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Titus

Redefine your comfort zone.™

terminal unit accessories

energy solutions

O

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TERMINAL UNIT ACCESSORIES PRODUCTS

OVERVIEW

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LINERS & ELECTRIC HEATING COILS

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Terminal Unit Accessories Products

digital controls

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BACnet

ALPHA

- Stand-alone & networked capable
- Wall sensor configurable (no software required)
- DAT (Discharge Air Temperature) Limiting (CA Title 24)
- BTL Listed
- UL 864 Smoke Control compliant
- Integral actuator
- CO_2 room control capability

Johnson Controls Metasys VMA Controller

VMA

- Switchable communications protocols between BACnet and N2 protocols
- Bluetooth Wireless Commissioning Interface
- BTL Listed
- UL 864 Smoke Control Compliant
- Auto Tuned Control Loops
- Integral Actuator
- Capable of interfacing with a variety of sensors to include Zone temperature, occupancy detection, duct temperature, zone humidity and dewpoint determination, CO_2 level, VAV box fan speed control, and discharge air temperatures

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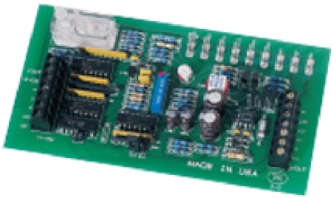
analog / pneumatic controls



Titus TA-1

ANALOG ELECTRONIC CONTROLS

- Flexible control sequences
- Excellent in small to medium buildings, retrofit & tenant finish applications
- Provides precise, accurate control without compressed air or sophistication of a digital control system

Titus II

PNEUMATIC CONTROLS

- High quality pneumatic velocity control
- Ideal for retrofit needs
- Adjustable minimum & maximum cfm settings
- Always modulates through its full reset span to avoid hunting issues

DIGITAL ELECTRONIC CONTROLS
Titus offers a wide variety of digital controls options for all stand-alone, BACnet, or LonWork requirements.

LINERS
Titus offers liners for all application requirements including several liners that eliminate fiberglass from the airstream.

ELECTRIC HEATING COILS
Titus offers staged and SSR controlled electric heaters.

OVERVIEW

HVAC systems. A DDC system utilizes digital processing that provides accurate, reliable and repeatable control of the terminal unit and HVAC system. Computer-based controls reduce maintenance time and expenses while increasing energy efficiency.

A DDC system provides many benefits, including lower energy costs, finer temperature control, flexibility, lower maintenance costs and graphical displays of the system.

DDC controls have the ability to measure very small increments of airflow and airflow changes, allowing the system to automatically adjust room temperatures. Facility managers and building engineers can easily set and adjust HVAC conditions throughout a building from a central location using a building management system (BMS).

There are several protocols for DDC controls. Some DDC controls are proprietary, meaning that they can only communicate with other components supplied by the same manufacturer. Some controls have an open protocol. Typically controls with an open protocol can communicate with components from other manufacturers using a gateway, or translator software.

BACnet is Building Automation Control Network. It is a communication protocol with agreed upon set of rules for creating interoperable building networks. These rules describe mechanisms for devices (HVAC-R, lighting, fire/smoke, etc.) to share information in a common manner. BACnet is supported by BACnet International which encourages the successful use of BACnet in building automation through testing and has established (BTL) BACnet Testing Laboratory which independently verifies that a product conforms to a listed profile. The standard was developed by ASHRAE, starting in 1987, with the first standard being

published in 1995. Standing ASHRAE committee 135 maintains and develop the standard. BACnet is considered an "Open Standard" which allows facility professionals to future-proof their installations allowing multiple product providers. By design, the standard adapts to emerging initiatives.

The Metasys® system is an industry-leading building automated system (BAS) and the foundation of modern building efficiency. It enhances occupant comfort, safety, security, and productivity, and it provides more system control and easier access to information than other building automation systems. Originally launched in 1990, Metasys is a complete family of hardware and software control components designed to work together as one cohesive system. A time-tested industry leader, the Metasys system has proven reliable for the most demanding customer scenarios.

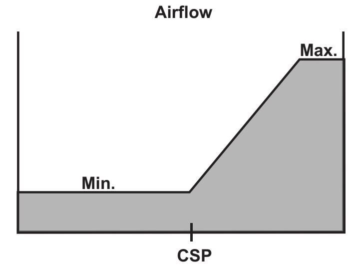
Titus offers several options for DDC controls to suit the variety of communication protocols on the market to be installed on Titus terminal units.

SINGLE DUCT

Cooling Only

With room temperature at setpoint, unit delivers minimum cfm. An increase in room temperature causes airflow to increase.

Airflow and temperature setpoints can be different for Occupied, Unoccupied, and Night Setback states.



Models: DESV, DECV, DQCV

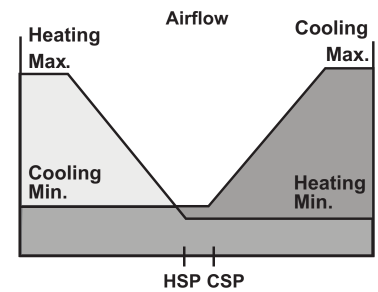
Heating/Cooling Autochangeover

With supply air temperature below a software adjustable setpoint, unit operates in cooling mode. An increase in room temperature over cooling causes airflow to increase.

If supply temperature increases above selected setpoint, unit operation changes to heating mode.

In heating mode, a decrease in room temperature below heating setpoint causes airflow to increase.

Airflow and temperature setpoints can be different for Occupied, Unoccupied, and Night Setback states.



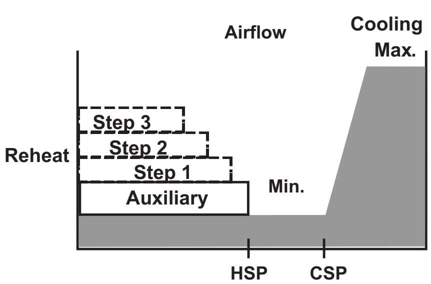
Model: DESV

Cooling with Electric Reheat

An increase in room temperature over cooling setpoint causes airflow to increase. Below cooling setpoint, airflow is at minimum or zero.

A decrease in room temperature below heating setpoint causes airflow to increase to the second heating minimum, as stages of reheat are energized.

Airflow and temperature setpoints can be different for Occupied, Unoccupied, and Night Setback states.



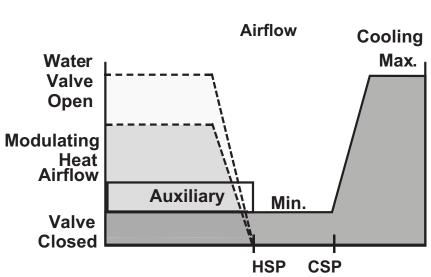
Model: DESV

Cooling with Proportional Hot Water Reheat

An increase in room temperature over cooling setpoint causes airflow to increase. Below cooling setpoint, airflow is at minimum or zero.

A decrease in room temperature below heating setpoint causes airflow to increase to a fixed heating minimum, or modulate to match water valve action, as hot water valve modulates open.

Airflow and temperature setpoints can be different for Occupied, Unoccupied, and Night Setback states.



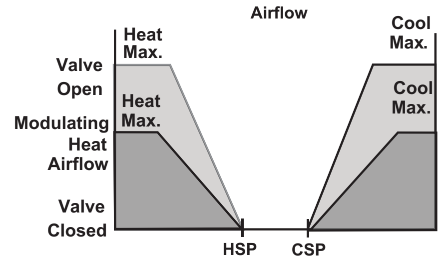
Model: DESV

DUAL DUCT

No Blending

An increase in room temperature over cooling setpoint causes airflow to increase. Below cooling setpoint, airflow is zero. A decrease in room temperature below heating setpoint causes heating airflow to increase.

Airflow and temperature setpoints can be different for Occupied, Unoccupied, and Night Setback states.

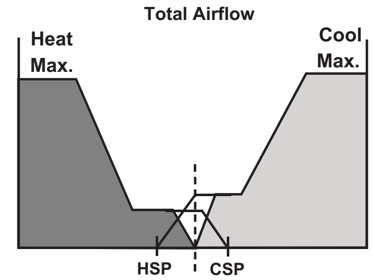


Models: DEDV, DMDV

VAV or CAV, Blending

An increase in room temperature over cooling setpoint causes cooling airflow to increase. Below cooling setpoint, airflow is at minimum. A decrease in room temperature below the midpoint of the deadband causes heating airflow to increase, as cooling decreases. In the blending mode, a separate total minimum flow setpoint is maintained.

Airflow and temperature setpoints can be different for Occupied and Unoccupied states.



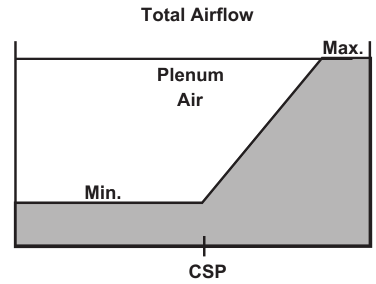
Models: DEDV, DMDV

FAN POWERED

Constant Fan VAV Terminal Cooling Only

Fan operates continuously in Occupied mode, providing constant volume to the space. An increase in room temperature causes cooling airflow to increase.

Airflow and temperature setpoints can be different for Occupied, Unoccupied, and Night Setback states for all Constant Fan VAV Terminal sequences.

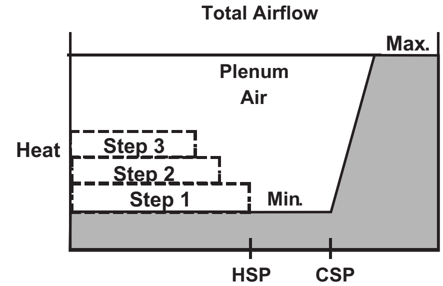


Models: DTFS, DTQS, DFLS

Constant Fan VAV Terminal with Electric Heat

Fan operates continuously in Occupied mode, providing constant volume to the space. An increase in room temperature triggers an increase in cooling airflow. Below cooling setpoint, cooling airflow is at minimum or zero.

On a decrease in room temperature below heating setpoint, stages of heat are energized.

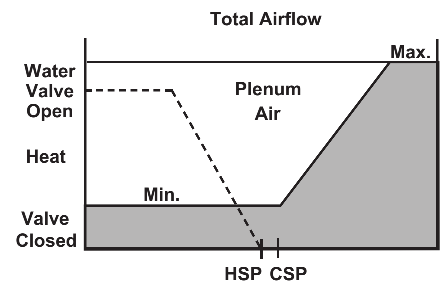


Models: DTFS, DTQS, DFLS

Constant Fan VAV Terminal with Proportional Water Heat

Fan operates continuously in Occupied mode, providing constant volume to the space. An increase in room temperature causes cooling airflow to increase. Below cooling setpoint, cooling airflow is at minimum or zero.

