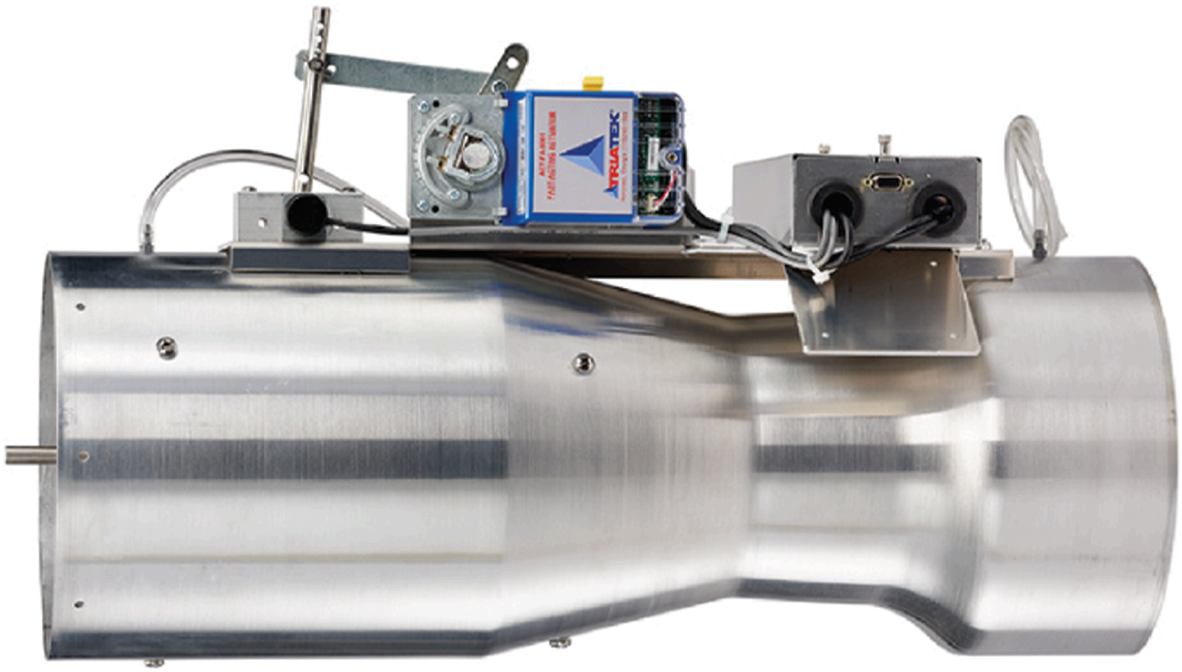
Venturi Air Valve Upgrade Kit Installation Guide



Air Distribution Technologies, Inc

www.airdistribution.com

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LIT-12014182

Contents

Overview

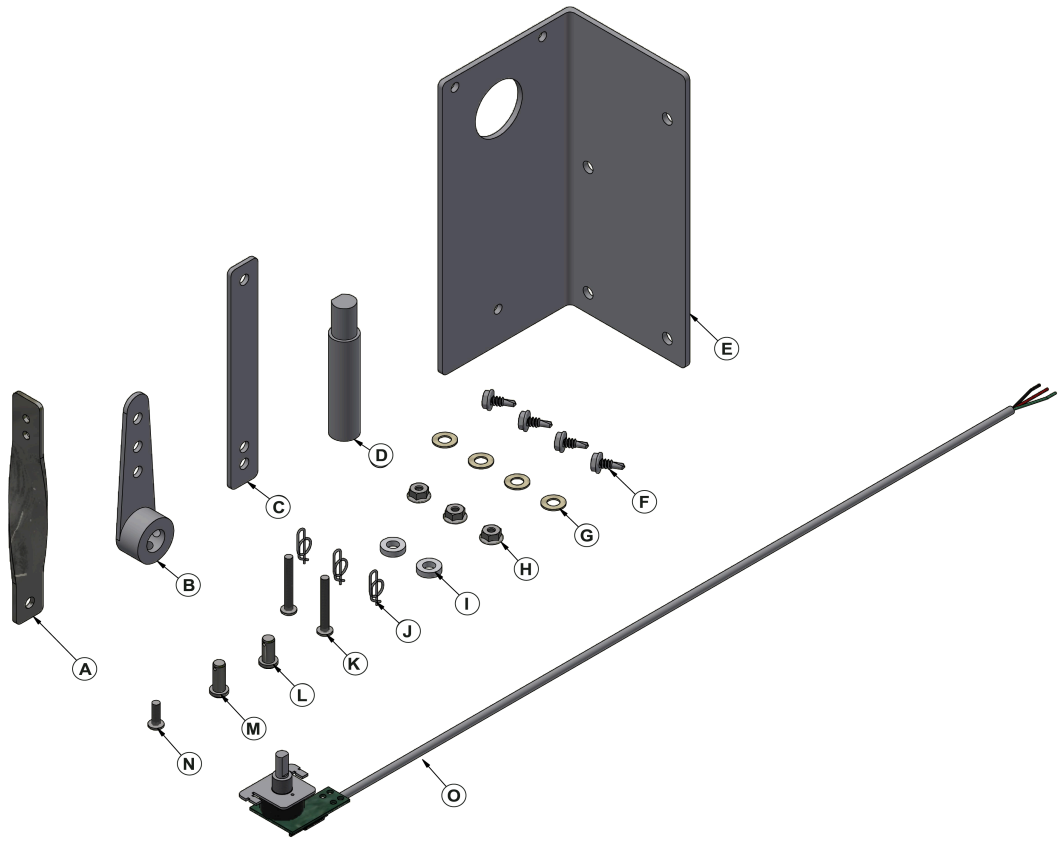
This installation guide instructs you how to upgrade and configure your Venturi air valve with a Triatek actuator and controls system. This guide also contains instructions on how to configure the Universal Valve Module (UVM1000).

