SIEMENS

Room Automation Stations
DXR2 VAV Start-up Procedures

Building Technologies

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Security best practices

⚠

Network setup must avoid direct connection from Internet to the end device.

- Implement Port Security to disallow the connection and network participation of any unauthorized laptop/device to a switch.

- Unauthorized access should be prevented by physical security measures. Meaning, access to the devices (controllers) must be limited only to people who require it. Equipment can further be monitored via CCTV.

- When possible, physically segment control systems from non-control systems. Apply the concept of Least Privilege to minimize the impact in case of a compromise of user credentials.

- Ensure that complex and strong passwords are required. Furthermore, ensure that administrator passwords are at least 12 characters long for users with administrative privileges and at least 8 characters long for non-administrative users.

- Ensure that the same username/password credentials are unique for each site within the country/office.

- Ensure that users each have their own individual unique login accounts. User accounts must not be shared.

- Configure account lockout settings (Threshold, Observation Windows, Duration) to protect the system from password guessing or brute force attacks.

- Ensure that accounts are removed within a reasonable time when users no longer work at the site.

- Ensure that firmware is downloaded only from legitimate / known locations.

Cyber security disclaimer

Siemens products and solutions provide security functions to ensure the secure operation of building comfort, fire safety, security management and physical security systems. The security functions on these products and solutions are important components of a comprehensive security concept.

It is, however, necessary to implement and maintain a comprehensive, state-of-the-art security concept that is customized to individual security needs. Such a security concept may result in additional site-specific preventive action to ensure that the building comfort, fire safety, security management or physical security system for your site are operated in a secure manner. These measures may include, but are not limited to, separating networks, physically protecting system components, user awareness programs, defense in depth, etc.

For additional information on building technology security and our offerings, contact your Siemens sales or project department. We strongly recommend customers to follow our security advisories, which provide information on the latest security threats, patches and other mitigation measures.

http://www.siemens.com/cert/en/cert-security-advisories.htm

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Before You Begin

User Knowledge

ABT Site has two online help systems:
- ABT Site online help
- Application online help

ABT-Site online help is the "tool" help - how to create projects, load templates etc. To access, click the Help button.

Application online help describes functions and features of the application types and templates loaded in the ABT-Site Library. To access, see **Application selection** in ABT-Site Help. This topic has information explaining when and how to access the Application help.

Terminology
● ABT-SSA is to be renamed "ABT Inside"

Prerequisites
● ABT Site installed.
● Working knowledge of ABT Site features and functionality.
● Users should be trained and knowledgeable regarding the technical principles and concepts of Desigo Room Automation (RA) including the Room / segment concept.

Design Engineer

Best practice
● Application templates with any configuration changes are completed by the Design Engineer prior to handoff.
● Parameter default values have been entered for each DXR2 automation station to minimize technician online setup time.

ABT Site Project Data

If following the recommended ABT project workflow for start-up, make sure that you have received the required ABT Site project data. This will include:

● ABT Site project requires User name and Password (both are case sensitive).
● Common project settings including user profiles.
● Engineered DXR2 automation stations.
● Application templates with any configuration changes are completed by the Design Engineer prior to handoff.
● Checkout reports.

ⓘ **ABT Site project data**
Project data must be completed using ABT Site (ABT-Site license required).

ABT-Site library with standard or custom templates/types must be installed so that changes applied during commissioning can be backed up following start-up.

Job Site

Prerequisites at the job site

● Electrical tested and available.
● Automation stations installed and pass Basic Sanity test (LED steady green).
● All needed mechanical documentation (plans and specifications) are available.

Equipment

Required equipment depends on the connection method and type of automation station.

Connection Method	Automation Station
Room operator unit	USB-KNX Interface (Siemens OCI702 stock number S55800-Y101)
USB	USB cable (A/B)
Ethernet IP connection (DXR2.E only)	- LAN cable - If necessary: USB to Ethernet adaptor

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Navigating ABT-SSA / ABT Inside

Users should be trained and knowledgeable with ABT Site.

To get to the properties of an object, click on the properties icon ⋮ .

After clicking the properties icon, click the filter button ⏷, to filter out most of the properties / parameters that don't typically need to be checked. (the filter button is a toggle – you can reverse your choice by clicking it a second time).

Common data point icons

ℹ️ | ABT-Site uses icons to visually identify the different types of points in the DXR automation station.

When online and viewing points in the DXR automation station, some items will have icons and some will not.
If an item has an icon next to it, it means the item is a BACnet object.
Items without icons are properties or parameters of an object.
Several common object icons are shown in the following table. For a complete list, see the Appendix in this document or search for "Online icons" in ABT Site Help.

Icon	Description	BACnet object type
	Input value	AI, BI, BlsIn, LgtIn, MI
	Output value	AO, BO, BlsOut, EmgLgt, LgtAOut, LgtBOut, MO
	Calculated value	ACalcVal, BCalcVal, MCalcVal, PrphDev
	Process value	APrcVal, BPrcVal, MPrcVal
	Configuration value	ACnfVal, BCnfVal, MCnfVal, UCnfVal
	Application function	FuncView: Functional view "parent" object that contains (owns) or references other objects.

Setting up the Automation Station

Establishing a Connection to the Automation Station

▷   The proper equipment is physically connected.

▷   In ABT Site, the desired project is open.

1. In the **Start-up** component, **Set up connection** task, select one of the following connection method tabs:

- **Room unit connection**
- **USB**
- **Ethernet**
- **Cloud**

2. Do one of the following:

- If using a room unit connection, click **Connect** and proceed to next section.
- If using other connection, continue with the remaining steps.

3. Under **Target selection**, select the **Device type** you want to work with:

- **IP device** (for DXR2.E automation station)
- **MS/TP device** (for DXR2.M automation station)

ⅈ

Recommended workflow:
Use ethernet connection to discover and download to MS/TP device. (The **Device type** you want to work with does not have to be the same automation station that you are using to connect to the network.)

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4. Select IP address.

5. Select the desired **Network interface** from the drop-down list (use "Network connections⋯" if needed).

6. Click **Connect**.

⇨   The connection is established.

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Configure and Load Pre-engineered Automation Stations (Recommended workflow)

⚠	**⚠ CAUTION**
	Recommended workflow You must use this workflow if your job requires custom application templates defined by the Design Engineer.

The following steps show how to configure and load pre-engineered Automation stations (AS). You can also use engineered serial numbers or configure / load multiple devices in parallel. See **Startup** in ABT Site Help for detailed information on these topics. These workflow(s) are more efficient than manual configuration.

If you choose to manually configure the automation stations, skip the following and proceed to Manual Configuration [➜ 9].

● (Connection to DXR is established)
In the **Startup** component, **Configure and download** task, the connected AS is automatically discovered and displayed under **Discovered devices**.

⇨ In some cases with an Ethernet connection or IP device, you may need to click **Discover** and wait a few moments before the connected AS displays. To extend discovery to other automation stations, ensure "All devices" is selected in the Discover drop-down menu.

ℹ	**Note** For MS/TP device connected through a room unit, discovery is limited to the local network (the network that the automation station is connected to).

2. Under the **Engineered devices** list, expand the building(s) and floor(s) to display the automation stations. Select the device to be loaded.

3. Under the **Discovered devices** list, select the device to be configured and loaded. Make sure the equipment ID of the discovered device matches the equipment ID of the engineered device. They must be the same.

4. Select **Assign** > **Device network configuration**.

5. Wait 15 seconds for the update to finish and the **Message** column to show **Configured**.

⇨ The communication settings of the automation station are now configured. At this point, the **Status** column will show **Download required** indicating that no application parameters have been loaded.

6. Select **Assign** > **Application configuration** to load application parameters.

⇨ When the **Status** column displays **Operational** (up to 4 - 5 minutes for slower connections) the automation station is ready to **Go online**.

7. If connected through a room unit, do the following after 4 - 5 minutes to refresh the Discovered devices list: Click **Clear table**, and then click **Discover**.
Repeat if necessary until **Status** column displays **Operational**.

8. Repeat steps 4 through 8 for other automation stations as needed.

9. When ready, proceed to Verify Configuration Settings [→ 10].

Templates (DXR)

	Number	Description	AS hardware
VAV	14020	VAV Cooling Only	DXR2.x12P / PX
	14022	VAV with 2-Stage Electric Heat	
	14023	VAV Hot Water	
	14123	VAV Hot Water with Supply Temp Control	
	14423	VAV Hot Water with Supply Temp Control with Lights and Blinds	
Chilled Beam, Passive	14058	Chilled Beam Passive Heating and Cooling and Hot Water Radiator	
Chilled Beam, Active	14158	Chilled Beam Active Heating and Cooling with VAV and Hot Water Radiator	
	14258	Chilled Beam Active Heating and Cooling with VAV and Electric 1-Stage Radiator	
VAV Dual Duct	14064	Dual Duct Variable Volume with Dedicated Ventilation Duct, Two Inlet Sensors, DCV and Hot Water Heat with Supply Temp Control	
	14069	Dual Duct Variable Volume with Two Inlet Sensors, Modulating Electric Heat and Hot Water Radiator	
	14169	Dual Duct Variable Volume with Two Inlet Sensors, DCV, Modulating Electric Heat and Hot Water Radiator	
	14269	Dual Duct Variable Volume with Two Inlet Sensors, 2-Stage Electric Heat, Chilled Ceiling and Hot Water Radiator	DXR2.x18

Templates (ADXR)

	Number	Description	AS hardware
VAV	14720	ADXR VAV Cooling Only	DXR2.x10PL / PLX
	14820	ADXR VAV Cooling Only – Pressure Dependent	
	14722	ADXR VAV 2-Stage Electric Heat	
	14723	ADXR VAV Hot Water	
	14823	ADXR VAV Hot Water with Supply Temp Control	
VAV Dual Duct	14369	Dual Duct Variable Volume with Two Inlet Sensors, Hot Water Heat and 1-Stage Electric Radiator	

Verify Configuration Settings

(Optional)

This step, if done, is part of the recommended workflow and **follows Configure and Load Pre-engineered Automation Stations**.

