

**DIGI-VAV™**



**Bes-Tech**

Saving Energy. Building Comfort.

# DIGI-VAV

Digi-VAV measures true fan airflow using embedded patent technology and measuring CO<sub>2</sub> concentration levels of the outside, return and supply air. Minimum airflow at each terminal box is reset, optimizing outside air intake of the AHU-chilled water/DX coil, and supply-air static pressure reset resulting in a reduction in cooling/heating of excess airflow and fan power

## Problem:

- Needless airflow results in excessive heating /cooling energy consumption
- Fixed minimum outdoor air intake ratio at AHU level
- Fixed minimum air flow rates at terminal box level
- Cannot guarantee fresh air requirement levels are achieved
- High install and ongoing maintenance cost with individual CO<sub>2</sub> sensor
- Compressors short cycle at low load conditions

## Solution:

- Resets minimum airflow for each zone to satisfy indoor air quality requirements based on zone occupancy schedules and supply air quality
- Resets outdoor air intake ratio based upon building occupancy conditions
- Resets static pressure based upon building load measured by fan airflow
- Optimize compressor staging to reduce or eliminate short cycling

# DIGI-VAV

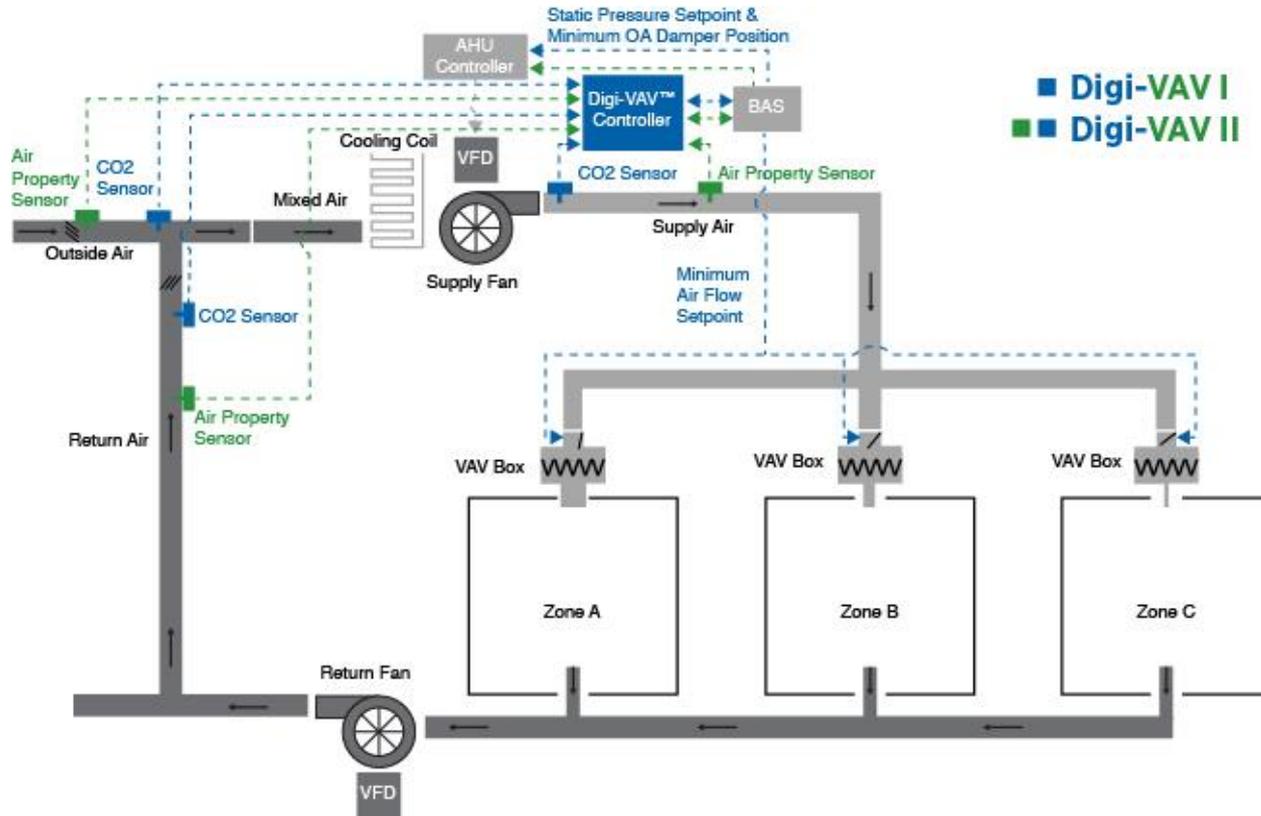
## Features:

- Resets
  - minimum airflow of each terminal box
  - minimum outside air intake based upon building occupancy condition
  - static pressure based upon true airflow measured by speed and power of the VFD
  - Compressor staging

