BACnet LCM-OAVS Application 6750 and 6756

VAV Room Pressurization with HW Reheat, BTU Compensation and Two Venturi Air Valves — One Exhaust, One Supply

Start-up Procedures

Building Technologies

140-1330
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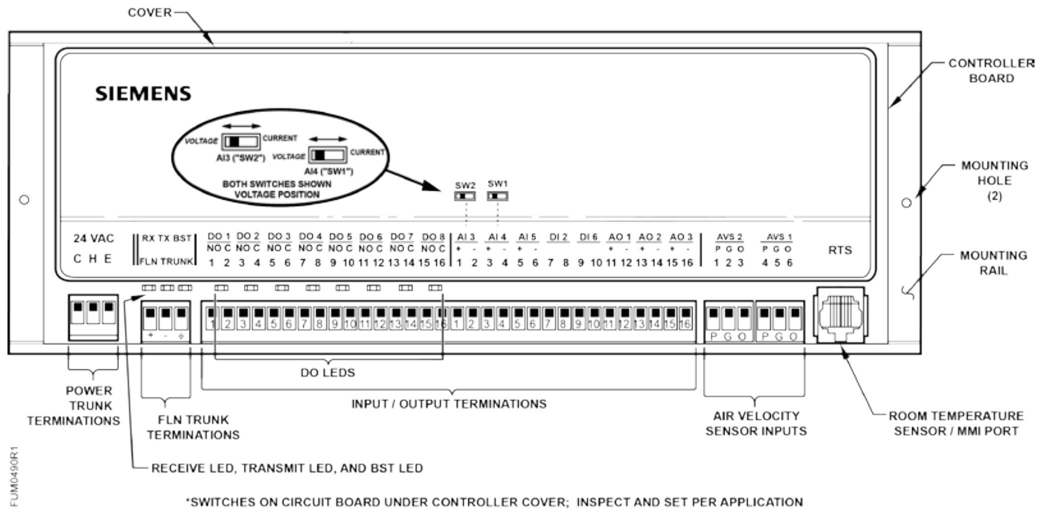
Restricted

Table of Contents

Before You Begin



Generic Controller I/O Layout. See *Wiring Diagram* for application specific details.

At the job site, locate the major control system and the mechanical and electrical drawings. These components include valves, motors, and any other components working in conjunction with the BACnet Laboratory Controller Module (LCM).

Verify that the LCM input/output (I/O) points are wired per the installation instructions.

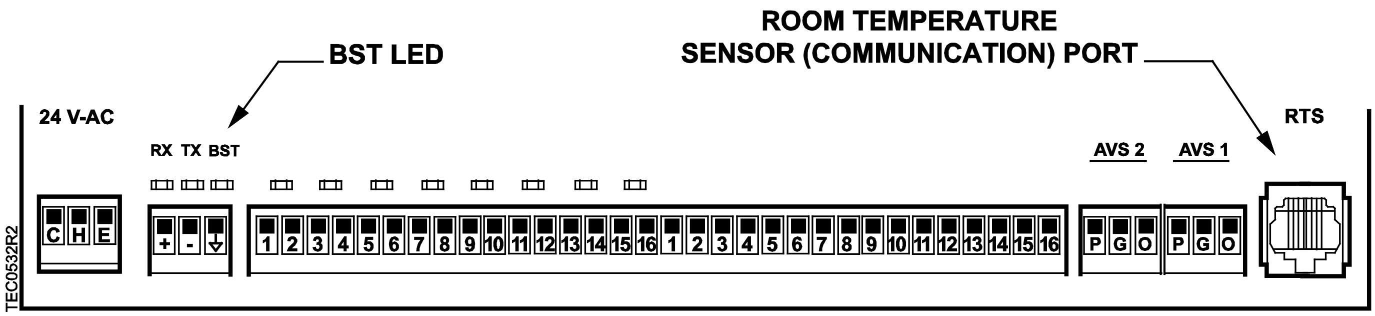
NOTES:
Applications 6750 and 6756 contain points with point numbers greater than 99. WCIS 4.0 must be used to view and configure these points. Point numbers greater than 99 are only available for display with field panel firmware 3.2.5 or higher and workstation revision 3.12 or higher.
These applications can be set up to operate without a supply air box or without a general exhaust box. See the *Application Notes* section for information on how to set up the controller to operate this way.

NOTES:
You should read and understand the sections on Venturi Air Valve Calibration and Table Statement Editing in the *Application Note* documentation for applications 6750 and/or 6756 before performing the Start-up Procedures. This is especially important if you need to edit the Venturi table statement during start-up. *Venturi Air Valve for Critical Environments Technical Specification Sheet* (149-425), has extensive information regarding Venturi air valves for critical environments.
These applications can be set up to operate without a supply air box or without a general exhaust box. See the Application Notes section for information on how to set up the controller to operate this way.

NOTE:
Update each controller at the field panel immediately after you have completed the controller start-up procedures and have made all other changes to the controller's point database, including balancing, tuning, and so on.

Verifying Power

1. Verify that the controller has 24 Vac power and that the fuse has been inserted into the trunk or that power to the transformer is ON.
2. Verify that the Basic Sanity Test (BST) LED on the controller flashes once per second.



Verifying Slave Mode Application Number

1. Plug the HMI into the Room Temperature Sensor port. See the above figure showing location of BST LED and RTS Port.
2. Verify that Application 6792 (Slave Mode) is running at the controller.

Setting the Application

1. Set APPLICATION to the desired number.

- Application 6750: BACnet LCM-OAVS VAV Room Pressurization Controller with HW Reheat and Two Fast-acting Venturi Air Valves — One Exhaust, One Supply
- Application 6756: BACnet LCM-OAVS VAV Room Pressurization Controller with BTU Compensation, HW Reheat and Two Fast-acting Venturi Air Valves — One Exhaust, One Supply

2. Set CTLR ADDRESS to the correct value obtained from the controller schedule.
   - Each controller must have a unique address.
   - Typical values are from **00** to **127** for master and **128** to **254** for slave, 255 is reserved.

Configuring Supply and General Exhaust

NOTE:
On a return from power failure, the damper-command DOs (DOs 1 through 4) remain OFF for 5 seconds prior to resuming control. Because of this it is recommended that the Supply Damper (SUP DMPR DIR) be set for Normally Closed (NCLOSE, closed when the actuator is retracted) for rooms where negative or neutral pressurization is required and Normally Opened (NOPEN, open when the actuator is retracted) for positively pressurized rooms. Likewise, it is recommended that the General Exhaust Damper (GEX DMPR DIR) be set to NOPEN for rooms where negative or neutral pressurization is required and NCLOSE for positively pressurized rooms. The default for the SUP/GEX DMPR DIR points is NOPEN.

- Verify that the Fast Acting Lab Electronic Actuators are set correctly.
  - The switch must be set for **Siemens Pulsed Control Signal**.
  - The switch for signal and failsafe direction must be set for expected operation.

Supply

Exhaust

Switch Settings for the Fast Acting Lab Electronic Actuator.

1. Select the direction of the supply damper actuator according to the specification.
   - If the damper is normally closed (closed when the actuator is retracted), set SUP DMPR DIR to **NCLOSED**.
   - If the damper is normally open, set SUP DMPR DIR to **NOPEN**.
2. Check the operation of the supply damper.
   - Verify that the damper opens quickly (full travel time of 3 seconds or less) when the damper command point SUP DMPR CMD is set to 100%.
   - Also, verify that it closes quickly when SUP DMPR CMD is set to –100%.
3. Release SUP DMPR CMD.
4. Select the direction of the general exhaust damper according to the specification.
   - If the general exhaust damper is normally open (open when the actuator is retracted), set GEX DMPR DIR to **NOPEN**.
   - If the damper is normally closed, set GEX DMPR DIR to **NCLOSED**.
5. Check the operation of the exhaust damper.
   - Verify that the damper opens quickly (full travel time of 3 seconds or less) when the damper command point GEX DMPR CMD is set to 100%.
   - Also, verify that it closes quickly when the point is set to –100%.
6. Release GEX DMPR CMD.

Setting Reheat Valve Configuration

1. Find the value of REHEAT AO1 that closes the valve by commanding REHEAT AO1 and observing the motion of the valve actuator. (Note that the presence of a discharge sensor makes it possible to detect valve operation by observing a change in discharge temperature).
   ⇨ Set VALVE CLOSED to this voltage value.
2. Find the value of REHEAT AO1 that opens the valve all the way.
   ⇨ Set VALVE OPEN to this voltage value.
3. Release **REHEAT AO1**.
4. Verify operation of the reheat valve.
   – Override VALVE CMD to **0** and verify that the valve closes.
   – Set VALVE CMD to **100%** and verify that the valve opens.
   – Release **VALVE CMD**.

