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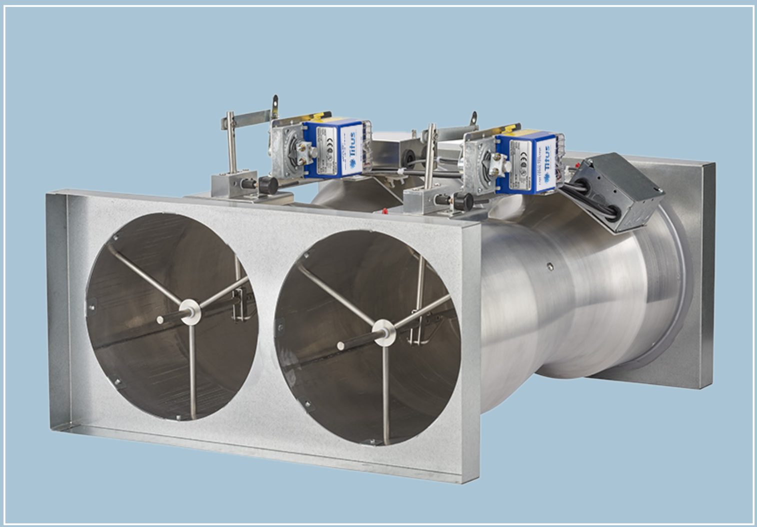
VAV with UVM1000

VENTURI AIR VALVE WITH UVM1000 INSTALLATION GUIDE



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- Project information
- Submittals
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- Wire strippers
- Flat screwdriver set with different sized drivers
- Phillips screw driver with different sized drivers
- Small vice grips
- Channel locks
- Needle nose pliers
- Crescent wrench
- Nut driver set
- Butane or electric soldering iron
- Fine tip markers

ADHERENTS

- Solder
- Electrical tapes
- Duct tape
- Foil tape
- ASHRAE approved duct sealant

ELECTRONICS AND COMPONENTS

- Cell phone
- Digital camera
- Flashlight
- Digital volt meter
- DC and AC voltmeter
- DC and AC ammeter
- Resistance measurement with tone
- Extra terminal connectors
- Wire labels
- Laptop with Windows OS and a free USB port
- USB to DB9 male cable
- Universal Valve Module (UVM) Configuration Tool installed

SAFETY

- Ladder
- Arrest harness
- Safety glasses
- Hard hat or bump cap
- Steel toe cap shoes
- Cut-resistant gloves

VENTURI AIR VALVES OPERATION OVERVIEW

The Venturi Valve is an air flow control device that varies the annular orifice to modulate the flow of air. The logarithmic profile of the valve body and the position of the internal damper assembly achieve the variable annular orifice. You can also refer to the orifice as a cone due to its shape. The cone is situated on an actuated shaft, which enables flow control through the full range of the valve, from 0% to 100%.

An increase in duct static pressure compresses a spring housed inside the cone and extends the spring when the pressure reduces. This spring moves the cone independently of the cone shaft, repositions it inside the valve body, and changes the annular orifice. This spring-activated cone travel enables instant mechanical flow adjustments independent of the actuator movement. The spring-enabled cone travel enables mechanical pressure independent flow control by the Venturi air valve.

The pressure-independent flow control feature of the Venturi Valves is functional between 0.3 in. W.C to 3.0 in. W.C for low pressure and 0.6 in. W.C to 3.0 in. W.C for medium pressure applications. This is due to weight, friction and other limiting factors, which attribute to the minimum force required for initiating cone travel.

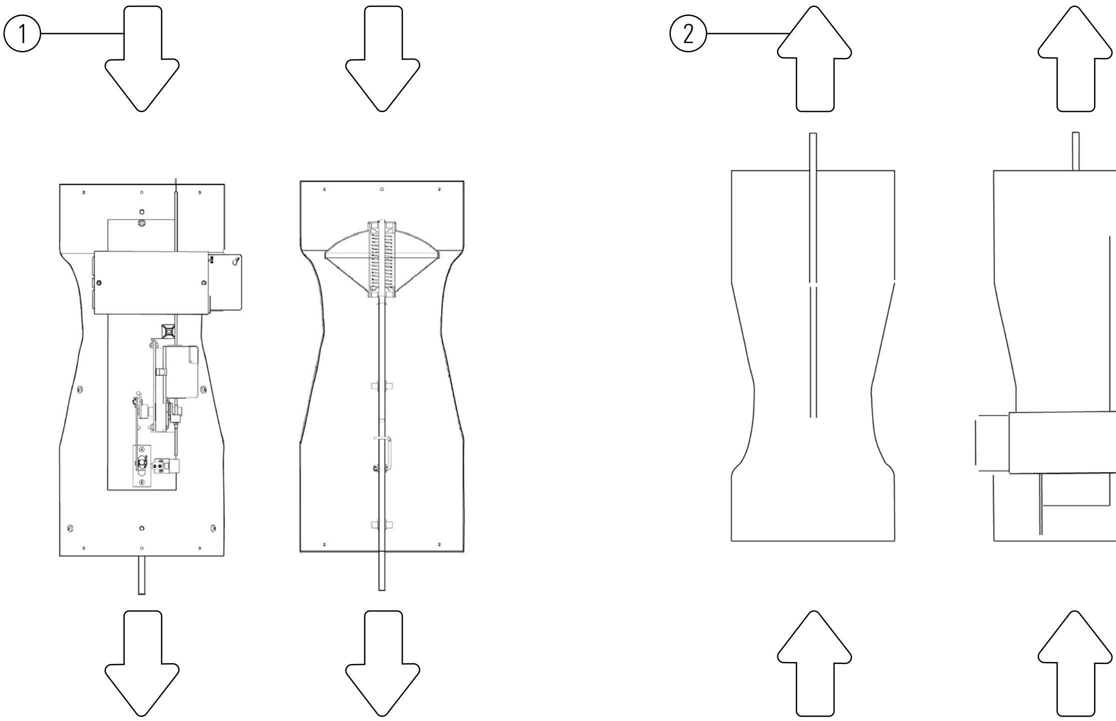
If duct static pressure falls below the minimum level required, 0.3 in. W.C for low pressure and 0.6 in. W.C for medium pressure applications, there is not enough force to move the cone and it begins to compress the spring inside to activate cone travel.

If duct static pressure exceeds the maximum pressure limit allowed, 3.0 in. W.C, the cone fully compresses the spring inside and prevents further cone travel.

Due to the dynamic spring action in the cone assembly, the pressure drop is never constant across a Venturi Valve. Measure at the time of operation for a true reading. To ensure correct operation of the Venturi Valve, maintain the pressure drop across the valve between 0.3 in. W.C and 3 in. W.C for low pressure and between 0.6 in. W.C and 3 in. W.C for medium pressure applications.

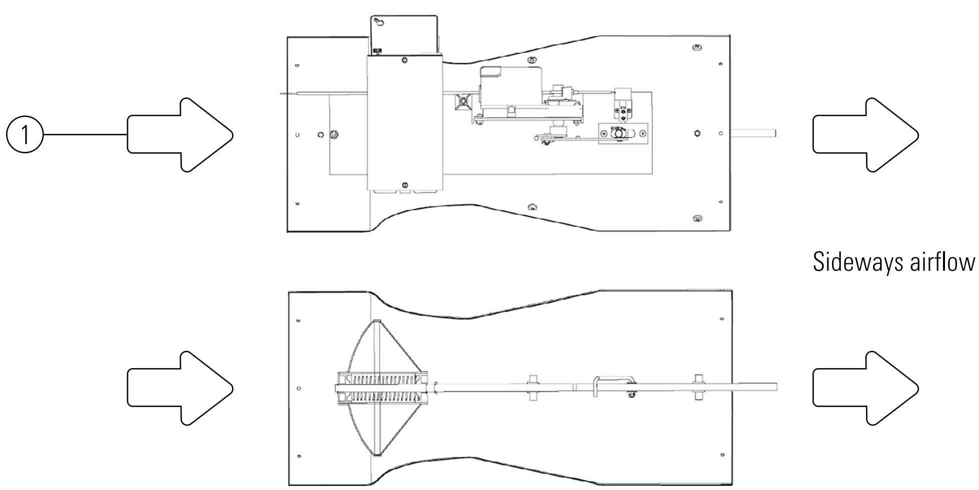
VENTURI VALVE ORIENTATIONS AND AIRFLOW DIRECTIONS

FIGURE 1: VERTICAL POSITION WITH UPWARD AND DOWNWARD AIRFLOWS



Callout	Description
1	Downward airflow
2	Upward airflow

FIGURE 2: HORIZONTAL POSITION WITH SIDEWAYS AIRFLOW



Callout	Description
1	Sideways airflow

CONSTANT VOLUME VENTURI AIR VALVE DIAGRAMS

The following figures and tables show the Constant Volume Venturi air valve, the Fast Actuated Venturi air valve, and the Venturi CCM valve controller and panel layout.

FIGURE 3: CONSTANT VOLUME VENTURI AIR VALVE

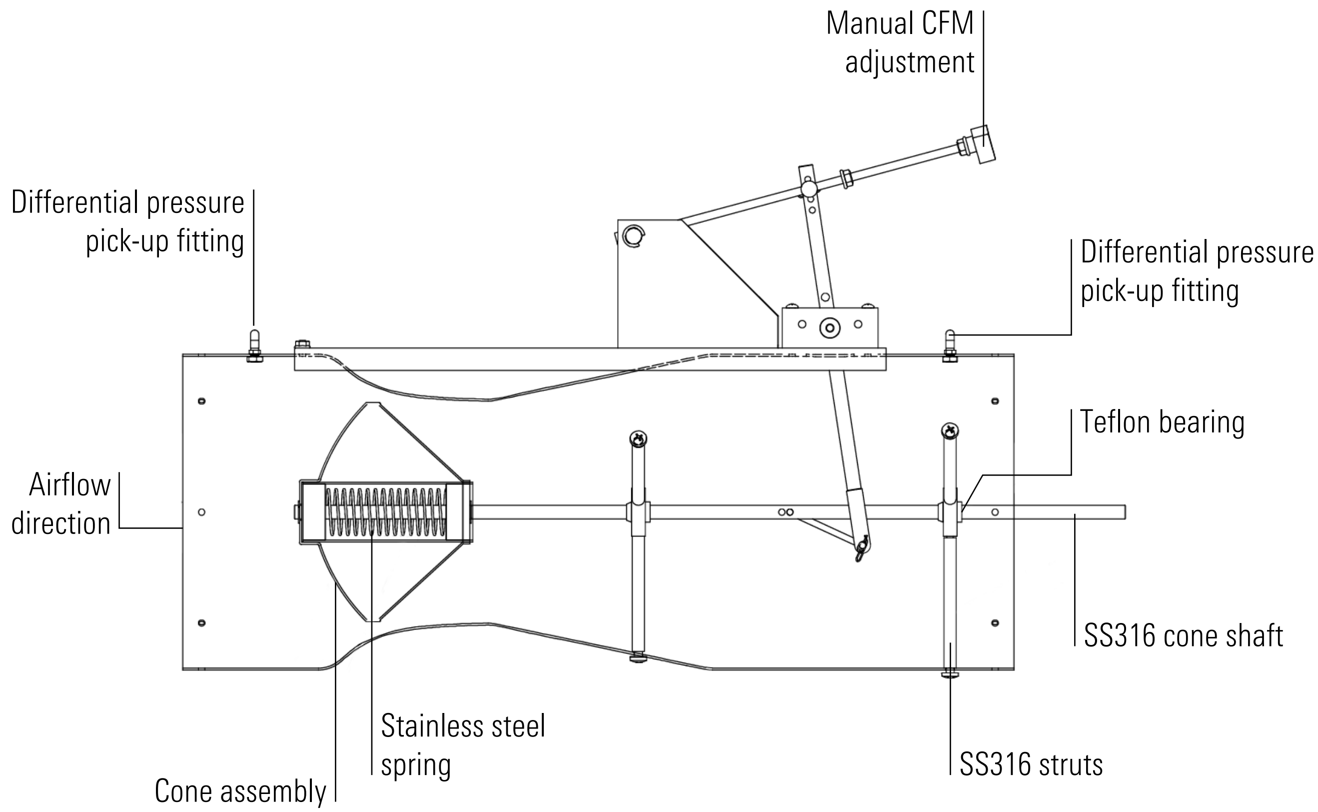


FIGURE 4: FAST ACTUATED (FA) VENTURI AIR VALVE

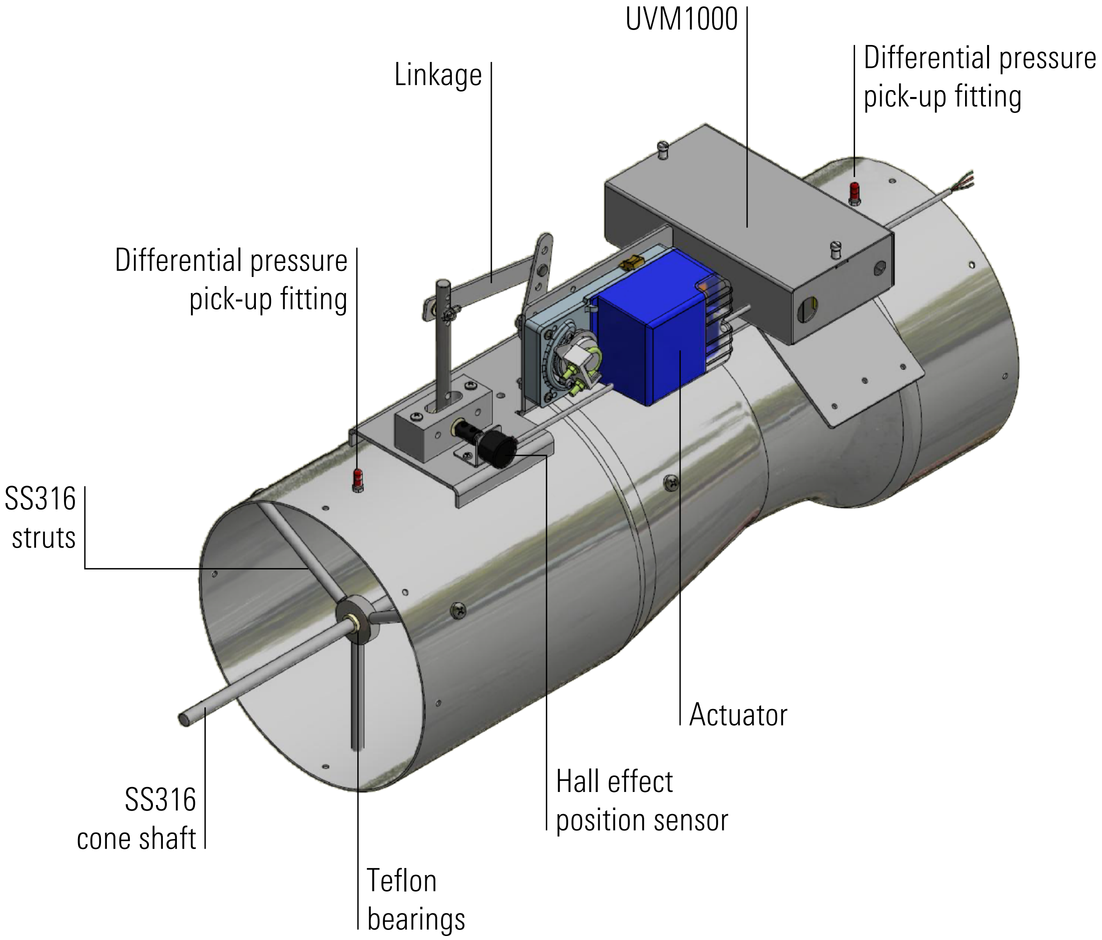
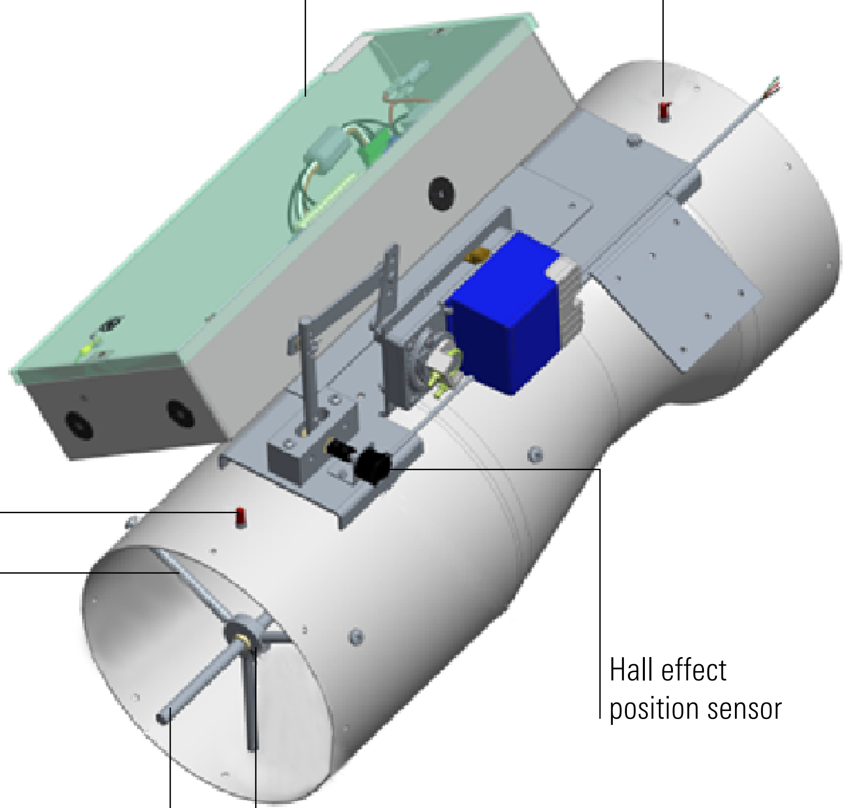
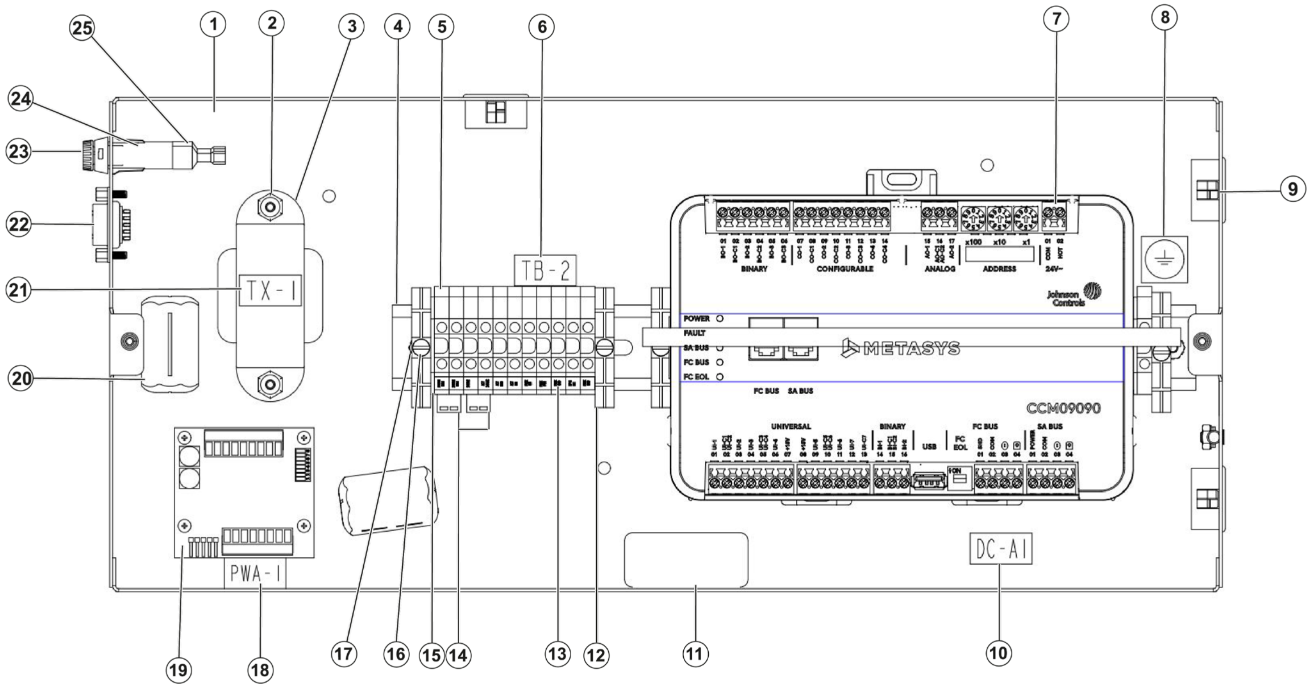


FIGURE 5: CCM09090 VALVE MOUNTED ROOM LEVEL CONTROLLER



Venturi air valves are available with a factory mounted room level controller CCM09090 on the valve body. This reduces the need for an additional wall mounted panel in the critical space and makes installation easier. The valve mounted controller is the central node in the room for connection to all other devices. It is best practice to designate the location of the controller onto a valve you can easily access, or to a valve with access to the general ventilation supply. For more information, refer to the CCM Quick Start Guide (LIT-12014059).

FIGURE 6: VENTURI CCM PANEL LAYOUT



The following table lists the components for the Venturi CCM panel. All dimensions are in H x W x D.

Callout	Component	Description	Quantity	Part number
1	Enclosure	Control panel enclosure. 8 in. x 18 in. x 3.5 in. (203 mm x 457.2 mm x 88.9mm)	1	74-00010-00024
2	Nut	Hex machine screw nut, size #6 to 32	2	02-489-268
3	Transformer	Control transformer 24 V, 30 VA 50/60Hz. Primary voltage 24 VAC	1	27-05837-00169
4	DIN rail	Low profile 13 in. (330.2 mm) length	1	74-00003-00032
5	Terminal block	Single terminal block for DIN rail, width 0.24 in. (6 mm)	13	02-217-2871
6	Label	Component label TB-2	1	02-814-1048
7	Controller assembly	M4-CCM09090-0	1	27-05837-00169
8	Label	Polyester ground label	3	02-814-1072
9	Bushing	Universal nylon flexible bushing, radius size 1 in. (25.4 mm)	3	02-500-00371
10	Label	Component label	1	02-814-1048
11	Label	Product identification label	2	14-1113-18
12	Terminal block	Single terminal block end clamp for DIN rail	3	02-217-2413
13	Label	Marking tags for terminal blocks	1	02-43-530
14	Jumpers	2 pole insulated jumper for terminal block	2	02-217-3657
15	Terminal block	Single terminal block cap for DIN rail	2	02-217-2898
16	Nut	Hex machine screw nut, size #8 to 32	4	69-12510-79
17	Washer	External toothed lock washers	4	02-65-170

The following table lists the components for the Venturi CCM panel. All dimensions are in H x W x D.