On a decrease in room temperature below heating setpoint hot water valve modulates open.



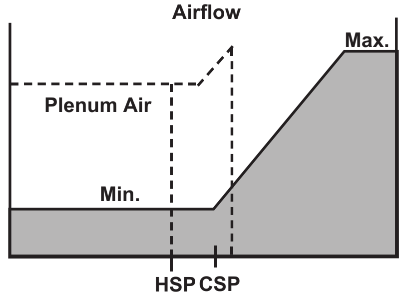
Models: DTFS, DTQS, DFLS

FAN POWERED

Variable Volume Fan VAV Terminal Cooling Only

At cooling setpoint, unit delivers minimum cooling cfm. An increase in room temperature causes cooling airflow to increase.

On a decrease in room temperature below heating setpoint or on a decrease in cooling cfm approaching cooling setpoint (software selectable), unit fan is energized to provide plenum air to the space. Airflow and temperature setpoints can be different for Occupied, Unoccupied, and Night Setback states, for all variable volume fan VAV terminal sequences.

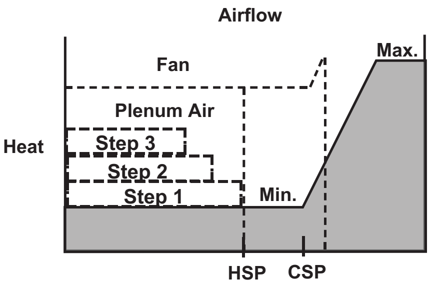


Models: DTQP, DFLP

Variable Volume Fan VAV Terminal with Electric Heat

At cooling setpoint, unit delivers minimum cooling cfm. An increase in room temperature causes cooling airflow to increase.

On a decrease in room temperature below heating setpoint or on a decrease in cooling cfm approaching cooling setpoint (software selectable), unit fan is energized to provide plenum air to the space, and stages of heat are energized.

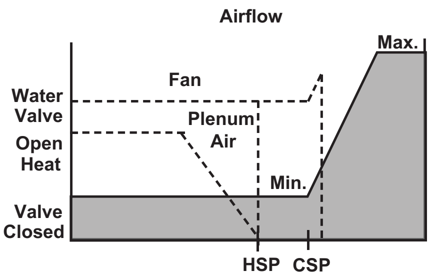


Models: DTQP, DFLP

Variable Volume Fan VAV Terminal with Proportional Water Heat

At cooling setpoint, unit delivers minimum cooling cfm. An increase in room temperature causes cooling airflow to increase.

On a decrease in room temperature below heating setpoint or on a decrease in cooling cfm approaching cooling setpoint (software selectable), unit fan is energized to provide plenum air to the space, and hot water valve modulates open.



Models: DTQP, DFLP

Alpha BACnet Controller

- Alpha controller is flexible & can be used in both stand-alone and network applications
- The controller is preconfigured at the factory, which saves time and money during installation
- The Alpha is easier to commission through a thermostat and does not require software at the jobsite
- The Alpha's extremely reliable one-piece design enjoys the advantage of an integrated controller, sensor, actuator, & communication. This reduces the common failures seen with typical "add-on" style designs of multiple connected components.

ALPHA CONTROLLER

See website for Specifications

MODEL:

ALPHA BACnet Controller

OVERVIEW

The Alpha Controller is the premier BACnet VAV controller in the industry that can operate in stand-alone applications or in BACnet building management systems. This controller is also available for quick ship requests as well. The Alpha controller can be stocked by representatives that wish to upgrade their pneumatic or analog inventory to a new digital solution. The controller commissioning is simple and the software and training is available to all representatives from Titus. This is an excellent product for representatives looking to provide a simple digital solution to their customers from their warehouse.

TITUS ALPHA CONTROLS FAMILY

Single Duct Cooling Only

Single Duct with Heat & Fan Powered Applications

Dual Duct Mixing & Non-Mixing

Johnson Controls VMA Metasys Multi-Protocol Controller

- The VMA series can be used as a standalone device or in a broader networked application
- The controller is shipped without programming and must be programmed in the field by an approved metasys technician
- Contains an internal bluetooth connection for easy commissioning
- Combines a digital controller, a differential pressure transducer (DPT), and a VAV box damper actuator into a a small and integrated package to facilitate quick installation and efficient use of space

VMA CONTROLLER

See website for Specifications

MODEL:

Johnson Controls VMA Metasys Multi-Protocol Controller

OVERVIEW

The VMA16 series is the most flexible VAV controller in the industry. This controller has been tested and listed by the BACnet Testing Laboratories (BTL) under the B-ASC device profile, ensuring that it conforms to the BACnet standard and is interoperable with other BACnet devices, systems, and applications. The VMA can also be software-switched to communicate via N2, a legacy Johnson Controls protocol still being used by several already-installed building automation systems. It can also communicate wirelessly to Metasys network automation engines using add-on ZFR series wireless routers.

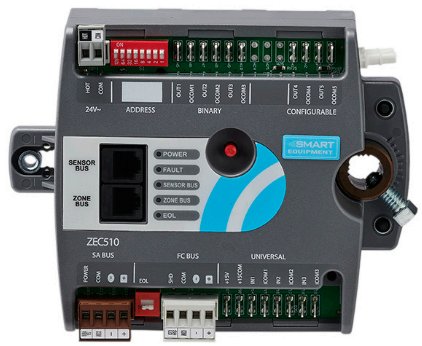
VMA CONTROLS FAMILY


VMA 1630


VMA 1615

Johnson Controls ZEC Verasys BACnet Controller

- The ZEC 500 Controller can be used in stand-alone only while the ZEC 510 requires a networked application
- The controller is configured and balanced in the field using the smart building hub tool
- Contains plug and play technology to detect which network sensor types are connected
- Combines a digital controller and a VAV box damper actuator
- Optional occupancy feature that makes it possible to switch between occupied and standby mode.



ZEC CONTROLLER

See website for Specifications

MODEL:

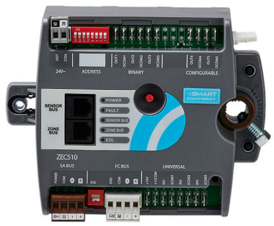
ZEC Verasys BACnet Controller

OVERVIEW

The ZEC 500 series provides one of the most flexible open sourced protocal controllers. The smart building hub tool gives an easy to use interface for for simple field installation, adjustments, and balancing. This controller has optional setback features to reduce energy consumption while unoccupied which lowers overall operating costs. When combined with applicable thermostats, the ZEC 510 can communicate with a buildings BAS system to control CO^2 within the zone and increasing overall indoor air quality. This controller offers an easy all in one solution specifically designed for VAV applications.

ZEC CONTROLS FAMILY

ZEC 500



ZEC 510

With the OEM Controls program, Titus stocks several major controls manufacturer's controls and actuators. Any prior coordination issues and delays are now eliminated! During the manufacturing process, the controllers will be mounted on the terminal units and the corresponding controller application will be downloaded. The terminal units will be shipped to the field with the controls ready to run. (Controls will not be addressed).

- VAV controls from select manufacturers are stocked at the Titus factory
- Terminals with OEM controls ship in standard lead time,with Quick Ship programs available
- No coordination issues or expensive control delivery expedites

Contact your local Titus representative for details.

The Titus OEM Program delivers a complete and downloaded terminal to the field & eliminates the following FMA control issues:

- leadtime
- expense
- coordination issues

Titus OEM Controls are comprised of the following:

- BACnet protocol
  - Titus Alpha
  - VMA
  - ZEC
- N2 protocol
  - VMA

Alpha Controller

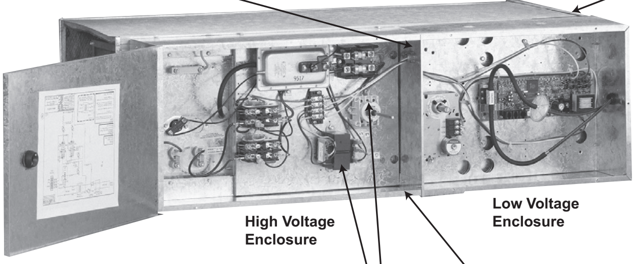
FACTORY MOUNTING AUTHORIZATIONS (FMA)

Factory mounting of digital controls supplied by the temperature control contractor is a common requirement in today's VAV marketplace. The Titus factory mounting authorization program (FMA) allows the mounting of digital controls on Titus terminals with the assurance of a quality finished product built in a controlled environment.

Titus' standard FMA program guarantees professional, quality installation of digital control products. Wiring diagrams and installation methods have been reviewed and approved by control manufacturers for hundreds of standard applications.

Titus' standard configuration includes a sheet metal NEMA type rated control enclosure for protection of the controls during shipment and installation.

Your Titus representative can supply details on the Titus FMA program and help you specify or coordinate the trades for a smoother running project.



Analog Electronic Controls

Titus TA-1

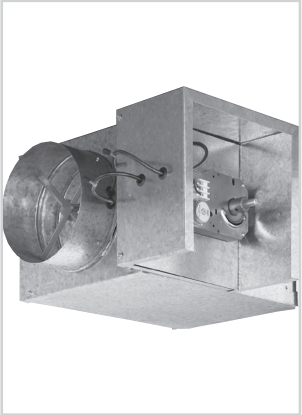
Overview

TA-1 Analog Control

Analog electronic controls are an excellent comfort solution in small to medium buildings, retrofit, and tenant-finish applications. They provide precise, accurate control without compressed air or the sophistication of a digital control system. These controls are compact, self-contained, and easy to set up and balance. There are no components requiring maintenance after balancing.

All adjustments are made simply at the thermostat, using a small screwdriver and a digital volt/ohmmeter (VOM). Voltage settings representing minimum, maximum and auxilary airflow setpoints do not shift with time. Temperature adjustments are made using convenient sliders, hidden under the tamper proof cover.

The TA1 was designed to provide maximum performance while reducing wiring, installation, and overall system complexity. This controller provides, in a single circuit board, all of the components necessary to operate a VAV damper, up to three stages of reheat, and a proportional water valve. In addition, control strategies such as night setback, heating/cooling changeover, morning warm-up, and primary damper overrides are handled without requiring any add-on boards or modules.