Setting MIN and MAX Airflow Setpoints

NOTE:
Airflow readings are most accurate when duct velocity is at least 300 fpm.
Minimum values in the Table *Min and Max Flow Limit Points* should be set up with this in mind.

1. Using values from the job specifications, enter the minimum and maximum flow limits for occupied and unoccupied conditions in each air terminal. Enter values for the points in Table *Min and Max Flow Limit Points*.
2. If an unoccupied mode is not specified, set the UOC values equal to the OCC values.
3. If using supply or exhaust only, see the Start-up Notes [➙ 40] sections for setup details.

Min and Max Flow Limit Points.	
OCC SUP MAX	OCC SUP MIN
OCC GEX MAX	OCC GEX MIN
UOC GEX MAX	UOC GEX MIN
UOC SUP MAX	UOC SUP MIN

The equation relating airflow to air velocity is:

Airflow (cfm) = Velocity (fpm) × Duct Area (sq. ft.) × Flow Coefficient

Therefore, for best results: Airflow ÷ (Duct Area × Flow Coefficient) should be > 300.

For example:

UOC SUP MIN ÷ (SUPDUCT AREA × SUP FLO COEF) > 300.

Fume Hood Maximum CFM

1. Set MAX HOOD VOL to the flow corresponding to 10 volts from the input signal source.
   - ➩ If there is more than one fume hood in the room, the signals must be averaged using an averaging and scaling module.
2. If using an FFM, set MAX HOOD VOL to the following: (A02 RANGE × Number of Hoods).
   - ➩ The A02 RANGE point in the FHC must be set to the same value in each FHC (maximum of six fume hoods per LCM).
   - ➩ If there is more than one fume hood in the room, AO2 RANGE in each fume hood must be set to the same value that is the highest max value. For example, if one fume hood is 700 cfm and the second is 1200 cfm, each FHC AO2 RANGE should be set to 1200 cfm, while MAX HOOD VOL in the LCM would be set to 2400 cfm.

The resulting airflow displays in point HOOD VOL.

NOTE:
If no fume hood(s) input will be connected to AI 3, make sure MAX HOOD VOL = **0** (default). This disables the alarm feature that would otherwise occur if the LCM were connected to a fume hood and the fume hood flow input dropped below 1 Vdc. When MAX HOOD VOL = 0, AI 3 is then available to use as a spare input.

Other Supply and Other Exhaust

Airflows not connected to the controller must be taken into consideration when pressurizing the room, including snorkels, canopies, as well as other supplies, such as offices within the lab space controlled by constant volume controllers. Since these inputs are not connected to the controller, the combination of their values must be entered into OTHER SUP and OTHER EXH so the controller can properly control the lab space.

NOTE:
If these airflow values change slowly or predictably (for example, VAV temperature control and/or occ/unoc differences), steps can be taken using PPCL to have the changes sent over the network to update OTHER EXH and OTHER SUP with the new values

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- Set OTHER EXH and OTHER SUP using actual airflow values for any supply or exhaust equipment not connected to the controller that will remain constant.

Setting Volume Differential Setpoints

> **NOTE:**
> Because *volume difference* is defined as total exhaust minus supply, VOL DIF STPT is a positive value when the room is negatively pressurized, and vice versa.

VOL DIF STPT equals UOC DIF STPT during unoccupied mode and OCC DIF STPT during occupancy.

- Set OCC DIF STPT and UOC DIF STPT to the desired value(s). The default is 400 cfm.

Setting TRACK MODE

Track mode (TRACK MODE) can be either Supply Tracks Exhaust (STE) or Exhaust Tracks Supply (ETS).

- Supply Tracks Exhaust mode is useful when trying to maintain negative pressurization.
- Exhaust Tracks Supply mode is useful when trying to maintain positive pressurization.

During Supply Tracks Exhaust, the supply air volume “tracks” or follows the exhaust air volume. If the exhaust air is “broke” (for instance, the general exhaust box damper is stuck open or stuck closed) the supply air will be adjusted so VOL DIF STPT is maintained as much as possible.

The supply air volume cannot go lower than zero and the application will not allow it to go higher than OCC SUP MAX during occupied periods or UOC SUP MAX during unoccupied periods.

During Exhaust Tracks Supply, the general exhaust air volume “tracks” or follows the supply air volume. If the supply air is “broke” (for instance, the supply box damper is stuck open or stuck closed) the general exhaust air volume will be adjusted such that VOL DIF STPT is maintained as much as possible.

The general exhaust air volume cannot go lower than zero and the application does allow it to go higher than OCC GEX MAX during occupied periods or UOC GEX MAX during unoccupied periods.

Track mode can be different during occupied and unoccupied periods, depending on the value of TRACK MODE.

- Set TRACK MODE to the desired value. See the following table.

TRACK MODE Values.	
TRACK MODE (value)	**Description**
0 default	Always STE (Supply Tracks Exhaust), exhaust only.
1	STE during occupancy, ETS during the unoccupied period.
2	ETS during occupancy, STE during the unoccupied period.
3	Always ETS (Exhaust Tracks Supply), supply only.

NOTE:
If TRACK MODE is set greater than 3, it will default to 0.

Setting TRACK METHOD

The TRACK METHOD can be either FLOW or STPT. In most cases, TRACK METHOD should be set to FLOW.

When TRACK MODE is set up for **Exhaust Tracks Supply** flow tracking (ETS):

- TRACK METHOD = FLOW tracking; the general exhaust flow setpoint is calculated using the actual supply airflow being read at the controller.
- TRACK METHOD = STPT tracking; the general exhaust flow setpoint is calculated based on the setpoint for the supply terminal.

However, this module changes over to FLOW tracking mode if the supply cannot reach setpoint.

When TRACK MODE is set up for **Supply Tracks Exhaust** flow tracking (STE):

- TRACK METHOD = FLOW tracking; the supply flow setpoint is calculated using the actual general exhaust airflow being read at the controller.
- TRACK METHOD = STPT tracking; the supply flow setpoint is calculated based on the setpoint for the general exhaust terminal.

However, this module changes over to FLOW tracking mode if the general exhaust cannot reach setpoint.

- Set TRACK METHOD to **FLOW** or **STPT** as desired.

Setting Duct Area

NOTE:
If the LCM will be operating as Supply only, with no General Exhaust box present, or if it will be operating as General Exhaust only with no Supply box present, then follow the instructions in the *Configuring Supply and General Exhaust* section before proceeding to the next section.

If provided, enter the duct area into SUPDUCT AREA and GEXDUCT AREA. Otherwise, use the following table to determine duct area.

Area =	Round Duct	Rectangular Duct
Area in Sq. Ft. (Dimensions in inches)	$(\pi \times R^2)/144$	Length × Height/144
Area in Sq. M (Dimensions in centimeters)	$(\pi \times R^2)/10{,}000$	Length × Height/10,000

NOTE:
When entering the TEC definition for a controller at the field panel, do not enter a duct area. (Choose **N** for none when prompted for the duct shape.) This controller does not send the value of air volume to the field panel in velocity (fpm). Instead, it uses volume (cfm) so a conversion is not necessary.

Setting Flow Coefficients

	⚠ CAUTION
	It is extremely important that the flow readings are accurate. Inaccurate flow readings will cause control problems.

NOTE:
Make sure the airflow sensors are calibrated before determining flow coefficients. This is done by setting CAL AIR to **YES** and waiting for it to switch back to NO on its own.

1. Set SUP FLO COEF and GEX FLO COEF to initial values that match your hardware configuration. See Table *Flow Coefficient Initial Values*.
2. Work with a balancer to obtain the exact value(s) for SUP FLO COEF and GEX FLO COEF using the following formula to fine-tune the flow coefficient:

New Flow Coefficient = (Actual Volume ÷ Controller Volume) × Old Flow Coefficient

The actual volume is the value obtained from the balancer's measurements. The controller volume is the value obtained from GEX AIR VOL and SUP AIR VOL. If the controller volume is not within 5% of the actual volume, repeat the procedure until it is. Loose or kinked flow sensor tubes, tubing connected backwards, and improper actuator and/or Venturi Air Valve operation can cause inaccurate readings.

