SIEMENS

Room Automation Station

DXR Configuration for VAV Pressure-Dependent Control in VVT System

A6V11521219
2018-09-26

Building Technologies

Table of Contents

Before You Begin

Knowledge and Training Prerequisites
The reader / user of this document must be trained, knowledgeable, and familiar with using ABT Site to configure DXR automation stations.

Firmware Compatibility
To engineer application types that include selections for "ADXR" hardware devices (e.g. DXR.M10PL and DXR.M10PLX) on a DXR that was shipped with older firmware, you must first upgrade the DXR’s firmware to a level compatible with the newer application types.

DXR Configuration for VAV Pressure-Dependent Control in VVT System

Scope and Purpose

This document summarizes key configuration elements when engineering DXR automation station(s) to control VAV pressure-dependent terminal boxes.

This document specifically provides information on how to configure an ADXR application for VAV pressure-dependent control in a VVT system. (VVT stands for Variable Volume and Temperature. In a VVT system, the terminal box supply damper varies the amount of supply air and the AHU system also varies the temperature of the primary supply air.)

ABT Site Configuration

ABT Site Feature Selections

To minimize configuration effort, start with a pre-loaded template that most closely matches job site requirements (from the installed ABT Site library).

Pressure-dependent control related features are the primary focus of this document. Additional selections not covered are the responsibility of the user, **as part of normal configuration of a DXR**.

The specific application configuration in this document was developed using:

- Library: ABT Site TRA CET 03 V6.1 HQ ABT3.1 MSTP
- DXR.E10Pxx or DXR.M10Pxx automation station (for ADXR)
- HvacLgtShd12 (VAV)

Subsequent ABT Site libraries will work provided they contain the needed HVAC type(s) and hardware choice(s)

The engineering and configuring process for VAV pressure-dependent control can be applied to these application types:

- HvacLgtShd12 (VAV)
- HvacLgtShd13 (FPB)

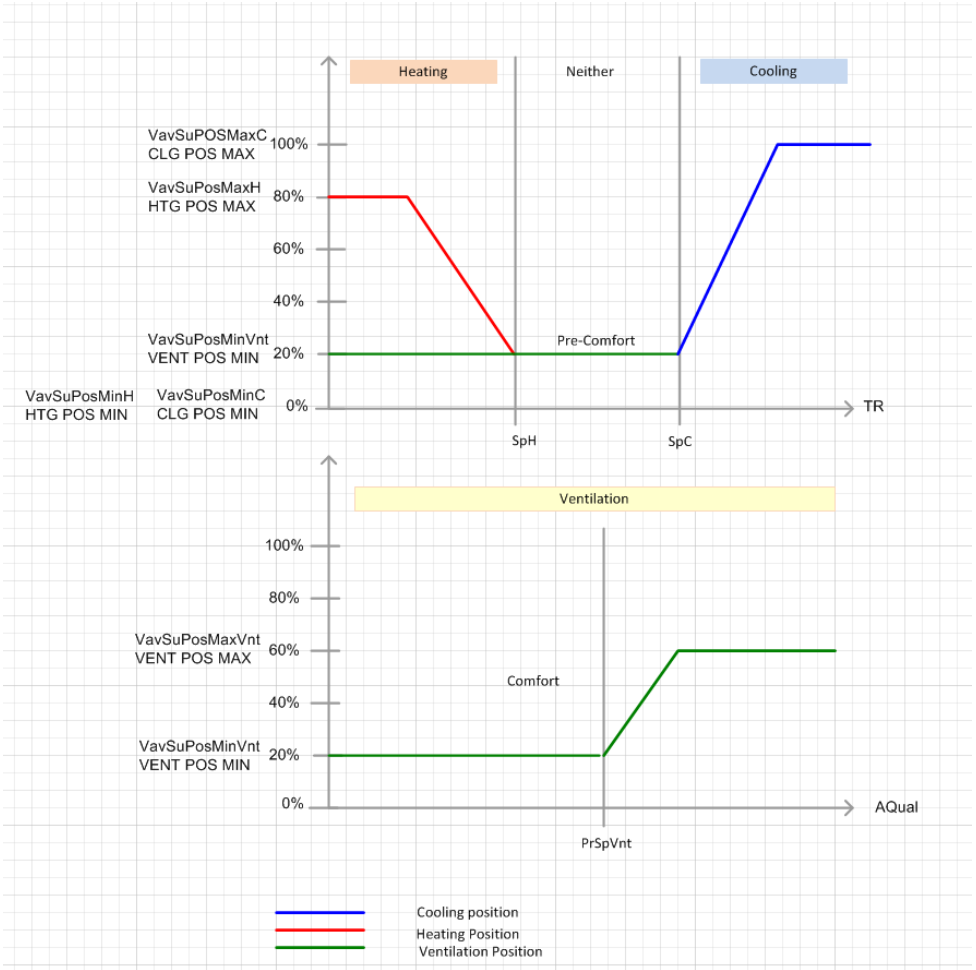
Supported DXR / ADXR hardware includes:

- DXR2.E10PL /..PLX
- DXR2.M10PL /..PLX
- DXR2.E12P /..PX
- DXR2.M12P /..PX
- DXR2.E18
- DXR2.M18

Application Overview

This section provides Control Sequence Diagrams and a Sequence of Operation summary (below).

Control Sequence Diagrams



VAV pressure-dependent control with DCV

Sequence of Operation – Summary

This application modulates the supply air damper of the terminal box to provide cooling, heating and ventilation to control the room temperature at the cooling or heating setpoint. The command output for the supply damper is modulated by a pressure-dependent algorithm, as reset by room temperature cooling, heating and ventilation requirements.

PID controllers are provided for each of the following control elements:

- Room cooling demand
- Room heating demand
- VAV damper setpoint
- Ventilation demand
  (basic ventilation and/or demand control)

Inputs

- Room temperature sensor
- Room temperature setpoint shift
- Temporary Comfort button
- Rapid ventilation button
- GreenLeaf button
- Supply air temperature sensor (for monitoring only)
- Room humidity sensor (for monitoring only)
- Room indoor air quality sensor (for demand control ventilation)

Outputs

- Supply damper actuator

Room operating modes

The operating mode of the controlled space is applied according to schedule or room occupant input. The room operating modes are:

- Comfort (occupied)
- Pre-Comfort (standby - optional)
- Economy (unoccupied)
- Protection (e.g. extended holiday - optional)

Comfort mode is applied per schedule via central command for each VAV box. A pushbutton (“Comfort button”) is provided at each room operator unit to temporarily override the Economy mode and place the room into occupancy (Comfort) for a period of time (120 min configurable). Prior to occupancy a request for cool down (also warm-up if optionally configured) can be provided via central command.

Each room operating mode has a configurable ventilation mode (e.g. minimum ventilation, DCV) and separate damper ventilation setpoint (e.g. 50 %, configurable).

Related objects:

- RM OP MODE – Room operating mode (ROpMod)
- OP MOD CMD – Central operating mode command value (CenOpModCmdv)
- CMF BTN – Comfort button (CmfBtn)
- COOL DN REQ – Cool down request (CoolDwnReq)
- WARM UP REQ – Warm-up request (WarmUpReq)

Room temperature setpoint determination

a) The application evaluates operating modes, setpoints and offsets to calculate and determine the current ("effective") room temperature heating and cooling setpoints.
b) The heating and cooling setpoints can be separately configured for each room operating mode.
c) Setpoints can be commanded manually or via central command.
d) The room operator unit is configured to allow manual adjustment of Comfort and Pre-Comfort control setpoints. Adjustments at the room unit [RM TEMP SHFT] will raise or lower both the heating and cooling setpoints together to maintain a constant deadband. The shift limit, default +/- 5.4°F is configurable.
e) Pre-Comfort heating and cooling setpoints are each based on a heating or cooling Comfort offset value; each Pre-Comfort setpoint has its own configurable offset differential (default 2°F).
f) During Comfort and Pre-Comfort modes, the room unit will display the current heating or cooling setpoint.
g) During Economy and Protection modes, the room unit will display the last Comfort or Pre-Comfort heating or cooling setpoint.
h) When in deadband (no heating or cooling) – during any mode – the room unit will display the last Comfort or Pre-Comfort heating or cooling setpoint.
i) The heating/cooling state is displayed as an icon on the room unit. When in deadband, the space for the icon is blank to indicate that heating and cooling are both off.

