be used. As it would be logical to use the pressure sensor for measuring the valve DP, the Use Press Sens as DP check box should be **selected**.

The *Use Digital Sensor* check box will enable a specific digital sensor to be used in lieu of the analog pressure sensor. The digital sensor uses an I2C communications media to talk to the UVM. Normally this setting should be left **un-selected**. This is a legacy setting and may be removed in future revisions.

The *Unit is VAV Box* check box is used to set the UVM mode to compute cfm from a VAV box flow probe instead of using a Venturi valve lookup curve. The *Gain PressSen* and *Offset PressSen* fields need to be set in order to calibrate the used pressure sensor, and the *VAV Box K Factor* and VAV Box Area settings need to be accurately set for proper computation of the VAV box air flow.

Use Press Sens as DP typically needs to be **un-selected**. The sensor pressure, air velocity, and air flow can be viewed under the Dynamic Values Tab.

The *Io Used for Min Press* setting (see *Figure 5*) is applicable to UVM revisions (S series) that provide for networked UVM units. This may read as being set, but can be ignored. When selected, and if this UVM is a primary, it will monitor the networked UVM's DP pressure values (they need to use pressure sensors) and determine the minimum pressure value from all the units.

This scaled minimum pressure value will be output on the Io connection on the UVM. This infers that the actuator cannot be used on this UVM. The minimum pressure value can be used by OEM control systems to regulate the fan system to a value where the lowest valve DP is just above the minimum specified DP value for valid operation. This setting has no meaning on standalone UVMs that are not of the S (summing)series, nor have the primary address. This can be left unchecked, and ignored if reported as active.

The *FB (not time) Float Act* setting applies to when t he UVM is using a floating actuator on the CCW and CW connections rather than an analog actuator on the Io connector. When not selected, the floating actuator will determine position purely by keeping track of run time in the up or down direction. For example, 50% position would be an accumulated +UP, -DOWN time equal to half the *Flt Stroke Time* setting. A floating actuator does not have high positional accuracy as it can slip depending on load. By setting this check box, the actuator is positioned only by use of the UVM / Valve FB sensor reading (via the cfm Table), and not by running times.

The *Use DIP Switches* check box (see *Figure 5*), allows the *DIP Switch Equivalents* settings to either be derived from the DIP switches, or by previously set values by the Configuration Tool. If this check box is selected, then the *cfm (not Pos) Output, cfm (not Pos) Input* and *Reverse Acting (2)* selections are derived from the DIP switches 5, 6 and 7 settings. The settings by the Configuration Tool are ignored. If this box is un-selected, then the DIP switches 5, 6, and 7 are ignored and the *cfm (not Pos) Output*, *cfm (not Pos) Input* and *Reverse Acting (2)* settings are as set by the Configuration Tool.

DIP Switch Equivalents

The *cfm (not Pos) Output* check box selects whether the Vo output represents the valve / VAV box cfm determined by the UVM or the valve position determined by the UVM.

The output Vo is obtained from the feedback sensor signal in the non- VAV case, or obtained from the flow pressure sensor in the VAV case.
In the checked state, the feedback signal is first converted to a position and then translated through the cfm curve to a cfm value for the non- VAV box case.

With the VAV, the pressure signal is converted to velocity with the K sqrt(P) math, and applied to the box area to get flow. This value is then scaled based on the *cfm/Press at 10 V* ranging and output on Vo. If this selection is un-selected, then the signal from the feedback sensor is converted to a position (0 -100%) as before, but this is scaled 0 -100% = 0 -10 V and applied to the Vo output. The position valve is not applicable to the VAV box case.
The *cfm (not Pos) Input* check box selects what the 0 -10V signal on the IN input represents. If the box is un-checked, the voltage on the IN connection represents a 0 – 100% positional percentage setpoint for the 0 -10 V signal. ie if 5 V were applied, the valve actuator would move to the 50% position.

If the box is checked, then the input voltage is interpreted as a cfm request. The scaling of this interpretation is defined by the *cfm/Press at 10 V* setting.

If, for this instance, this setting was 1500, then 0 V in is 0 cfm and 10 V is 1500 cfm. The UVM will move the actuator to try to achieve 1500 cfm. The cfm setting is not relevant when the UVM is being used in the VAV mode. This setting should be **un-selected** for VAV mode use.

The *Reverse Acting(2)* check box is used to select the Normal/ Reverse mode of operation of the UVM. In UVM revisions before 0.7x , checking this box would invert the Io signal to the actuator. In subsequent revisions, checking this box/state inverted both the input SP signal on IN and the actuator output signal on Io.

In this case the IN signal takes 0 -10 V to be xxx cfm - 0 cfm. Reverse acting is typically used for exhaust and hood valves. This should be left un-checked for VAV box use. See the *UVM Installation Manual* for wiring and Normal/Reverse setting recommendations.

See *Figure 7* for Normal and Reverse modes of operation switch/ state settings.