Flow Coefficient Initial Values.	
SUP FLO COEF	**GEX FLO COEF**
0.68	0.77

Automatic Calibration Option

This only functions when using the OAVS. To set CAL SETUP, select the automatic calibration option that best meets the job's requirements from the following table. It is highly recommended that Option 4, the factory default mode, be used.

At the start of the calibration cycle, the controller automatically sets CAL AIR to **YES**. When the cycle is complete, it sets CAL AIR to **NO**.

NOTE:
The air velocity sensor should be calibrated at least once every 24 hours. Make sure that the sensor has been calibrated before balancing takes place, as this will affect the balancer's results.

CAL SETUP Options.	
CAL SETUP (value)	**Description**
0	Calibration occurs ONLY when the point CAL AIR is set to **YES**.

CAL SETUP Options.	
CAL SETUP (value)	**Description**
1	Calibration occurs when the field panel commands an occupied/unoccupied or a day/night mode changeover.
4 (factory default value)	Calibration occurs on the time interval set in the point CAL TIMER. **Example:** If CAL TIMER = 12, then the calibration period is 12 hours. Actual calibration is subject to a time delay based on the value of CTLR ADDRESS. See the example in Option 1. This is the recommended option when using a controller with an Autozero Module.

Venturi Air Valve Action

In this section you will set VENTURI ACT so that the action of the application matches the operation of the installed valves. The following table assumes that the Venturi air valves have been physically setup—in terms of hardware actuation and linkages—such that setting VENTURI ACT to 1 (default) results in the Supply Venturi being Normally Closed and the Exhaust Venturi being Normally Opened.

VENTURI ACT Values.	
VENTURI ACT (value)	**Description**
0	All Supply and Exhaust Venturi Valves are Normally Closed (Direct Acting)
1 (default)	Supply Venturi Normally Closed, Exhaust Venturi Normally Opened
2	Supply Venturi Normally Opened, Exhaust Venturi Normally Closed
3	All Supply and Exhaust Venturi Valves are Normally Opened (Reverse Acting)

NOTE:
If VENTURI ACT is set greater than 3, it will default to 0.

NOTE:
On a return from power failure, the AOs remain OFF for 5 seconds. Therefore, it is recommended that the Supply Venturi Air Valve be Normally Closed for rooms where negative or neutral pressurization is required, and Normally Opened for positively pressurized rooms. Likewise, it is recommended that the General Exhaust Venturi Air Valve be Normally Opened for rooms where negative or neutral pressurization is required, and Normally Closed for positively pressurized rooms. Setting of the Venturi direction is via VENTURI ACT.

NOTE:
To change the power fail operation, the switches on the Fast Acting Lab Electronic Actuators board must be modified.

The switch for signal and failsafe direction must be set for expected operation.

Supply

Exhaust

Switch Settings for the Fast Acting Lab Electronic Actuator.

Configuring Airflow Control

You should read and understand the sections on *Venturi Air Valve Calibration* and *Table Statement Editing* in the Application documents before setting up airflow control. This is especially important if you need to edit the Venturi table statement during start-up.

Venturi Operational Modes

Mode 1 – Operates with both a PID loop and a Venturi table.

This mode provides the best control and is the most commonly used mode for these applications. In this mode, the embedded Venturi table statements work together with a PID feedback loop to operate the Venturi air valve so that the measured air velocity is maintained at setpoint. The following sections describe this mode.

Mode 2 - Operates with a PID loop, but no Venturi table.

In this mode, the controller operates with PID control based on a flow sensor input, but the Venturi table is not used. See the *PID Only Mode* section for specific information on this mode.

Mode 3 - Operates with Venturi table, but no PID loop

In this mode, the controller operates open loop (without a flow sensor). There is no PID control. Positioning of the actuator is based solely on a Venturi table consisting of command voltages and their resultant corresponding airflows. See the *Open Loop Mode* section for specific information on configuring the application for open loop control.

Before setting up airflow control, you should read and understand the sections on *Venturi Air Valve Calibration* and Table *Statement Editing* in the Application Note documents; this information is located on Info Link or Asset Portal. This is especially important if you need to edit the Venturi table statement during start-up.

Calibrating the Venturi Air Valves (Modes 1, 3)

CAUTION

The LCM cannot calibrate the supply and general exhaust Venturi valves at the same time. They must be calibrated separately.

- Set CAL GEX VLV to **YES**. After approximately three minutes, calibration will finish and the application will automatically set CAL GEX VLV back to NO. If the calibration was successful, GEX VLV STAT will be set to CAL OK. If it reads NOTCAL, the calibration was rejected and the valve must be calibrated again.

Check for loose or kinked flow sensor tubes as well as proper actuator and valve operation, then recalibrate.

CAUTION

Under certain conditions, a Venturi calibration sequence may overwrite the low flow (less than 350 fpm) voltage/flow values that you may have entered into TABLE FLOW and TABLE VOLTS previously.

If this happens, you must edit the Venturi table statement manually. Specifically, you must set the voltage/flow values of the second voltage/flow pair equal to what you previously entered into the low flow point (these are the low flow voltage and flow values that you verified with help from a balancer in the section *Airflow Control*.)

Information on how to edit the Venturi table statement is in *Venturi Table Evaluation and Editing* section. After you have manually set the voltage/flow values of the second supply or exhaust table element equal to the original low flow values, you must then reset the original low flow point back to these same original values. The end result is that the first and second table elements (the low flow point and the one immediately following it) of the affected Venturi Air Valve(s) will have the same voltage and flow values.

Low Flow Operation - Below 350 fpm (Modes 1, 2, 3)

1. Make sure that both the supply and general exhaust Air Velocity Sensors are operating normally (neither SUP AIR VOL nor GEX AIR VOL) has a status of FAILED), and that both Air Velocity Sensors have been calibrated.
2. Read the minimum cfm flow values from the room schedule or from the supply and exhaust Venturi air valve housings. Write down these values.
3. Using the Table *Venturi Airflow @ 350 fpm* and the values from Step 2, determine whether your Venturi air valves will be operating below 350 fpm. If operating below 350 fpm, continue with the following steps. Otherwise, skip to *Verifying Flow Range*.
4. Adjust the voltage to the supply actuator, SUP DMPR AO2, until the desired minimum flow is reached. Verify the flow value with a balancer and write down the voltage value.
5. Set V TABLE PT to **1**. (Setting V TABLE PT to 1 allows the flow (cfm) and voltage values from the first element of the active supply table to be displayed in TABLE FLOW and TABLE VOLTS where they can be edited.)
6. Enter the minimum cfm flow value for the supply Venturi air valve into TABLE FLOW.
7. Enter the minimum voltage value for the supply Venturi air valve actuator into TABLE VOLTS.
8. Adjust the voltage to the general-exhaust actuator, GEX DMPR AO3, until the desired minimum flow is reached. Verify the flow value with a balancer and write down the voltage value.
9. Set V TABLE PT to **31**. (Setting V TABLE PT to 31 allows the flow (cfm) and voltage values from the first element of the active exhaust table to be displayed in TABLE FLOW and TABLE VOLTS where they can be edited.)

10. Enter the minimum cfm flow value for the general-exhaust Venturi air valve into TABLE FLOW.
11. Enter the minimum voltage value for the general-exhaust Venturi air valve actuator into TABLE VOLTS.
12. Set V TABLE PT to **0**.

Venturi Airflow @ 350 fpm.	
Valve Size in Inches	**Cfm**
5	48
6	69
8	122
10	191
12	275
Dual 10	380
Dual 12	550
Triple 12	825

Verifying Flow Range (Modes 1, 2, 3)

CAUTION

You must confirm that the correct, specified minimum and maximum airflows can be reached before the Venturi air valves are calibrated.

Otherwise, calibration could be wrong, in which case, the valve(s) will not work correctly once proper airflow is achieved. If the min/max flows cannot be reached, the fan system must be adjusted.

NOTE:
Set HI LIMIT and LOW LIMIT to the desired values. (See *Stabilizing Unsteady Control*) VENTURI ACT must be set to 1 (default).

1. Make sure that both the supply and general exhaust Air Velocity Sensors are operating normally (neither SUP AIR VOL nor GEX AIR VOL) has a status of FAILED), and that both Air Velocity Sensors have been calibrated.
2. Set SUP DMPR AO2 to **0 volts** and verify that SUP AIR VOL can reach OCC SUP MIN or UOC SUP MIN (whichever is less).
3. Set SUP DMPR AO2 to **10 volts** and verify that SUP AIR VOL can reach OCC SUP MAX or UOC SUP MAX (whichever is greater).
4. Release SUP DMPR AO2.
5. Set GEX DMPR AO3 to **10 volts** and verify that GEX AIR VOL can reach OCC GEX MIN or UOC GEX MIN (whichever is less).