## Benefits:

- Decreases heat/reheat energy consumption between 30 - 80%
- Lowers cooling energy consumption between 10 - 25%
- Reduces fan power consumption between 30 - 50%
- Decrease DX unit compressor power by 20%
- Reduce DX cycling by 70%
- Reduce air leakage and noise at terminal box
- Complies ASHRAE Standard 62.1 & CA Title 24 air quality
- Eliminates the need for individual CO<sub>2</sub> room sensors

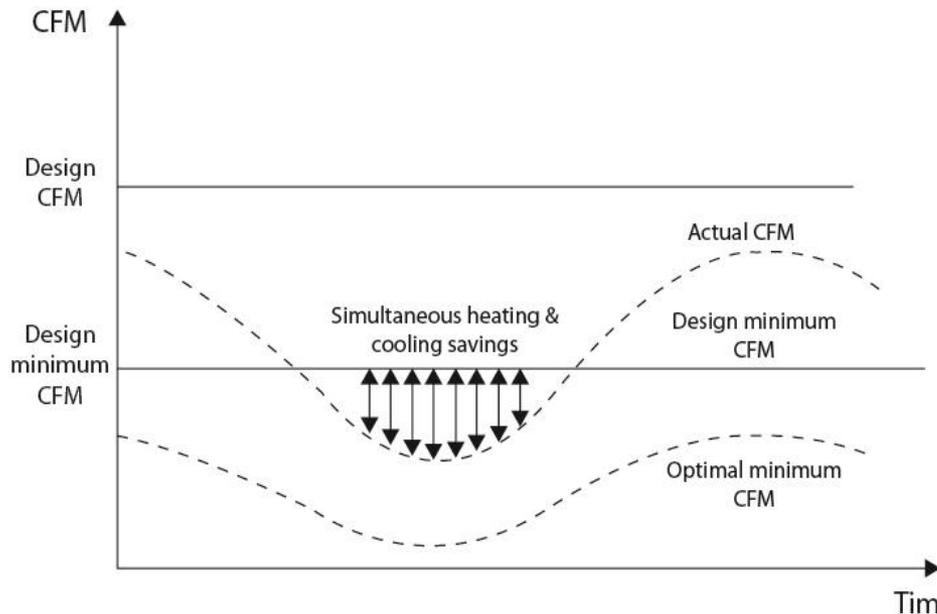
# DIGI-VAV



optimized air flow for large single duct VAV systems

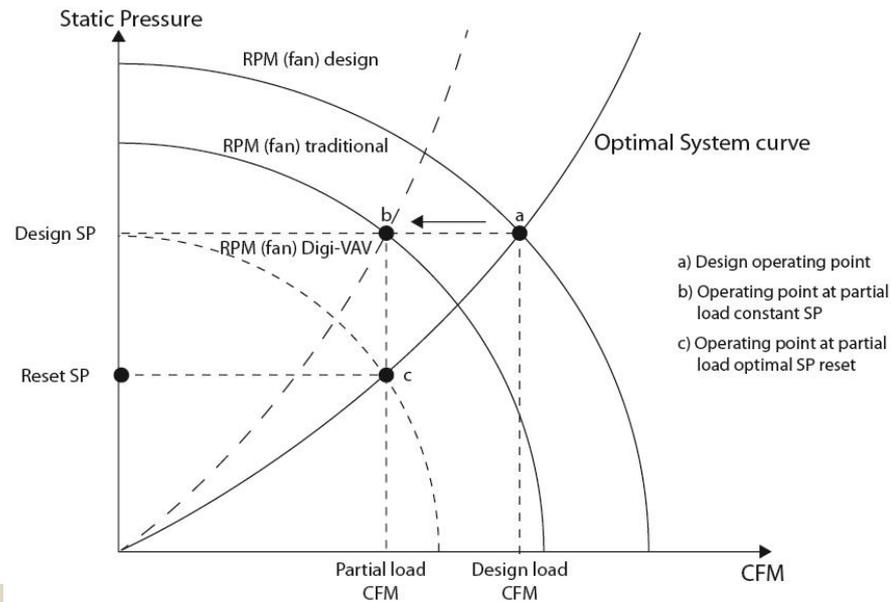
# CFM TERMINAL BOX MINIMUM AIRFLOW

Traditional	Digi-VAV
<p>Minimum airflow set at a constant design level meeting IAQ requirements in worst case scenario. (typical 30% of design maximum airflow)</p>	<p>Digi-VAV measures the actual supply air freshness with CO<sub>2</sub> sensors in the outside, return &amp; supply air ducts, that reset terminal box minimum airflows through the BAS.</p>
<p>When the actual space load drops below the design minimum, it creates an oversupply of conditioned air. This consumes needless re-heat and cooling energy.</p>	<p>When building occupancy is low or in economizer mode, the supply-air freshness is high. The total required airflow to the room can be lowered and still achieve the required amount of fresh air. While reducing or eliminating simultaneous heating and cooling.</p>



# FAN SPEED CONTROL

Traditional	Digi-VAV
Fan control set at a constant static pressure.	As actual measured space load changes, Digi-VAV resets the static pressure to remain on the optimal point of the system curve.
At partial loads, the space requires less airflow, the system curve moves to left and rests at an inefficient point on the fan curve. Running the fan at a higher speed than necessary.	Fan speed is adjusted to remain on the optimal system curve while continuing to deliver the required air flow but more efficiently.



