SIEMENS

Room Automation Station

DXR2 Lab Configuration (HvacLgtShd14_15)

Start-up Procedures

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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

Before You Begin

⚠ CAUTION

Requirement for FhSpEh12 *

(Fume hood exhaust air setpoint 12, exhaust level)

If FhSpEh12 is selected for new template configuration,
DO NOT change the following parameters, they must be left at default:
• SpAirFlMinReq (Minimum exhaust airflow setpoint)
• SpEmgPrg (Emergency purge setpoint)
• SpEhFire (Fire exhaust setpoint)

*FhSpEh12 from CET library V6.1_ABT2.1, on DXR firmware 02.10.31.xxx and earlier.

Standard templates use FhSpEh11 and are not affected.

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.

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

Navigating ABT-SSA

Prerequisites

- Users are trained and knowledgeable with ABT Site and comfortable with the online help systems.
- ABT-Site is loaded, licensed and running.
- See topics under the “Online” book in the Help.

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

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.

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.

For a complete list, open ABT-Site help and go to **ABT-SSA > User interface overview > Online icons**.

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**
2. Do one of the following:
   - If using a room unit connection, click **Connect** and proceed to next section.
   - If using a USB or Ethernet 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)

Note
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.

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.

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.

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].

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.

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 the table 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**.

VAV templates

Box type	Number	Description	AS hardware
Pressurized Room	16751 16851	Lab Room VAV Pressurization with Fast-Action and HW Reheat with Damper	DXR2.E17C…
	16750 16850	Lab Room VAV Pressurization with Fast-Action and HW Reheat with Venturi air valve	
	16756 16856	Lab Room VAV Pressurization with Fast-Action Venturi Air Valves and HW Reheat – Thermal Power Control	
	16773 16873	Lab Room VAV Pressurization with Slow Floating Dampers, HW Reheat, Supply Temp Control and AOV Perimeter Radiation	

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.

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To save time, read the **Navigating ABT-SSA** 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 Notes documentation available on InfoLink (InfoLink > Critical Environments > Life Science > Applications.

Going Online with ABT-SSA

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 and select **Go online**.

Logout to save changes

In ABT-SSA, changes made during a live session should save automatically. 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).

Base Configuration

In this step you will configure the basic features of the lab room. For example you must indicate positive or negative pressurization, whether fume hoods are present, etc. This is the basic (“base”) configuration for the lab room.

Prerequisites:
- On-site, online with ABT-Site after loading template.
- You have read **Navigating ABT-SSA** in this document.

See the Application Help in ABT Site for detailed descriptions of parameters and settings. Template defaults are in **bold font**.

Parameter or object	Access path and instructions
	Room > Room HVAC coordination > Room pressure control .[properties]
Number of supply air VAV boxes	Enter the number of supply air VAV boxes in the lab room.
Number of exhaust air VAV boxes	Enter the number of extract air VAV boxes in the lab room.
Number of fume hoods	Enter the number of fume hoods. If none, enter 0.
Room pressurization mode	Enter the general pressurization goal. [Neutral | Positive | **Negative**]
Tracking mode	Select the flow tracking algorithm according to project specifications. If it is not specified, select according to PRMod. Supply tracks extract is typically chosen for negative rooms; Extract tracks supply is typically chosen for positive rooms. [**Supply air tracks extract air** | Extract air tracks supply air]
Tracking method	Use the default value unless project specifications clearly direct otherwise. Setpoint tracking is both faster and more stable than flow tracking. Some people choose flow tracking for the certainty of tracking the actual flow. [**Setpoint** | Air volume flow]
	The remaining items in this table are objects, not properties, so the access path is different: *Room > Room HVAC coordination > Room pressure control*
Additional supply air volume flow	Consult job specification documents.
Additional extract air volume flow	Consult job specification documents.
Transferred air volume flow setpoint	Consult job specification documents.
Room differential pressure setpoint	(Only for CetPFlCas11 - flow pressure cascade; disregard if your template does not use this AF)
Minimum transferred air volume flow	(Only for CetPFlCas11 - flow pressure cascade; disregard if your template does not use this AF)

Supply Box Configuration

Access path: *Room segment > HVAC > Supply air VAV*

This section covers basic setup procedures for the supply box. Advanced setup comes later. For details on venturi calibration, see the Appendix.