6. Set GEX DMPR AO3 to **0 volts** and verify that GEX AIR VOL can reach OCC GEX MAX or UOC GEX MAX (whichever is greater).
7. Release GEX DMPR AO3.

Editing the Venturi Table (Modes 1, 3)

NOTE:
This procedure does not apply when running Venturi actuators in the PID Only Mode. See *PID Only Mode* for more information.

Normally, there is no need to view or edit the Venturi table statement. However, if the Venturi air valve(s) seem to be reacting incorrectly, or if calibrating the Venturi air valves resulted in an overwrite of the supply or exhaust low flow point, then you may need to view or edit the Venturi table statement. You can do this using the following points: V TABLE PT, TABLE FLOW and TABLE VOLTS. See Table *Venturi Air Valve Table Statement*.

A Venturi Air Valve table statement consists of two sets of voltage/flow values—one set is active and the other inactive. When you run the calibration, the first thing that happens is that the inactive table values are filled in with new values generated by the calibration. Then the application checks these new values to make sure they are good. If they pass (that is, if enough increment correctly), these new values become the active values, and the old active values become inactive. However, if the new values don’t pass, then the old active values remain active.

Running a successful calibration sequence is one way of changing/updating the active values. You can also edit the table manually. Normally this is not necessary, but if you are having flow control problems you may need to edit the table.

In order to manually edit the table statement, you must first know which points in the active table need adjusting. This is done by setting V TABLE PT to the appropriate active point values found in the Table *Venturi Air Valve Table Statement* in order to gather and view the active voltage/flow curve for the Venturi Air Valve and its actuator. By gathering and analyzing the active voltage/flow values (for example, you can plot them on a graph as in the figure *Problematic Venturi Air Valve Voltage/Flow Curves*), you can decide which one(s) need adjusting. The flow curve should be smooth and incremental.

You can change the active values using the following steps:

1. Set V TABLE PT to a “swap” value that tells the application to exchange active table values with inactive table values (see the Table *Venturi Air Valve Table Statement* for swap value).

   ⇨ This step is necessary because the application does not allow active values to be manually overridden.

NOTE:
An exception to this rule is when active values cannot be manually overridden. The first element in the active portion of the table—the low flow point—can be edited directly. The Table *Venturi Air Valve Table Statement* explains this in more detail.

2. Edit the inactive table values.

   ⇨ Since you have just switched the active and inactive portions of the table in Step 1, the inactive values are now identical to what the active values were moments ago. You can now edit these new inactive values by using V TABLE

PT to reference them in TABLE FLOW and TABLE VOLTS. The Table *Venturi Air Valve Table Statement* explains this in more detail.

3. Set V TABLE PT once again to the swap value. This places the newly edited inactive values back into the active portion of the table statement (again, the active and inactive portions of the table are simply swapped). However, before the swap is finalized, the application analyzes your proposed values using the same logic as in a regular calibration sequence.

   ⇨ If your proposed values are good, then the swap is made and the edited values are accepted into the active supply (or exhaust) portion of the table. Depending on which portion of the table you were editing, SUP VLV STAT or GEX VLV STAT is marked PASS and control of the Venturi Air Valve resumes.

   ⇨ However, if it is marked FAIL, you must gather and view the voltage/flow values to see where the problem lies.

The following table lists all values for V TABLE PT and describes their use.

Venturi Air Valve Table Statement

	V TABLE PT	Description
	0	Default value for **V TABLE PT**. When **V TABLE PT** equals 0, changes to **TABLE FLOW** or **TABLE VOLTS** are ignored. Setting **V TABLE PT** to 0 cancels an edit session.
Active Supply	1	Setting **V TABLE PT** to 1 takes the flow (cfm) and voltage values from the first element of the active supply table and displays them in **TABLE FLOW** and **TABLE VOLTS** where they can be edited. (This is the only active supply element (or “point”) that can be directly edited.) Flow and voltage values are not allowed to exceed those in active supply point 2. To operate in the range below minimum readable flow (less than 350 fpm), a low flow value in cfm from either the room schedule or the supply Venturi Air Valve housing is entered into **TABLE FLOW**, with the correct corresponding actuator voltage determined/confirmed by the balancer and entered into **TABLE VOLTS**. **NOTE:** This point is only necessary for supply Venturi Air Valve operation in the range below minimum readable flow (below 350 fpm). Otherwise it can be ignored. This low flow point must be entered only after other non-zero points exist in the table as a result of manual edits, or as the result of a prior Venturi auto calibration sequence.
	2 - 16	This portion of the table (2 through 16) can be viewed but not edited directly. When a point is selected (that is, when **V TABLE PT** is set to a value 2 through 16), the corresponding flow and voltage values are displayed in TABLE FLOW and **TABLE VOLTS**. Setting **V TABLE PT** to 2 will result in the smallest readable flow and associated voltage for the supply Venturi Air Valve to be displayed in **TABLE FLOW** and **TABLE VOLTS**; setting V TABLE PT to 16 will result in the maximum flow and associated voltage for the supply Venturi Air Valve to be displayed in TABLE **FLOW** and **TABLE VOLTS**. The in between values (3 through 15) are for the range of flow between min and max. **NOTE:** The table swap will fail if valid flow and voltage values are not entered in point 16. Table entries marked as failed display FAIL for both flow and voltage.

<table>
<tr><th colspan="3">Venturi Air Valve Table Statement</th></tr>
<tr><th></th><th>V TABLE PT</th><th>Description</th></tr>
<tr><td rowspan="2">Active Exhaust</td><td>31</td><td>Setting V TABLE PT to 31 takes the flow (cfm) and voltage values from the first element of the active exhaust table and displays them in TABLE FLOW and TABLE VOLTS where they can be edited. (This is the only active exhaust element (or “point”) that can be directly edited.) Flow and voltage values are not allowed to exceed those in active exhaust point number 32.
To operate in the range below minimum readable flow (less than 350 fpm), a low flow value in cfm from either the room schedule or the general-exhaust Venturi Air Valve housing is entered into TABLE FLOW, with the correct corresponding actuator voltage determined/confirmed by the balancer and entered into TABLE VOLTS.
NOTE: This point is only necessary for general-exhaust Venturi Air Valve operation in the range below minimum readable flow (below 350 fpm). Otherwise it can be ignored. This low flow point must be entered only after other non zero points exist in the table as a result of manual edits, or as the result of a prior Venturi auto calibration sequence.</td></tr>
<tr><td>32 - 46</td><td>This portion of the table (32 through 46) can be viewed but not edited directly. When a point is selected (that is, when V TABLE PT is set to a value 32 through 46), the corresponding flow and voltage values are displayed in TABLE FLOW and TABLE VOLTS.
Setting V TABLE PT to 32 will result in the smallest readable flow and associated voltage for the exhaust Venturi Air Valve to be displayed in TABLE FLOW and TABLE VOLTS; setting V TABLE PT to 46 will result in the maximum flow and associated voltage for the exhaust Venturi Air Valve to be displayed in TABLE FLOW and TABLE VOLTS. The in between values (33 through 45) are for the range of flow between min and max.
NOTE: The table swap will fail if valid flow and voltage values are not entered in Point 46.
Table entries marked as failed display FAIL for both flow and voltage.</td></tr>
<tr><td>Inactive Supply</td><td>61 – 76</td><td>This portion of the table can be viewed and edited. The user enters a point (any value 61 through 76) into V TABLE PT and the corresponding cfm and voltage values display in TABLE FLOW and TABLE VOLTS where they can be edited.</td></tr>
<tr><td>Inactive Exhaust</td><td>91 – 106</td><td>This portion of the table can be viewed and edited. By entering a point (any value 91 through 106) into V TABLE PT, the corresponding cfm and voltage values display in TABLE FLOW and TABLE VOLTS where they can be edited.</td></tr>
<tr><td>Supply Swap</td><td>120</td><td>Setting V TABLE PT to 120 instructs the controller to evaluate the values in the inactive supply portion of the table using standard calibration pass/fail logic. If they pass, they are exchanged with those in the active supply portion of the table.</td></tr>
<tr><td>Exhaust Swap</td><td>121</td><td>Setting V TABLE PT to 121 instructs the controller to evaluate the values in the inactive exhaust portion of the table using standard calibration pass/fail logic. If they pass, they are exchanged with those in the active exhaust portion of the table.</td></tr>
</table>

- If **SUP FLO COEF** is 0, the table edit feature uses a supply flow coefficient of 1.
- If **SUPDUCT AREA** is 0, the table edit feature uses a supply duct area of 1 square foot.