Callout	Component	Description	Quantity	Part number
18	Label	Printed wire assembly component label component label	1	02-814-1048
19	UVM-PCBA	UVM1000 Printed Circuit Board Assembly	1	UVM-PCBA
20	Ferrite clamp	Ferrite clamp for EMI suppression	2	02-1035-126
21	Label	Component label	1	02-814-1048
22	Wire harness	Control panel wire harness for Titus serial port	1	75-00001-00012
23	Fuse	Slow-blow fuse 1.0A, 0.20 in. x 0.79 in. (5 mm x 20 mm)	1	02-412-01437
24	Fuse holder	Fuse holder, 0.20 in. x 0.79 in. (5 mm x 20 mm)	1	02-531-00385
25	Faston	Solderless faston insulated terminal for wire gage 18 AWG to 22 AWG	2	02-494-633

The following table lists the components for the Venturi CCM panel. All dimensions are in H x W x D.

TABLE 1: DIMENSIONS AND WEIGHTS

Size	Ganged valves	Weight				Valve diameter		Valve length (A)		Valve height (B)		Collar width (C)		Collar width (D)	
		lb	kg	lb	kg	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
8 in. (203 mm)	1	15	7	20	9	7.75	197	23	584	14	356	N/A			
10 in. (254 mm)	1	20	9	27	12	9.74	247	26	660	16	406	N/A			
	2	40	18	54	24	N/A	N/A	30	762	17	432	22.63	575	11.44	291
	3	60	27	81	37	N/A	N/A	30	762	17	432	33.75	857	11.44	291
	4	100	45	135	61	N/A	N/A	30	762	35	889	22.63	575	22.88	581
	6	140	64	189	86	N/A	N/A	30	762	35	889	33.75	857	22.88	581
12 in. (305 mm)	1	20	9	27	12	11.68	297	26.8	681	18	457	N/A			
	2	60	27	81	37	N/A	N/A	30.8	782	19	483	26.75	679	13.5	343
	3	80	36	108	49	N/A	N/A	30.8	782	19	483	40	1016	13.5	343
	4	100	45	135	61	N/A	N/A	30.8	782	38	965	26.75	679	27	686
	6	150	68	203	92	N/A	N/A	30.8	782	38	965	40	1016	27	686
14 in. (356 mm)	1	25	11	N/A		13.62	346	30	762	22	559	N/A			
	2	50	23			N/A	N/A	34	864	24	610	32.15	817	16	406
	3	75	34			N/A	N/A	34	864	24	610	48.3	1227	16	406
	4	120	54			N/A	N/A	34	864	48	1219	32.15	817	32	813
	6	160	73			N/A	N/A	34	864	48	1219	48.3	1227	32	813

TABLE 2: PARTIALLY CLOSED (PC) VENTURI VALVE FLOW RATES

Size	Ganged valves	Low pressure, minimum 0.3 in. W.C (inches of water column)				Medium pressure, minimum 0.6 in. W.C			
		Minimum flow		Maximum flow		Minimum flow		Maximum flow	
		CFM	CMH	CFM	CMH	CFM	CMH	CFM	CMH
8 in. (203 mm)	1	35	59	500	850	35	59	700	1189
10 in. (254 mm)	1	50	85	550	934	50	85	1000	1699
	2	100	170	1100	1869	100	170	2000	3398
	3	150	255	1650	2803	150	255	3000	5097
	4	200	340	2200	3738	200	340	4000	6796
	6	300	510	3300	5607	300	510	6000	10,194
12 in. (305 mm)	1	90	153	1050	1784	90	153	1500	2549
	2	180	306	2100	3568	180	306	3000	5097
	3	270	459	3150	5352	270	459	4500	7646
	4	360	612	4200	7136	360	612	6000	10,194
	6	540	917	6300	10,704	540	917	9000	15,219
14 in. (356 mm)	1	175	297	1400	2379	175	297	2100	3568
	2	350	595	2800	4757	350	595	4200	7136
	3	525	892	4200	7136	525	892	6300	10,704
	4	700	1189	5600	9514	700	1189	8400	14,272
	6	1050	1784	8400	14,272	1050	1784	12,600	21,408

TABLE 3: FULL SHUT-OFF (FS) VENTURI VALVE FLOW RATES

Size	Ganged valves	Low pressure, minimum 0.3 in. W.C				Medium pressure, minimum 0.6 in. W.C			
		Minimum flow		Maximum flow		Minimum flow		Maximum flow	
		CFM	CMH	CFM	CMH	CFM	CMH	CFM	CMH
8 in. (203 mm)	1	0	0	400	680	0	0	600	1019
10 in. (254 mm)	1	0	0	450	765	0	0	850	1444
	2	0	0	900	1529	0	0	1700	2888
	3	0	0	1350	2294	0	0	2550	4332
	4	0	0	1800	3058	0	0	3400	5777
	6	0	0	2700	4587	0	0	5100	8665
12 in. (305 mm)	1	0	0	750	1274	0	0	1100	1869
	2	0	0	1500	2549	0	0	2200	3738
	3	0	0	2250	3823	0	0	3300	5607
	4	0	0	3000	5097	0	0	4400	7476
	6	0	0	4500	7646	0	0	6600	11,213

Note: 14 in. valve is not available in FS valve body.

GANGED VALVE DIMENSIONS AND FLOW DATA

FIGURE 7: DUAL VENTURI VALVE

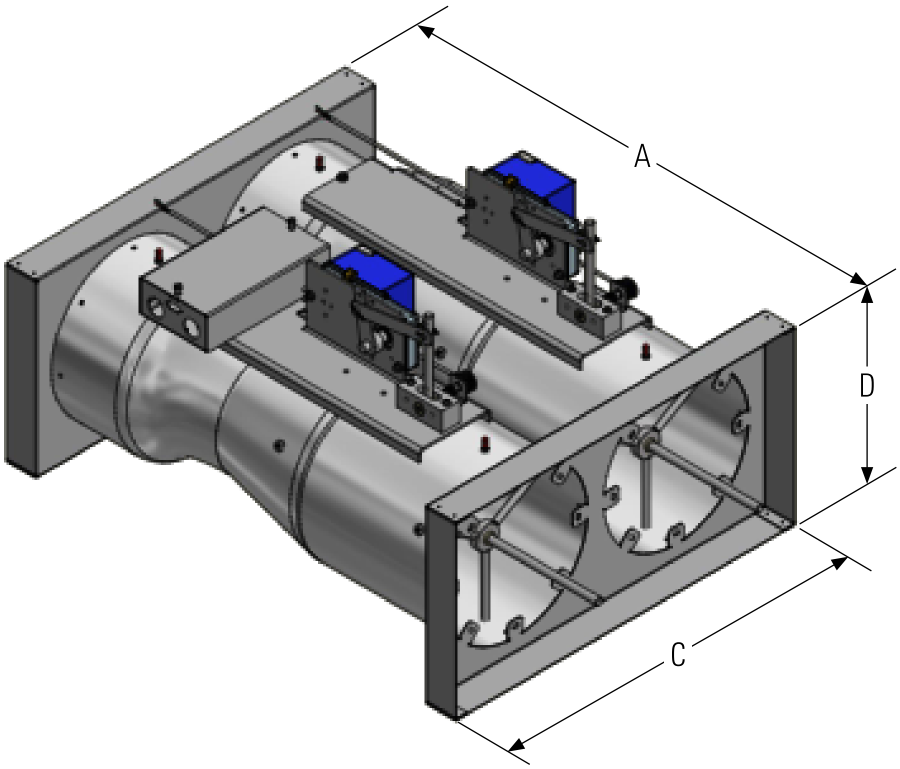
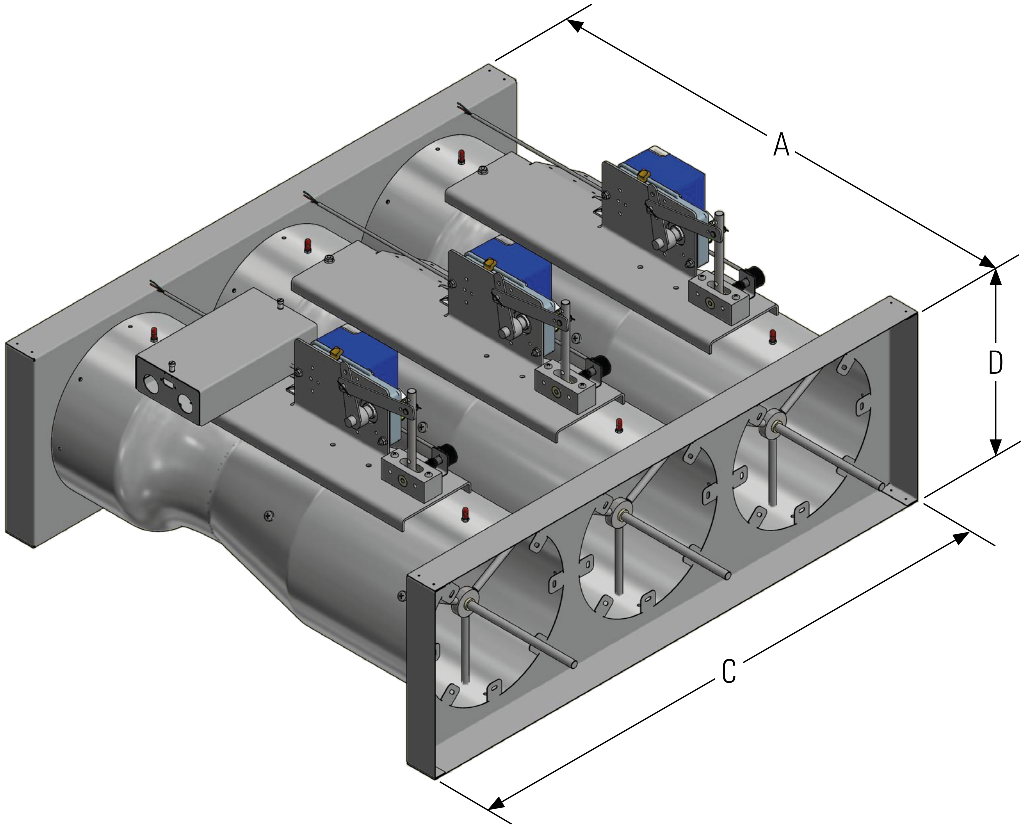


FIGURE 8: TRIPLE VENTURI VALVE



GANGED VALVE DIMENSIONS AND FLOW DATA

FIGURE 9: QUAD VENTURI VALVE

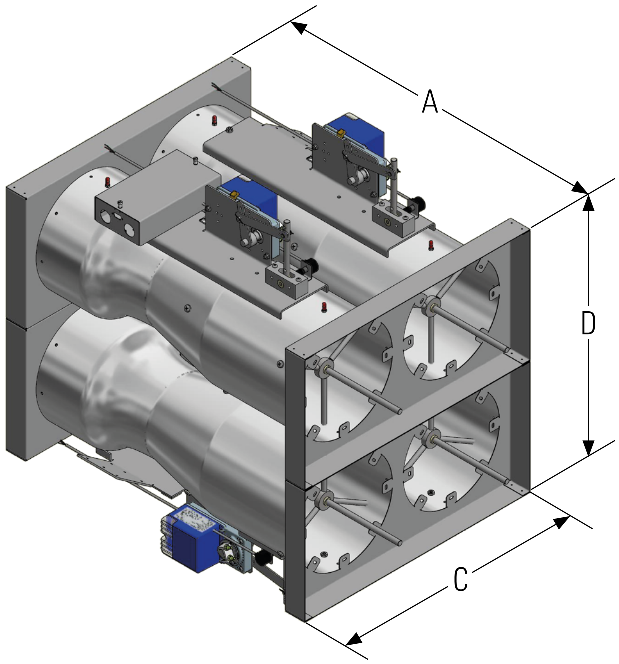
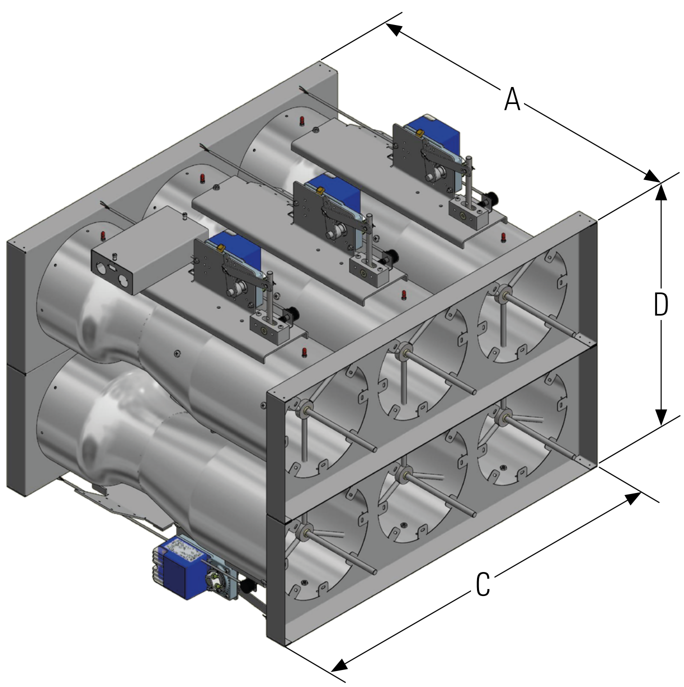


FIGURE 10: HEX VENTURI VALVE



Callout	Description
A	Valve length
C	Collar width
D	Collar depth

Note: For specific measurements, see Table 1, Table 2, and Table 3.

Before you begin:

Read all of the information in this Venturi Air Valve Installation Guide prior to installation.

1. Unpack the valve from the shipping container in the area where you want to mount the valve and verify that the tag number on the valve matches the mechanical engineering schedule.

   Important

   - The central cone shaft extends out of the valve body outlet opening when it is in the fully open position. Do not stand a Venturi Valve on outlet opening side when it is in the fully open position.
   - Do not carry a valve by the linkage, cone bracket, or any other control component that is mounted onto or into the valve body.

2. To verify the size, flow range, and orientation of the valve, compare the data on the valve label to the specifications listed on the schedule or architectural drawings.

   Note

   - Valve outside diameter dimensions are sized to fit inside standard spiral and flexible duct.

3. Install all pressure independent valves horizontally or vertically based on submittals, drawings and specifications.

   Note

   - You cannot interchange or substitute the horizontal, vertical up, and vertical down valves for each other.

4. Make sure to install the valve so that air flow direction corresponds to the arrow on the valve, for example, from short cylindrical section to longer cylindrical section. To verify the cone direction, check the label on the valve and compare the arrow on the label to the direction of cone. The cone moves freely forward and back in the direction that the arrow points.
5. Before you mount the valve to the duct work, verify the direction of flow within the duct and align the valve accordingly.
6. Install a hanger stock to support the duct work within 12 in. (305 mm) of the valve connection. Install the valve onto the duct after hanger stock is in place. For precise operation, ensure the valve is level after mounting.

   Note

   - The actuator and linkage operates in any position, it is not affected by the orientation of the installation. However, for future maintenance and adjustments, do not position the linkage or the valve with the actuator completely face down as potential condensation can run into the actuator. Allow a minimum of 14 in. (356 mm) of unobstructed space around the valve for best access.
   - Do not position the electronic components below the valve in case of duct condensation build up.

7. To provide for possible future changes, that require re-set of air flow, maintain 5.75 in. (146 mm) of unobstructed space in the duct on the valve's outlet side for the shaft to reach the maximum flow position.
8. When equipped with an electric actuator, you need 24 VAC, separate from the controller, to power it. See Wiring options for more information.
9. Do not use metal screws longer than 0.75 in. (19.05 mm) and do not screw them more than 1 in. (25.40 mm) from either end of the valve.
10. Seal all duct connections, in accordance with local codes, to prevent leaks and provide the highest duct static pressure.

    Note

    - Use ASHRAE approved duct sealant on all valve and duct connections or flange gaskets for circular flanges. Do not use a sealant that prevents valve removal.
    - Do not remove or paint over the ID and calibration tags.
    - Follow the appropriate installation diagram.
    - Unless you specifically order for a particular job, Johnson Controls does not provide screws, fasteners, duct sealant, hanger stocks, companion flanges, or gaskets.

For more information on the installation procedures see Figure 11, Figure 12, Figure 13, and Figure 14.

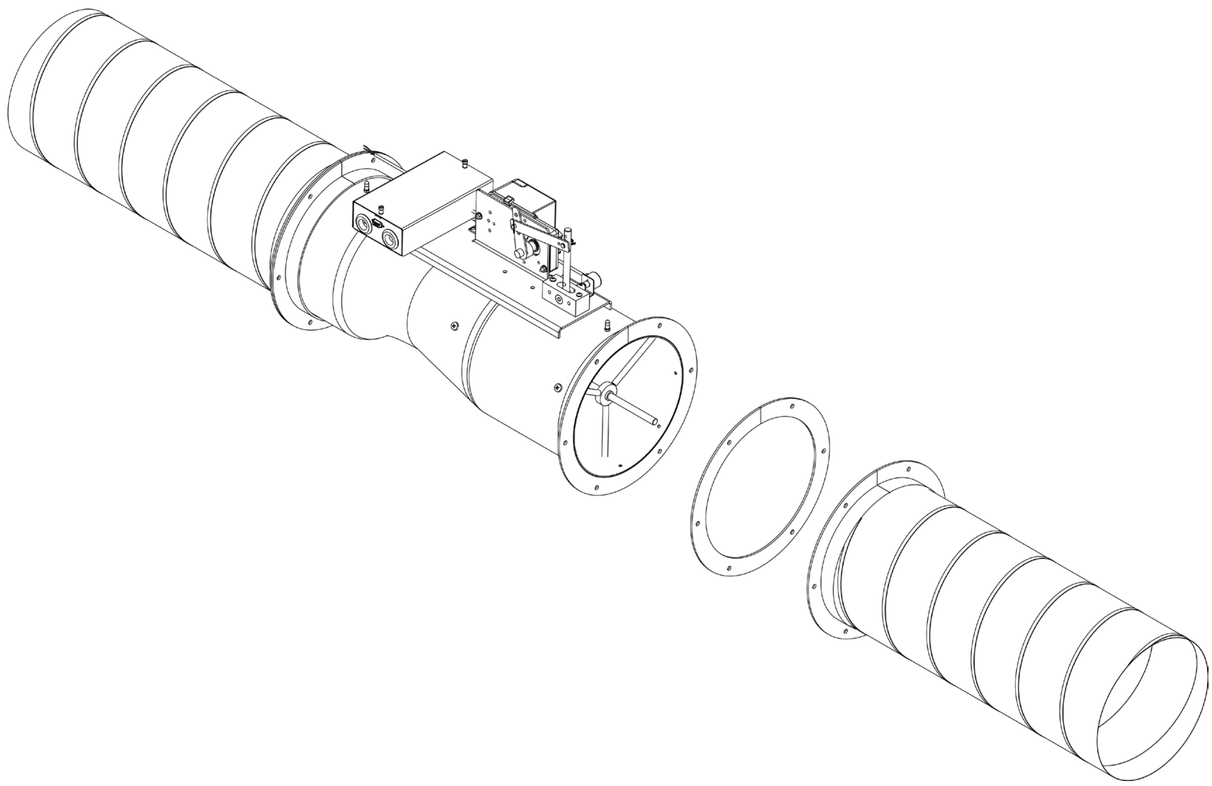
INSTALLING THE VENTURI AIR VALVE DUCT

MOUNTING THE FLANGED VALVE

Flanged valves require a gasket between the duct and valve flanges, with the addition of nuts and bolts as flange fasteners. Ensure that the metal straps support both sides of the valve weight and the duct work. For correct hardware, mounting, sealing and installation requirements, consult local building codes.

Note: Gasket, nuts, and bolts are field supplied. They do not come with the valve.

FIGURE 11: MOUNTING A FLANGED VALVE



INSTALLING THE VENTURI AIR VALVE DUCT

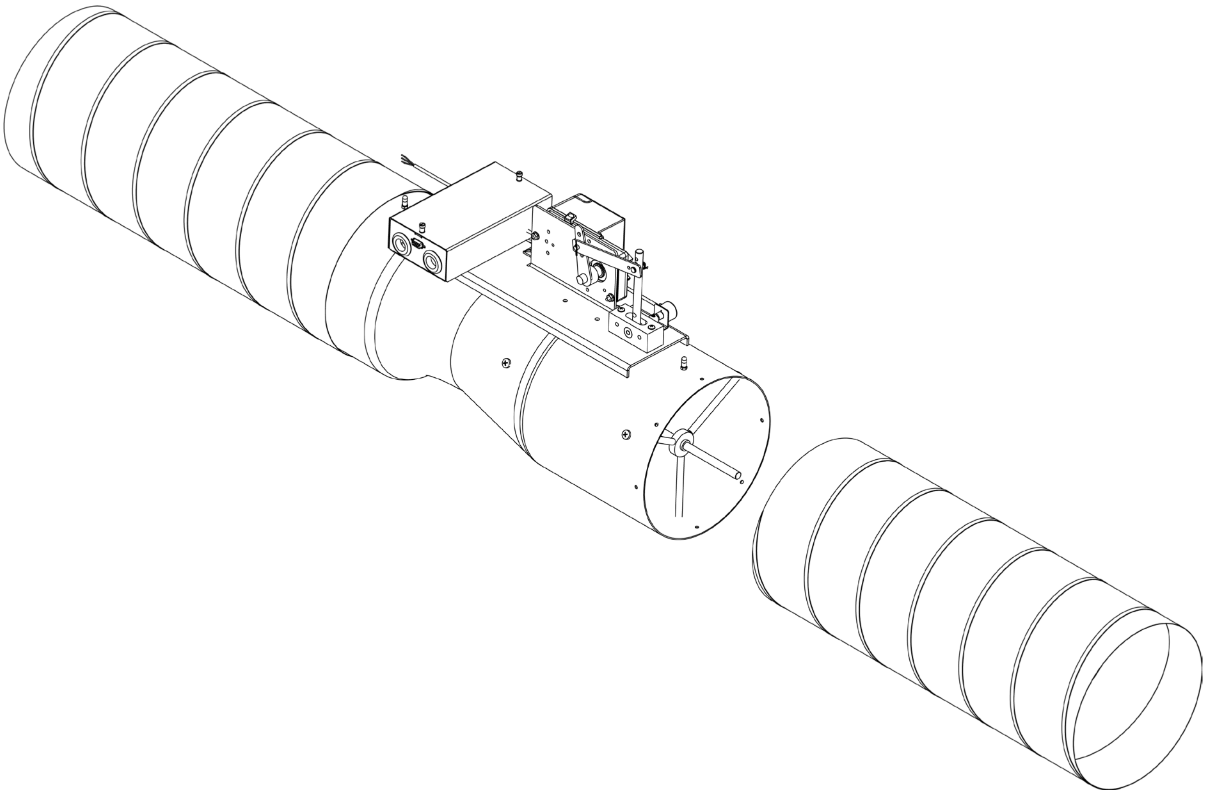
MOUNTING THE SLIP-IN VALVE

The outside diameter of the valve is undersized to fit inside standard duct sizes. Once the valve slips inside the duct:

1. Secure the valve with sheet metal screws.
2. To ensure the seal is air tight, apply a duct seal.
3. Ensure the metal straps support both sides of the valve weight and the duct work.