Objects and parameters will vary depending on which AF is loaded

CetVavSu11: external air flow controller
CetVavSu12: dp sensor
CetVavSu13: dp sensor and OEM box coefficient
CetVavSu14: air velocity sensor
CetVavSu15: dp sensor, venturi air valve

Step 1

Confirm that the air system is working.

With the air system running and air flowing in the room, override **Supply air VAV position** to zero and confirm that the damper closes and terminal airflow reaches zero or near zero. (If CetVavSu11, the point to override is **Supply air VAV setpoint for air vol.flow**.)

	NOTICE
	Was step 1 successful? If a problem exists, it must be resolved before continuing.

Step 2

Calibrate the air sensor. (If CetVavSu11, skip this step, you have no physical air sensor.)

Access the properties for **Supply air VAV differential pressure** and click the **Calibration command** button. (If CetVavSu14, the point name is **Supply air VAV air velocity**.)

Step 3

Box configuration.

The table lists objects / parameters for the supply box. Follow the box schedule / project documents when checking or applying values. CetVav**Su11** and CetVav**Su13** have no duct-size or duct-shape objects so these parameters (size, shape etc.) will not be present if Su11 or 13 is loaded.

Parameter or object	Access path and instructions
	Room segment > HVAC > Supply air VAV
Supply air VAV duct area	Duct area is calculated by the application. To manually enter a different value, you must first set the duct shape object (**Supply air VAV duct shape**) to **Direct entry** and then return to **Supply air VAV duct area** to enter the desired value. **CAUTION:** If the user manually enters a duct area value **without first setting the duct shape object to Direct entry**, the value will be accepted, but it will be susceptible to being overwritten at a later time (return to previous value) without notifying the user.
Supply air VAV duct shape	Set the duct shape. [Rectangular | Round | Flat oval | Direct entry] Note: if shape = Direct entry, dimensions A and B will be ignored.
Supply air VAV dimension A	Set dimension A (width of duct).
Supply air VAV dimension B	Set dimension B. If duct shape is Rectangular or Flat oval, dimension B ≠ dimension A.
Venturi calibration command (venturi only - else skip)	Access the properties and click the **Calibration command** button. Wait until calibration is done before proceeding.
Venturi calibration state (venturi only - else skip)	Should read "**Calibrated**". If Failed, see **Venturi calibration** in Appendix.
Supply air VAV max.air vol.flow for cooling	CLG FLOW MAX (For detailed information on how to set max and min flow settings, see "Airflow Limits" in application notes documentation for Lab templates.)
Supply air VAV min.air vol.flow for cooling	CLG FLOW MIN
Supply air VAV max.air vol.flow for heating	HTG FLOW MAX
Supply air VAV min.air vol.flow for heating	HTG FLOW MIN
Supply air VAV max.air vol.flow for ventilation	VENT FLO MAX
Supply air VAV min.air vol.flow for ventilation	VENT FLO MIN **Min ventilation flow is not the same as a required ventilation rate. VENT FLO MIN must be left at zero for correct results.**
Supply air VAV changeover condition	VAV CHGOVR DO NOT change without consulting the design engineer.
Nominal air volume flow	This is a parameter of the parent AF. Access path: *Room segment > HVAC > Supply air VAV .[properties]* Can be left at 0 (default). If used, set equal or larger than the largest max flow setpoint.

Step 4

Starting values for PID loop controller object.

Check the parameter values of the loop controller object, **Supply air VAV air flow controller**.

Note
Starting values only; for fine tuning see Flow Control section.