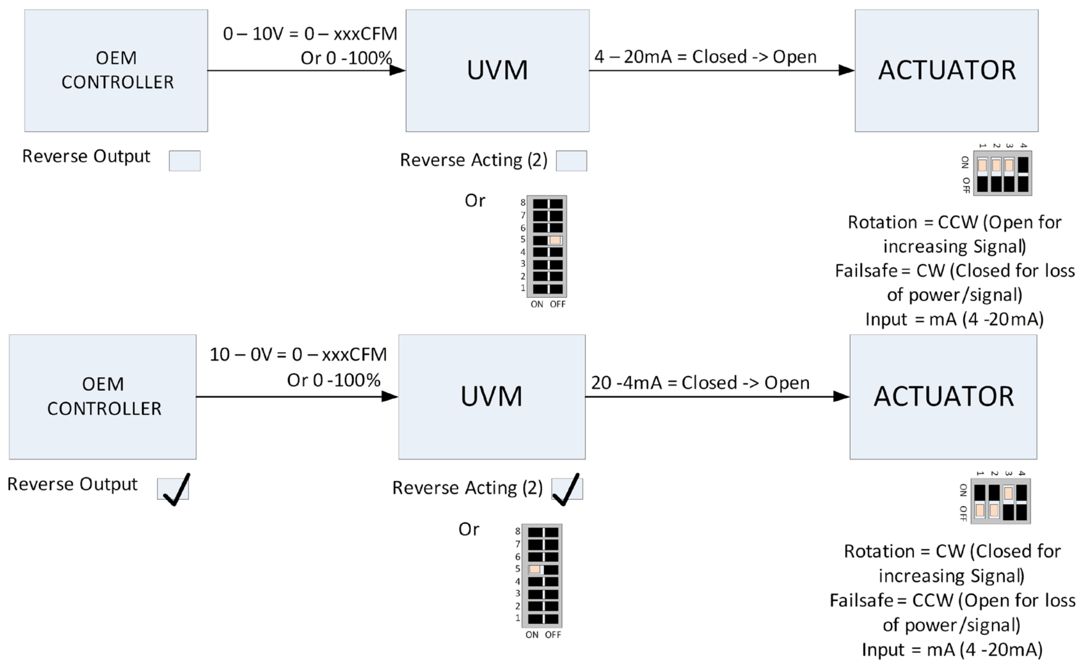


Figure 7. Normal/Reverse settings

User Settings Tab and CFM Table Tab

Non-Permanent

The Non-Permanent values can be set and cleared with the UVM Configuration Tool, and the UVM will react to their selections. These settings do not retain their selected state when power is removed and re-applied. On power up, they will be inactive/de-selected.

The *Override AO 1 (Vo)* check box is used to disconnect the Vo output from the control logic, and allow the user to set a Vo control value directly. This control is done through the *FeedBack Output* field and *Set Feedback Output Raw Value* button on the Dynamic Values Tab.

To directly control the Vo signal, check the *Override AO 1 (Vo)* check box, then go to the Dynamic Values Tab. On this tab, enter a desired value between 0 and 1000, where 0 is 0 Volts and 1000 is 10.00 Volts, in the *FeedBack Output* field. Click the *Set Feedback Output Raw Value* button to write the value to the AO 1 (Vo) signal.

The *Override AO 2 (Act)* check box is used to disconnect the actuator Io output from the control logic, and allow the Io to be commanded directly. The control is done through the *Actuator Output* field and the *Set Actuator Raw Output Value* button on the Dynamic Values Tab.

To directly control the Io signal, select the *Override AO 2 (Io)* check box, then go to the Dynamic Values Tab. On this tab, enter a desired value between 0 and 1000, where 0 is 4 mA (0%) and 1000 is 20 mA (100%), in the *Actuator Output* field. Click the *Set Actuator Output Raw Value* button to write the value to the AO 2 (Io) signal.

CW DO

The *CW DO* group is used to directly control the CW digital output on the UVM. To override the CW output, check the *Override DO Up* check box. Select the state that the DO should be by clicking either the *ON* or *OFF* radio button associated with the *CW DO* group. Note that the DO is equivalent to relay contacts but in an electronic package. When *ON*, the output will short to the *COM* pin on the UVM. The DO can switch either AC or DC signals.

CCW DO

The *CCW DO* group is used to directly control the CCW digital (grounding) output on the UVM. To override the CCW output, check the *Override DO Dwn* check box. Select the state that the DO should be by clicking either the *ON* or *OFF* radio button associated with the *CCW DO* group. Note that the DO is equivalent to relay contacts but in an electronic package. When *ON*, the output will short to the *COM* pin on the UVM. The DO can switch either AC or DC signals.

Status

The *DI State* check box is used for status indication only. Checking the box will have no effect on the UVM. When the *Get All State Settings* button is clicked, the Config Tool will read through all the states that are set and un-set in the UVM. The state of the UVM DI_1 input will be reflected in the final state of this check box.

The *Digital Sensor OK* check box is used for indicating the status of the digital sensor when use of the digital sensor is enabled with the *Use Digital Sensor* check box in the Permanents group. When the *Get All State Settings* button is clicked, the Config Tool will read through all the states that are set and unset in the UVM. The *State of the Digital Sensor* operation will be reflected in the final state of this check box.