# OUTSIDE AIR INTAKE CONTROL

Traditional	Digi-VAV
Supply constant minimum outside air based on design occupancy.	Resets the minimum outside air to a lower value when building occupancy is low, saving heating and cooling energy.
At partial occupancy, excessive outside air is supplied to the space wasting heating and cooling energy.	

# COMPRESSOR STAGING CONTROL

Traditional	Digi-VAV
Stages the compressor(s) to maintain a constant supply air temperature (typically 55° F).	Stages compressor(s) based on supply air temperature high/low limits and measured supply airflow.
Causes compressor(s) short cycling and system inefficiency during partial loads.	When supply air temperature is higher than the high limit or supply airflow is high, compressor(s) are staged “up”.
Condenser and evaporator are partially utilized under partial load conditions	When supply air temperature is lower than low limit or supply air flow is lower than low limit, compressor(s) are staged “down”.
	Reduces compressor(s) short cycling and improves system efficiency saving energy.

# ECONOMIZER CONTROL

Traditional	Digi-VAV
<b>Maintain mixed air temperature set point to avoid mechanical cooling when outside air temperature is lower than 60F (adjustable) for DX unit.</b>	<b>Maintain the supply air temperature at the set point by modulating the outside air temperature when the outside air temperature is lower than the set point. No mechanical cooling occur.</b>
<b>Low economizer range to avoid compressor hunting</b>	<b>Modulate both outside air damper and staging to maximize the free cooling and ensure smooth compressor staging when the outside air temperature is higher than the set point and the enthalpy is lower than the room air enthalpy.</b>

# FAQ

## How does Digi-VAV save energy?

- Digi-VAV dynamically resets minimum airflow of each terminal box based on the supply air quality and zone occupancy status. This allows lower and more accurate minimum airflow set-point, reducing needless heating and cooling at the terminal box
- Digi-VAV dynamically resets the supply duct static pressure based on measured building load. Digi-VAV lowers the duct static pressure set-point allowing the fan to run at lower speeds
- Digi-VAV perform DCV plus function to minimize outside air intake during hot summer and cold winter
- Digi-VAV doubles the free cooling for DX units.

# FAQ

**Does Digi-VAV communicate with the AHU controller or terminal box controller?**

- No, Digi-VAV communicates via the BAS controller providing revised set-points for supply static pressure, minimum OA damper, and terminal box minimum airflow

**Do the existing supply fan VFDs need to be replaced?**

- No

**Where is the Digi-VAV mounted?**

- Inside the mechanical room or next to the AHU

**Install time for the Digi-VAV unit?**

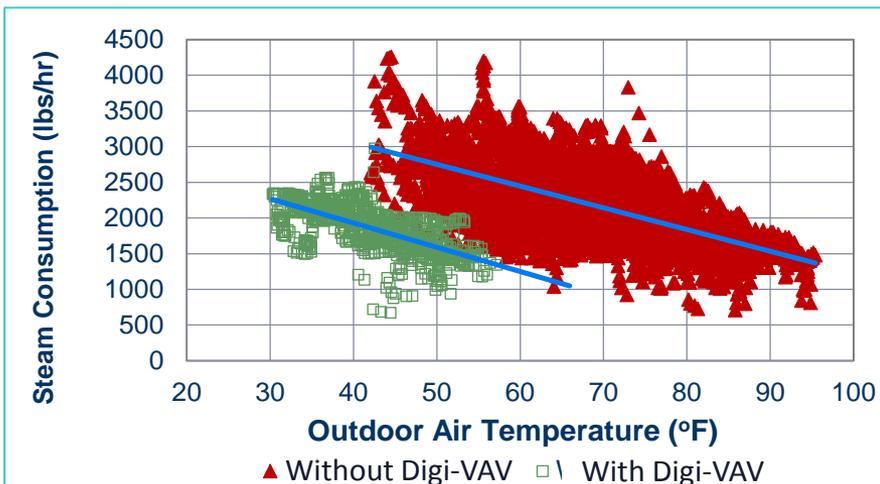
- 3-hours for installation, and 30-minute programming per terminal box

# DIGI-VAV CASE STUDY

- Omaha, NE
- 134,000 sq. ft.
- Classrooms, offices, laboratories
- Two SDVAV AHUs
- Siemens Apogee



Steam-heat usage reduced by 54%



Fan power reduced by 66% (kW)