Parameter or object	Access path and instructions
	Room segment > HVAC > Supply air VAV > Supply air VAV air flow controller .[properties]
Gain	If damper: Gain = Max flow / Measured airflow with damper fully open If venturi: Gain = Max flow / Measured airflow with venturi fully open / 4 Max flow = largest of: CLG FLOW MAX, HTG FLOW MAX, VENT FLO MAX, Nominal air volume flow
Integral action-time Tn	Actuator stroke time / 2 (usually about 1sec; fast actuating GNP191.1P has a stroke time of 2s)
Derivative action-time Tv	0[s]
Rise time from 0 to 100%	Depends on actuator type (fast / slow) (2s = fast acting GNP...)
Fall time from 100 to 0%	Depends on actuator type (fast / slow) (2s = fast acting GNP...)
Neutral zone	If damper: relative flow setpoint at minimum flow / 20 If venturi: relative flow setpoint at minimum flow / 5

See Application Help if you need information on remaining parameters and/or additional details on parameter functions.
See Appendix (in this document) for information on balancing, if needed.

Nominal Air Volume Flow

Access path: *Room segment > HVAC > Supply air VAV .[properties]*

The parameter for Nominal air volume flow (**AirFlNom**) can be left at 0 (default) or it can be set equal to or greater than the highest max flow setpoint. All airflow percent calculations, including ventilation in each operating mode are based on the highest flow setpoint, such as max cooling or max vent, or, AirFlNom if it has been set as the largest. If AirFlNom is not the largest it is ignored.

The term "nominal air volume flow" means the flow rating of the terminal box, the maximum flow for which it is rated.

Note
AirFlNom can be left at 0 (default). If it is used (i.e., if it is set as the largest flow value), it should **not** be set higher than approximately 1.2 times the size of the next largest max flow setpoint, typically max cooling or max vent. When AirFlNom is used, all air volume flow percent calculations, including ventilation flows for each operating mode, are based on the value of AirFlNom.

!	⚠ CAUTION
	Duct size must be considered if setting nominal air volume flow (AirFlNom) to a value other than zero (default). **Example:** 6-inch round duct (approx 0.2 sq ft) with typical maximum velocity 3000 ft/min suggests nominal air volume flow of 600 cfm (3000 ft/min * 0.2 sq ft = 600 cfm (approximately 300 lps)). AirFlNom is not a BACnet object. It is a configuration parameter that can only be set using ABT Site or ABT-SSA. Access path: *Room segment > HVAC > Supply air VAV .[properties]*

Extract Box Configuration

Access path: *Room segment > HVAC > Extract air VAV*

This section covers basic setup procedures for the extract box. Advanced setup comes later. For details on venturi calibration, see the Appendix.

Objects and parameters will vary depending on which AF is loaded

CetVavEx11: external air flow controller
CetVavEx12: dp sensor
CetVavEx13: dp sensor and OEM box coefficient
CetVavEx14: air velocity sensor
CetVavEx15: dp sensor, venturi air valve

Step 1

Confirm that the air system is working.

With the air system running and air flowing in the room, override **Extract air VAV position** to zero and confirm that the damper closes and terminal airflow reaches zero or near zero. (If CetVavEx11, the point to override is **Extract air VAV setpoint for air vol.flow**.)

!	*NOTICE*
	Was step 1 successful? If a problem exists, it must be resolved before continuing.

Step 2

Calibrate the air sensor. (If CetVavEx11, skip this step, you have no physical air sensor.)

Access the properties for **Extract air VAV differential pressure** and click the **Calibration command** button. (If CetVavEx14, the point name is **Extract air VAV air velocity**.)

Step 3

Box configuration.

The table lists objects / parameters for the extract box. Follow the box schedule / project documents when checking or applying values. CetVav**Ex11** and CetVav**Ex13** have no duct-size or duct-shape objects so these parameters (size, shape etc.) will not be present if Ex11 or 13 is loaded.