CFM Table Tab

The CFM Table Tab page (see *Figure 8*) allows the valve flow curve and the feedback flow curve to be entered and / or changed. The table is organized as three columns, one for actuator position, one for feedback position and the last one for valve cfm.

At the factory, the curve is populated with the actuator position values and the cfm values. When the UVM is attached to the valve and specifically to the feedback sensor, a calibration process is carried out and the feedback entries in the table are placed.

The actuator and feedback entries are entered as a whole number being as 10 times the positional value. For instance, a position value of 40.5% would be entered as 405.

The feedback curve is required, as the relationship between the actuator position and the feedback sensor position through the valve linkages is not linear (deviates about 5% in the middle of the curve).

The automatic feedback calibration process through the UVM tool creates the correct feedback values to compensate and correct for this non-linearity. Typically the actuator and feedback sensor and cfm data would already be entered at the factory for a UVM supplied with a valve.

For units supplied without a valve, the installer can enter the position and cfm values via the tool. Typically they come from the curve supplied with the valve, or from live position / cfm measurements done on site.

Next, enter the positional values and the cfm values in the table and click the *Set cfm Entries* button. Check that the *Actuator Stroke Time* value is entered to match the time the actuator takes to travel from 0 to 100%. For a Triatek actuator use 4 seconds. Ensure that the *Auto Populate FB Entries* check box is checked.

This ensures that the tool not only computes the gain and offset for the feedback sensor, but also enters the corrected position values for each of the defined actuator positions. Before proceeding with the feedback calibration, ensure that the *Lo Field Cal* and *Hi Field Cal* entries are acceptable. These two values define the low and high travel points at which to obtain the information used to compute the gain and offset for the feedback curve. The 0 and 100% positions are not used as these points tend not to be on the linear part of the feedback curve.

CFM Table Tab

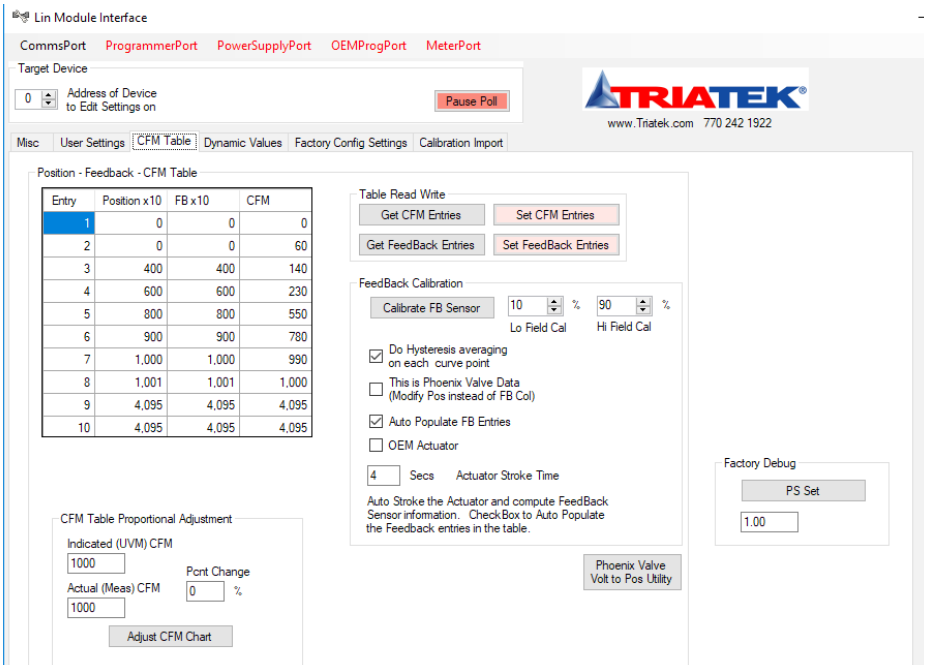
The feedback calibration process will take an A/D reading at these two positions both from the up-going and down-going direction and take the average. This is to account for any hysteresis in the feedback sensor reading.

There is also a checkbox *Do Hysteresis averaging on each curve point* that enables the average up and down reading on each of the curves actuator positions for the feedback sensor. This improves accuracy, but will take longer to execute.

With the feedback sensor properly attached and the actuator position curve downloaded to the controller, click the *Calibrate FB Sensor* button.
The tool will automatically position the actuator at the *Hi Field Cal* and *Lo Field Cal* positions, approaching from both directions and getting the average A/D reading from which to compute the gain and offset for the feedback sensor.

It will then position the actuator at each of the position points in the table and take a corresponding reading from the sensor. If the *Hysteresis* box is checked, it will take readings of the position, approaching from both directions and taking the average. It will convert that into a feedback sensor position and enter it in the table. When complete, the *Set Feedback Entries* button will become enabled. Click this button to download the values to the controller.

This procedure is relevant to the Triatek style installation where the valve is calibrated to the actuator position and cfm value. With other valve styles, typically in retrofit situations, where the valve information is not from Triatek, the valve may contain a feedback position, or feedback voltages and cfm values. The tool has the provision to open a dialog where feedback voltages and cfm values can be entered. This is done with the *Phoenix Valve Volt to Pos* button. Click this to bring up the entry chart.