Upgrade kit components

For a list of individual components, see the following table:

Note: The UVM1000 does not come included in the upgrade kit. You must purchase it separately.

Figure 1: Upgrade kit components



Item	Quantity	Part No.	Description
A	1	N-104111	Twisted crank arm connector dual gang upgrade
B	1	N-103938	Crank arm 1/2 in. 3 hole
C	1	N-105070	Retro kit 1/4 in. hole crank arm
D	1	N-104462	Shaft actuator coupler short
E	1	N-101860	Retro kit actuator bracket
F	4	N-106010	Sheet metal screw 5/16 in. x 1/2 in.
G	4	N-104750	Nylatron washer 1/4 in. hole, 0.262 in. ID

Item	Quantity	Part No.	Description
H	3	N-104162	Nut lock ZPS 8-32 nylon insert
I	2	N-104750	Nylon sleeve washer 1/4 in. ID x 1 in.
J	3	N-104341	Cotter rue ring SS302 F/14 in. SH
K	2	N-103895	Screw 8-32 x 1-1/4 in. RND PHIL
L	1	N-104702	Clevis pin 1/4 in. diameter x 1/2 in. length
M	1	N-104826	Clevis pin 1/4 in. diameter x 5/8 in. length
N	1	N-104653	Screw 8-32 x 1/2 in. SS PHIL PH
O	1	S-300253	Hall Effect position sensor assembly

Required equipment

The following pieces of equipment are required to install the upgrade kit to your Venturi air valve.

Note: The following pieces of equipment are not provided by Triatek.

Actuator and linkage set up tools

Example:

- Needle nose pliers
- Cordless 20 V drill
- Hex key set
- Screwdriver set
- 7/16 in. socket or wrench
- 5/16 in. socket or wrench
- 3/8 in. socket or wrench

UVM set up tools

- USB to RS485 cable - FTDI (Part No.: UVM-CABLE)
- Windows PC with USB port and UVM configuration tool software installed.
- Copy of *UVM-1000 Universal Valve Module Installation Guide* (LIT-12013155)

Additional documentation

You require the *Venturi Air Valve with UVM1000 Installation Guide (LIT-12014273)* to install the UVM successfully. The guide is provided with the module.

Ordering equipment

To ensure that you receive all the components to successfully upgrade your Venturi air valve, you need to order several items simultaneously. Typical single valve upgrade components order include the following items:

Table 1: Upgrade components

Component description	Part Number
UVM1000 linerization module	UVM1000
Necessary linkage hardware to connect the actuator to the valve shaft	VV-UPGRADE-KIT
UVM configuration cable	UVM-CABLE
Actuator	For actuator part numbers, see table

Table 2: Available actuators

SKU	Description	Document number
SM060-TK7	Triatek actuator TK7 70 in.lb O/C	LIT-12014157
BM060-TK6	Triatek actuator TK6 50 in.lb O/C	LIT-12014151
SM000-TK7	Triatek actuator TK7 70 in.lb last	LIT-12014156
BM000-TK6	Triatek actuator TK6 50 in.lb last	LIT-12014150

The number of valves you need to upgrade determines how many of each item you need to order. Each single valve requires its own UVM, actuator, and position sensor. For ganged valve upgrades, see Contact information.