For correct hardware, mounting, sealing and installation requirements, consult local building codes.

FIGURE 12: MOUNTING A SLIP-IN VALVE

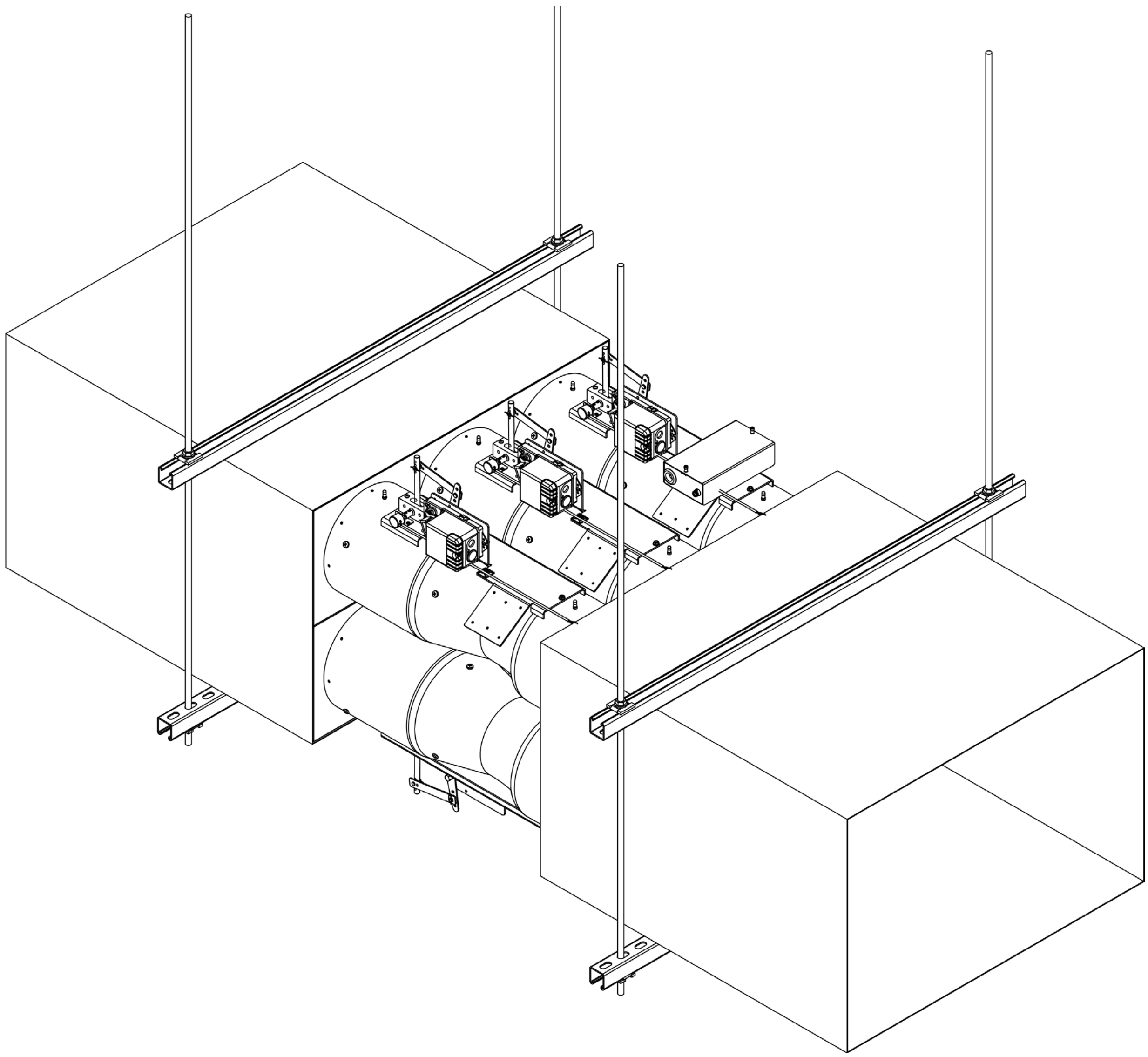


INSTALLING THE VENTURI AIR VALVE DUCT

MOUNTING THE GANGED VALVE

Due to the large size and weight of ganged valves, use threaded rods and channel struts to support the installation. Consult the local building codes for correct hardware, mounting, sealing, and installation requirements.

FIGURE 13: GANGED VALVE

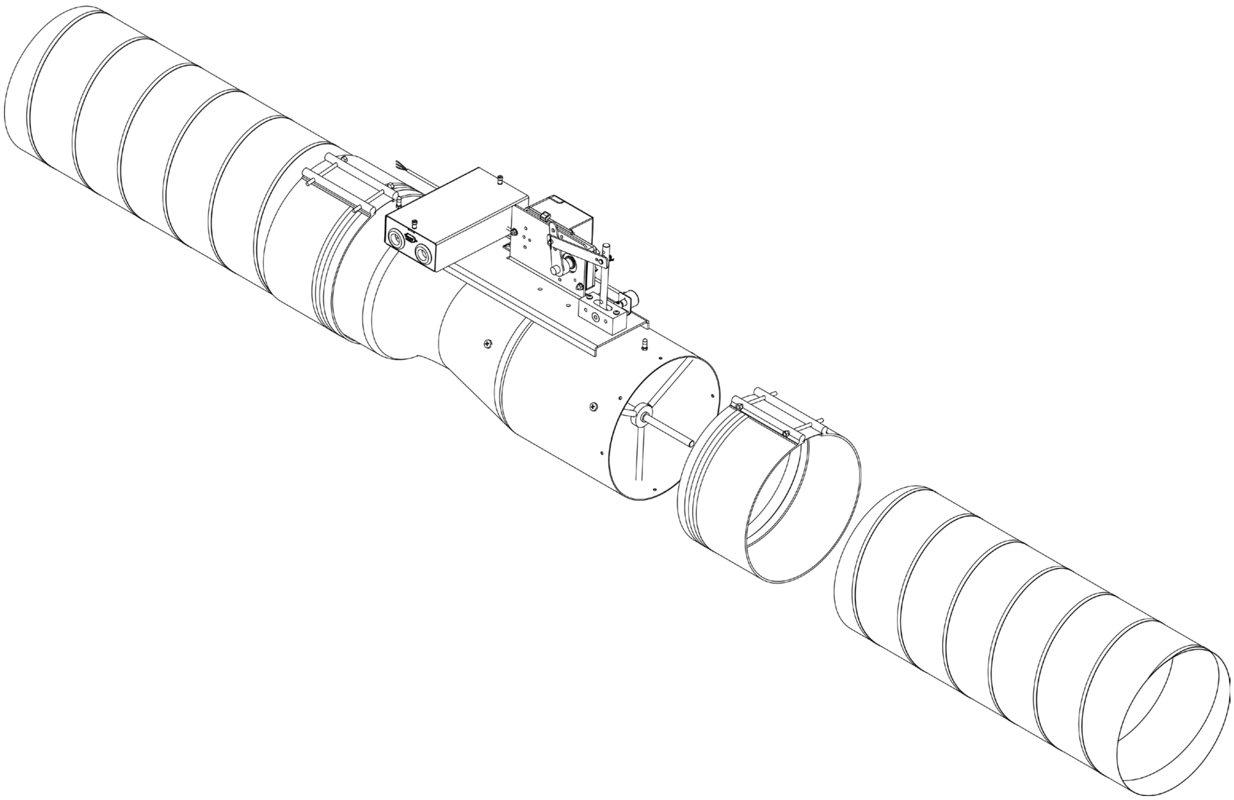


INSTALLING THE VENTURI AIR VALVE DUCT

MOUNTING THE QUICKSLEEVE VALVE

Quicksleeves are an optional accessory to accelerate the installation of the valve. Each valve requires two quicksleeves, one on the inlet side and one on the outlet side of the valve. Due to the reduced diameter of the valve body, it is necessary to install the quicksleeves with the turned groove on the valve. This ensures that an airtight seal forms when the quicksleeve tightens around the valve. For correct hardware, mounting, sealing and installation requirements, consult the local building codes.

FIGURE 14: MOUNTING A QUICKSLEEVE VALVE



QUICKSLEEVE ORDER NUMBERS

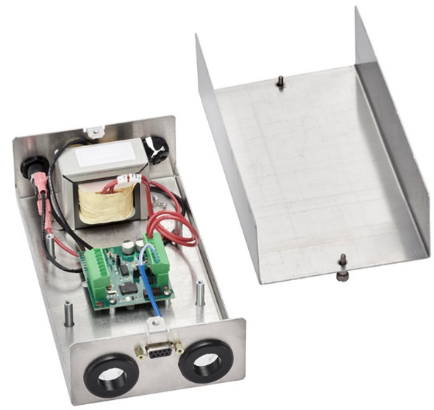
TABLE 4: QUICKSLEEVE ORDER PART NUMBERS

SKU order number	Description
8IN-DUCTSLEEVE	8 in. (203 mm) Ductmate quicksleeve valve X1EA
10IN-DUCTSLEEVE	10 in. (254 mm) Ductmate quicksleeve valve X1EA
12IN-DUCTSLEEVE	12 in. (305 mm) Ductmate quicksleeve valve X1EA
14IN-DUCTSLEEVE	14 in. (356 mm) Ductmate quicksleeve valve X1EA

UVM1000

The Universal Valve Module (UVM) is used to control Venturi Valves and are mounted and wired in the factory.

FIGURE 15: UNIVERSAL VALVE MODULE



INTRODUCTION

The Universal Valve Module is designed to enable interoperability between Venturi valves and third party controllers.

Each Venturi valve is individually characterized on a calibrated air line at the factory to generate its own unique position to cubic feet per minute (CFM) curve. You can use the UVM to create a linearization curve in each UVM1000 module for each associated valve. The linearization curve is accesible through 0 VDC to 10 VDC command control signal. You can also use the UVM to span, scale, and linearize the feedback sensor to obtain useful information from UVM.

OVERVIEW

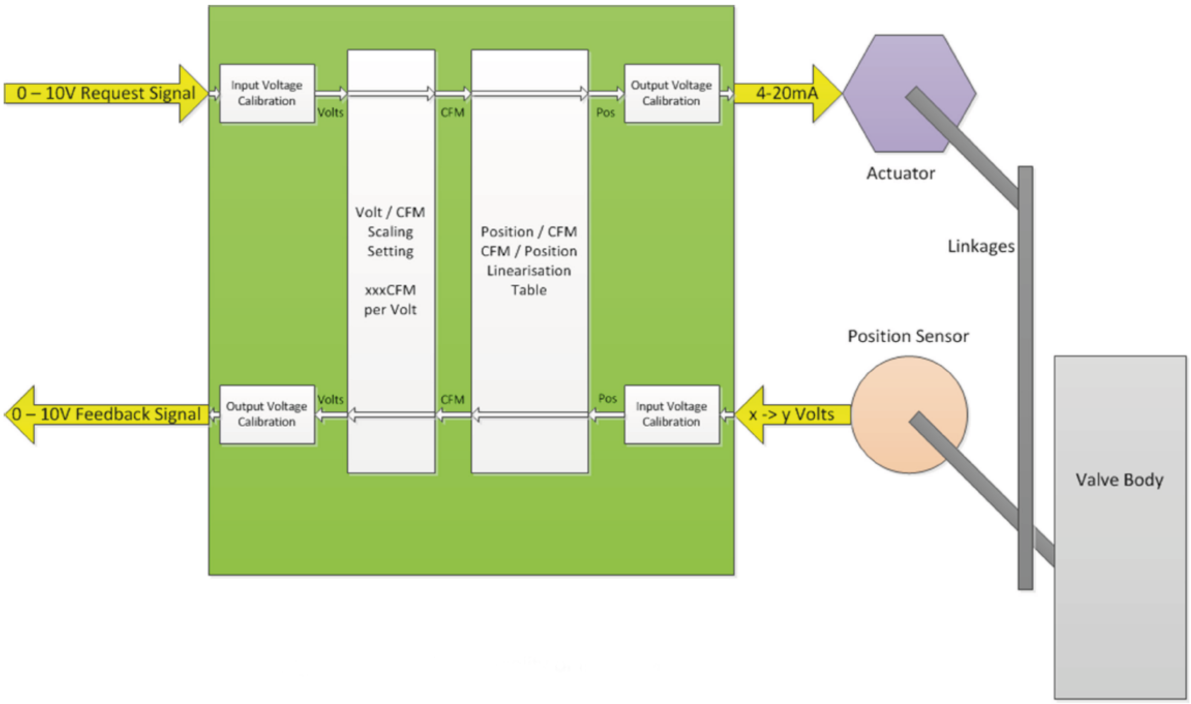
The UVM takes a 0 V to 10 V scaled CFM command signal from the room level controller and interprets it as a 0 CFM to xxxx CFM request signal. Each Venturi valve comes factory mounted with a UVM, which is characterized with the unique flow curves associated with the valve. The UVM moves the valve's actuator to the correct position for the requested CFM.

There is a fitted electronic position sensor on each valve. The sensor provides actual valve position feedback signal to the UVM processor. This feedback signal is non-linear and has a random 0% and 100% position voltage.

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

For more information on basic UVM functionality, see the following image.

FIGURE 16: BASIC FUNCTIONALITY OF THE VENTURI AIR VALVE UVM1000



Note

- You can configure and adjust the UVM1000 module in the field.
- Ganged Venturi air valves have a single UVM module. This is because multiple Venturi characterizations are linearized to a single command and control curve. All the valves in the gang assembly are treated as one unit.

UVM POSITION FEEDBACK AND SCALING

The following table shows the default signal voltage scaling relative to valve size:

TABLE 5: UVM CFM SCALING FACTORS

Unit Size	Ganged Units	Minimum CFM	MaximumCFM
8 in. (203 mm)	1	0	800
10 in. (254 mm)	1	0	1100
	2	0	2200
	3	0	3300
	4	0	4400
	6	0	6600
12 in. (305 mm)	1	0	1600
	2	0	3200
	3	0	4800
	4	0	6400
	6	0	9600
14 in. (356 mm)	1	0	2300
	2	0	4600
	3	0	6900
	4	0	9200
	6	0	13,800

Note

- Multiply the single size scaling factor by the ganged value for ganged valves.
- Exhaust air valves are configured in the factory to fail open. Supply air valves are factory configured to fail closed.
- Fail Open Valves require the configured control signal to be Reverse Acting. 10 VDC and 0 VDC = 0% to 100% AO% = 0 CFM to 800 CFM. The 0 VDC control signal results in maximum calibrated CFM. 10 VDC closes the valve to 0%.

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 an equivalent CFM value is outputted.

This CFM value is passed through CFM to voltage scaling factor and converted to a voltage value. The voltage value is 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 does not match the requested CFM signal. If 0 CFM is requested, the input is 0 V and the valve is closed to the minimum CFM that it can attain. This value is not 0 CFM and for a 12 in. valve is approximately 90 CFM. In this case, the feedback signal is the equivalent of 90 CFM or 0.56 V for a 10 V = 1600 setting.

If a UVM for an 8 in. valve is set with a scale of 10 V = 1100 CFM (or 110 CFM/V), and a request signal of 9 V (or 990 CFM) is input into the unit, the actuator increases to 100%, as the maximum is 800 CFM. The voltage feedback output signal uses the same scale and is approximately 6.4 V. The actual valve CFM is approximately 700 CFM.

UNIVERSAL VALVE MODULE

UVMs come factory-mounted and wired, and are ideal for retrofits or new installations.

UVM OVERVIEW

All actuated Venturi air valves come equipped with the UVM1000 module that uses 0 V to 10 V signals from the module. The UVM1000 translates these signals into a predetermined flow position or percentage position for any valve. For example, a valve with a UVM, that is scaled for 2500 CFM max flow only opens at 1250 CFM if voltage sent from the UVM1000 module to the UVM is at 5 V, or 50%. The UVM can also produce a 0 V to 10 V output signal as feedback of the valve CFM or valve position.

The UVM board has an eight-position DIP switch. You can use the UVM to set a hardware address between 0 and 15, the selection of percentage or CFM input interpretation, the percentage or CFM representation of the output signal, and normal or reverse operation. 15 is normally used as the parent address. Contact the factory before making any adjustments to these DIP switches as they come pre-configured from the factory for most applications.

UVM1000 MODULE AND VALVE

The UVM1000 are valve mounted and wired at the factory and require a 24 VAC Class 2 power supply capable of 25 VA or more and a 0 V to 10 V set point signal.

The 24 VAC supply needs to provide a minimum of 25 VA, with 20 VA for the actuator and 5 VA for the UVM. The 0 V to 10 V CFM request signal attaches to the IN connection on the UVM board, with the ground lead attached to any of the GND connections. The feedback signal derives from the Vo connection and any of the GND connections. For more information on wiring requirements, see the following figures.

Valve calibration information is stored on the internal UVM1000 module ROM memory and at the factory the valve ships from. CFM curve adjustments can be done in the field. However, we do not support it. To make any curve adjustments, you require UVM Configuration Software.

After you wire the room level UVM1000 module and connect the power, the actuator initially moves to both the 0% and 100% positions to perform an autostroke to enable the module to generate a control signal based on the input set point voltage.

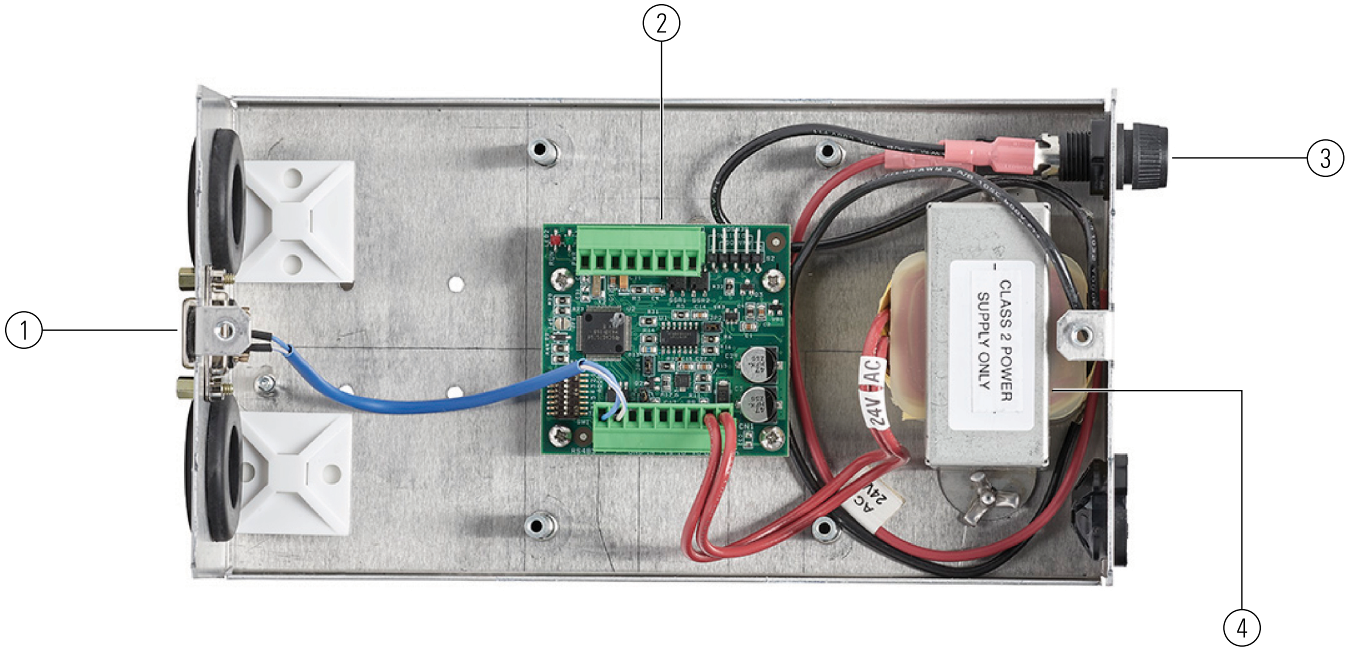
In its minimal configuration, the UVM requires a 24 VAC supply and a 0 VDC to 10 VDC control signal. Additionally, the UVM can provide a 0 V to 10 V output signal to monitor the CFM the valve is regulated to. The UVM can also optionally take in a digital signal from a differential pressure (DP) switch that indicates the absence of sufficient differential pressure across the valve. The DP switch is an optional accessory that comes mounted and pre-wired from the factory. If enabled and inactive, the flow feedback voltage signal indicates **0**.

If you choose to use the optional DP switch in the field, you must use the UVM Configuration Tool to enable the feature in the UVM.

The UVM can accept a digital input DP switch. The factory connects the DP switch to the pneumatic tubing. The factory also sets the DP switch to trip at a preset threshold of 0.3 in. W.C. for low pressure valves and 0.6 in. W.C. for medium pressure valves.

If the pressure across the valve falls below the low or medium pressure threshold, the valve interprets the CFM as inaccurate or non-existent. The UVM provides a 0 CFM feedback signal if it is indicated by the DP switch signal that pressure across the valve falls below the preset differential pressure threshold.