PID Loop Only Operation (Mode 2)

NOTE:
The default P gain value is intended for PID operation in conjunction with the Venturi table. When operating without the Venturi table the application is slower to respond. Therefore, you should adjust the P gain as needed when operating in PID Only mode to ensure acceptable performance.

The Venturi calibration table initially contains all zeros by default, that is, it contains no calibration information. When the application detects a zero flow for the sixteenth entry (the table entry with the highest flow), the application does operate, but runs with **only** PID control. If PID only control is satisfactory for a given job, there is no need to populate the Venturi tables.

Open Loop Operation (Mode 3)

To operate open loop control with manual entry of Venturi table:

1. Set **G OPEN LOOP** to **YES** to indicate that the respective actuator is to operate open loop.
2. Use the *Venturi Table Evaluation and Editing* procedure. For additional information on the open loop table values, see appropriate application manual.

To operate open loop control with automatic entry of Venturi table:

1. Temporarily connect an AVS flow sensor to the application.
2. Temporarily set **G OPEN LOOP** to **NO**.
3. Initiate the Venturi calibration sequence as described earlier in this document
4. Remove the flow sensor.
5. Set **G OPEN LOOP** to **YES** to indicate that the respective actuator is to operate open loop.

The point values above are for the exhaust table. Open loop supply operation is similar, but the points used are 1-16, not 30-46.

Tuning the Flow Loops (Mode 1, 2, 3)

NOTE:
This procedure does not apply to Venturi actuators that are configured to run open loop.

CAUTION

Adjusting P gains (supply and/or exhaust) to values greater than 0.1 may cause system instability.

1. Set VOL DIF STPT to **0**.
2. Change the flow by commanding SUP FLO STPT and examine the response. If the airflow oscillates or overshoots significantly, or if the supply damper oscillates, reduce the gain (SUP P GAIN). If it takes too long to reach the setpoint, increase SUP P GAIN. Try different values—it should move accurately and with stability. When the desired performance is achieved, release SUP FLO STPT.
3. Repeat the process for GEX FLO STPT, adjusting GEX P GAIN if necessary. When the desired performance is achieved, release GEX FLO STPT.
4. Release VOL DIF STPT.

Stabilizing Unsteady Control (Mode 1, 2, 3)

NOTE:
This procedure does not apply to Venturi actuators that are configured to run open loop.

HI LIMIT and LO LIMIT can be configured to keep the controller from hunting around the supply and general exhaust airflow setpoints.

By increasing the HI LIMIT and decreasing the LO LIMIT, a deadband is set up around the setpoints. For example, if the values for HI LIMIT and LO LIMIT are set to 1.10 and 0.90 respectively, and the flow is within 10% of setpoint, the airflow PID loop stops controlling and leaves the actuator in its last position. Active control resumes once the flow leaves the deadband. (Setting both points to 1.0 disables this feature. Setting LO LIMIT greater than or equal to HI LIMIT also disables this feature.)

- Set HI LIMIT and LOW LIMIT to the desired values.

Setting Control Modes (VAV and/or CV)

Applications can operate as either a variable air volume (VAV) controller or a constant volume (CV) controller. These operational modes can vary between the occupied and unoccupied periods, if desired.

VAV means that the supply airflow can be varied to provide cooling. *CV* means the supply airflow is not a source of cooling. However, the supply and general exhaust can still change in CV mode to keep the volume differential setpoint constant. This is necessary if HOOD VOL is varying.

The Table *VOLUME STATE Values* shows what the application does when VOLUME STATE is at a particular value.

- Set VOLUME STATE to the desired value.

VOLUME STATE Values.	
VOLUME STATE (value)	**Description**
0	Always Constant Volume.
1 (default)	VAV during occupancy, Constant Volume during unoccupied period.
2	Constant Volume during occupancy, VAV during unoccupied period.
3	Always VAV.

NOTE:
If VOLUME STATE is set greater than 3, it will default to 0.

Setting Room Pressurization Control Mode

In this section you will configure the points that determine room pressurization during occupied and unoccupied modes while the controller is operating as VAV or CV.

OCC CV MODE

If VOLUME STATE is **0** or **2** (that is, if the controller operates in the Constant Volume Mode during the occupied period) then this procedure needs to be performed. Otherwise, this section can be skipped.

1. Set NET OCC CMD to **OCC**, if it is not there already, to ensure that the LCM is in the occupied mode.

2. Set OCC SUP MIN to be numerically equal to OCC SUP MAX. (Setting OCC SUP MIN to be numerically equal to OCC SUP MAX sets the constant volume setpoint to be as high as possible during the occupied period.)

   ⇨ Make sure that the system operates at the VOL DIF STPT and that the room is pressurized properly when the hood is opened and when the hood is closed. (by checking the value of VOL DIFFRNC). During occupied mode VOL DIF STPT equals OCC DIF STPT.

3. Set OCC SUP MIN to its desired value for the job. (This sets the constant volume setpoint to be as low as possible during the occupied period.)

   ⇨ Make sure that the system operates at the VOL DIF STPT and that the room is pressurized properly when the hood is opened and when the hood is closed. (by checking the value of VOL DIFFRNC). During occupied mode VOL DIF STPT equals OCC DIF STPT.

4. When all conditions have been checked, set both OCC SUP MIN and OCC SUP MAX back to their desired values for the job. If NET OCC CMD is overridden, release it.

NOTE:
Set OTHER EXH and OTHER SUP to take into account any supply or exhaust airflow values from equipment or sources not connected to the controller.
If these airflow values change slowly or predictably (for example, VAV temp control and/or occ/unoc differences), steps should be taken to have the changes sent over the network to update OTHER EXH and OTHER SUP with the new values. This can be done apart from these startup instructions

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UNOCC CV MODE

If VOLUME STATE is **0** or **1** (that is, if the controller operates in the Constant Volume Mode during the unoccupied period) then this procedure needs to be performed. Otherwise, this section can be skipped.

1. Do the following to ensure that the LCM is in the unoccupied mode:
   a. Set NET OCC CMD to **UNOCC** if it is not there already.
   b. Set OCC ENA to **0** if it is not there already.

2. Set UOC SUP MIN to be numerically equal to UOC SUP MAX. (Setting UOC SUP MIN to be numerically equal to UOC SUP MAX sets the constant volume setpoint to be as high as possible during the unoccupied period.)

   ⇨ Make sure that the system operates at the VOL DIF STPT and that the room is pressurized properly when the hood is opened and when the hood is closed. (by checking the value of VOL DIFFRNC). During occupied mode VOL DIF STPT equals OCC DIF STPT.

3. Set UOC SUP MIN to its desired value for the job. (This sets the constant volume set point to be as low as possible during the unoccupied period.)

   ⇨ Make sure that the system operates at the VOL DIF STPT and that the room is pressurized properly when the hood is opened and when the hood is closed. (by checking the value of VOL DIFFRNC). During occupied mode VOL DIF STPT equals OCC DIF STPT.

4. When all conditions have been checked, set both UOC SUP MIN and UOC SUP MAX back to their desired values for the job. If NET OCC CMD is overridden, release it.

NOTE:
Set OTHER EXH and OTHER SUP to take into account any supply or exhaust airflow values from equipment or sources not connected to the controller.
If these airflow values change slowly or predictably (for example, VAV temp control and/or occ/unoc differences), steps should be taken to have the changes sent over the network to update OTHER EXH and OTHER SUP with the new values. This can be done apart from these startup instructions

OCC VAV MODE

If VOLUME STATE is **1** or **3** (that is, if the controller operates in the VAV Mode during the occupied period) then this procedure needs to be performed. Otherwise, this section can be skipped.

1. Set NET OCC CMD to **OCC**, if it is not there already, to ensure that the LCM is in the occupied mode.

2. Verify pressurization in at least four airflow operating conditions. Make sure that the system operates at the VOL DIF STPT and that the room is pressurized properly. Use the following operating conditions:
   a. Hoods open, minimum cooling
   b. Hoods closed, minimum cooling
   c. Hoods open, maximum cooling
   d. Hoods closed, maximum cooling

NOTE:
To achieve the required conditions, set TEMP CTL VOL equal to OCC SUP MAX for maximum cooling and to OCC SUP MIN for minimum cooling.