Preparing to Install the Upgrade Kit

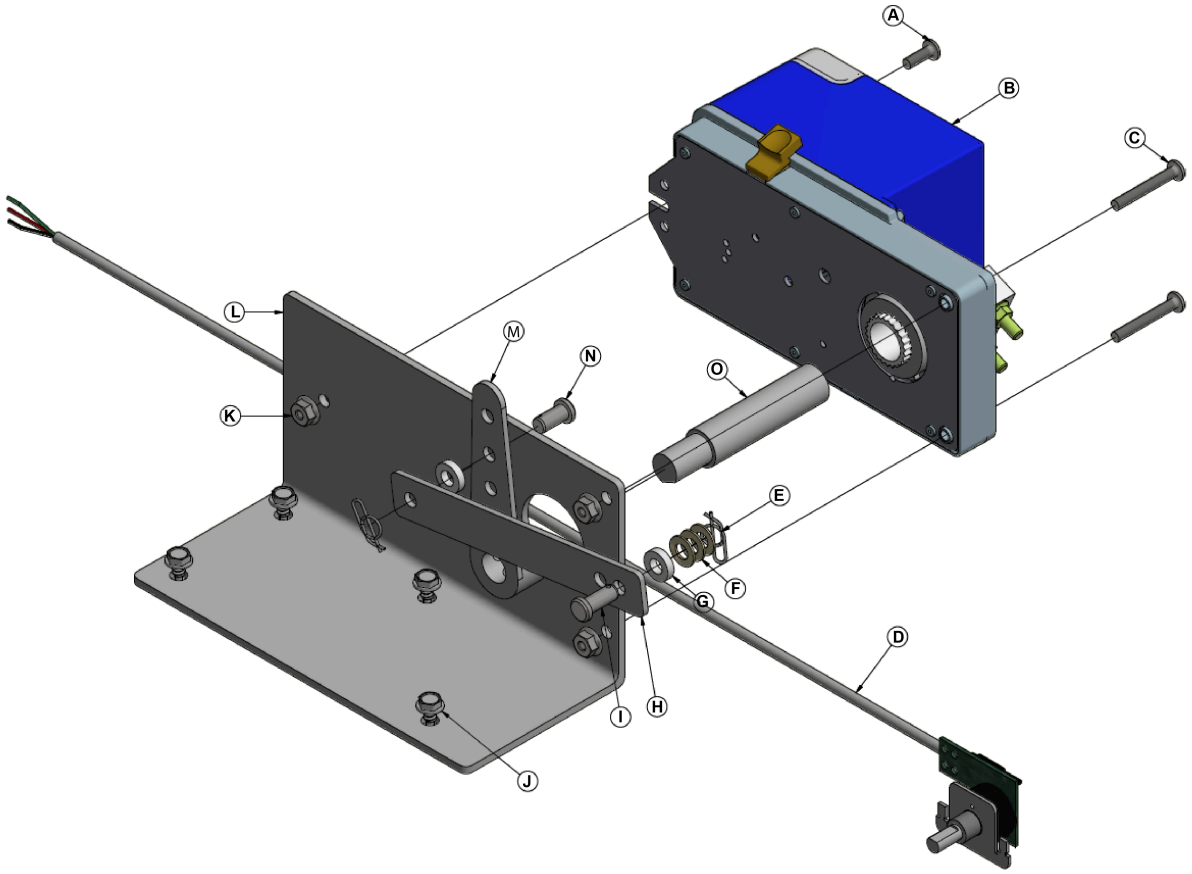
Before you install the upgrade kit, ensure the following preparations are completed.

Inspecting the valve

Important: If the Venturi valve displays any of the following symptoms, replace the valve:

- The valve rattles or makes noise other than the sound of air movement while air flows through the installed duct.
- Any sound of loose parts.
- Holes or cuts that compromise the envelope of the valve.
- Dents or deformations in the airflow regulation portion of the shell.
- Dents or deformations in the portion from the throat to the air inlet.
- The rectangular control lever is stuck, is hard to move, is not uniformly smooth in its action, or cannot travel its full range of movement.
- Damage to the lever pivot point or the airtight shroud at the pivot point.
- Damaged or loose lever pivot point or air seal.
- Connection point for the Hall Effect position sensor is bent, stripped, or loose and does not move smoothly with the lever when it is moved back and forth.

Figure 2: Preassembled actuator



ⓘ **Note:** Keep the coupler secure. Replacement couplers are not available.

Item	Quantity	Description
A	1	Screw 8-32 x 1/2 in. SS PHIL PH
B	1	Actuator 50 lb -fast-O/C-ACTFA9001-BM060FN(TK5)
C	1	Screw 8-32 x 1-1/4 in. RND PHIL
D	1	Hall Effect position sensor assembly
E	1	Cotter rue ring SS302 F/14 in.
F	4	Nylatron washer 1/4 in. hole, 0.262 in. ID
G	4	Nylon sleeve washer 1/4 in. ID x 1 in.
H	3	Upgrade kit 1/4 in. hole crank arm
I	2	Clevis pin 1/4 in. diameter x 5/8 in. length
J	3	Sheet metal screw 5/16 in. x 1/2 in.
K	2	Nut lock ZPS 8-32 nylon insert
L	1	SH Upgrade kit actuator bracket
M	1	Crank arm 1/2 in. 3 hole
N	1	Clevis pin 1/4 in. diameter x 1/2 in. length
O	1	Shaft actuator coupler short

Installing the Upgrade Kit

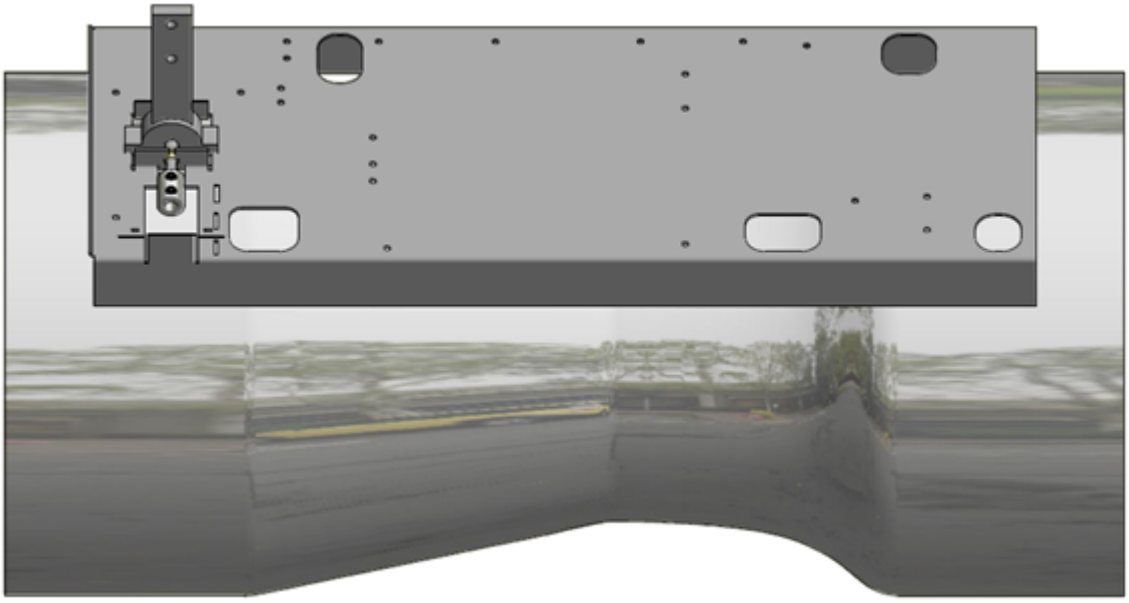
To install the upgrade kit, see the following instructions:

Assembling the actuator and linkage hardware

Before you begin:
Inspect the valve and the valve location to ensure safe and convenient working conditions.