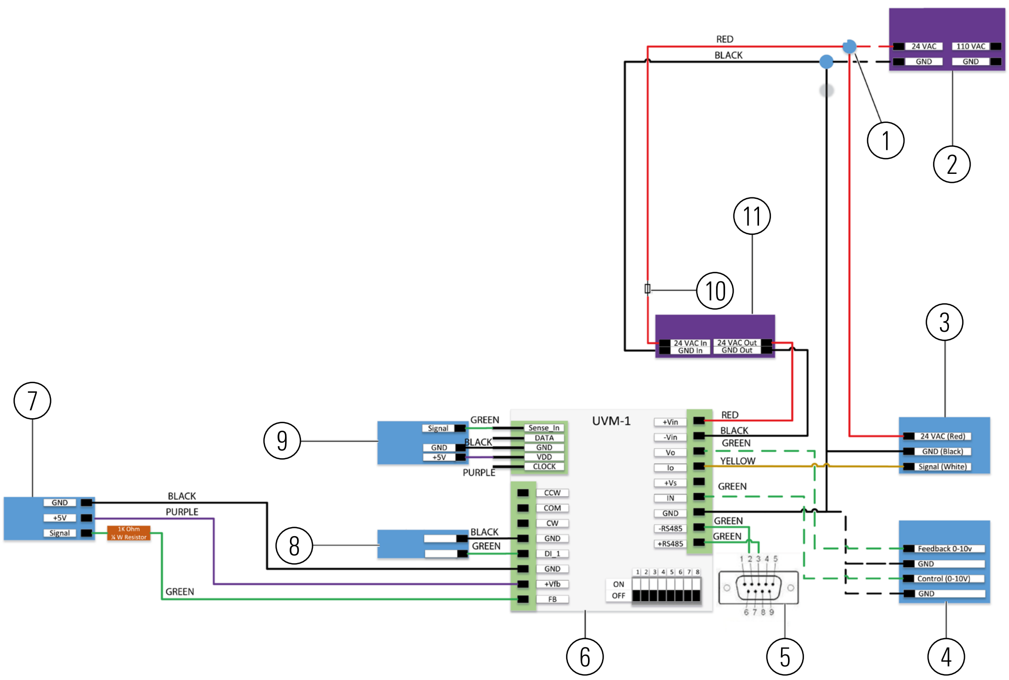
FIGURE 17: UVM1000 COMPONENTS



Callout	Description
1	DB9 female connector
2	UVM PCAB
3	1A fuse
4	24 VAC isolation transformer

WIRING OPTIONS

FIGURE 18: SINGLE VENTURI AIR VALVE WIRING DIAGRAM

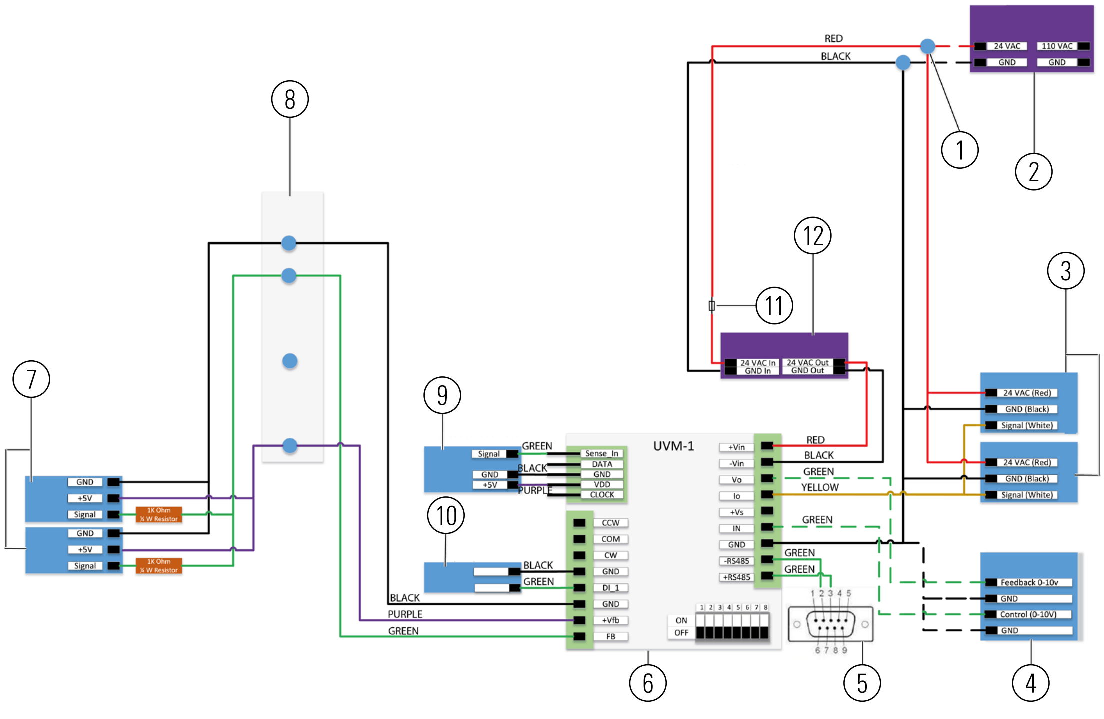


Callout	Description
1	Wire nuts to connect to external power transformer
2	External power transformer
3	Actuator
4	Room controller
5	Female DB-9 connector
6	UVM1000
7	Position sensor valve
8	Differential Pressure Switch (DPS)
9	Differential Pressure Transducer (DPT)
10	Fuse
11	ISO transformer

Note

- To change the command input signal from 2 VDC to 10 VDC to 4 mA to 20 mA, set the actuator DIP switch nr.3 to ON. Ensure actuator 1 is set to 4 mA to 20 mA.
- DPT and DPS are optional features.
- You need an RS485 to USB cable to connect the valve to the UVM Configuration Tool.
- DIP switch 8 engages the RS485 terminating resistor. Activate one DIP switch per loop.
- The user wires the power transformer and the UVM1000 module. The other input and output terminations are wired in the factory.

FIGURE 19: DUAL VENTURI AIR VALVE WIRING DIAGRAM

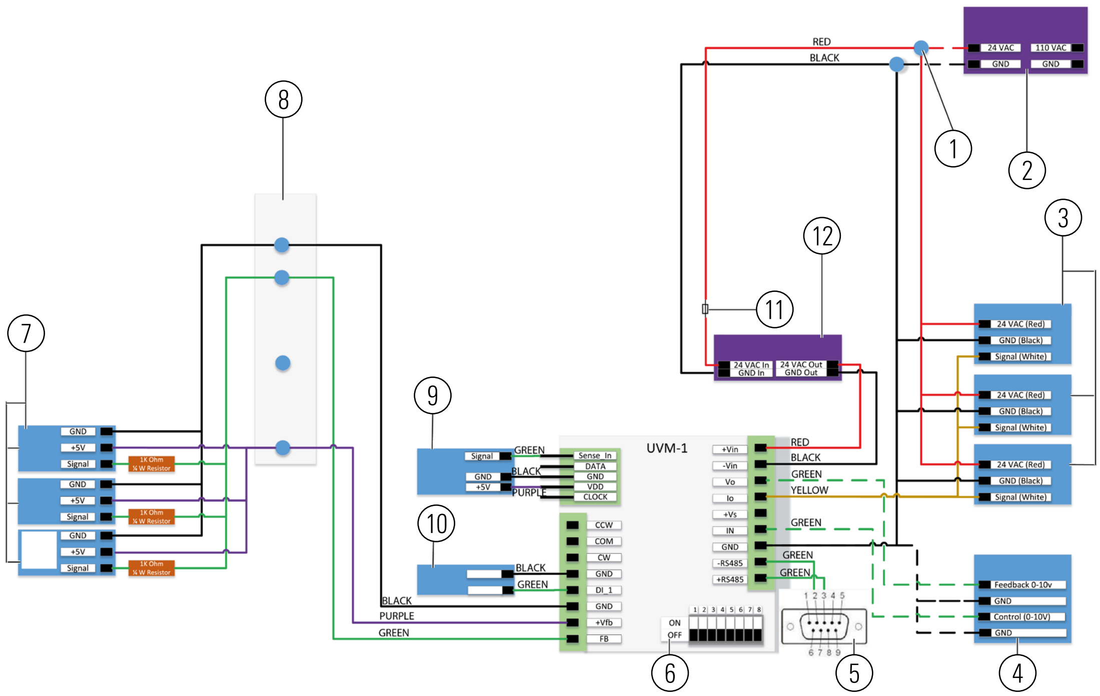


Callout	Description
1	Wire nuts to connect to external power transformer
2	External power transformer
3	Actuators 1 and 2
4	Room controller
5	Female DB-9 connector
6	UVM1000
7	Position sensor valves 1 and 2
8	Junction box
9	Differential Pressure Transducer (DPT)
10	Differential Pressure Switch (DPS)
11	Fuse
12	ISO transformer

Note

- To change the command input signal from 2 VDC to 10 VDC to 4 mA to 20 mA, set the actuator DIP switch nr.3 to ON. Ensure actuator 1 is set to 4 mA to 20 mA. Ensure the other actuator is set to 2 V to 10 V.
- DPT and DPS are optional features.
- You need an RS485 to USB cable to connect the valve to the UVM Configuration Tool.
- DIP switch 8 engages the RS485 terminating resistor. Activate one DIP switch per loop.
- The user wires the power transformer and the UVM1000 module. The other input and output terminations are wired in the factory.

FIGURE 20: TRIPLE VENTURI AIR VALVE WIRING DIAGRAM

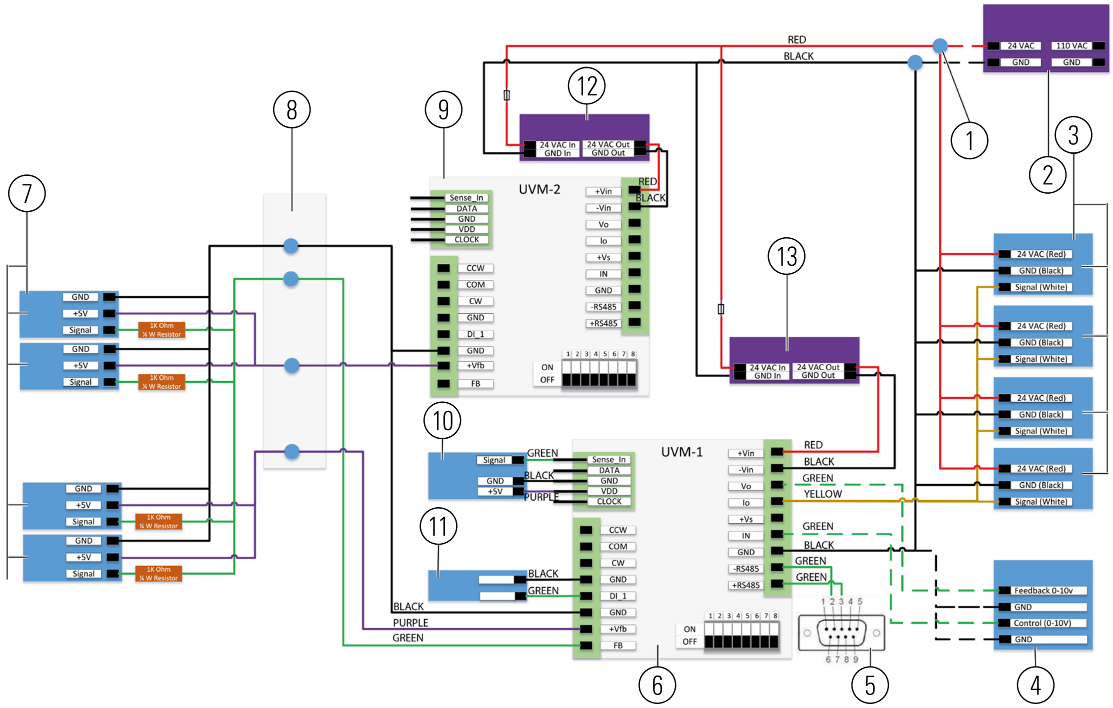


Callout	Description
1	Wire nuts to connect to external power transformer
2	External power transformer
3	Actuators 1, 2, and 3
4	Room controller
5	Female DB-9 connector
6	UVM1000
7	Position sensor valves 1, 2, and 3
8	Junction box
9	Differential Pressure Transducer (DPT)
10	Differential Pressure Switch (DPS)
11	Fuse
12	ISO transformer

Note

- To change the command input signal from 2 VDC to 10 VDC to 4 mA to 20 mA, set the actuator DIP switch nr.3 to ON. Ensure actuator 1 is set to 4 mA to 20 mA. Ensure the other actuators are set to 2 V to 10 V.
- DPT and DPS are optional features.
- You need an RS485 to USB cable to connect the valve to the UVM Configuration Tool.
- DIP switch 8 engages the RS485 terminating resistor. Activate one DIP switch per loop.
- The user wires the power transformer and the UVM1000 module. The other input and output terminations are wired in the factory.

FIGURE 21: QUADRUPLE VENTURI AIR VALVE WIRING DIAGRAM

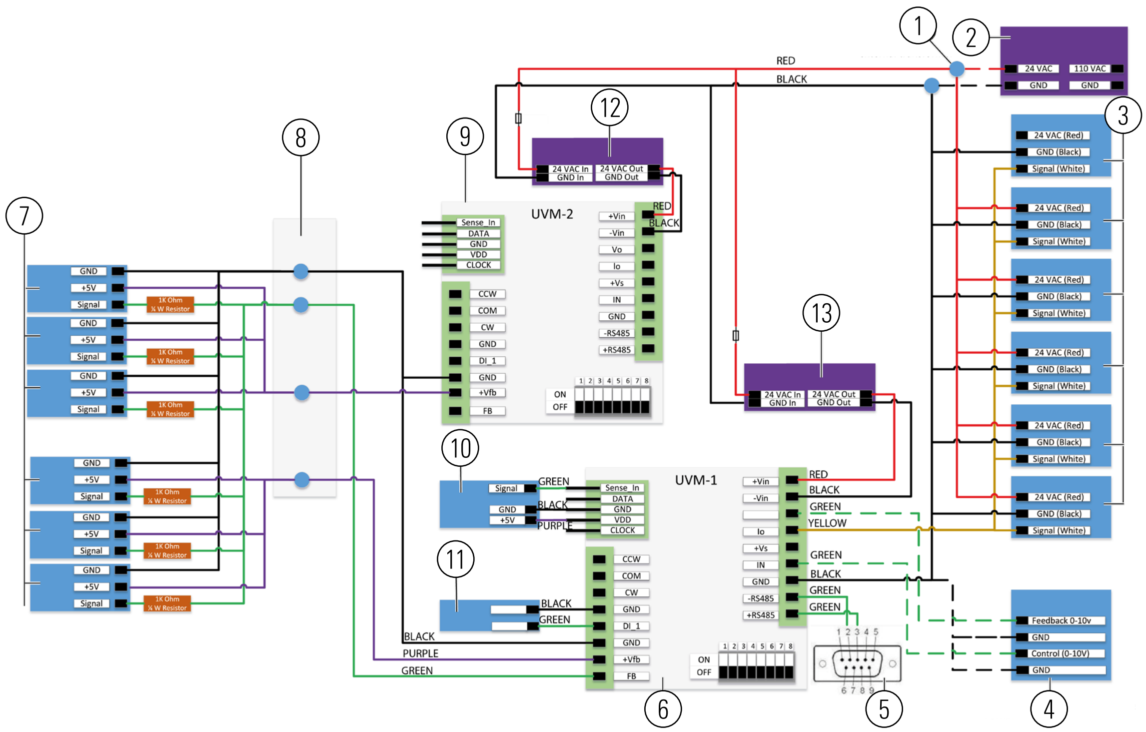


Callout	Description
1	Wire nuts to connect to external power transformer
2	External power transformer
3	Actuators 1, 2, 3, and 4
4	Room controller
5	Female DB-9 connector
6	First UVM1000
7	Position sensor valves 1, 2, 3, and 4
8	Junction box
9	Second UVM1000
10	Differential Pressure Transducer (DPT)
11	Differential Pressure Switch (DPS)
12	Second ISO transformer
13	First ISO transformer

Note

- To change the command input signal from 2 VDC to 10 VDC to 4 mA to 20 mA, set the actuator DIP switch nr.3 to ON. Ensure actuator 1 is set to 4 mA to 20 mA. Ensure the other actuators are set to 2 V to 10 V.
- DPT and DPS are optional features.
- You need an RS485 to USB cable to connect the valve to the UVM Configuration Tool.
- DIP switch 8 engages the RS485 terminating resistor. Activate one DIP switch per loop.
- The user wires the power transformer and the UVM1000 module. The other input and output terminations are wired in the factory.

FIGURE 22: SIX VENTURI AIR VALVE WIRING DIAGRAM



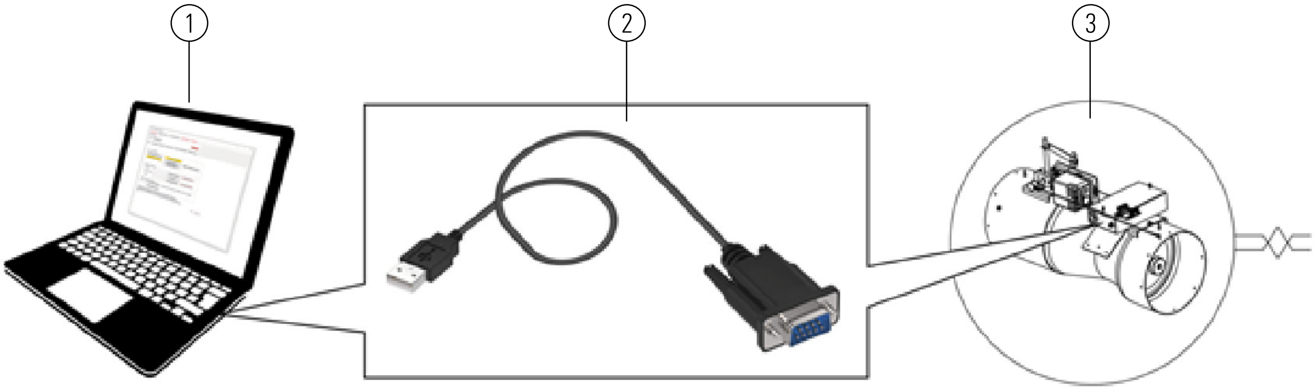
Callout	Description
1	Wire nuts to connect to external power transformer
2	External power transformer
3	Actuators 1, 2, 3, 4, 5, and 6
4	Room controller
5	Female DB-9 connector
6	First UVM1000
7	Position sensor valves 1, 2, 3, 4, 5, and 6
8	Junction box
9	Second UVM1000
10	Differential Pressure Transducer (DPT)
11	Differential Pressure Switch (DPS)
12	Second ISO transformer
13	First ISO transformer

Note

- To change the command input signal from 2 VDC to 10 VDC to 4 mA to 20 mA, set the actuator DIP switch nr.3 to ON. Ensure actuator 1 is set to 4 mA to 20 mA. Ensure the other actuators are set to 2 V to 10 V.
- DPT and DPS are optional features.
- You need an RS485 to USB cable to connect the valve to the UVM Configuration Tool.
- DIP switch 8 engages the RS485 terminating resistor. Activate one DIP switch per loop.
- The user wires the power transformer and the UVM1000 module. The other input and output terminations are wired in the factory.

FIGURE 23: UVM CONNECTION PROCESS

You can configure actuated Venturi air valves with a factory mounted UVM1000 to meet a wide variety of application parameters. A USB to DB9 cable forms an RS485 connection between the air valve and the UVM configuration tool software. You can download the UVM configuration software from the Licensing Portal. For more information, contact your sales representative.



Callout	Description
1	UVM configuration tool
2	UVM USB to DB9 cable. Part number: UVM-CABLE
3	UVM1000

UVM SUMMING

UVM summing is a standalone pseudo modbus network created by wiring Venturi air valves in a closed series circuit connected in a continuous row and polling them individually for their respective CFMs. The valves are summed together in the parent valve for a single CFM total output. This facilitates summing of up to 16 valves together that only require one set of I/Os on the room level controller. Wire all the Venturi air valves together using an RS485 twisted pair shielded wire. Ensure the white wire is always positive (+).

Based on the specific application needs, the wiring requirements are unique to each project but follow the same logic across all systems:

- If there are enough I/Os on the room level controller, connect each Venturi air valve directly to the room level controller. This ensures the building automation system sees the individual CFM feedback signals.
- If there are not enough I/Os on the room level controller, and an I/O expansion module is not an option, you can use the UVM summing feature to sum the flow of multiple Venturi air valves. For example, general supply air, general exhaust air, and fume hood exhaust air. This consolidates the need for additional I/Os on the room level controller.
- If each individual air valve needs a signal from the CFM feedback position, you cannot use the UVM summing feature to meet application specifications. Wire each air valve directly into theroom level controller.

Note: Regardless of summing, if the room has more than one general supply air valve it is best practice to connect all valves in series using an RS485 twisted pair wire to create a standalone UVM network. This enables ease of access to all the air valves from the single parent valve. If the hardware addresses are set correctly using the dip switches, the need to connect the UVM-CABLE to each valve individually is eliminated.

FIGURE 24: UTILIZING THE UVM CONTROLLER UVMNet TO SUM CFM VALUES

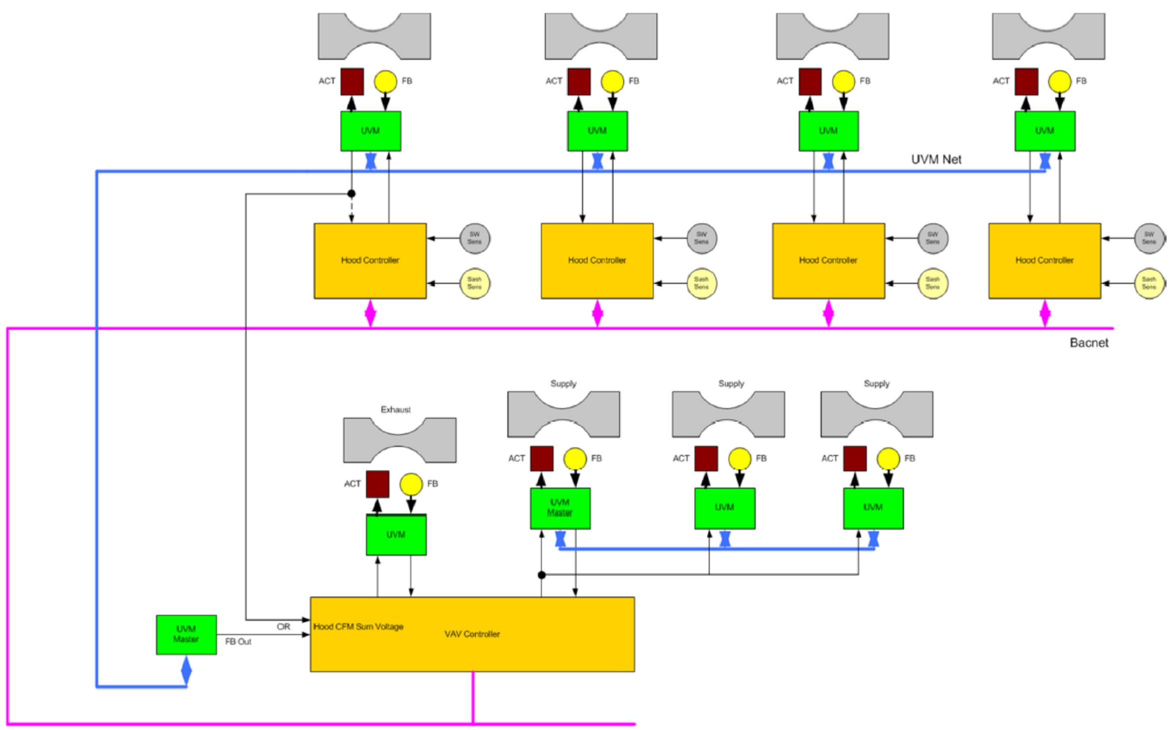
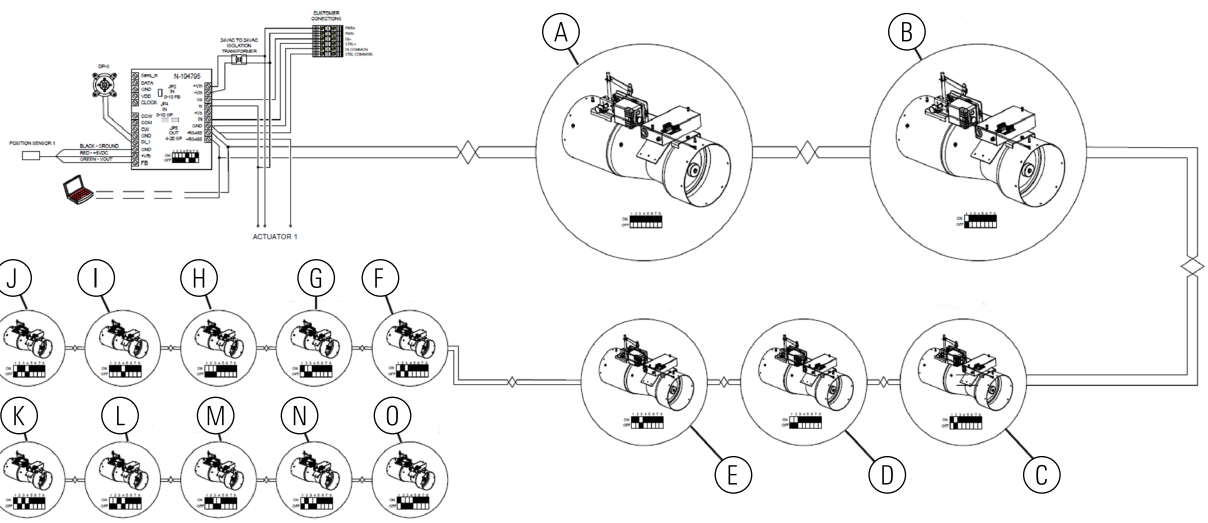


FIGURE 25: UVM SUMMING WIRING DIAGRAM



Call Out	Child Valve	Hardware Address	Software Address
A	1	0	16
B	2	1	17
C	3	2	18
D	4	3	19
E	5	4	20
F	6	5	21
G	7	6	22
H	8	7	23
I	9	8	24
J	10	9	25
K	11	10	26
L	12	11	27
M	13	12	28
N	14	13	29
O	15	14	30

TABLE 6: DIP SWITCH SETTINGS

Switch Number	Parent Valve	Hardware Address														
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off
2	On	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On	Off	Off	On
3	On	Off	Off	Off	Off	On	On	On	On	Off	Off	Off	Off	On	On	On
4	On	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On
5	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
6	On	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
7	On	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
8	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off

OPTIONAL WIRING FOR UVM SUMMING

About this task:

You can configure the UVM1000 to sum CFMs over the RS-485 network and output the summed equivalent on the Vo of the designated primary unit. The designated primary unit uses hardware address 15. Secondary polled units are units with address 16 and onwards. The primary unit specifies how many units to poll from address 16 and onwards.