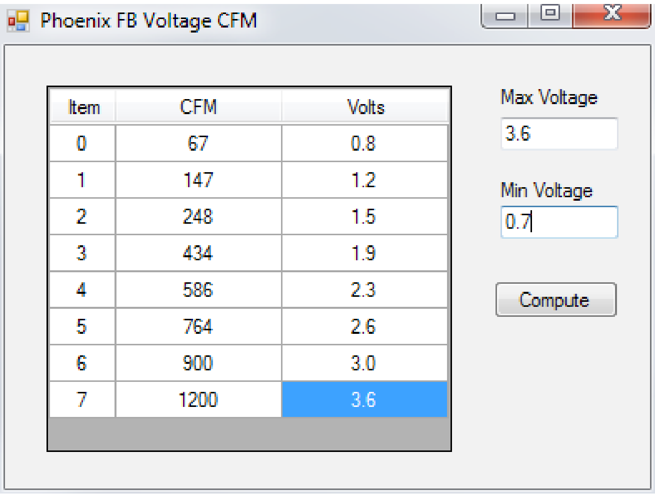


Entry	Position x10	FB x10	CFM
1	0	0	0
2	0	0	60
3	400	400	140
4	600	600	230
5	800	800	550
6	900	900	780
7	1,000	1,000	990
8	1,001	1,001	1,000
9	4,095	4,095	4,095
10	4,095	4,095	4,095

Figure 8. CFM Table Tab

CFM Table Tab and Dynamic Values Tab

OEM OEM Voltage – cfm Entry



Item	CFM	Volts
0	67	0.8
1	147	1.2
2	248	1.5
3	434	1.9
4	586	2.3
5	764	2.6
6	900	3.0
7	1200	3.6

Figure 10. Phoenix FB Voltage CFM

Enter the cfm (Low to High) and the voltages from the valve label. Enter the Min and Max voltages. Click the Compute button, and the position and cfm values will be automatically entered in the Position – Feedback – cfm Table on the main screen. Close the OEM Voltage dialog box if desired.

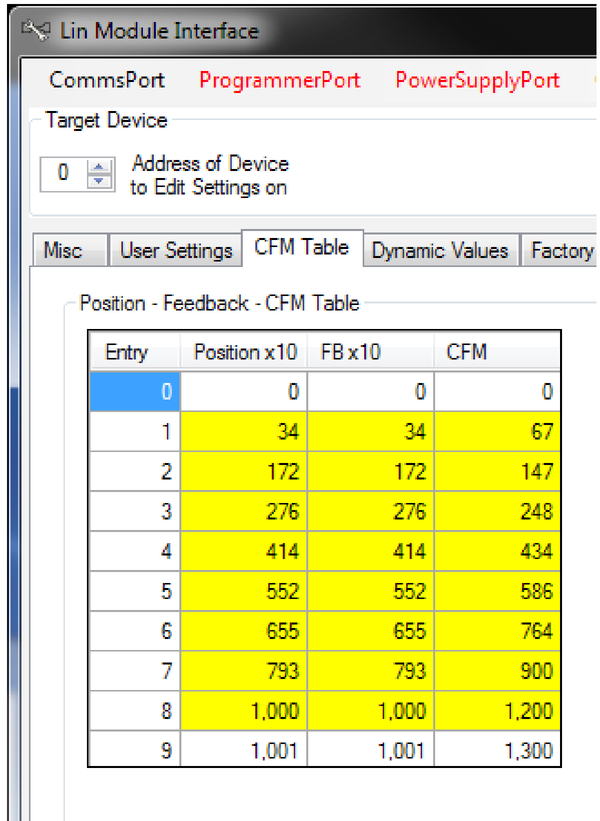
Updated Position – CFM Entry

Select the CFM Table Tab and click the *Set CFM Entries* and *Set Feedback Entries* buttons to download the values to the controller.

As the cfms are accurate to the feedback sensor position and not the actuator position, calibration of the feedback will be done to the actuator. In this case check the *This is Phoenix Valve Data* check box. Ensure that the *Auto Populate FB Entries* check box is checked.

This ensures that the tool not only computes the gain and offset for the feedback sensor, but that it also enters the corrected position values for each of the defined feedback positions.

Check that the *Actuator Stroke Time* value is correctly set and click the *Calibrate FB Sensor button*. Wait while the valve moves to 100%, then 0% and then to each of the defined feedback positions.



Entry	Position x10	FB x10	CFM
0	0	0	0
1	34	34	67
2	172	172	147
3	276	276	248
4	414	414	434
5	552	552	586
6	655	655	764
7	793	793	900
8	1,000	1,000	1,200
9	1,001	1,001	1,300

Figure 11. Phoenix CFM Table After

When complete the *Set cfm Entries* and *Set Feedback Entries* buttons will be enabled. Click each to update the controller.