The following should be verified. See "Reports (component)" in the Help prior to going online with the automation station.

● MAC address

● Instance number

● Network number

● Baud rate (Link speed) → Network port

Note

How to create reports is covered in ABT Site Help; search for "creating reports" using the search function in the Help.

Point Verification and Checkout

Before checking or setting points using ABT-SSA / ABT Inside, the automation station(s) must be Configured and Operational. Refer to previous steps if necessary.

To save time, read the **Navigating ABT-SSA / ABT Inside** section earlier in this document before going online with the tool. Also, for a better understanding of application template functionality and related parameters, read the Application Help in ABT Site and related "Application Note" documentation available on the extranet site (https://extranet.w3.siemens.com/buildingtechnologies/partner/CPSUSEN/Pages/default.aspx).

Going online with ABT-SSA / ABT Inside

First, establish a connection with the automation station(s). Then in the Startup component, Configure and download task: Under **Discovered automation stations**, right click on the desired automation station(s) and select **Go online**. (for IP DXR's, another valid method is to type in the IP address of the automation station into a web browser.)

i	In ABT-SSA / ABT Inside, changes made during a live session should save automatically (**once every 30 minutes**).
	To force a save, use the **Log out** feature when you quit a session. Logout is located in the user management menu dropdown (upper right). DO NOT kill power to the device immediately after logging out; wait for the device to process the forced save. (about a minute)

KNX PL-Link Device(s)

If only one device with KNX PL-Link is connected to the network, it is typically detected and automatically configured. To verify that **any/all** KNX PL-Link devices are configured and operational, follow these steps:

1. Click the navigation menu icon ☰ and select **Installation**.
    ⇨ Wait for the screen to fully load (10 seconds).

2. Select **KNX PL-Link bus**.

3. Select **Identification**.

4. Confirm that each KNX PL-Link device on the bus displays.

5. Verify that each device is in the State: **Operational**.

6. Click the navigation menu icon ☰.

7. Select **Application** and proceed to the next section.

i	**Note**
	If the state of any KNX PL-Link device is **Device not assigned**, follow the instructions in ABT Site Help. (search for "Assign network peripheral devices")

Favorite room status

For a quick overview of the room (its "status"), the room status Favorites comprise the main setpoints and mode points. Point values do not need to be changed here.

1. In the Application menu, select **Favorites**.

2. Select **Room** > **Favorite room status**.

   ⇨ The room status Favorites display.

Description	Object / Property Name	Comment	Default	Template
Room operating mode	ROpMod RM OP MODE	Displays current value. Commandable for testing purposes. [Protection | Economy | Pre-Comfort | Comfort]	Comfort	All
Present operating mode	PrOpMod OP MODE EFF	Displays current value.	Comfort	All
Plant operating mode	PltOpMod PLANT OPMODE	Displays current value. Commandable for testing purposes.	Comfort	All
Room temperature	RTemp RM TEMP EVAL	Displays the result of one or more room temperature sources.	—° F	All
Relative humidity for room	RHuRel RM HUM EVAL	Displays current (average) value of one or more room RH inputs (for QMX3.P74 room unit or similar).	–	Hpu templates
Room air quality	RAQual RM DCV EVAL	Displays current (average) value of one or more room air quality inputs (for QMX3.P74 room unit or similar).	–	Hpu templates
Heating/cooling state	HCSta H.C STATE	Displays current value. **Note:** There is a two-minute delay when switching from heating to cooling.	–	All
Room temperature setpoint (Room unit display only)	SpTR RM TEMP STPT	Display only. Displays last heating/cooling Comfort (or Pre-Comfort) setpoint for use on room unit. **CAUTION**: Commanding this point does not change the setpoint for control (instead use Present cooling or Present heating setpoint).	72.5° F	All
Room temperature setpoint shift	SpTRShft RM TEMP SHFT	The current setpoint shift from Room operator unit. Commandable for testing purposes.. **CAUTION:** Commanded / overridden @ Prio8 will prevent input requests from room unit (Prio13) from taking effect.	0.0° F	All
Present cooling setpoint	PrSpC CLG STPT EFF	Result of inputs from Room operating mode, cooling setpoints, and user input. Commandable for testing purposes.	75.0° F	All
Present heating setpoint	PrSpH HTG STPT EFF	Result of inputs from Room operating mode, heating setpoints, and user input. Commandable for testing purposes.	70.0° F	–

Favorite room, start-up & checkout

The room startup and checkout Favorites provide points that regulate room functions.

i	The ⭐ icon in the **Verify** column indicates typical items to set or verify.

1. In the Application menu, select **Favorites**.

2. Select **Room** > **Favorite room, start-up & checkout**.

   ⇨ The Favorites for Room start-up & checkout display.

3. Proceed with point verification and checkout:

   a. Match the objects in the table with those in ABT-SSA.

   b. **IMPORTANT:** Read the notes in the Comment column for items you change or verify.

i	**Manual setpoint adjustment & EefCndTrg** The default configuration for **Energy efficiency condition trigger** will reset a user-entered setpoint adjustment when the room mode changes. To eliminate this reset, do the following: - Set **Comfort/Pre-Comfort to Economy (CmfPcfToEco)** to "**None**" - Set **Comfort to Pre-Comfort (CmfToPcf)** to "**None**" See below.

Verify	Description	Object / Property Name	Comment	Default
	Ventilation control	VntCtl	Displays current value.	1000 ppm
	Present cooling setpoint	PrSpC CLG STPT EFF	Result of inputs from Room operating mode, cooling setpoints, and user input. Commandable for testing purposes. See Cooling setpoint for comfort for additional information.	75° F
⭐	Cooling setpoint for comfort	SpCCmf CMF CLG STPT	Initial configuration for cooling Comfort setpoint (set as relinquish default) Room operating units and other sources command this point at higher priorities.	75° F
⭐	Delta cooling setpoint for pre-comfort	DSpCPcf STBY C DELTA	Configuration: Entered as positive offset from current Comfort cooling calculation.	2° F
⭐	Cooling setpoint for economy	SpCEco ECO CLG STPT	Configuration for fixed cooling Economy modes. Automatically shifted by the system application to prevent changes from user input to prevent overlaps.	85° F
	Cooling setpoint for protection	SpCPrt PROT CLGSTPT	Adjustable configuration, but typically left at default. Protection mode can be set by the central system for extended unoccupied periods (e.g. holiday break)	104° F

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Verify	Description	Object / Property Name	Comment	Default
	Present heating setpoint	PrSpH HTG STPT EFF	Result of inputs from Room operating mode, heating setpoints, and user input. Commandable for testing purposes. See Heating setpoint for comfort for additional information.	70° F
⭐	Heating setpoint for comfort	SpHCmf CMF HTG STPT	Initial configuration for heating Comfort setpoint. (set as relinquish default) Room units and other sources command this point at higher priorities.	70° F
⭐	Delta heating setpoint for pre-comfort	DSpHPcf STBY H DELTA	Entered as positive offset from current Comfort heating calculation.	2° F
⭐	Heating setpoint for economy	SpHEco ECO HTG STPT	Configuration for fixed heating Economy modes (unoccupied). Automatically shifted by the system application to prevent overlapping changes from user input.	55° F
	Heating setpoint for protection	SpHPrt PROT HTG SP	Adjustable configuration, but typically left at default. Protection mode can be set by the central system for extended unoccupied periods (e.g. holiday break).	45° F
	Room temperature setpoint (Room unit display only)	SpTR RM TEMP STPT	Display only. Displays last heating/cooling Comfort (or Pre-Comfort) setpoint for use on room unit. **CAUTION**: Commanding this point does not change the setpoint for control (instead use Present cooling or Present heating setpoint).	72.5° F
	Room temperature setpoint shift	SpTRShft RM TEMP SHFT	Displays current setpoint shift value (**SpShftIn**) configured in room operator unit. **CAUTION:** Commanded / overridden @ Prio8 will prevent input requests from room unit (Prio13) from taking effect. See also **Room operator unit configuration section**.	0.0° F
	Room operating mode	ROpMod RM OP MODE	Displays current value. Commandable for testing purposes. [Protection	Economy	Pre-Comfort	Comfort]	Comfort
	Present operating mode	PrOpMod OP MODE EFF	Displays current value.	Comfort
	Plant operating mode	PltOpMod PLANT OPMODE	Displays current value. Commandable for testing purposes. [Off	Protection	Economy	Pre-Comfort	Comfort	Warm-up	Cool down	Room low temp.prot.	Not used	Free cooling	Night cooling	Ventilation	not used	Air vol.flow off |Smoke ctrl.pos.press.	Smoke ctrl.neg.press.] **Note:** Not all configurations support every plant mode.	Comfort
	Room temperature	RTemp RM TEMP EVAL	Displays the result (average) of one or more room temperature sources.	—° F

Verify	Description	Object / Property Name	Comment	Default
	Heating/cooling state	HCSta H.C STATE	Displays current value. [Neither | Heat | Cool] **Note:** There is a configurable delay (default 2min) when switching between heating and cooling.	–
⭐	Room operating mode determination	ROpModDtr	Click the properties icon ⋮ then click the filter button	Comfort
⭐	Time for comfort button	TiCmfBtn	**TiCmfBtn** = time in Comfort mode when the Comfort button on the room unit is pressed. If **TiCmfBtn** = 0, Comfort button is disabled.	[120:0.0]min:s
⭐	Comfort/Pre-Comfort to Economy - and - Comfort to Pre-Comfort	CmfPcfToEco CmfToPcf	Default configuration causes reset of user-entered setpoint adjustment when the room mode changes. To eliminate this reset, set both to **None**.	Energy efficiency condition

ℹ️ **ROpModDtr**
Room operating mode determination has additional configurable parameters. For detailed information on application functionality, read the Application Notes documentation available on InfoLink (InfoLink > Automation > Desigo DXR).