1. Remove the controls and actuator from the valve so that the mounting plate is ready for the new actuator assembly. Do not to remove the bolts that secure the mounting plate to the valve body.
2. Use a hex key to loosen the old coupler set screws to remove the old position sensor. Slide the sensor forward onto the shaft pin to clear the old position sensor shaft.

Figure 3: Venturi air valve with old position sensor removed

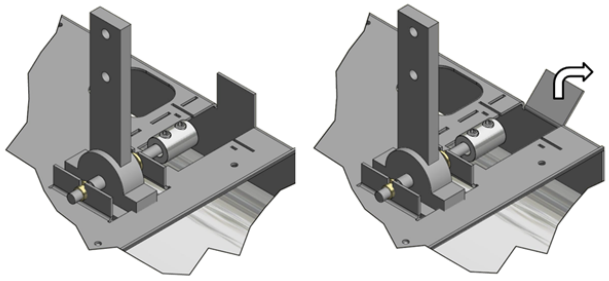


3. Use pliers to twist the two tabs that hold the position sensor bracket in place and remove the old position sensor. Replacement couplers are not available. Do not lose the coupler.
4. Check the valve for visible signs of damage. For more information, see Inspecting the valve.
5. Preassemble the actuator and linkage hardware onto the mounting bracket. For a visual example, see Figure 2.

Installing the position sensor subassembly

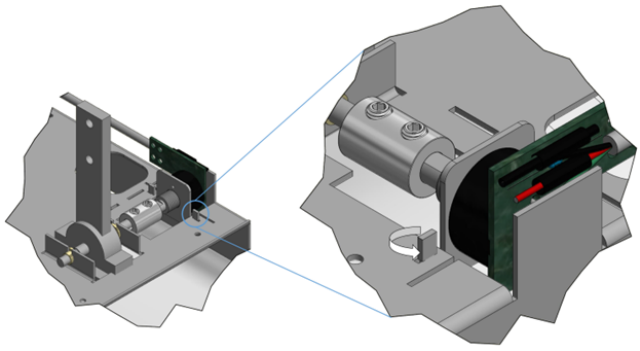
1. Remove the position sensor cover. Use pliers to bend the guard tab outwards to give space for the position sensor assembly installation.

Figure 4: New position sensor assembly



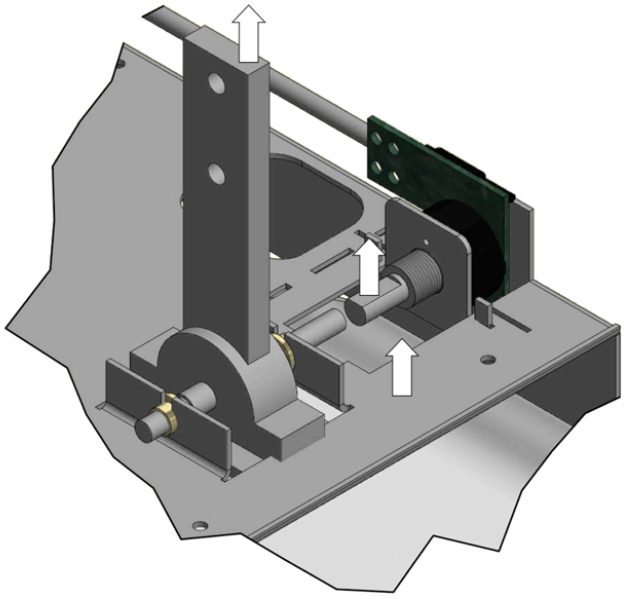
2. Place the small bracket tabs at the sensor end of the position sensor assembly into the two corresponding slots in the mounting plate from below. Use pliers to twist the tabs 45°. Do not twist the tabs further as it may cause them to shear off.

Figure 5: Position sensor subassembly



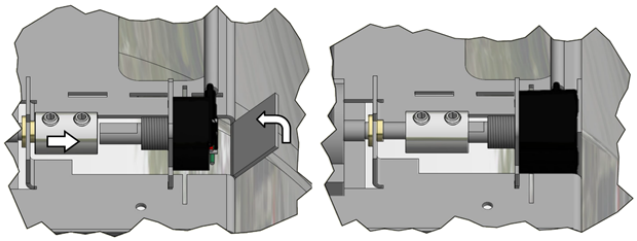
3. Ensure the flat face on the position sensor shaft faces outwards and parallel to the plane of the mounting plate. Position the cone shaft perpendicular to the mounting plate.