Parameter or object	Access path and instructions
	Room segment > HVAC > Extract air VAV
Extract air VAV duct area	Duct area is calculated by the application. To manually enter a different value, you must first set the duct shape object (**Extract air VAV duct shape**) to **Direct entry** and then return to **Extract air VAV duct area** to enter the desired value. **CAUTION:** If the user manually enters a duct area value **without first setting the duct shape object to Direct entry**, the value will be accepted, but it will be susceptible to being overwritten at a later time (return to previous value) without notifying the user.
Extract air VAV duct shape	Set the duct shape. [Rectangular | Round | Flat oval | Direct entry] Note: if shape = Direct entry, dimensions A and B will be ignored.
Extract air VAV dimension A	Set dimension A (width of duct).
Extract air VAV dimension B	Set dimension B. If duct shape is Rectangular or Flat oval, dimension B ≠ dimension A.
Venturi calibration command (venturi only - else skip)	Access the properties and click the **Calibration command** button. Wait until calibration is done before proceeding.
Venturi calibration state (venturi only - else skip)	Should read "**Calibrated**". If Failed, see **Venturi calibration** in Appendix.
Extract air VAV max.air vol.flow for ventilation	EX VENT MAX (For detailed information on how to set max and min flow settings, see "Airflow Limits" in application notes documentation for Lab templates.)
Extract air VAV min.air vol.flow for ventilation	EX VENT MIN **Min ventilation flow is not the same as a required ventilation rate. EX VENT MIN must be left at zero for correct results.**
Nominal air volume flow	This is a parameter of the parent AF. Access path: *Room segment > HVAC > Extract air VAV .[properties]* Can be left at 0 (default). If used, set equal or larger than the largest max flow setpoint.

Step 4

Starting values for PID loop controller object.

Check the parameter values of the loop controller object, **Extract air VAV air flow controller**.

Note
Starting values only; for fine tuning see Flow Control section.

Parameter or object	Access path and instructions
	Room segment > HVAC > Extract air VAV > Extract air VAV air flow controller .[properties]
Gain	If damper: Gain = Max flow / Measured airflow with damper fully open If venturi: Gain = Max flow / Measured airflow with venturi fully open / 4 Max flow = largest of: EX VENT MAX, Nominal air volume flow
Integral action-time Tn	Actuator stroke time / 2 (usually about 1sec; fast actuating GNP191.1P has a stroke time of 2s)
Derivative action-time Tv	0[s]
Rise time from 0 to 100%	Depends on actuator type (fast / slow) (2s = fast acting GNP...)
Fall time from 100 to 0%	Depends on actuator type (fast / slow) (2s = fast acting GNP...)
Neutral zone	If damper: relative flow setpoint at minimum flow / 20 If venturi: relative flow setpoint at minimum flow / 5

See Application Help if you need information on remaining parameters and/or additional details on parameter functions.
See Appendix (in this document) for information on balancing, if needed.

Flow Control

!	*NOTICE*
	Customer Specifications and On-Site Tuning You should expect to adjust the tuning parameters on-site to achieve performance that meets the customer's expectations and specifications.

In these steps you will fine tune the parameters of the airflow PID controller object(s):

- VavSuAirFlCtr - Supply air VAV air flow controller (*Room segment > HVAC > Supply air VAV > Supply air VAV air flow controller .[properties]*)
- VavExAirFlCtr - Extract air VAV air flow controller (*Room segment > HVAC > Extract air VAV > Extract air VAV air flow controller .[properties]*)

To fine tune the supply and extract flow loops, follow the guidelines under **Airflow control for critical spaces** in the ABT Site Help.

Step 1
In ABT Site Help, see Technical principles > Lab > Airflow control for critical spaces.

Step 2
Change the VAV airflow setpoint for the supply box (**Supply air VAV setpoint for air vol.flow**). Make changes and observe performance over a range of realistic operating conditions. Watch the flow response of **Supply air VAV air volume flow**, it should move accurately and with stability. Tune the flow loop as needed, using the guidelines in Airflow control for critical spaces.

Step 3
Change the VAV airflow setpoint for the extract box (**Extract air VAV setpoint for air vol.flow**). Make changes and observe performance over a range of realistic operating conditions. Watch the flow response of **Extract air VAV air volume flow**, it should move accurately and with stability. Tune the flow loop as needed, using the guidelines in Airflow control for critical spaces.

Flow control – Fume hood

If any fume hoods are present, see the fume hood startup procedures document (A6V11173155) and configure the fume hood(s) as specified.