AESV - TA1

THERMOSTAT INSTALL

Like all Titus controls, TA1 is compatible for use with the standard Titus AeroCross™ multi-point, center averaging velocity sensor to ensure accurate inlet velocity control regardless of inlet duct configuration. The TA1 is shipped to you mounted within a heavy duty metal enclosure prepiped and wired to the electric actuator.

The Titus TA1 controller offers a simple and economical way to achieve highly accurate flow and temperature control!

See website for Specifications

MODEL:

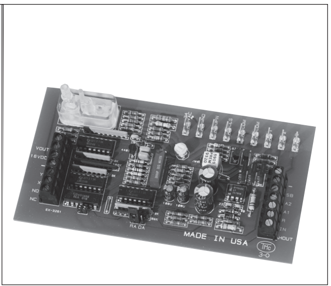
Titus TA-1

SYSTEM FEATURES

- Precise temperature control
- No compressed air needed
- Excellent repeatability with time
- No programming required
- Stand-alone control system
- Easy installation and balancing
- Application flexibility

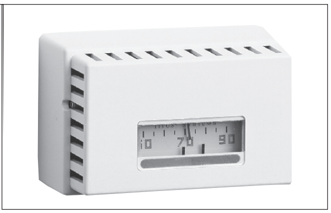
Titus CONTROLLER

- Titus AeroCross™ multi-point, center averaging velocity sensor for accuracy
- Platinum/ceramic flow through transducer for reliability
- Snaptrack mounting for easy serviceability
- One model handles all standard control strategies
- Pressure independent VAV damper control
- Constant or intermittent fan stage sequencing
- Operates up to three stages of reheat
- Controls 0 to 10 VDC proportional hot water valves
- Controls 24 VAC on/off auxiliary heat
- Automatic changeover capability
- Temperature setback available



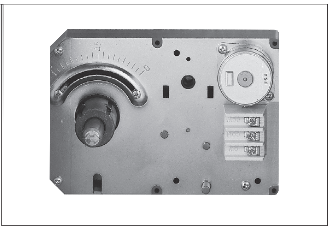
THERMOSTAT

- Contains all adjustments for easy balancing
- Bi-metal temperature indicator
- Minimum, maximum, and auxiliary flow limit adjustments
- Live velocity readout terminal
- Tamper proof cover



Titus ACTUATOR

- 24 VAC tri-state damper actuator
- Rugged construction
- No stall design featuring magnetic clutch
- Linkage release button
- 50-inch per pound minimum torque rating
- 5-minute full stroke time

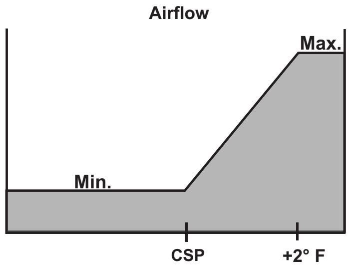


SINGLE DUCT

Controller Type: AT31

Cooling Only

With room temperature at setpoint, unit delivers minimum cfm. An increase in room temperature causes airflow to increase, reaching maximum cfm 2°F above setpoint.



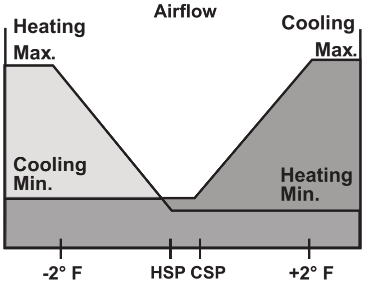
Models: AESV, AECV, AQCV

Controller Type: AT34

Heating/Cooling Autochangeover

With supply temperature below 70°F, unit operates in cooling mode. An increase in room temperature causes airflow to increase, reaching maximum cfm 2°F above setpoint.

If supply temperature increases above 80°F, unit changes to heating mode. With supply temperature above 80°F, unit operates in heating mode. A decrease in room temperature causes airflow to increase, reaching maximum cfm 2°F below setpoint. If supply temperature decreases below 70°F, unit changes to cooling mode.



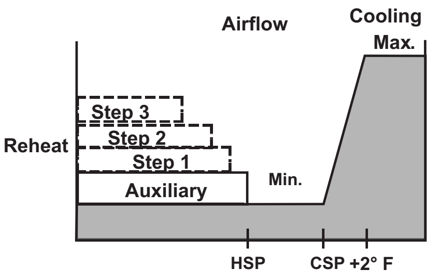
Models: AESV, AECV, AQCV

Controller Type: AT33

Cooling with Electric Reheat

An increase in room temperature causes airflow to increase, reaching maximum cfm 2°F above cooling setpoint. On a decrease in room temperature, minimum airflow is maintained until 0.2°F below heating setpoint, when airflow increases to auxiliary cfm.

At 0.4°F below heating setpoint, the first reheat stage is energized. The optional second and third stages are energized at 1.1° and 1.7°F below heating setpoint, respectively. An increase in room temperature de-energizes the heat stages at 1.5°, 0.9°, and 0.2°F below heating setpoint.



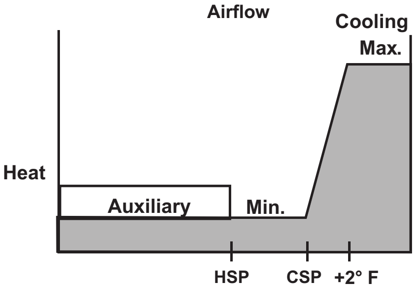
Model: AESV

Controller Type: AT33

Cooling with Auxiliary Heat

An increase in room temperature causes airflow to increase, reaching maximum cfm 2°F above cooling setpoint. On a decrease in room temperature, minimum airflow is maintained until 0.2°F below heating setpoint.

Airflow increases to auxiliary cfm. At 0.4°F below heating setpoint, a stage of on/off auxiliary heat (water coil, radiant panel, radiator, etc.) is activated. An increase in room temperature deactivates the auxiliary heat at 0.2°F below heating setpoint.



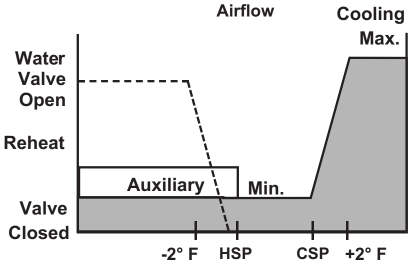
Model: AESV

Controller Type: AT35

Cooling with Proportional Hot Water Reheat

An increase in room temperature causes airflow to increase, reaching maximum cfm 2°F above cooling setpoint.

On a decrease in room temperature below heating setpoint, a proportional valve begins to open. The water valve is fully opened 2°F below heating setpoint. At 0.2°F below heating setpoint, airflow increases to auxiliary cfm if desired.



Model: AESV

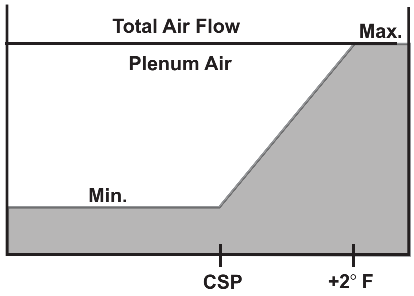
Note: The cooling and heating setpoints can be adjusted to be within 1°F from each other

FAN POWERED

Controller Type: AT31

Constant Fan VAV Terminal, Cooling Only

Fan operates continuously, providing constant volume to the space. With room temperature at setpoint, unit delivers minimum cooling cfm. An increase in room temperature causes airflow to increase, reaching maximum cooling cfm 2°F above setpoint.



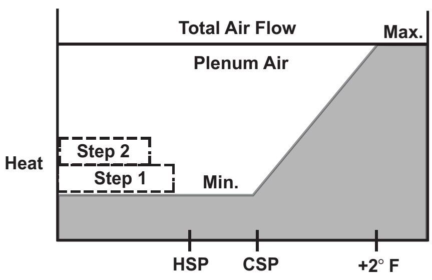
Models: ATFS, ATQS, AFLS

Controller Type: AT33

Constant Fan VAV Terminal with Electric Heat

Fan runs continuously, providing constant volume to the space. With room temperature at setpoint, unit delivers minimum cooling cfm. An increase in room temperature causes airflow to increase, reaching maximum cooling cfm 2°F above cooling setpoint.

On a decrease in room temperature, minimum cooling airflow is maintained. At 1.1°F below heating setpoint, the first heat stage is energized. The optional second heat stage is energized at 1.7°F below heating setpoint. An increase in room temperature de-energizes the heat stages at 1.5° and 0.9°F below heating setpoint.



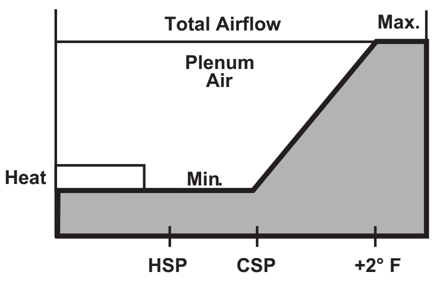
Models: ATFS, ATQS, AFLS

Controller Type: AT33

Constant Fan VAV Terminal with Auxiliary Heat

Fan runs continuously, providing constant volume to the space. With room temperature at setpoint, unit delivers minimum cooling cfm. An increase in room temperature causes airflow to increase, reaching maximum cooling cfm 2°F above cooling setpoint.

On a decrease in room temperature, minimum cooling airflow is maintained. At 1.1°F below heating setpoint, a stage of on/off auxiliary heat (water coil, radiant panel, radiator, etc.) is activated. An increase in room temperature de-activates the auxiliary heat at 0.9°F below heating setpoint.



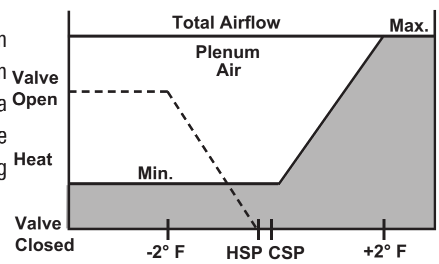
Models: ATFS, ATQS, AFLS

Controller Type: AT35

Constant Fan VAV Terminal with Proportional Hot Water Heat

Fan operates continuously, providing constant volume to the space. With room temperature at cooling setpoint, unit delivers minimum cooling cfm. An increase in room temperature causes airflow to increase, reaching maximum cooling cfm 2°F above cooling setpoint.

On a decrease in room temperature, minimum cooling airflow is maintained. When room temperature falls below heating setpoint, a proportional water valve begins to open. The water valve is fully opened 2°F below heating setpoint.