Figure 6: Flat face position sensor



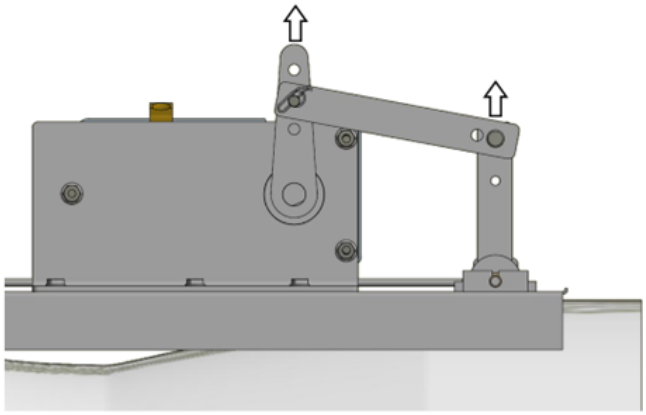
4. Align the flat face of the position sensor shaft with the vertical control lever shaft. Move the coupler to connect with the cone shaft pin and the position sensor shaft. Use a hex key to tighten the coupler set screws.

Figure 7: Coupler and cone shaft pin



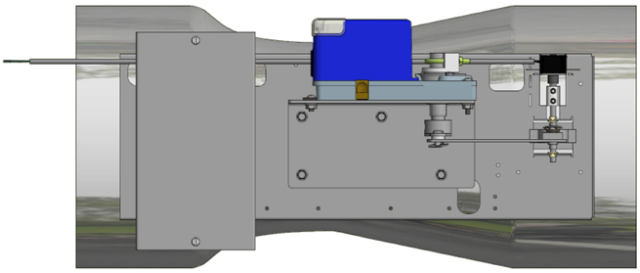
5. Connect the preassembled actuator with linkage hardware to the valve cone shaft. When the actuator is in the 50% position, the crank arm is 90° from the mounting plate when connected to the valve cone shaft in its vertical position. The connection bracket is in the horizontal position for optimal operating range.

Figure 8: Crank arm



6. Ensure the actuator can move the valve through its entire range and does not limit the cone shaft travel from 0% to 100%. To ensure the actuator moves, press the yellow clutch button on the actuator, which disengages the gears and allows for the free movement.
7. Press the clutch and move the shaft through its full range. The full range of the valve is not reduced by the actuator. The motion must be smooth with no interference utilizing the entire range of the valve cone shaft travel.
8. Check the alignment of all the brackets and adjust as necessary before you tighten the crank arm with the actuator shaft.

Figure 9: Bracket alignment



9. Mount the actuator assembly bracket to the valve mounting plate with the provided fasteners. Do not drill though the valve body.
10. Mount the UVM1000 onto the valve.

Dual gang valves

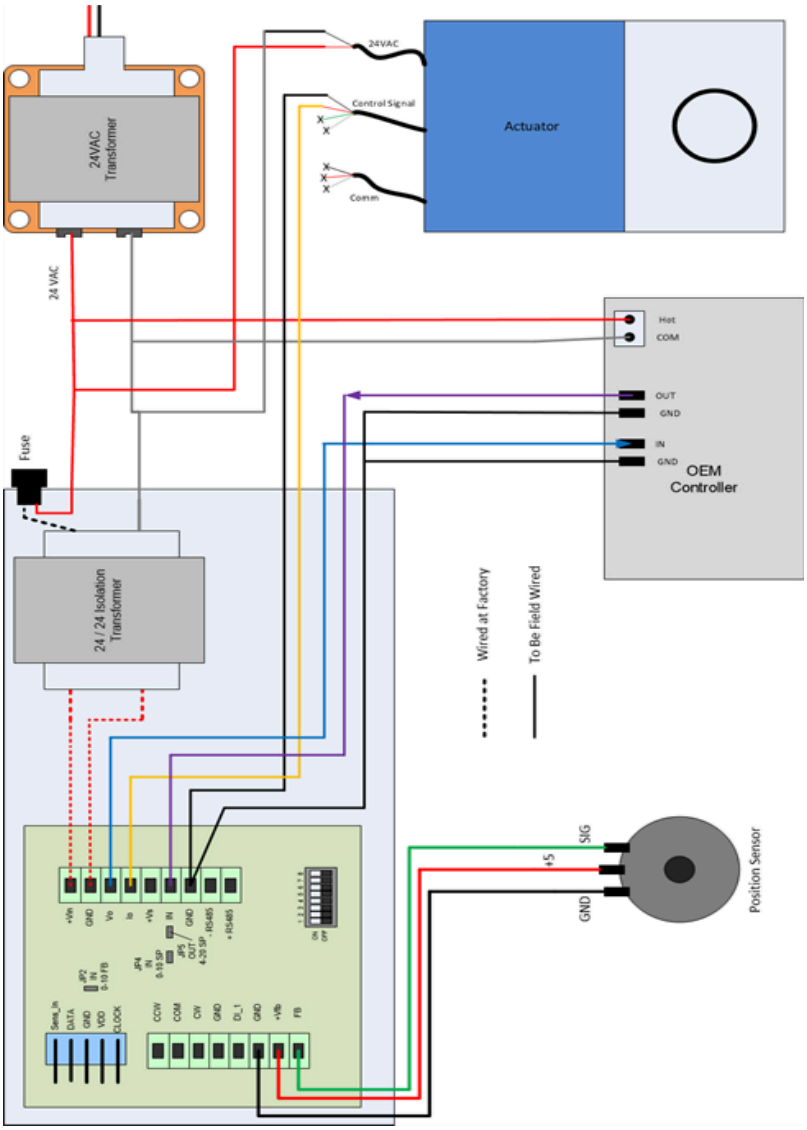
If a single pneumatic actuator actuates a dual valve, you need to utilize the twisted connector linkage bracket to connect valves to a single actuator.