Pressurization control

The parameters in this section depend on which application function is presently loaded on the automation station. (Standard lab templates use CetAirFlTck11)

- CetAirFlTck11 (Air volume flow tracking only – does not control differential pressure)
- CetPFlCas11 (Flow pressure cascade – air volume flow tracking and differential pressure control)

If you don't know which application function is loaded, access the properties for the **Room pressure control** AF and read the value for **Node subtype**. Access path: *Room > Room HVAC coordination > Room pressure control .[properties]*

CetAirFlTck11

(Air volume flow tracking)
See the Application Help in ABT Site for detailed descriptions of parameters and settings. Template defaults are in **bold font**.

Parameter or object	Access path and instructions
	Room > Room HVAC coordination > Room pressure control .[properties]
Room supply response to failed supply air volume flow	Specifies action at all supply terminals in the room, if flow data is unavailable from one of them (no affect if there is only 1 supply terminal). [Normal | Maximum | Minimum | Zero | **Hold**]
Room supply response to failed extract air volume flow	Specifies action at all supply terminals in the room, if flow data is unavailable from one of the extract terminals. [Normal | Maximum | Minimum | Zero | **Hold**]
Room extract response to failed extract air volume flow	Specifies action at all extract terminals in the room, if flow data is unavailable from one of them (no effect if there is only 1 extract terminal). [Normal | Maximum | Minimum | Zero | **Hold**]
Room extract response to failed supply air volume flow	Specifies action at all extract terminals in the room, if flow data is unavailable from one of the supply terminals. [Normal | Maximum | Minimum | Zero | **Hold**]
Transferred air volume flow alarm configuration	Set according to customer's need to monitor room pressurization. [Disabled | Alarm on high value | **Alarm on low value** | Alarm on high or low value]
Delay for transferred air volume flow alarm	Set according to customer's need to monitor room pressurization. In most applications a brief lapse in transfer flow is not a contamination control issue. Set the delay long enough that normal dynamic flow changes to not cause unnecessary alarms.
Tolerance for transferred air volume flow alarm	Set according to customer's need to monitor room pressurization. Set large enough that normal variations in flow measurements to do not trip the alarm. Set small enough that operating staff are informed when the system is out of working order. A value of approximately 50% of the transferred air volume flow is often appropriate.
Reset fume hood setpoint configuration	Set to Yes to allow the room to request additional exhaust from fume hoods. The room will only request additional exhaust from the fume hoods if the extract terminals are at maximum and the temperature or ventilation demands are not being met. The parameters in FhSpEh for each fume hood also need to be configured for this feature to function. [**No** | Yes]
Fume hood use exceeded configuration	Set to Yes to enable fume hood use alarm. Typically used when there are multiple fume hoods in a room and the room supply cannot provide enough makeup air if all the fume hoods are open. [**No** | Yes]
Fume hood air volume flow use limit	Value specified / chosen by customer. Alarm is indicated when sum of fume hood flows in the room exceeds this value.

CetPFlCas11

(Flow pressure cascade)
See the Application Help in ABT Site for detailed descriptions of parameters and settings. Template defaults are in **bold font**.

