



APPLICATION GUIDE

# OpenAir™ Damper Actuator Best Practices

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# Application and Installation Best Practices

This guide covers installation best practices for Roof Top Units (RTU), Fire and Smoke and Variable Air Volume (VAV) applications.



In rooftop units, the damper actuator controls the economizer, or outside air damper. This application would potentially require a spring return, and the torque value of that actuator is going to vary based on the features and the size of the economizer or damper.

Fire and smoke applications require a spring return actuator but the cycle time is much faster than a typical spring return actuator. Fire and smoke actuators also need to be life safety rated. Torque requirements for fire and smoke applications vary with the size of the fire/smoke damper.

VAV or variable air volume terminal applications typically require a lower torque non-spring return actuator.

## Rooftop Units (RTU):

A packaged unit installed on the roof which contains all air conditioning components.



## Fire and Smoke applications:

A device installed within an HVAC system, that closes automatically upon the detection of heat in accordance with UL standard 555 and 555S.



## Variable Air Volume (VAV):

Type of heating, ventilating, and/or air-conditioning system which supply a variable airflow at a constant temperature.



# Rooftop Units (RTU)

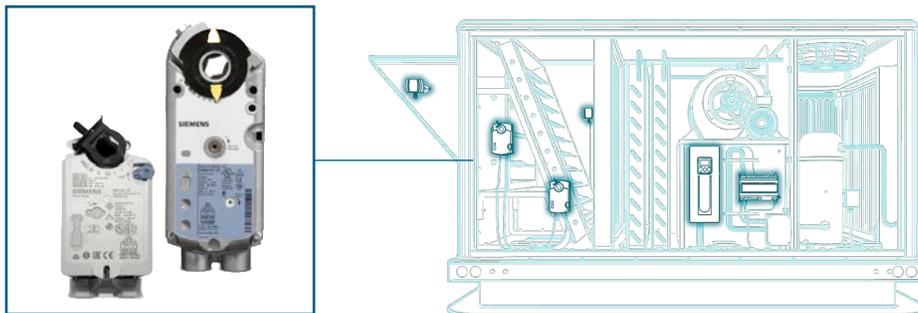
Rooftop units are a popular application and can be seen on the top of buildings.

Rooftop Unit issues that directly relate to the damper actuators are seen in the Economizer or Outside Air Damper space. An economizer is a style of damper for when the outdoor conditions present themselves and allow for free cooling to the unit. An example could be when there is a current ambient temperature of 55 degrees Fahrenheit outside, but it is still warm within the indoor space, and some cool air is required to reach a current set-point. Instead of running compressors to create cool air within the RTU and have it pumped into the zone with the fan, the controller will command the damper actuator to fully open the Economizer or Outside Air Damper and will use the outside ambient air instead. This is "free cooling" since there isn't a need to have the actual compressors working to create the cool air you require.

The number one issue for economizer dampers is when they aren't functioning properly, and in most cases AT ALL. Roughly 70% of all economizers in the field are not functioning properly, and this is typically due to either not

being fitted with an actuator in the first place or using an improperly sized actuator. An example of this occurred when visiting a customer site and assisting with some troubleshooting on a handful of rooftop units. Within a minute of being on the roof, the technician noticed the economizer dampers weren't functioning on the 7.5 ton and 12 ton units that were installed at this location. It was a brisk morning and the units could have of easily been taking advantage of the cool ambient air. The technician found that the actuators were improperly sized and had the incorrect control signal for this application. An assessment of the damper was made by estimating the torque requirement and the technician picked a proper actuator to fit. The technician chose a GPC actuator on the 7.5 ton unit and a GMA on the 12 ton unit, both of which are spring return style actuators that have 24V power, modulating 2-10 control signal and built-in positional feedback, as these are the most common types for economizer damper control.

Properly setting up the economizer damper on the Rooftop Unit is crucial for a building to be energy efficient since it utilizes the cool ambient air when it is available and gives the RTU components and equipment a much-needed rest.