Wiring the UVM

Before you begin:
For more information about the installation and wiring processes, refer to the *Venturi Air Valve with UVM1000 Installation Guide,* (LIT-12014273).

1. See the wiring directions in the following figure to connect the position sensor and actuator with the UVM1000.

Figure 10: Wiring diagram for connecting the UVM1000



2. Use the following to help you set the UVM DIP switches correctly:

Figure 11: Controller DIP switch positions

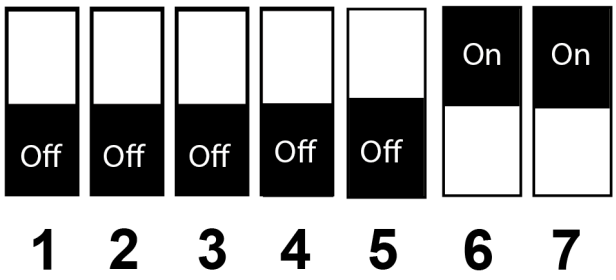


Table 3: Controller DIP switch settings

Switch number	Position	Description
1 to 4	Off	Controller address to create address 1 to 15
5	Off	Normal
6	On	CFM/Positive input
7	On	CFM/Positive output
8	n/a	Output not used

3. Use the following to help you set the actuator DIP switches correctly:

Figure 12: Actuator DIP switch positions

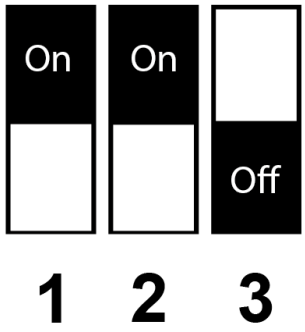


Table 4: Actuator DIP switch settings

Switch number	Position	Description
1	On	CCW rotation
2	On	CW failsafe closed
3	On	mA
4	n/a	Output not used

ⓘ **Note:** To use CCW failsafe open, set DIP switch 2 to off.

4. If the valve is an exhaust, it may need to operate in reverse acting mode depending on your situation. Otherwise, set the valve in normal mode. See the following images for the required DIP switch configuration.

Figure 13: Normal acting mode

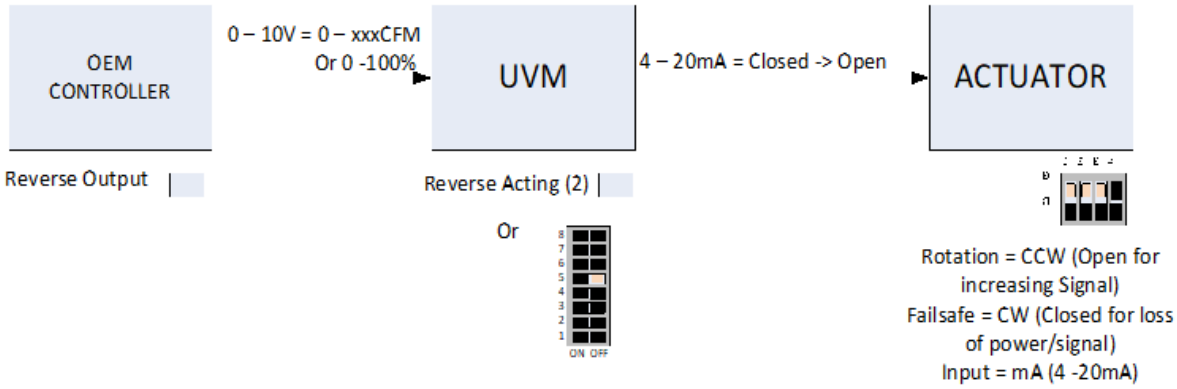
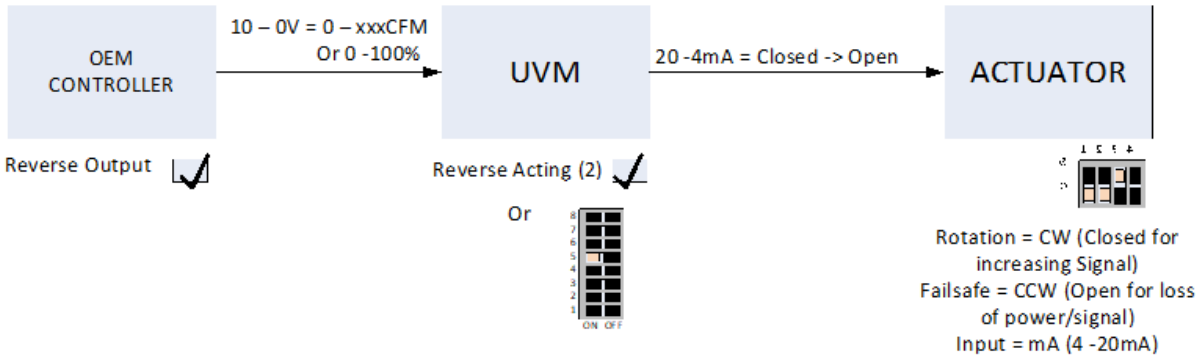


Figure 14: Reverse acting mode



UVM Setup

When you wire the UVM , use the UVM Configuration Tool to perform the set up and calibration.