Parameter or object	Access path and instructions
	Room > Room HVAC coordination > Room pressure control .[properties]
Room supply response to failed supply air volume flow	Specifies action at all supply terminals in the room, if flow data is unavailable from one of them (no affect if there is only 1 supply terminal). [Normal | Maximum | Minimum | Zero | **Hold**]
Room supply response to failed extract air volume flow	Specifies action at all supply terminals in the room, if flow data is unavailable from one of the extract terminals. [Normal | Maximum | Minimum | Zero | **Hold**]
Room extract response to failed extract air volume flow	Specifies action at all extract terminals in the room, if flow data is unavailable from one of them (no effect if there is only 1 extract terminal). [Normal | Maximum | Minimum | Zero | **Hold**]
Room extract response to failed supply air volume flow	Specifies action at all extract terminals in the room, if flow data is unavailable from one of the supply terminals. [Normal | Maximum | Minimum | Zero | **Hold**]
Room differential pressure alarm configuration	Set according to customer's need to monitor room pressurization. Consider use of this alarm along with Transferred Air Volume alarm. [Disabled | Alarm on high value | Alarm on low value | Alarm on high or low value]
Delay for room differential pressure alarm	Set according to customer's need to monitor room pressurization. Set long enough to prevent alarms from normal operation of the door. Set short enough to address actual contamination control issues.
Tolerance for room differential pressure alarm	Set according to customer's need to monitor room pressurization.
Transferred air volume flow alarm configuration	Set according to customer's need to monitor room pressurization. [Disabled | Alarm on high value | Alarm on low value | Alarm on high or low value]
Delay for transferred air volume flow alarm	Set according to customer's need to monitor room pressurization. In most applications a brief lapse in transfer flow is not a contamination control issue. Set the delay long enough that normal dynamic flow changes to not cause unnecessary alarms.
Tolerance for transferred air volume flow alarm	Set according to customer's need to monitor room pressurization. Set large enough that normal variations in flow measurements to do not trip the alarm. Set small enough that operating staff are informed when the system is out of working order. A value of approximately 50% of the transferred air volume flow is often appropriate.

Parameter or object	Access path and instructions
Reset fume hood setpoint configuration	Set to Yes to allow the room to request additional exhaust from fume hoods. The room will only request additional exhaust from the fume hoods if the extract terminals are at maximum and the temperature or ventilation demands are not being met. The parameters in FhSpEh for each fume hood also need to be configured for this feature to function. [**No** | Yes]
Fume hood use exceeded configuration	Set to Yes to enable fume hood use alarm. Typically used when there are multiple fume hoods in a room and the room supply cannot provide enough makeup air if all the fume hoods are open. [**No** | Yes]
Fume hood air volume flow use limit	Value specified / chosen by customer. Alarm is indicated when sum of fume hood flows in the room exceeds this value.
Delay for room pressure control after door close	Binary inputs for door contacts must be defined for this feature to function. The room pressure control loop will be held at its present value when a room door contact is opened. The room pressure control loop will be held constant for <delay time> after the door contacts are closed.

Differential pressure tuning for CetPFICas11

The flow pressure cascade AF has a PID controller object (Differential pressure controller) that should be tuned for proper performance.

See **Pressurization for critical spaces** in ABT Site Help prior to tuning the Differential pressure controller parameters. (Technical principles > Lab > Pressurization for critical spaces)

Ventilation Control Configuration

The parameters in this section depend on which application function is presently loaded on the automation station. (Standard lab templates use CetVavVntCtl11)

- CetVavVntCtl11 (Min ventilation)
- CetVavVntCtl12 (Min ventilation & DCV)
- CetVavVntCtl13 (Min ventilation & external DCV)

If you don't know which application function is loaded, access the properties for the **Ventilation control** AF and read the value for **Node subtype**. Access path: *Room > Room HVAC coordination > Ventilation control .[properties]*

The minimum required ventilation settings are configurable per room operating mode, allowing min ventilation to be handled separately from min cooling flows. DCV (demand controlled ventilation) requires IAQ capable room operating unit.

⚠ CAUTION

Ventilation rate(s)

Ventilation rates may be part of the client's safety program; occupational safety regulations may apply.
– Ventilation rates must come from the ventilation engineer's specification and be set per job specifications following applicable safety guidelines.