4. Return to the beginning of this section by repeating the initial navigating steps as follows:
In the Application menu, select **Favorites**, then select **Room** > **Favorite room, start-up & checkout**.

5. Proceed with **Ventilation control** setup.

Verify	Description	Object / Property Name	Comment	Default
⭐	Ventilation control	VntCtl	Click the properties icon ⋮ then click the filter button	1000 ppm
⭐	Comfort configuration	CmfCnf	Set CmfCnf for ventilation options in Comfort mode: [Off | Min.ventilation | DCV | Min.ventilation & DCV] **Note** When configured as Min.ventilation, the ventilation setpoints function without IAQ sensor or DCV control. When configured as DCV, an IAQ sensor is mandatory in the room. When configured as Min.ventilation & DCV, an IAQ sensor is needed either in the room or in the Extract air of the room. Also set the desired flow setpoint for each mode (for example, **AirFlMinRCmf**). *(Optional)* Also see the minimum ventilation setpoint (**VavSuAflMinVnt**) in the **Room segment start-up and checkout** section.	Min.ventilation

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Verify	Description	Object / Property Name	Comment	Default
⭐	Pre-Comfort configuration	PcfCnf	Set for ventilation options in Pre-Comfort mode: [Off | Min.ventilation | DCV | Min.ventilation & DCV] **Note** s/a Comfort	Min.ventilation
	Economy configuration	EcoCnf	Set for ventilation options in Economy mode: [OFF | Min.ventilation | DCV | Min.ventilation & DCV] **Note** s/a Comfort	Off
	Protection configuration	PrtCnf	Set for ventilation options in protection mode: [OFF | Min.ventilation | DCV | Min.ventilation & DCV] **Note** s/a Comfort	Off
⭐	Minimum room air volume flow for comfort **Note**: the name is different for pressure dependent applications 14820 and 14828: Minimum damper **position** for comfort	AirFlMinRCmf DmpPosMinCmf	Set flow for minimum ventilation in Comfort mode. **Note** If flow setting is greater than zero, **CmfCnf** must not equal Off.	150 ft^3/min (50% for pressure dependent)
⭐	Minimum room air volume flow for pre-comfort (see above Note)	AirFlMinRPcf DmpPosMinPcf	Set flow for minimum ventilation in Pre-Comfort mode. **Note** If flow setting is greater than zero, **PcfCnf** must not equal Off.	150 ft^3/min (50% for pressure dependent)
	Minimum room air volume flow for economy	AirFlMinREco	Set flow for minimum ventilation in Economy mode. **Note** If flow setting is greater than zero, **EcoCnf** must not equal Off.	0 ft^3/min (50% for pressure dependent)
	Minimum room air volume flow for protection	AirFlMinRPrt	Set flow for minimum ventilation in Protection mode. **Note** If flow setting is greater than zero, **PrtCnf** must not equal Off.	0 ft^3/min (50% for pressure dependent)

6. Return to the beginning of this section one last time by repeating the initial navigating steps as follows: In the Application menu, select **Favorites**, then select **Room** > **Favorite room, start-up & checkout**.

7. Set the following air quality control objects if required.

Verify	Description	Object / Property Name	Comment	Default
⭐	Ventilation control	VntCtl	Click the Link icon ❯ to display additional vent control objects.	1000 ppm
	Present ventilation setpoint	PrSpVnt VENT SP EFF	Current setpoint based on operating mode Displays current value	— ppm
	Ventilation controller	VntCtr	Displays current value Ventilation controller (PID)	— %

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Verify	Description	Object / Property Name	Comment	Default
	Room control	RCtl	Displays current value (Group member)	-
⭐	Setpoint room air quality for comfort	SpAQualRCmf CMF IAQ STPT	Set for CO2 level in ppm in Comfort mode when optional DCV control and CO2 sensor present. Requires IAQ sensor (see note for CmfCnf parameter above).	1000 ppm
⭐	Setp.room air quality for pre-comfort	SpAQualRPcf STBY DCV SP	Set for CO2 level in ppm in Pre-Comfort mode when optional DCV control and CO2 sensor present. Requires IAQ sensor (see note for CmfCnf parameter above).	1200 ppm
	Setpoint room air quality for economy	SpAQualREco ECO DCV STPT	Set for CO2 level in ppm in Economy mode when optional DCV control and CO2 sensor present.	1500 ppm
	Setpoint room air quality for protection	SpAQualRPrt PROT DCV SP	Set for CO2 level in ppm in Protection mode when optional DCV control and CO2 sensor present. Optional configuration - typically left at default.	2000 ppm

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Favorite room control

The room control Favorites show the PID loop controllers for the room.

> **!** Tuning of PID controllers is limited to unstable operation. Parameters should not be changed otherwise.

1. In the Application menu, select **Favorites**.

2. Select **Room** > **Favorite room control**.
   ⇨ The room control Favorites display.

3. (*Optional or as required*) Display the parameters by clicking the icon ✉ next to the loop controller description.

Description	Object	Comment	Default	Template
✉ Room temp.controller cooling for VAV	VavTRCtrC	Loop controller	0.0%	All
✉ Room temp.controller heating for VAV	VavTRCtrH	Loop controller	0.0%	All except 14020
✉ Room temp.ctr.heating for heating coil	HclTRCtrH	Loop controller	0.0%	All except 14020
✉ Ventilation controller	VntCtr	Loop controller	0.0%	All

Parameter favorites for a loop control object include:

PID parameters	Staged parameters
Controller type - PID	Controller type - Staged
Gain	Hysteresis switch-off
Integral action time Tn [1]	Hysteresis switch-on
Derivative action time Tv (0.0 sec)	Controller output minimum
Controller output minimum	Controller output maximum
Controller output maximum	Number of stages
Controller output for offset	Switch delay [2]
Neutral zone	
Rise time from 0 to 100%	
Fall time from 100 to 0%	

[1] 15 or 30min depending on type of controller function (heating, cooling, or ventilation)

[2] 5 or 8min delay between control stages depending on HVAC device

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Additional room parameters

Some parameters that may need adjustment are not listed in Favorites. See the following.

| **i** | The ⭐ icon in the **Verify** column indicates typical items to set or verify. |

1. In the Application menu, select **List view**.

2. Select **Room** > **Room HVAC coordination**.

    ⇨ The sub items for **Room HVAC coordination** display.

3. Using the down arrow at the bottom of the screen, scroll down the list and locate the following objects:

    a. 🔲 Rapid ventilation operation

    b. 🔲 Room temperature setpoint determination

    c. 🔲 Green leaf

4. See the table for instructions and information on the parameters associated with these objects.

Verify	Description	Object / Property Name	Comment	Default
⭐	🔲 Rapid ventilation operation	RpdVntOp	Click on the properties icon ⋮ to display the **Rapid ventilation runtime** parameter (**TiRnRpdVnt**).	Off
⭐	Rapid ventilation runtime	TiRnRpdVnt	Defines the length of time for rapid ventilation (flush) operation.	15[min]
⭐	🔲 Room temperature setpoint determination	SpTRDtr	Click on the properties icon ⋮ to display the **Display absolute room temp.setpoint** parameter (**SpTRAbsDspy**).	—° F
⭐	Display absolute room temp.setpoint	SpTRAbsDspy	Defines whether the room unit will display the current temperature control setpoint (Comfort or Pre-Comfort heating or cooling), or if it will display an average of the two. For example, if heating setpoint = 70 and cooling setpoint = 75, setting this parameter to **Average value** will result in the room operating unit displaying 72.5 If H.C mode is "Neither" (deadband) the last H or C setpoint displays. Display does not change if mode is Economy or Protection. [Average value | Present value]	Present value

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Verify	Description	Object / Property Name	Comment	Default
⭐	▣ Green leaf	GrnLf	Click on the properties icon ⋮ to display the **Max.tolerance of room temp.setp.shift** parameter (**TolMaxSpTRShft**).	—
⭐	Max.tolerance of room temp.setp.shift	TolMaxSpTRShft	Defines the limit of how much the temperature setpoint can shift (based on user changes) before the Green leaf LED changes from green to red.	3.6° F

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Nominal Air Volume Flow

(Skip this topic for Passive Chilled Beam or Pressure Dependent configurations; they don't have AirFlNom parameter.)

Nominal air volume flow (AirFlNom) is a parameter located in the VAV supply or extract damper AF ("VavSu.."). Exceptions: not in VavSu11 or 15; not in VavEx11 or 15. AirFlNom can be accessed in **Favorite room segment, start-up & checkout**.

In VAV applications for DXR, the system relies on a max flow value as the basis for determining all of the application's internal air volume flow percent calculations. This crucial value comes from **the largest** the following four values; whichever value is largest is the value that the application will use:

- CLG FLOW MAX
- HTG FLOW MAX
- VENT FLO MAX
- Nominal Air Volume Flow (AirFlNom)

⚠	**Set VENT FLO MAX to Appropriate Value** with or without Demand Control Ventilation
	The default for VENT FLO MAX in some preloaded templates is 1200 ft3/min. • DO NOT leave VENT FLO MAX set to 1200 ft3/min if the job does not require it. For example, if DCV (demand control ventilation) is not used, then a 1200 ft3/min ventilation flow is (typically) unnecessary. **The application will use the largest max flow value as the basis for determining all of the application's internal percent flow calculations.** • Leaving VENT FLO MAX at 1200, if it should be set lower, can disrupt the application's internal percent flow calculations.