Note

- Do not combine exhaust and supply valves in same RS-485 loop when UVMnet summing is available. You can only use loops exclusively for supply or exhaust for summing.
- It is best practice you sum spaces with less than 10 devices. Set the parent device, typically the general exhaust, to hardware address 15.
- The parent device control signal scaling is determined by the valve size and ganged values of parent device.

1. Ensure you connect all exhaust valves in a space with a RS-485 loop. Ensure you address the valves to Parent Device Address 15 and Polled Devices 16 to 32.
2. Set the first fume hood for hardware address 14 with dip switch 2,3,4-ON/ 1-OFF. Connect with the UVM Cable and set the secondary Address to 16.
3. Set the second fume hood to hardware address 13 with UVM dip switch 1,3,4-ON/ 2-OFF. Connect with UVM Cable and set the secondary Address to 17. You can now communicate with all three exhaust valves at addresses 15, 16, and 17 for summing.
4. Set the Summing Loop Feedback scaling for summed scaling factors for all valves in loop. For example, three single 8 in. valves have a feedback scaling factor of 2400 CFM.
5. Ensure that you configure Vo= 10 VDC to 2400 CFM. Using the UVM Configuration Tool, click **User Settings Tab> Vo=10v.** To write the setting, click **Set 10v SUM CFM.** See the following table for more information on value inputs.

TABLE 7: VALUE INPUTS AND LOCATIONS

Value Amount	Value Location
2300 CFM	Single valve scaling factor
1	Ganged value
2171 CFM	Preferred CFM setpoint
9.439130435 VDC	Direct acting control signal
0.560869565 VDC	Reverse acting control signal
2300 CFM	Analog Output/Input scale
0 VDC to 10 VDC	UVM feed-back signal

Note

- A reverse acting valve is controlled with a reverse acting analog output.
- All 0 VDC to 10 VDC feed-back signals are direct acting.
- The Parent Device control signal scaling is determined by the valve size and ganged values of the Parent Device.

6. Determine if you need a feedback calibration by error verification in Control Signal voltage and Indicated CFM.

UVM PCBA

FIGURE 26: UVM-PCBA LAYOUT DIAGRAM

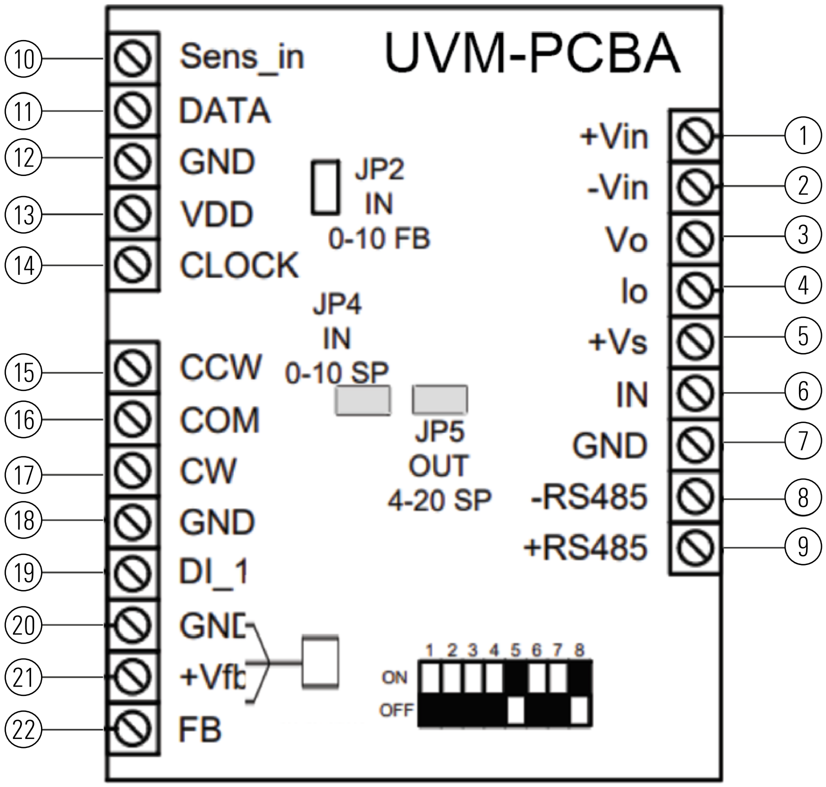


TABLE 8: DIP SWITCH CONFIGURATION

DIP Switch	On	Off	Function	If Supply	If Exhaust	If Enabled
1	+1	0	Unit hardware address 0 to 15	For more information, see UVM summing.		Unit hardware address 0 to 15
2	+2	0	Unit hardware address 0 to 15			Unit hardware address 0 to 15
3	+4	0	Unit hardware address 0 to 15			Unit hardware address 0 to 15
4	+8	0	Unit hardware address 0 to 15			Unit hardware address 0 to 15
5	Reverse	Normal	Actuator reverse/ normal	Set OFF	Set ON	Actuator reverse/normal
6	CFM	Position	Input position/CFM	ON	ON	Input = position/CFM
7	CFM	Position	Output position/ CFM	ON	ON	Output = position/CFM
8	Terminate	Open	RS485 line terminate	OFF	OFF	RS485 line terminate

TABLE 9: JUMPERS CONFIGURATION

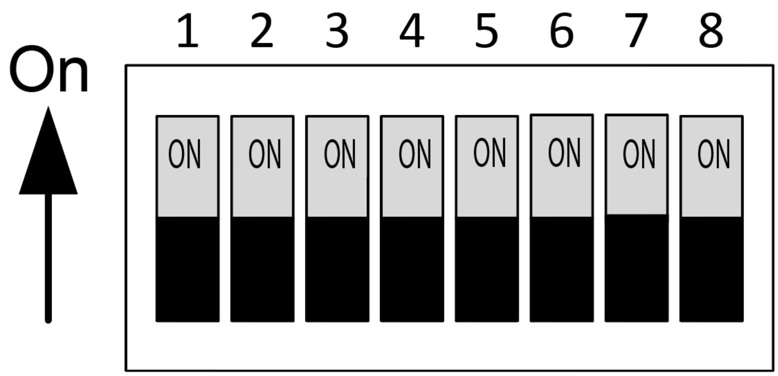
Jumper Number	On	Off	Function	If Supply	If Exhaust
JP2	0V to 10V	0.5V to 5.5V	Feedback Out	On	On
JP4	0V to 10V	0.5V to 5.5V	Input = Position/CFM	On	On
JP5	Do not use			Off	Off

TABLE 10: TERMINALS CONFIGURATION

Terminal Number	Name	Signal	Function
1	+Vin	24 VAC	Power in
2	-Vin	24 VAC	Power in
3	Vo	0 VDC to 10 VDC	User feedback signal
4	Io	4 mA to 20mA	Actuator command
5	+Vs	10 V	Sash sensor power
6	IN	0 VDC to 10 VDC	Controller command signal
7	GND	n/a	Ground
8	+RS485	9600 baud	UVM Summing and configuration tool
9	+RS485	9600 baud	UVM Summing and configuration tool
10	Sens_in	0 VDC to 5 VDC	Pressure sensor signal
11	DATA	3.3 V	Pressure sensor I2C data
12	GND	n/a	Pressure sensor ground
13	VDD	3.3 V	Pressure sensor power
14	CLOCK	3.3 V	Pressure sensor clock
15	CCW	24 VAC	Counterclockwise DO
16	COM	n/a	n/a
17	CW	0/3.3 V	Clockwise digital output
18	GND	n/a	Reference to DP switch
19	DI_1	0/3.3 V	DP switch signal
20	GND	n/a	Switch/sensor ground
21	_Vfb	5 V	Position sensor power
22	FB	0 VDC to 5 VDC	Position sensor signal

Note: All the GND connections are connected together.

FIGURE 27: DIP SWITCH FUNCTIONS



Note: You can disable the DIP Switch function, other than address and termination, by internal software setting and selection

SYSTEM EXAMPLES

FMS SYSTEM EXAMPLES

TABLE 28: FMS AND HMS SYSTEM

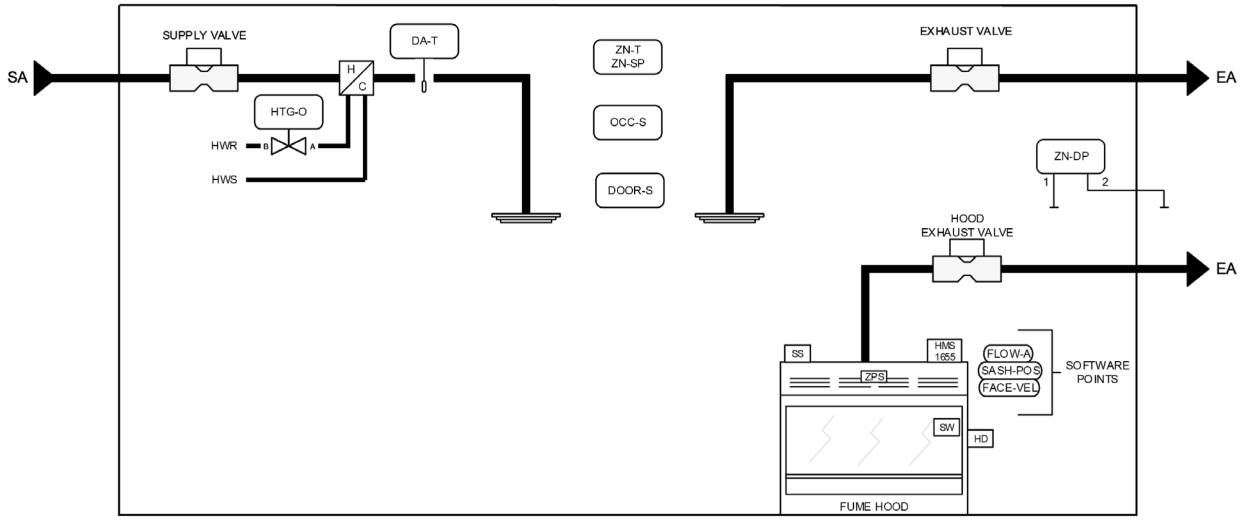


TABLE 29: FMS AND HMS EXHAUST AND SUPPLY SYSTEM WIRING

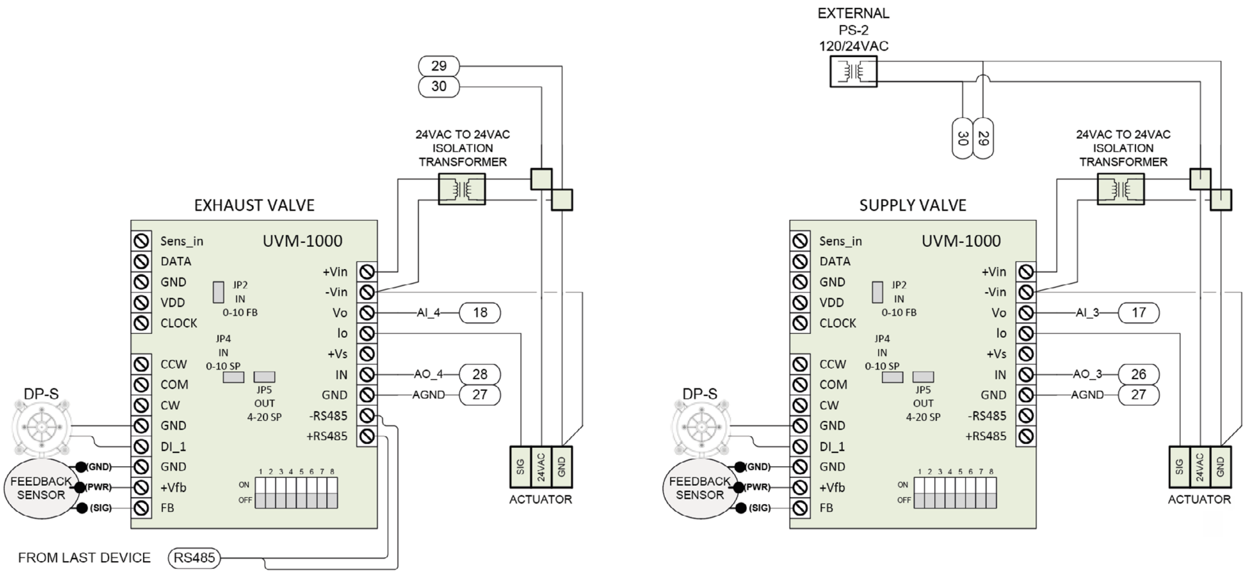


FIGURE 30: FUME HOOD EXHAUST TO HMS DISPLAY SYSTEM WIRING

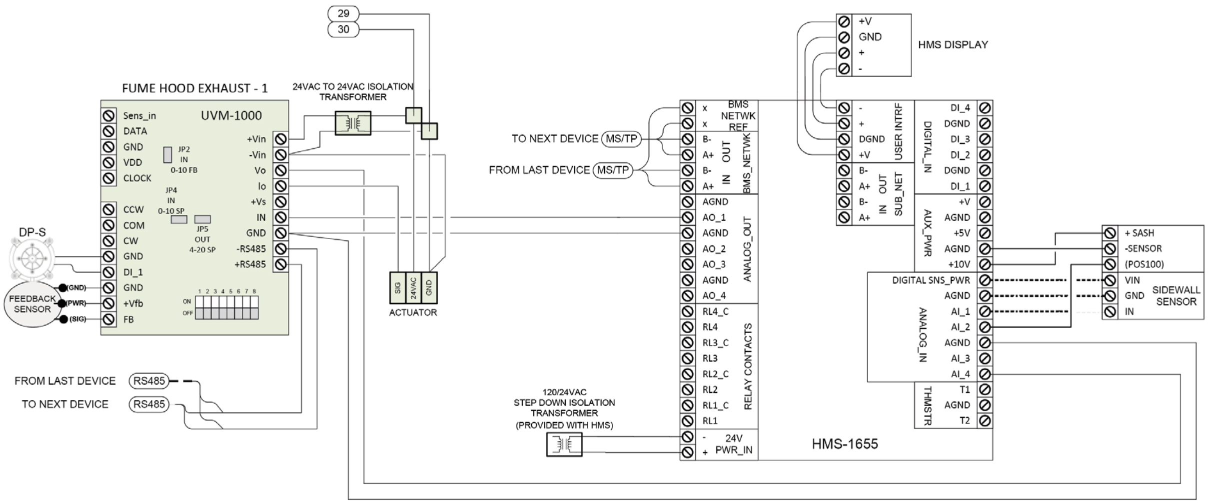


FIGURE 31: FMS DISPLAY SYSTEM WIRING

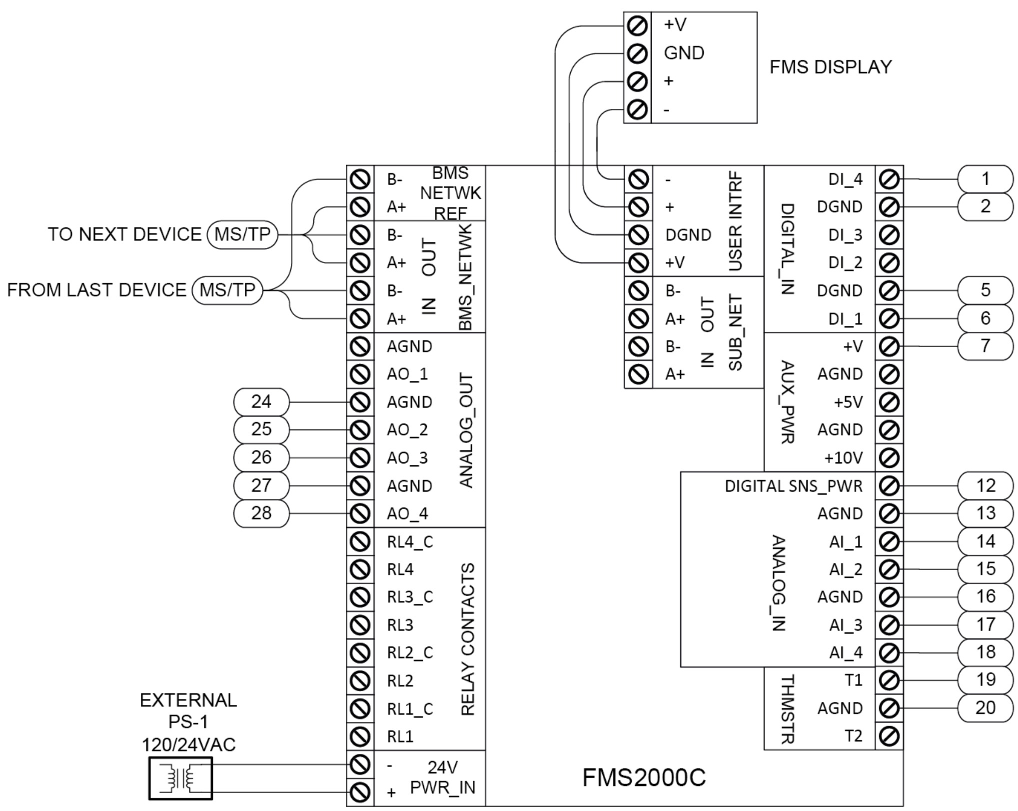
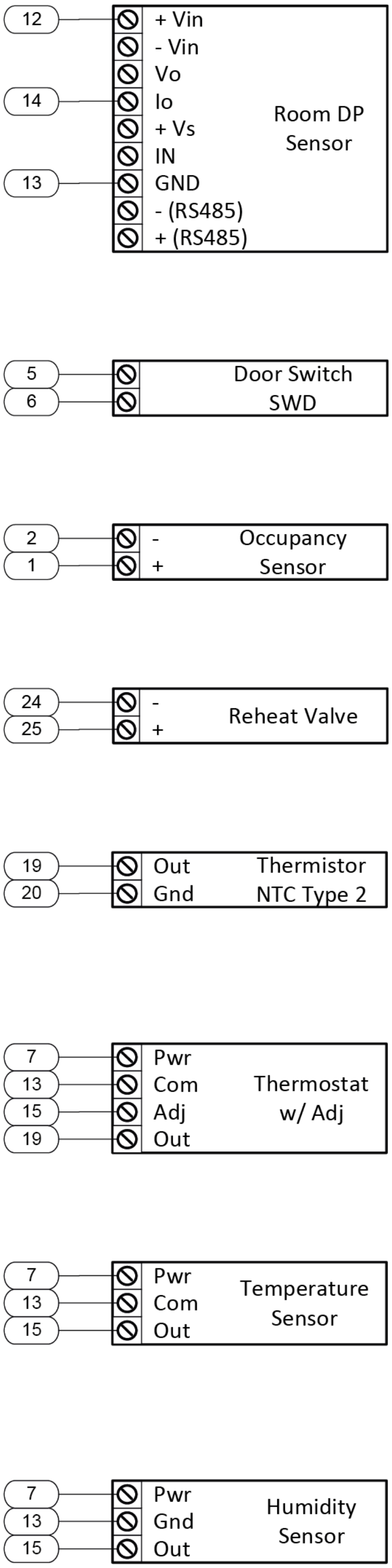