Parameter or object	Access path and instructions
	Room > Room HVAC coordination > Ventilation control .[properties]
Unit for minimum room ventilation	**RVntMinUnit** defines the flow measuring units for the Minimum room ventilation parameters. (default = m^3/h)
Minimum room ventilation for Comfort	**Do not** leave at default - set according to job specification. (Minimum room-ventilation setpoint for Comfort) Value must come from ventilation engineer's specifications.
Minimum room ventilation for Pre-Comfort	**Do not** leave at default - set according to job specification. (Minimum room-ventilation setpoint for Pre-Comfort; might also be specified as "standby ventilation rate")
Minimum room ventilation for Economy	Set according to job specification. (Minimum room-ventilation setpoint for Economy; might also be specified as "unoccupied ventilation rate")
Minimum room ventilation for Protection	Set according to job specification. (Minimum room-ventilation setpoint for Protection)
Volume of room	(for DCV) The VntAchgRate object (Ventilation air change rate) is calculated based on this parameter, and will be 0 if this parameter is left at default. **Note**: Volume of the room **must** be entered if **RVntMinUnit** is set to /h.
Area of room	The VntVRate object (Ventilation velocity rate) is calculated based on this parameter, and will be 0 if this parameter is left at default. **Note**: Area of the room **must** be entered if **RVntMinUnit** is set to $m^3/h/m2$, $ft^3/min/ft^2$, or $l/s/m^2$.
Ventilation alarm limit	Defines how much the ventilation flow can deviate from setpoint before the ventilation alarm activates. Set according to customer's need to monitor ventilation rates. Set low enough that normal variation in flow measurements do not trip the alarm, but high enough to notify operating staff if the system is not performing as expected.
Ventilation alarm delay	Set according to customer's need to monitor ventilation rates. In most applications a brief lapse in ventilation will not result in an air quality problem. Set the delay long enough that normal dynamic flow changes do not cause unnecessary alarms.

Reheat Valve and Heating Configuration

This section covers configuration for room heating and the reheat valve if present.

- Heating setpoints
- Series or parallel sequencing of reheat coil and VAV supply air volume flow
- Heating PID controller objects / parameters

This partial list of parameters is not intended for a specific job. Consult with HVAC design engineer / job specifications to determine all configuration points and parameters to set as needed.

Parameter or object	Access path and instructions
	Room > Room HVAC coordination > Temperature control for heating
Heating setpoint for Comfort	Consult job specification documents.
Delta heating setpoint for Pre-Comfort	Consult job specification documents.
Heating setpoint for Economy	Consult job specification documents.
Heating setpoint for Protection	Consult job specification documents.
Room temp.controller heating for VAV	(Optional) Access the properties (" ⋮ ") to configure VAV heating PID.
Room temp.ctr.heating for heating coil	(Optional) Access the properties (" ⋮ ") to configure reheat coil valve PID.
VAV operation	To access VAV operation click the properties icon (" ⋮ ") for the **Temperature control for heating** AF. [Series | Parallel] Factory default = Series (coil and VAV operate sequentially). Consult HVAC design engineer before making changes.

Confirm the Rise and Fall times for the Heating coil valve position output object. (HTG V POS)
Access path: *Room segment > Heating coil valve position .[properties]*

Thermal power control

(Templates 16756 and 16856)

The thermal power control AF has two parameters not present in other temperature control AFs:

- SpTSuMax - Maximum supply air temp setpoint (default 90F)
- SpTSuMin - Minimum supply air temp setpoint (default 50F)

DO NOT change without consulting the HVAC design engineer.

Room Operator Unit and ODP Configuration

Room unit and ODP parameters and descriptions are available in the Application Help. Search for the model number of the room unit or ODP (for example "QMX3.P87").

Room units

- QMX3.P34
- QMX3.P37

Access path for room unit parameters: *Favorites > Room segment > Favorite room operator unit config. > Room operator unit device .[properties]*

Note

The room temperature AI object (TR) owned by the room operator unit has the property **Correction offset**. This property can be configured to provide an offset in the temperature reading used to control the room. Access path: *Favorites > Room segment > Favorite room operator unit config. > Room operator unit device > Room temperature .[properties]*

Manual setpoint adjustment & EefCndTrg

The default configuration 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**"

These parameters are in the AF, Room operating mode determination **ROpModDtr**.

ODP

- QMX3.P87
- QMX3.P88

Operator display panel parameters are covered in the Fume hood startup document (A6V11173155).

