



MULTI-ZONE AIR HANDLING UNITS

SYSTEM DESIGN GUIDE

Guidance for using the ClimaVision Central Control Unit for:

- ▶ *Multi-Zone Packaged RTUs*
- ▶ *Multi-Zone Packaged AHUs*

Supporting up to five stages and / or modular heating and cooling elements, stepped and VFD fans, one dehumidification sequence, and modulating outside air sequence for up to 20 zones

INTRODUCTION TO THE CLIMAVISION DESIGN PHILOSOPHY

Carrier is on a mission to substantially reduce energy consumption in the world's commercial buildings while improving the comfort and health of the people who work there. ClimaVision achieves this through automation that adapts to change and data that engages people with insights they can use to maintain building systems and operations. To make that difference, automation and data must be present in a much greater percentage of the buildings than they are today, and this can only be accomplished by cutting cost and increasing value.

ClimaVision has adopted a works-out-of-the-box philosophy that redefines the state of the art. Instead of a BAS that can be programmed to do anything, we have created a Climate Control System that is pre-programmed to do most things. Within that pre-programmed manifesto, we still need to account for building variations. To account for these variations while keeping our works-out-of-the-box mantra, we have developed a hierarchy of ways to support variations:

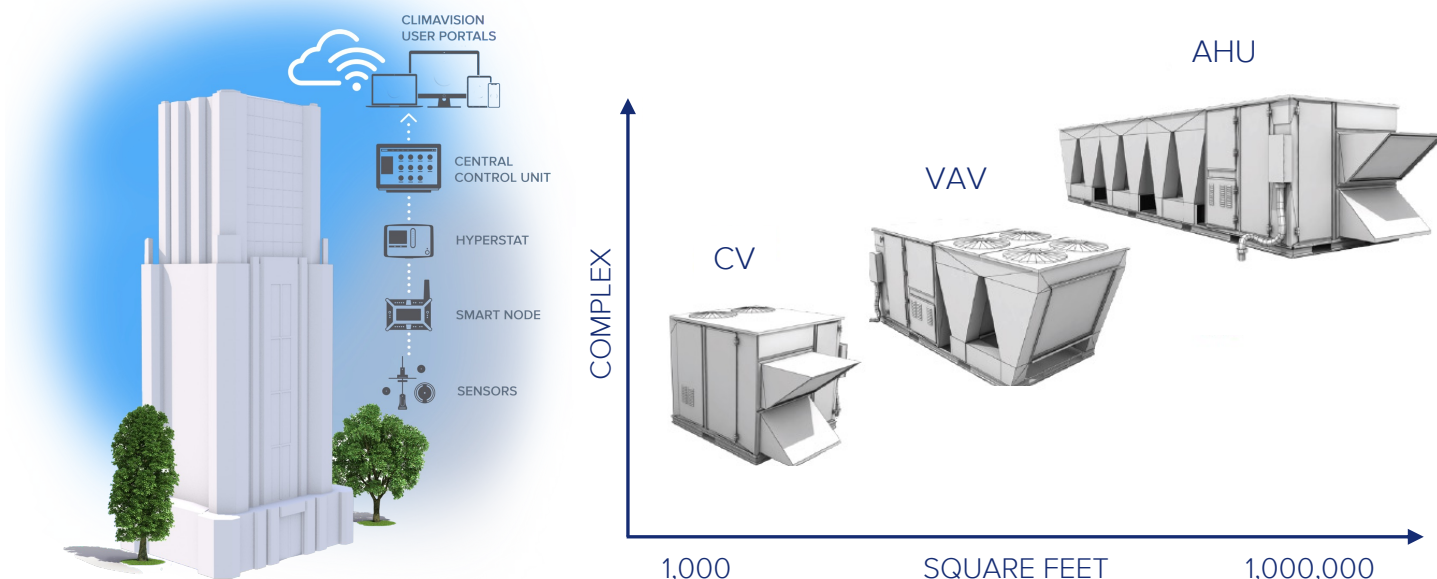
PROFILES — Software and firmware bundles that encapsulate sequences of operation for building systems and terminal equipment.

CONFIGURATIONS — Field settings within each profile that account for equipment differences in systems and terminal equipment.

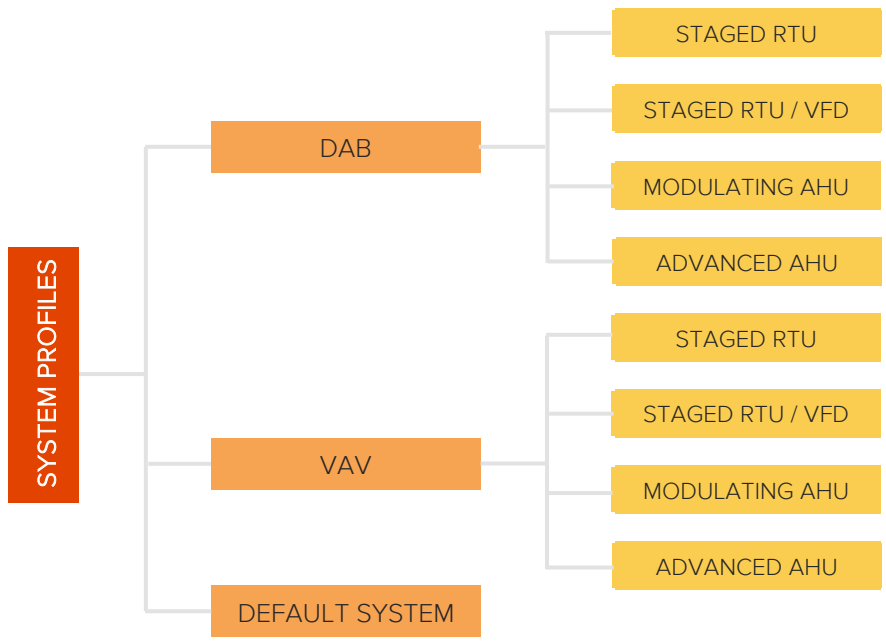
TUNERS — Units and factors within the algorithm supporting sequences of operation that fine-tune the behavior of the system and terminal equipment.

ANALYTICS & NOTIFICATIONS — Predefined analytics and notifications suitable for the selected profiles, and user-defined dashboards and alerts.

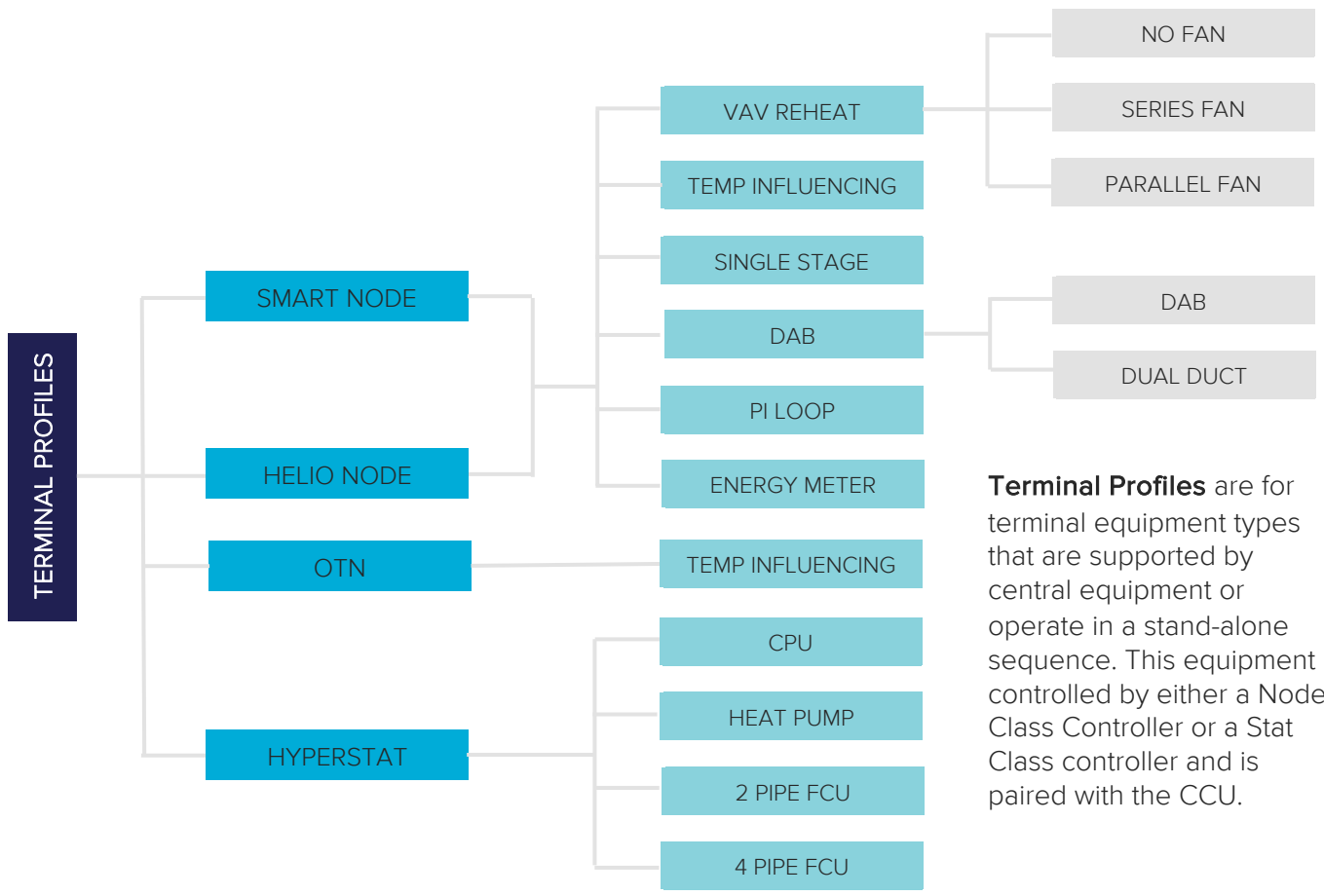
The System Design Guides Carrier has prepared are intended to help designers and sales teams determine which solutions are a fit with the type of systems that need control, and how Carrier provides them. The System Design Guide provides a high-level understanding of the requirements sufficient to prepare an initial design at the Profile level and a quotation for a project. Configurations are not discussed here; these would be found in a Submittal when the project arrives at that stage. Tuners are addressed during startup and ongoing support.



CLIMAVISION SYSTEM & TERMINAL PROFILES



System Profiles are for central HVAC equipment types that are controlled by a ClimaVision Central Control Unit (CCU), such as multi-zone air handlers.



Terminal Profiles are for terminal equipment types that are supported by central equipment or operate in a stand-alone sequence. This equipment is controlled by either a Node Class Controller or a Stat Class controller and is paired with the CCU.



MULTI-ZONE AHU APPLICATION OVERVIEW

Multi-zone air handlers require automation to support the various sequences of operation required by these systems. Automation systems vary from rudimentary zone controllers to full DDC BACnet Building Management Systems (BMS). There are inherent flaws in the entire range of existing options: low-cost zone systems are not holistic and operate each zone independently; and DDC BACnet systems require programmed sequences that are rarely optimized for the instance and most often include the outdated pressure independent VAV with reheat sequence variations.

ClimaVision solves these problems by providing an out-of-the-box solution with pre-programmed, holistic sequences including ASHRAE Guideline 36, networking, remote access, master systems integration, analytics, and Project Haystack-native data portal with API.