The curve values for a newly attached controller can be examined by clicking the Get cfm Entries and/or Get Feedback Entries button(s). **The OEM Actuator check box is for factory use, do not check this.**

Dynamic Values Tab

The Dynamic Values Tab (see *Figure 12*) provides a set of buttons and fields to access dynamic values within the controller.

This is typically used for fault finding and performance debugging. Output override values can also be set from here. If so selected, a “soft” setpoint can also be entered here.

Dynamic Values Tab

Values displayed include calculated values such as cfm, position, pressure, etc., and also raw A/D values from the AI inputs. The values do not automatically update, they need to have their associated *Get XX* button clicked to force a value to be read.

The *SetPoint* entry displays the current converted setpoint for the actuator as a (times 10) percentage value. If the input, as defined under the User Settings Tab is set to *cfm (not Pos)* Input = checked, then the incoming voltage is interpreted as a cfm and parsed through the valve curve as a cfm to position.

The resulting percentage (times 10) position is displayed in the *SetPoint* field when the *Get Setpoint* button is pushed. Depending on the state of the *cfm (not Pos) Input* check box, a cfm or position value can be entered into the *Setpoint* field, and passed to the controller when the *Set Setpoint* button is pushed.

The passed value will only have effect if the *Use AI Setpoint* on the User Settings Tab is **un-checked**. If it is checked, the UVM will use the voltage on the IN input as the cfm/Position setpoint. This field can be used for operational fault finding without having to have a variable voltage source.

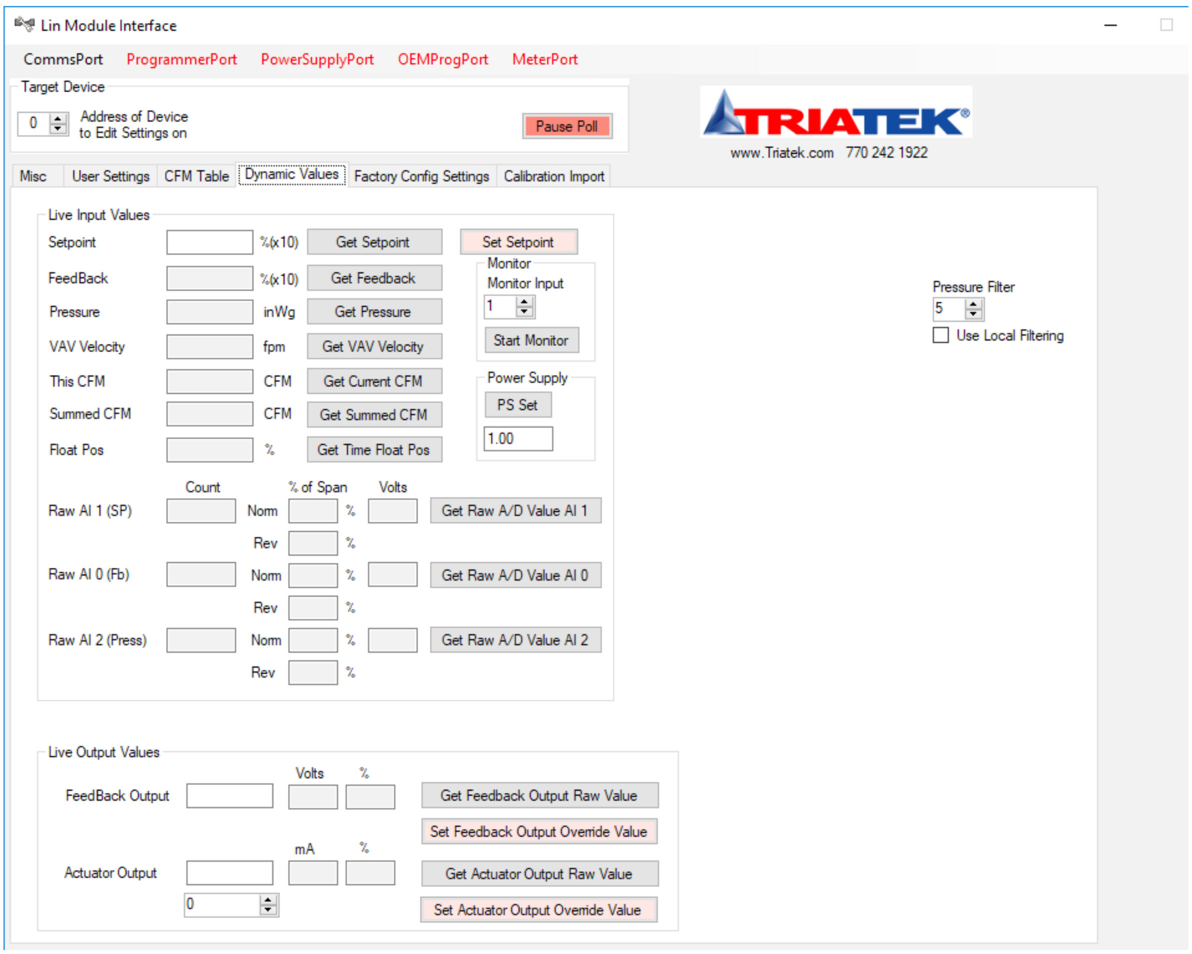


Figure 12. Dynamic Values Tab

The *FeedBack* field is used to show the position of the feedback sensor as a percentage (by 10) value. The value will only be accurate if the feedback sensor has been calibrated (at the factory or by the user). In normal operation, this value should be close to the *Get SetPoint* value.