Models: ATFS, ATQS, AFLS

Note: The cooling and heating setpoints can be adjusted to be within 1°F from each other

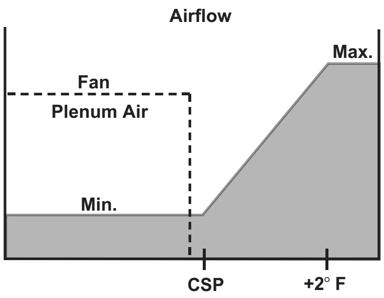
FAN POWERED

Controller Type: AT31

Variable Volume Fan VAV Terminal, Cooling Only

With room temperature at setpoint, unit delivers minimum cooling cfm. An increase in room temperature causes airflow to increase, reaching maximum cooling cfm 2°F above setpoint.

On a decrease in room temperature, minimum cooling airflow is maintained. When room temperature is 0.4°F below setpoint, the unit fan is energized to deliver return air to the space. The unit fan is de-energized when room temperature is 0.2°F below setpoint.



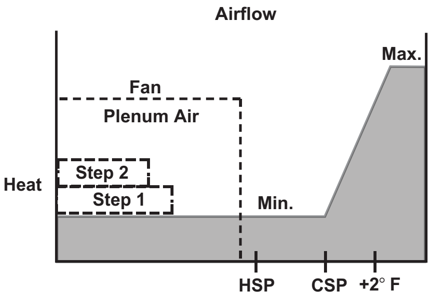
Models: ATQP, AFLP

Controller Type: AT33

Variable Volume Fan VAV Terminal with Electric Heat

With room temperature at cooling setpoint, unit delivers minimum cooling cfm. An increase in room temperature causes airflow to increase, reaching maximum cooling cfm 2°F above cooling setpoint.

On a decrease in room temperature, minimum cooling airflow is maintained. When room temperature is 0.4°F below heating setpoint, unit fan is energized to deliver return air to the space. At 1.1°F below heating setpoint, the first heat stage is energized. The optional second heat stage is energized at 1.7°F below heating setpoint. An increase in room temperature de-energizes the heat stages and unit fan at 1.5°, 0.9°, and 0.2°F below heating setpoint, respectively.



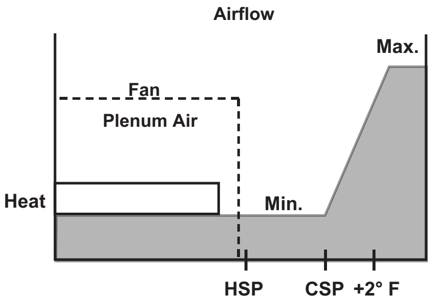
Models: ATQP, AFLP

Controller Type: AT33

Variable Volume Fan VAV Terminal with Auxiliary Heat

With room temperature at cooling setpoint, unit delivers minimum cooling cfm. An increase in room temperature causes airflow to increase, reaching maximum cooling cfm 2°F above cooling setpoint.

On a decrease in room temperature, minimum cooling airflow is maintained. When room temperature is 0.4°F below heating setpoint, unit fan is energized to deliver return air to the space. At 1.1°F below heating setpoint, a stage of on/off auxiliary heat (water coil, radiant panel, radiator, etc.) is activated. An increase in room temperature de-activates the auxiliary heat and unit fan at 0.9° and 0.2°F below heating setpoint, respectively.



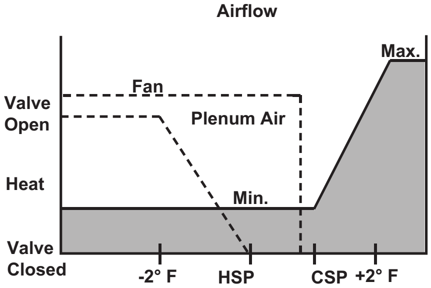
Models: ATQP, AFLP

Controller Type: AT35

Variable Volume Fan VAV Terminal Cooling with Proportional Hot Water Reheat

With room temperature at cooling setpoint, unit delivers minimum cooling cfm. An increase in room temperature causes airflow to increase, reaching maximum cooling cfm 2°F above cooling setpoint.

On a decrease in room temperature, minimum cooling airflow is maintained. When room temperature is 0.4°F below setpoint, unit fan is energized to deliver return air to the space. If room temperature falls below heating setpoint, a proportional water valve begins to open. The water valve is fully opened 2°F below heating setpoint.



Models: ATQP, AFLP

Note: The cooling and heating setpoints can be adjusted to be within 1°F from each other

NOTES:

- AUXILIARY HEAT
  Controls provide a 24 VAC output signal for operation of devices requiring up to 10 VA

- PROPORTIONAL HOT WATER REHEAT
  Controls are compatible with any 0 to 10 VDC nominal valve, configured such that 0 and 10 VDC correspond to fully closed and fully open, respectively. Valve control signal requirements up to 10 mA are acceptable.

- MORNING WARM-UP (TERMINALS WITHOUT REHEAT/AUXILIARY HEAT ONLY)
  When supply air temperature exceeds 80°F, damper drives to a fully open position

- NIGHT SHUTDOWN (FAN POWERED TERMINALS ONLY)
  A pressure switch turns fan off when main fan system is off. Night shutdown automatically locks out optional electric heat.

- NIGHT SETBACK (FAN POWERED TERMINALS ONLY)
  A pressure switch detects main fan system shutdown. Unit fan and heat/auxiliary heat operate to maintain setback temperature. Constant volume fans operate intermittently in night setback.

- OPTIONAL STRATEGIES
  Night setback, night shutdown, and primary damper overrides may be initiated by external 24 VAC inputs and/or contact closures. Consult your Titus representative for details concerning special control sequences.

Titus I & II

Overview

Titus I & II – Pneumatic Controls

The Titus I & Titus II controllers have been around since the late 1970s. They have led the industry in precision pneumatic velocity control.

The Titus I controller can be used in less demanding applications. Its operation is completely pressure independent and the CFM can be adjusted from minimum to maximum.

Operation is completely pressure independent, with adjustable minimum and maximum cfm settings. The model identified by the gray housing is for use with a reverse acting thermostat and a normally closed damper, while the beige model is for use with a direct acting thermostat and a normally open damper.

The Titus II controller is the ideal choice for new construction, retrofit applications or replacement. Factory calibration is standard on single duct, dual duct, and fan powered terminals equipped with the Titus II.

TITUS I

TITUS II

See website for Specifications

MODELS:

Titus I
Titus II

TITUS II FEATURES

- Accurate control over a duct velocity range of 0 to 3000 fpm
- Operates at low system pressures. As effective at 0.03" Ps at 6.0" Ps.
- Pressure independent
- Reset span remains constant regardless of maximum and minimum cfm adjustments. The factory set 5 psi span is adjustable from 3 to 10 psi to match any thermostat.
- Reset start point is adjustable from 3 to 13 psi to work with accessories such as reheat coils (factory setting is 8 psi)
- Thermostat switch changes the action from direct acting to reverse acting without additional calibration. No additional relays required - great for quick retrofit installation!
- Damper switch changes the operation of the control from normally open to normally closed without re-caliberation. No additional relays required.
- All adjustments are made with a hex shanked knob stored in the face of the Titus II controller
- Operates on a control air pressure of 15 to 25 psi
- Control air consumption is no more than 1.2 scfh

FEATURES AND BENEFITS

PRESSURE INDEPENDENT

In operation, the Titus amplifying velocity sensor in the inlet feeds signals to the Titus II controller, which acts as a pneumatic computer. As indicated by the block diagram, the controller monitors the input data — room temperature, system total pressure, static pressure, and velocity pressure. It processes the input data and energizes the pneumatic damper actuator to obtain the required airflow. The results of the damper movement are sent as pressure signals through the feedback loop to the input for evaluation and correction.

Because of the extreme sensitivity of the controls, minor variations in the room temperature and duct pressure are immediately sensed and acted upon. Hunting and over controlling are minimized and operation is stable over the entire operating range.

Reversible Damper Action

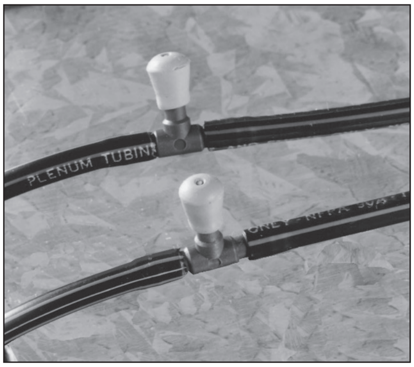
The damper can be changed between normally open and normally closed by simply loosening the set screws in the crank arm, rotating the shaft 90°, and tightening the set screws. An indicator mark on the end of the shaft shows the damper position figure.

Gauge Taps

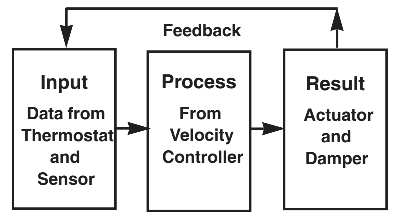
Connect a differential pressure gauge to the Titus amplifying velocity sensor for accurate airflow measurement (on pressure independent terminals only).

PRESSURE DEPENDENT (SINGLE DUCT TERMINALS)

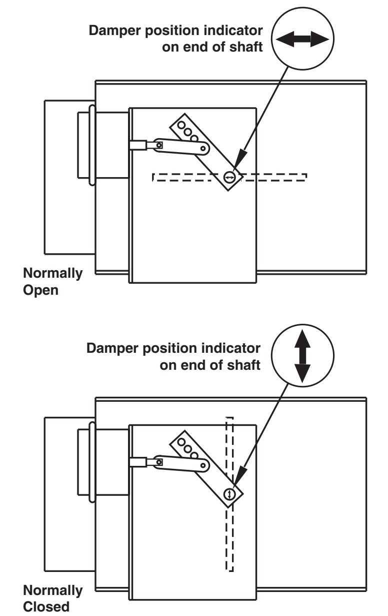
In pressure dependent terminals, the sensor and controller are omitted and the pneumatic actuator is controlled directly by the thermostat. This version of the Titus pneumatic terminal unit is used where neither pressure independence nor regulated maximum flow is required. An example is a variable volume air supply in which the duct pressure is held constant by other controls.