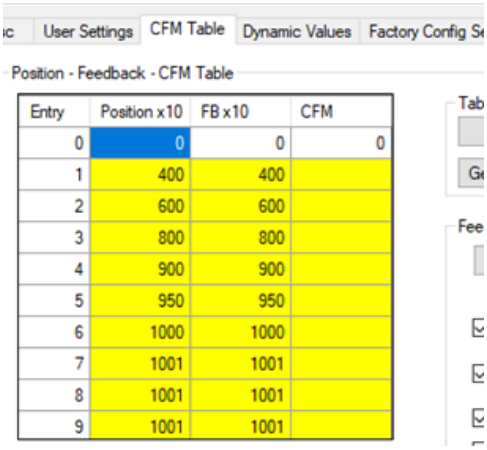
Setting up the UVM

1. To stroke the actuator, push the small black button next to the actuator DIP switches. The actuator cycles between the 0% and 100% end stops and determines the 0% and 100% positions.
2. Connect the + and - to the UVM communication terminals on the UVM (RS485 + -). Typically, the + wire is orange and the - wire is yellow.
3. Insert a **USB to RS485 communications cable** into the PC. Use the PC's device manager or equivalent tool to determine the Comm port that the USB device has connected to.
4. Start the **UVM Configuration Tool** program on the PC.
5. Use the **Comms Port** tab to set the port determined in step 3, and the baud rate to 9600. Click **Set**. If you use the same cable in the future, the program remembers and the port does not need to be set again.
6. Ensure the spin box with **Address of Device to Edit Settings on** is at the same address that the UVM's address switches are set to. This is typically 0.
7. Click the **Get All Settings From Device** button. The button is grayed out. Wait until the button turns black again. The UVM Configuration Tool now has all the settings from the UVM. To save these settings to the PC, click the **Save Displayed Values to File** button.
8. Click the **User Settings** tab
9. Set the **10V on IN =** scaling factor to a value relevant for the valve. Typically this is set as 700 for 8 in. valves, 1100 for 10 in. valves, 1600 for 12 in. valves, and 2200 for 14 in. valves. Click the **Set 10V CFM** button to set the value into the UVM. Record the value to ensure it matches the scaling used in the OEM controller.
10. In the **Permanents** Controller State Settings panel, select the **Use AI Setpoint** and **Use DIP Switches** checkboxes. If you use a DP switch, select the **Use DI as DP** and **DP Switch NC** checkboxes as appropriate. All other checkboxes remain unselected.
11. Ensure that the actuator and the UVM have the correct Normal/Reverse settings selected. On the UVM, the direction of travel for the actuator and valve is through the DIP switch if you select the **Use DIP Switch** checkbox. If the **Use DIP Switch** checkbox is not selected, select the **Norm/Reverse** checkbox.

Calibrating the UVM

1. Click the **CFM Table** tab.
2. If the retrofit valve is a Phoenix unit, click **Phoenix Valve Volt to Pos Utility**. A dialog box appears. Input the voltage and CFM information available on the valve sticker into the dialog box. Include the maximum and minimum voltages.
3. Input the previous values into the rest of the 0 cells . If there is no voltage/CFM chart available, manually measure the test and balance readings and enter the values. Select a range of positions and input them in the Position x 10 and FB x 10 columns. For example, values without decimal point go under the x 10 column, therefore 25% is 250. The suggested values are 0, 400, 600, 800, 900, 950, and 1000.

Figure 15: CFM feedback table



4. Override the actuator. To override the actuator, refer to the *UVM Configuration Tool Manual*. Take the CFM readings at the selected positions of 0%, 40%, 60%, 80%, 90%, 95% and 100% if you use the example in the previous image. Remove the override when completed. Enter the CFM values in the CFM column of the table against the position they were read at.
5. Click **Set CFM Entries** > **Set Feedback Entries**.
6. Calibrate the FeedBack sensor. If you used the **Phoenix Valve Volt to Pos Uitlity**, select the **This is Phoenix Valve Data** check box. Otherwise, do not select the checkbox if you used test and balance readings to fill the table with an overridden actuator. Select the **Auto Populate FB Entries** checkbox. Select the **Do Hysteresis averaging on each curve point** check box if a more accurate result is required, which can take twice as long as normal.
7. Set the **Actuator Stroke Time** to a few seconds longer than the actuator stroke time, for example, 4 seconds for 3 second actuators.
8. Ensure that there is air pressure on the cone, otherwise there needs to be an equivalent pressure in the direction that air would normally generate on the lever during the calibration process. This removes any slack or hysteresis in the calibration process.
9. Click the **Calibrate FB Sensor** button. The PC program overrides and drives the actuator to the 0% and 100% positions and then to each of the positions in the chart and take readings from the sensor. This populates one of the columns in the chart and sends the data to the UVM. There may be a difference of +/- 5% in the FB sensor raw values from the actuator position. This process corrects for that difference. The position mismatch is due to the geometry of the linkages between the actuator and the position sensor. The PC program flags any errors greater than +/- 5%.

Further Information

Switching to Air Distribution Technologies, Inc from another building automation system (BAS

To switch from one BAS to another, the owner needs to create a program in the new BAS. This program needs to use the same I/O points to perform the lab balance. The BAS manufacturer or installer can complete this programming. Triatek can assist with the programming, and work with the owner to verify if the program functions correctly, if needed. This includes BAS such as Delta, Tridium, Honeywell, and Siemens.