FEATURES

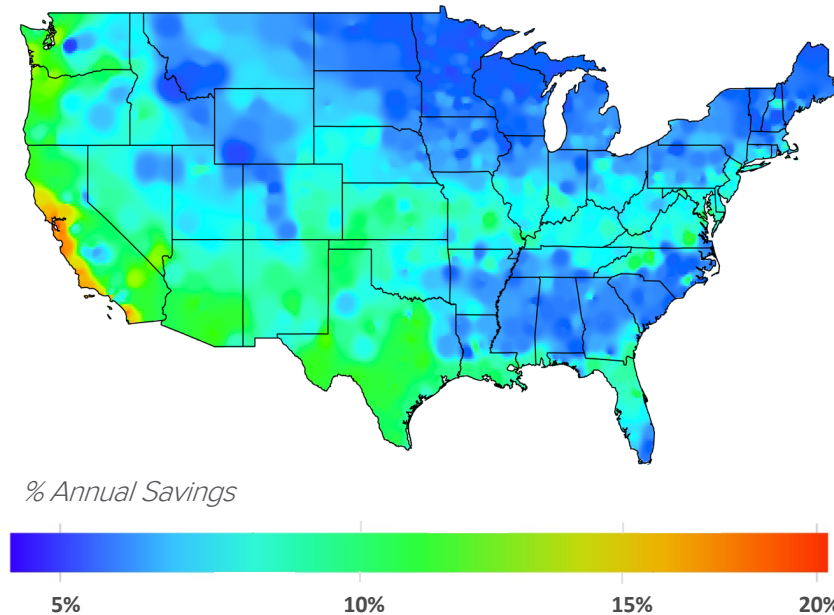
- ▶ ASHRAE Guideline 36 sequences auto-updating out of the box
- ▶ Integration with both ClimaVision user portal and occupant app
- ▶ Dual max dampers, reheat for terminal units
- ▶ Scales from RTUs to full AHUs
- ▶ Implemented trim & respond
- ▶ Variable supply air temperature and supply fan pressure based on loads
- ▶ Built-in prioritization
- ▶ Advanced modes like Forced Occupied

ADVANTAGES

- ▶ Energy savings of 20 – 30% over traditional VAV systems
- ▶ Adaptive building load calculations from supply air temperature and machine learning optimization with ClimaVision algorithms
- ▶ Dynamic Airflow Balancing while heating increases savings
- ▶ Occupancy and IAQ controls on a per-zone basis for improved comfort
- ▶ Fast wireless installs with zero programming required
- ▶ Remote configuration, easy scheduling scale



ENERGY EFFICIENCY IN MULTI-ZONE AHUS



Data from the National Renewable Energy Laboratory detailing energy savings potential of ClimaVision control strategies in medium offices with packaged air conditioning units

ENERGY CONSERVATION MEASURES

- ▶ Temperature setbacks based on an occupied time schedule with optimum start
- ▶ Auto-away temperature setbacks based on PIR sensor
- ▶ Forced-occupied temperature setbacks by default with occupant override
- ▶ Demand-control ventilation (DCV)
- ▶ Monitoring system runtime
- ▶ Supply air temperature (SAT) reset
- ▶ Fan speed reset
- ▶ Zoning and air balancing

SEQUENCES OF OPERATION

Both analog and 24v relay controls are available to support the required sequences for multi-zone AHUs. Dual setpoints, deadbands, hysteresis, and PI loops are all built into the sequence with configurations and tuners exposed for the sequences to be fine-tuned. These sequences include:

Variable Air Volume:

- ▶ VAV With Reheat – ASHRAE Guideline 36, High Performance Systems for HVAC Operation
- ▶ Dynamic Airflow Balancing (DAB) – for VAV systems that do not have reheat
- ▶ DAB Dual Duct – for CAV and VAV dual duct systems

Constant Air Volume:

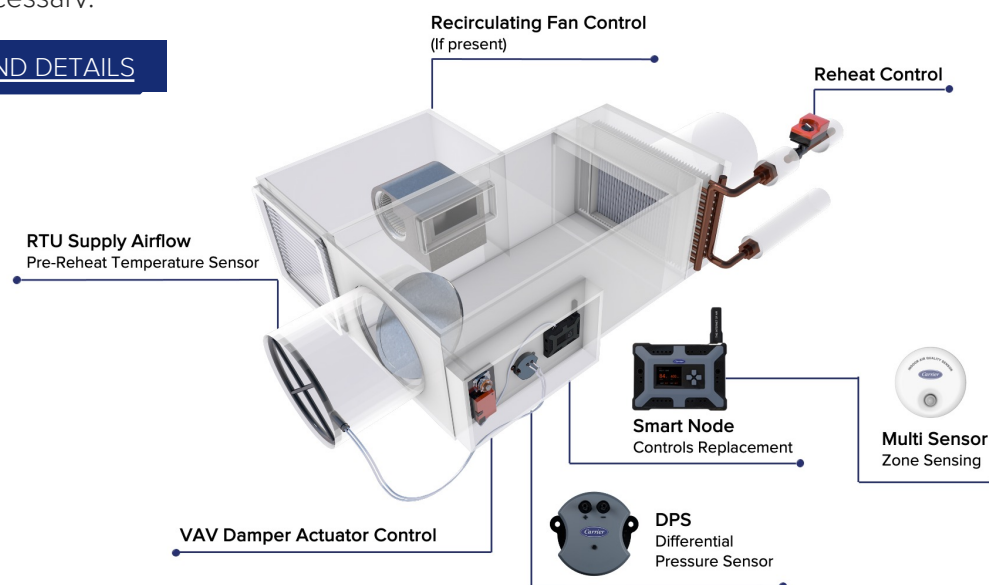
- ▶ Dynamic Airflow Balancing (DAB) — A weighted average, auto changeover with bypass solution for maximum occupant comfort and efficiency similar to Carrier VVT

SEQUENCE OF OPERATION - VARIABLE AIR VOLUME:

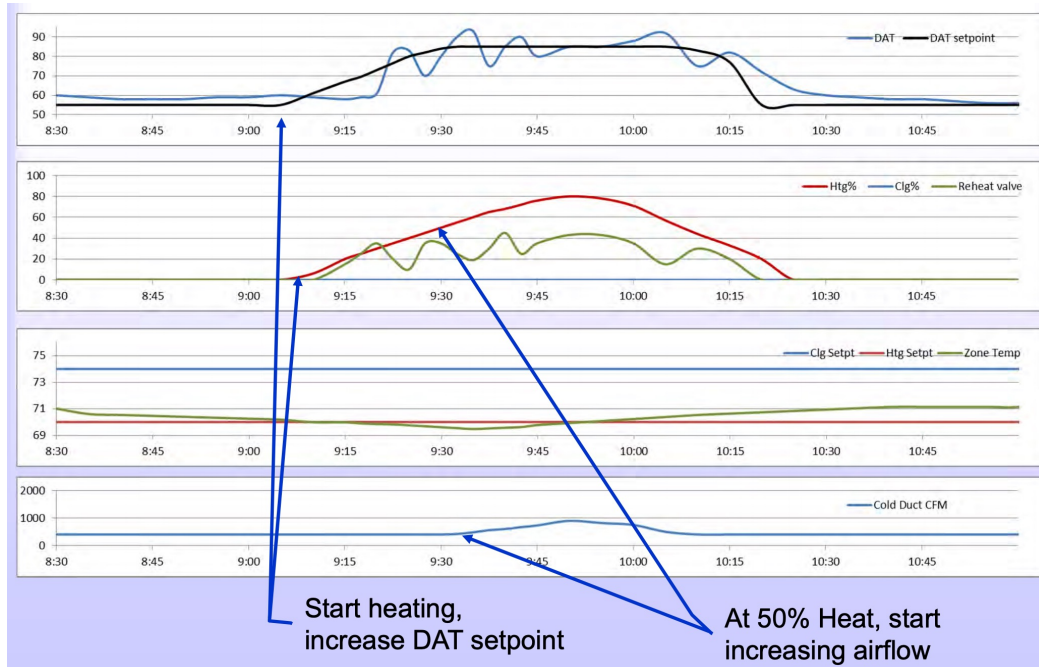
VAV sequences follow ASHRAE Guideline 36 High Performance Sequences of Operation for HVAC Systems. This sequence applies to the AHU and terminal VAV units with hydronic or electric reheat. ClimaVision controls the air handler and VAV terminal units in a holistic fashion, featuring ASHRAE Guideline 36 trim and respond algorithm for discharge air temperature (DAT) and variable frequency drive (VFD) fan speeds or duct pressure.

VAV operation favors cooling at the RTU because each VAV unit has independent reheat. When a zone needs cooling, the system switches the AHU to cooling mode and responds to drift by first opening the dampers, and then sending a request to cool the air even further at greater fan speeds or static pressures. The system works to provide the warmest supply air temperature that will satisfy cooling loads at the lowest airflow setting or fan speed. This allows buildings to meet comfort, IAQ, and ventilation requirements, while enjoying best-in-class energy consumption for applied mechanical equipment. ClimaVision Smart VAV with Reheat follows Guideline 36 when any of the zones are calling for cooling. Our sequence deviates from the guidelines in the case that all the zones are calling for heating. When all zones are calling for heating, our sequence will reset the DAT to higher temperatures or changeover to heating and attempt to satisfy the heating calls with supply air using the ClimaVision Dynamic Airflow Balancing (DAB) sequences explained in this guide. Zone reheaters will not be used unless necessary.

TRIM & RESPOND DETAILS



ASHRAE GUIDELINE 36



*Dual maximum logic in action, per standard 90.1 and RP-1455.
Image: Steve T. Taylor, Taylor Engineering LLC*

INCORPORATING ASHRAE GUIDELINE 36 INTO YOUR BUILDING SEQUENCE

The purpose behind ASHRAE Guideline 36 and its correlated RPs (1455, 1547, 1587, 1747) is to provide the mechanical design community with a resource to deliver uniform, high efficiency control sequences for HVAC systems. With ClimaVision's advanced algorithms and continuous feedback loops, customers can achieve the objectives that ASHRAE Guideline 36 outlines with an out of the box solution for Variable Air Volume/Multi-zone AHU configurations.

ASHRAE Guideline 36 and RP 1747-Appendix A outline a list of hardwired sensors (both required and optional based on application) for optimal control loops. Although ClimaVision's devices communicate wirelessly with each other over a wireless mesh network, sensors are hardwired into devices for reliability purposes. The exception to this is ClimaVision's outdoor air temperature sensors. For these outdoor readings, GPS coordinated weather data measures dynamic onsite enthalpy conditions for every building. This not only eliminates the potential for sensor failure at the site but allows the dynamic starting warmup/cool-down sequences outlined in RP 1747 to be taken a step further. RP 1747 calls for the controls system to consider zone setpoints, current sensor readouts, and a self-tuning mass/capacity correction factor; ClimaVision utilizes all the above plus live weather forecasting to limit preconditioning time while delivering thermal comfort.