3. When all conditions have been checked, release TEMP CTL VOL. If NET OCC CMD is overridden, release it.

NOTE:
Set OTHER EXH and OTHER SUP to take into account any supply or exhaust airflow values from equipment or sources not connected to the controller.
If these airflow values change slowly or predictably (for example, VAV temp control and/or occ/unoc differences), steps should be taken to have the changes sent over the network to update OTHER EXH and OTHER SUP with the new values. This can be done apart from these startup instructions

UNOCC VAV MODE

If VOLUME STATE is **2** or **3** (that is, if the controller operates in the VAV Mode during the unoccupied period) then this procedure needs to be performed. Otherwise, this section can be skipped.

1. Do the following to ensure that the LCM is in the unoccupied mode:
   a. Set NET OCC CMD to **UNOCC** if it is not there already.
   b. Set OCC ENA to **0** if it is not there already.

2. Verify pressurization in at least four airflow operating conditions. Make sure that the system operates at the VOL DIF STPT and that the room is pressurized properly. Use the following operating conditions:
   a. Hoods open, minimum cooling
   b. Hoods closed, minimum cooling
   c. Hoods open, maximum cooling
   d. Hoods closed, maximum cooling

NOTE:
To achieve the required conditions, set TEMP CTL VOL equal to UOC SUP MAX for maximum cooling and to UOC SUP MIN for minimum cooling.

3. When all conditions have been checked, release TEMP CTL VOL. If NET OCC CMD is overridden, release it.

NOTE:
Set OTHER EXH and OTHER SUP to take into account any supply or exhaust airflow values from equipment or sources not connected to the controller.
If these airflow values change slowly or predictably (for example, VAV temp control and/or occ/unoc differences), steps should be taken to have the changes sent over the network to update OTHER EXH and OTHER SUP with the new values. This can be done apart from these startup instructions

AVS FAILMODE

AVS FAILMODE is an enumerated point that describes how the supply Venturi Air Valve and the general exhaust Venturi Air Valve will respond if one or both Air Velocity Sensors (AVS) fail. It can handle both positively pressurized rooms and negatively pressurized rooms.

The default value of AVS FAILMODE is **0**. This default causes both the supply and general exhaust to hold their current position when an AVS fails. Open Supply, Open Exhaust and Close Supply, Close Exhaust are not defined AVS FAILMODE states.

Tables *AVS Failure and AVS FAILMODE Values* shows what the application does when AVS FAILMODE is at a particular value and an air velocity sensor(s) has failed.

Set AVS FAILMODE to the desired value.

AVS Failure and AVS FAILMODE Table Values.	
	AVS FAILMODE
0 (default)	Hold Supply, Hold General Exhaust
1	Hold Supply, Open General Exhaust
2	Hold Supply, Close General Exhaust
3	Open Supply, Hold General Exhaust
4	Close Supply, Hold General Exhaust
5	Close Supply, Open General Exhaust
6	Open Supply, Close General Exhaust
7	VENTILATION
8	PRESSURE

CAUTION

If AVS FAILMODE is set to a value of 7 or 8, then VOL DIF MIN and VOL DIF MAX values must have the same sign. They must both be positive, or they must both be negative. Otherwise, damper(s) will respond incorrectly.

Alarms

ALARM ENA is an analog point whose value determines whether or not a particular alarm activates ALARM DO7.

For ALARM ENA, the terms enabled and not enabled do not mean that a particular alarm is enabled or not. It means whether or not a particular alarm will or will not activate ALARM DO7. For example, if ALARM ENA is set to **1** (Vent Alarm Enabled) and a ventilation alarm occurs, then both VENT ALM and ALARM DO7 will turn on. However, if ALARM ENA is not Vent Alarm Enabled and a ventilation alarm occurs, VENT ALM will turn on, but ALARM DO7 will not.

- Using the job specification, determine which alarms are required and set them up accordingly.

ALARM ENA Values.	
	ALARM ENA
0 default	No alarms are enabled.
1	Vent Alarm is enabled.
2	Alarm Switch is enabled.
4	Dif Alarm is enabled.
5	Vent Alarm and Dif Alarm are enabled.
6	Alarm Switch and Dif Alarm are enabled.

ALARM ENA Values.	
	ALARM ENA
7	Vent Alarm, Alarm Switch, and Dif Alarm are all enabled.

NOTE:
If ALARM ENA is set greater than 7, it will default to 0.

ALM ENA is additive. For example, if ALM ENA equals 5, then either a ventilation or a pressurization alarm would activate ALARM DO7, but the alarm switch would not.

Pressurization Alarm

1. To set the pressurization alarm, set DIF ALM DBD to the alarm level specified. If no value is specified, use the default value, provided that the warning that follows is satisfied.

WARNING

To ensure that VOL DIF ALM turns on before the pressure in the room changes sign, DIF ALM DBD must be less than the absolute value of VOL DIF STPT.

For example, if negative pressure is desired and VOL DIF STPT equals 70 cfm and DIF ALM DBD is 200 cfm, then the room could go positive by almost 130 cfm without the pressure alarm turning on. In this case, if you want the alarm to turn on before the room changes sign, then you must set DIF ALM DBD to be less than 70 cfm.

2. For delay time, set DIF ALM DEL to the value specified. If no value is specified, start with the default value of 30 seconds. Adjust as required to eliminate nuisance alarms.
3. Set ALARM ENA to a value that enables the pressure alarm (4, 5, 6, or 7) if the specification requires annunciation of the pressurization alarm through a local alarm device connected to ALARM DO7.

NOTE:
VOL DIF ALM is the output point that indicates an alarm condition.

Hardware Switch

The hardware alarm switch is ALM SWIT DI6. If the specification requires that the controller pass alarms from other equipment (connected to ALM SWIT DI6) to a local alarm device using ALARM DO7, then set ALARM ENA to a value that enables the Alarm Switch (**2**, **3**, **6**, or **7**).

Ventilation Alarm

1. Set OC V ALM LVL to the specified alarm level for the occupied mode. It may be specified in air changes per hour. If so, convert it to cfm (lps).
   If no ventilation alarm is required, set OC V ALM LVL to **0** (zero).
2. Set UC V ALM LVL to the specified value for the unoccupied mode. If no unoccupied mode is specified, use the same value as OC V ALM LVL.
   (If ventilation alarms are not required during unoccupied mode, set UC V ALM LVL to **0** (zero).

NOTE:
Setting the alarm level to zero means the ventilation alarm will not turn on just because of a low value for TOTL SUPPLY. However, even if the alarm level is set to zero, the ventilation alarm will still turn on if:

- SUP AIR VOL stays below the currently active supply minimum for a time at least equal to VENT ALM DEL.

and/or

- GEX AIR VOL stays below the currently active general exhaust box minimum for a time at least equal to VENT ALM DEL.

   – In the previous note, the currently active supply flow minimum is OCC SUP MIN during occupancy and UOC SUP MIN during the unoccupied period. Likewise, the currently active general exhaust box minimum is OCC GEX MIN during occupancy and UOC GEX MIN during the unoccupied period.

3. For the alarm delay, set VENT ALM DEL to the value specified. If no value is specified, use the default value.
4. Set ALARM ENA to a value that enables the ventilation alarm (**1**, **3**, **5**, or **7**) if the job specification requires annunciation of the ventilation alarm through a local alarm device connected to ALARM DO7.

NOTE:
VENT ALM is the output point that indicates an alarm condition.

Network Alarms

If must indicate other alarms in the local ALARM DO7, they may be programmed in the field panel to work through NET ALM CMD. No setup is required at the controller to enable this function.

Setting Occupancy Control

OCC ENA is an analog point whose value determines whether or not OCC BUTTON, or OCC SWIT DI2, is enabled.

Table *OCC ENA Values* shows what is enabled when OCC ENA is at a particular value.

OCC ENA Values	
OCC ENA (value)	**Description**
0 (default)	Both OCC BUTTON and OCC SWIT DI2 are disabled.
1	Only OCC BUTTON is enabled.
2	Only OCC SWIT DI2 is enabled.

NOTE:
OCC ENA does not allow both OCC BUTTON and OCC SWIT DI2 to be enabled at the same time. This is because the switch point is a maintained input, while the button point is a momentary input. By setting OCC ENA to 1 or 2, the controller can be configured to be on the lookout for one or the other input type. It cannot be on the lookout for both types of input at the same time.

If OCC ENA is set greater than 2, it will display a 0 and act like it was set to 0.

NOTE:
There is no timeout for the push button input on lab controllers.