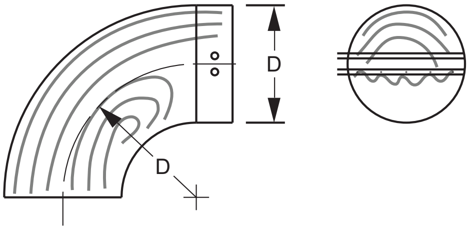
Titus II Block Diagram



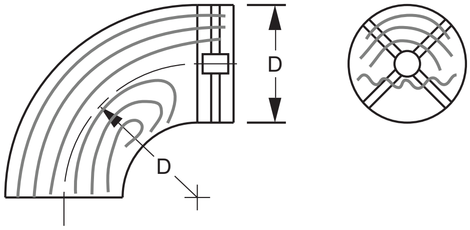
Damper Position



When you specify and install Titus terminal units, you get predictable airflow control even in less than ideal installations. What makes this performance possible is the Titus AeroCross™ Multi-Point, Center Averaging Velocity Sensor. It samples velocities over the entire cross section of the inlet, then averages and amplifies them.



A. Linear-averaging Sensor with short radius elbow at unit inlet. Uneven air velocities leaving the short radius elbow send a false reading to the linear-averaging velocity sensor at the center of the unit inlet. Low amplification reduces control accuracy at lower flow rates.



B. Titus AeroCross™ Multi-Point, Center Averaging Sensor with short radius elbow at unit inlet. The AeroCross™ measures the same uneven velocities as in A, but at many points across the entire inlet opening. It simultaneously averages and amplifies these velocities for an accurate indication of the total airflow through the unit, even at low flow rates.

COMPARISON

All velocity controllers are not equal!

The Titus II has offered unequaled pneumatic velocity reset control for more than 20 years. While there are some claims of equality, no control better suits the needs of today's new construction, retrofit, or replacement market for pneumatic controls than the Titus II.

The table to the right compares the Titus II with two other controls on the market today. The Titus II is clearly superior!

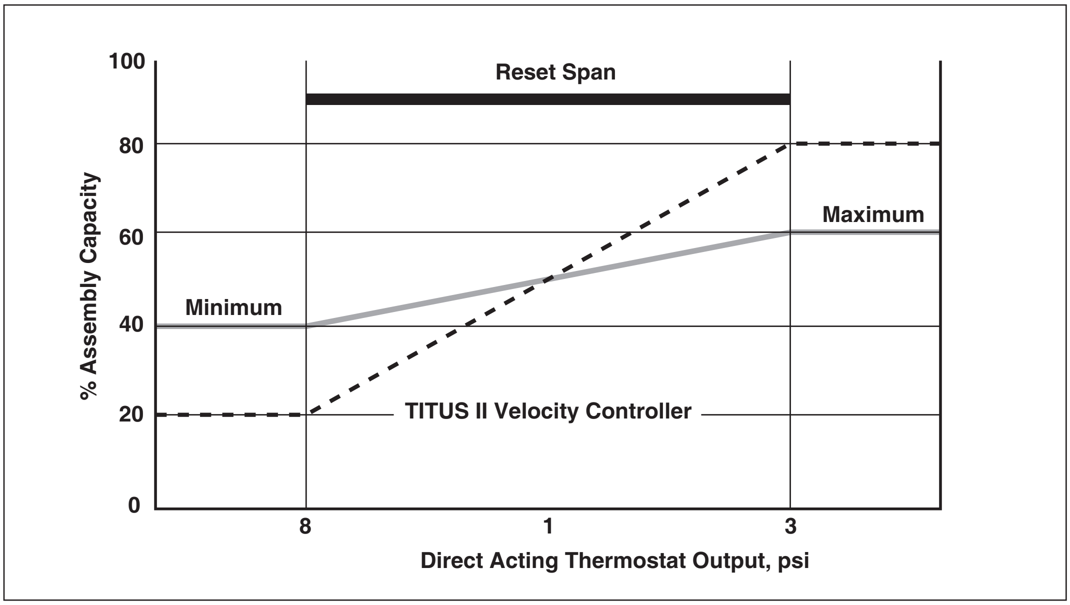
The Titus II performance advantage often an otherwise well-designed HVAC system does not perform as well as expected, mainly because the reset span (throttling range) of the velocity controller is too narrow.

The Titus II controller always modulates through its full reset span, regardless of the maximum or minimum cfm setting. Hunting is avoided.

The reset span can be adjusted from 3 to 10 psi (5 psi is standard). It is then held constant, even if the cfm settings are changed.

The reset start point is also adjustable to match various thermostat throttling ranges such as 3 to 8, 5 to 10, or 8 to 13, and to coordinate with accessories such as heating coils.

Titus II	Controller A	Controller B
Models		
One Model	One Model	Model 1: Da/NO, RA/NC Model 2: DA/NC, RA/NO
Reset Start Point		
Factory Set at 8.0 psi. Adjustable from 3 - 10 psi.	Factory set at 8.0 psi for DA thermostats. Must recalibrate to 3.0 psi for RA stats. Adjustable 3 - 10 psi.	Factory set at 8.0 psi for Model 1, 3.0 psi for Model 2. Adjustable 3 - 10 psi in 1 psi increments (no fine tuning).
Reset Span		
Factory set at 5.0 psi. Adjustable from 3 - 10 psi. Range (0 to 1.0").	Factory Reset Dial (may require flow limit recalibration). Range (0-1.0").	5.0 psi (non-adjustable). Reset range adjustable from 0.15" to 2.0" wg.
Reset Damper Action		
Damper Reset Switch.	Damper Reset Dial (may require flow limit recalibration).	Change controller model or add reversing relay.
DA/RA Thermostat Change		
Thermostat Switch.	Re-calibrate airflow limits and adjust reset start point.	Disassemble and reassemble controller.
Ambient Operating Temperature		
Limits +40 to +120°F.	Limits +40 to +120°F.	Limits +60 to +85°F.

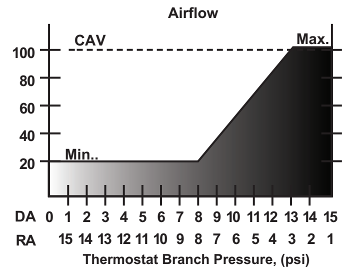


SINGLE DUCT

Control Option Code: 00

VAV (Variable Air Volume) Cooling
As the room temperature increases, the room thermostat modulates the cold airflow from the minimum to the maximum setting.

CAV (Constant Air Volume) Cooling
The airflow remains constant regardless of changes in duct pressure or room temperature. A room thermostat is not used.

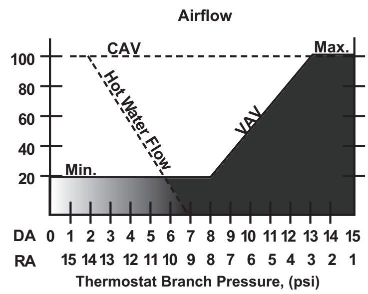


Models: PESV, PECV, PQCV

Control Option Code: 00

VAV Cooling, Hot Water Reheat
As the room temperature increases, the room thermostat modulates the hot water coil valve toward the closed position. On a further increase in room temperature, the room thermostat modulates the cold airflow from the minimum to maximum setting.

CAV Cooling, Hot Water Reheat
The cold airflow remains constant regardless of changes in duct pressure or room temperature. As room temperature increases, the room thermostat modulates the hot water coil valve toward the closed position.

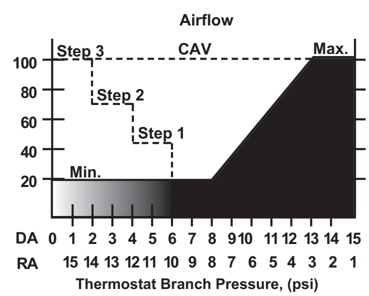


Model: PESV

Control Option Code: 00

VAV Cooling, Electric Reheat
As the room temperature increases, the room thermostat de-energizes the electric heating one step at a time. On a further increase in room temperature, the room thermostat modulates the cold airflow from the minimum to the maximum setting.

CAV Cooling, Electric Reheat
The cold airflow remains constant regardless of changes in duct pressure or room temperature. As room temperature increases, the room thermostat de-energizes the electric heating coil one step at a time.

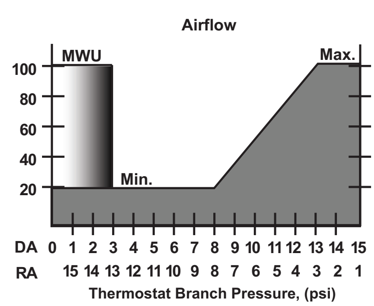


Model: PESV

Control Option Code: WU

VAV Cooling with Morning Warm-Up (MWU)
A separate 15 to 25 psi pneumatic signal line to each terminal unit resets the controller setpoint through a signal selector relay for pressure independent hot airflow at the maximum setting. Additional heat may be provided by a heating coil on the discharge of the unit.

When the warm-up signal is turned off, the unit resumes normal cooling operation. As the room temperature increases, the room thermostat modulates the cold airflow from the minimum to the maximum setting.



Models: PESV, PECV, PQCV

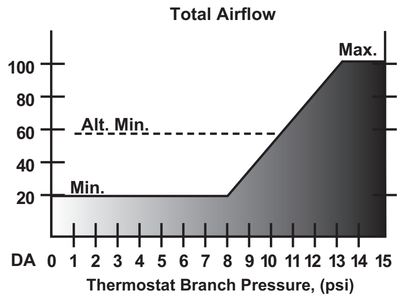
SINGLE DUCT

Control Option Code: DM

VAV Cooling, Dual Minimum Flows, with Reheat (Signal Line)

When the signal line is zero psi, a decrease in room temperature modulates the cold airflow from the maximum to the minimum setting.

When the signal line equals the alternate psi, a decrease in room temperature modulates the airflow from maximum to alternate minimum setting. A further decrease in room temperature modulates the hot water valve or steps the electric coil for reheat.



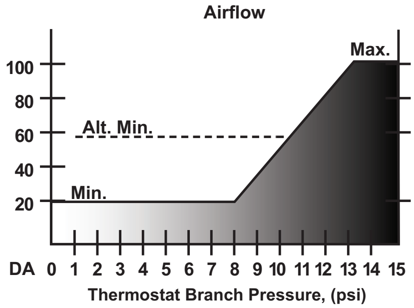
Model: PESV

Control Option Code: DP

VAV Cooling, Dual Minimum Flows, with Reheat (Dual Pressure Main)

At the summer main pressure (usually 18 psi) a decrease in room temperature modulates the airflow from maximum down to the minimum setting.

At the winter main pressure (usually 23 psi), a decrease in room temperature modulates the airflow from maximum down to alternate minimum setting. A further decrease in room temperature modulates the hot water valve to open or steps the electric coil on for reheat.