The points list provided in 1747 is comprehensive, and ClimaVision's Multi Sensor and / or HyperSense comes equipped with all the required sensors plus most of the optional sensors, including CO₂ and VOC, an infrared occupancy sensor, a humidistat for measuring relative humidity, and a light sensor. While these additional sensors are not needed for all VAV/Multi-zone AHU applications, the combination of these inputs into a single wiring point allows for a more uniform installation approach and consistency across zone feedback. It also offers building engineers unparalleled flexibility and value. For applications that do not require a DCV approach and only need basic monitoring, a dual temperature and humidistat sensor is provided.



ASHRAE GUIDELINE 36

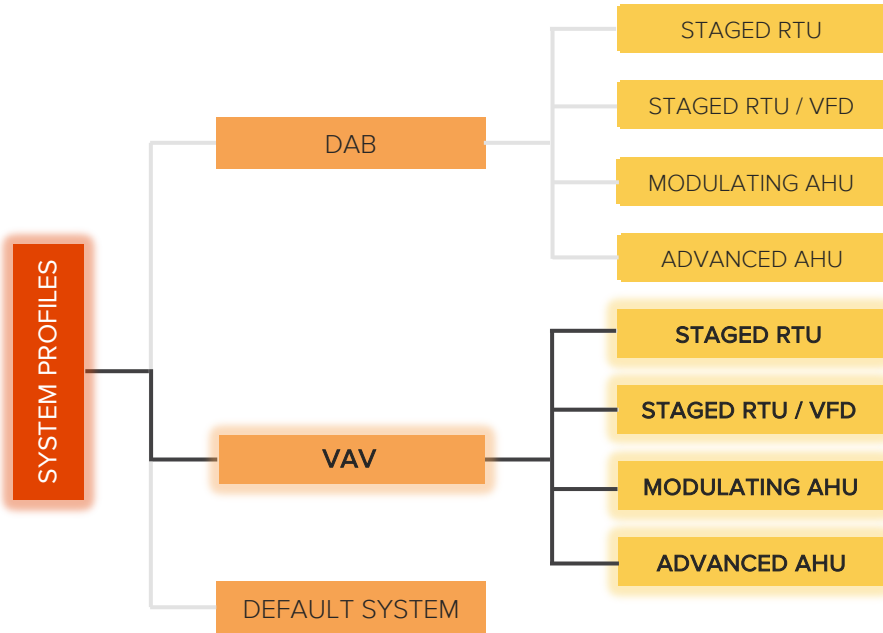
VAV with Reheat takes an Option 1 approach to determining the V_{min} setpoint for airflow at the VAV box. By utilizing a 0-10V or 2-10V actuator, ClimaVision can control a damper until no airflow is being sensed. This default logic sets V_{min} for all boxes equal to zero. This requirement for fully modulating actuators is one of the first differences typically noted about ClimaVision controls. By dictating the actuator signal to be a 0-10V or 2-10V output, it's possible to accurately determine damper position for an optimized trim and response control logic sequence.

The heart of ASHRAE Guideline 36 and its related RP's is to be as efficient as possible while maintaining comfort within a space. In addition to damper position, this involves not requiring 55F off the coil to maintain a standard setpoint range and instead trimming (resetting) that SAT setpoint based on requests by the Cooling or Heating Loop algorithmically. Utilizing a trim and response style control loop the ClimaVision system will deliver the warmest air possible to the space to maintain indoor conditions while optimizing pressure to keep fans running at their minimum. Optimum required supply air temperature (SAT) and system pressure are continuously monitored and controlled by the ClimaVision Central Control Unit at the AHU to achieve the best possible thermal comfort and energy efficiency.

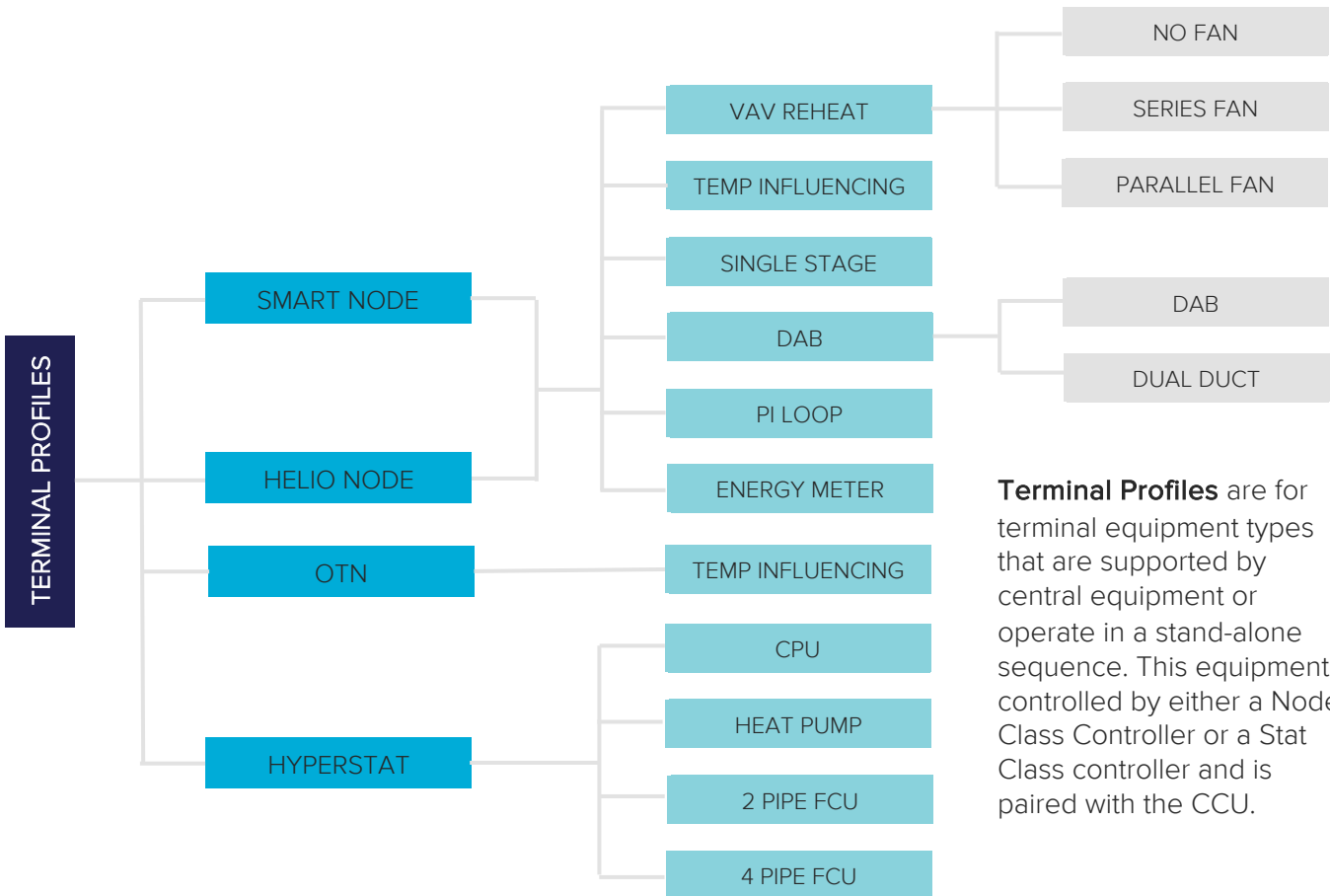
This control sequence, and the ability to accurately calculate discharge air temp and pressure across a range of HVAC equipment and systems, is what sets ClimaVision's VAV with Reheat apart. With ASHRAE Guideline 36 out of the box, customers are maintaining zone level temperatures while enjoying best-in-class energy consumption of applied mechanical equipment.



PROFILE MAP — VAV SYSTEM CONTROL WITH CLIMAVISION CCU



System Profiles are for central HVAC equipment types that are controlled by a ClimaVision Central Control Unit (CCU), such as multi-zone air handlers.



Terminal Profiles are for terminal equipment types that are supported by central equipment or operate in a stand-alone sequence. This equipment is controlled by either a Node Class Controller or a Stat Class controller and is paired with the CCU.



CLIMAVISION CENTRAL CONTROL UNIT

The CCU connects to and controls a wide range of air handling equipment while supervising all terminal unit ClimaVision Smart Nodes. This ranges from single or dual-unit RTUS to fully-modulating AHUs with VFDs. Terminal unit parameters are reset by the CCU back to the Smart Node every 60 seconds to continuously optimize zone comfort and efficiency. Sequences leverage Trim and Response to reset DAT and fan or duct pressure, as well as Dual Max algorithms per ASHRAE Guideline 36, reset each minute for continuous and granular control.

VFD speed control, DX staging, furnace staging, and hot & chill water coil valve analog controls are all native to the CCU. Any outside air dampers and exhaust fans are controlled by a Smart Node, just as on a VAV box. In the cloud a systemCoolingLoopOutput, systemHeatingLoopOutput is calculated in real time, which represents a value of 0-100% of the capacity of the central unit. This is then mapped into the appropriate type of control signal (relays or analog DC voltage) to interface correctly with the equipment.

VAV SYSTEM PROFILES

The following four system profiles are available for pre-configured sequences of operation for common HVAC equipment types. All these profiles are compatible with the ClimaVision Outside Air Optimization application to upgrade economizers and outside air dampers and exhaust systems.



VAV STAGED RTU

[MORE DETAILS](#)

In applications where buildings use a staged RTU, the CCU provides up to seven 24V relays to control the RTU. Relays may be mixed as required with a max of five stages for cooling, heating, or fan each. By default, the system is set up as two-stage cooling, two-stage heating, two-stage fan. This profile is typically used for packaged RTUs and split systems.

VAV STAGED RTU WITH VFD FAN

[MORE DETAILS](#)

When applied to a staged RTU with VFD fan, the CCU provides up to seven 24V relays that control the RTU. A 0-10V analog point is available as an input for the speed of the VFD driving the fan. This profile is typically used when a packaged RTU has been upgraded from a step-motor to VFD. The VFD frequency is optimized for each stage of the RTU with an optional minimum fan speed selection.

VAV FULLY MODULATING AHU

[MORE DETAILS](#)

When applied to a fully modulating AHU, the CCU provides four 0-10V analog points that control the AHU. These points include cooling, fan speed or duct static pressure, heating and outside air. Typical application is a built-up air handler with hot water coil and valve, chill water coil and valve, and VFD fan or duct static pressure.

VAV ADVANCED HYBRID AHU

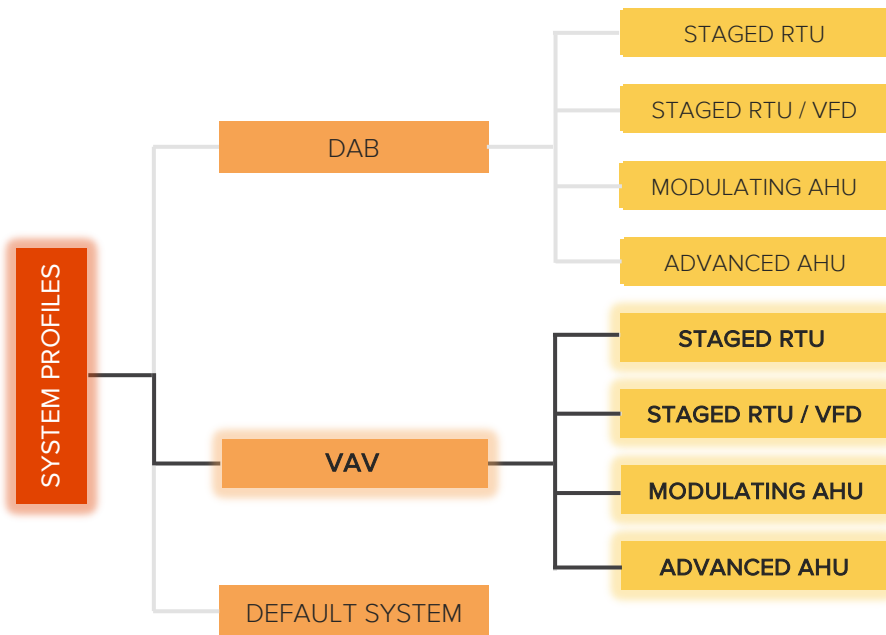
[MORE DETAILS](#)

For the most advanced or hybrid AHUs, the CCU provides up to seven 24V relays that control the AHU itself. In addition, four separate 0-10V analog points can be used to control the AHU. These analog points include cooling, fan speed or duct pressure, heating, and a composite. This profile is used anywhere where the AHU has a combination of staged equipment and modulating equipment.

