



VARIABLE AIR VOLUME SYSTEMS

Comfort. Energy Savings. Sustainability.



PRICE VAV DIFFUSER SYSTEMS

High-performance air systems demand modern design approaches with leading-edge products and technology in order to optimize comfort and reduce energy consumption.

A comfortable environment is achieved by providing the smallest possible zones of temperature control, allowing for individual temperature distribution and better air movement. Reduction in energy is realized by designing a low-pressure HVAC system that allows for maximum turndown while maintaining temperatures.

PRICE VAV DIFFUSER SYSTEMS PROVIDE:

- D Comfort**

With each VAV diffuser acting as an individual zone of control, every area of a building can have separate, optimized temperature settings. The individual occupant selects a personal comfort setting, and average temperature is maintained within 1.5°F/0.9°C. Price VAV diffusers provide a constant discharge velocity with improved comfort as a result of higher throw, reduced dumping, improved room air movement and uniform temperature distribution.
- D Energy Savings**

Price VAV diffusers allow for low-pressure, low-energy consumption systems. Our energy-efficient VAV diffuser systems prevent overcooling and overheating – resulting in 10%–47% energy savings when compared to other HVAC systems. Energy savings is produced from three sources: small zones, low turndown and pressure drop and low system pressure.
- D Sustainability**

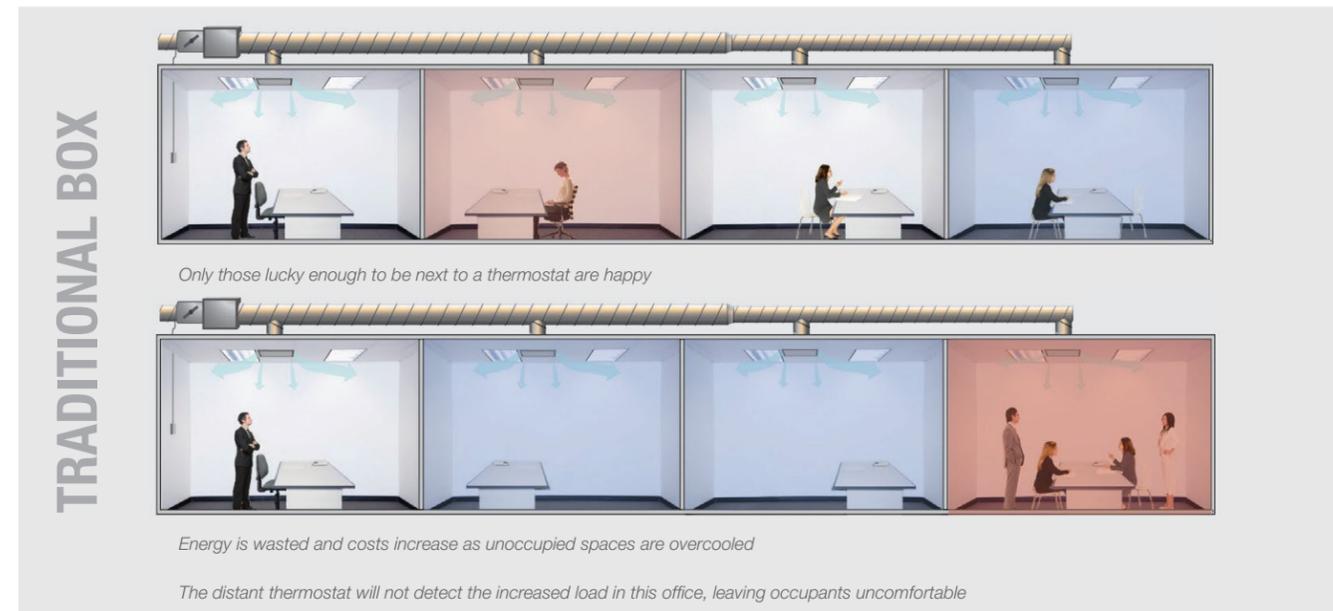
Sustainable buildings are designed to be environmentally responsible and resource efficient throughout their life cycle. For sustaining long-term usefulness, Price’s VAV diffuser systems are exceptionally adaptable to office changes. No diffuser zone is split when office walls are put up or moved. The modular concept and flexibility provided by a VAV diffuser system guarantees that any changes in the floor plan need not trigger expensive and disruptive changes to the HVAC system.

COMFORT

Personal thermal comfort stems from appropriately sized zones of control. Creating many small zones provides exceptional levels of control, leading to outstanding occupant comfort.

Individual Thermostat Control

VAV diffusers are a cost-effective and practical way to provide this level of personalized control. Each VAV diffuser has an individual thermostat and built-in damper, allowing it to act as an individual VAV zone of control. The damper is continuously adjusted to vary the volume of airflow (warm or cold) into the room in response to room temperature and set point.



Better Room Air Mixing

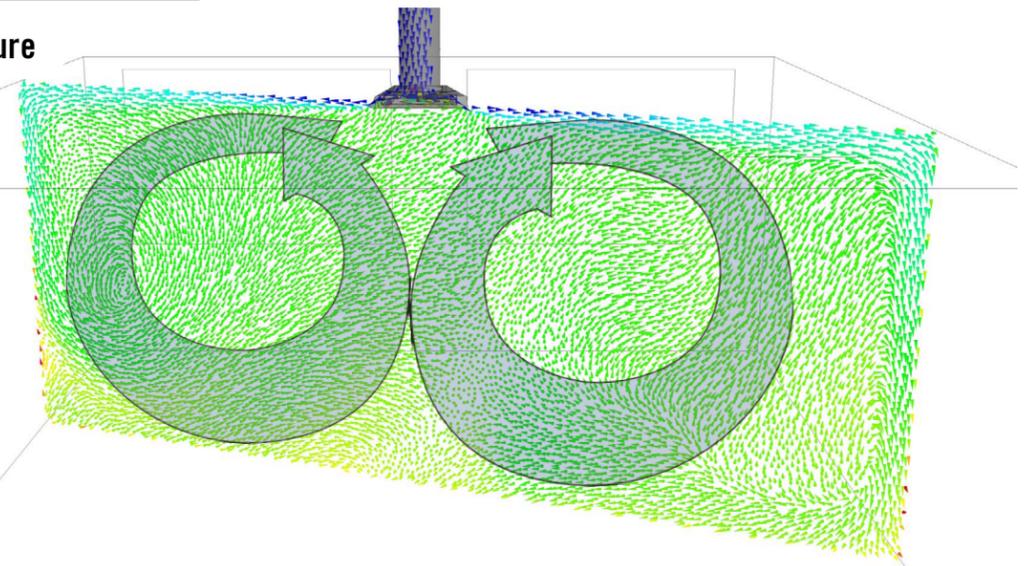
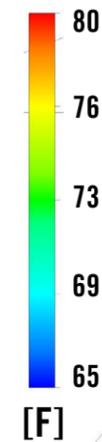
With an adjustable damper built right in, VAV diffusers are able to enhance occupant comfort by varying the discharge opening as they vary air volume. The result is an almost-constant discharge velocity, with the benefits of a better throw, no dumping, a higher level of room air movement and a uniform temperature distribution, even at low supply air volumes.