Default value of AirFlNom
- Standard preloaded VAV / FPB templates: **1200 ft3/min**
- Standard preloaded VAV Dual Duct templates: **0 ft3/min**
- Raw factory value in unconfigured VAV or FPB type: 100 m3/h (59 ft3/min)
- Lab (CET) type: see Lab documentation

⚠	**⚠ CAUTION**
	Duct size must be considered when setting AirFlNom **Example:** a 6-inch round duct (approx 0.2 sq ft) with a typical maximum velocity of 3000 ft/min suggests a nominal air volume flow of 600 cfm (3000 ft/min * 0.2 sq ft = 600 cfm (approximately 300 lps)). In this example, AirFlNom **must not** be left at a preloaded template default value of 1200 cfm! It requires a different value following the guidelines below. (AirFlNom is not a BACnet object. It is a configuration parameter that can only be set using ABT Site or ABT-SSA / ABT Inside.)

Guidelines for Setting AirFlNom

Dual Duct templates:
For all Dual Duct templates, AirFlNom can be set or left at default of zero.
Note, Dual Duct templates have "AirFlNom1" and "AirFlNom2"; each duct uses its own parameter. If not set to zero, it should be set **equal to** the largest max flow value for the specific duct.

ADXR templates:
For VAV or FPB templates on ADXR hardware, AirFlNom can be set to zero.
Note that preloaded ADXR templates may have AirFlNom default of 1200 ft3/min, in which case it should be checked and set appropriately. If not set to zero, it should be set **equal to** the largest max flow value.

Other VAV or FPB templates (non Dual Duct, non ADXR):
Configuring AirFlNom differs depending on the **version number** of the application.

- Version 3.xxx and higher can set AirFlNom to zero. Preloaded templates may have AirFlNom default of 1200 ft3/min, in which case it should be checked and set appropriately. If not set to zero, it should be set **equal to** the largest max flow value.

- Version 2.xxx and lower: AirFlNom must equal the largest max flow value.

Version# can be read in ABT Site or online with the DXR: Device > List view > Infrastructure > *your application .[properties]* > "Present application version"

Favorite room segment, start-up & checkout

The room segment startup and checkout Favorites provide points that regulate room segment functions. Note that for pressure dependent applications (14820, 14828) not all points will be present.

| ℹ | The ⭐ icon in the **Verify** column indicates typical items to set or verify. |

| ℹ | For Dual Duct, **see the Appendix** for how to configure the application. |

| ℹ | For Dual Duct applications, several points share the same description with VAV except they have "1" or "2" at the end of the name, to indicate which duct they represent (Duct 1 or Duct 2). |

- Example: "Supply air VAV position1" and "Supply air VAV position2"

In the tables that follow, these Dual Duct application objects display with "***Dual Duct ..1 & 2***" under the regular description. Example:

Supply air VAV position

(Dual Duct ..1 & 2)

1. In the Application menu, select **Favorites**.

2. Select **Room segment** > **Favor.room segment, start-up & checkout**.

   ⇨ The Favorites for Room segment start-up & checkout display.

Verify	Description	Object / Property Name	Comment	Default
	Supply air VAV	VavSu	(Parent object for Supply air VAV parameters)	--- %
⭐	Supply air VAV max.air vol.flow f.cool. **Note**: the name is different for pressure dependent applications 14820 and 14828: Supply air VAV max.**position** for cooling	VavSuAirFlMaxC CLG FLOW MAX VavSuPosMaxC CLG POS MAX	Per job specs (100% for pressure dependent apps)	1200.0 ft^3/min 100%
	Supply air VAV min.air vol.flow f.cool. (see above Note)	VavSuAirFlMinC CLG FLOW MIN VavSuPosMinC CLG POS MIN	**CAUTION:** CLG FLOW MIN **does not** function like it does in PTEC applications. Leave at default of zero and use ventilation flow setpoints based on the operating mode (Comfort, Pre-Comfort, Economy, Protection). (50% for pressure dependent apps)	ft^3/min 50%

Verify	Description	Object / Property Name	Comment	Default
⭐	Supply air VAV max.air vol.flow f.heat. (see above Note)	VavSuAirFlMaxH HTG FLOW MAX	Should not be set greater than 50% of Max Cooling flow. If the AHU is configured* to provide heated air, set HTG FLOW MAX as required, otherwise leave at zero.	150 ft³/min
		VavSuPosMaxH HTG POS MAX	*Note When an AHU delivers heated air, the Supply air VAV changeover condition object (VAV CHGOVR) must be controlled from Central / Field panel.	100%
⭐	Supply air VAV min.air vol.flow f.heat. (see above Note)	VavSuAirFlMinH HTG FLOW MIN	Set to flow required for terminal heating coils heat transfer. Can be set to zero for configurations with terminal fans. Can be set to zero for configurations with only radiator or ceiling heating coils.	150 ft³/min
		VavSuPosMinH HTG POS MIN		50%
⭐	Supply air VAV max.air vol.flow f.vent (see above Note)	VavSuAflMaxVnt VENT FLO MAX	Configuration used when DCV is enabled with CO2 sensors. Also used for flow setpoint when Rapid ventilation is activated. Don't leave at default if no DCV. . . .	1200 ft³/min
		VavSuPosMaxVnt VENT POS MAX	Ensures proportional flow for each ventilation across multiple room segments (VAV flow terminals).	100%
⭐	Supply air VAV min.air vol.flow f.vent. (see above Note)	VavSuAflMinVnt VENT FLO MIN	Can be left at zero; Use the ventilation configurations for minimum ventilation flow in each operating mode.	ft³/min
		VavSuPosMinVnt VENT POS MIN	If VENT FLO MIN is set to a non-zero value, flow will be the larger of VENT FLO MIN and the current min flow setpoint for the operating mode. For example, if: - VENT FLO MIN = 200, - ventilation in Comfort = 300, and - Comfort configuration parameter **CmfCnf** = **Min.ventilation**, then the terminal unit will have a min ventilation setpoint of 300 during Comfort mode. See **Ventilation control** in **Room start-up & checkout**.	20%
	Supply air VAV position (Dual Duct ..1 & 2)	VavSuPos DAMPER POS	Displays current value. Commandable for testing purposes.	---%
	Supply air VAV setpoint for air vol.flow (Dual Duct ..1 & 2)	VavSuSpAirFl AIR VOL STPT	Displays current value. Commandable for testing purposes.	--
	Supply air VAV setpoint position	VavSuSpPos SU POS SP	Displays current value. Commandable for testing purposes.	
	Supply air VAV air volume flow (Dual Duct ..1 & 2)	VavSuAirFl AIR VOLUME	Displays current value.	0.0 ft³/min
⭐	Supply air VAV duct area (Dual Duct ..1 & 2)	VavSuDuctArea DUCT AREA	Duct area is calculated by the application. To manually enter a different value, you must first set the duct shape object (**VavSuDuctShape**) to **Direct entry** and then return here to manually enter the desired duct area value. **CAUTION:** If the user manually enters a duct area value without first setting **VavSuDuctShape** to **Direct entry**, the value will be accepted by the application but immediately overwritten by the system without informing the user!	0.55 ft²
⭐	Supply air VAV duct shape (Dual Duct ..1 & 2)	VavSuDuctShape	Default = Round [Rectangular	Round	Flat oval	Direct entry] See the Caution note above regarding Direct entry.	Round

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Verify	Description	Object / Property Name	Comment	Default
⭐	Supply air VAV dimension A *(Dual Duct ..1 & 2)*	VavSuDmsnA	Entries used to calculate duct area when Duct shape set to round, rectangular or oval.	10 in
⭐	Supply air VAV dimension B *(Dual Duct ..1 & 2)*	VavSuDmsnB	Entries used to calculate duct area when duct shape is set to rectangular or oval.	10 in
⭐	Supply air VAV flow coefficient *(Dual Duct ..1 & 2)*	VavSuFlCoef FLOW COEF	Enter initial flow coefficient – to be adjusted during balancing procedures.	0.63
	Supply air temperature	TSu SPLY TEMP	Supply temp sensor	—° F
	Heating coil valve position	HclVlvPos HTG VLV POS	HclVlvPos displays current value. Commandable for testing purposes.	0%

3. Return to the beginning of this section by repeating the initial navigating steps as follows:
   In the Application menu, select **Favorites**, then select **Room segment** > **Favor.room segment, start-up & checkout**.

4. Locate **Supply air VAV**.

Verify	Description	Object / Property Name	Comment	Default
⭐	🔲 Supply air VAV	VavSu	Click directly on the object icon 🔲 to display the **Supply air VAV** parameters. Locate **Nominal air volume flow (AirFlNom)**. In the list that opens, **AirFlNom** is usually the only parameter that needs checking or setting.	— %
⭐	Nominal air volume flow *(Dual Duct ..1 & 2)*	AirFlNom	Follow guidelines in "Nominal Air Volume Flow" section earlier in this document.	

5. Return to the beginning of this section by repeating the initial navigating steps as follows:
   In the Application menu, select **Favorites**, then select **Room segment** > **Favor.room segment, start-up & checkout**.