## Rooftop Units (RTU):

Contains all air conditioning components, including:

- Evaporator Coil • Fan • Compressor • Condenser

**Issues** found typically on RTU's are inoperable Outside Air Dampers or Economizer Dampers:

- 70% of economizer dampers in the field are not working properly
- Typically not correctly fitted with an electric damper actuator

**This can easily be solved** by properly fitting the Economizer Damper with a modulating actuator (typically 2-10 Vdc) that provides a feedback signal to the unit to notify position.

**Main benefit** of this would be energy savings of the RTU, by having the unit open the Economizer Damper which then allows the fan to pull in cool, fresh air when available; instead of running the unit at full load to cool the air.

# Fire and Smoke

The most effective fire protection plans includes three key factors: detection, suppression and containment which require both an active and a passive fire protection system.

**Active fire protection** includes all systems designed to suppress or extinguish fire once it has started, as well as aid in the evacuation of occupants.

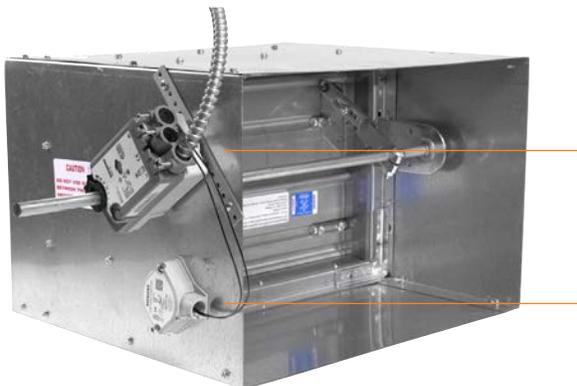
**Passive fire protection** is designed to prevent smoke, toxic gases, and fire from spreading, and by compartmentalizing fire. Passive fire protection systems strengthen the effectiveness of active systems by facilitating occupant evacuation (protect people) and minimizing property damage (protect property)

Siemens damper actuators fall under passive fire protection, and are designed to open/close when the electronic fusible link (EFL), or temperature sensing device senses an increase in heat. With an increase in heat, the EFL cuts power to the actuator and the mechanical spring drives the actuator to the correct open/close position based on the system design.

For Fire, Smoke and combination fire and smoke dampers, ALL of these actuators must be installed directly by the OEM damper manufacturer, to ensure the proper installation per UL555/UL555S codes, so there won't be handling swapping out the actuators in the field.

Siemens offers four torque sizes and ground up designs. OpenAir Fire and Smoke damper actuators are designed to reduce risk and deliver better life safety performance with the only actuator that uniquely integrates with our patented electronic fusible link that is simple and connects easily.

These actuators come with a 5-year warranty, are made in the USA and have been listed with the California Fire Marshall. While maintaining a compact design, this line ranges from 20 lb-in, all the way up to 200 lb-in. The right device matters to operate a fire and smoke damper system, not only is it important to meet the UL555 and UL555S standards, it is imperative that the devices used mitigate any risk to life safety, are long-lasting and reliable when needed.



#### **Damper Actuator:**

Drives the damper to OPEN or CLOSE. Must be qualified along with the damper and tested to UL Standards 555 and 555S.

#### **Electronic Fusible Link (EFL):**

A heat responsive device cuts power to the electronic damper actuator, and the actuator's spring return mechanism closes the damper when it reaches a certain temperature level.

#### **Fire and Smoke applications:**

A device installed within an HVAC system, that closes automatically upon the detection of heat in accordance with UL standard 555 and 555S.

**A common issue** associated with fire and smoke damper and actuator installations is the lack of periodic cycle testing done on-site after installation, which is required per UL code.

**Solved by** the manual override button located on the Siemens Electronic Fusible Link, which will simulate the fusible link "tripping" or hitting a temperature limit and cause the actuator to fail-close/open.

All smoke and combination fire-smoke dampers are required to have an actuator. Fire dampers can also be supplied with an actuator, but it is not required and is relatively rare.