Room Mixing Comparison

Computational fluid dynamics (CFD) analysis shows effective room air mixing with the VAV diffuser both at 100% open (top) and at 25% open (bottom).

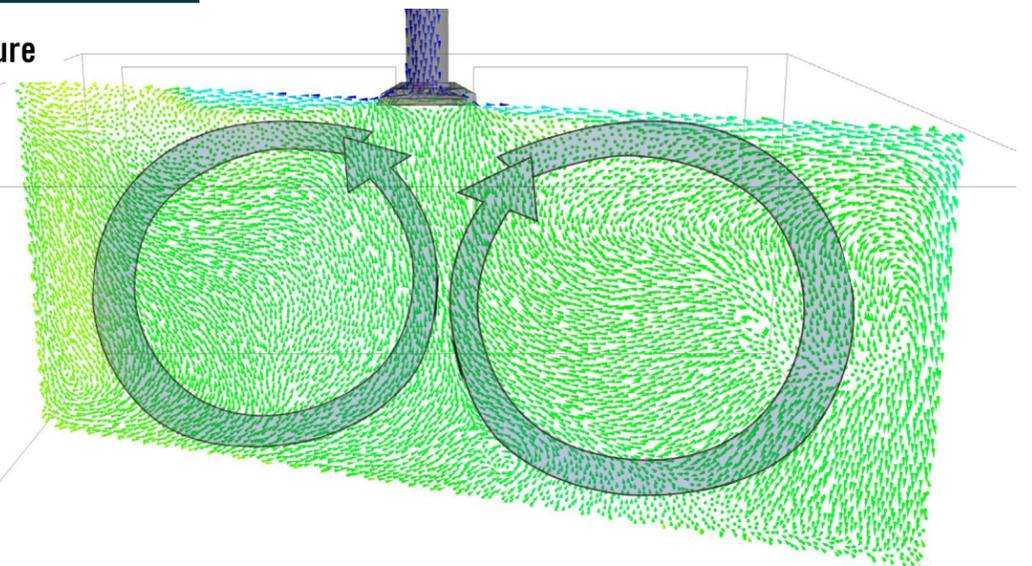
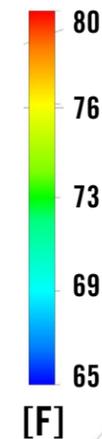
CFD analysis at 100% airflow

Temperature



CFD analysis at 25% airflow

Temperature



ENERGY SAVINGS



Savings from Three Sources

VAV diffusers allow for low-pressure, low-energy consumption systems. The energy savings of systems designed using VAV diffusers can be broken down into three main sources:

- Small zones
- Low turndown and pressure drop
- Low system pressure

Small zones

Many small zones provide individual temperature control to prevent overcooling or overheating when spaces are unoccupied.

Low turndown and pressure drop

VAV diffuser systems do not have a velocity limitation because pressure independence is achieved by measuring only static pressure. The static pressure damper in a VAV diffuser system may be oversized to minimize pressure drop without the penalty of increasing minimum flow.

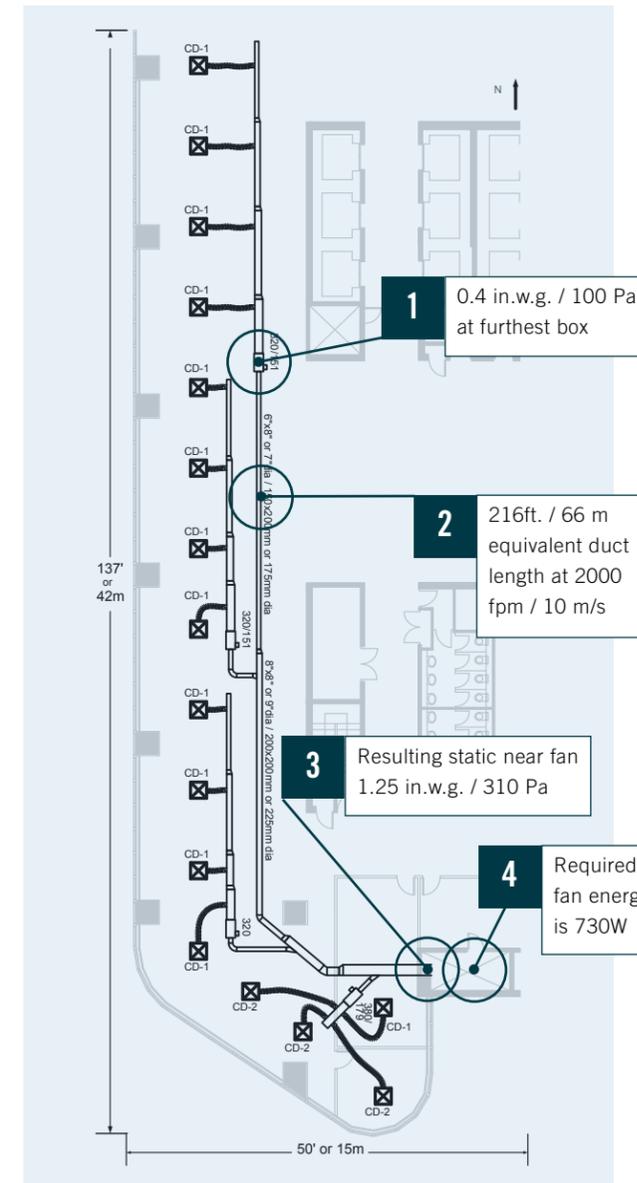
Low system pressure

VAV diffuser systems require low duct pressure, which reduces the required fan horsepower and, in turn, the energy required to operate the system.

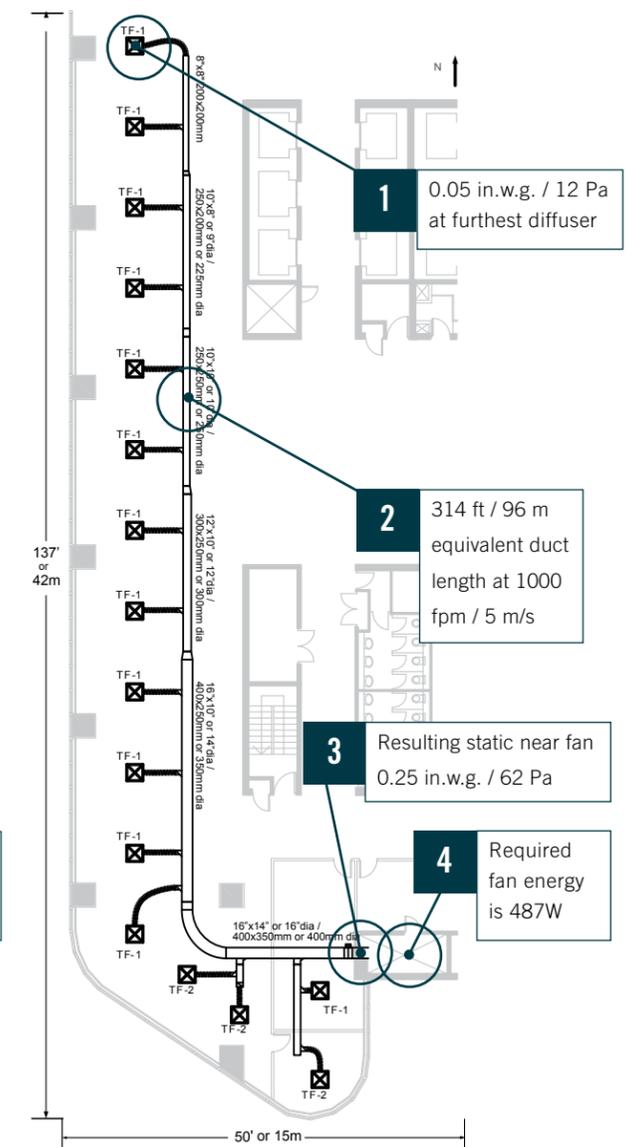
Low Pressure Drop Comparison

Compared to other systems, the low-pressure, low-energy systems designed around VAV diffusers require less fan horsepower and prevent the overcooling and overheating of spaces. The example below shows 33% energy savings compared to traditional VAV box systems.