6. Locate **Supply air VAV position**.

Verify	Description	Object / Property Name	Comment	Default
⭐	↪ Supply air VAV position *(Dual Duct ..1 & 2)*	VavSuPos DAMPER POS	Click directly on the object icon ↪ to display the **Supply air VAV position** parameters.	---%
	Commissioning state *(Dual Duct ..1 & 2)*	-	--	Not checked
	Commissioning information *(Dual Duct ..1 & 2)*	-	--	-

Verify	Description	Object / Property Name	Comment	Default
	Startup synchronization (*Dual Duct ..1 & 2*)	-	For damper actuators, **Single close** is typical. If AHU is on, setting some (30 to 50 percent) to **Single open** will minimize over pressure conditions. Setting to **None** will keep damper at last control position at startup with risk of overpressure conditions. [None	Single close	Single open]	Single close
	End position synchronization (*Dual Duct ..1 & 2*)	-	Set to **Single** for standard damper and water valve control (0 or 100 percent command will drive a floating actuator fully closed or fully open a single time). Special actuators may need different synchronization selection. [None	Continuous	Single	Every 10 min	Every 20 min	Continuous open	Continuous close	Open every 10 min	Open every 20 min	Close every 10 min	Close every 20 min]	Single
⭐	Rise time from 0 to 100% (*Dual Duct ..1 & 2*)	-	Floating control stroke time to open. **CAUTION:** if using tenths of seconds to enter changes, multiply seconds by 10. That is, enter 900 for 90 seconds.	[90.0]s
⭐	Fall time from 100 to 0% (*Dual Duct ..1 & 2*)	-	Floating control stroke time to close. **CAUTION:** if using tenths of seconds to enter changes, multiply seconds by 10. That is, enter 900 for 90 seconds.	[90.0]s
⭐	Control action (*Dual Duct ..1 & 2*)	-	[Direct	Reverse]	Direct

7. Return to the beginning of this section one last time (from the Application menu select **Favorites**, then select **Room segment** > **Favor.room segment, start-up & checkout**).

8. Locate **Heating coil valve position**.

Verify	Description	Object / Property Name	Comment	Default
⭐	Heating coil valve position	HclVlvPos HTG VLV POS	Click directly on the object icon to display the **Heating coil valve position** parameters.	---%
	Commissioning state	-	--	Not checked
	Commissioning information	-	--	-
	Startup synchronization	-	Cold or hot water valves should be set to **Single close**. [None	Single close	Single open]	Single close
	End position synchronization	-	Set to **Single** for standard damper and water valve control (0 or 100 percent command will drive a floating actuator fully closed or fully open a single time). Special actuators may need different synchronization selection. [None	Continuous	Single	Every 10 min	Every 20 min	Continuous open	Continuous close	Open every 10 min	Open every 20 min	Close every 10 min	Close every 20 min]	Single

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Verify	Description	Object / Property Name	Comment	Default
⭐	Rise time from 0 to 100%	-	Floating control stroke time to open. **CAUTION:** if using tenths of seconds to enter changes, multiply seconds by 10. That is, enter 900 for 90 seconds.	[90.0]s
⭐	Fall time from 100 to 0%	-	Floating control stroke time to close. **CAUTION:** if using tenths of seconds to enter changes, multiply seconds by 10. That is, enter 900 for 90 seconds.	[90.0]s
⭐	Control action	-	[Direct | Reverse]	Direct

Favorite room operator unit configuration

The room operator unit Favorites provide points that regulate the behavior of the room unit.

For detailed information on how the room operator unit functions, read the application template documentation and ABT Site Help. The most common settings are covered here in the startup.

i	The ⭐ icon in the **Verify** column indicates typical items to set or verify.

1. In the Application menu, select **Favorites**.
2. Select **Room segment** > **Favorite room operator unit config**.

!	*NOTICE*
	Room operator unit type Values for QMX3.P34, P74 are shown below.

Verify	Description	Object / Property Name	Comment	Default
⭐	Room operator unit device 1	-	Click the Link icon ＞ to display additional vent control objects.	Operational
⭐	⭲ Room operator unit 1	ROpUn RM UNIT STA	Status of room unit. Click the properties icon ⋮ then click the filter button ▽	Operational
⭐	Device type	-	Room operator unit model.	QMX3.P34 (QMX3.P74 if heat pump)
	Commissioning state	-	*(Optional)* Startup technician can enter commissioning stage. [Not checked	Check failed	Check successful]	Not checked
	Commissioning information	-	*(Optional)* Can be used to enter date and Tech ID.	-
	Room unit, display temperature	-	Defines which temperature values can be displayed. [None	Display room temperature	Display outside air temperature	Display room & outside air temp.] If **Display room & outside air temp.** is selected, toggling between the values is enabled.	Display room temperature
	Room unit, display humidity	-	Enable display of room humidity , outside air humidity or both. (requires humidity sensing room operator unit such as QMX3.P74) [None	Display room humidity	Display outside air temperature	Display room & outside air humidity.]	None (heat pump: Display room humidity)
	Room unit, display windows status	-	Enables display or window status [No	Yes]	No

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Verify	Description	Object / Property Name	Comment	Default
	Room unit, display air quality	-	Enable display of room air quality, outside air quality or both. (requires humidity sensing room operator unit such as QMX3.P74) [None | Display room air quality | Display outside air temperature | Display room & outside air quality.]	None (heat pump, Display room air quality)
	Room unit, air quality display	-	Air quality display options [Numeric, in ppm | Symbolic | Textual]	Symbolic
	Room unit, display heat./cool. status	-	[No | Yes]	Yes
	Enable operation: Room temp. setpoint	-	Also see options for shift limits and Setpoint option [No | Yes]	Yes
⭐	Room unit, room temp. setpoint display	-	Setpoint display option [Absolute temperature setpoint | Relative setpoint shift]	Absolute temperature setpoint
	Enable operation: Fan speed setpoint	-	VAV / FPB: defines whether **Rapid ventilation** option is configured for activation via fan speed button on room unit. [No | Yes] FCU: defines if room unit provides visual indication of when fan is running. FCU has no rapid ventilation feature. HP: defines if room unit provides visual indication of when fan is running. HP has no rapid ventilation feature.	Yes (heat pump: No)
	Enable operation: Room humidity setp.	-	For humidity control [No | Yes]	No
	Enable operation: Air quality setpoint	-	With CO2 sensor present [No | Yes]	No
	Enable operation: Presence button	-	Defines if the user can activate / deactivate presence (Comfort mode) via push button (key 8). (If you change this to Yes, you must disable Temporary Comfort button below.) **Enable operation: Presence button** and **Enable operation: Temporary comfort** cannot both equal Yes because they use the same button on the room operator unit (key 8). [No | Yes]	No
⭐	Enable operation: Temporary comfort	-	Defines if the user can activate presence (Comfort mode) via push button (key 8) for a configurable time. **Enable operation: Temporary comfort** and **Enable operation: Presence button** cannot both equal Yes because they use the same button on the room operator unit (key 8). [No | Yes]	Yes
	Enable operation: Room op.mode	-	Room op mode control [No | Yes]	No
	Enable operation: Green leaf	-	Defines if the GreenLeaf icon on the room operator unit can change color (green/red) based on user changes. [No | Yes]	Yes

3. Return to the beginning of this section by repeating the initial navigation steps as follows:
   In the Application menu, select **Favorites**, then select **Room segment** > **Favorite room operator unit config**.

4. Locate **Room temperature** object.

Verify	Description	Object / Property Name	Comment	Default
⭐	⊙ Room temperature	TR	Displays current value. Click the properties icon ⋮ then click the filter button ▽	--- ° F
	Commissioning state	-	*(Optional)* Startup technician can enter commissioning stage. [Not checked | Check failed | Check successful]	Not checked
	Commissioning information	-	*(Optional)* Can be used to enter date and Tech ID.	-
	Present maximum value	-	-	122.0 ° F
	Present minimum value	-	-	32.0 ° F
⭐	Correction offset	-	As necessary, enter correction offset (plus or minus).	0.00

5. Return to the beginning of this section by repeating the initial navigation steps as follows:
   In the Application menu, select **Favorites**, then select **Room segment** > **Favorite room operator unit config**.

6. Locate **Setpoint shift input value** object.

Verify	Description	Object / Property Name	Comment	Default
⭐	⊡ Setpoint shift input value	SpShftIn	Displays current input. The available range for shifting the setpoint is +/- 5.4 ° F. Click the properties icon ⋮ then click the filter button ▽ to display the **Setpoint shift input value** min / max shift values.	Operational
⭐	Present maximum value	-	Limit of setpoint shift up	5.4 F
⭐	Present minimum value	-	Limit of setpoint shift down	5.4 F

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Favorite terminal control

The terminal control Favorites show the PID loop controllers for the terminal unit.

!

Tuning of PID controllers is limited to unstable operation. Parameters should not be changed otherwise.

1. In the Application menu, select **Favorites**.

2. Select **Room segment** > **Favorite terminal control**.
   ⇨ The terminal control Favorites display.

3. (*Optional or as required*) Display the parameters by clicking the icon ☒ next to the loop controller description.

Description	Object	Comment	Default	Template
☒ Supply air VAV air flow controller (not in pressure dependent applications 14820, 14828)	VavSuAirFlCtr *(Dual Duct ..1 & 2)*	Loop controller	---%	All

Additional control items:

● Supply air VAV setpoint for air vol.flow (VavSuSpAirFl / AIR VOL STPT): default 150 ft^3/min

● Supply air temperature (TSu / SPLY TEMP): Click directly on the object icon

   ⊕ to display the **Correction offset** parameter as needed.