Related objects:

- OP MODE EFF – Present operating mode (PrOpMod)
- RM TEMP EVAL – Room temperature (RTemp)
- HTG STPT EFF – Present heating setpoint (PrSpH)
- CLG STPT EFF – Present cooling setpoint (PrSpC)
- RM TEMP STPT – Room temperature setpoint (SpTR)
- RM TEMP SHFT – Room temperature setpoint shift (SpTRShft)
- CMF CLG STPT – Cooling setpoint for comfort (SpCCmf)
- CMF HTG STPT – Heating setpoint for comfort (SpHCmf)
- STBY C DELTA – Delta cooling setpoint for pre-comfort (DSpCPcf)
- STBY H DELTA – Delta heating setpoint for pre-comfort (DSpHPcf)
- ECO CLG STPT – Cooling setpoint for economy (SpCEco)
- ECO HTG STPT – Heating setpoint for economy (SpHEco)
- PROT CLGSTPT – Cooling setpoint for protection (SpCPrt)
- PROT HTG SP – Heating setpoint for protection (SpHPrt)
- H.C STATE – Heating/cooling state (HCSta)

Ventilation: Demand control ventilation

When the room indoor air quality [RM DCV EVAL] rises above the effective [VENT SP EFF], the supply damper modulates to the maximum of (the minimum ventilation position and ventilation PID controller) to the ventilation maximum position to satisfy VENT SP EFF.

Demand control ventilation setpoints, separately configurable:

- CMF IAQ STPT – Setpoint room air quality for comfort (SpAQualRCmf)
- STBY DCV STPT – Setpoint room air quality for pre-comfort (SpAQualRPcf)
- ECO DCV STPT – Setpoint room air quality for economy (SpAQualREco)
- PROT DCV SP - Setpoint room air quality for protection (SpAQualRPrt)

Supply damper setpoints

Min and max supply damper heating and cooling setpoints, separately configurable:

- HTG POS MIN – Supply air VAV minimum air position for heating (VavSuPosMinH)
- HTG POS MAX – Supply air VAV maximum air position for heating (VavSuPosMaxH)
- CLG POS MIN – Supply air VAV minimum air position for cooling (VavSuPosMinC)
- CLG POS MAX – Supply air VAV maximum air position for cooling (VavSuPosMaxC)

Min and max supply airflow ventilation setpoints:

- VENT POS MIN – Supply air VAV minimum air position for ventilation (VavSuPosMinVnt)
- VENT POS MAX – Supply air VAV maximum air position for ventilation (VavSuPosMaxVnt)

During Comfort, occupant can enable rapid ventilation mode. (see Rapid ventilation)

VAV Box Sequence

a) The VAV supply changeover condition [VAV CHGOVR] from the primary central air handler indicates the current supply air status from the central air handler. Four states are supported: 1: Neither, 2: Heating, 3: Cooling, 4: Neutral. (The default is Cooling.) When VAV CHGOVR = Cooling, the cooling demand will modulate the supply air damper. “Neutral” means that the heating and cooling PID controllers are both enabled to provide modulation control for supply flow setpoints. When VAV CHGOVR = Neither, the supply damper setpoint is controlled by ventilation demand only.

b) Cooling – When VAV CHGOVR is in Cooling or Neutral, and the room temperature [RM TEMP EVAL] rises above the effective cooling setpoint [CLG STPT EFF], the supply damper modulates from the cooling minimum or ventilation minimum (whichever is larger) to the cooling maximum position to satisfy CLG STPT EFF.

c) Heating – When VAV CHGOVR supply changeover condition [VAV CHGOVR] is in Heating or Neutral, and the room temperature [RM TEMP EVAL] falls below the effective heating setpoint [HTG STPT EFF], the supply damper modulates from the heating minimum or ventilation minimum (whichever is larger) to the heating flow max to satisfy HTG STPT EFF.

d) Ventilation – When the room temperature is between the effective heating and cooling setpoints, the supply damper is positioned to maintain the configured minimum ventilation requirements (either minimum ventilation or demand control ventilation). In the heating or cooling mode, the larger of the airflow required for temperature or for ventilation will be utilized.

e) Warm up cycle (via central command) – The supply damper is positioned at heating max to satisfy the effective heating setpoint.

f) Cool down cycle (via central command) – The supply damper is positioned at cooling max to satisfy the effective cooling setpoint.

Rapid ventilation

The fan speed button [RAPID VENT] at the room operator unit allows the occupant to temporarily increase the ventilation rate in the room to improve air quality when the room operating mode is Comfort. Airflow is set to the maximum ventilation flow setpoint for a length of time (15 min, adjustable). The room returns to Comfort settings after the rapid ventilation timer expires.

Related objects:

- RAPID VENT – Rapid ventilation (RpdVnt)
- VENT POS MAX – Supply air VAV maximum damper position for ventilation (VavSuPosMaxVnt)

Room GreenLeaf

The GreenLeaf symbol on the room operator unit indicates that the room is operating in an energy-efficient manner (symbol glows green). A user-entered setpoint change to a non energy-efficient state will result in the leaf symbol turning red.

- Occupant can restore the room to energy efficiency by pressing the GreenLeaf button (direct press on leaf symbol). Pressing the GreenLeaf button when it is red removes the manual setpoint shift and restores the room to energy efficiency (symbol glows green).
- Setpoint shift tolerance before leaf symbol turns red is 3.6°F, configurable.
- GreenLeaf status can be externally reset to green (e.g. schedule change). The behavior is configurable.

AHU plant coordination

Collect demand from VAV supply air terminal boxes

The central plant collects and evaluates VAV supply damper position information to coordinate primary air demand requests from the terminal boxes with central AHU supply capacity.

- Supply air VAV changeover condition [VAV CHGOVR] is provided by the primary air handler to Supply air damper control to enable the following control sequences Neither (Ventilation), Heating, Cooling, Neutral (maximum (minimum ventilation for heating or cooling).
- Heating/cooling demand [HC DEMAND] is provided by the Vav terminal box to the central supply air handling unit serving the room to indicate the room heating/cooling demand: 1:Neither, 2:Heating, 3:Cooling.
- Supply air Vav position saturation [SU POS SATUR] is provided by the VAV terminal box to the central supply air handling unit serving the room to indicate
- Supply air VAV cooling demand [VAV CLG DMD] percentage of cooling request from room.
- Supply air VAV heating demand [VAV HTG DMD] percentage of heating request from room.
- Supply air VAV ventilation demand [VAV VENT DMD] percentage of ventilation request from room.
- Supply air temperature [SLPY TEMP] for VAV terminal box (if present).

ABT Site Application Configuration

Step 1 – On-board Output: Supply Air VAV Outputs

Note: This application was developed using application type HvacLgtShd12 pre-loaded template on DXR2.x10PL (or ..PLX).

Select the On-board outputs for the Supply air VAV position.

Supply air VAV Damper – Output Configuration

As a general rule, 0-10Vdc actuators do not require further configuration. If you select a 3-position (floating) actuator you will need to check the run-time to ensure the defined time matches the actuator connected (default 150 secs).

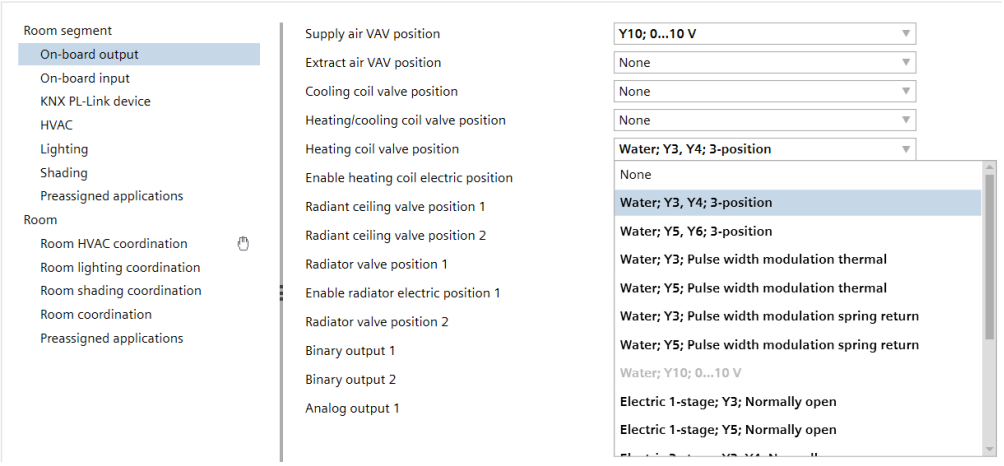
The rise and fall times may need to both be defined/checked as indicated in the following figure. The values are found in the **Default values** task selector in ABT Site.