The *Pressure* value displays the converted value from the pressure input connection. This value is only accurate when the pressure input has been calibrated and the *Gain PressSen* and *Offset PressSen* on the User Settings Tab have been calculated and sent to the UVM board. See the User Settings Tab section (page 7) of this document as to how to calculate the gain and offset for the pressure sensor. Click the *Get Pressure* button to read the current pressure.

The *VAV Velocity* field shows the calculated FPM from the velocity pressure as derived from the pressure input. The pressure sensor should be previously setup and calibrated for this to be accurate.

This value shows 0 if the *Unit is VAV Box* is un-checked. Also the *VAV Box K Factor* entry needs to have a valid entry (downloaded to the UVM) for the specific flow probe being used on the VAV box.

The UVM calculates the velocity value by getting the flow pressure from the pressure input, square rooting it and multiplying it by the K factor (if the *Unit is VAV Box* is checked). Click the *Get VAV Velocity* button to read the current VAV velocity.

The *This cfm* value is the current cfm being derived in this UVM. The value could either be the cfm computed from the feedback sensor in conjunction with the valve curve, or the cfm computed from the VAV velocity times the *VAV Box Area* (if the *Unit is VAV Box* is checked). Click the *Get Current cfm* button to read the current cfm.

The *Summed cfm* value is the value of cfms of other UVMs which are communication replicas of this unit. The primary UVM will request cfm values from up to 16 other (replica) UVMs and sum those values together.

It will also include the cfm value of the primary (this) UVM. If this UVM is not part of a valve or VAV box, care should be taken to ensure that a 0 local cfm value is generated internally for *This cfm*. This function is only applicable to a special summing revision of the UVM code, and will typically not be the standard code release. Click the *Get Summed cfm* button to read the current total system cfm.

The *Float Pos* value is the positional (computed) value of a floating actuator, if attached. The CW and CCW outputs will drive a floating actuator open and closed based on the *Flt Stroke Time* value under the User Settings Tab.

The UVM will compute the effective position from this stroke time and the time the actuator has been running open or closed. Floating actuators are normally not very accurate, and as such this value may not match the actual actuator position. Click the *Get Time Float Pos* button to read the current floating actuator assumed position.

The *Raw AI 1 (SP)* fields display information as to the raw value on the IN (SetPoint) analog input. The first field is the actual A/D count from the IN analog input. The second field is the input value as a percentage of the total possible input range. Typically the input value will be between 0 and 4095. The second field is the input A/D as a percentage of 4095. The third field is (4095 – A/D input) as a percentage of 4095. The values can be used as a rough guide as to where the input signal is relative to the full range.

The *Raw AI 0 (Fb)* fields display information as to the raw value on the feedback sensor analog input. The first field is the actual A/D count from the feedback analog input. The second field is the input value as a percentage of the total possible input range. Typically the input value will be between 0 and 4095. The second field is the input A/D as a percentage of 4095.

The third field is (4095 – A/D input) as a percentage of 4095. The values can be used as a rough guide as to where the feedback signal is relative to the full range.

Unlike the IN signal which goes from 0 -10 V (0 – 4095) during normal operation, the feedback signal may use only a portion of this range depending on where the feedback sensor is positioned and what angular range the actuator uses on the valve.

The *Raw AI 2 (Press)* fields display information as to the raw value on the analog sensor (pressure) analog input.

The first field is the actual A/D count from the press sensor analog input. The second field is the input value as a percentage of the total possible input range.

Dynamic Values Tab and Factory Config Settings Tab

Typically the input value will be between 0 and 4095. The second field is the input A/D as a percentage of 4095. The third field is (4095 – A/D input) as a percentage of 4095. The values can be used as a rough guide as to where the input signal is relative to the full range. This input is used as the raw input prior to scaling of an analog pressure sensor.

Each of the input A/D count sections have a voltage field that indicates the approximate voltage at the input based on the A/D and the calibration factors on the *Factory Cal* page.

The *FeedBack Output* field is used to check or control (when overridden) the Vo signal that is used as the 0 -10 V feedback signal to the third party controller. Clicking the *Get Feedback Output Raw Value* button will return the raw value (0 – 4095) being sent to the D/A for the Vo channel. If the Vo channel is overridden by checking the *Override AO 1 (Vo)* on the User Settings Tab, the output on Vo can be set by the user (for debug). Enter a value between 0 and 1000 (100.0%) in the feedback text box and click *Set Feedback Output Override Value* button so that the Vo output goes to a value between 0 and 10 V.

The *Actuator Output* field is used to check or control (when overridden) the Io signal that is used as the 4 -20mA actuator control signal.
Clicking the *Get Actuator Output Raw Value* button will return the raw value (0 – 4095) being sent to the D/A for the Io channel. If the Io channel is overridden by checking the *Override AO 2 (Act)* on the User Settings Tab, the output on Io can be set by the user (for debug).