Parameter favorites for a loop control object include:

● Controller output maximum
● Controller output minimum
● Controller output for offset
● Gain
● Hysteresis switch-off
● Hysteresis switch-on
● Integral action-time Tn: 15 - 30min dependent on controller function (heating, cooling, or ventilation)
● Derivative action-time Tv (0.0 sec)

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Favorite balancing

This section shows points associated with airflow balancing.

| **i** | The ⭐ icon in the **Verify** column indicates typical items to set or verify. |

1. In the Application menu, select **Favorites**.

2. Select **Room segment** > **Favorite balancing**.
    ⇨ The balancing Favorites display.

3. Proceed with point verification and checkout.

Verify	Description	Object / Property Name	Comment	Default
⭐	Supply air VAV max.air vol.flow f.cool.	VavSuAirFlMaxC CLG FLOW MAX	Per job specs	1200 ft³/min
	Supply air VAV min.air vol.flow f.cool.	VavSuAirFlMinC CLG FLOW MIN	**CAUTION:** This point **DOES NOT** function like PTEC applications. **LEAVE AT DEFAULT ZERO** Leave at default of zero to use ventilation flow setpoints based on operating modes (Comfort, Pre-Comfort, Economy).	0.0 ft³/min
⭐	Supply air VAV max.air vol.flow f.heat.	VavSuAirFlMaxH HTG FLOW MAX	Should not be set greater than 50% of Max Cooling flow. If the AHU is configured* to provide heated air, set HTG FLOW MAX as required, otherwise leave at zero. ****Note** When an AHU delivers heated air, the Supply air VAV changeover condition object (VAV CHGOVR) must be controlled from Central / Field panel.	150 ft³/min
⭐	Supply air VAV min.air vol.flow f.heat.	VavSuAirFlMinH HTG FLOW MIN	Set to flow required for terminal heating coils heat transfer. Can be set to zero for configurations with terminal fans. Can be set to zero for configurations with only radiator or ceiling heating coils.	150 ft³/min
⭐	Supply air VAV max.air vol.flow f.vent.	VavSuAflMaxVnt VENT FLO MAX	Configuration used when DCV is enabled with CO2 sensors. Also used for flow setpoint when Rapid ventilation is activated. Ensures proportional flow for each ventilation across multiple room segments (VAV flow terminals). Do not leave at default if DCV is not used.	1200 ft³/min
⭐	Supply air VAV min.air vol.flow f.vent.	VavSuAflMinVnt VENT FLO MIN	Can be left at zero; Use the ventilation configurations for minimum ventilation flow in each operating mode. If VENT FLO MIN is set to a non-zero value, flow will be the larger of VENT FLO MIN and the current min flow setpoint for the operating mode. For example, if: - VENT FLO MIN = 200, - ventilation in Comfort = 300, and - Comfort configuration parameter **CmfCnf** = **Min.ventilation**, then the terminal unit will have a min ventilation setpoint of 300 during Comfort mode. See **Ventilation control** in **Room start-up & checkout**.	0.0 ft³/min

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Verify	Description	Object / Property Name	Comment	Default
	Supply air VAV position (Dual Duct ..1 & 2)	VavSuPos DAMPER POS	Displays current value. Commandable for testing purposes.	---%
	Supply air VAV setpoint for air vol.flow (Dual Duct ..1 & 2)	VavSuSpAirFl AIR VOL STPT	Displays current value. Commandable for testing purposes.	150 ft^3/min
	Supply air VAV air volume flow (Dual Duct ..1 & 2)	VavSuAirFl AIR VOLUME	Displays current value.	0 ft^3/min
	Supply air VAV balancing state (Dual Duct ..1 & 2)	VavSuBalSta	Displays current balancing state. (updates as balancing commands change) Prior to Balancing procedure, state will display **Initial** To abort balancing during the process (prior to Calibrate), command the balancing state to **Initial**. [Initial | Balancing | Balanced]	Initial
	Supply air VAV balancing mode (Dual Duct ..1 & 2)	VavSuBalMod	Displays current value Enter desired mode in which to perform balancing function. If Manual is selected, configuration object VavSuAirFlSmk will be used. Overriding Supply air flow setpoint can be used for values other than existing configuration values [Max.cooling | Max.heating | Max.ventilation | Min.cooling | Min.heating | Min.ventilation | Smoke]	Max.cooling
⭐	Supply air VAV balancing command (Dual Duct ..1 & 2)	VavSuBalCmd	Enter desired balancing mode: To start balancing process, select **Balancing**. When air flow value from hood is entered, a calculated flow coefficient (**VavSuFlCoefCal**) is displayed. Select **Calibrate** to accept the calculated flow coefficient and it will replace the current coefficient (**VavSuFlCoef**) and record a snapshot of current terminal unit values and configurations Select **Record** if an optional snapshot is desired. (Previous recorded will be overwritten. Each set of record values must be saved externally if needed). Select **Balanced** to indicate terminal unit has been balanced and is operational. [Balancing | Calibrate | Record | Balanced]	-
	Supply air VAV air volume flow at hood (Dual Duct ..1 & 2)	VavSuAirFlHood	Enter total supply air volume from registers after stable control is reached. Re-enter values as needed prior to selecting command to calculate new coefficient.	--- ft^3/min
⭐	Supply air VAV duct area (Dual Duct ..1 & 2)	VavSuDuctArea DUCT AREA	Duct area is calculated by the application. To manually enter a different value, you must first set the duct shape object (**VavSuDuctShape**) to **Direct entry** and then return here to manually enter the desired duct area value. **CAUTION:** If the user manually enters a duct area value without first setting VavSuDuctShape to **Direct entry**, the value will be accepted by the application but immediately overwritten by the system without informing the user!	0.55 ft^2

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Verify	Description	Object / Property Name	Comment	Default
⭐	Supply air VAV duct shape *(Dual Duct ..1 & 2)*	VavSuDuctShape	Default = Round [Rectangular | Round | Flat oval | Direct entry]	Round
⭐	Supply air VAV dimension A *(Dual Duct ..1 & 2)*	VavSuDmsnA	Entries used to calculate duct area when Duct shape set to round, rectangular or oval.	10 in
⭐	Supply air VAV dimension B *(Dual Duct ..1 & 2)*	VavSuDmsnB	Entries used to calculate duct area when duct shape is set to rectangular or oval.	10 in
⭐	Supply air VAV flow coefficient *(Dual Duct ..1 & 2)*	VavSuFlCoef FLOW COEF	Enter initial flow coefficient – to be adjusted during balancing procedures.	0.63

4. Return to the beginning of this section by repeating the initial navigation steps as follows:
In the Application menu, select **Favorites**, then select **Room segment** > **Favorite balancing**.

5. Locate Supply air VAV position.

Verify	Description	Object / Property Name	Comment	Default
⭐	⊖ Supply air VAV position *(Dual Duct ..1 & 2)*	VavSuPos DAMPER POS	Displays current value. Commandable for testing purposes. Click directly on the object icon ⊖ to access the following three parameters.	---%
⭐	Rise time from 0 to 100% *(Dual Duct ..1 & 2)*	-	Floating control stroke time to open. **CAUTION:** if using tenths of seconds to enter changes, multiply seconds by 10 – i.e. enter 900 for 90 seconds.	[90.0]s
⭐	Fall time from 0 to 100-0% *(Dual Duct ..1 & 2)*	-	Floating control stroke time to close. **CAUTION:** if using tenths of seconds to enter changes, multiply seconds by 10 – i.e. enter 900 for 90 seconds.	[90.0]s
⭐	Control action *(Dual Duct ..1 & 2)*	-	Default – direct [Direct | Reverse]	Direct

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Favorite recorded balancing values

1. In the Application menu, select **Favorites**

2. Select **Room segment** > **Favorite recorded balancing values**.

⇨ Record the balancing values.

NOTE: for all objects, *(Dual Duct ..1 & 2)*

Description	Object / Property Name	Comment	Recorded value	Template
Supply air VAV max.air vol.flow f.cool.	VavSuAirFlMaxC CLG FLOW MAX	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV min.air vol.flow f.cool.	VavSuAirFlMinC CLG FLOW MIN	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV max.air vol.flow f.heat.	VavSuAirFlMaxH HTG FLOW MAX	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV min.air vol.flow f.heat.	VavSuAirFlMinH HTG FLOW MIN	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV max.air vol.flow f.vent.	VavSuAflMaxVnt VENT FLO MAX	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV min.air vol.flow f.vent.	VavSuAflMinVnt VENT FLO MIN	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV air volume flow at hood	VavSuAirFlHood	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV recorded balancing mode	VavSuBalModRec	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV recorded air flow at hood	VavSuAflHodRec	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV recorded flow coefficient	VavSuFlCoefRec	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV initial flow coefficient	VavSuFlCoefIni	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV recorded air volume flow	VavSuAirFlRec	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV recorded position	VavSuPosRec	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV duct area	VavSuDuctArea DUCT AREA	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV flow coefficient	VavSuFlCoef FLOW COEF	Snapshot of current value when balancing 'record' is selected.		All
Supply air VAV calc.flow coefficient	VavSuFlCoefCal	Snapshot of current value when balancing 'record' is selected.		All

Backup Commissioning Settings

ABT Site required for project data completion
ABT Site project data must be completed using ABT Site. It cannot be completed via ABT-SSA / ABT Inside or other online tool.

Only **Application type** devices (automation stations) can be uploaded, not free-programmable devices.

1. In the **Startup** component, **Set up connection** task, establish a connection as described previously in **Establishing a Connection to the Automation Station**.

2. In the **Startup** component, **Upload** task, **Discovered automation stations** tab, the connected AS is automatically discovered and displayed.