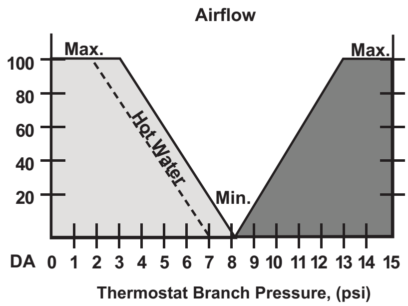
Model: PESV

Control Option Code: FF

VAV Cooling and VAV Heating, Equal Maximum Flows (Flip-Flop)

A decrease in room temperature modulates the airflow from maximum to minimum setting (at room thermostat setpoint).

A further decrease in room temperature modulates the airflow from minimum to maximum setting and modulates the hot water control valve to the open position.



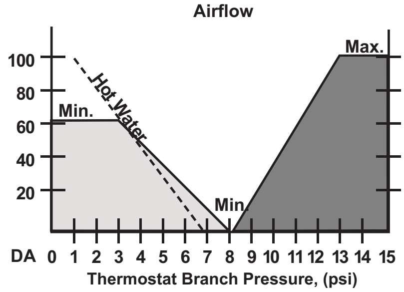
Model: PESV

Control Option Code: DO

VAV Cooling and VAV Heating, Dual Maximum Flows

A decrease in room temperature modulates the airflow from maximum to minimum setting (at room thermostat setpoint).

A further decrease in room temperature modulates the airflow from minimum to alternate maximum setting and modulates the hot water control valve to the open position.



Model: PESV

DUAL DUCT

Control Option Code: 00

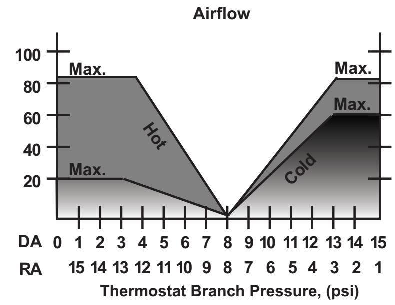
VAV, No Mixing

The hot and cold duct controllers are set independently for maximum airflow setting. Both controls are set for zero minimum airflow.

Hot and cold controls can be set for equal maximum airflow. If heating loads are less demanding or unequal inlets are required, the hot duct maximum can be adjusted for a lower setting.

Equal Max. Flow Rates

Unequal Max. Flow Rates



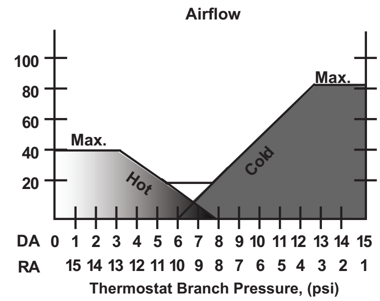
Model: PEDV

Control Option Code: 00

VAV with Mixing (Attenuator required)

Diagram shows unit with hot inlet and cold total flow sensors. The hot control is still set for zero minimum airflow. The unit minimum is set on the cold inlet control. Unequal inlets are available for the hot inlet.

Maximum airflow can be independently adjusted for equal or unequal settings. Mixing begins when the cold airflow reaches minimum airflow. When the hot airflow is greater than the unit minimum, the cold damper is fully closed. Optional cold inlet and hot total flow sensors are available.



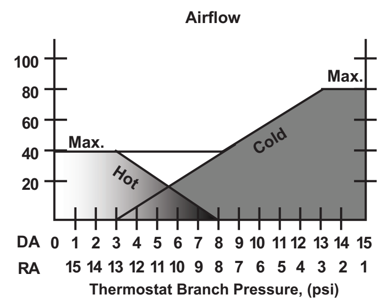
Models: PEDV, PMDV

Control Option Code: 00

VAV with Hot Maximum Equal to Unit Minimum Airflow (Attenuator required)

Diagram shows unit with hot inlet and cold total flow sensors. The hot control is still set for zero minimum airflow. The unit minimum is set on the cold inlet control. Unequal inlets are available for the hot inlet.

Maximum airflow for the hot inlet is set equal to unit minimum. Mixing begins when the cold airflow reaches minimum airflow. When the hot airflow is equal to the unit minimum, the cold damper is fully closed. Optional cold inlet and hot total flow sensors are available.



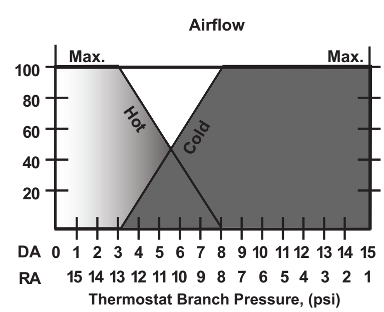
Models: PEDV, PMDV

Control Option Code: 00

Constant Air Volume (Attenuator required)

Diagram shows unit with hot inlet and cold total flow sensors. The hot control is set for zero minimum airflow and maximum airflow is equal to total airflow.

The cold control minimum and maximum are set equal to total flow. The room thermostat is connected to the hot control only. If the optional cold inlet and hot total sensors are selected, the mixing occurs between 8 and 13 psi thermostat pressure.



Models: PEDV, PMDC

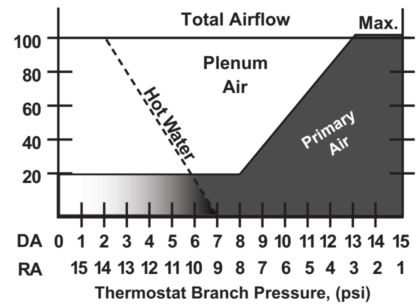
FAN POWERED

Control Option Code: 00

Constant Volume Fan VAV Terminal with Hot Water Heat

The unit fan delivers a constant airflow to the space at all times. As the room temperature decreases, the primary air valve modulates the airflow from the maximum to the minimum setting.

With a further decrease in room temperature, the room thermostat modulates the water coil valve to the open position.



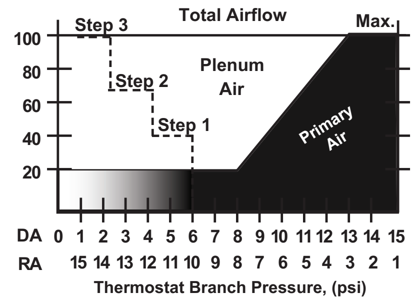
Models: PTFS, PTQS, PFLS

Control Option Code: 00

Constant Volume Fan VAV Terminal with Electric Heat

The unit fan delivers a constant airflow to the space at all times. As the room temperature decreases, the primary air valve modulates the airflow from the maximum to the minimum setting.

With a further decrease in room temperature, the electric heating coil is energized one step at a time.



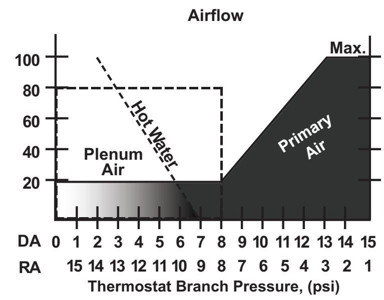
Models: PTFS, PTQS, PFLS

Control Option Code: 00

Variable Volume Fan VAV Terminal with Hot Water Heat

As the room temperature decreases, the primary airflow modulates from maximum to minimum setting (at room thermostat setpoint).

With a further decrease in room temperature, the room thermostat energizes the unit fan and the water coil valve modulates to the full open position.



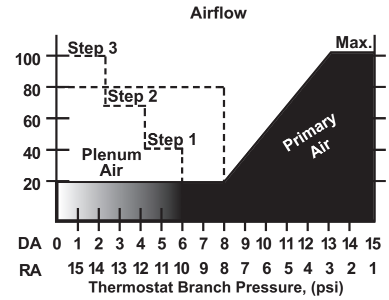
Models: PTQP, PFLP

Control Option Code: 00

Variable Volume Fan VAV Terminal with Electric Heat

As the room temperature decreases, the primary airflow modulates from the maximum to the minimum setting (at room thermostat setpoint).

With a further decrease in room temperature, the room thermostat energizes the unit fan and the electric heating coil is energized one step at a time.



Models: PTQP, PFLP

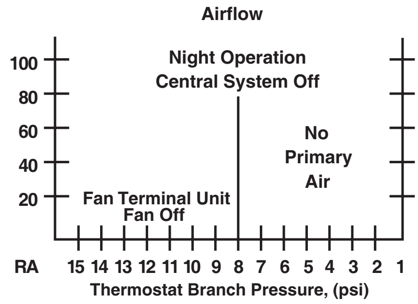
FAN POWERED

Control Option Code: AC

Constant Fan VAV Terminal with Night Shutdown (NSD) PE

Day operation, main air ON. See the control sequence outlined on page 021.

Night operation, main air OFF, primary air fan must be shut off. The unit fan remains off until the main air is restored. Units with electric heat must use reverse acting thermostats to prevent heat operation when fan is off.



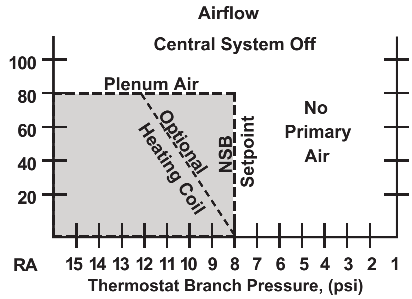
Models: PTFS, PTQS, PFLS

Control Option Code: AE

Constant Fan VAV Terminal with Night Setback (NSB) PEs

Day operation, main air ON. See the control sequence outlined on page 021.

Night operation, main air OFF, Primary air fan must be shut off. The unit fan remains off until the night setback thermostat calls for heat. The unit fan energizes followed by the water or electric heat. Units with electric heat must use reverse acting thermostats to prevent heat operation when fan is off.



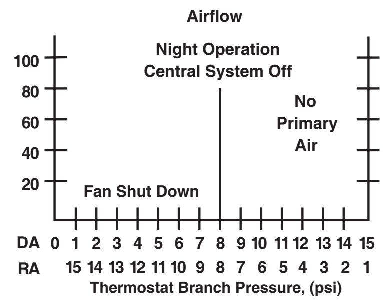
Models: PTFS, PTQS, PFLS

Control Option Code: AD

Constant Fan VAV Terminal with Night Shutdown (NSD) Airflow Switch

Day operation, primary air handler ON. See control sequence on page 021.

Night operation, primary air to the unit is shut off. The unit fan remains off until the primary air is restored.



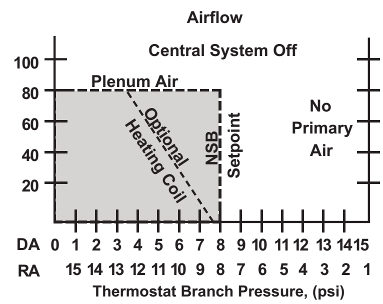
Models: PTFS, PTQP, PFLP

Control Option Code: AF

Constant Fan VAV Terminal with Night Setback (NSB) Airflow Switch

Day operation, primary air handler ON. See the control sequence on page 021.