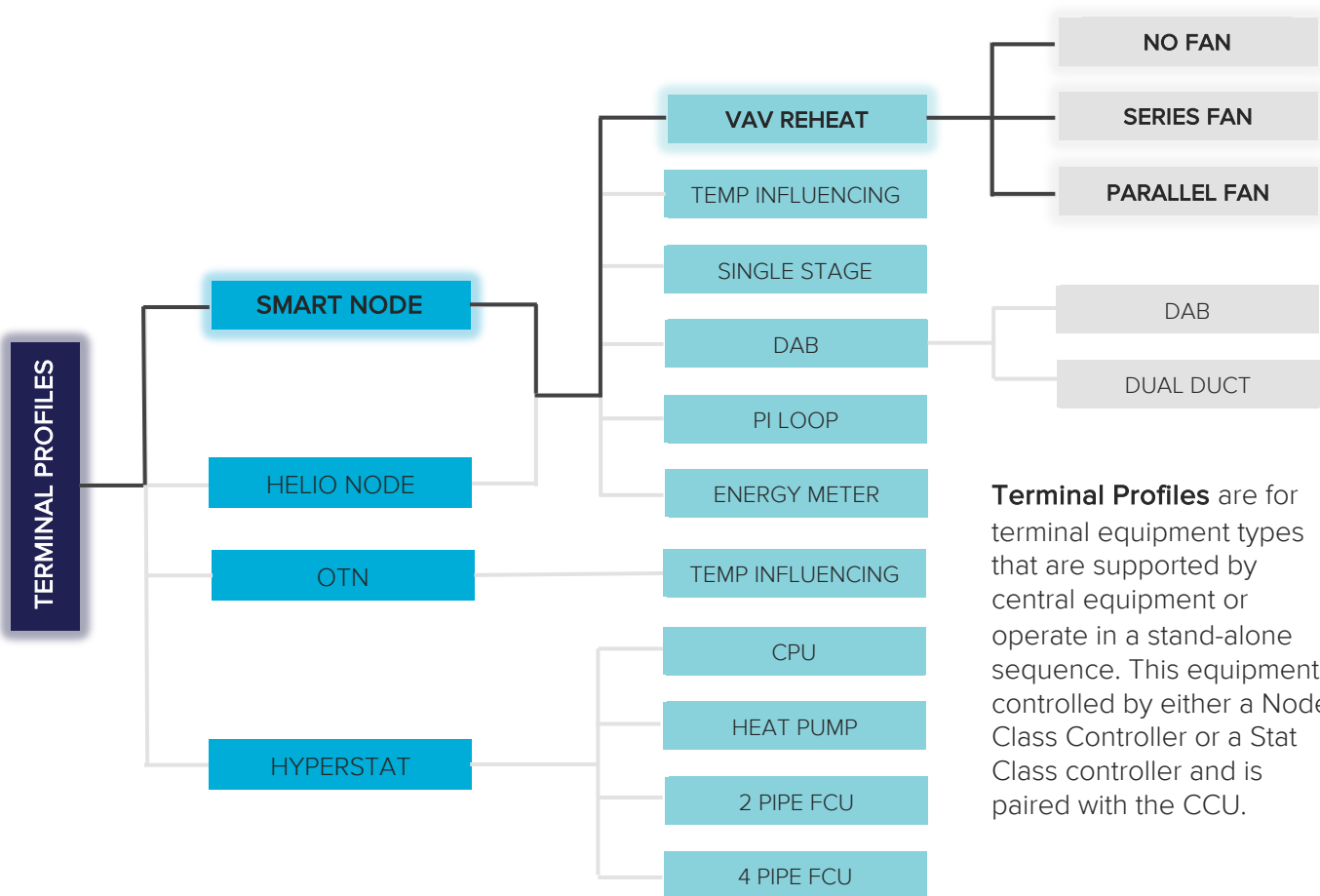
[MORE ABOUT OAO](#)



PROFILE MAP — VAV TERMINAL CONTROL WITH CLIMAVISION SMART NODE



System Profiles are for central HVAC equipment types that are controlled by a ClimaVision Central Control Unit (CCU), such as multi-zone air handlers.



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CLIMAVISION SMART NODE

CLIMAVISION SMART NODE

ClimaVision Smart Node wireless controllers in each terminal unit collect hard-wired sensor data such as zone temperature and humidity that is wirelessly transmitted to the CCU for holistic load calculations and central air handler control. There are multiple terminal profiles for VAV depending on the type of physical box to which the Smart Node is connected.

Two of the primary variants involve modulating or staged electric or hot water reheat valves. In addition to hydronic and electric reheaters, the Smart Node is designed to control damper actuators, parallel fans and series fans. Two airflow temperature sensors are connected upstream and downstream of the reheat coil to deliver entering and discharge temperature data to the Smart Node. A differential pressure transducer is used to calculate airflow volume. Available points on the Smart Node include:

SMART NODE I/O

- ▶ (2) Analog In
- ▶ (2) Analog Out
- ▶ (2) Thermistor In
- ▶ (2) 24V Relays Out
- ▶ (1) 3-Pin Digital Bus
- ▶ (1) 4-Pin Digital Bus (RS-485)



VAV TERMINAL PROFILES

- ▶ VAV with Reheat, No Fan — This profile is for a typical VAV box with a modulating 0/2-10V actuator

[MORE DETAILS](#)

- ▶ VAV with Reheat, Parallel Fan — This profile is for a typical fan-powered VAV box

[MORE DETAILS](#)

- ▶ VAV with Reheat, Series Fan — This profile is for the series fan-powered VAV box

[MORE DETAILS](#)



SMART NODE SENSOR OPTIONS

Sensors are wired to the Smart Node to support desired sequence of operation, monitoring and notifications. Any analog sensor may also be connected to the Smart Node, such as current transformers and third-party pressure transducers. The following ClimaVision digital sensors can be wired via digital and analog inputs:



WALL SENSOR

Perfect for drywall or other framed walls. Senses for temperature and humidity.



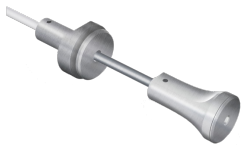
DUCT SENSOR

Placed in the return duct and senses for temperature and humidity.



FLUSH MOUNT
SENSOR

Perfect for beams and concrete where sensor wire must be exposed. Senses for temperature and humidity.



CEILING SENSOR

For installs with limited wall space or zones with a lot of solar gain. Senses for temperature and humidity.



MULTI SENSOR

A digital multi-sensor with PIR occupancy and CO₂ in addition to temperature and humidity.



HYPERSENSE

Offers every sensor the HyperStat does, but connects to the Smart Node via the ClimaVision 4-pin digital sensor input for control.