TRADITIONAL VAV BOX SYSTEM



PRICE VAV DIFFUSER SYSTEM



33% FAN ENERGY SAVINGS

SUSTAINABILITY

Enduring Ease-of-Use

Price VAV diffusers have a long life span and offer simple maintenance. Thermally powered units do not require any wiring and, aside from set point adjustment, are virtually maintenance free with 40+ years of proven operation. Motorized diffusers make use of long-life brushless motors to reduce maintenance requirements and provide near-silent operation.



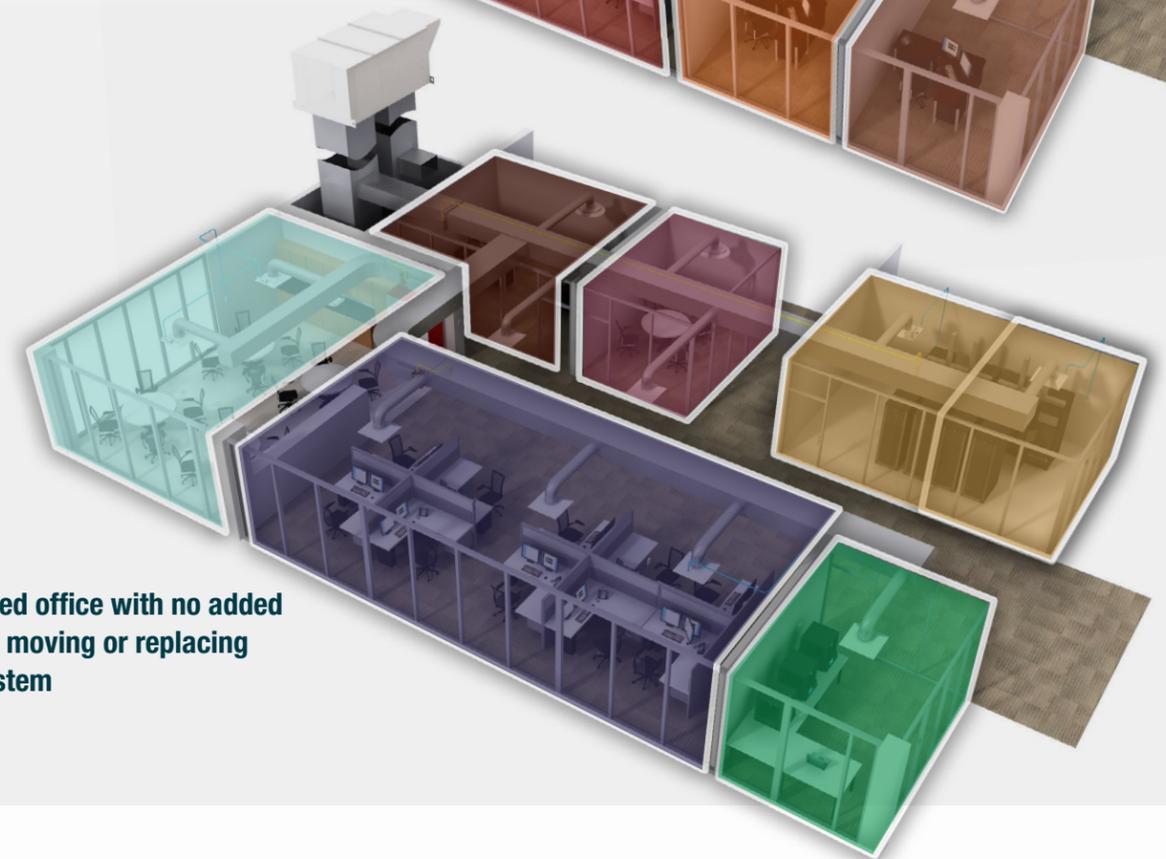
Future-Proof Flexibility

VAV diffuser systems are exceptionally adaptable to office changes. The modular concept and flexibility provided by a VAV diffuser system means that any changes to the floor plan need not trigger expensive and disruptive changes to the HVAC system.

Original office layout with VAV diffuser system and seven zones of control



Remodeled office with no added costs for moving or replacing HVAC system



FUNCTIONALITY

Each VAV diffuser is a ceiling diffuser with an individual thermostat and built-in VAV damper, allowing it to act as an individual VAV zone of control. The damper is continuously adjusted to vary the volume of airflow (warm or cold) into the room in response to room temperature and set point. When supply air is warm, the VAV diffuser operates in heating mode, and the damper opens in response to a drop in room temperature. When the supply air is cold, the VAV diffuser operates in cooling mode, and the damper opens in response to a rise in room temperature.

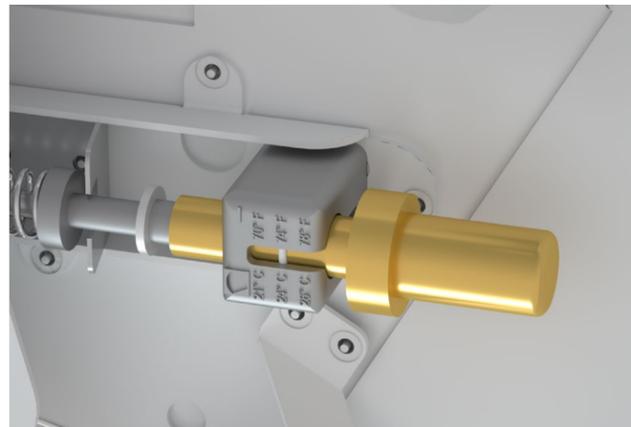
Separate room temperature set points for heating and cooling are individually adjustable and average temperature is maintained within 1.5°F/0.9°C.

As with all diffusers, air circulates around the room in a circular motion. Secondary air rises under the diffuser, passes beneath the diffuser plaque and entrains with the primary air at the outside edge of the diffuser. This secondary air best represents average room temperature.



To monitor average room temperature, a continuous sample of secondary air is drawn around the plaque past the room thermostat(s). This is accomplished by feeding primary air through venturi nozzle(s).

Primary air blowing through the nozzle(s) creates just enough vacuum to draw some secondary air around the plaque, over the thermostat(s) and out the other side.