Night operation, primary air OFF. The unit fan remains off until the night setback thermostat calls for heat. The unit fan energizes followed by the water or electric heat.



Models: PTFS, PTQP, PFLP

EcoShield

Overview

EcoShield Liner

EcoShield is a sustainable product comprised of recycled denim, which means it is environmentally friendly and contains no harmful irritants or chemicals.

EcoShield also includes an EPA registered anti-microbial (biocide) mold and fungal inhibitor ensuring the product is safe for you and the environment.

Additionally, EcoShield is a thermally bonded, high density insulation that meets all industry thermal and acoustic requirements.

ECOSHIELD

energy solutions

See website for Specifications

MODELS:

½" EcoShield Liner
1" EcoShield Liner
½" EcoShield Liner with Foil Face
1" EcoShield Liner with Foil Face

½" ECOSHIELD

INSULATION CHARACTERISTICS

Material:	Natural Fiber Duct Liner
Thickness:	½ inch
R-Value:	2.0 ft^2 °F h/Btu @ 75° F
Density:	3.0 lbs/ft^3
Flame Spread:	less than 25
Smoke Density:	less than 50
Mold Growth:	None

CODE COMPLIANCES

NFPA 90A & 90B	Appliances
NFPA 255	Flame / Smoke Spread (25/50)
UL 723	Flame / Smoke Spread (25/50)
ASTM C 411	UL 181 Air Erosion
ASTM E84	UL 181 Mold Growth & Humidity
ASTM C 1071	Operating Temperature Limits
ASTM C 739	Flame / Smoke Spread (25/50)
ASTM G 21	Maximum Air Velocity
ASTM G 22	Corrosion Resistance
	Fungi Resistance
	Bacteria Resistance

1" ECOSHIELD

INSULATION CHARACTERISTICS

Material:	Natural Fiber Duct Liner
Thickness:	1 inch
R-Value:	4.0 ft^2 °F h/Btu @ 75° F
Density:	1.5 lbs/ft^3
Flame Spread:	less than 25
Smoke Density:	less than 50
Mold Growth:	None

CODE COMPLIANCES

NFPA 90A & 90B	Appliances
NFPA 255	Flame / Smoke Spread (25/50)
UL 723	Flame / Smoke Spread (25/50)
UL 181 Air Erosion	Operating Temperature Limits
UL 181 Mold Growth & Humidity	Flame / Smoke Spread (25/50)
ASTM C 411	Maximum Air Velocity
ASTM E84	Corrosion Resistance
ASTM C 1071	Fungi Resistance
ASTM C 739	Bacteria Resistance
ASTM G 21	
ASTM G 22	

Fiberglass

Overview

Fiberglass Liner

Titus offers a wide variety of liners suitable to meet any application requirement. Standard fiberglass insulation is the most commonly used, but some applications do not allow fiberglass in the airstream. For these applications, Titus offers Fibre Free closed cell foam insulation, SteriLoc foil lined insulation and UltraLoc solid metal liner.

FIBERGLASS

See website for Specifications

MODELS:

½" Fiberglass Liner
1" Fiberglass Liner

½" FIBERGLASS

INSULATION CHARACTERISTICS

Material:	Dual Density Fiberglass
Thickness:	½"
R-Value:	1.9 ft² °F h/Btu @ 75° F
Density:	1.5 lbs/ft³ with 4.0 lbs/ft³ face
Flame Spread:	less than 25
Smoke Density:	less than 50
Mold Growth:	None

CODE COMPLIANCES

NFPA 90A & 90B	Appliances
NFPA 255	Flame / Smoke Spread (25/50)
UL 181	Air Erosion
UL 181	Mold Growth and Humidity
UL 723	Flame / Smoke Spread (25/50)
ASTM E84	Flame / Smoke Spread (25/50)

1" FIBERGLASS

INSULATION CHARACTERISTICS

Material:	Dual Density Fiberglass
Thickness:	1"
R-Value:	3.9 ft² °F h/Btu @ 75° F
Density:	1.5 lbs/ft³ with 4.0 lbs/ft³ face
Flame Spread:	less than 25
Smoke Density:	less than 50
Mold Growth:	None

CODE COMPLIANCES

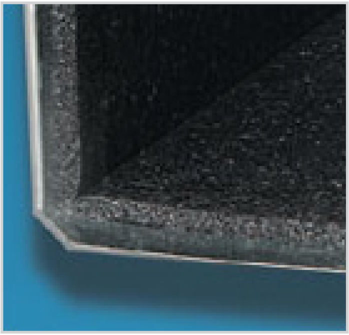
NFPA 90A & 90B	Appliances
NFPA 255	Flame / Smoke Spread (25/50)
UL 181	Air Erosion
UL 181	Mold Growth and Humidity
UL 723	Flame / Smoke Spread (25/50)
ASTM E84	Flame / Smoke Spread (25/50)

Fibre Free

Overview

Fibre Free Liner

Titus offers a wide variety of liners suitable to meet any application requirement. Fibre Free is an engineered polymer foam insulation. Fibre Free contains no fiberglass and has a cleanable surface, making it ideal for many hospital and IAQ applications.



FIBER FREE

See website for Specifications

MODELS:

½" Fibre Free
1" Fibre Free

½" FIBRE FREE

INSULATION CHARACTERISTICS

Material:	EPFI (Engineered Polymer Foam Insulation)
Thickness:	½"
R-Value:	2.0 ft² °F h/Btu @ 75° F
Density:	1.5 lbs/ft³
Flame Spread:	less than 25
Smoke Density:	less than 50
Mold Growth:	None

CODE COMPLIANCES

NFPA 90A & 90B	Appliances
NFPA 255	Flame / Smoke Spread (25/50)
UL 181	Air Erosion
UL 181	Mold Growth and Humidity
UL 723	Flame / Smoke Spread (25/50)
ASTM E96	Water Vapor Transmission
ASTM E84	Flame / Smoke Spread (25/50)
Factory Mutual Listed	

1" FIBRE FREE

INSULATION CHARACTERISTICS

Material:	EPFI (Engineered Polymer Foam Insulation)
Thickness:	1"
R-Value:	4.0 ft² °F h/Btu @ 75° F
Density:	1.5 lbs/ft³
Flame Spread:	less than 25
Smoke Density:	less than 50
Mold Growth:	None

CODE COMPLIANCES

NFPA 90A & 90B	Appliances
NFPA 255	Flame / Smoke Spread (25/50)
UL 181	Air Erosion
UL 181	Mold Growth and Humidity
UL 723	Flame / Smoke Spread (25/50)
ASTM E96	Water Vapor Transmission
ASTM E84	Flame / Smoke Spread (25/50)
Factory Mutual Listed	

SteriLoc

Overview

SteriLoc Liner

Titus offers a wide variety of liners suitable to meet any application requirement. SteriLoc is 13/16" foil face duct board liner. The foil face provides a cleanable surface, making it suitable for many hospital and IAQ applications. All edges are encapsulated so that no fiberglass is exposed to the airstream.

STERILOC

See website for Specifications

MODEL:

13/16" SteriLoc Liner

13/16" STERILOC

INSULATION CHARACTERISTICS

Material:	Foil Faced Duct Board Insulation
Thickness:	13/16"
R-Value:	3.5 ft^2 °F h/Btu @ 75° F
Density:	4.0 lbs/ft^3
Flame Spread:	25
Smoke Density:	50
Mold Growth:	None

CODE COMPLIANCES

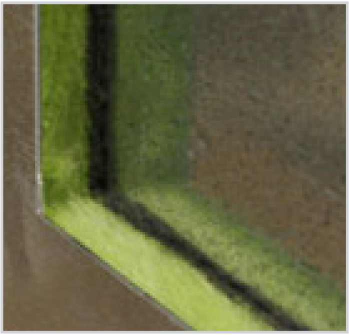
UL 723	Flame / Smoke (25/50)
UL 181	Air Erosion
UL 181	Mold Growth and Humidity
ASTM C 665	Corrosiveness
ASTM 1338	Fungi Resistance
ASTM G21	Fungi Resistance
ASTM G22	Fungi Resistance

UltraLoc

Overview

UltraLoc Liner

Titus offers a wide variety of liners suitable to meet any application requirement. UltraLoc is a solid metal liner that encapulates fiberglass insulation. The metal surface is cleanable, making it suitable for hospital and IAQ applications.



ULTRALOC

See website for Specifications

MODEL:

1" UltraLoc Liner

1" ULTRALOC

INSULATION CHARACTERISTICS

Material:	Solid Metal Liner over Fiberglass
Thickness:	1" Fiberglass in ¾" Deep Metal Pan
R-Value:	Fiberglass - 3.9 ft² °F h/Btu @ 75° F
Density:	Fiberglass - 1.5 lbs/ft³
Flame Spread:	25
Smoke Density:	50
Mold Growth:	None

CODE COMPLIANCES

NFPA 90A & 90B	Appliances
NFPA 255	Flame / Smoke Spread (25/50)
UL 181	Air Erosion
UL 181	Mold Growth and Humidity
UL 723	Flame / Smoke Spread (25/50)
ASTM E84	Flame / Smoke Spread (25/50)

Electric Heating Coils

OVERVIEW

Integral electric coils are available on Titus single duct and fan powered terminals. Titus electric heating coils are specifically designed to for use with Titus terminal units. Titus electric heater coils are not available as stand-alone duct heaters.

The heater design minimizes stratification and hot spots that can cause nuisance tripping of the thermal cutouts.

On fan powered terminals, the electric coil controls are interlocked with the unit fan to allow the electric coil to energize only when the fan is running.

Each complete terminal, with electric coil installed, is ETL listed and has been tested in accordance with UL standards. The NEMA 1 electrical enclosure includes a single point.