Enter a value between 0 and 1000 (100.0%) in the *Act* text box and click *Set Actuator Output Override Value* button so that the Io output goes to a value between 4 and 20 mA.

The two output sections also have a voltage field that show the approximate voltage out based on the control value and calibration factors on the *Factory Cal* section.

Factory Config Settings Tab

See *Figure 13.*

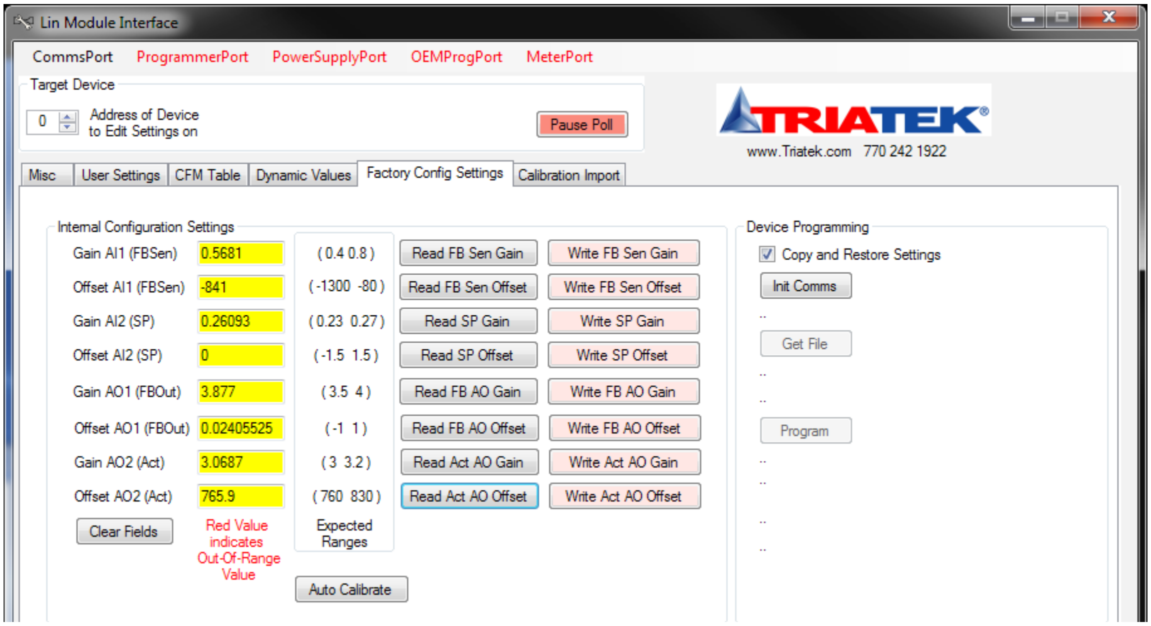


Figure 13. Factory Config Settings Tab

Factory Settings Tab

Internal Configuration Settings

This tab and the fields under it are for use by the factory to program and calibrate the AI and AO channels. It contains the gain and offset settings for each of the channels. **These values should not be adjusted unless instructed by Triatek.**

The entries show a value as obtained during factory calibration and an acceptable range for the value. If the value is within range it will have a yellow background. If it is out of range, then the back ground will be red.

In some instances the user may adjust these to correct any voltage errors that there may be. Instructions for this modification are included in a “Procedure to Check I_O on a UVM Board” document. (See *Figure 14*).

The *Auto Calibrate* button is used by the factory to automatically adjust the gain and offset values for each of the analog channels during calibration. This process requires specialized test equipment to operate correctly.

Device Programming

This field is used to load new firmware into the UVM controller. It requires specialized programming equipment to operate correctly. **This should only be used under instruction from Triatek.**

Calibration Import Tab

See *Figure 15*.

Module Calibration Info

This tab and fields are used for factory setup of the UVM. It allows the importation of the valve curves and valve data for inclusion in the UVM storage and for creating valve summary labeling. There is no user relevant fields on this tab, and as such **it should not be accessed without instruction from Triatek.** Calibration of the feedback sensor can be achieved from the cfm Table Tab.