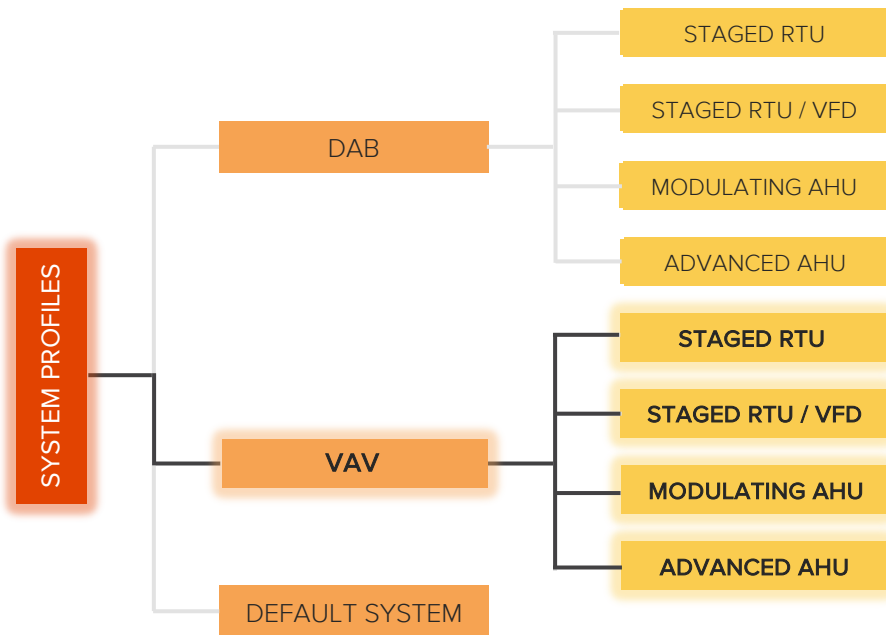


DIFFERENTIAL
PRESSURE SENSOR

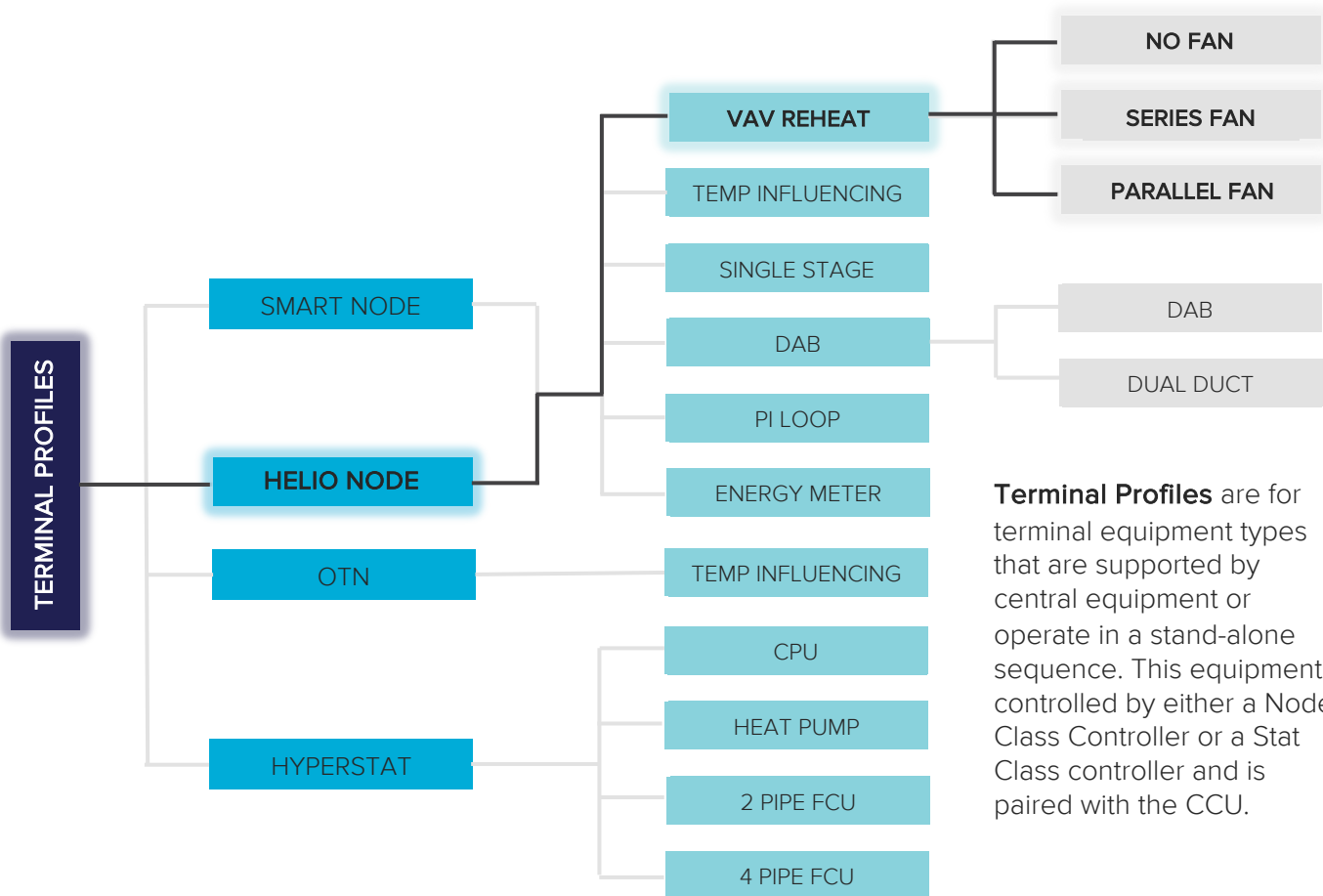
Digital pressure transducer connected to the 3-pin digital bus. Compatible with Wall Sensors and Multi-Sensors on the same bus.



PROFILE MAP — VAV TERMINAL CONTROL WITH CLIMAVISION HELIO NODE



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CLIMAVISION HELIO NODE

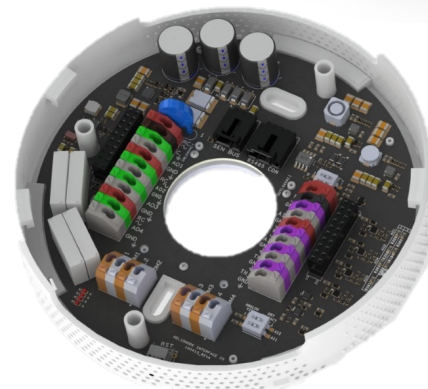
CLIMAVISION HELIO NODE

With five on-board sensors, the Helio Node is an all-in-one controller and indoor air quality sensing station. The Helio Node is part of ClimaVision's vertically-integrated Climate Control System, delivering multi-mode sensing, remote monitoring, and individual zone control for the comfort and productivity of building occupants.

The Helio Node is an equipment controller designed to be installed below the ceiling or on the walls of occupied spaces. Like the ClimaVision Smart Node, it supports VAV terminal profiles. Each Helio Node is powered by 24V AC or DC and is designed to accept daisy-chain power. This device includes wireless mesh network communication and Bluetooth commissioning.

HELIO NODE I/O

- ▶ (1) 3-Pin Digital Bus
- ▶ (1) 4-Pin Digital Bus (RS-485) for the ClimaVision Smart Sense
- ▶ (4) 24V DC Relays
- ▶ (2) 0-10K Type II Thermistor Terminals
- ▶ (2) Analog In
- ▶ (4) Analog Out
- ▶ Temperature and Humidity sensor
- ▶ CO₂ sensor
- ▶ PIR Occupancy Sensor
- ▶ Ambient light sensor



VAV TERMINAL PROFILES

- ▶ VAV with Reheat, No Fan — This profile is for a typical VAV box with a modulating 0/2-10V actuator

[MORE DETAILS](#)

- ▶ VAV with Reheat, Parallel Fan — This profile is for a typical fan-powered VAV box

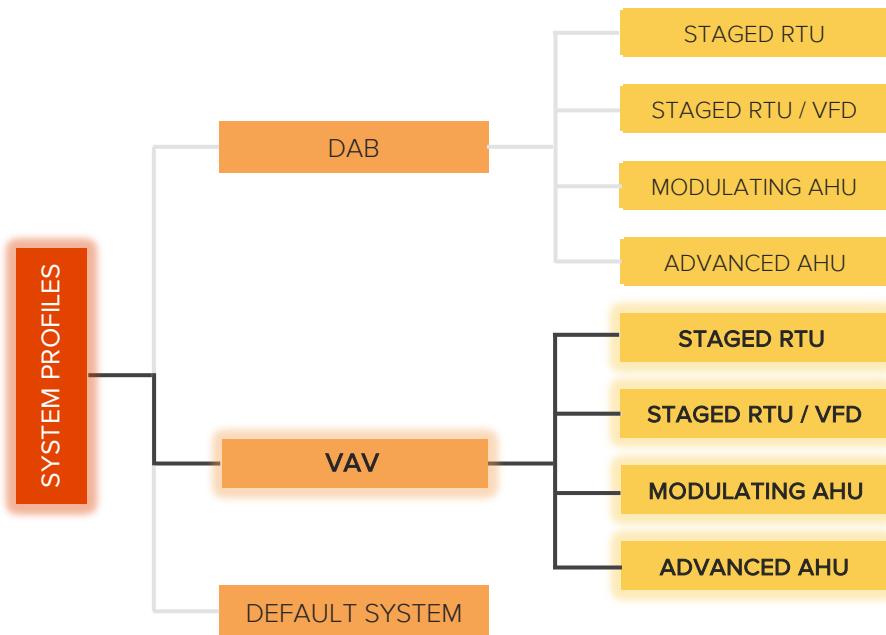
[MORE DETAILS](#)

- ▶ VAV with Reheat, Series Fan — This profile is for the series fan-powered VAV box

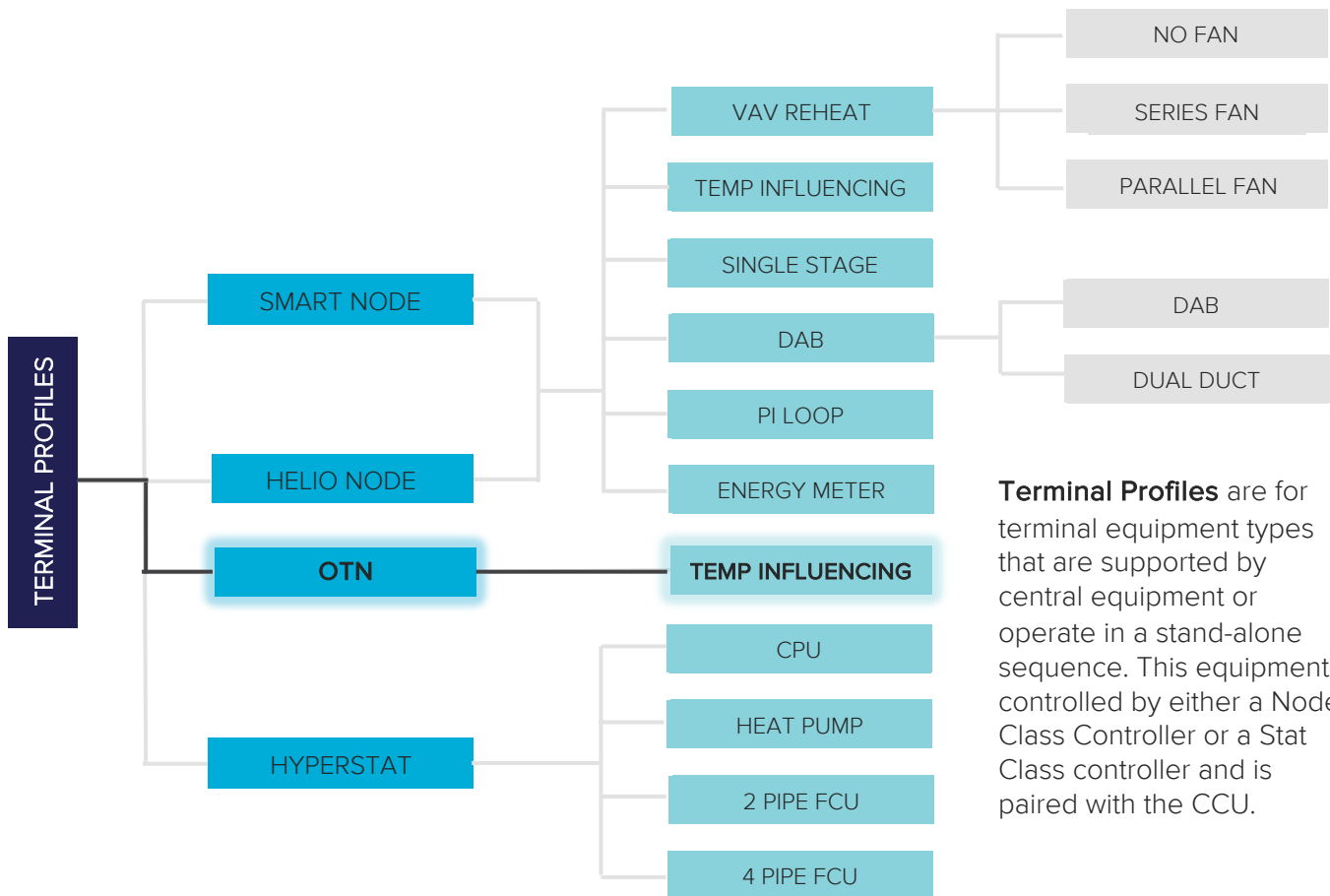
[MORE DETAILS](#)



PROFILE MAP — VAV TERMINAL INFLUENCE WITH CLIMAVISION OTN



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CLIMAVISION OCCUPANCY & TEMPERATURE NODE

[MORE DETAILS](#)

CLIMAVISION OCCUPANCY & TEMPERATURE NODE

ClimaVision Occupancy and Temperature Nodes (OTN) are battery-powered, wireless sensors for zone temperature, humidity, and occupancy that are wirelessly transmitted via the 900 MHz wireless mesh to the CCU for load calculations and central air handler control. The OTN is not a controller; the OTN is only for sensing, monitoring and influencing the load calculations in the CCU. Up to 48 OTNs can be paired with a CCU.