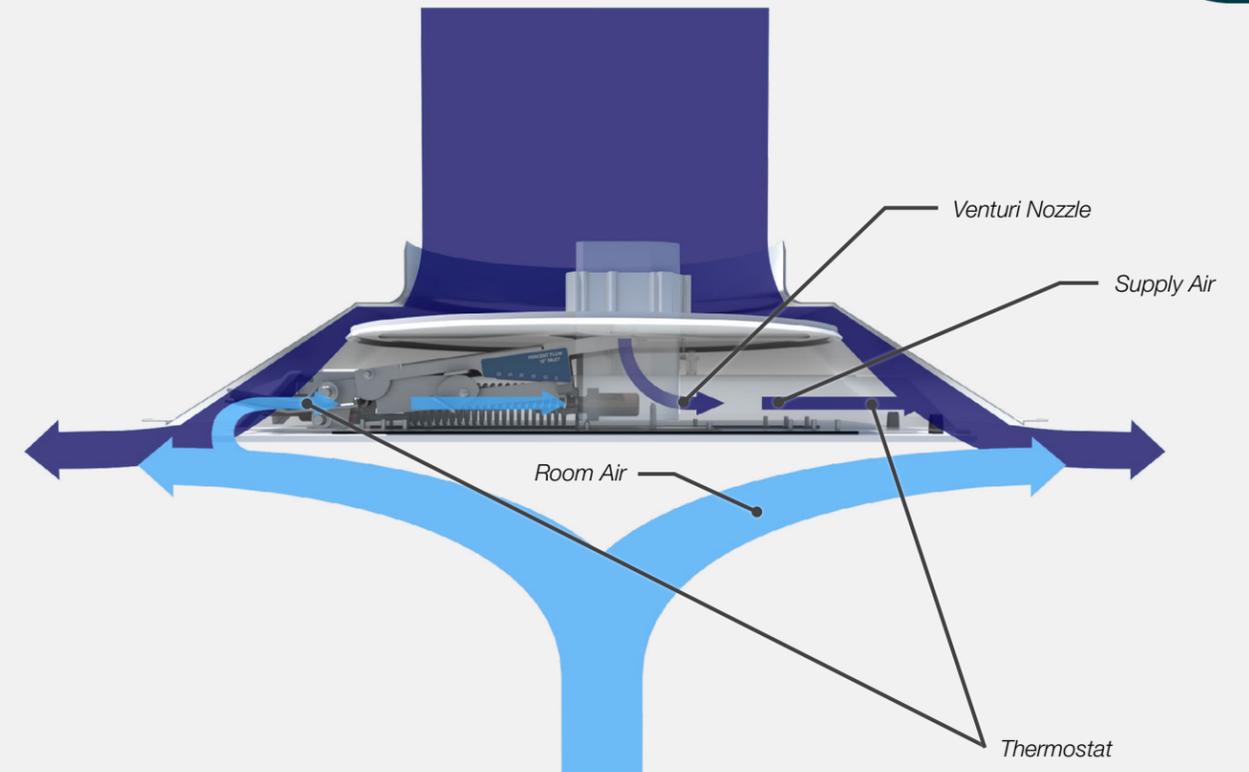


Thermostat and actuator – a copper cup containing a blend of petroleum distillate waxes; the waxes melt and expand, driving a piston with a precise movement per degree temperature change

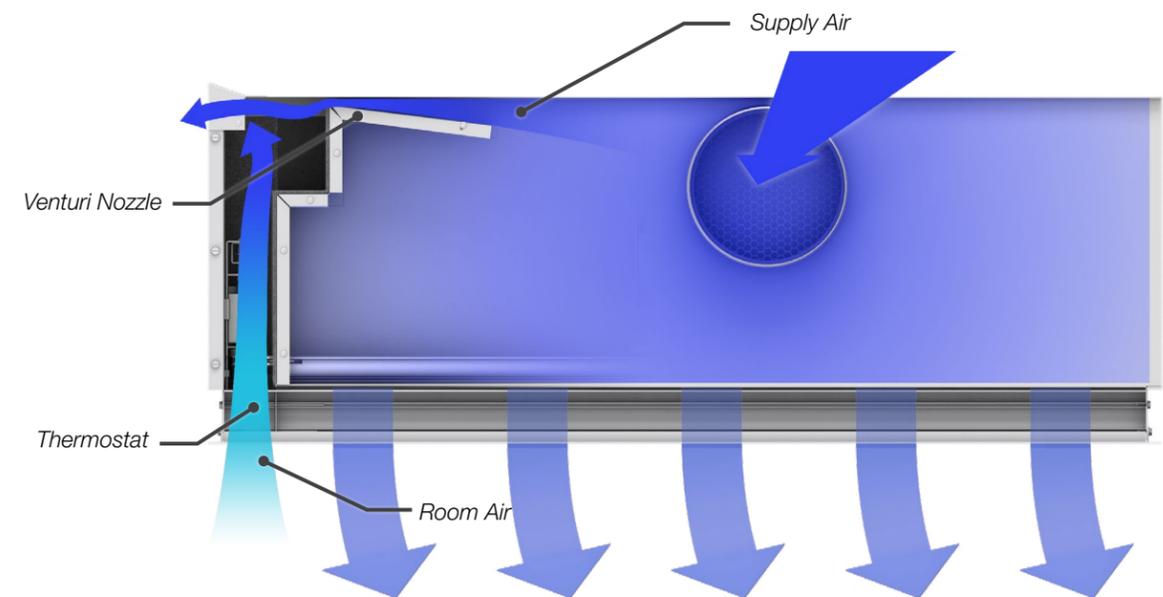


For electric diffusers, quiet, long-life, brushless motors provide repeatable and reliable control

Positive induction mechanism – a continuous sample of room air drawn over the individual thermostats



The high velocity discharge from the diffuser entrains room air into the supply air resulting in a rising column of room air under the diffuser. A small amount of supply air passed through a venturi nozzle creates an area of low pressure in the diffuser that induces a sample of room air over the thermostat. Room air is positively induced over the thermostat independent of diffuser damper position.





VAV DIFFUSER SYSTEM OPTIONS

As energy costs continue to rise, managing energy while balancing tenant comfort and operational costs is a significant challenge for commercial building owners and managers. A building automation system (BAS) is an option that provides monitoring of entire building systems with single-source control and troubleshooting. Price's VAV diffuser system is designed to work cooperatively with a wide range of BAS options. Whether you're looking for simple individual temperature control with no energy required for operation or full-scale networking for system scheduling, monitoring, reporting, troubleshooting and more, this guide will help you determine what is best for your building needs and budget.

Mechanical Thermal Diffusers

VARITHERM SERIES

Our thermally actuated VAV diffusers are simple to install, require no maintenance, come with a 10-year warranty and offer the lowest cost per zone of control.

Digital Electric VAV Diffusers

PRODIGY SERIES

Our digital electric VAV diffusers use a controller and electric motor, allowing for an increased range of set points, and are available for both stand-alone and BACnet networking applications.