TABLE 32: FMS AND HMS TERMINAL BLOCK



CCM SYSTEM EXAMPLES

FIGURE 33: CCM SYSTEM

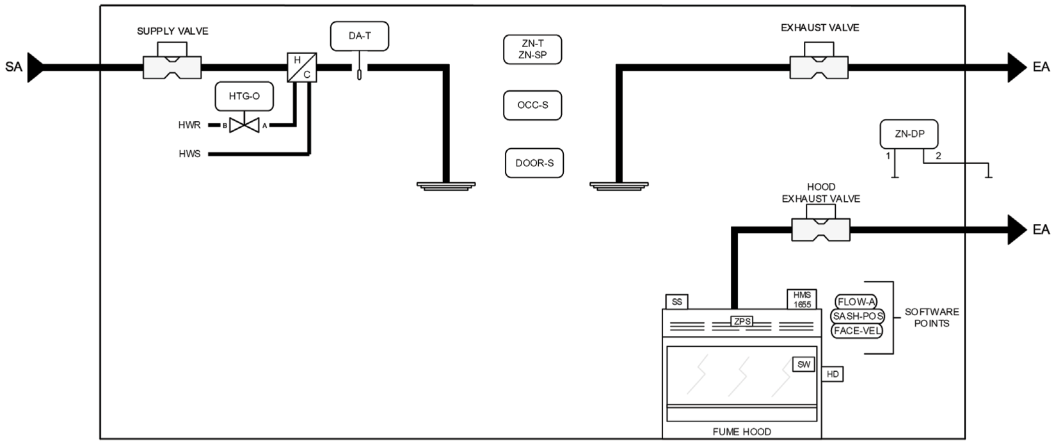


FIGURE 34: CCM SUPPLY VALVE AND CONTROLLER SYSTEM

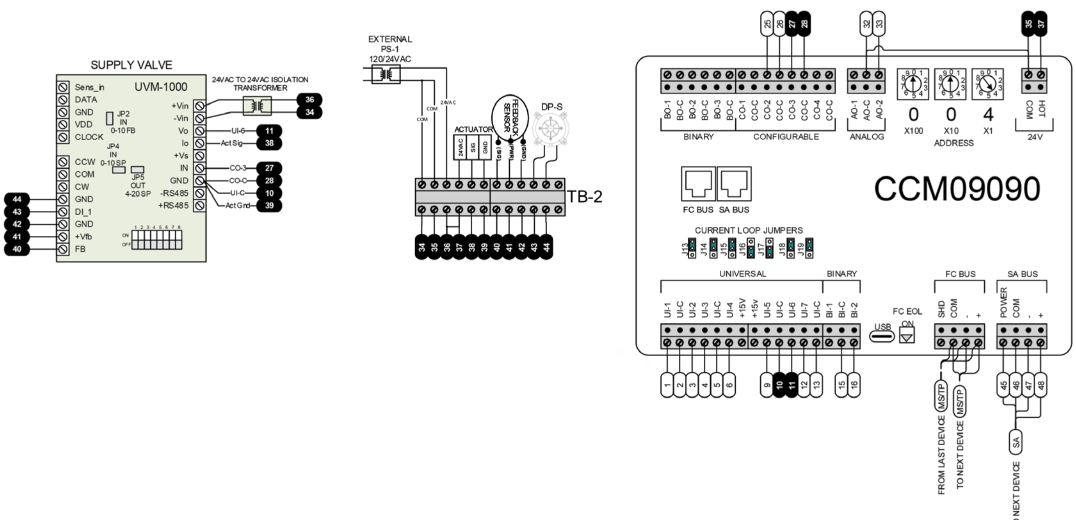


FIGURE 35: CCM EXHAUST VALVE SYSTEM

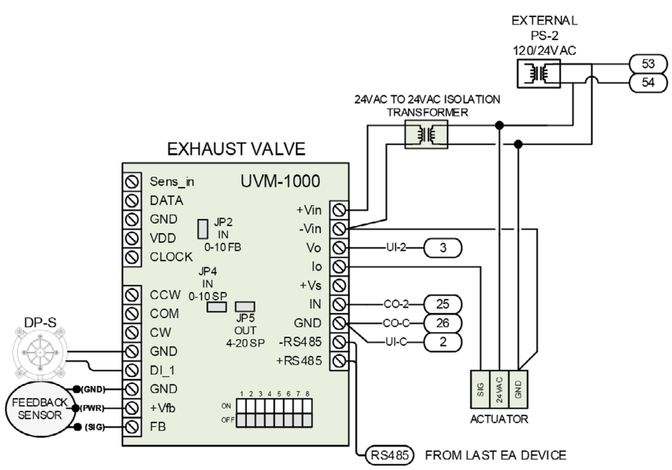


FIGURE 36: CCM TERMINAL BLOCK

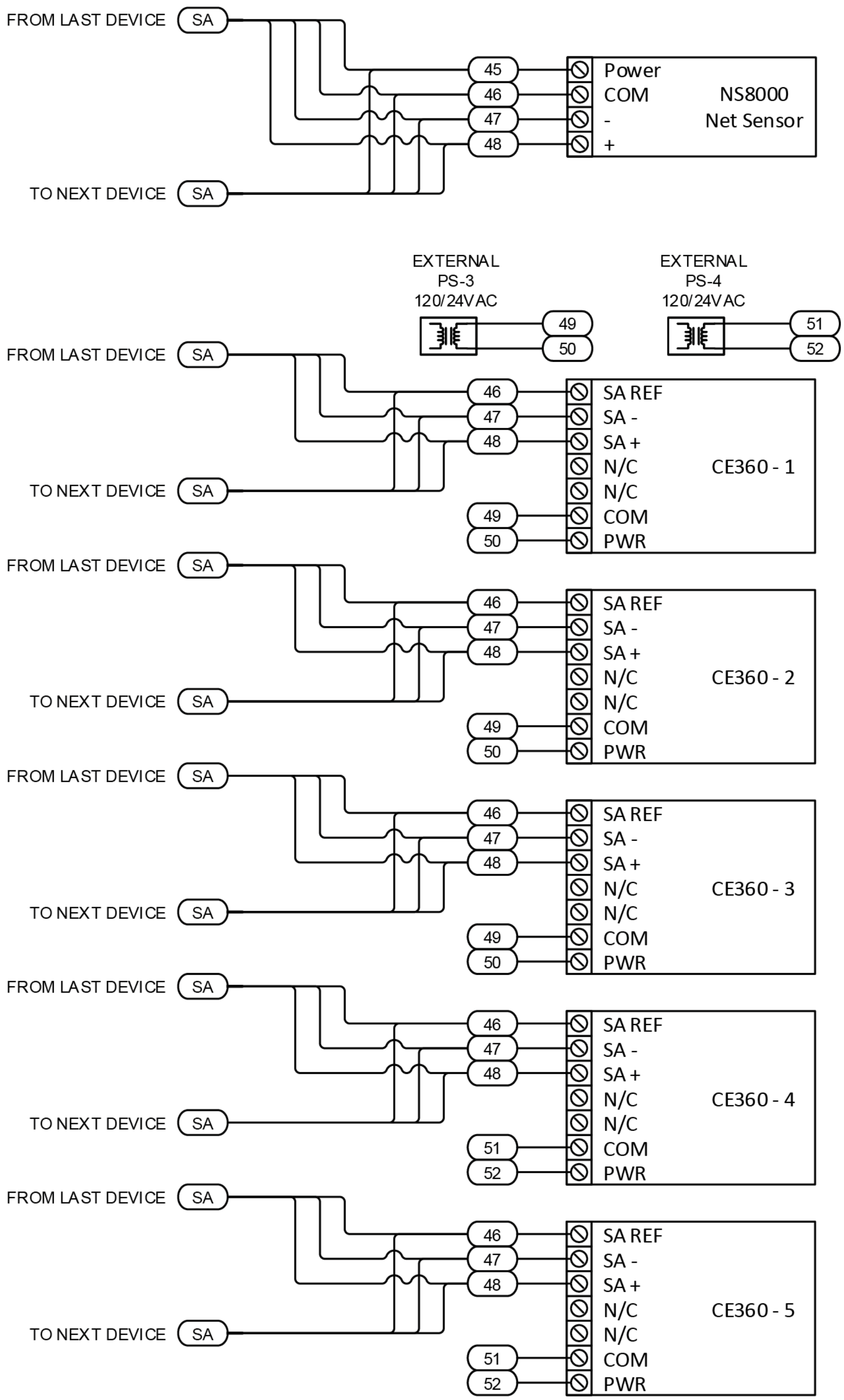


FIGURE 37: CCM UVM SUMMING WIRING

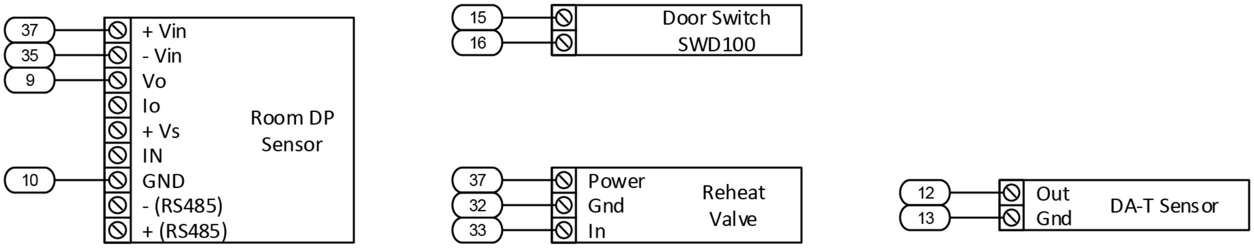
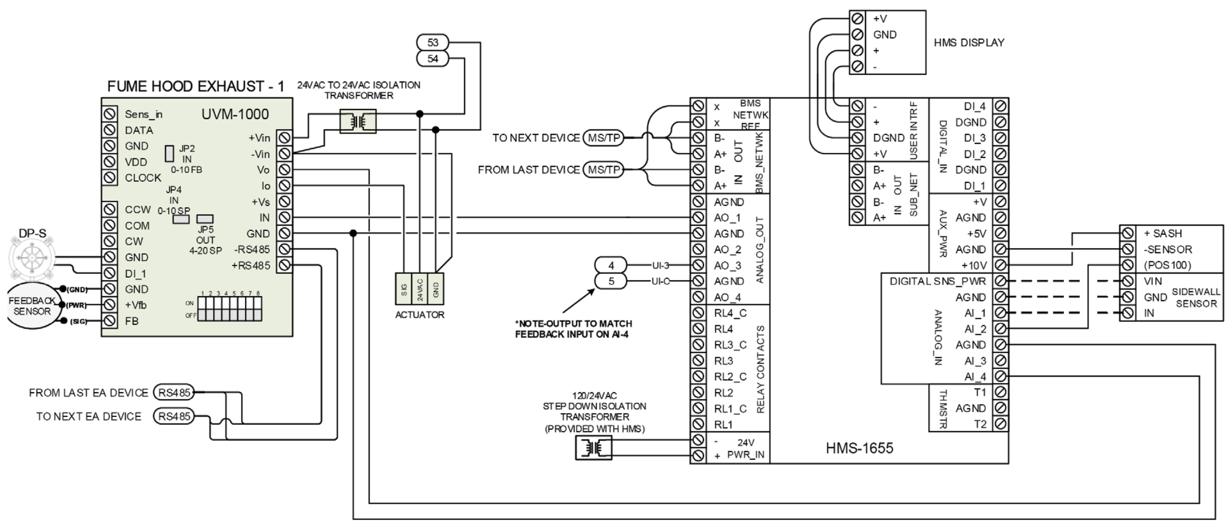


FIGURE 38: FUME HOOD EXHAUST TO HMS DISPLAY SYSTEM WIRING



NORMAL AND REVERSE OPERATION

The valve actuator can be set for normal or reverse operation. This ensures that fail-safe actions are achieved.

The fail-safe modes include loss of power and loss of signal. The UVM has a setting, either through the UVM Configuration Tool or by an enabled DIP switch to select the normal-reverse mode of operation.

Set the normal/reverse acting DIP switch, if enabled, or select the reverse operation check box in the Misc Tab of the UVM Configuration Tool to the preferred mode of operation.

If the reverse setting is selected, set the actuator to reverse acting and invert the command signal from the third-party controller.

The reverse operation signal from the OEM controller is 10 V to 0 V for 0 to xxxx CFM, and the actuator output control signal from the UVM is 20 mA to 4 mA for 0% to 100% positioning.

The feedback signal is always 0 V to 10 V for 0 to xxxx CFM, it is never inverted.

Supply valves use normal operation and exhaust and hood valves use reverse operation. For normal operation settings, see Figure 41. For reverse operation settings, see Figure 42.

FIGURE 39: HORIZONTAL VALVE CALIBRATION LABEL

Part No	VV-3-14-A-N-FA-P-H-M-U	**Date**	7/12/2022
Serial No	V07228577-016	**Valve No**	26, 27, 28
Tag No	VAV-1F-01		
CFM/Volt	690.0 cfm/volt, or 10V = 6900 CFM	**F/B A/D Mi..**	1329/2485

WARNING this valve is calibrated for **HORIZONTAL** use only

Actuator Position %	0	40	60	80	90	95	100			
UVM FB=Vo (Norm/Rev) **UVM SP=IN (Norm)**	0.65	2.10	3.74	6.39	7.85	8.60	9.23			
UVM SP=IN (Rev) Volts	9.35	7.90	6.26	3.61	2.15	1.40	0.77			
Flow CFM	449	1448	2579	4408	5415	5935	6370			

AIR FLOW

FIGURE 40: VERTICAL VALVE CALIBRATION LABEL

Part No	VV-N-10-H-N-FA-P-U-M-U	**Date**	7/18/2022
Serial No	V07228577-072	**Valve No**	80
Tag No	FH		
m3h/Volt	186.9 m3h/volt, or 10V = 1869 m3h	**F/B A/D Mi..**	1115/2394

WARNING this valve is calibrated for **VERTICAL** use only

Actuator Position %	0	40	60	80	90	95	100			
UVM FB=Vo (Norm/Rev) **UVM SP=IN (Norm)**	0.33	1.01	2.16	4.94	7.12	8.44	9.65			
UVM SP=IN (Rev) Volts	9.67	8.99	7.84	5.06	2.88	1.56	0.35			
Flow m3/h	61	189	404	923	1330	1577	1804			

AIR FLOW

FIGURE 41: NORMAL OPERATING MODE

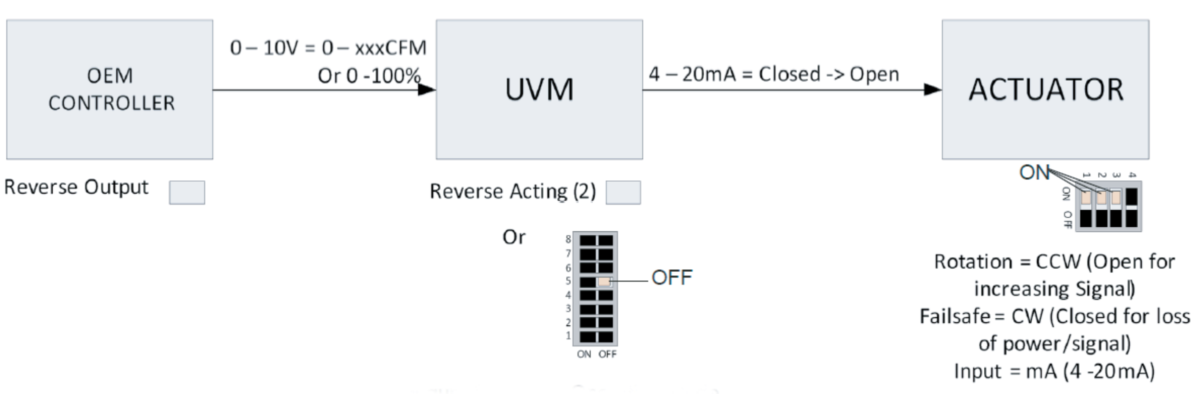
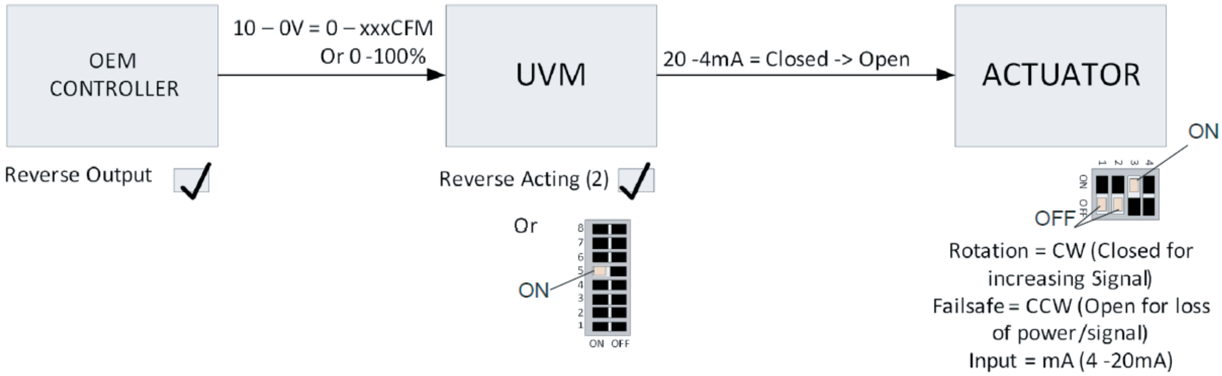


FIGURE 42: REVERSE OPERATING MODE



CFM AND PERCENTAGE SELECTION

When enabled, there is a DIP switch for each control input and the feedback output. The individual DIP switch interprets the input or output voltage as a CFM signal or position signal. If the switch is set for CFM, the signal represents the CFM scaling the UVM is setup for.

For example, if 1600 CFM is set at 10 V, an input of 10 V requests the valve is at 1600 CFM. Feedback of 10 V indicates the valve is at 1600 CFM. If the DIP switch is set to position, an input of 10 VDC requests the actuator is at 100%. 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 AND DP SWITCH

If a DP switch is attached, it is connected by 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 up to 15 V for application of over-voltages. NO or NC operation mode can be set in the UVM via the UVM Configuration Tool.

UVM CONFIGURATION TOOL

Before you begin:

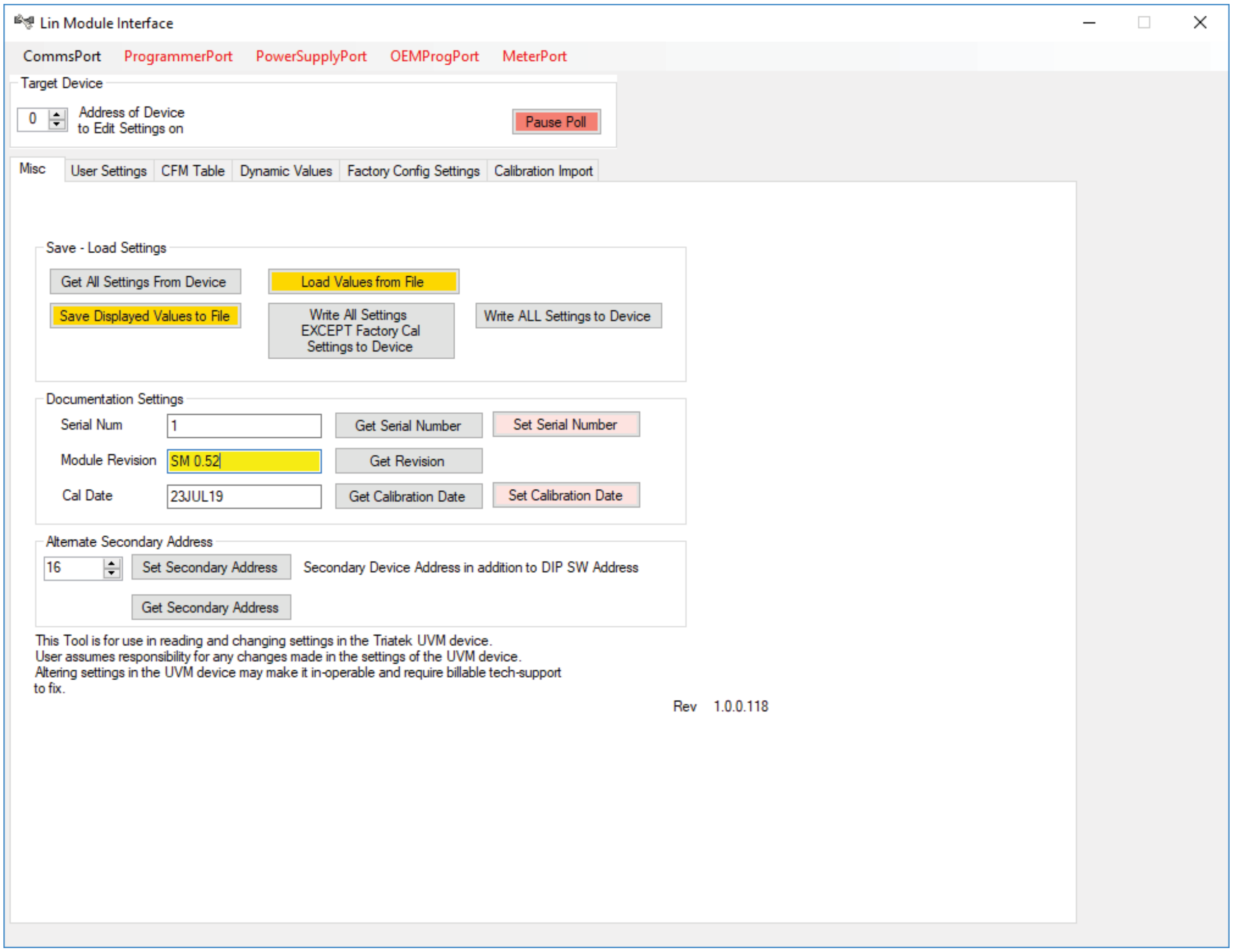
To set up the UVM configuration tool, see the following steps:

1. Download the UVM1000 configuration software (ValveLinModuleLabeler.exe) from the Johnson Controls License Portal onto the UVM configuration tool.
2. Install Microsoft Visual Basic (VB) Powerpack 10 to initiate the UVM Configuration Tool. Use the following link to install the Microsoft VB Powerpack manually: http://go.microsoft.com/ fwlink/?LinkID=145727&clcid=0x804.
3. Use a USB to DB9 cable to connect the mounted UVM1000 to the Venturi air valve. For the cable part number, see Figure 23.

OVERVIEW OF THE LIN MODULE INTERFACE

FIGURE 43: LIN MODULE INTERFACE

The Lin Module Interface displays the different UVM Configuration Tool settings and options.



INSTALLATION

About this task:

The following steps describe the initial UVM Configuration Tools installation process and the specific data required by each tab.

! Note — The Microsoft VB Powerpack 10 is not included with the Setup.exe program. You must download and install the Microsoft VB Powerpack 10 separately to ensure the tool launches.

1. To use the Microsoft.net architecture, open and run the Setup.exe program to install the Microsoft VB Powerpack 10. If the Microsoft VB Powerpack 10 fails to install, use the following link to install the power pack manually: http://go.microsoft.com_fwlink/?LinkID=145727&clcid=0x804 When the Setup.exe program installation is complete, the UVM Configuration Tool runs automatically.

   ! Note — The Setup.exe program address downloaded from the License Portal is UVM Configuration Tool.zip\UVM Configuration Tool\ValveLinModuleLabeler_v1.0.0.118.zip\ValveLinModuleLabeler\Setup.exe.

