HVAC Economizers 101
Section #8

Dampers:
Types, Actuators, and Characteristics
Section #8-Dampers: Types, Actuators, and Characteristics

- Economizers on many Central AHU are custom ordered for the job specific requirements.

- Economizers on packaged RTU are normally ordered as an option with the package.

- Control dampers can be either: parallel or opposed
Economizer damper will have either direct connect Actuators bolted directly to the damper or they will be installed with a shaft and linkage arrangement (more prone to fail)
Parallel Blade Damper Characteristics Have Poor Linear Control

Figure 3
Parallel Blade Damper Flow Characteristics

Installed flow characteristics at different damper authorities (1-100 %)

% Maximum Flow

Damper Position Degrees Open

Control Signal

Courtesy T.A. & Co.
Opposed Damper Characteristics Have Better Linear Control

Figure 4
Opposed Blade Damper Flow Characteristics

Installed flow characteristics at different damper authorities (1-100%)

% Maximum Flow

Damper Position Degrees Open

Control Signal

0 10 20 30 40 50 60 70 80 90 100

0 10 20 30 40 50 60 70 80 90 100

Courtesy T.A. & Co.
Damper Actuators are Controlled by Either a Voltage (2-10 vdc) or Current (4-20 ma) Signal from the Controller

![Diagram of damper actuator control signals]

1. 24 VAC Transformer
2. Line Volts
3. 4 to 20 mA
4. Control Signal
5. 2 to 10 VDC Feedback Signal
6. 500Ω
7. 1 Common
8. 2 + Hot
9. 3 Y1 Input, 2 to 10V
10. 5 U Output 2 to 10V

AF24-LIN US

Courtesy Belimo
Exercise #8
(Provide Answers below on notes page)

1. Which fan system has custom ordered dampers, the packaged RTU or the central AHU?

2. If a parallel damper receives 50% of the control signal, how much air flow will there be on 10% authority of the dampers?

3. If an opposed blade damper receives 50% of the control signal, how much air flow will there be on 10% authority of the dampers?

4. Which damper actuator is less prone to fail, direct connect or shaft/coupling connected, and why?

5. What are the two most common control signals used with damper actuators?