SYSTEM OPTIONS

Features	Thermal		Electric	Hybrid	
	Varitherm stand-alone thermally powered VAV diffusers	Varitherm thermally powered + DISIO Display wall thermostat	Prodigy stand-alone electric motor VAV diffusers	Varitherm VAV diffusers	Prodigy VAV diffusers
Individual temperature control, superior air distribution, energy-saving adaptable system	✓	✓	✓	✓	✓
No diffuser maintenance	✓	✓		✓	
No diffuser wiring	✓			✓	
BAS only monitors parts of system requiring periodic maintenance	✓			✓	
Monitors room air temperature		✓	✓		✓
Monitors and adjusts room temperature set points		✓	✓		✓
Monitors diffuser supply air temperature			✓		✓
Monitors diffuser supply air volume			✓		✓
Network protocol		BACnet	BACnet		BACnet
Other network functions			✓		✓
Diffuser power	Thermal	Thermal	Electric motor	Thermal	Electric
Installed cost	\$	\$\$	\$\$\$	\$\$	\$\$
Warranty*	10 year	10 year	2 year	10 / 2 year	

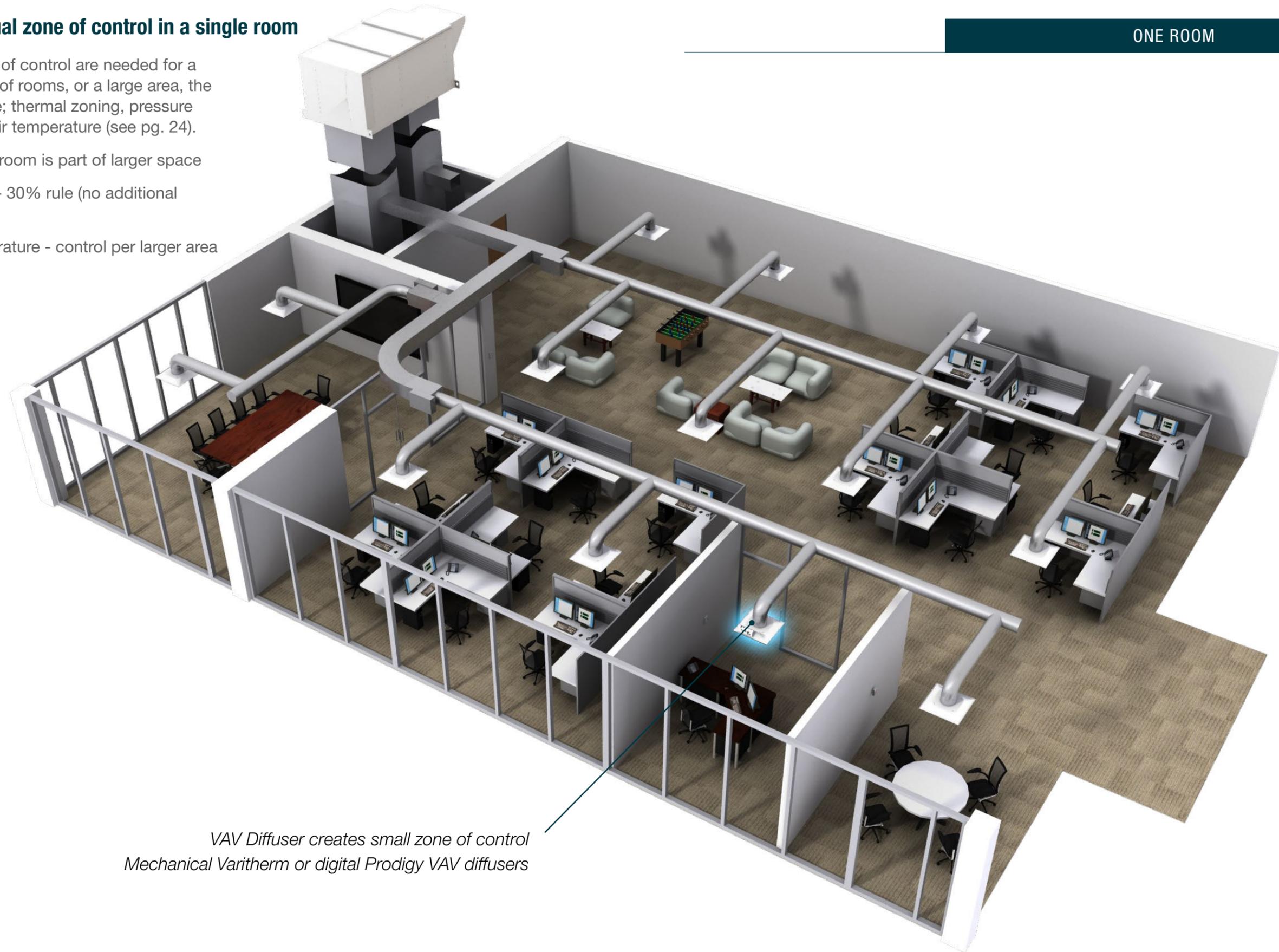
*Not applicable to options and accessories

Create an individual zone of control in a single room

Whether small zones of control are needed for a single room, a group of rooms, or a large area, the approach is the same; thermal zoning, pressure control, and supply air temperature (see pg. 24).

- Thermal Zoning - room is part of larger space
- Pressure Control - 30% rule (no additional control needed)
- Supply Air Temperature - control per larger area