☐	Supply air VAV position	Switchover delay	1	1/10s	DAMPER POS 3
☐	Supply air VAV position	Reaction time	0	1/10s	DAMPER POS 3
☐	Supply air VAV position	Control action	Direct		DAMPER POS 3
☐	Supply air VAV position	Neutral zone	1	%	DAMPER POS 3
☐	Supply air VAV position	Hysteresis	2	%	DAMPER POS 3
☑	Supply air VAV position	Fall time from 100 to 0%	1500	1/10s	DAMPER POS 3
☑	Supply air VAV position	Rise time from 0 to 100%	1500	1/10s	DAMPER POS 3
☐	Supply air VAV position	Function command	Ready		DAMPER POS 3
☐	Supply air VAV position	End position synchronization	Single		DAMPER POS 3
☐	Supply air VAV position	Startup synchronization	Single close		DAMPER POS 3

Note: Rise and fall time values are scaled to 1/10s; this means 150 seconds is represented as 1500.

Heating coil valve position (Variant – Output Selection)

If the VAV pressure-dependent terminal box has a hot water heating coil, select the actuator output for the coil.



As a general rule, 0-10Vdc actuators do not require further configuration. If you select a 3-position (floating) actuator you will need to check the run-time to ensure the defined time matches the actuator connected (default 150 secs).

The rise and fall times may need to both be defined/checked as indicated in the following figure. The values are found in the **Default values** task selector in ABT Site.

☐	Heating coil valve position	Switchover delay	1	1/10s	HTG V POS 1
☐	Heating coil valve position	Reaction time	0	1/10s	HTG V POS 1
☐	Heating coil valve position	Control action	Direct		HTG V POS 1
☐	Heating coil valve position	Neutral zone	1	%	HTG V POS 1
☐	Heating coil valve position	Hysteresis	2	%	HTG V POS 1
☑	Heating coil valve position	Fall time from 100 to 0%	1500	1/10s	HTG V POS 1
☑	Heating coil valve position	Rise time from 0 to 100%	1500	1/10s	HTG V POS 1
☐	Heating coil valve position	Function command	Ready		HTG V POS 1
☐	Heating coil valve position	End position synchronization	Single		HTG V POS 1
☐	Heating coil valve position	Startup synchronization	Single close		HTG V POS 1

Note: Rise and fall time values are scaled to 1/10s; this means 150 seconds is represented as 1500.

Hot water radiator position (Variant – Output Selection)

As a general rule, 0-10Vdc actuators do not require further configuration. If you select a 3-position (floating) actuator you will need to check the run-time to ensure the defined time matches the actuator connected (default 150 secs).

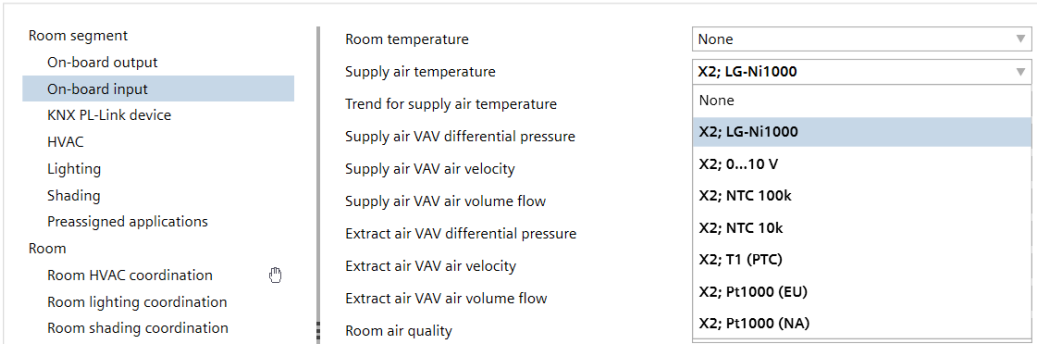
The rise and fall times may need to both be defined/checked as indicated in the following figure. The values are found in the **Default values** task selector in ABT Site.

☐	Radiator valve position 1	Startup synchronization	Single close		RAD V POS 2
☐	Radiator valve position 1	End position synchronization	Single		RAD V POS 2
☐	Radiator valve position 1	Function command	Ready		RAD V POS 2
☐	Radiator valve position 1	Rise time from 0 to 100%	1500	1/10s	RAD V POS 2
☐	Radiator valve position 1	Fall time from 100 to 0%	1500	1/10s	RAD V POS 2
☐	Radiator valve position 1	Hysteresis	2	%	RAD V POS 2
☐	Radiator valve position 1	Neutral zone	1	%	RAD V POS 2
☐	Radiator valve position 1	Control action	Direct		RAD V POS 2
☐	Radiator valve position 1	Reaction time	0	1/10s	RAD V POS 2
☐	Radiator valve position 1	Switchover delay	1	1/10s	RAD V POS 2

Step 2 – On-board Input: Supply Air Temperature

(To complete this step you must be sure of the type of sensor being used.)

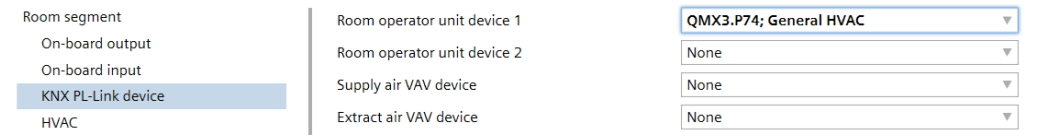
IMPORTANT: In the following figure, you are selecting the sensor type for Supply air temperature (X2; LG-Ni1000). Note that the **Supply air VAV differential pressure** selection – which can't be seen because it is covered / hidden by the drop-down for Supply air temperature – must be set to "None". Pressure-dependent control does not use a DP sensor.



☐	Supply air temperature	Signal value 2	-1	---	SPLY TEMP 1
☐	Supply air temperature	Signal value 1	-1	---	SPLY TEMP 1
☐	Supply air temperature	Signal type	Temperature (LG-Ni1000 -50...180 °C)		SPLY TEMP 1
☐	Supply air temperature	Process value 2	30.2	°F	SPLY TEMP 1
☐	Supply air temperature	Process value 1	30.2	°F	SPLY TEMP 1

Step 3 – KNX PL-Link Device

For this application, the QMX3.P74 has been selected as the room operator unit.