OTN AVAILABLE POINTS

- ▶ Temperature
- ▶ Humidity
- ▶ PIR Occupancy



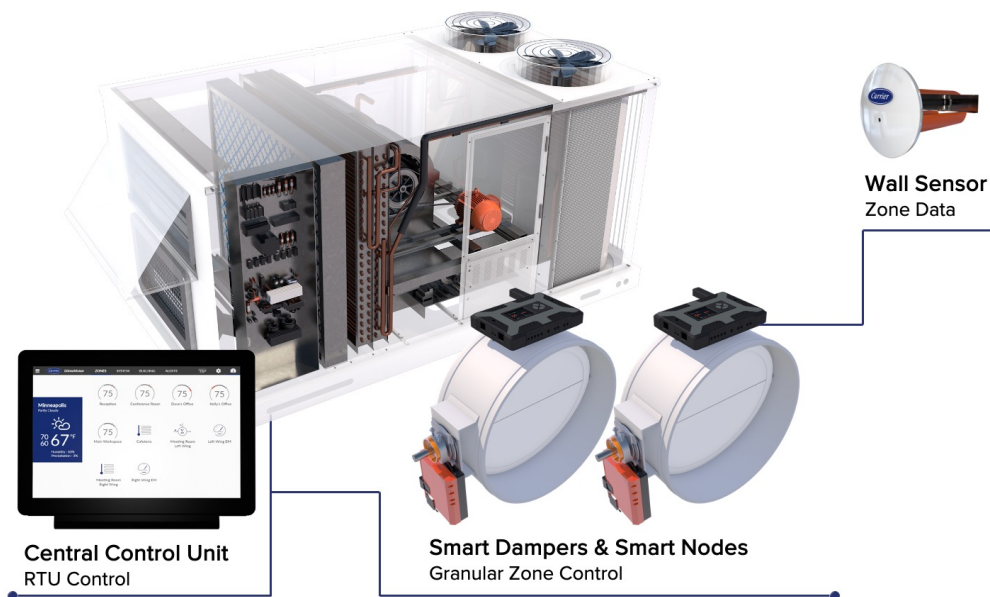
SEQUENCE OF OPERATION - CLIMAVISION DYNAMIC AIRFLOW BALANCING

MORE DETAILS

ClimaVision Dynamic Airflow Balancing (DAB) is today's version of the familiar Carrier VVT zone control system that updates systems with remote control and monitoring for superior comfort and efficiency for CAV and VAV systems with no reheat. With advanced scheduling and occupancy options, DAB is also energy efficient. When used in CAV systems, a pressure dependent bypass damper or relief damper is available.

DAB is a custom sequence that will rebalance airflow in each zone every minute based on a holistic weighted average assessment of the thermal envelope. Zones that are farthest away from their desired temperature will receive the highest dynamic Zone Priority in the load calculation and this resets AHU control points Mode, Stage and Fan in CAV systems and CW, HW and VFD fan in modulating systems.

DAB is inherently more efficient than single zone systems because air is constantly redirected to the zones that need conditioning the most. Studies by Gas Technology Institute show that savings range from 25% to 40% when a DAB system is compared with the same system in single zone mode. Savings at the higher side of the range occur in highly compartmented envelopes with variable occupancy enabled.

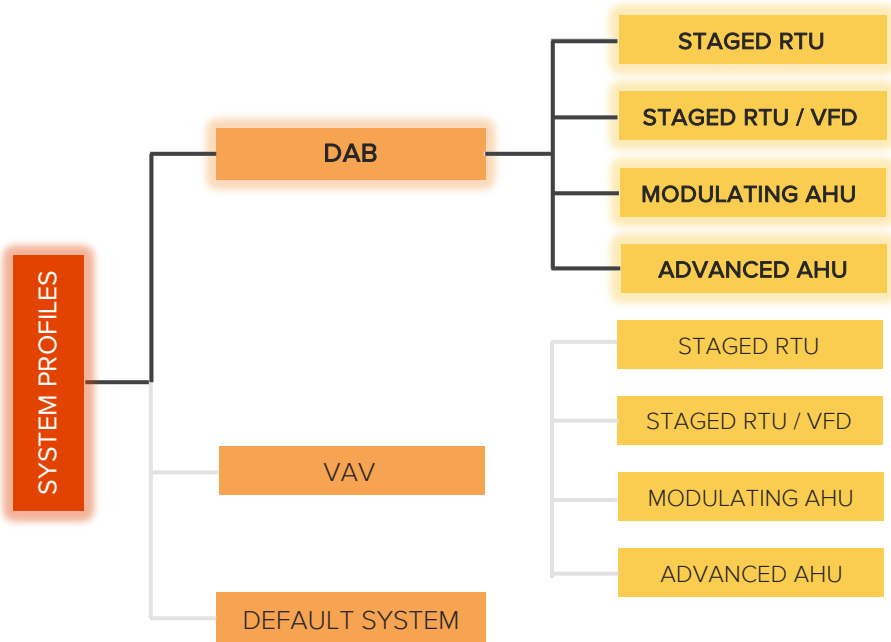


WHY USE DAB IN VAV SYSTEMS?

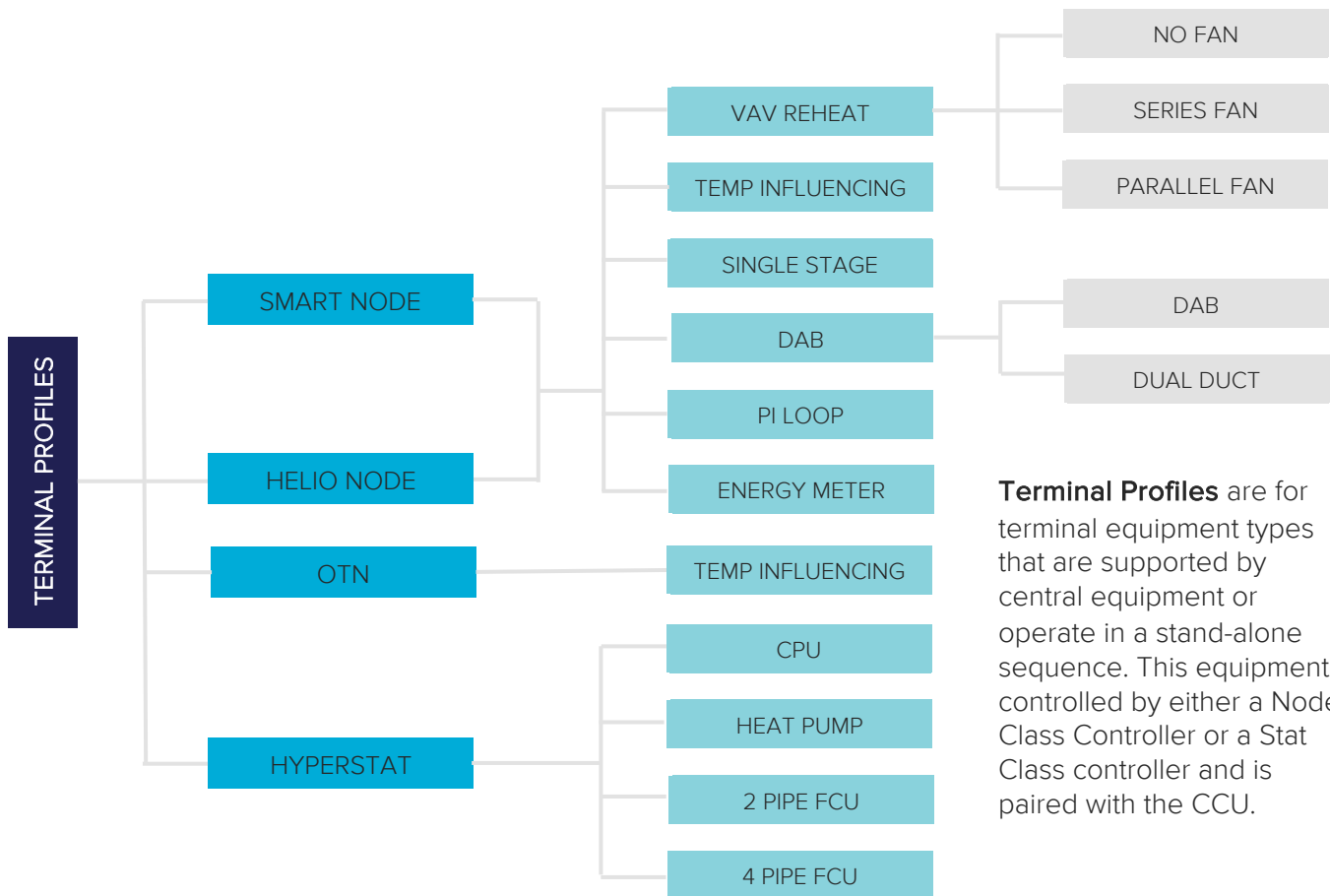
When a VAV system has no reheat capability in the terminal units, ClimaVision recommends using our DAB sequence instead of our VAV options because it is inherently more comfortable and energy efficient. When the AHU has both cooling and heating capabilities, DAB includes an auto-changeover sequence that is determined by a weighted average load calculation that favors those zones that need the most conditioning. The load calculation is reset every 60 seconds regardless of what the zones are calling for and makes tiny incremental rebalancing adjustments. In this manner, the air is constantly rebalanced as the load shifts for maximum comfort and efficiency. To ensure airflow is always entirely utilized, the rebalancing calculation is normalized so that at least one damper is always 100% open. The average damper setting is between 70% to 80% open. This causes the system to become satisfied as a whole in the shortest period of time.



PROFILE MAP — DAB SYSTEM CONTROL WITH CLIMAVISION CCU



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VFD speed control, DX staging, furnace staging, and hot & chill water coil valve analog controls are all native to the CCU. Any outside air dampers and exhaust fans are controlled by a Smart Node, just as on a VAV box. In the cloud a systemCoolingLoopOutput, systemHeatingLoopOutput is calculated in real time, which represents a value of 0-100% of the capacity of the central unit. This is then mapped into the appropriate type of control signal (relays or analog DC voltage) to interface correctly with the equipment.

DAB SYSTEM PROFILES

The following four system profiles are available for pre-configured sequences of operation for common HVAC equipment types. All these profiles are compatible with the ClimaVision Outside Air Optimization application to upgrade economizers and outside air dampers and exhaust systems.



DAB STAGED RTU

[DETAILS](#)

In applications where buildings use a staged RTU, the CCU provides up to seven 24V relays to control the RTU. Relays may be mixed as required with a max of five stages for cooling, heating, or fan each. By default, the system is set up as two-stage cooling, two-stage heating, two-stage fan. This profile is typically used for packaged RTUs and split systems.

DAB STAGED RTU WITH VFD FAN

[MORE DETAILS](#)

When applied to a staged RTU with VFD fan, the CCU provides up to seven 24V relays that control the RTU. A 0-10V analog point is available as an input for the speed of the VFD driving the fan. This profile is typically used when a packaged RTU has been upgraded from a step-motor to VFD. The VFD frequency is optimized for each stage of the RTU with an optional minimum fan speed selection.

DAB MODULATING AHU WITH DCWB

[MORE DETAILS](#)

Dynamic Chilled Water Balancing is an energy-savings measure aimed at optimizing chill water consumption at the AHU by managing the Delta T.

DAB FULLY MODULATING AHU

[MORE DETAILS](#)

When applied to a fully modulating AHU, the CCU provides four 0-10V analog points that control the AHU. These points include cooling, fan speed or duct static pressure, heating and outside air. Typical application is a built-up air handler with hot water coil and valve, chill water coil and valve, and VFD fan or duct static pressure.