Updates to ADTI BAS Software

Since the UVM does not control the valves, any changes to the BAS software involves the BAS only. Therefore you do not need to update the air flow controls. If the BAS update significantly changes the controller, the programming may need a major overhaul. However, the BAS manufacturer can manage the change. If you observe obscure or false readings on the updated BAS, Triatek can verify the data on the BAS. This includes BAS such as Delta, Tridium, Honeywell, and Siemens.

Gateway requirement for the completed system

There are no gateways in the UVM-based system. The room controllers are standard BAS controllers with BACnet MS/TP capability.

Maintaining the existing pneumatic system

Electronic controls have replaced pneumatics on all upgraded valves. The current pneumatic system does not require continued maintenance for the laboratory control system to function.

Displaying fume hood face velocities on the monitor

The Triatek sidewall sensor reports true and accurate face velocities to the fume hood monitor. The side wall sensor does not calculate face velocity readings based on valve position and does not display them on the fume hood monitor. On a constant volume fume hood, the fume hood monitor displays the true face velocity constantly as the sash raises and closes. On a variable air volume fume hood, the vertical sash sensor determines 95% of the face velocity flow as the sash rises. The sidewall sensor calculates the last 5% of the flow. This functionality is described as trimming out the final flow through the face of the fume hood. The sidewall sensor also displays the true face velocity value, even if there is an obstruction in the fume hood. For example, if half of the sash is blocked, the sidewall sensor takes over and reduces the airflow to compensate for the obstructed area to maintain the face velocity set point. The fume hood monitor also displays this value. The combination of the sash sensor and sidewall sensor creates a safer fume hood.

Maintaining the typical lab air flow system

For critical air flow systems, conduct an annual inspection of all components to ensure functionality and accurate readings. Triatek can train your employees to perform some of these tasks.

Lighting on the fume hood monitor

If the fume hood monitor is in an alarm condition, one of the parameters is out of range. The parameters consist of low flow, high flow, sash position, and face velocity. If a parameter is out of range, there are several possible solutions:

- Adjust the sash into its correct position
- Ensure that the exhaust operates correctly
- Ensure there is power connected to the fan and controls

You can program alarms into your BAS to send an alert to appropriate personnel when the fume hood monitor signals an issue.

Note: If your fume hood controller is the HMS1655, refer to the *HMS-1655 Fume Hood Controller Installation Instructions (LIT-12013211)* for more information.

Switching a constant volume (CV) fume hood to variable air volume (VAV) fume hood

If the fume hood already has a valve that can provide VAV (locked in CV mode), you need to reconfigure the fume hood from CV to VAV through the control panel on the Triatek fume hood monitor. Triatek can train your employees to perform this task. In some cases, you may need to upgrade the valve. For more information on how to switch to a VAV fume hood, see Contact information.

Advantages of the Hall Effect sensor provide and differences from a potentiometer

The potentiometer provides actuator arm feedback and valve position to the BAS. This feedback can indicate if a valve does not function correctly. As part of the UVM upgrade, the Hall Effect Sensor replaces the potentiometer. A potentiometer is an adjustable resistor which consists of a wiper that slides across a resistive strip to increase or decrease in resistance. The level of resistance determines the output of current to the circuit. This physical contact results in wear to the wipers and resistance strip over time, which could result in dead spots. These dead spots render the potentiometer faulty. A Hall Effect sensor is a transducer that varies its output voltage in response to a magnetic field.

The Hall Effect sensor uses a non-contact method that features magnetic resistance similar to a hard drive. The advantage of this technology is that due to the lack of friction, the Hall Effect sensor has a much longer lifespan than a potentiometer.

Locating the fume hood controller away from the valve in a more easily accessible location

There are five components to control the fume hood:

- Sash sensor
- Sidewall sensor
- Fume hood monitor
- Fume hood controller (HMS)
- The UVM on the exhaust valve

The sash sensor, the fume hood monitor and sidewall sensor are all mounted on the hood. The fume hood controller can be located away from the fume hood exhaust valve, preferably on top of the fume hood itself. The advantage to separating the fume hood controller form the valve ensures you can place it in a more accessible location. The UVM is mounted on the valve.

Upgrading the valve and UVM if Triatek upgrades their firmware

Use the 10-pin connector on the back of the UVM to change the firmware. This creates a connection between the UVM and the firmware programming tool. Connect the firmware programming tool to a laptop to upgrade the firmware. Triatek can train staff on how to upgrade the UVM firmware.

Replacing an upgraded valve

The valve owner needs to order a new Triatek UVM valve body that meets the current specifications such as air flow and CFM to voltage scale. To remove the valve body, disconnect it from the power and controls. Place the new UVM valve into position. Wire the new valve to the power and controls. When you return power to the valve, the valve functions correctly. You do not require new programming as the BAS is already programmed for the valve. The owner can upgrade the valve. If the UVM fails, purchase and install a new UVM.

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.

Product Warranty

This product is covered by a limited warranty, details of which can be found at https://www.airdistribution.com/sales-terms/

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 ?? Your use of this product constitutes an agreement to such terms.

Single Point of Contact

US
AIR DISTRIBUTION TECHNOLOGIES, INC. 605 SHILOH RD. PLANO, TX 75074

Contact Information

Find Triatek service and support: https://www.triatek.com/product-support/service-and-support

Contact Triatek: https://www.triatek.com/contact-us