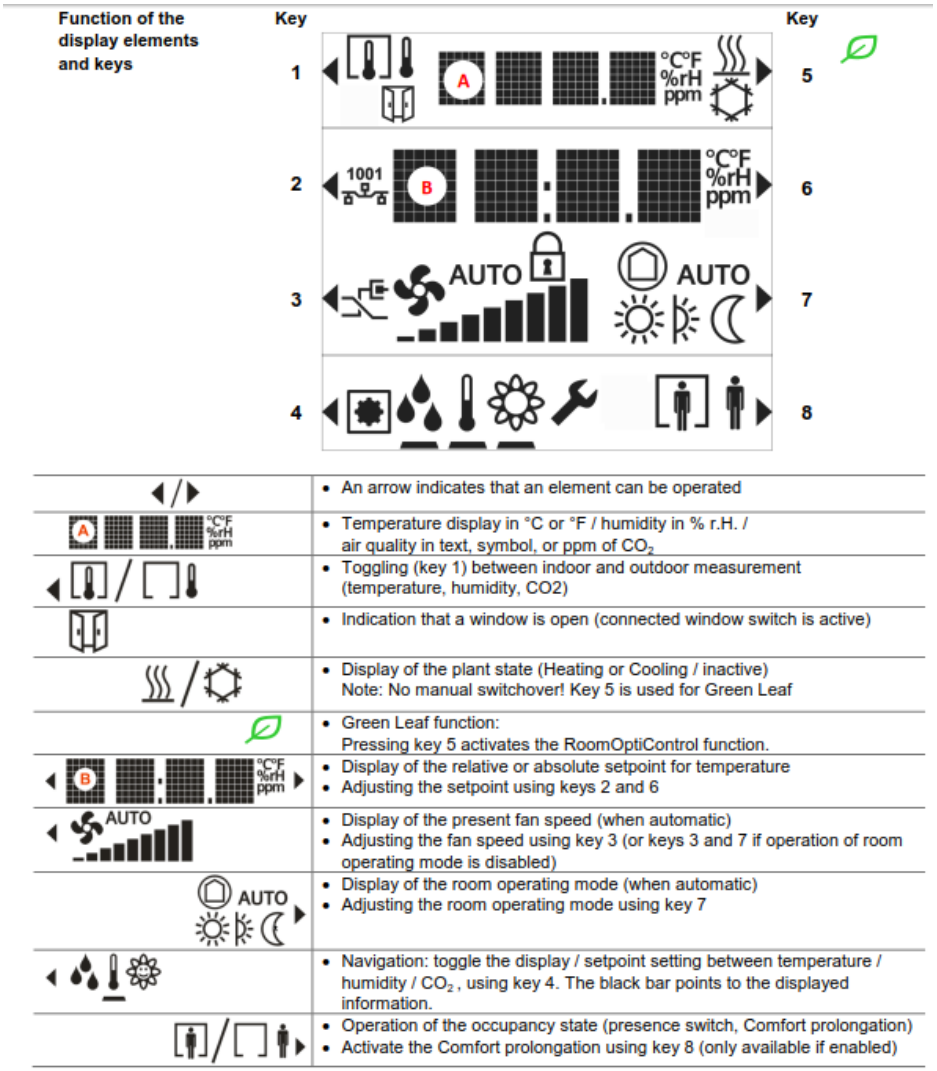
Wall-mounted Room sensor QMX3.P74 – Configuration

The wall-mounted QMX3.P74 room sensor provides: room temperature sensor, relative humidity sensor and a CO2 sensor.

After choosing a room operator unit, select the elements for display in the Default values task selector.

	KNX PL-Link device			
☑	Setpoint shift input value	Present minimum value	-5.4	°F
☑	Setpoint shift input value	Present maximum value	5.4	°F
☑	**Room operator unit 1**	**Enable operation: green leaf**	**Yes**	
☑	**Room operator unit 1**	**Enable operation: room op.mode**	**Yes**	
☑	**Room operator unit 1**	**Enable operation: temporary comfort**	**Yes**	
☐	Room operator unit 1	Enable operation: presence button	No	
☐	Room operator unit 1	Enable operation: fan speed setpoint	No	
☐	Room operator unit 1	Room unit, room temp. setpoint display	Absolute temperature setpoint	
☑	**Room operator unit 1**	**Enable operation: room temp. setpoint**	**Yes**	
☑	**Room operator unit 1**	**Room unit, display heat./cool. status**	**Yes**	
☑	**Room operator unit 1**	**Room unit, air quality display**	**Numeric, in ppm**	
☑	**Room operator unit 1**	**Room unit, display air quality**	**Display room air quality**	
☐	Room operator unit 1	Room unit, display windows status	No	
☑	**Room operator unit 1**	**Room unit, display humidity**	**Display room humidity**	
☑	Room operator unit 1	Room unit, display temperature	Display room temperature	

The QMX3.P74 will display the selected information based on the figure:



◀/▶	• An arrow indicates that an element can be operated
A °C°F %rH ppm	• Temperature display in °C or °F / humidity in % r.H. / air quality in text, symbol, or ppm of CO_2
◀ /	• Toggling (key 1) between indoor and outdoor measurement (temperature, humidity, CO2)
	• Indication that a window is open (connected window switch is active)
/	• Display of the plant state (Heating or Cooling / inactive) Note: No manual switchover! Key 5 is used for Green Leaf
	• Green Leaf function: Pressing key 5 activates the RoomOptiControl function.
◀ B °C°F %rH ppm ▶	• Display of the relative or absolute setpoint for temperature • Adjusting the setpoint using keys 2 and 6
◀ AUTO	• Display of the present fan speed (when automatic) • Adjusting the fan speed using key 3 (or keys 3 and 7 if operation of room operating mode is disabled)
AUTO ▶	• Display of the room operating mode (when automatic) • Adjusting the room operating mode using key 7
◀	• Navigation: toggle the display / setpoint setting between temperature / humidity / CO_2, using key 4. The black bar points to the displayed information.
/ ▶	• Operation of the occupancy state (presence switch, Comfort prolongation) • Activate the Comfort prolongation using key 8 (only available if enabled)

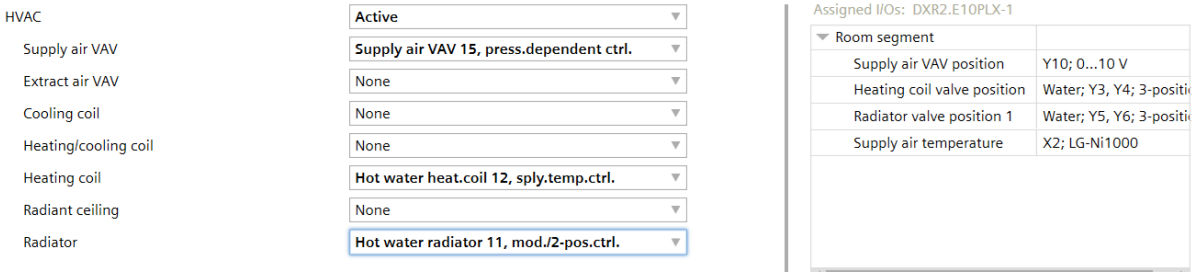
Note: (lock icon)

	• Indicates that the room operator unit is locked by the system. – Operation is disabled – The display in line 1 shows the temperature from bus

Room segment, HVAC

ABT Site selects Hvac room segment applications based on the selections made for on-board outputs and on-board inputs.

The **Supply air Vav 15, pressure-dependent control** application function (AF) modulates the supply air damper actuator to control the flow of primary air into the room. The AF includes a PID controller to calculate the damper position. Note that pressure-dependent control can only be enabled if no supply air differential pressure input is selected.



*Variant: **Hot water heating coil 12, supply temp control** is the default selection (due to the previous selection of the supply air temperature sensor). If cascade control (ie supply temp control) is not desired then change selection to **Hot water heating coil 11**.*

Step 4 – Supply air VAV, Pressure-dependent control

For a Supply air VAV pressure-dependent application, the following configurations should be defined/checked as indicated in the following figure.

The shape of the VAV duct and its dimensions can be defined to inform the user of these characteristics. The options are: Rectangular, Round, Flat oval or Direct entry. The shape and dimensions will be used by the DXR to calculate the duct area. Note that the duct area is not used in the pressure-dependent algorithm.

	Supply air VAV			
☑	Supply air VAV duct shape	Present value	Round	
☑	Supply air VAV duct area	Present value	0.54	ft2
☑	**Supply air VAV dimension B**	**Present value**	**8**	**in**
☑	**Supply air VAV dimension A**	**Present value**	**8**	**in**
☑	Supply air VAV balancing state	Present value	Initial	
☑	Supply air VAV	Enable monitoring for fan state	No	
☐	Supply air VAV	Enable relief	No	
☑	Supply air VAV	Switch-on delay saturation	60:000	ss.ms
☑	Supply air VAV	Saturation level	90	%
☑	Supply air VAV	Enable saturation calculation	Yes	
☑	Supply air VAV	Setpoint selector for extract air VAV	Supply air VAV position	

Go to the "Application configuration" part of ABT Site, and "Default values" section. Select "Show/hide parameters". The desired Ventilation min and Ventilation max values should added and defined for the supply air Vav positions for heating, cooling and ventilation.

A traditional PID controller is not needed between the Damper setpoint and Damper position. A Rate Limiter function is provided to minimize rapid damper repositioning if, for example, the value for Supply air VAV setpoint for position [SU POS SP] experiences a large change (e.g., manual command of building operator). The rate limiter delay is only applied when SU POS SP is in 15:automatic priority, and not in 5:protection or 2:emergency priority.