3. Select the automation station to be uploaded.

4. Click **Upload**.

⇨ The status of the selected AS will display **Backup in progress**. After a few minutes, the status displays **Operational** when the upload is complete.

Appendix

VAV Start-up Pocket Guide

This topic summarizes the main steps of VAV Startup procedures.

1. Connect to the DXR2 automation station using ABT-SSA / ABT Inside.

2. Complete the following under **Room segment** > **Favor.room segment, start-up & checkout**:

   a. Set the Nominal air volume flow: AirFlNom

   b. Set base flow setpoints:
      - Max air flow for cooling (VavSuAirFlMaxC)
      - Min air flow for cooling (VavSuAirFlMinC)
        (leave at zero to allow ventilation functions)
      - Max air flow for heating (VavSuAirFlMaxH)
        (only for increased flow across coils)
      - Min air flow for heating (VavSuAirFlMinH)
        (for units without terminal fans, set for min heating flow across coil; otherwise leave at zero)
      - Max air flow for ventilation
        (can be set equal to max cooling)
      - Min air flow for ventilation
        (leave at zero and set ventilation per operating mode in Step 3)

3. Set flow setpoints and configurations for ventilation under **Room** > **Favorite room, start-up & checkout** > **Ventilation control**:

   a. Set / verify ventilation action in each operating mode:
      - Comfort / Pre-Comfort: Min ventilation
      - Economy / Protection: Off

   b. Set ventilation flow in each operating mode:
      - Comfort: e.g. 150 ft3/min
      - Pre-Comfort: e.g. 150 ft3/min
      - Economy / Protection: 0 ft3/min
        (linked with configuration "Off")

4. Complete the following for floating control damper actuator under **Room segment** > **Favor.room segment, start-up & checkout** > **Supply air VAV position**:

   a. Set / verify damper open/close time

   b. Set / verify control action (direct/reverse)

5. Complete the following for floating control Heating coil valve under **Room segment** > **Favor.room segment, start-up & checkout** > **Heating coil valve**:

   a. Set / verify valve open/close time

b. Set / verify control action (direct/reverse)

6. Complete the following under **Room segment** > **Favor.room segment, start-up & checkout**:

   a. Set Duct Area (VavSuDuctArea)
      (Direct entry or Shape and dimensions)

   b. Set / verify flow coefficient (VavSuFlCoef)

7. Set the Room temperature setpoint under **Room** > **Favorite room start-up & checkout**:

   a. Set Comfort cooling and Comfort heating temperature setpoints: PrSpC, PrSpH

   b. Pre-Comfort, Economy and Protection (change if needed)
      ● Delta setpoints for Pre-Comfort: DSpCPcf, DSpHPcf
      ● Setpoints for Economy and Protection: SpCEco, SpHEco, SpCPrt, SpHPrt

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Dual Duct Configurations

Default settings assign Duct 1 as cold duct and Duct 2 as hot duct, but these assignments are configurable / reversible if desired or required. The following examples use the default assignments for cold duct and hot duct (use case 4 is special case, see below).

Main objects / parameters for dual duct use case configurations:

Name	Description	Available settings
VavSuChovrCnd1 (1VAV CHGVR)	Changeover object for Duct 1	1:Neither 2:Heating 3:**Cooling** (default) 4:Neutral
VavSuChovrCnd2 (2VAV CHGVR)	Changeover object for Duct 2	1:Neither 2:**Heating** (default) 3:Cooling 4:Neutral
VntDuctSprt	Parameter that defines which duct(s) provide ventilation air flow	1:No ventilation 2:Duct 1 3:Duct 2 4:Both ducts
CtlStrgy	Parameter that defines whether mixing control is supported by the dual duct configuration	1:Snap acting control 2:Mixing control
VntSprtDdband	Parameter that defines how ventilation is provided during temperature deadband	1:Duct 1 2:Duct 2 3:Last duct

Use case 1: VAV DD - Ventilation source in one duct
- 1a - Ventilation in cold duct (Duct 1)
- 1b - Ventilation in hot duct (Duct 2)

Use case 2: VAV DD - Ventilation in both ducts, with mixing control
- 2a - Cold duct ventilation in deadband
- 2b - Hot duct ventilation in deadband
- 2c - Last duct ventilation in deadband

Use case 3: VAV DD - Ventilation in both ducts, snap acting control
- 3a - Cold duct ventilation in deadband
- 3b - Hot duct ventilation in deadband
- 3c - Last duct ventilation in deadband

Use case 4: VAV DD - Dedicated duct for ventilation from DOAS (dedicated outside air system)

Use case 5: Constant volume DD option - Ventilation in both ducts, with mixing control
- 5a - Cold duct ventilation in deadband
- 5b - Hot duct ventilation in deadband

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Color legend for graphics:

- Red = heating
- Blue = cooling
- Green = ventilation
- Yellow = total air flow

Ventilation source	Ventilation in deadband	Control strategy	Use case	Schedule
Cold duct only	Cold duct	- -	1a	
Hot duct only	Hot duct	- -	1b	
Both ducts	Cold duct	Mixing control	2a	
		Snap acting	3a	
	Hot duct	Mixing control	2b	
		Snap acting	3b	
	Last duct	Mixing control	2c	
		Snap acting	3c	

Use Case 1a – **VAV DD with ventilation in cold duct only** (Duct 1):

Cold duct does not close if ventilation requirement remains constant.

Parameter configuration for use case 1a:

- VavSuChovrCnd1 = Cooling
- VavSuChovrCnd2 = Heating
- VntDuctSprt = Duct 1
- CtlStrgy = n/a [1]
- VntSprtDdband = n/a [1]

[1] CtlStrgy and VntSprtDdband are ignored when VntDuctSprt does not equal "Both ducts".

Use Case 1b – **VAV DD with ventilation in hot duct only** (Duct 2):

Hot duct does not close if ventilation requirement remains constant.

Parameter configuration for use case 1b:

- VavSuChovrCnd1 = Cooling
- VavSuChovrCnd2 = Heating
- VntDuctSprt = Duct 2
- CtlStrgy = n/a [1]
- VntSprtDdband = n/a [1]

[1] CtlStrgy and VntSprtDdband are ignored when VntDuctSprt does not equal "Both ducts".

Use Case 2a – VAV DD with ventilation in both ducts, cold duct ventilation in deadband, with mixing control:
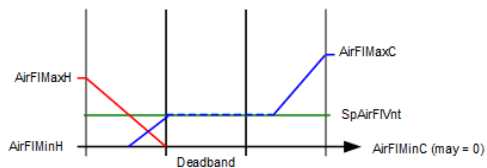
Cold duct will stay open in deadband to meet a ventilation requirement. As heating load ramps up, cold duct damper modulates to zero as hot duct damper modulates open (i.e., mixing control during ramp up of heating mode).

Parameter configuration for use case 2a:

- VavSuChovrCnd1 = Cooling

- VavSuChovrCnd2 = Heating

- VntDuctSprt = Both ducts

- CtlStrgy = Mixing control

- VntSprtDdband = Duct 1

Use Case 2b – VAV DD with ventilation in both ducts, hot duct ventilation in deadband, with mixing control:
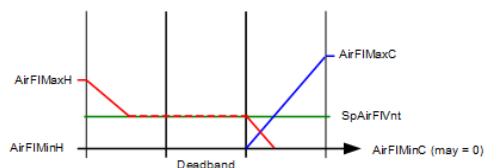
Hot duct will stay open in deadband to meet a ventilation requirement. As cooling load ramps up, hot duct damper modulates to zero as cold duct damper modulates open (i.e., mixing control during ramp up of cooling mode).

Parameter configuration for use case 2b:

- VavSuChovrCnd1 = Cooling

- VavSuChovrCnd2 = Heating

- VntDuctSprt = Both ducts

- CtlStrgy = Mixing control

- VntSprtDdband = Duct 2

Use Case 2c – VAV DD with ventilation in both ducts, last duct ventilation in deadband, with mixing control:
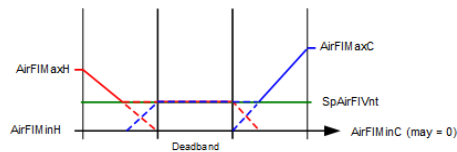
Last active duct will stay open in deadband to meet a ventilation requirement. Outside of deadband, as the heating load (or the cooling load) ramps up, the ducts provide a hot/cold mixture to meet the ventilation requirement. See additional information below.

Parameter configuration for use case 2c:

● VavSuChovrCnd1 = Cooling

● VavSuChovrCnd2 = Heating

● VntDuctSprt = Both ducts

● CtlStrgy = Mixing control

● VntSprtDdband = Last duct

Use Case 3a – VAV DD with ventilation in both ducts, cold duct ventilation in deadband, snap acting control:
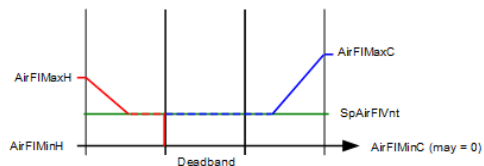
Cold duct will stay open in deadband to meet ventilation requirement. On an exit to heating, the cold duct closes immediately and the hot duct takes over ventilation needs.

Parameter configuration for use case 3a:

● VavSuChovrCnd1 = Cooling

● VavSuChovrCnd2 = Heating

● VntDuctSprt = Both ducts

● CtlStrgy = Snap acting control

● VntSprtDdband = Duct 1

Use Case 3b – VAV DD with ventilation in both ducts, hot duct ventilation in deadband, snap acting control:
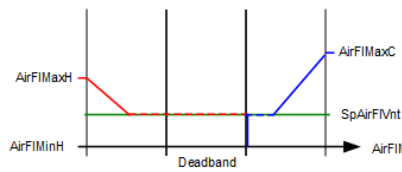
Hot duct will stay open in deadband to meet ventilation requirement. On an exit to cooling, the hot duct closes immediately and the cold duct takes over ventilation needs.