2. Connect a USB-RS485 adaptor cable to the computer.
3. Note which **COM Port** the RS485 cable is connected to. To determine which port the cable is connected to, click **Control Panel >Device Manager >Ports (COM and LPT).** To see which **COM Port** disappears and reappears from the screen, pull the USB plug out and plug it in again.
4. Click **Run** to launch the configuration program. If any of the ports are not present, the associated port tab is highlighted in red.
5. To manually change the RS485 **COM Port** settings or the **ProgrammerPort** settings, click the **COM Port, ProgrammerPort, PowerSupplyPort, OEMProgPort,** or **MeterPort** option on the Main Menu.
6. In the **COM Port** dialog box, select the communications port that the RS485 is connected to. Set the baud rate to **9600** and click **Set.**

   ! Note — Certain circumstances require the module to be upgraded to a later revision. If the module needs to be upgraded, repeat step 6.

7. Connect the MSP-GANG programmer to the appropriate **COM Port** in the **CommsPort** drop down menu. Set the baud rate to **9600**. To use the selected settings, click **Set**. If you do not need to use this port, click **Cancel.**

MISC TAB

You can read and write all the settings from the UVM on the Misc tab. You can also view the serial number, module revision, and calibration date on the Misc tab.

! Important — The save displayed values to file button saves the configuration software values. The button does not save values in the UVM. Before you make changes to the UVM settings, click **Save Displayed Values to File** and save the .xml file in a secure location. To save the values in the UVM, click **Get All Settings from Device** when you have received the setting.

To find the serial number and calibration date on the unit:

1. Click **Get Serial Number** or **Get Calibration Date** buttons. For a visual example, see Figure 43.

   You can set the alternate secondary address of the module as well. The unit responds 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 alternate software address.

   ! Note — When using write all settings to device on a new device, do not overwrite the existing calibration information.

2. Set the address of the UVM module that you want to interact with from addresses 0 to 15. The addresses are from the DIP switches on the unit. See Table 9 for more information.

   ! Note — The unit can have an internal secondary address, labeled +16, that it responds to automatically.

3. To confirm that communication is present, click **Get Revision**. The revision number appears in the Misc tab module revision box.
4. To save a copy of these settings to your computer, click **Save Displayed Values to File.**

USER SETTINGS TAB

You can use the user settings tab to configure settings for the UVM. The settings that are available on the tab depend on the mode of operation and the options that are available for that mode.

To load specific information onto the controller, use the individual set buttons.

! Note — Do not overwrite the factory calibration values in the UVM for the AO and AI ports.

USER CONFIGURATION SETTINGS

The CFM/Press at 10 V field sets the control signal and feedback signal scale in and out of the UVM. If the UVM is configured to operate with a Venturi valve, this value represents what CFM the 10 V input and output signals represent.

For example, if you enter a value of 1500 CFM, a 10 V signal applied to the IN connection requests 1500 CFM, and a 10 V signal from the Vo connection indicates that the valve provides 1500 CFM. This value is set initially by the factory and is matched to the size of the valve attached to the UVM. For more information on the typical values, see Table 5

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. Some third-party controllers use a PWM method to produce their AO signals. This method typically results in a signal that varies by up to 0.5 V at 10 KHz. The UVM is sensitive to this signal and results in an actuator that moves between various positions as it follows the moving input control signal. This value is typically 10 to 20 but can be 50 or more for third party controllers with unsteady AO signals.

! Note: The higher this value, the less responsive the UVM is to sudden changes in the control signal.

SCALING

The gain press sen and offset press sen fields can scale an optional external pressure sensor, so 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 active only when the use press sens as DP selection is active. 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.C. See Table 5 for more information on scaling details.

! Note: When an analog pressure sensor is used with a voltage output connected to the sens_In pin, use the following scaling. The scaling is derived from : 0 V = 0 counts, 5 V = 4095 counts = x Press = (x – Offset) * Gain

- Gain = ((Ph – Pl) / (Vh – Vl)) * (5 / 4095)
- 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.

AUTOMATIC CALCULATION

About this task:

The calc button opens a calculation dialog box where you can enter the sensor pressure range and output voltages.

1. To enable to automatic calculation, click the **Calc** button.
2. To calculate the gain and offset values automatically, click the **Compute** button. The values are entered into the **Gain PressSens** and **Offset PressSens** boxes.
3. If the values entered are correct, click the **Set PressSens Gain and Set PressSens Offset** button to send the values to the controller.

FLOW

The in. W.C. pressure value is entered into the no flow press field. For Titus standard flow valves, this value is 0.6 in. W.C. If the pressure flow in the valve is invalid, a 0 CFM flow feedback signal is created.

The flow sw delay setting is used when a DP switch is connected to the valve that detects insufficient DP 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 check box is selected.

When a floating actuator is used with the UVM, the fit stroke time setting is used. The actuator counterclockwise (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 outputs of a 24 VAC supply. Ensure the Float DO is DP Out selection is unselected. The fit stroke time is the stroke time of the floating actuator, between 60 seconds and 90 seconds.

! Note: Floating actuators are not very accurate for stroke time to determine position. The actual requested CFM and achieved CFM may not match.

The floating actuator is also used with the feedback sensor, where the valve position is determined by the feedback value and not the stroke time of the actuator. To enable this mode of operation, select the FB float act check box.

The float dead band is the dead band associated with the floating actuator position. This dead band value requests the CFM change before the actuator moves to new position.

UVM WITH VAV BOX

About this task:

The UVM can be used with a Variable Air Volume (VAV) box. The VAV box provides flow pressure to the UVM.

1. To enable the use of a UVM with a VAV box, selected the **Unit is VAV Box** check box.
2. To calibrate the pressure sensor, enter the preferred values into the **Gain PressSen** and **Offset PressSen** fields.
3. To set the VAV box area and K factor, enter the preferred values into the **VAV Box K Factor** and **VAV Box Area** fields.

UVM WITH A PRESSURE SENSOR

About this task:

You can also use the UVM with a pressure sensor. For more information on how to wire the pressure sensor to the UVM, see Figure 18 for more information.

1. Ensure the **Use Press Sens as DP** check box is not selected. The UVM is not designed to autonomously control a VAV box.
2. Position the actuator to match the signal. The UVM accepts a 0 V to 10 V control signal from an OEM controller and interprets this as a 0% to 100% position signal for the actuator.
3. Ensure the **CFM not Pos Output** box is not selected. The UVM uses the flow pressure sensor to provide a 0 V to 10 V as 0 to xxx CFM feedback signal. The OEM controller modulates the actuator and monitors the CFM signal to obtain the desired CFM value.
4. To observe dynamic pressure, velocity, and flow values, select the **Dynamic Values Tab.**

CONTROLLER STATE SETTINGS

You can use the user settings tab to choose the various operational states of the UVM. The tab states are permanent, non-permanent, and status.

The permanent state can be set or not set in the UVM. The state settings are stored in EEPROM. The settings retain their state across power losses.

The non-permanent states can be set from the tool but reset to not chosen when the power to UVM is cycled. They are typically used for overrides and tests.

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

PERMANENTS

AI SETPOINT

The use AI setpoint state selects whether the CFM or 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 scaled analog IN value. This value is the typical mode of operation. When not selected, the setpoint value can be set via the setpoint field on the dynamic values tab. Ignore the IN voltage.

PRESSURE SENSOR AS DP STATE

The Use press sens as DP state selects whether a connected pressure sensor is used to measure the DP across the valve. The state determines when the DP is invalid and reduces the CFM feedback signal to zero. Refer to the UVM Installation Guide for sensor wiring information. If this state is enabled, ensure the gain press sen, offset press sen, and no flow press values are valid and set. Ensure use DI as DP, use digital sensor, and unit is VAV box are not selected.

If DP monitoring is required, but a DP switch is used instead of a pressure sensor, select the use DI as DP check box and ensure the use press sens as DP check box is not selected. A calibrated DP switch monitors the pressure across the valve and makes or breaks contact when the pressure falls below the specified valve minimum operation pressure.

DP SWITCH

The normally closed or normally open (NC/NO) mode of operation for the switch is set with the state of the DP switch NC. When checked, the DP switch is normally closed and opened when the pressure falls below the specified value.

The float DO is DP out setting enables the pressure sensor, when used to monitor DP, to report DP sensor state. This setting simulates a DP switch with a pressure sensor.

The pressure sensor and the UVM pressure settings enable the DO to act as the output of a DP switch for use on other controllers to reduce the CFM reading to zero. When the setting is selected, the floating actuator output control cannot be used. Use the pressure sensor to measure the valve DP. Ensure the use press sens as DP check box is checked.

DIGITAL SENSOR

The use digital sensor enables a specific digital sensor instead of the analog pressure sensor. The digital sensor uses I2C communications media to communicate with the UVM. Ensure the setting is not checked. This is a legacy setting and may be removed in future revisions.

VAV BOX UNIT

The unit is VAV box is used to set the UVM mode to compute CFM from a VAV box flow probe instead of a Venturi valve lookup curve. Ensure the gain press sen and offset press sen fields are checked to calibrate the used pressure sensor, and the VAV box K factor and VAV box area settings are checked for proper computation of the VAV box air flow.

Ensure the use press sens as DP check box is not selected. The sensor pressure, air velocity, and air flow can be viewed under the dynamic values tab.

MINIMUM PRESSURE

The Io used for min press setting applies to UVM S series revisions that provide for networked UVM units. The setting can read as being set, but can be ignored. If this UVM is a primary, it monitors the networked UVM's DP pressure values when selected. The UVM uses pressure sensors and determines the minimum pressure value from all the units.

This scaled minimum pressure value is outputted on the IO connection on the UVM. The actuator cannot be used on this UVM. The minimum pressure value can be used by OEM control systems to regulate the fan system. The fan system is regulated 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 part of the summing series. This setting does not have the primary address, and can be left blank and ignored if reported as active.

FLOAT SETTING

The FB (not time) float act setting applies when the UVM uses a floating actuator on the CCW and CW connections, rather than an analog actuator on the Io connector. When not checked, the floating actuator keeps track of run time in the up or down direction. For example, 50% position is an accumulated +UP, -DOWN time equal to half the fit stroke time setting. A floating actuator does not have high positional accuracy because it can slip depending on load. If the user clicks this check box, the actuator is positioned only by use of the UVM or valve FB sensor reading through the CFM table, and not by run times.

DIP SWITCHES

The use DIP switches setting derives the DIP switch equivalents from the DIP switches, or by previously set values by the configuration tool. If you select this check box is, 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. Ignore the settings by the configuration tool. If this box is not checked, ignore DIP switches 5, 6, and 7 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 setting can determine whether the Vo output represents the valve or VAV box. The CFM is determined by the UVM, and the valve position is determined by the UVM.

The feedback sensor signal is obtained from the output Vo in the non-VAV case, or obtained from the flow pressure sensor in the VAV case.

In the checked state, the feedback signal converts to a position and translates through the CFM curve to a CFM value for the non-VAV box case.

With the VAV, the pressure signal converts to velocity with the K sqrt(P) math and applied to the box area to get flow. This scaled value is based on the CFM/Press at 10 V range and output on Vo. If not checked, the signal from the feedback sensor converts to the previous position of 0% to 100%. However, the value scales from 0% to 100% = 0 V to 10 V applies to the Vo output. The position valve is not applicable to the VAV box case.

The CFM not Pos input setting can determine what the 0 V to 10V signal on the IN input represents. With an unselected check box, the voltage on the IN connection represents a 0% to 100% positional percentage setpoint for the 0 V to 10 V signal. For example, if 5 V is the applied signal, the valve actuator moves to the 50% position.

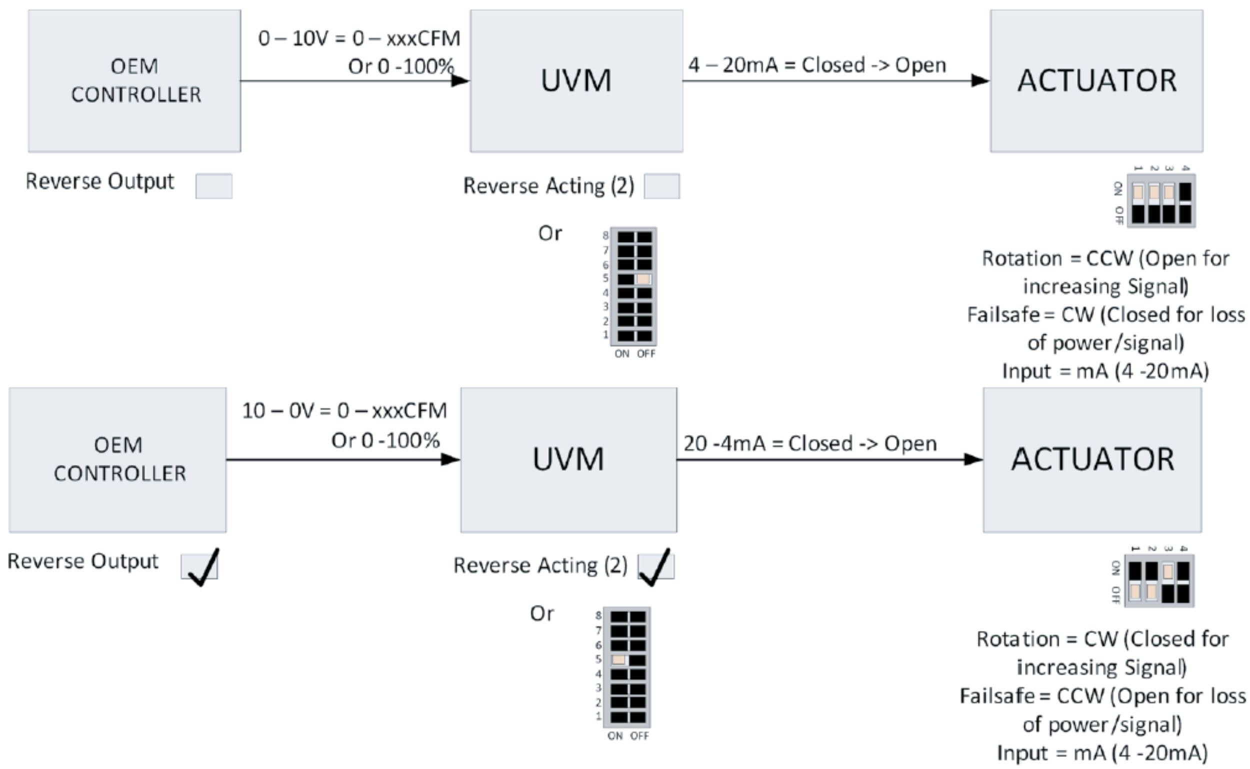
A selected check box interprets the input voltage as a CFM request. The CFM/Press at 10 V setting defines the scale of this interpretation. For example, if the setting is 1500 CFM, 0 V is 0 CFM and 10 V is 1500 CFM. The UVM moves the actuator to 1500 CFM. The CFM setting is not relevant when the UVM operates in the VAV mode. Ensure this setting box is unselected for VAV mode use.

The reverse acting 2 setting enables the normal or reverse mode of operation of the UVM. For a checked box in UVM revisions before 0.7x, there is an inverted Io signal to the actuator. For a checked box in UVM revisions after 0.7x, there is an inverted SP input signal on IN and an inverted actuator output signal on Io.

For example, the IN signal takes 0 V to 10 V to be xxx CFM to 0 CFM. For exhaust and hood valves, use reverse acting. Ensure the IN-signal box is unselected for VAV box use. Refer to the *UVM-1000 Universal Valve Module Installation Guide* for more information on wiring and normal or reverse setting recommendations.

For normal and reverse modes of operation switch and state settings, see the following figure.

FIGURE 44: NORMAL AND REVERSE SETTINGS



USER SETTINGS TAB AND CFM TABLE TAB

You can find different tabs and values in the user settings and CFM table tabs.

NON-PERMANENT

The non-permanent values can be set and cleared with the UVM Configuration Tool. The UVM reacts to their selections. If loss of power occurs, these settings do not retain their selected state when power is re-applied. When starting the device, the values are inactive or not checked.

The override AO 1 (VO) setting disconnects the Vo output from the control logic. The override AO 1 (VO) enables the user to set a VO control value directly. The control operate through the feedback output field and set feedback output raw value button on the dynamic values tab.

To control the VO signal:

1. Click the **Override AO 1 (Vo)** check box and click the **Dynamic Values** tab.
2. In the **FeedBack Output** field, enter a value between 0 CFM and 1000 CFM, where 0 is 0 volts and 1000 is 10 volts.
3. Click the **Set Feedback Output Raw Value** button to write the value to the AO 1 (VO) signal.

The override AO 2 (Act) setting disconnects the actuator Io output from the control logic and enables the user to control the IO directly. The control operates through the actuator output field and the set actuator raw output Value button on the dynamic values tab.

To control the IO signal:

1. Check the **Override AO 2 (Io)** check box and click the **Dynamic Values** tab.
2. Enter a value between 0 CFM and 1000 CFM, where 0 is 4 mA (0%) and 1000 is 20 mA (100%), in the **Actuator Output** field.
3. Click the **Set Actuator Output Raw Value** button to write the value to the AO 2 (IO) signal.

CW DO

The CW DO group controls the CW digital output on the UVM.

1. To override the CW output, click the **Override DO Up** check box.
2. To select the state of the DO, click the **ON Radio** or **OFF Radio** button associated with the CW DO group.

! Note The DO is equivalent to the relay contacts but in an electronic package. When ON, the output shorts to the COM pin on the UVM. The DO can switch to either AC or DC signals.

CCW DO

The CCW DO group controls the CCW digital grounding output on the UVM.

1. To override the CCW output, click the **Override DO Dwn** check box.
2. To select the state of the DO, click the **ON Radio** or **OFF Radio** button associated with the CCW DO group.

! Note 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 to either AC or DC signals.

STATUS

The DI state setting indicates status only. If you click the check box it has no effect on the UVM. When you click the get all state settings button, the configuration tool reads through all the states that are set and not set in the UVM. The state of the UVM DI_1 input reflects the final state of the check box.

The digital sensor OK setting indicates the status of the digital sensor when the digital sensor is enabled with the use digital sensor setting in the Permanents group. If the user clicks the get all state settings button, the configuration tool reads through all the states that are set and not set in the UVM. The state of the digital sensor operation reflects the final state of the check box.

CFM TABLE TAB

The CFM table tab enables changes to the valve flow curve and the feedback flow curve. The table has three columns for actuator position, feedback position, and valve CFM.

At the factory, the actuator position values and the CFM values populate the curve. With the attached UVM, valve, and feedback sensor, a calibration process occurs that places the feedback entries in the table.

The actuator requires a feedback curve. The relationship between the actuator position and the feedback sensor position through the valve linkages is non-linear. The relationship deviates around 5% in the middle of the curve.

To compensate for this non-linearity, the automatic feedback calibration process through the UVM creates the correct feedback values. The factory enters the actuator, feedback sensor, and CFM data for a UVM supplied with a valve.

For units supplied without a valve, you can enter the position and CFM values through the UVM. They come from the curve supplied with the valve, or from live position and CFM measurements set on site.

The feedback calibration process takes an A/D reading from the up-going and down-going direction and calculates the average. This accounts for any hysteresis in the feedback sensor reading.

The DO hysteresis setting averages each curve point that enables the average up and down reading of the curve's actuator positions for the feedback sensor. This improves accuracy but takes longer to execute.

CHANGING THE VALVE FLOW AND FEEDBACK FLOW

To enable changes to valve flow and feedback flow curve in the CFM table tab, see the following steps.

1. Enter the actuator and feedback entries as a whole number 10 times the positional value. For example, enter a position value of 40.5% as 405.
2. Enter the positional values and the CFM values in the table and click the **Set CFM Entries** button. Ensure the actuator stroke time value entered matches the time the actuator takes to travel from 0% to 100%. For a Titus actuator, use 4 seconds.
3. To ensure the tool computes the gain and offset for the feedback sensor, and also enters the corrected position values for each of the defined actuator positions, select the **Auto Populate FB Entries** check box.

Note: Before you proceed with the feedback calibration, ensure the LO field cal and HI field cal entries are acceptable. These two values define the low and high travel points to obtain the information to compute the gain and offset for the feedback curve. The 0% and 100% positions do not use these points, as they are not on the linear part of the feedback curve.

4. Attach the feedback sensor and download the actuator position curve to the controller and click the **Calibrate FB Sensor** button. The tool automatically positions the actuator at the **HI Field Cal** and **LO Field Cal** positions. This calculates the average A/D reading from which to compute the gain and offset for the feedback sensor.
5. Position the actuator at each of the position points in the table and take readings from the relevant sensor. A selected **Hysteresis** check box records readings of the position that approaches from both directions and calculates the average. The actuator converts that information into a feedback sensor position and enters it into the table.
6. When complete, the **Set Feedback Entries** button is enabled. To download the values to the controller, click the **Set FeedBack Entries** button.
7. To view the entry chart, click the **Phoenix Valve Volt to Pos** button.

Note: This procedure is relevant to the Titus style installation where the calibrated valve responds to the actuator position and CFM value. With other valve styles in retrofit situations, where the valve information is not from Titus, the valve can contain a feedback position, or feedback voltages and CFM values. The tool can open a dialog where you can enter feedback voltages and CFM values. The tool can do this with the phoenix valve volt to Pos button.

CFM TABLE AND DYNAMIC VALUES TABS

You can add other values to the CFM table and dynamic values tabs.

OEM VOLTAGE TO CFM ENTRY

To enter the OEM voltage to CFM entry, see the following steps:

1. From lowest value to highest value, enter the minimum and maximum CFM values and the minimum and maximum voltages from the valve label.
2. To automatically enter the position and CFM values into the table on the main screen, click the **Compute** button.
3. When finished, click **Close the OEM Voltage** dialog box.

UPDATED CFM ENTRY POSITION

To download the values to the controller:

1. Click **CFM Table tab** > **Set CFM Entries** > **Set Feedback Entries** buttons.
2. Select the **This is Phoenix Valve Data** check box. Check the **Auto Populate FB Entries** check box. The CFM values are accurate to the feedback sensor position and not the actuator position Calibration of the completed feedback occurs in the actuator.

Note: The tool computes the gain and offset for the feedback sensor and also enters the correct position values for each of the defined feedback positions.

3. Ensure the correct actuator stroke time value is set and click the **Calibrate FB Sensor** button. Wait until the valve moves from 100% to 0% and to each of the defined feedback positions.

Note: Do not select the OEM actuator check box.

DYNAMIC VALUES TAB

The dynamic values tab provides a set of buttons and fields to access dynamic values within the controller.

The tab finds faults and debugs performance issues. Output override values can also be set from here. If selected, you can enter a soft setpoint.

The values displayed include calculated values such as CFM, position, and pressure. Also displayed are raw A/D values from the AI inputs. The values do not automatically update. To read a value, click the associated value button.

SETPOINT ENTRY

The setpoint entry displays the current converted setpoint for the actuator as a multiplied by 10 percentage value. If the input is set to CFM (not Pos) input and you clicked the check box, the voltage converts to a CFM. The CFM goes through the valve curve as a CFM to position. See user settings tab for more information.