*NOTE: To define the supply air VAV parameters as part of the template in ABT Site, additional parameters will need to be added to the Additional parameters list in Default values, by selecting the "Show/hide parameter" option. Navigate through **%RmSegm% > HVAC > VavSu** to the required parameters (e.g., VENT POS MIN, etc.).*

☐	Supply air VAV smoke ctrl.setpoint pos.	Present value	50	%	%RSegm%'HVAC'VavSu'VavSuSpPosSmk
☑	Supply air VAV min.position for vent.	Present value	0	%	VENT POS MIN
☑	Supply air VAV min.position for heating	Present value	50	%	HTG POS MIN
☑	Supply air VAV min.position for cooling	Present value	50	%	CLG POS MIN
☑	Supply air VAV max.position for vent.	Present value	100	%	VENT POS MAX
☑	Supply air VAV max.position for heating	Present value	100	%	HTG POS MAX
☑	Supply air VAV max.position for cooling	Present value	100	%	CLG POS MAX
☑	Supply air VAV changeover condition	Present value	Neither		VAV CHGOVR
☑	Supply air VAV	Rate limitation for position	60:000	ss.ms	%RSegm%'HVAC'VavSu

When the device mode is Control mode (VAV MODE = 2:Control mode), SU POS SP is the maximum of the the following values: Cooling, Heating, Ventilation, Airflow support for cooling coil, and Airflow support for heating coil.

For applications without demand ventilation control (DCV), the minimum primary airflow is applied when ventilation is required. For applications with DCV, the primary airflow value is applied when the calculated ventilation demand is at minimum and ventilation is required.

The supply air VAV damper position goes to 0% when the supply air VAV setpoint for damper position receives a signal of less that 2%. The damper will stay at 0% until the signal received rises above 4%, at which time the value will equal the signal to the damper. Between 2% and 4% the damper position holds the last value.

Supply VAV Changeover mode

By default, the supply VAV changeover mode is set to Cooling. This means that the supply VAV demand will modulate between cooling Ventilation min and Ventilation max setpoints based on cooling demand. In this mode, the supply demand will remain at minimum in heating even if a higher heating Vent max setpoint has been defined (because the changeover mode setting (Cooling) is effectively defining the air supplied by the AHU as cooling air).

If supply demand is desired to increase for heating as well as cooling then the mode should be set to "Neutral" which defines the air supplied from the AHU as being neither exclusively for heating, nor exclusively for cooling. A setting of Neutral allows for full modulation of the supply air damper for both cooling and heating. "Neutral" means both the room temperature heating and room temperature cooling PID controllers are enabled in the DXR application; "Neither" means both PID controllers are disabled.

☑	Supply air VAV changeover condition	Present value	Neither	VAV CHGOVR

Step 5 – Variant, Hot water heating coil, supply temp control

This variant is for applications with a hot water coil in the supply air VAV terminal box and a discharge air temperature sensor, to allow cascade control of the supply air temperature.

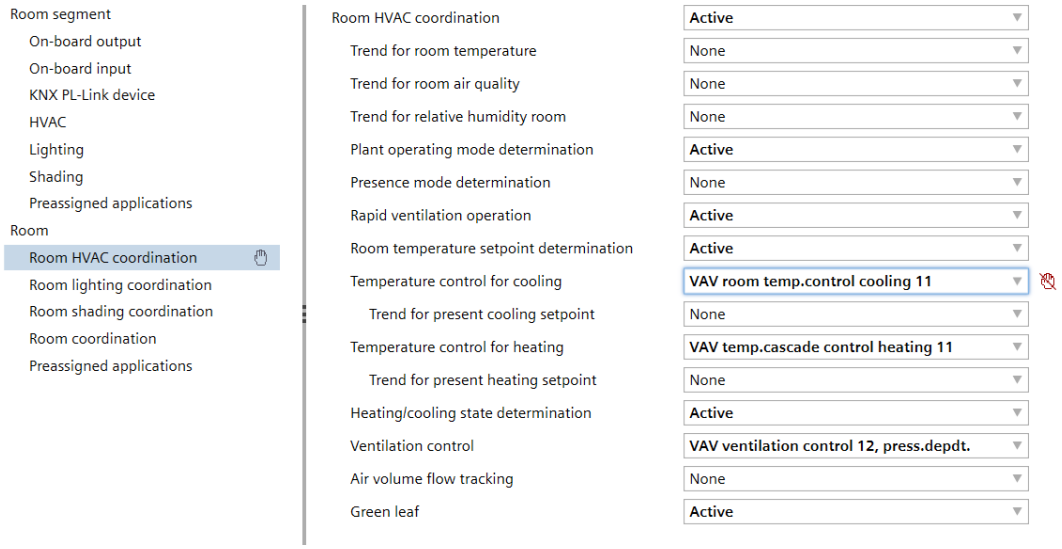
☑	Heating coil	Max.supply air temp.setpoint for heating	89.6	°F	%RSegm%'HVAC'Hcl
☑	Heating coil	Min.supply air temp.setpoint for heating	50	°F	%RSegm%'HVAC'Hcl
☐	Heating coil	Switch-on point for hot water demand	4	%	%RSegm%'HVAC'Hcl
☐	Heating coil	Hysteresis for hot water demand	2	%	%RSegm%'HVAC'Hcl
☐	Heating coil	Switch-on point for air flow heat.req	4	%	%RSegm%'HVAC'Hcl
☐	Heating coil	Hysteresis for air vol.flow heat.req.	2	%	%RSegm%'HVAC'Hcl
☐	Heating coil	Switch-on delay for air flow heat.req.	30:000	ss.ms	%RSegm%'HVAC'Hcl
☑	Heating coil	Enable monitoring for air vol.flow state	Yes		%RSegm%'HVAC'Hcl
☑	Supply temp.ctr.heating for heating coil	Gain	2.8	%/°F	%RSegm%'HVAC'Hcl'HclTSuCtrH
☐	Supply temp.ctr.heating for heating coil	Rise time from 0 to 100%	1	1/10s	%RSegm%'HVAC'Hcl'HclTSuCtrH
☑	Supply temp.ctr.heating for heating coil	Fall time from 100 to 0%	1	1/10s	%RSegm%'HVAC'Hcl'HclTSuCtrH
☑	Supply temp.ctr.heating for heating coil	Hysteresis switch-off	0.9	°F	%RSegm%'HVAC'Hcl'HclTSuCtrH
☐	Supply temp.ctr.heating for heating coil	Hysteresis switch-on	0.9	°F	%RSegm%'HVAC'Hcl'HclTSuCtrH
☐	Supply temp.ctr.heating for heating coil	Neutral zone	0.4	°F	%RSegm%'HVAC'Hcl'HclTSuCtrH
☑	Supply temp.ctr.heating for heating coil	Integral action time Tn	300	s	%RSegm%'HVAC'Hcl'HclTSuCtrH
☑	Supply temp.ctr.heating for heating coil	Controller type	PID controller		%RSegm%'HVAC'Hcl'HclTSuCtrH
☐	Supply temp.ctr.heating for heating coil	Controller output maximum	100	%	%RSegm%'HVAC'Hcl'HclTSuCtrH
☐	Supply temp.ctr.heating for heating coil	Controller output minimum	0	%	%RSegm%'HVAC'Hcl'HclTSuCtrH
☐	Supply temp.ctr.heating for heating coil	Controller output for offset	0	%	%RSegm%'HVAC'Hcl'HclTSuCtrH
☐	Supply temp.ctr.heating for heating coil	Number of stages	1	---	%RSegm%'HVAC'Hcl'HclTSuCtrH
☐	Supply temp.ctr.heating for heating coil	Switch delay	05:00	mm:ss	%RSegm%'HVAC'Hcl'HclTSuCtrH
☐	Supply temp.ctr.heating for heating coil	Derivative action-time Tv	0	s	%RSegm%'HVAC'Hcl'HclTSuCtrH

Step 6 – Variant, Hot water radiator

The default configuration of the radiator application has the downdraft control logic disabled. Configure the radiator to support downdraft control, if it is required for the job site.