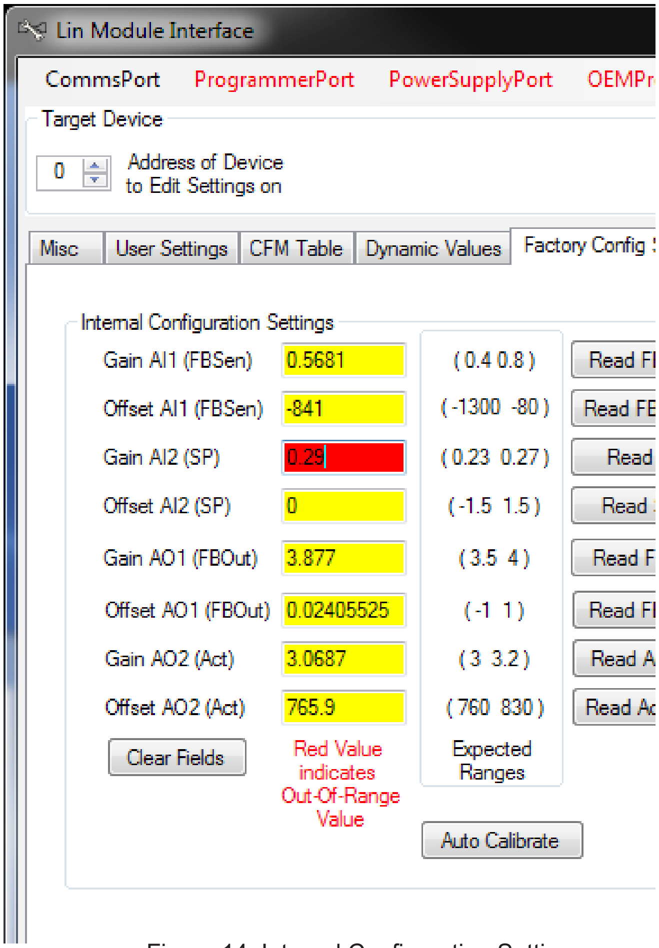


Figure 14. Internal Configuration Setting

Factory Settings Tab and Calibration Import Tab

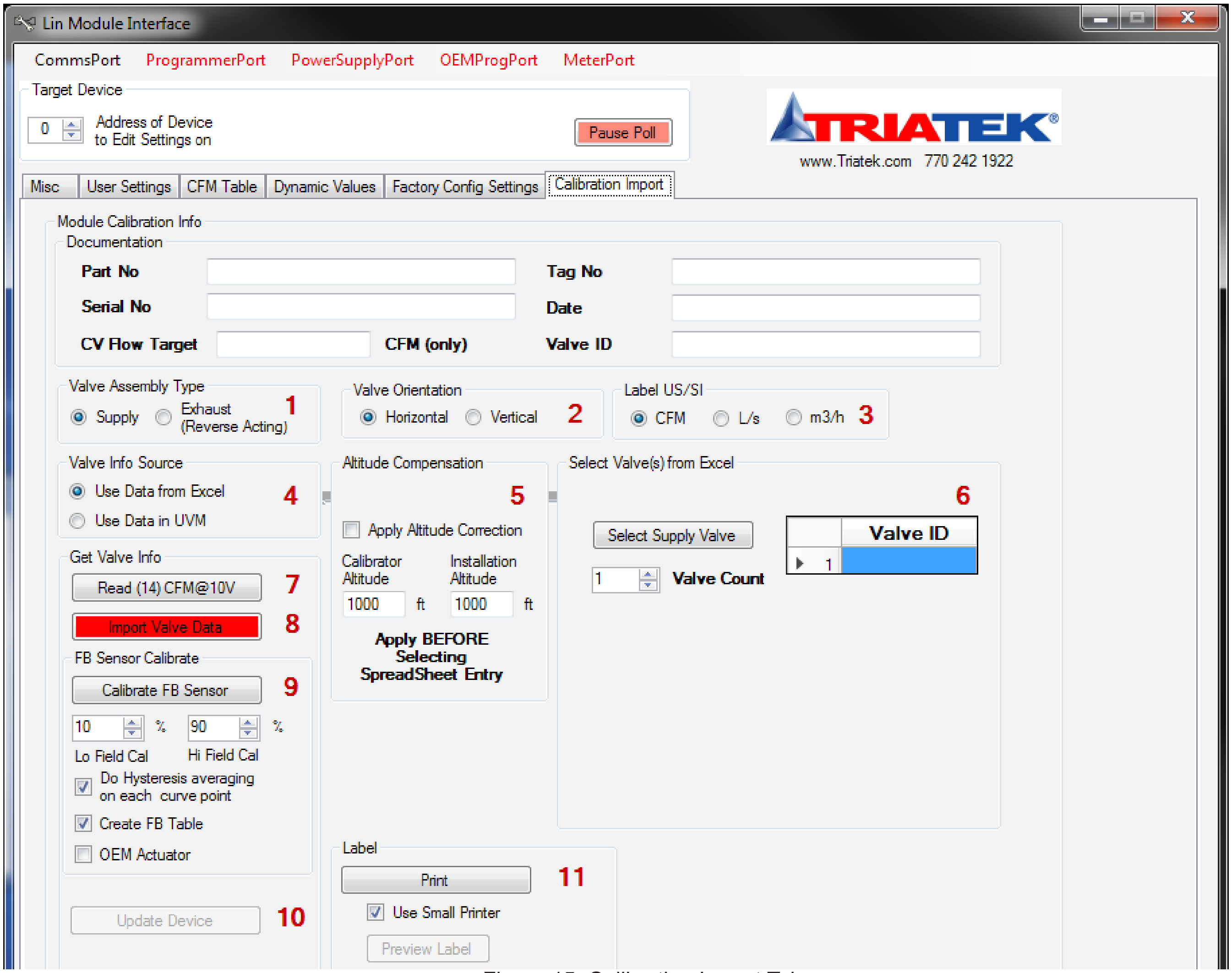


Figure 15. Calibration Import Tab

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