Note: Due to continuous product improvement and development, Triatek reserves the right to change product specifications without notice. Please contact Triatek Technical Support for any questions or concerns you may have on the latest product improvements.

Technical Support:
Factory telephone support for all Triatek products is provided from 8:00AM-5:00PM EST Monday through Friday by calling 888-242-1922 or 770-242-1922. Product information is also available at www.triatek.com.
**Setup Overview:**

1. Valve is calibrated at Triatek
2. The valve label indicates the calibration values at set positions
3. Set controllers for a 0-10Vdc
4. Set the output airflow scale based on your valve size
5. Set your feedback signal voltage the same as the CFM scale
Introduction

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

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

Overview of Operation

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

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

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

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

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

The factory default settings relative to valve size are:

- 8 inch valve 10V = 800 CFM
- 10 inch valve 10V = 1100 CFM
- 12 inch valve 10V = 1600 CFM
- 14 inch valve 10V = 2300 CFM

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

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

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

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

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

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

INTRODUCTION / OVERVIEW OF OPERATION

Figure 1. Basic Functionality of the UVM

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Digital Input DP Switch

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

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

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

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

Figure 2. UVM Use with DP Switch
Universal Valve Module (UVM)

Figure 3. UVM with Pressure Sensor

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

This signal only provides positioning information for the VAV box. The feedback sensor signal is replaced by the VAV box flow probe pressure signal. This voltage signal is scaled and converted to an internal pressure value. The pressure value is then square-rooted and multiplied by a K factor to obtain an internal velocity value. The velocity value is multiplied by a duct area value to obtain an internal CFM value. This CFM value is then scaled to the appropriate voltage, passed to the Vo feedback voltage signal for use by the third party controller. The scaling, K factor, and area can be set by the user with the UVM Configuration Tool.

Figure 4. UVM use as a VAV Interface
Other than through the UVM Configuration Tool, the user does not have access to any settings or operating modes of the UVM. The exception is that the input and output signal modes and the normal/reverse operation can be set via the DIP switches if that functionality is enabled in the UVM.

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

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

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**Figure 5. UVM Module DIP Switch Functions**
The later version (S series revisions) is capable of being configured to sum CFMs over the RS485 network and output the summed equivalent on the Vo of the unit designated to be primary. The primary unit is the unit designated with hardware address 15. Secondary (polled) units are units with address 16 on-wards. The primary unit specifies how many units to poll from address 16 on-wards. See the *UVM Configuration Tool* manual as to how this is setup.

*Figure 6. UVM Controller Utilizing UVMNet to sum CFM values*
Installation and Setup

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

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

Figure 7. Universal Valve Module Wiring
Normal-Reverse Operation

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

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

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

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

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

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

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

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

*Figures 8 and 9 are on next the page.
Universal Valve Module (UVM)

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**SUBHEAD**

**Universal Valve Module (UVM)**

**INSTLLATION AND SETUP**

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**Figure 8. Normal Operating Mode**

**Figure 9. Reverse Operating Mode**

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CFM / Percentage Selection

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

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

Valve Flow Integrity (DP Switch)

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

Figure 10. DP Switch Connections
DP Switch Connections

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

![Pressure Sensor Wiring Diagram](image-url)

Figure 11. Pressure Sensor Wiring
Should the UVM be supplied without the valve and any pre-wiring, then the following items are required to wired to the unit.

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

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

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

Figure 12. Position Sensor / Actuator Wiring
Universal Valve Module (UVM)

INSTALLATION AND SETUP

Figure 13. Dual Valve Operation
Headquartered in Norcross, Georgia, Triatek has been on the forefront of designing and manufacturing innovative airflow solutions for critical environments since 1985. Triatek provides complete end-to-end solutions for healthcare facilities and laboratories including Venturi valves, room pressure controllers, fume hood controllers, monitors, sensors, actuators, and more all designed to seamlessly integrate into a facility’s building automation system.

Triatek’s customer service is unparalleled. Our product support system includes on-site installation, phone support, repairs, calibrations, and in-depth training sessions.

From our knowledgable engineers and sales team to our talented field technicians, Triatek goes above and beyond to ensure our products are installed correctly and our customers’ critical environments are working properly.