☑	Radiator	Downdraft charact.for outs.air temp.X1	23	°F	%RSegm%'HVAC'Rad
☑	Radiator	Downdraft charact.for outs.air temp.X2	50	°F	%RSegm%'HVAC'Rad
☐	Radiator	Switch-on point for hot water demand	4	%	%RSegm%'HVAC'Rad
☐	Radiator	Hysteresis for hot water demand	2	%	%RSegm%'HVAC'Rad
☑	Radiator	Enable downdraft compensation	No		%RSegm%'HVAC'Rad
☑	Radiator	Downdraft charact.for valve position Y1	100	%	%RSegm%'HVAC'Rad
☑	Radiator	Downdraft charact.for valve position Y2	25	%	%RSegm%'HVAC'Rad

Room, HVAC coordination



Step 7 – Plant operating mode determination

The room operating mode, presence detection, HVAC presence mode and window contact, as well as the warm-up, cool down and free cooling signals received from the central workstation, are read and used to determine the VAV plant operating modes. The plant operating mode (PltOpMod) is a multi-state BACnet object that supports up to 17 different states (1:Off, 2:Protection, 3: Economy, 4:Pre-Comfort, 5:Comfort, 6:Warm-up,7: Cooldown, …). For a complete of all states see the Application Help or the “Application note“ documentation.

There is a 5 minute [Default] switch delay between switching plant operating mode states when a person becomes present/absent from the room.

	Plant operating mode determination				
☑	Plant operating mode determination	Switch delay when present	05:00:000	mm:ss:ms	%R%'RHvacCoo'PltModDtr
☑	Plant operating mode determination	Switch delay when absent	05:00:000	mm:ss:ms	%R%'RHvacCoo'PltModDtr

Step 8 – Rapid Ventilation

The fan button on the room operating unit allows the room occupant to place the room into ‘Rapid Ventilation’.

	Rapid ventilation operation				
☐	Rapid ventilation operation	Op.command for comfort cond.at manual	None		%R%'RHvacCoo'RpdVntOp
☐	Rapid ventilation operation	Op.command for comfort cond.at automatic	None		%R%'RHvacCoo'RpdVntOp
☐	Rapid ventilation operation	Op.command for energy effic.at manual	None		%R%'RHvacCoo'RpdVntOp
☐	Rapid ventilation operation	Op.command for energy effic.at automatic	None		%R%'RHvacCoo'RpdVntOp
☑	Rapid ventilation operation	Rapid ventilation runtime	60:00:000	mm:ss:ms	%R%'RHvacCoo'RpdVntOp

Step 9 – Temperature control for Cooling

Order Sequencing for Cooling devices

The order sequencing of cooling devices has default settings. They can be modified as required by room temperature cooling control sequence. *Typically, no changes are required to this section*.

☐	Temperature control for cooling	Radiant ceiling cooling sequence	1	---	%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Heating/cooling coil cooling sequence	2	---	%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Cooling coil cooling sequence	3	---	%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	VAV cooling sequence	4	---	%R%'RHvacCoo'TCtlC

Room operating mode configuration for Cooling devices

Each room operating mode can be customize to support one of the following cooling device configurations: None, Radiant & air treatment devices (RadATrDv), Radiant devices (RadDev), Air treatment devices (ATreaDev). *Typically, no changes are required to this section*.

☐	Temperature control for cooling	Comfort configuration	RadATrDv		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Pre-Comfort configuration	RadATrDv		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Economy configuration	RadATrDv		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Protection configuration	RadATrDv		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Cool down configuration	RadATrDv		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Free cooling configuration	RadATrDv		%R%'RHvacCoo'TCtlC

Controller mode by Room operating mode

The operation of the cooling coil or radiant devices can be configured to operate either in: Continuous (modulating) or 2-Position for each room operating mode. This allows radiant devices to easily be configure for cool-down mode. *Typically, no changes are required to this section.*

☐	Temperature control for cooling	Coil: controller mode by comfort	Cont		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Coil: controller mode by pre-comfort	Cont		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Coil: controller mode by economy	Cont		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Coil: controller mode by protection	Cont		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Coil: controller mode by cool down	Cont		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Radiant devices: ctr.mode by comfort	Cont		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Radiant devices: ctr.mode by pre-comfort	Cont		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Radiant devices: ctr.mode by economy	Cont		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Radiant devices: ctr.mode by protection	Cont		%R%'RHvacCoo'TCtlC
☐	Temperature control for cooling	Radiant devices: ctr.mode by cool down	Cont		%R%'RHvacCoo'TCtlC

Cooling setpoints for Room operating mode

The cooling setpoints for each operating mode can be configured to meet job site specifications. Default values are set based on ASHRAE 90.1-2016 recommendations.

☑	Delta cooling setpoint for pre-comfort	Present value	1.8	°F	STBY C DELTA
☑	Cooling setpoint for protection	Present value	104	°F	PROT CLGSTPT
☑	Cooling setpoint for economy	Present value	95	°F	ECO CLG STPT
☑	Cooling setpoint for comfort	Default command	75.2	°F	CMF CLG STPT

Room temperature PID controller Cooling for VAV

☐	Room temp.controller cooling for VAV	Derivative action-time Tv	0	s	%R%'RHvacCoo'TCtlC'VavTRCtrC
☐	Room temp.controller cooling for VAV	Switch delay	05:00	mm:ss	%R%'RHvacCoo'TCtlC'VavTRCtrC
☐	Room temp.controller cooling for VAV	Number of stages	1	---	%R%'RHvacCoo'TCtlC'VavTRCtrC
☑	Room temp.controller cooling for VAV	Fall time from 100 to 0%	600	1/10s	%R%'RHvacCoo'TCtlC'VavTRCtrC
☑	Room temp.controller cooling for VAV	Rise time from 0 to 100%	600	1/10s	%R%'RHvacCoo'TCtlC'VavTRCtrC
☐	Room temp.controller cooling for VAV	Controller output for offset	0	%	%R%'RHvacCoo'TCtlC'VavTRCtrC
☐	Room temp.controller cooling for VAV	Controller output minimum	0	%	%R%'RHvacCoo'TCtlC'VavTRCtrC
☐	Room temp.controller cooling for VAV	Controller output maximum	100	%	%R%'RHvacCoo'TCtlC'VavTRCtrC
☑	Room temp.controller cooling for VAV	Controller type	PID controller		%R%'RHvacCoo'TCtlC'VavTRCtrC
☑	Room temp.controller cooling for VAV	Integral action time Tn	900	s	%R%'RHvacCoo'TCtlC'VavTRCtrC
☐	Room temp.controller cooling for VAV	Neutral zone	0	°F	%R%'RHvacCoo'TCtlC'VavTRCtrC
☐	Room temp.controller cooling for VAV	Hysteresis switch-on	0.9	°F	%R%'RHvacCoo'TCtlC'VavTRCtrC
☐	Room temp.controller cooling for VAV	Hysteresis switch-off	0.9	°F	%R%'RHvacCoo'TCtlC'VavTRCtrC
☑	Room temp.controller cooling for VAV	Gain	27.8	%/°F	%R%'RHvacCoo'TCtlC'VavTRCtrC

Step 10 – VAV Temperature cascade control heating

Order sequencing for Heating Devices

The order sequencing for the heating devices have default settings. They can be modified as required by room temperature heating control sequence. *Typically, no changes are required to this section.*

☑	Temperature control for heating	Radiant devices: ctr. mode by warm-up	Cont		%R%'RHvacCoo'TCtlH
☑	Temperature control for heating	Radiator heating sequence	1	---	%R%'RHvacCoo'TCtlH
☑	Temperature control for heating	Radiant ceiling heating sequence	2	---	%R%'RHvacCoo'TCtlH
☑	Temperature control for heating	Coil heating sequence	3	---	%R%'RHvacCoo'TCtlH
☑	Temperature control for heating	VAV heating sequence	4	---	%R%'RHvacCoo'TCtlH

Room operating mode configuration for Heating

Each room operating mode can be customized to support one of the following heating device configurations: None, Radiant & air treatment devices (RadATrDv), Radiant devices (RadDev), Air treatment devices (ATreaDev). *Typically, no changes are required to this section.*

☐	Temperature control for heating	Comfort configuration	RadATrDv		%R%'RHvacCoo'TCtlH
☐	Temperature control for heating	Pre-Comfort configuration	RadATrDv		%R%'RHvacCoo'TCtlH
☐	Temperature control for heating	Economy configuration	RadATrDv		%R%'RHvacCoo'TCtlH
☐	Temperature control for heating	Protection configuration	RadATrDv		%R%'RHvacCoo'TCtlH
☐	Temperature control for heating	Warm-up configuration	RadATrDv		%R%'RHvacCoo'TCtlH

Controller mode for each room operating mode

The operation of the heating coil or radiant devices can be configured to operate either in: Continuous (modulating) or 2-Position for each room operating mode. This allows radiant devices to easily be configured for warm-up mode. *Typically, no changes are required to this section.*