SINGLE DUCT ELECTRIC COIL

STANDARD FEATURES:

- Primary automatic reset thermal cutout (one per coil)
- Secondary manual reset thermal cutout
- Airflow switch (differential pressure)
- Derated nickel chrome heating elements
- Magnetic or safety contactors (as required)
- Line terminal block
- Control terminal block
- ETL listed
- 80/20 nickel chrome element wire

SINGLE DUCT OPTIONAL FEATURES:

- Class II, 24 VAC control transformer
- Door interlock disconnect switch
- Main supply fuses
- Dust tight construction
- Optional Lynergy Comfort Controlled SSR Electric Heat available

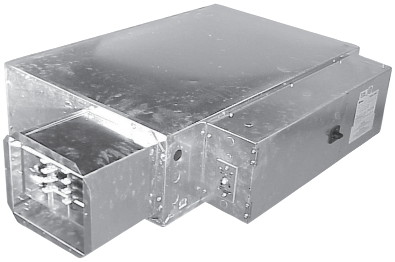
FAN POWERED DUCT ELECTRIC COIL

STANDARD FEATURES:

- Automatic reset thermal cutouts, one per element
- 80/20 nickel chrome heating elements
- Magnetic contractors, where required, on pneumatic units
- Airflow safety switch
- Line terminal block (277/1∅, 208/240/3∅, or 480/3∅ 4 wire)
- Flanged connection
- Control transformer for DDC or analog electronic controls
- Pneumatic electric switch for pneumatic parallel fan terminals
- Fan relay for DDC fan terminals
- Magnetic contactor per step on terminals with DDC or analog electronic controls

FAN POWERED OPTIONAL FEATURES:

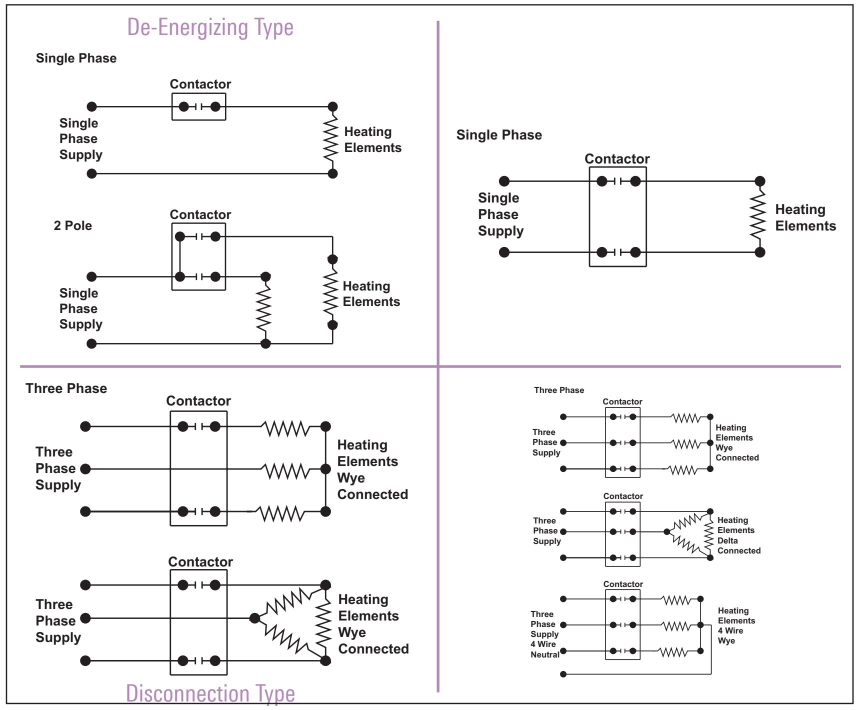
- Interlocking disconnect
- Main power supply fuses
- Manual reset thermal cutout
- Dust tight construction
- Optional Lynergy Comfort Controlled SSR Electric Heat available



CONTACTOR CIRCUITRY

There are two types of contactor circuitry used in electric coils: de-energizing contactors break only one ungrounded line on single phase circuits and two ungrounded lines of three phase circuits. (Note: Breaking the L1 on 277 volt electric coil can be considered as disconnecting.)

Disconnecting contactors break all ungrounded lines or conductors. The electric coils are wired for de-energizing contactor circuitry as standard.

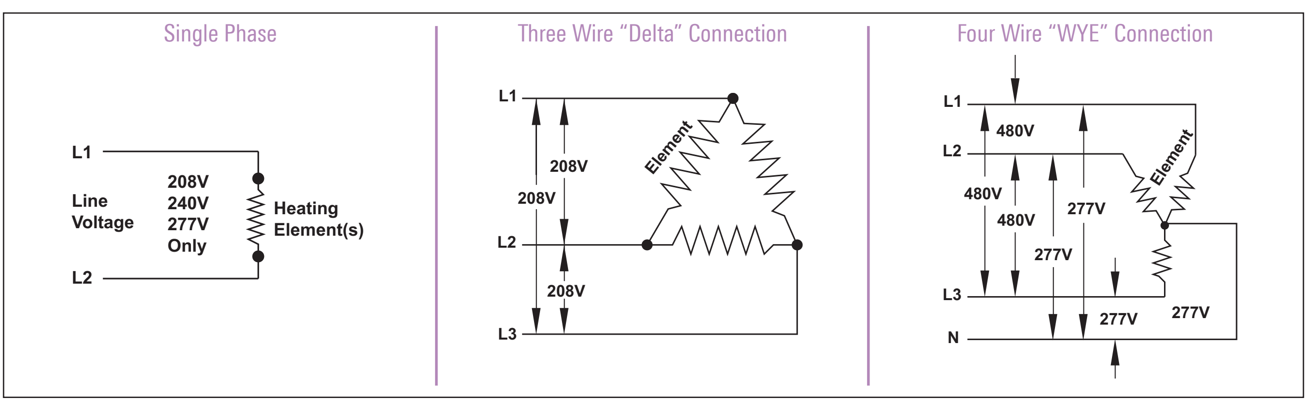


ELEMENT WIRING CONFIGURATIONS

There are three basic wiring configurations used with electric coils. The coil can be wired for single phase, three phase delta, or three phase wye. When using single phase coils versus three phase coils, the amp draw will be almost double and will require heavier gauge conductors.

Therefore, it would normally be more economical to use three phase electric coils. If the electric coil and fan motor combination exceeds 48 amps, you are required to subdivide the heating elements. Each subdivided circuit will be required to have some type of over current protection such as fuses.

Note: A 480 volt three wire wye connection, 277 volts is not available for the fan motor. You must have four wire wye.



Calculating Line Amperage

$$\text{Single Phase Amps} = \frac{\text{kW x 1000}}{\text{Volts}} \qquad \text{Three Phase Amps} = \frac{\text{kW x 1000}}{\text{Volts x 1.73}}$$

Converting kW to BTU per hour BTUH = kW x 3413

OPTIONAL LYNERGY CONTROLLED SSR ELECTRIC HEAT

OVERVIEW

The zone reheat in an HVAC system needs to address concerns about comfort, indoor air quality, energy and acoustics. Several ASHRAE Standards are used to cover all of these areas of design.

The ASHRAE Fundamentals Handbook states that discharging air at a temperature more than 15°F above the room (90°F in a 75°F room) will likely result in significant unwanted air temperature stratification.

ASHRAE Standard 62 (Indoor Air Quality) has been modified to require increased outside air when heating from the ceiling (Table 6.2, Addenda N. Using the ASHRAE 129 test procedure for Air Change Effectiveness, mixing effectiveness values as low as 20% (or lower) have been observed, when the supply to room differential exceeds 15°F. In most cases, it only requires 85°F air to handle a typical winter design perimeter load at 1 cfm/Sq.Ft. air supply rate (the airflow rate recommended for both good ventilation mixing and comfort).

Standard staged electric heat energizes each stage of heat as the zone temperature calls for more heat. In a three-stage heater, the increase happens in 33% heater output increments. If an additional 33% heater output provides too much heating, then the heater will de-energize that stage. The result is over- and under-heating of the zone.

A proportional SCR or SSR heater eliminates the over- and under-heating of the zone by providing only as much heater output needed to satisfy the zone.

During the time a standard staged electric heater is over-heating the zone, it is using more energy than needed to satisfy the zone. For example, if the zone requires 50% of the heater capacity, a three-stage heater would have to output 66% of its capacity until the thermostat responds to the temperature in the over-heated zone and de-energizes the second stage of heat.

The Lynergy Comfort Control SSR electric heater is an electronic, time proportional electric heater, which utilizes silent, rapid responding solid-state relays. The solid-state relays are controlled by the Lynergy Comfort Controller.

The Lynergy Comfort Controller is available in 208V and 240V single phase and 277V, 208V, and 480V three phase line voltages. The Lynergy Comfort Controller accepts one of seven input signal types to provide superior control and flexibility: PWM, 2 stage heat, 0-10V/0-20mA, 2-10V/4-20mA, incremental thermostat, binary, and 3-point floating.

If the optional discharge temperature sensor is used, the heater is set to modulate heat to a set discharge temperature. The sensor can be mounted up to 20 feet from the unit discharge. User defined maximum temperature and controller defined temperature desired are maintained independent of heater kW or incoming air temperature.

The maximum discharge temperature produced by the heater is set by rotary dial on the Lynergy control board. When the unit receives a signal to start heating, the board will take an initial temperature reading and modulate heat from that point to the maximum temperature.

For example, if a thermostat requires only a 10% increase in heating of air that was initially 60°F, and has a maximum temperature setting of 90°F, the Lynergy controller will modulate the heater's output temperature to 63°F (the additional 3 degrees coming from (90°-60°) x 10%). This option allows an increase of heater energy into occupancy by increasing discharge airflow while keeping an optimal discharge temperature.

OPTIONAL STANDARD SCR CONTROLLED ELECTRIC HEAT

As an alternative to the standard staged electric heater, Titus offers SCR controlled electric heat, also known as time proportioned electric heat. SCR controlled electric heat provide superior comfort and energy savings. Two and three stage electric heaters cycle the stages on and off to meet the comfort requirements of the space. When the zone requires 50 percent heat output, a three stage heater will cycle the second stage of heat on and off. When the second stage is on, the heat output is 66.6 percent, 16.6 percent more than required to satisfy the zone.

An SCR controller is a time proportioned controller that modulates the heater to supply the exact amount of heat required to satisfy the zone requirements. SCR electric heat works by modulating the time the electric heater is powered on, not the kW of the heater.

An SCR heater sends a pulsed ON/OFF signal to energize and de-energize the electric coil to provide an average heat output that matches the heat requirement of the zone. The SCR is silent and can be pulsed continuously.

The Titus SCR controlled heater has a patented proportional electronic airflow sensor. This sensor allows the heater to operate at extremely low airflow. The unique electronic flow sensor allows the heater to respond exactly to the quantity of air flowing through the unit and safely de-energize in case of a total loss of airflow. The electronic airflow sensor allows you to size the box for the exact space requirements instead of oversizing for minimum required heater cfm, which can reduce the initial terminal unit cost.

Icons

contributes toward energy savings by reducing operating costs of air distribution devices

energy solutions