Appendix

Balancing

For the complete balancing procedures see DXR2 Balancing Procedures (A6V10665943). A condensed version is available in ABT-Site Help: *Online > Monitoring and operating > Balancing*

Performance tuning

See the Application Help for tuning guidelines: *Technical principles > Lab*

Venturi calibration

A manual modification of the venturi calibration table may be needed due to:

- No airflow sensor.
- Adding calibration point(s) below the parameter setting for minimum duct velocity, **AirVMinCtlClb** (Minimum air velocity for control and venturi calibration).
- Correcting the table of a failed calibration.
- Optimizing the table of a successful calibration.

Before performing a venturi calibration, the following must be completed or verified:

- Air balancing is complete and flow coefficient is set.
- The settings for Rise and Fall time must match the physical run time of the actuator. **Rise time from 0 to 100%** and **Fall time from 100 to 0%** are properties of the loop controller object; for example, “Supply air VAV air flow controller”. (This is especially critical if slow floating actuators are used).
- Airflow setpoint is not zero – air system is operational.

The following examples are for a venturi supply box / air valve but the procedures are identical for extract box or fume hood. The only difference is that object names vary to match the box type. (“Su” for supply boxes, “Ex” for extract boxes, “Eh” for fume hoods)

- Vntr**Su**ClbSta - Supply air venturi valve calibration state (supply box)
- Vntr**Ex**ClbSta - Extract air venturi valve calibration state (extract box)
- Vntr**Eh**ClbSta - Exhaust venturi valve calibration state (fume hood)

VntrSuClbSta (for a venturi supply box) in the following examples.

Manual calibration

▷ You are in ABT Site, online with the automation station.

▷ You have selected **List view > Room segment > Supply air VAV**

1. Locate **Supply air venturi valve calibration state** (VntrSuClbSta) and open the properties.
2. Enter airflows from smallest to largest in **Inactive air flow**.
3. Enter corresponding actuator positions in Inactive valve position.
4. Return to **Supply air VAV**.
5. Locate **Supply air venturi valve calibration command** (VntrSuClbCmd).
6. Set Venturi valve calibration command to **Apply**.
7. One of the following occurs:

- If manual entries are accepted, the values in Inactive air flow and Inactive valve position are copied into **Active air flow** and **Active valve position**, and **VntrSuClbSta** is set to **Calibrated**.
- If manual entries are not accepted, **VntrSuClbSta** is set to **Failed calibration**. You must open the properties and check **Calibration error** for the cause of failure.

Automated calibration

▷ You are in ABT Site, online with the automation station.

▷ You have selected **List view > Room segment > Supply air VAV**

1. Locate **Supply air venturi valve calibration command** (VntrSuClbCmd)
2. Set Venturi valve calibration command to **Calibrate**.
   A pop-up message may notify that the calibration procedure may take some time. Click **OK** to close the message.
3. To monitor progress, access the properties of **Supply air venturi valve calibration state** and go to **Remaining calibration time** (this is an estimated time).
4. One of the following occurs:

- If calibration is successful, **VntrSuClbSta** is set to **Calibrated**.
- If calibration is not successful, VntrSuClbSta is set to **Failed calibration**. You must open the properties and check **Calibration error** for the cause of failure. The values from a failed calibration are stored in **Inactive air flow** and **Inactive valve position**.

To correct an airflow reading in the inactive table, command the damper to the failed position, read VavSuAirFl and enter this value at the proper position in Inactive air flow.

To add airflow readings that have duct velocities below the configuration property Minimum air velocity for control and venturi calibration, do the following:

1. Command the damper to the desired position.
2. Measure the airflow following standard air balance procedures.
3. Enter both the airflow value and the position into **Inactive air flow** and **Inactive valve position**.
4. Repeat these steps as needed.

After manual entries have been made to Inactive air flow or Inactive valve position, do the following:

1. Locate **Supply air venturi valve calibration command** (VntrSuClbCmd).
2. Set Venturi valve calibration command to **Apply**.
3. One of the following occurs:

- If manual entries are accepted, the values in Inactive air flow and Inactive valve position are copied into Active air flow and Active valve position, and VntrSuClbSta is set to **Calibrated**.
- If manual entries are not accepted, VntrSuClbSta is set to **Failed calibration**. You must open the properties and check **Calibration error** for the cause of failure.

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