☐	Temperature control for heating	Coil: controller mode by comfort	Cont		%R%'RHvacCoo'TCtlH
☐	Temperature control for heating	Coil: controller mode by pre-comfort	Cont		%R%'RHvacCoo'TCtlH
☐	Temperature control for heating	Coil: controller mode by economy	Cont		%R%'RHvacCoo'TCtlH
☐	Temperature control for heating	Coil: controller mode by protection	Cont		%R%'RHvacCoo'TCtlH
☑	Temperature control for heating	Coil: controller mode by warm-up	Cont		%R%'RHvacCoo'TCtlH
☐	Temperature control for heating	Radiant devices: ctr.mode by comfort	Cont		%R%'RHvacCoo'TCtlH
☐	Temperature control for heating	Radiant devices: ctr.mode by pre-comfort	Cont		%R%'RHvacCoo'TCtlH
☐	Temperature control for heating	Radiant devices: ctr.mode by economy	Cont		%R%'RHvacCoo'TCtlH
☐	Temperature control for heating	Radiant devices: ctr.mode by protection	Cont		%R%'RHvacCoo'TCtlH
☑	Temperature control for heating	Radiant devices: ctr. mode by warm-up	Cont		%R%'RHvacCoo'TCtlH

Heating setpoints for each room operating mode

The heating setpoints for each operating mode can be configured to meet job site specifications. Default values are set based on ASHRAE 90.1-2016 recommendations.

☑	Heating setpoint for protection	Present value	53.6	°F	PROT HTG SP
☑	Heating setpoint for economy	Present value	59	°F	ECO HTG STPT
☑	Heating setpoint for comfort	Default command	69.8	°F	CMF HTG STPT
☑	Delta heating setpoint for pre-comfort	Present value	1.8	°F	STBY H DELTA

Room temperature PID controller Heating for VAV

For effective configuration of **Room temperature controller heating for VAV**, make sure the "Supply VAV changeover condition" was changed to Neutral in step 4, to allow the supply air VAV damper position to modulate on a call for heating (see Supply VAV Changeover mode in Step 4).

☐	Room temp.controller heating for VAV	Derivative action-time Tv	0	s	%R%'RHvacCoo'TCtlH'VavTRCtrH
☐	Room temp.controller heating for VAV	Switch delay	05:00	mm:ss	%R%'RHvacCoo'TCtlH'VavTRCtrH
☐	Room temp.controller heating for VAV	Number of stages	1	---	%R%'RHvacCoo'TCtlH'VavTRCtrH
☑	Room temp.controller heating for VAV	Fall time from 100 to 0%	600	1/10s	%R%'RHvacCoo'TCtlH'VavTRCtrH
☑	Room temp.controller heating for VAV	Rise time from 0 to 100%	600	1/10s	%R%'RHvacCoo'TCtlH'VavTRCtrH
☐	Room temp.controller heating for VAV	Controller output for offset	0	%	%R%'RHvacCoo'TCtlH'VavTRCtrH
☐	Room temp.controller heating for VAV	Controller output minimum	0	%	%R%'RHvacCoo'TCtlH'VavTRCtrH
☐	Room temp.controller heating for VAV	Controller output maximum	100	%	%R%'RHvacCoo'TCtlH'VavTRCtrH
☑	Room temp.controller heating for VAV	Controller type	PID controller		%R%'RHvacCoo'TCtlH'VavTRCtrH
☑	Room temp.controller heating for VAV	Integral action time Tn	900	s	%R%'RHvacCoo'TCtlH'VavTRCtrH
☐	Room temp.controller heating for VAV	Neutral zone	0	°F	%R%'RHvacCoo'TCtlH'VavTRCtrH
☐	Room temp.controller heating for VAV	Hysteresis switch-on	0.9	°F	%R%'RHvacCoo'TCtlH'VavTRCtrH
☐	Room temp.controller heating for VAV	Hysteresis switch-off	0.9	°F	%R%'RHvacCoo'TCtlH'VavTRCtrH
☑	Room temp.controller heating for VAV	Gain	27.8	%/°F	%R%'RHvacCoo'TCtlH'VavTRCtrH

Offset for VAV start

☐	Temperature control for heating	Offset for VAV start	0	°F	%R%'RHvacCoo'TCtlH

Room temperature PID controller for Heating coil

☐	Room temp.controller heating for coil	Derivative action-time Tv	0	s	%R%'RHvacCoo'TCtlH'CoilTRCtrH
☐	Room temp.controller heating for coil	Switch delay	05:00	mm:ss	%R%'RHvacCoo'TCtlH'CoilTRCtrH
☐	Room temp.controller heating for coil	Number of stages	1	---	%R%'RHvacCoo'TCtlH'CoilTRCtrH
☑	Room temp.controller heating for coil	Fall time from 100 to 0%	600	1/10s	%R%'RHvacCoo'TCtlH'CoilTRCtrH
☑	Room temp.controller heating for coil	Rise time from 0 to 100%	600	1/10s	%R%'RHvacCoo'TCtlH'CoilTRCtrH
☐	Room temp.controller heating for coil	Controller output for offset	0	%	%R%'RHvacCoo'TCtlH'CoilTRCtrH
☐	Room temp.controller heating for coil	Controller output minimum	0	%	%R%'RHvacCoo'TCtlH'CoilTRCtrH
☐	Room temp.controller heating for coil	Controller output maximum	100	%	%R%'RHvacCoo'TCtlH'CoilTRCtrH
☑	Room temp.controller heating for coil	Controller type	PID controller		%R%'RHvacCoo'TCtlH'CoilTRCtrH
☑	Room temp.controller heating for coil	Integral action time Tn	900	s	%R%'RHvacCoo'TCtlH'CoilTRCtrH
☐	Room temp.controller heating for coil	Neutral zone	0	°F	%R%'RHvacCoo'TCtlH'CoilTRCtrH
☐	Room temp.controller heating for coil	Hysteresis switch-on	0.9	°F	%R%'RHvacCoo'TCtlH'CoilTRCtrH
☐	Room temp.controller heating for coil	Hysteresis switch-off	0.9	°F	%R%'RHvacCoo'TCtlH'CoilTRCtrH
☐	Room temp.controller heating for coil	Gain	27.8	%/°F	%R%'RHvacCoo'TCtlH'CoilTRCtrH

Room temperature PID controller heat for Radiator

NOTE: Configure the radiator for 2-Position control by changing **Controller type** to "Staged controller". Select the appropriate configuration for: Number of stages, and for Switch delay.

☐	Room temp.controller heat.for radiator	Derivative action-time Tv	0	s	%R%'RHvacCoo'TCtlH'RadTRCtrH
☐	Room temp.controller heat.for radiator	Switch delay	05:00	mm:ss	%R%'RHvacCoo'TCtlH'RadTRCtrH
☐	Room temp.controller heat.for radiator	Number of stages	1	---	%R%'RHvacCoo'TCtlH'RadTRCtrH
☑	Room temp.controller heat.for radiator	Fall time from 100 to 0%	600	1/10s	%R%'RHvacCoo'TCtlH'RadTRCtrH
☑	Room temp.controller heat.for radiator	Rise time from 0 to 100%	600	1/10s	%R%'RHvacCoo'TCtlH'RadTRCtrH
☐	Room temp.controller heat.for radiator	Controller output for offset	0	%	%R%'RHvacCoo'TCtlH'RadTRCtrH
☐	Room temp.controller heat.for radiator	Controller output minimum	0	%	%R%'RHvacCoo'TCtlH'RadTRCtrH
☐	Room temp.controller heat.for radiator	Controller output maximum	100	%	%R%'RHvacCoo'TCtlH'RadTRCtrH
☑	Room temp.controller heat.for radiator	Controller type	PID controller		%R%'RHvacCoo'TCtlH'RadTRCtrH
☐	Room temp.controller heat.for radiator	Integral action time Tn	3600	s	%R%'RHvacCoo'TCtlH'RadTRCtrH
☐	Room temp.controller heat.for radiator	Neutral zone	0	°F	%R%'RHvacCoo'TCtlH'RadTRCtrH
☐	Room temp.controller heat.for radiator	Hysteresis switch-on	0.9	°F	%R%'RHvacCoo'TCtlH'RadTRCtrH
☐	Room temp.controller heat.for radiator	Hysteresis switch-off	0.9	°F	%R%'RHvacCoo'TCtlH'RadTRCtrH
☑	Room temp.controller heat.for radiator	Gain	27.8	%/°F	%R%'RHvacCoo'TCtlH'RadTRCtrH