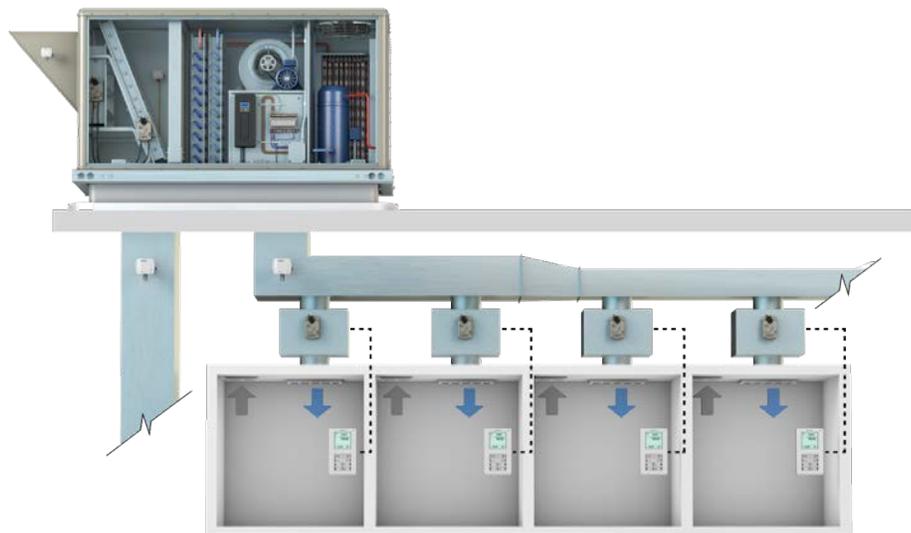
# Variable Air Volume (VAV)

The way a typical variable air volume (VAV) application works is that the rooftop unit provides airflow with a constant temperature. The damper actuator in each VAV terminal box controls the temperature in its zone by opening and closing a damper.

What this means is that the actuator is constantly being repositioned to maintain the zone's correct air temperature. A potential pain point that may be experienced is failure of the actuators due to these constant repositions. One thing for sure is that a durable damper actuator is needed for this application and one of the features of Siemens VAV damper actuators is that they are rated for 5 million repositions and 100,000 full cycles to ensure a long product life.

Another potential pain point in VAV applications is incorrect installation of the actuator to the VAV terminal unit. Improperly installed actuators can put undo strain on the damper, potentially causing damage to the damper which in turn would cause the VAV terminal unit to fail prematurely.

Siemens' single screw, self centering shaft adapter helps to ensure correct installation. Our patented design not only aids in correct installation, but it also simplifies installation to save. Whether installing the actuator offsite or in the field, easier and more accurate installation will always save installers time and money.



## Variable Air Volume (VAV):

Type of heating, ventilating, and/or air-conditioning system which supplies a variable airflow at a constant temperature; compared to the Constant Air Volume (CAV) which provides a constant supply of airflow at a variable temperature.

### Concerns when specifying a damper actuator:

- Constant repositioning of VAV terminal unit damper is required in order to maintain correct zone temperature
- Correct engagement of damper actuator to damper drive shaft is imperative in order to get the full life out of a VAV terminal unit

# OpenAir Electronic Damper Actuators

More torque, greater energy efficiency, and long-lasting reliability gives you an ideal solution for all your HVAC equipment needs.



**40+ Years**

Innovating control actuators



**1.5+ Million**

OpenAir reposition operations for longer life



**60+ Thousand**

Full strokes at rated torque and temperature



**100%**

Factory tested



**25%**

Lower power consumption



**20%**

More torque than the competition

Rely on Siemens for the best possible system performance.  
The right HVAC device matters to make your perfect place a reality.

**Siemens Industry, Inc.**

Building Products  
1000 Deerfield Parkway  
Buffalo Grove, IL 60089-4513  
USA  
Tel. 847-215-1000

**Siemens Canada Limited Headquarters**

1577 North Service Road East  
Oakville, ON L6H 0H6  
Canada  
Tel. 905-465-8000