ONE ROOM

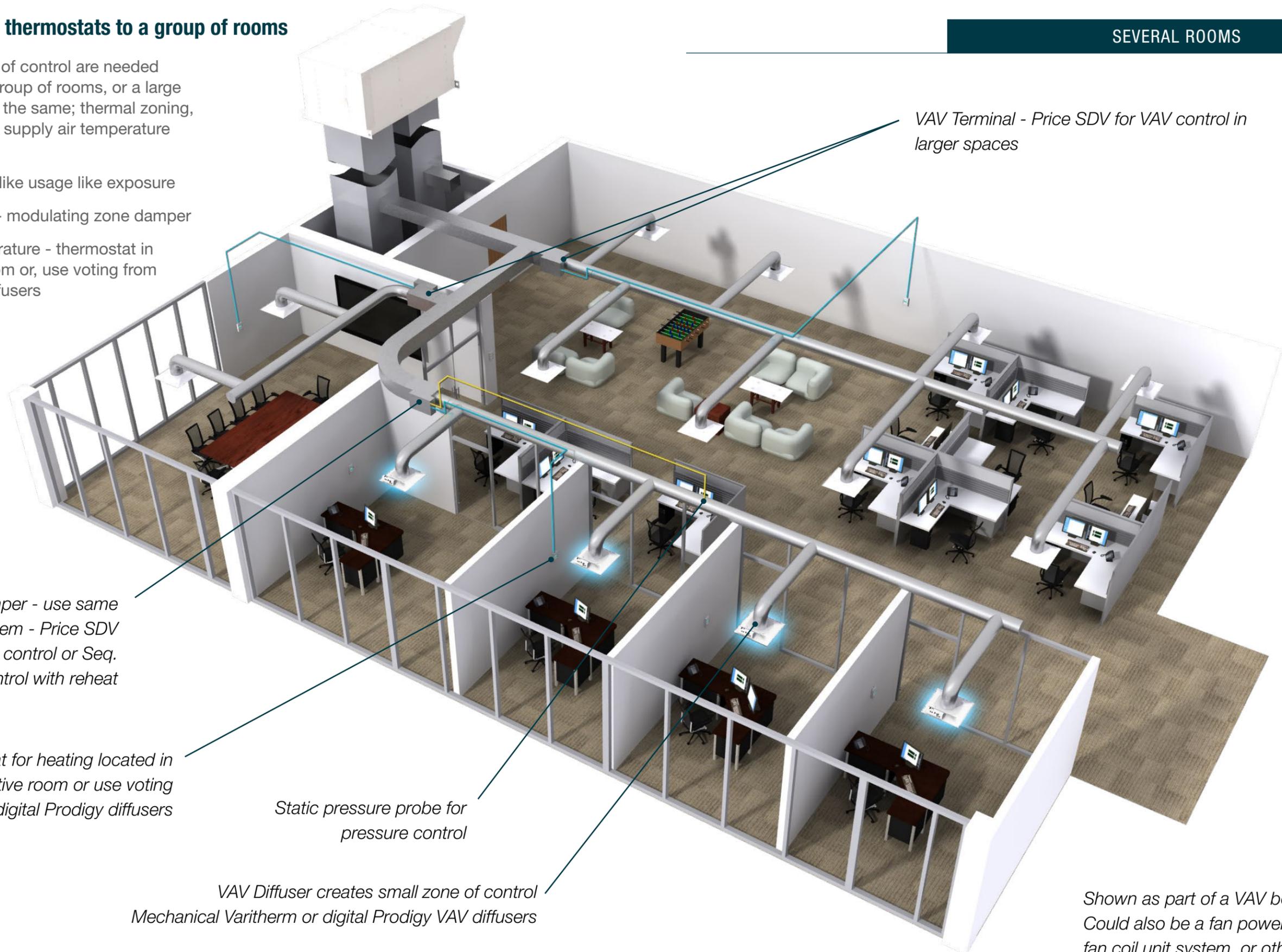


*VAV Diffuser creates small zone of control
Mechanical Varitherm or digital Prodigy VAV diffusers*

Provide individual thermostats to a group of rooms

Whether small zones of control are needed for a single room, a group of rooms, or a large area, the approach is the same; thermal zoning, pressure control, and supply air temperature (see pg. 24).

- Thermal Zoning - like usage like exposure
- Pressure Control - modulating zone damper
- Supply Air Temperature - thermostat in representative room or, use voting from digital Prodigy diffusers



VAV Terminal - Price SDV for VAV control in larger spaces

Modulating zone damper - use same terminal devices as system - Price SDV Seq. 1551 for pressure control or Seq. 1553 for pressure control with reheat

Tstat for heating located in representative room or use voting from digital Prodigy diffusers

Static pressure probe for pressure control

VAV Diffuser creates small zone of control Mechanical Varitherm or digital Prodigy VAV diffusers

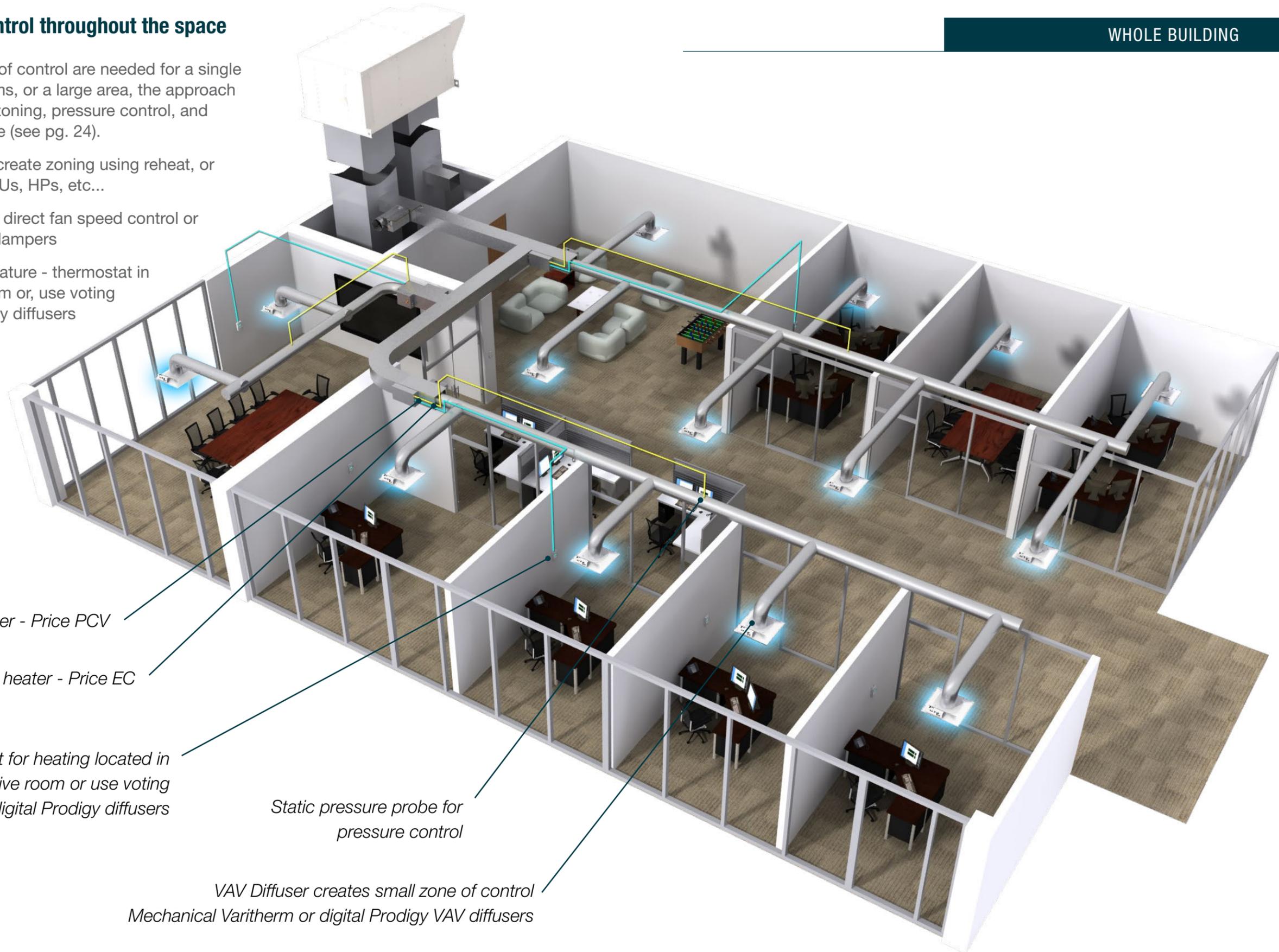
Shown as part of a VAV box system. Could also be a fan powered box system, fan coil unit system, or other forced air ceiling system.

Small zones of control throughout the space

Whether small zones of control are needed for a single room, a group of rooms, or a large area, the approach is the same; thermal zoning, pressure control, and supply air temperature (see pg. 24).