The percentage position, multiplied by 10, displays in the setpoint field. To view the percentage position, click the get setpoint button. The state of the CFM (not Pos) input check box determines entry of a CFM or position value into the set point field.

1. To pass the values to the controller, click the **Set Setpoint** button.

The passed value is effective if the use AI setpoint check box on the user settings tab is not clicked. If selected, the UVM uses the voltage on the IN input as the CFM and position setpoint. This field can find operational faults without a variable voltage source.

The feedback field shows the position of the feedback sensor as a percentage value multiplied by 10. The value is accurate if the factory or the user calibrated the feedback sensor. In normal operation, this value is close to the get setpoint value.

PRESSURE VALUES

The pressure value displays the converted value from the pressure input connection. The value is accurate if there is a calibrated pressure input and the calculated gain press sen and offset press sen values on the user settings tab are sent to the UVM board.

1. To read the current pressure, click the **Get Pressure** button.

   See the user settings tab for more information on how to calculate the gain and offset for the pressure sensor.

VAV VALUES

The VAV velocity field displays calculated FPM from the velocity pressure derived from the pressure input. The pressure sensor is previously setup and calibrated to be accurate.

If the VAV box is not selected, the value is zero. Enter a valid VAV box K factor entry, downloaded to the UVM, for the specific flow probe on the VAV box.

The UVM calculates the velocity value. The UVM does this by multiplying the square root of the flow pressure from the pressure input by the K factor, if the VAV Box is checked.

1. To read the current VAV velocity, click the **Get VAV Velocity** button.

CFM VALUES

The CFM value is the current CFM value derived from UVM. The value is either the CFM calculated from the feedback sensor in conjunction with the valve curve, or the CFM calculated from the VAV velocity multiplied by the VAV box area. The VAV velocity calculates the value when the VAV is checked.

1. To read the current CFM, click the **Get Current CFM** button.

The summed CFM value is the total number of CFMs from communication replica UVMs. The primary UVM requests CFM values from a maximum 16 replica UVMs and adds those values together.

Also included is the CFM value of the primary UVM. If the primary UVM is not part of a valve or VAV box, ensure a 0 local CFM value generates internally. This function is applicable to a special summed revision of the UVM code and is not the standard code release.

1. To read the current total system CFM, click the **Get Summed CFM** button.

FLOAT VALUES

The float Pos value is the positional computed value of an attached floating actuator. The CW and CCW outputs open and close a floating actuator based on the Fit stroke time value under the User settings tab.

The UVM computes the effective position from the stroke time and how the actuator is open or closed. Floating actuators are not very accurate. This value may not match the actual actuator position.

1. To read the current floating actuator assumed position, click the **Get Time Float Pos** button.

RAW AI VALUES

The raw AI 1 (SP) fields display 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.

The input value is between 0 and 4095. The second field is the input A/D as a percentage of 4095. The third field is 4095 of A/D input as a percentage of 4095. You can use the values as a rough guide to where the input signal is relative to the full range.

The raw AI 0 (Fb) fields display 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. The input value is between 0 and 4095. The second field is the input A/D as a percentage of 4095.

The third field is 4095 of A/D input as a percentage of 4095. You can use the values as a rough guide as to where the feedback signal is relative to the full range.

In normal operation, the IN signal goes from 0 V to 10 V, or 0 to 4095. If you position the actuator differently and it has a different angular range on the valve, the feedback signal may use only a portion of the range.

The raw AI 2 (Press) fields display 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 AND FACTORY CONFIGURATION SETTINGS TABS

The input value is between 0 and 4095. The second field is the input A/D as a percentage of 4095. The third field is 4095 of A/D input as a percentage of 4095. You can use the values as a rough guide to where the input signal is relative to the full range. You can use his input as the raw input prior to scaling of an analog pressure sensor.

Each of the input A/D count sections have a voltage field. This field indicates the approximate voltage of the input based on the A/D, and the calibration factors on the factory cal page.

OVERRIDING THE FEEDBACK OUTPUT FIELD

When you override the feedback output field controls, the device uses the VO signal the 0 V to 10 V feedback signal to a third-party controller. To return the raw value of 0 to 4095 to the D/A for the Vo channel:

1. Click the **Get Feedback Output Raw Value** button. If you click the **Override AO 1 (VO)** check box on the **User Settings** tab, and override the VO channel, the output on VO can be set by the user for debugging.
2. Enter a value between 0 and 1000, 100%, in the feedback text box.
3. Click **Set Feedback Output Override Value** button. The Vo output goes to a value between 0 V and 10 V.

OVERRIDING THE ACTUATOR OUTPUT FIELD

When you override the actuator output field, you can control the Io signal. The Io uses the 4 mA to 20 mA actuator control signal.

To return the raw value of 0 to 4095 to the D/A for the Io channel:

1. Click the **Get Actuator Output Raw Value** button. If you click the **Override AO 2 (Act)** check box on the **User Settings** tab, and override the Io channel, the output on Io can be set by the user for debugging.
2. Enter a value between 0 and 1000, 100%, in the **Act Text** box.
3. Click **Set Actuator Output Override Value** button. The Io output goes to a value between 4 mA and 20 mA.

The two output sections also have a voltage field that displays the approximate voltage out based on the control value and calibration factors on the factory cal section.

UPDATED CFM ENTRY POSITION

About this task:

You can use the CFM entry position table to input the values into the controller. To update the CFM entry positions, see the following steps.

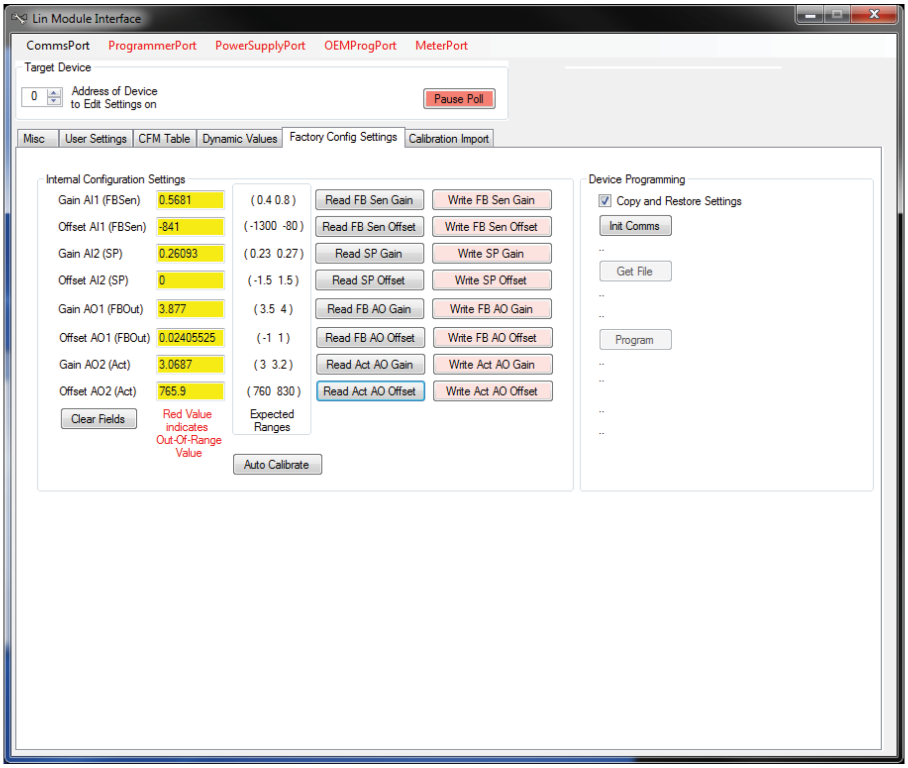
1. To download the values to the controller, click **CFM Table tab** > **Set CFM Entries** > **Set Feedback Entries** buttons.
2. Select the **This is Phoenix Valve Data** and the Auto **Populate FB Entries** check boxes. The CFM values are accurate to the feedback sensor position and not the actuator position. Calibration of the completed feedback occurs in the actuator.
3. Ensure the correct actuator stroke time value is set and click the **Calibrate FB Sensor** button. Wait until the valve moves from 100% to 0% and to each of the defined feedback positions. The tool computes the gain and offset for the feedback sensor and also enters the correct position values for each of the defined feedback positions.
4. When you enter all the values into the table, the **Set CFM Entries** and **Set Feedback Entries** buttons are enabled. To update the CFM and feedback controller entries, click each button.

Note: Do not select the OEM actuator check box

FACTORY CONFIGURATION SETTINGS TAB

You can find different tabs and enter different values in the Factory Configuration Settings tab.

FIGURE 45: FACTORY CONFIGURATION SETTINGS TAB WINDOW



INTERNAL CONFIGURATION SETTINGS

The factory programs and calibrates the AI and AO channels with the fields in the Internal Configuration settings tab. The tab contains the gain and offset settings for each of the channels.

Note: Do not adjust these values unless instructed by Titus.

The entries show a factory calibration value and an acceptable range for the value. If the value is within range, it has a yellow background. If the value is out of range, it has a red background.

The user can adjust the ranges to correct any voltage errors that occur. Refer to Procedure to Check I_O on a UVM Board for more information.

The factory uses the auto calibrate button to automatically adjust the gain and offset values for the analog channels while calibration occurs. This process requires specialized test equipment tooperate correctly.

DEVICE PROGRAMMING

The device programming field loads new firmware onto the UVM controller. The field requires specialized programming equipment to operate correctly.

Note: Do not use this field unless under instruction from Titus.

MODULE CALIBRATION INFORMATION

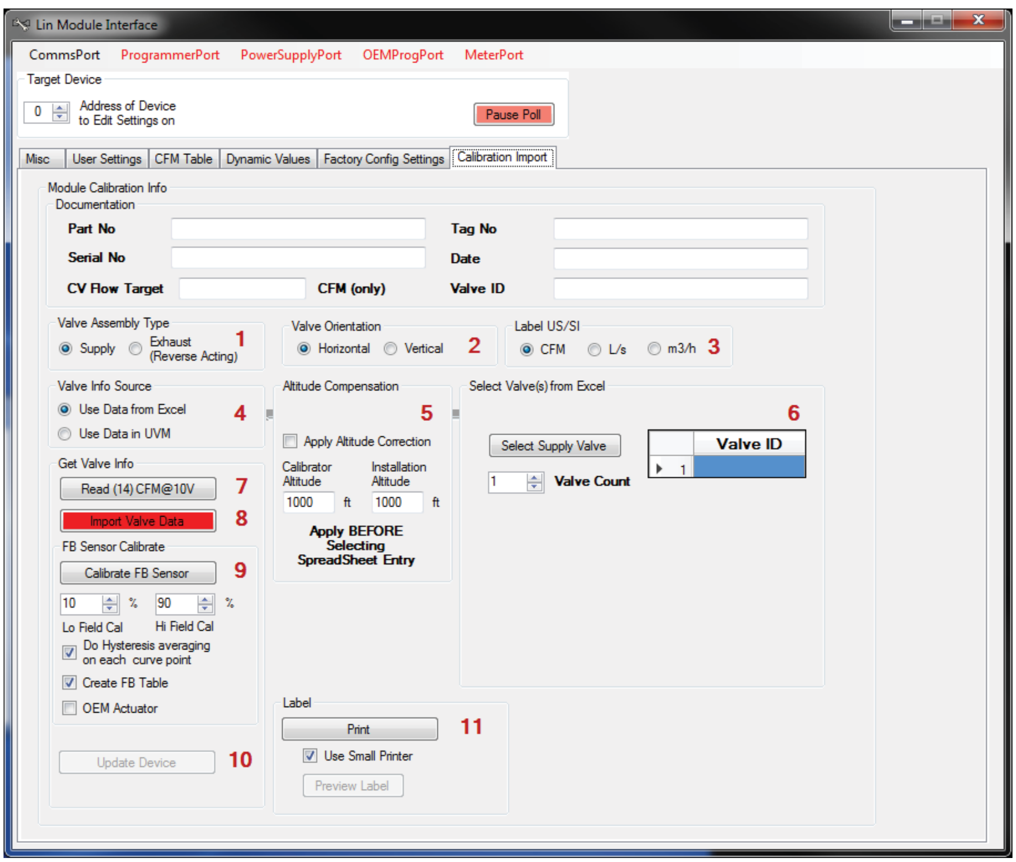
The factory uses module calibration information for setup of the UVM. The field enables the importation of the valve curves and valve data for inclusion in the UVM storage. The field also creates valve summary labels. You can calibrate the feedback sensor from the CFM Table tab.

Note: Do not use this field unless under instruction from Titus.

CALIBRATION IMPORT TAB

The calibration import tab enables the factory set up of the UVM.

FIGURE 46: CALIBRATION IMPORT TAB

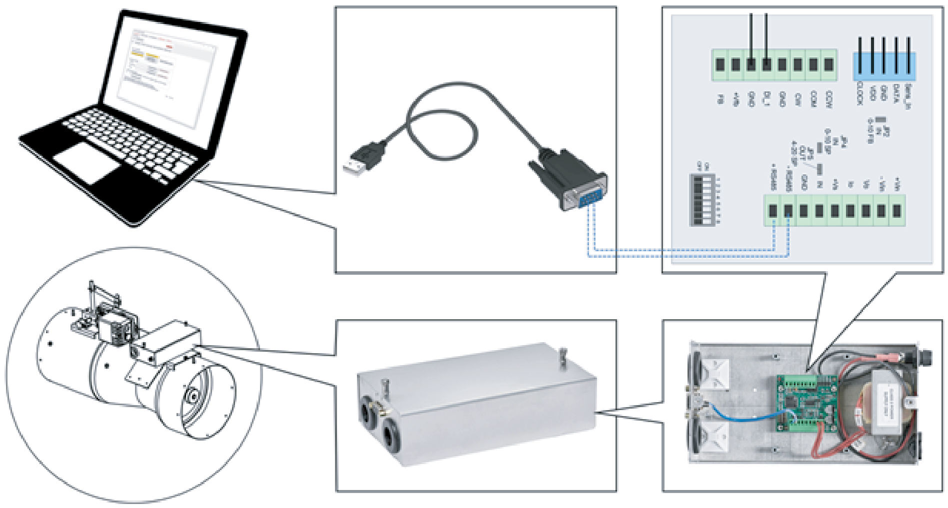


COMMISSIONING THE VENTURI AIR VALVE

Before you begin:

Ensure that the UVM Configuration Tool has successfully installed onto the laptop, the parent valve is connected to the UVM-CABLE, and communication is active.

FIGURE 47: VENTURI AIR VALVE COMMISSIONING SEQUENCE



1. To determine the pressure type of your valve, locate the part number on the valve .
2. Ensure you have the specified differential pressure measured across the valve at >90% positioning. Low Pressure between 0.3 in. W.C and 3 in. W.C, or medium Pressure between 0.6 in. W.C and 3 in. W.C.
3. Confirm you have the UVM and actuator configured properly for the open Fail-Safe Acting Mode. UVM Dip Switch SW1/5-ON: Reverse Acting, and Critical Environments (CE) fast actuator DS1 Switches 1-2 OFF: Fail Open.
4. Confirm you have the UVM and actuator configured properly for the closed Fail-Safe Acting Mode. UVM Dip Switch SW1/5-OFF: Direct Acting, and CE fast actuator DS1 Switches 1-2 ON: Fail Closed.
5. Ensure the controller analog output provides control signal scaled from 0 VDC to 10 VDC = 0 CFM to XXX CFM. Scaling Factor CFM is based on size and ganged data. See Table 5 for more information.
6. Ensure the controller analog input receives CFM feedback between 0 VDC and 10 VDC from the UVM, and is scaled between 0 VDC to 10 VDC = 0 CFM to xxxx CFM. Scaling Factor CFM is based on size and ganged data.See Table 5 for more information.

   For example: A single 8 in. valve with part number: JV-N-08-A-N-FA-P-H-M-U has a scaling factor of 800 CFM. For more information on minimum and maximum UVM scaling factors, see Table 5.

CHECKING THE COMMISSIONING WIRING

About this task:

To check that the Venturi Air Valve wiring is commissioned correctly, see the following steps:

1. Ensure the 0 VDC to 10 VDC control signal wiring terminates on UVM CN1 terminals IN and Ground.
2. Ensure the 0 VDC to 10 VDC CFM Feedback wiring terminates on UVM CN1 terminals VO and Ground.
3. Ensure 24 VAC is provided to the UVM and actuator in accordance with *UVM Installation Guide*. See Figure 18 for more information.

Use the following information as a guide for potential resolution of a site issue.

TABLE 11: TROUBLESHOOTING

Problem	Causes	Solution
Fume hood monitor in alarm; Room pressurization problem. Low static pressure across valve (<0.6 in. W.C; 150 Pa)	- Too many sashes open at one time - Sash open beyond maximum allowable position - Blocked or kinked pressure switch tubing	- Contact HVAC service maintenance contractor to inspect, verify and correct - Review operator sash movement
	- Incorrect valve position - Valve is not responding to input signal - Loss of pneumatics - Mechanical linkage is disconnected - Loss of power or electrical control signal - Broken sash cable - Monitor calibrated incorrectly - Incorrect wiring terminations	Contact HVAC service maintenance contractor to inspect, verify and correct.
Temperature control issues	- Reheat system issues - Thermostat malfunction - Air handler malfunction - Water valve response issues	Contact HVAC service maintenance contractor to inspect, verify and correct.
Valve banging	- Fluctuation in pressure that is out of acceptable design range - Lack of bypass damper control - Slow response to duct pressure control	- Adjust bypass damper control. - Install fast acting actuators; flow probes and VAV control; integrate into stand alone lab control. - Contact HVAC service maintenance contractor for inspection, verification and correction. Note: Exposing any Venturi Valve to excessive pressures that are outside of the range of specification may require the valve to be recalibrated and recertified at factory; potential damage to the valve may also occur.
Monitor indicates normal operation, but actual face velocity or flow is measured high or low.	Low or high static pressure	- Verify at least 0.6 in. W.C (150 Pa) across valve. - Connect a Magnahelic gauge across the valve taps. - For hood valves, check voltage at TB-16 at fume hood monitor. (>10 V=low static)

SERVICE AND MAINTENANCE

In light of the occupational hazards involved with treating patients confined to isolation rooms, or bio hazardous laboratories, it is best practice that a hospital or research lab room pressure sensor be inspected, re-certified, maintained, and recalibrated if necessary, at least once per year.

You do not need to lubricate, replace parts, or periodically service the Venturi Air Valve in any way. Proper installations and field startup ensure that the valves provide years of ongoing operation.

Ensure compliance with any owner or regulatory requirements that may mandate specified periods of inspection, maintenance, and re-calibration.

FURTHER INFORMATION

NVLAP CERTIFICATION

The National Voluntary Laboratory Accreditation Program (NVLAP) is a US federal program run by the National Institute of Standards and Technology (NIST) that provides third party accreditation to laboratories in the USA. NVLAP tests laboratories and not products, for accordance with ISO/IEC 17025:2005. NVLAP accreditation is available, but it is not required for commercial university and federal laboratories.

It is important to note that NVLAP accreditation to ISO/IEC 17025:2005 is no longer recognized as of November 30, 2020. As a result, NVLAP has developed a transition plan to ensure all NVLAPaccredited laboratories meet the requirements of the 2017 version of the ISO/IEC 17025 standard within the required time frame.

Competitors include this requirement as part of their specifications with the sole purpose of eliminating competitors. It adds no additional value to the performance of the product or the ability of a supplier to achieve excellent performance, accuracy and reliability for the end-users application.

Competitors still calibrate their Venturi Valves to the NIST Policy on Metrological Traceability standard same as Johnson Controls with the same accuracy of ±5% or 10 CFM, whichever is greater and use NVLAP certification to prevent competition. It is important to educate the customer and ask a few questions to clarify for the engineers involved, and explain that the NVLAP certification is not a true requirement for the performance, accuracy and reliability of the Venturi Valves.

DATA POINTS AND THE CALIBRATION PROCESS

The factory calibrates each individual Venturi Valve to 49 points, across the entire operational flow and duct static pressure range of the device, to ensure it meets the published performance specifications.

Some competitors use a 48 point calibration at only one static pressure, whereas Johnson Controls calibrates at least seven different static pressures to ensure pressure independence across the entire operating range of the Venturi Valve.

VENTURI VALVE CERTIFICATION

The electronics on the Johnson Controls Venturi Valves are UL certified.

VENTURI VALVE DUCT STATIC PRESSURE CHANGE RESPONSE

The Venturi Air Valve responds instantly. This is the main benefit of the Venturi Valve and its mechanical spring damper design. As the duct static pressure changes, so does the force on the damper and the spring in the damper assembly responds immediately. It repositions the cone inside the Venturi, to provide the same amount of air flow, independent of the pressure changes or fluctuations in the duct work. For this reason, the Venturi Valves are recognized as pressure independent air flow control devices.

Note: The pressure independence of Venturi Valves is only functional between 0.3 in. W.C to 3.0 in. W.C for low pressure and 0.6 in. W.C to 3.0 in. W.C for medium pressure applications.

VENTURI VALVE ACTUATOR CONTROL SIGNAL AND AIR FLOW RESPONSE

The fast acting actuators respond almost instantly to the controller signal and begin to move to the required position to meet the change in airflow requirement. The time it takes for the actuator to go from 0% to 100% is less than three seconds.

VENTURI VALVE AIR FLOW CONTROL ACCURACY

All Venturi Valves have an industry standard accuracy of ±5% or 10 CFM, whichever is greater.

VENTURI VALVE PRESSURE DROP

The pressure drop across a Venturi Valve is dynamic and not static. It can be anywhere between 0.3 in. W.C to 3.0 in. W.C for low pressure and 0.6 in. W.C to 3.0 in. W.C for medium pressure Venturi Valves. As long as the pressure does not fall below the minimum of 0.3 in. W.C for low pressure and 0.6 in. W.C for medium pressure, or exceed the maximum of 3.0 in. W.C, the Venturi Valve will maintain pressure independent flow control and function as intended. In order to get a true pressure drop reading across the valve, it must be measured during its operation conditions. When you calculate the pressure drop to determine the required Fan static, use any value between 0.3 in. W.G, or 0.6 in. W.G for standard pressure, and 3.0 in. W.G as the value across the valve. Typically the lower value is used plus some margin for static fluctuations.

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 the users will be required to correct the interference at their own expense.

Warning (Part 15.21)

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

Industry Canada Statement(s)

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage, et
2. L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

PATENTS

Patents: https://jcipat.com

PRODUCT WARRANTY

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

SOFTWARE TERMS

Use of the software that is in (or constitutes) this product, or access to the cloud, or hosted services applicable to this product, if any, is subject to applicable end-user license, open-source software information, and other terms set forth at www.johnsoncontrols.com/techterms. Your use of this product constitutes an agreement to such terms.

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