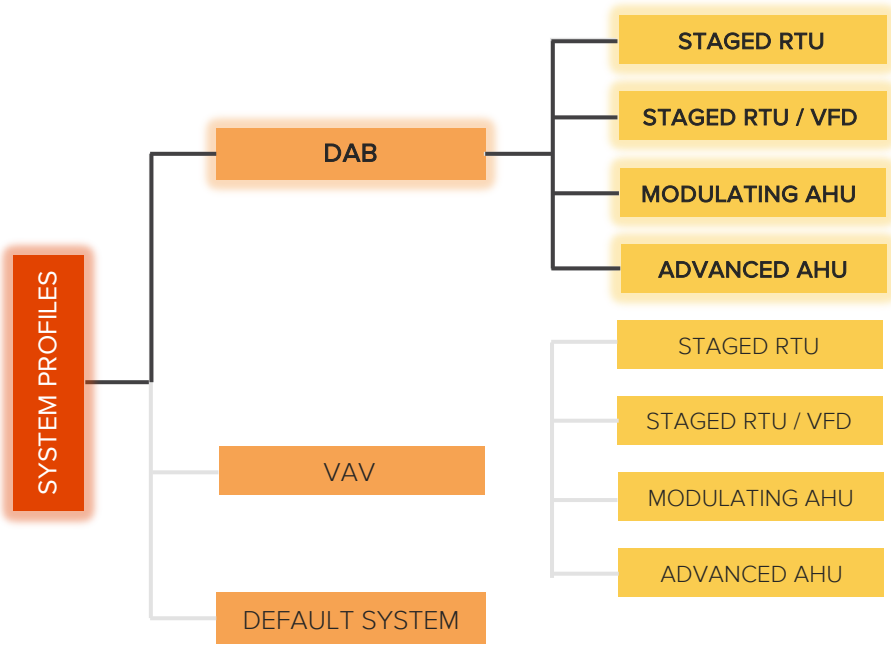
DAB ADVANCED HYBRID AHU

[MORE DETAILS](#)

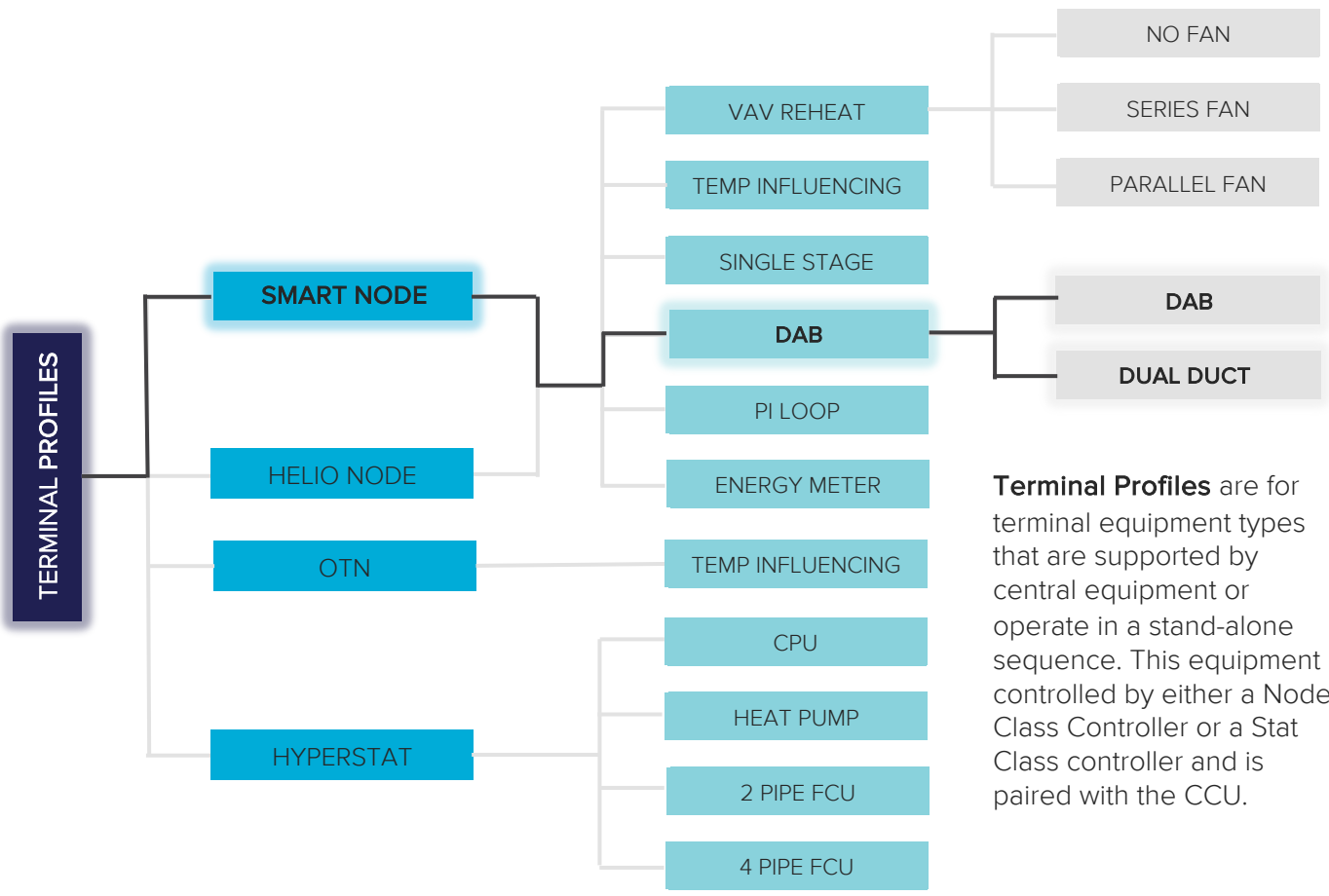
For the most advanced or hybrid AHUs, the CCU provides up to seven 24V relays that control the AHU itself. In addition, four separate 0-10V analog points can be used to control the AHU. These analog points include cooling, fan speed or duct pressure, heating, and a composite. This profile is used anywhere where the AHU has a combination of staged equipment and modulating equipment.



PROFILE MAP — DAB TERMINAL CONTROL WITH CLIMAVISION SMART NODE



System Profiles are for central HVAC equipment types that are controlled by a ClimaVision Central Control Unit (CCU), such as multi-zone air handlers.



Terminal Profiles are for terminal equipment types that are supported by central equipment or operate in a stand-alone sequence. This equipment is controlled by either a Node Class Controller or a Stat Class controller and is paired with the CCU.



CLIMAVISION SMART NODE

CLIMAVISION SMART NODE

ClimaVision Smart Node wireless controllers in each terminal unit collect hard-wired sensor data such as zone temperature and humidity that is wirelessly transmitted to the CCU for holistic load calculations and central air handler control. There are two Terminal Profiles for DAB depending on the type of system: Single or Dual Duct.

SMART NODE I/O

- ▶ (2) Analog In
- ▶ (2) Analog Out
- ▶ (2) Thermistor In
- ▶ (2) 24V Relays Out
- ▶ (1) 3-Pin Digital Bus
- ▶ (1) 4-Pin Digital Bus (RS-485)

DAB TERMINAL PROFILES

- ▶ Dynamic Airflow Balancing — This profile is for a typical damper with a modulating 0/2-10v actuator

[MORE DETAILS](#)

- ▶ Dynamic Airflow Balancing with Dual Duct — This profile is for a typical dual duct VAV box

[MORE DETAILS](#)



SMART NODE SENSOR OPTIONS

Sensors are wired to the Smart Node to support desired sequence of operation, monitoring and notifications. Any analog sensor may also be connected to the Smart Node, such as current transformers and third-party pressure transducers. The following ClimaVision digital sensors can be wired via digital and analog inputs:



WALL SENSOR

Perfect for drywall or other framed walls. Senses for temperature and humidity.



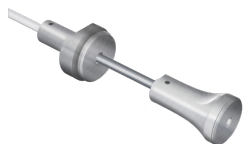
DUCT SENSOR

Placed in the return duct and senses for temperature and humidity.



FLUSH MOUNT
SENSOR

Perfect for beams and concrete where sensor wire must be exposed. Senses for temperature and humidity.



CEILING SENSOR

For installs with limited wall space or zones with a lot of solar gain. Senses for temperature and humidity.



MULTI SENSOR

A digital multi-sensor with PIR occupancy and CO₂ in addition to temperature and humidity.



HYPERSENSE

Offers every sensor the HyperStat does, but connects to the Smart Node via the ClimaVision 4-pin digital sensor input for control.