1. To set up occupancy control, determine the occupancy triggers required by the job specification.
   – If the controller must set occupancy according to the state of a switch connected to OCC SWIT DI2 set OCC ENA to **2**.
   – If the controller must set occupancy according to the push button on the room thermostat, set OCC ENA to **1**.
   ⇨ If there are other occupancy criteria, they may be programmed at the field panel to work through NET OCC CMD. The controller does not require any setup for this.
   ⇨ If network commands are not required and occupancy will be set by sources in the room, set NET OCC CMD to **UNOCC**. (If NET OCC CMD = OCC, the controller stays in occupied mode.)
2. If there is no unoccupied mode specified, do the following:
   – Set OCC ENA to **0** (default).
   – Set NET OCC CMD to **OCC** (default).

Setting Discharge Temperature Control

If the discharge temperature limits are called out in the specification, set DISCH MIN and DISCH MAX according to the specification. If they are not called out, then set the limits according to the desired HVAC system operation. For example, from 55°F to 80°F.

1. Set DISCH MIN to match the temperature supplied by the air handler. It should be set a few degrees lower than the air handler temperature. This will prevent undesired heating if there is some discrepancy between the sensor in the air handler and the one in the supply terminal.
2. Set DISCH MAX according to the heating function required.
   - Many lab rooms do not need "heat," meaning they never need supply air to come in above the room temperature setpoint. The reheat equipment only serves to reduce the cooling effect of the supply airflow. In this case, set DISCH MAX a few degrees higher than the room temperature setpoint.
   - Rooms with significant exposure to cold outside conditions may call for discharge temperatures significantly above the room temperature. In these rooms, DISCH MAX should be set to the warmest discharge temperature desired for the heating function—for example, 90 degrees.
3. Check the operation of the discharge temperature loop by overriding DISCH STPT and observing the response of DISCH TEMP. Tune the discharge temperature loop if necessary.
   - The discharge temperature loop is more sensitive at low airflow than at high airflow. Check tuning at a low flow (such as minimum) by overriding the setpoint and observing the response of the discharge temperature.
   - Overshoot is acceptable as a suggested response (even 5 to 10 degrees), but it should dampen out within 1 or 2 cycles. Small sustained oscillations may be acceptable if they do not overwork the valve. If acceptable performance is achieved at low flow, then the system should be stable, but not too slow at high flow.
4. Release DISCH STPT.

To set room temperature control, enter the room temperature setpoint (ROOM STPT) or set the thermostat dial. The room temperature should settle at the setpoint with very little oscillation within an hour. If it does not settle out or reach the setpoint, adjust the room temperature loop gains.

NOTE:
Advanced PID algorithms have been implemented at and near the setpoint to minimize actuator repositioning.

Room Temperature Setpoint Limits

If the room temperature sensor has a setpoint dial that will be used, set RM STPT MIN and RM STPT MAX for the minimum and maximum allowable room temperature set point values, respectively. Common values for these points are 65°F (18°C) for RM STPT MIN and 80°F (27°C) for RM STPT MAX.

NOTE:
If CTL STPT is going to be controlled from a field panel, this section can be skipped. When CTL STPT is overridden or controlled by a field panel, RM STPT MIN/MAX are ignored.

Setting Room Temperature Control

To set room temperature control, enter the room temperature setpoint (ROOM STPT) or set the thermostat dial. The room temperature should settle at the setpoint with very little oscillation within an hour. If it does not settle out or reach the setpoint, adjust the room temperature loop gains.

NOTE:
Advanced PID algorithms have been implemented at and near the setpoint to minimize actuator repositioning.

NOTE:
When using a Series 2000 Room Thermostat:
During **unoccupied mode**, you cannot change the Room Setpoint using a Siemens Industry Series 2000 thermostat. Any attempt to change Room Setpoints during unoccupied mode using a Series 2000 stat will be ignored.

During **occupied mode**, the Room Setpoint can be changed using a Series 2000 stat. However, if it is, then the controller initial values should be uploaded to the field panel; otherwise, the controller will not keep the adjusted Room Setpoint value upon return from a power failure.

For more information, contact your local Siemens Industry representative.

Room Temperature Offset (Optional)

TEMP OFFSET is a user-adjustable offset that will compensate for deviations between the value of ROOM TEMP and the actual room temperature. This correct value is displays in CTL TEMP.

CTL TEMP = ROOM TEMP + TEMP OFFSET

Example

If the actual room temperature is 72.0°F, and the value of ROOM TEMP is 73.0°F, then the value entered into TEMP OFFSET is –1.0. In this case, the value of ROOM TEMP would read 73.0°F, but the value of CTL TEMP would read 72.0°F.

NOTE:
Update each controller at the field panel immediately after you have completed the controller start-up procedures and made all other changes to the controller's point database, including balancing, tuning, and so on.

Setting SENSOR SEL

SENSOR SEL is a configurable, enumerated point (values are additive). This point tells the controller what type of room unit is being used and how to handle loss of communication, for more information see Fail Mode Operation. It also provides the ability to enable the optional RH and CO2 sensors and indicates which thermistor type is connected.

Room Temperature, Setpoint, RH and CO2

- When the digital room unit (Series 2200/2300) is used, SENSOR SEL selects the source for temperature and setpoint and enables a loss of communications indication:
  - 1 = enables supervision (from the room unit) for fail communications for temperature and setpoint.
  - 2 = enables supervision (from the room unit) for fail communications for relative humidity.
  - 4 = enables supervision (from the room unit) for fail communications for CO2.
- When the analog room unit (Series 1000/2000) is used, SENSOR SEL values for temperature/setpoint, relative humidity and CO2 should be left at their default values (0).

Thermistor Inputs

- Default for input is 10K.
- To enable 100K Ω thermistor on input, see the following table for additive values.

MODHTG FLO

As a safety feature for jobs where reheat is an electric element, these applications include MODHTG FLO to ensure that adequate airflow is present before reheat is energized. The value is in feet-per-minute (fpm) and is defaulted to 300 fpm, which means that the airflow must be at least 300 fpm before heating output is enabled. (Using fpm (feet per minute) rather than cfm (cubic feet per minute) makes the feature not dependent on duct size.)

A value of 300 fpm equates to the following cfm:

In a 12 inch diameter duct and a typical flow coefficient of 0.7, 300 fpm equates to 158 cfm.

12 inch diameter = 0.75 sq ft

0.75 sq ft * 300 fpm * 0.7 = 158 cfm

In an 8 inch diameter duct and a typical flow coefficient of 0.7, 300 fpm equates to 74 cfm.

8 inch diameter = 0.35 sq ft

0.35 sq ft * 300 fpm * 0.7 = 74 cfm

The default value of 300 fpm can be raised or lowered as required based on the manufacturer's minimum flow recommendation for a given electric reheat element. As the fpm changes by a certain percentage, the associated minimum cfm for a given duct size will also change by that same percentage.

If the application uses hot water heat rather than electric heat, then MODHTG FLO may be set lower than the default value of 300. This would allow reheating to occur even if for some reason the box is operating well below its designated minimum flow setting.

In the open loop mode, the measured airflow is always 0. To re-enable heating, the MOD HTG FLO value must be set to 0. When used with an electric reheat, the 0 should be set only after a thorough safety review that the electric heating mechanism has sufficient internal safeguards (that is, resetable shutoffs) that would operate if the system actually did have insufficient flow.

Configuring BACnet Parameters

Using WCIS, do the following:

1. From the **Device** menu, select **Device Properties** to configure BACnet parameters.
2. In the **Object** section, enter information for the following fields:
   – **Instance Number** – unique to BACnet network (valid values are 0 through 4,194,303).
   – **Object Name** – unique to BACnet network (30 alphanumeric character limit in RAD50).
   – **Device Description** – description of controller (60 alphanumeric character limit).
   – **Device Location** – physical location of controller (60 alphanumeric character limit).
3. In the **BACNet Communication Settings** section:
   – **Set the CIS/MMI Command Priority to the desired value.**
   – Set **Baud Rate** to the MS/TP network baud rate. Options are; 9600, 19200, 38400 or 76800.
4. In the **MSTP Slave** section do one of the following:
   – Check the **MS/TP Slave** check box if the controller is to function as a slave device (when address range is 0 through 127).
   – Set the **Max Master Node** number.
5. In the **Device Settings** section (configuring the Room Unit port), do one of the following:
   – If using a sensing only Room Unit, the baud rate can be 1200 to 38400. Use **38400** for optimal use with WCIS.
   – If using a communicating digital Room Unit, the baud rate uses whatever rate the network is using or sets it to 19200 after the controller address is configured.
6. Press the **Write** button. The controller accepts the configuration values and then resets.
   ⇨ When the BACnet MS/TP TEC is successfully installed, the RX and TX LEDs continuously flashes On/Off rapidly. This indicates a proper communication with other devices on the network.