Parameter configuration for use case 3b:

- VavSuChovrCnd1 = Cooling

- VavSuChovrCnd2 = Heating

- VntDuctSprt = Both ducts

- CtlStrgy = Snap acting control

- VntSprtDdband = Duct 2

Use Case 3c – VAV DD with ventilation in both ducts, last duct ventilation in deadband, snap acting control:
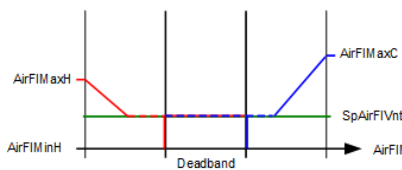
Last active duct will stay open in deadband to meet ventilation requirement. For behavior outside of deadband see additional information below.

Parameter configuration for use case 3c:

- VavSuChovrCnd1 = Cooling

- VavSuChovrCnd2 = Heating

- VntDuctSprt = Both ducts

- CtlStrgy = Snap acting control

- VntSprtDdband = Last duct

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Use Case 4: VAV DD - Dedicated duct for ventilation from DOAS (dedicated outside air system)

Duct 1   Duct 2

Parameter configuration for use case 4:

- VavSuChovrCnd1 = Cooling

- VavSuChovrCnd2 = Neither

- VntDuctSprt = Duct 2

- CtlStrgy = n/a [1]

- VntSprtDdband = n/a [1]

[1] CtlStrgy and VntSprtDdband are ignored when VntDuctSprt does not equal "Both ducts".

In use case 4 the mechanical equipment consists of a multiple fan AHU with DOAS, and separate elements (if present) for heating / cooling air distribution. When the thermal load is in deadband, air flow in the duct used for temperature control can be zero (Duct 1 in graphic).

When configured for DCV (demand control ventilation) an increase in ventilation flow is provided in response to room IAQ (CO_2) setpoints (Duct 2 in graphic).

Use Case 5a – Constant volume DD option, ventilation in both ducts, mixing control, with cold duct ventilation in deadband
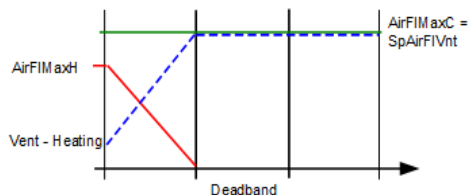
Cold duct stays at constant max volume during cooling and deadband to provide the **elevated minimum ventilation setting**.
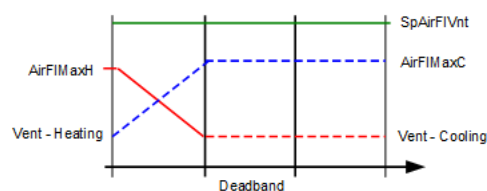
Cold duct stays at constant max volume during cooling and deadband with an additional level of supplemental ventilation air flow provided by hot duct. The air flows are summed to provide an **elevated minimum ventilation setting larger than max cooling flow**.

Parameter configuration for use case 5a:

- VavSuChovrCnd1 = Cooling

- VavSuChovrCnd2 = Heating

- VntDuctSprt = Both ducts

- CtlStrgy = Mixing control

- VntSprtDdband = Duct 1 (mixing will occur at/during setpoint for Duct 2 hot duct)

- Minimum ventilation parameter(s)* = desired CV flow

*In the room AF for ventilation control (VavVntCtl) set min vent parameter for Comfort mode (AirFlMinRCmf) to desired CV flow; the min vent setpoint object in VavSuDuald11 (VavSuAflMinVnt) can be set to zero when the minimum ventilation parameters are used for min vent settings.

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Use Case 5b – Constant volume DD option, ventilation in both ducts, mixing control, and hot duct ventilation in deadband
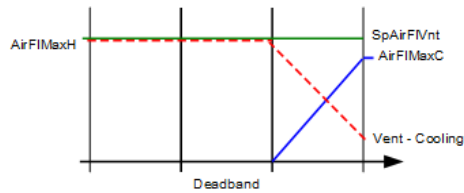
VntSprtDdband = Duct 2, example 1:

Hot duct stays at constant max volume during heating and deadband to provide the **elevated minimum ventilation setting**.
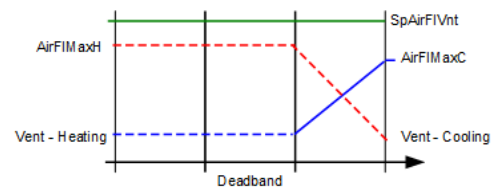
VntSprtDdband = Duct 2, example 2:

Hot duct stays at constant max volume during heating and deadband with an additional level of supplemental ventilation air flow provided by cold duct. The air flows are summed to provide an **elevated minimum ventilation setting larger than max heating flow**.

Parameter configuration for use case 5b:

- VavSuChovrCnd1 = Cooling

- VavSuChovrCnd2 = Heating

- VntDuctSprt = Both ducts

- CtlStrgy = Mixing control

- VntSprtDdband = Duct 2 (mixing will occur at/during setpoint for Duct 1 cold duct)

- Minimum ventilation parameter(s)* = desired CV flow

*In the room AF for ventilation control (VavVntCtl) set min vent parameter for Comfort mode (AirFlMinRCmf) to desired CV flow; the min vent setpoint object in Duald11 (VavSuAflMinVnt) can be set to zero when the minimum ventilation parameters are used for min vent settings.

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Manual Configuration

This procedure assumes the DXR has not been previously configured.

1. (Connection to DXR is established)

    In the **Startup** component, **Configure and download** task, click the icon for

    Discovered devices pane (▐■).

    ⇨ The connected AS is automatically discovered and displayed under **Discovered devices**. In some cases with an Ethernet connection or IP device, you may need to click **Discover** and wait a few moments before the connected AS displays.

ℹ️ **Note**
For MS/TP device connected through a room unit, discovery is limited to the local network (the network that the automation station is connected to).

---

2. Under the **Discovered devices** list, right click on the AS to be configured and select **Manually configure**.

3. Complete the configuration details and click **Configure**.

4. Wait 15 seconds for the update to finish and the **Message** column to show **Configured**.

    ⇨ The communication settings of the automation station are now configured. At this point, the **Status** column will show **Download required** indicating that no application parameters have been loaded.

5. Select **Go online**.

6. Enter the default user name and password and click **Login**.

    ⇨ You are prompted for Old password, New password, and Confirm new password.

7. After confirming the new password, wait for the screen to load and then select the desired **application type** by clicking the icon to the left of the description. Note the engineering units (see caution note).
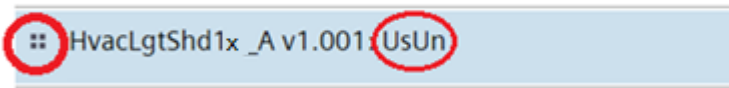
⚠️	⚠️ **CAUTION**
	Engineering Units MUST be correct
	It is crucial to select the correct application type – **this includes engineering units**. The example above shows US engineering units (**UsUn**). Select the type and engineering units you need.

---

8. Select one of the pre-loaded application templates by click the following, in order:

    a. **Select application**

    b. The **Select** button

    c. The desired template, and then click **OK**.

        Note:
        If the entire template name is not visible, hover your cursor over the truncated name to display a pop-up with the full template name. See table(s) at the end of this section for correct (full) template names.

9. To activate the selected application, click the **Command** arrow and then select **Activate** from the drop-down list.

    ⇨ The DXR takes time to process the command and restart. Before continuing, wait until the screen changes and **APPLICATION** displays at the top of the list. (the top parameter displays a status of **Operational**)

    When finished, click the menu icon ☰ (upper left) and select

    Application.

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Data Point Icons

Datapoint icons represent BACnet objects associated with buildings, floors, and rooms.

In ABT-SSA / ABT Inside, datapoint icons appear to the left of objects in the favorites tables. Clicking an icon exposes the object's parameters if any exist.

Indicator	Description	BACnet object type
Structured view objects		
	Building	AreaView (Bldg)
	Floor	AreaView (Floor)
	Room	AreaView (R)
	Room segment	AreaView (RSegm)
	Favorite view	FvrView
	Other special View Node Objects	ColView, DevView, InfraView, yyy(xxx)
Value objects		
	Input value	AI, BI, BlsIn, LgtIn, MI
	Output value	AO, BO, BlsOut, EmgLgt, LgtAOut, LgtBOut, MO
	Calculated value	ACalcVal, BCalcVal, MCalcVal, PrphDev
	Process value	APrcVal, BPrcVal, MPrcVal
	Configuration value	ACnfVal, BCnfVal, MCnfVal, UCnfVal
	Trigger value	MTrgVal
Centralized command grouping objects		
	Command object	CmdObj
	Central function	AreaView (CenFnct)
	Group master	GrpMaster
	Group member	GrpMbr
	Application function	FuncView
Structured view objects		
	Network view	NwkView
	Scheduler	Schedule

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Indicator	Description	BACnet object type
	Calendar	Calendar
System objects		
	Automation station	ASView
	Controller	Controller
Alarm and trend objects		
	Common Event Enrollment	CmnEvtEnr, EvtEnr, DevAlert
	Trend log	TrndLogS
	Other special Objects	AppCnf, CmnEvt, DevObj, FileObj, FldBusMgmt, NotifClass, NwkPortIP, NwkPortMSTP, Pgm
System function objects		
	Diagnostics	Diag
	Event log	EvtLog

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