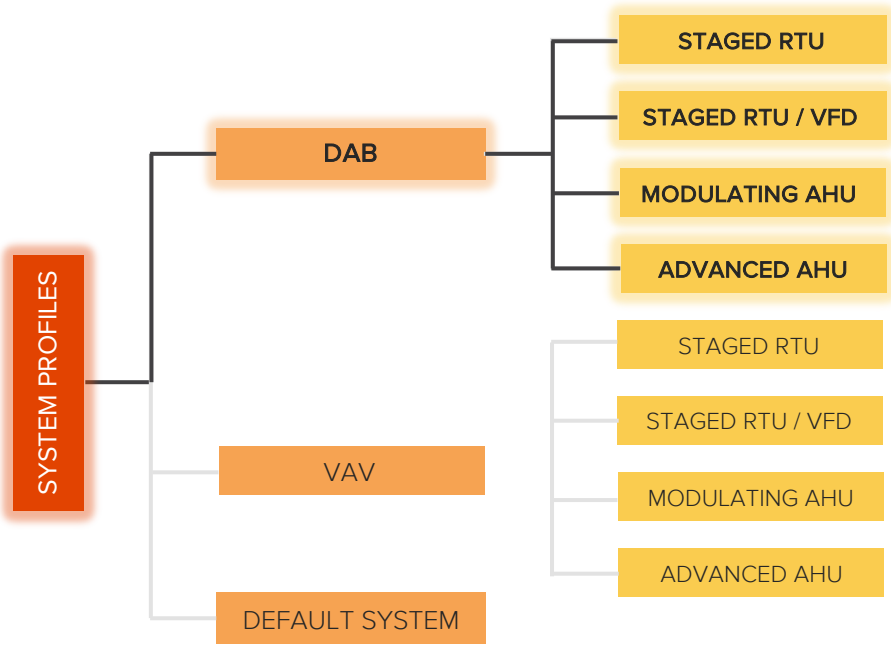


DIFFERENTIAL
PRESSURE SENSOR

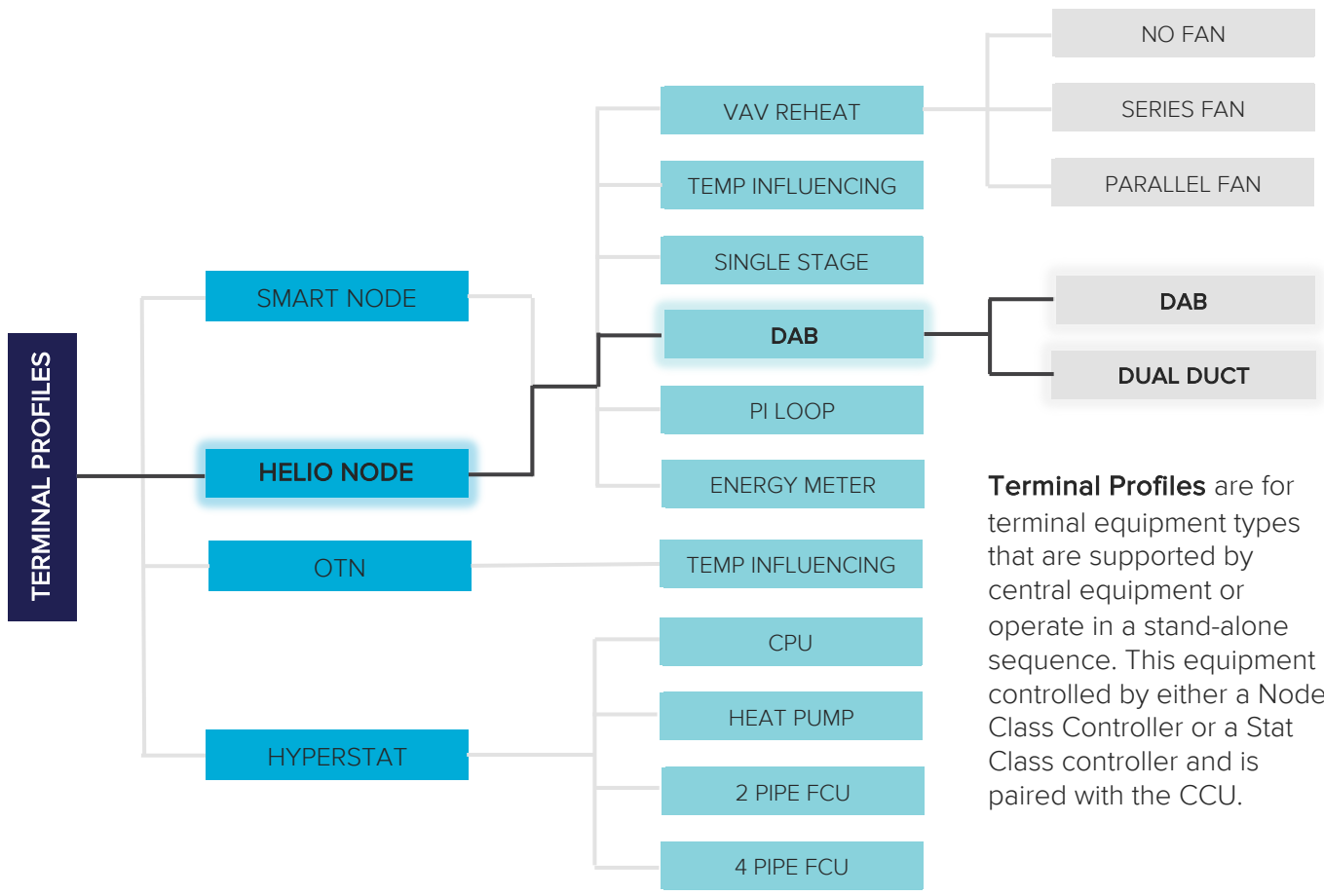
Digital pressure transducer connected to the 3-pin digital bus. Compatible with Wall Sensors and Multi-Sensors on the same bus.



PROFILE MAP — DAB TERMINAL CONTROL WITH CLIMAVISION HELIO NODE



System Profiles are for central HVAC equipment types that are controlled by a ClimaVision Central Control Unit (CCU), such as multi-zone air handlers.



Terminal Profiles are for terminal equipment types that are supported by central equipment or operate in a stand-alone sequence. This equipment is controlled by either a Node Class Controller or a Stat Class controller and is paired with the CCU.



TERMINAL CONTROLLER — CLIMAVISION HELIO NODE

CLIMAVISION HELIO NODE

With five on-board sensors, the Helio Node is an all-in-one controller and indoor air quality sensing station. The Helio Node is part of ClimaVision's vertically-integrated Climate Control System, delivering multi-mode sensing, remote monitoring, and individual zone control for the comfort and productivity of building occupants.

The Helio Node is an equipment controller designed to be installed below the ceiling or on the walls of occupied spaces. Like the ClimaVision Smart Node, it supports VAV terminal profiles. Each Helio Node is powered by 24V AC or DC and is designed to accept daisy-chain power. This device includes wireless mesh network communication and Bluetooth commissioning.

HELIO NODE I/O

- ▶ (1) 3-Pin Digital Bus
- ▶ (1) 4-Pin Digital Bus (RS-485) for the ClimaVision Smart Sense
- ▶ (4) 24V DC Relays
- ▶ (2) 0-10K Type II Thermistor Terminals
- ▶ (2) Analog In
- ▶ (4) Analog Out
- ▶ Temperature and Humidity sensor
- ▶ CO₂ sensor
- ▶ PIR Occupancy Sensor
- ▶ Ambient light sensor



DAB TERMINAL PROFILES

- ▶ Dynamic Airflow Balancing — This profile is for a typical VAV box with a modulating 0/2-10v actuator

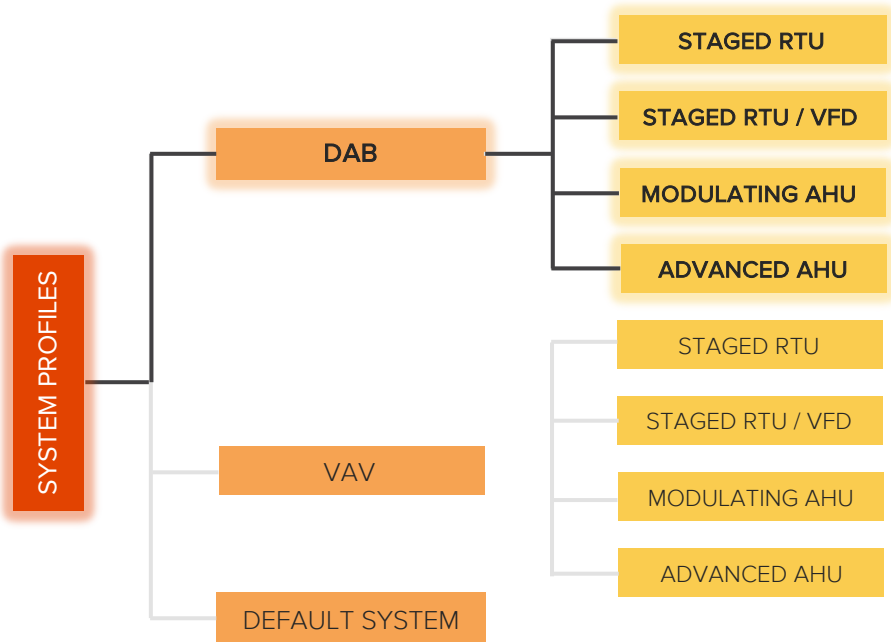
[MORE DETAILS](#)

- ▶ Dynamic Airflow Balancing with Dual Duct — This profile is for a typical dual duct VAV box

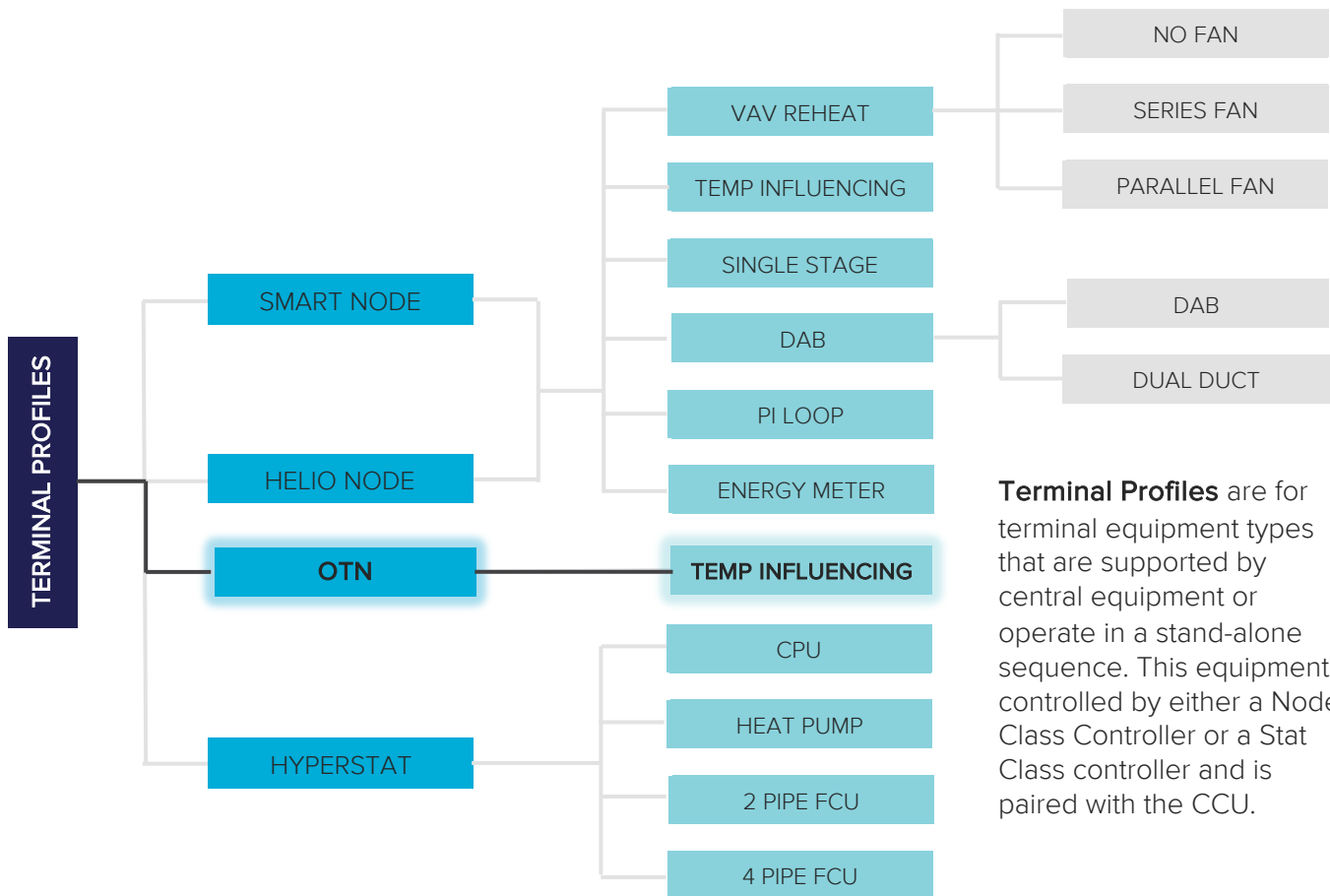
[MORE DETAILS](#)



PROFILE MAP — DAB TERMINAL INFLUENCE WITH CLIMAVISION OTN



System Profiles are for central HVAC equipment types that are controlled by a ClimaVision Central Control Unit (CCU), such as multi-zone air handlers.



Terminal Profiles are for terminal equipment types that are supported by central equipment or operate in a stand-alone sequence. This equipment is controlled by either a Node Class Controller or a Stat Class controller and is paired with the CCU.



CLIMAVISION OCCUPANCY & TEMPERATURE NODE

[MORE DETAILS](#)

CLIMAVISION OCCUPANCY & TEMPERATURE NODE

ClimaVision Occupancy and Temperature Nodes (OTN) are battery-powered, wireless sensors for zone temperature, humidity, and occupancy that are wirelessly transmitted via the 900 MHz wireless mesh to the CCU for load calculations and central air handler control. The OTN is not a controller; the OTN is only for sensing, monitoring and influencing the load calculations in the CCU. Up to 48 OTNs can be paired with a CCU.

OTN AVAILABLE POINTS

- ▶ Temperature
- ▶ Humidity
- ▶ PIR Occupancy