- Thermal Zoning - create zoning using reheat, or multiple RTUs, FCUs, HPs, etc...
- Pressure Control - direct fan speed control or modulating zone dampers
- Supply Air Temperature - thermostat in representative room or, use voting from digital Prodigy diffusers

WHOLE BUILDING



Modulating zone damper - Price PCV

Duct mounted electric heater - Price EC

Tstat for heating located in representative room or use voting from digital Prodigy diffusers

Static pressure probe for pressure control

VAV Diffuser creates small zone of control Mechanical Varitherm or digital Prodigy VAV diffusers

VAV DIFFUSER PRODUCTS



2 x 2 ft. Square Diffuser with Blade Damper
(24 in. / 600 mm square)

Varitherm Series – VBD

Four-blade dampers provide superior throw with 66 linear inches of variable discharge area.

Inlet diameter	6/8/10/12 in.	150/200/250/300 mm
Pressure ranges	0.05 to 0.25 in.w.g.	12 to 62 Pa
Air volumes	100 to 720 CFM	45 to 340 l/s
Throw¹	3/4/6 to 12/14/17 ft.	1.7/1.2/0.9 to 5.1/4.2/3.6 m
Noise²	<15 to 34 NC	<15 to 34 NC



1 x 1 ft. Square Diffuser with Blade Damper
(12 5/8 in. / 320 mm square)

Varitherm Series – VKD

Specially designed for small task conditioning. Four-blade damper provides superior throw.

Inlet diameter	6 in.	150 mm
Pressure ranges	0.05 to 0.25 in.w.g.	12 to 62 Pa
Air volumes	115 to 265 CFM	55 to 125 l/s
Throw¹	4/6/8 to 8/10/13 ft.	1.2/1.7/2.5 to 2.5/3.0/4.0 m
Noise²	<15 to 37 NC	<15 to 37 NC



Linear Diffuser – Ceiling, Wall, Individual or Continuous
Varitherm Series – VLD / Prodigy Series – PLD

Elegant linear design for individual units or continuous linear slots. VAV diffusers with streamlined aluminum extrusions to provide a slim architectural shape. Ceiling and sidewall applications.

Length	24/36/48/60 in.	600/900/1200/1500 mm
Slots	Multiple slots and blow patterns available	
Pressure ranges	0.05 to 0.25 in.w.g.	12 to 62 Pa
Air volumes	45 to 960 CFM	20 to 455 l/s
Throw¹	2/3/4 to 25/33/40 ft.	0.6/0.9/1.2 to 7.6/10.0/12.2 m
Noise²	<15 to 42 NC	<15 to 42 NC



2 x 2 ft. Square Diffusers with Disc Damper
(24 in. / 600 mm square)

Prodigy Series – PPD

Designed to provide a greater range of operation and increased speed of response required by some projects.

Inlet diameter	6/8/10/12 in.	150/200/250/300 mm
Pressure ranges	0.05 to 0.25 in.w.g.	12 to 62 Pa
Air volumes	115 to 730 CFM	54 to 344 l/s
Throw¹	4/6/10 to 9/12/16 ft.	1.2/1.8/3.0 to 2.7/3.7/4.9 m
Noise²	<15 to 40 NC	<15 to 40 NC



2 x 2 ft. Square Diffusers with Disc Damper
(24 in. / 600 mm square)

Varitherm Series – VPD

Easy adjustment minimum flow dial. One stop lever for balancing.

Inlet diameter	6/8/10/12 in.	150/200/250/300 mm
Pressure ranges	0.05 to 0.25 in.w.g.	12 to 62 Pa
Air volumes	105 to 740 CFM	50 to 350 l/s
Throw¹	<1/1/3 to 9/11/13 ft.	<0.3/0.3/0.9 to 2.7/3.4/4.0 m
Noise²	<15 to 38 NC	<15 to 38 NC



2 ft. Round Diffuser with Disc Damper
(24 in. / 600 mm round)

Varitherm Series – VRD

With all the performance and air distribution of the VPD, the round model has been developed for aesthetic consideration.

Inlet diameter	6/8/10/12 in.	150/200/250/300 mm
Pressure ranges	0.05 to 0.25 in.w.g.	12 to 62 Pa
Air volumes	105 to 740 CFM	50 to 350 l/s
Throw¹	<1/1/3 to 9/11/13 ft.	0.3-0.3 /0.9 to 2.7/3.4/4.0 m
Noise²	<15 to 38 NC	<15 to 38 NC



2 ft. Round Diffuser with Disc Damper
(24 in. / 600 mm round)

Prodigy Series – PRD

The pleasing round shape blends in with round architectural features or exposed round duct work.

Inlet diameter	6 / 8 / 10 / 12 in.	150/200/250/300 mm
Pressure ranges	0.05 to 0.25 in.w.g.	12 to 62 Pa
Air volumes	120 to 720 CFM	59 to 340 l/s
Throw¹	3/4/7 to 10/12/17 ft.	0.9/1.1/2/2 to 3.0/3.7/5.2 m
Noise²	<15 to 42 NC	<15 to 42 NC



2 x 2 ft. Swirl Face Diffuser with Disc Damper
(24 in. / 600 mm square)

Prodigy Series – PSD

The swirl face provides a modern, aesthetically pleasing appearance combining a high-induction geometry with a VAV damper.

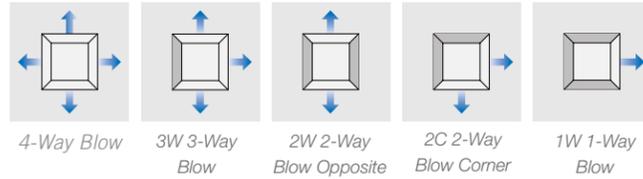
Inlet diameter	6 / 8 / 10 / 12 in.	150/200/250/300 mm
Pressure ranges	0.05 to 0.25 in.w.g.	12 to 62 Pa
Air volumes	130 to 525 CFM	61 to 248 l/s
Throw¹	1/2/4 to 5/8/12 ft.	0.3/0.6/1.2 to 1.5/2.4/3.7 m
Noise²	<15 to 41 NC	<15 to 41 NC

¹Throw at v_i = 150 / 100 / 50 FPM / 0.25 / 0.50 / 0.75 m/s
²Noise based on L_w(10⁻¹² watts reference) - 10 dB

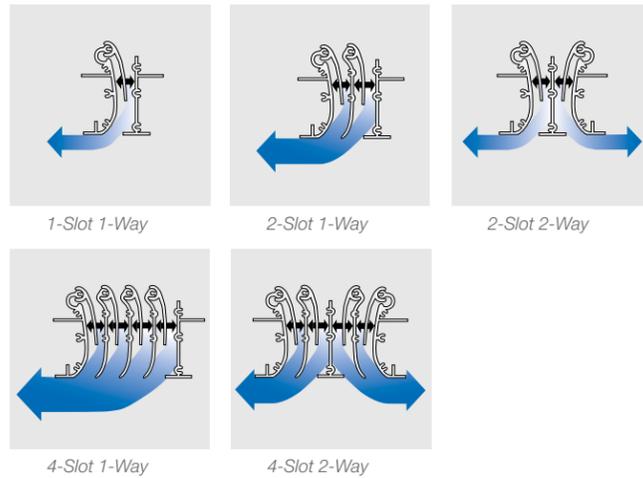
¹Throw at v_i = 150 / 100 / 50 FPM / 0.25 / 0.50 / 0.75 m/s
²Noise based on L_w(10⁻¹² watts reference) - 10 dB

BLOW PATTERNS

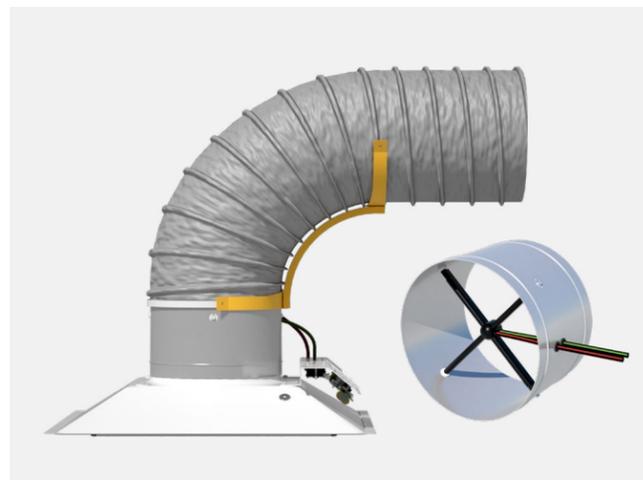
Custom air-blow patterns are available for most models. Contact Price for additional information.