Step 11 – Ventilation control

Ventilation control type for each room operating mode

Each room operating mode has its own ventilation control type. Configure ventilation control to meet job specification requirements. The following ventilation control types are supported: Off (no ventilation), MnVent (Minimum ventilation), DCV (Demand control ventilation) and MnVntDCV (Minimum ventilation & Demand control ventilation)

☑	Ventilation control	Comfort configuration	MnVntDCV		%R%'RHvacCoo'VntCtl
☑	Ventilation control	Pre-Comfort configuration	DCV		%R%'RHvacCoo'VntCtl
☑	Ventilation control	Economy configuration	Off		%R%'RHvacCoo'VntCtl
☑	Ventilation control	Protection configuration	Off		%R%'RHvacCoo'VntCtl

Minimum damper position for Room operating modes

☑	Ventilation control	Minimum damper position for comfort	50	%	%R%'RHvacCoo'VntCtl
☑	Ventilation control	Minimum damper position for pre-comfort	50	%	%R%'RHvacCoo'VntCtl
☑	Ventilation control	Minimum damper position for economy	50	%	%R%'RHvacCoo'VntCtl
☑	Ventilation control	Minimum damper position for protection	50	%	%R%'RHvacCoo'VntCtl

Demand Control Ventilation PID controller

☑	Ventilation controller	Gain	0.23	%/ppm	%R%'RHvacCoo'VntCtl'VntCtr
☐	Ventilation controller	Hysteresis switch-off	100	ppm	%R%'RHvacCoo'VntCtl'VntCtr
☐	Ventilation controller	Hysteresis switch-on	100	ppm	%R%'RHvacCoo'VntCtl'VntCtr
☐	Ventilation controller	Neutral zone	0	ppm	%R%'RHvacCoo'VntCtl'VntCtr
☑	Ventilation controller	Integral action time Tn	1800	s	%R%'RHvacCoo'VntCtl'VntCtr
☑	Ventilation controller	Controller type	PID controller		%R%'RHvacCoo'VntCtl'VntCtr
☑	Ventilation controller	Controller output maximum	100	%	%R%'RHvacCoo'VntCtl'VntCtr
☐	Ventilation controller	Controller output minimum	0	%	%R%'RHvacCoo'VntCtl'VntCtr
☐	Ventilation controller	Controller output for offset	0	%	%R%'RHvacCoo'VntCtl'VntCtr
☑	Ventilation controller	Rise time from 0 to 100%	600	1/10s	%R%'RHvacCoo'VntCtl'VntCtr
☑	Ventilation controller	Fall time from 100 to 0%	600	1/10s	%R%'RHvacCoo'VntCtl'VntCtr
☐	Ventilation controller	Number of stages	1	---	%R%'RHvacCoo'VntCtl'VntCtr
☐	Ventilation controller	Switch delay	05:00	mm:ss	%R%'RHvacCoo'VntCtl'VntCtr
☐	Ventilation controller	Derivative action-time Tv	0	s	%R%'RHvacCoo'VntCtl'VntCtr

Room air quality setpoints for each room operating mode

Each room operating mode has an air quality setpoint. As a general rule, when outside air CO_2 is 400 ppm, the following CO_2 setpoints can be used:

- 20 cfm/person = 930 ppm
- 15 cfm/person = 1,100 ppm
- 10 cfm/person =1,450 ppm

Consult job specification requirements for the actual CO2 setpoint and differential to be used.

☑	Setpoint room air quality for comfort	Present value	900	ppm	CMF IAQ STPT
☑	Setp.room air quality for pre-comfort	Present value	1100	ppm	STBY DCV SP
☑	Setpoint room air quality for economy	Present value	1500	ppm	ECO DCV STPT
☑	Setpoint room air quality for protection	Present value	1500	ppm	PROT DCV SP

Step 12 – Room operating mode determination

Source for present operating mode [default = PltOpMod]:

- Considers the impact of window contact, presence detector, manual fan operation inputs have on the room operating mode.

Manual operation lock configuration [default = ProtEcon]:

- Locks the manual operation of the room unit, during centrally scheduled room operating modes, so comfort cannot be increased/energy efficiency is maintained. Configure to support the appropriate room operating modes; 1:None, 2:Protection, 3:Protection/Economy, 4: Protection/Economy/Pre-Comfort.

Time for comfort button [default 2 hours]:

- Time period for the presence button and temporary Comfort, as triggered by the Comfor button.

	Room operating mode determination				
☑	**Room operating mode determination**	**Source for present operating mode**	**PltOpMod**		**%R%'ROpModDtr**
☐	Room operating mode determination	Repetition number energy effic.trigger	0	---	%R%'ROpModDtr
☐	Room operating mode determination	Repetition time energy efficiency trig.	60:00:000	mm:ss:ms	%R%'ROpModDtr
☐	Room operating mode determination	Protection to Economy	None		%R%'ROpModDtr
☐	Room operating mode determination	Protection/Economy to Pre-Comfort	None		%R%'ROpModDtr
☐	Room operating mode determination	Protection/Economy/Pre-Comf.to Comfort	ComfCon		%R%'ROpModDtr
☐	Room operating mode determination	Comfort to Pre-Comfort	EnrEfCon		%R%'ROpModDtr
☐	Room operating mode determination	Comfort/Pre-Comfort to Economy	EnrEfCon		%R%'ROpModDtr
☐	Room operating mode determination	Comfort/Pre-Comf./Economy to Protection	EnrEfCon		%R%'ROpModDtr
☑	Room operating mode determination	Manual operation lock configuration	ProtEcon		%R%'ROpModDtr
☐	Room operating mode determination	Op.command for energy effic.at automatic	Auto		%R%'ROpModDtr
☐	Room operating mode determination	Comfort button inactive configuration	Auto		%R%'ROpModDtr
☑	Room operating mode determination	Time for comfort button	120:00:000	mm:ss:ms	%R%'ROpModDtr

Step 13 – AHU coordination for Heating / cooling air demand

The maximum controller demand (CtrDmd) from either heating (VavTRCtlH) or cooling (VavTRCtlC) determines the value of Heating/Cooling demand (HCDmd). The Heating/cooling demand object **HCDmd** is a multistate calculated value that supports the following states: 1: Neither, 2: Heating, 3: Cooling.

HCDmd is written to a group member: RCtl$HCDmd in the Room and passed down to the Room segment. HCDmd ONLY appears as a BA object in the VavSuSplyAir group member, it is not used for anything else.

☑	Heating/cooling demand	Present value	Neither		HC DEMAND

The DXR gathers the following information to be sent to the air handling unit that serves the room.

Description of data point	Data point type	Signal from room	Signal to room
Effective room temperature	ACalcVal	ROOM TEMP	
Room relative humidity	AI	ROOM HUM	
Room Air quality	AI	ROOM DCV	
Present ventilation setpoint	APrcVal	VENT SP EFF	
Supply air temperature	AI	SPLY TEMP	
Outside air temp (from central)	ACalcVal		OA TEMP
Comfort button	BPrcVal	CMF BTN	
Room temperature setpoint shift	APrcVal	RM TEMP SHFT	
Room temperature setpoint	APrcVal	RM TEMP STPT	
Present heating setpoint	APrcVal	HTG STPT EFF	
Present cooling setpoint	APrcVal	CLG STPT EFF	
Present plant operating mode	MPrcVal	OP MODE EFF	
Vav Supply device mode	MPrcVal	VAV MODE	
Supply air damper position	AO	DAMPER POS	
Supply air VAV position saturation	BCalcVal	SU POS SATUR	
Supply air VAV changeover condition	MPrcVal	VAV CHGOVR	
Heating coil valve position	AO	HTG V POS	
Heating coil device mode	MPrcVal	HTG DEV MODE	
Heating/cooling demand	MCalcVal	HC DEMAND	

Issued by
Siemens Industry, Inc.
Building Technologies Division
1000 Deerfield Pkwy
Buffalo Grove IL 60089
Tel. +1 847-215-1000

Document ID	A6V11521219	A6V11521219(AA)
Edition	2018-09-26	