Linear Diffuser



OPTIONS & ACCESSORIES



DMS Airflow Measurement for Prodigy Series Diffusers

The Diffuser Measuring Station (DMS) is an optional addition to the Prodigy VAV diffuser providing airflow measurement at each Prodigy master diffuser.



Wall Adjusters and Thermostats

Varitherm – DISIO Display Adjuster

Prodigy Series – TSTAT*

Price's Wall Adjusters for VAV diffusers allow the occupant to easily adjust the temperature set point. The Wall Adjuster is available in a wired or wireless model. Wall Adjusters are easily integrated to BAS with a protocol-independent interface.

Price's thermostats for Prodigy diffusers provide both room temperature and occupant adjustable room temperature set point.

*There are several options for the Prodigy, including LCD display, occupancy and CO₂ sensors.



Hot Water Zone Heater

The hot water zone heaters use a modulating PI (proportional/integral) heat controller to vary the hot water through the coil and prevent excessive valve cycling.

Control	PID	PID
Valve ¹	PICCV or CCV	PICCV or CCV
Coil inlet diameter ²	6/8/10/12/14/16 in.	150/200/250/300/350/400 mm
Coil heating ²	5 1 to 111.6 MBH	17.4 to 380.9 kW
Coil air volumes ²	200 to 3300 cfm	94 to 1557 l/s

¹Optional pressure-independent, two-way or three-way valve

²Optional one- or two-row coil



Electric Zone Heater

EC Electric Coil

The electric zone heaters use a patented airflow sensor and the most advanced modulating SCR (silicon controlled rectifier) proportional heat controller to vary the electrical power through the coil.

Electric heating units are available in round, square and rectangular sizes.

Control	SCR	SCR
Inlet/outlet diameter	Round, rectangular or square	
Heating	Up to 21 kW/sq. ft.	up to 226 kW/m ²
Air volumes	Varies by size	
Power	Varies by size	



Pressure Relief Collar

All Models

The Pressure Relief Collar is an inexpensive solutions when duct pressures are higher than desired. When the diffuser reduces the air flow into the room, these devices bypass the excess air into the plenum return system.

	Inlet sizes	Height
Pressure relief collar	6/8/10/12 in. 150 / 200 / 250 / 300 mm	8 in. 203 mm

Not available for linear diffusers.



Ceiling Approaches

All Models

Price offers a variety of ceiling frames to suit most ceiling types. Diffusers installed in special ceilings should be installed such that obstacles are not below the plane of the diffuser casing extended. Breaking this plane risks breaking Coanda and could allow primary air to drop.



Static Pressure Control

All Models

The Price Pressure Control Valve (PCV) helps VAV diffusers to operate quietly at both full flow and turndown conditions by providing pressure independence as either a modulating bypass or zone damper. It can be supplied with or without a damper, square/rectangular opposed blade or round damper with peripheral gasket.

SYSTEM DESIGN CHECKLIST

Note: This is a general checklist. For detailed recommendations about specific systems, visit priceindustries.com/vavdiffusers.

JOB NAME _____

1. DIFFUSER SIZE AND LOCATION

- Air volume sufficient for rooms needs. Correct inlet sizing for available static pressure.
- All VAV diffusers within 2 ft. of wall equipped with three-way blow away from wall.
- Multiple VAV diffusers in same room – space no less than two times the 150 fpm / 0.76 m/s throw; use three-way blow if closer.

2. SUPPLY AIR TEMPERATURE –

Cooling minimum 50°F/10°C
 Heating maximum 120°F/49°C
 Changeover: To heating 80°F/26.5°C
 To cooling 68°F/20°C

• Source of cooling:

- Chilled water AHU DX

• Source of heating:

- AHU heat } Gas Hot water Electric Steam

Duct heat

Heat pump

- Separate perimeter heat – Baseboard Radiant panels Separate duct

• Portions of building in one master zone:

One exterior Note: Separate master zones are preferred for the interior and each exposure

More than one exterior

Heat pump

Other _____

• Source of cooling:

Fan runs continuously

• Location of thermostat (or BMS sensor) used to control the AHU water valves or DX compressor:

Note: Do not use a return air thermostat (sensor)

System using some VAV diffusers and some fixed opening

Room thermostat or sensor located in room of highest heating and cooling load. Fixed opening diffuser used in this room.

Complete System

Preferred approach – supply air control / room changeover

Supply air temperature controlled by discharge air thermostats (sensors)

Mode selected by changeover thermostat (sensor) in the room. Varitherm diffuser with minimum flow stops in this room

SYSTEM DESIGN CHECKLIST

Note: This is a general checklist. For detailed recommendations about specific systems, visit priceindustries.com/vavdiffusers.

3. STATIC PRESSURE —

Inlet minimum 0.05 in.w.g. / 12 Pa or high enough for required air volume.
 Inlet maximum 0.25 in.w.g. / 62 Pa for NC 35 or less.

• Control:

Less than 30% turndown of system air – static pressure control usually not necessary.

Over 30% turndown of system air.

Static pressure control with:

Fan control

Variable speed drive

Other _____

Zone control damper

Bypass

Damper

R-rings: use only with ceiling plenum return

Both fan and zone control

Static pressure sensor located half to two-thirds of the equivalent duct length between control and end of duct.

• Duct Design:

Supply:

Static pressure no higher than 0.25 in.w.g. / 62 Pa at the first takeoff downstream from the static pressure control.

Sufficient static pressure at the last VAV diffuser to obtain the required airflow. Size last VAV diffusers larger to achieve required flow.

• Zone dampers are necessary where pressure losses in ducts are too high.

Manual balancing dampers should be used at the takeoff for each diffuser. Manual balancing dampers may not be required with ducts designed to Price specifications.

Return:

Ceiling plenum

Ducted

Other

} One return for each diffuser preferred.
 Minimum of one return per room.

priceindustries.com/vavdiffusers



PRICE HEADQUARTERS

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Product improvement is a continuing endeavor at Price. Therefore, specifications are subject to change without notice. Consult your Price Sales Representative for current specifications or more detailed information. Not all products may be available in all geographic areas. The complete product offering can be viewed online at priceindustries.com/vavdiffusers.

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