Auto Discover and Auto Addressing

An improved commissioning workflow has been designed for all BACnet PTEC controllers (standard 66*xx* applications) along with WCIS (Revision 4.0 and later). This provides the option to use the MS/TP network (using the field panel or a router) and the WCIS tool to discover and auto-address each controller. For more information, see the *WCIS Online Help*.

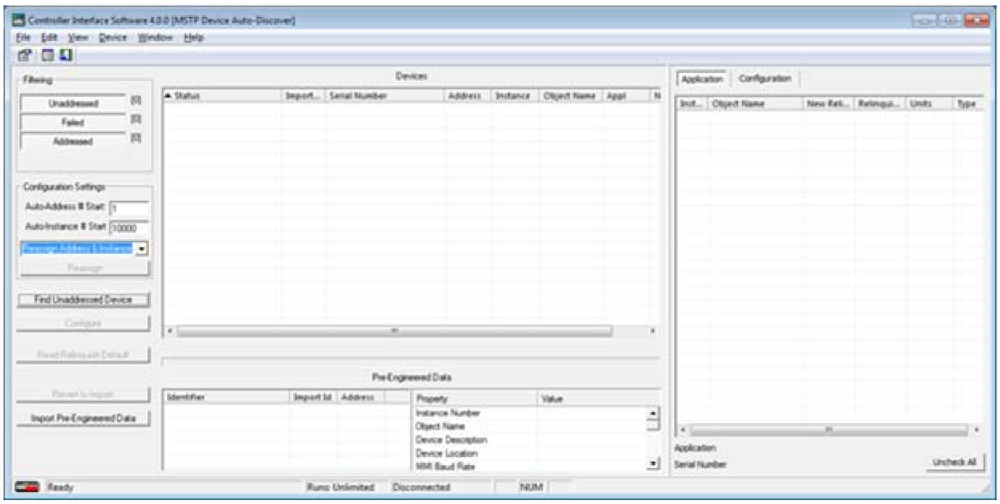
NOTE:
The current workflow will continue to support setting the baud rate and address for each controller using the HMI port or at the room unit.

▷ All BACnet PTEC controllers (standard 66*xx* applications) have an internal unique serial number and a two part serial number label.

1. Connect WCIS to the field panel or use a router connected to the MS/TP network.
2. Assign one PTEC a valid address (using the serial number). This will establish and set the baud rate for the entire network.

Auto Discovery allows you to automatically discover and identify PTEC/ATEC controllers on the BACnet MS/TP Network. There are two basic configurations:

- Devices not configured with an address. (Devices are discovered by their unique serial number.)
- Devices configured with an address and available for modification.



Filtering

These buttons allow you to select what you see in the **Auto-discovery** window. All three buttons are selected by default.

- **Unaddressed** - Displays unaddressed devices
- **Failed** - Displays failed devices
- **Addressed** - Displays addressed devices

Configuration Settings

- **Auto Address # Start** - Beginning address number. An address is reserved for each discovered device starting with this number.
- **Auto Instance # Start** - Beginning instance number. An instance number is reserved for each discovered device starting with this number.
- **Reassign Address and Instance** drop-down menu - Reassigns the address and instance number of the selected device(s).
- **Reassign Address Only** drop-down menu - Reassigns the address of the selected device(s).
- **Reassign Instance Only** drop-down menu - Reassigns the instance of the selected device(s).

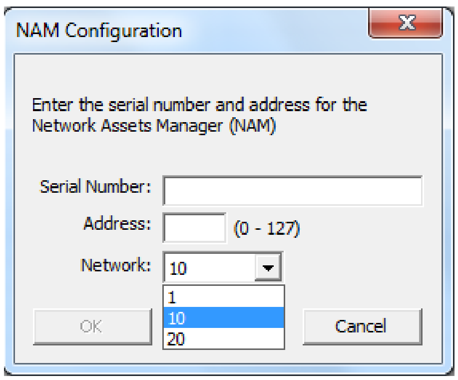
Auto-Discovery

- **Find Unaddressed Device** - Searches the connected network for all devices (addressed and unaddressed).
- **Configure** - Sends modified application data to the controller(s).
- **Read Relinquish Default** - Refreshes relinquish default column of the Application tab with values from the controller.
- **Revert to Import** - Returns to Pre-Engineered Data after changes have been made.
- **Import Pre-Engineered Data** - A .csv file can be used to set initial values in the controller. The file can be taken from Commissioning Tool or exported from Excel. See Commissioning a Controller [→ 37].

Auto-Discovery Procedure

- Click **Find Unaddressed Device**.

  ⇨ If a NAM (Network Asset Manager) device is not defined, the **NAM Configuration** window displays. All new TECs can be assigned as a NAM.

  – Enter the serial number (found on print from electrician).

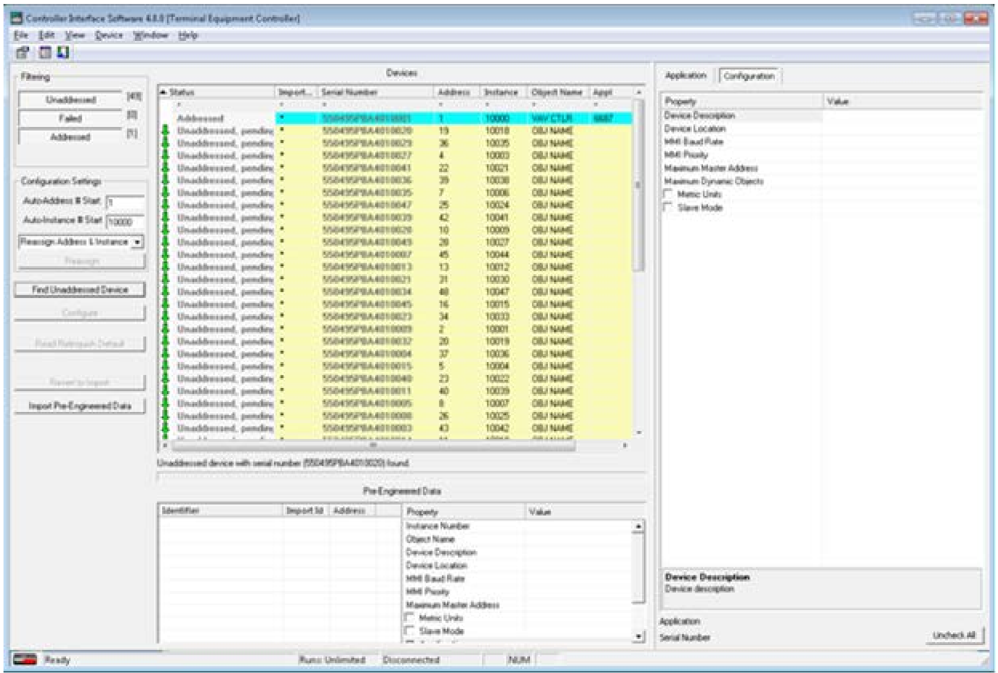
  – Enter a unique (unused) address (0 through 127).

  – Click **OK**.

⇨ The device is assigned as the NAM for the network with the address you specified.

⇨ The NAM device auto-discovers all other devices on the network.

⇨ WCIS displays all devices.

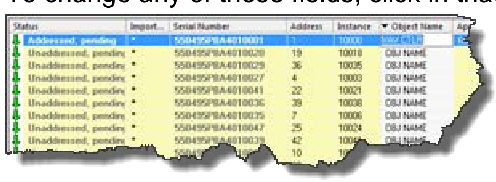


Configuring Discovered Devices

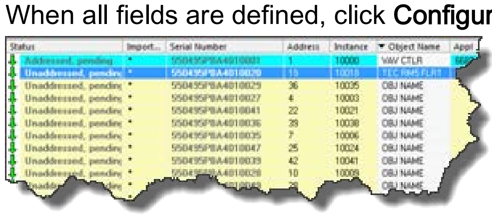
Each device on the network must have unique identifiers in the following fields:

- Address
- Instance
- Object Name - 30 alphanumeric character limit for Siemens field panels.

1. To change any of these fields, click in that field and enter the desired value.

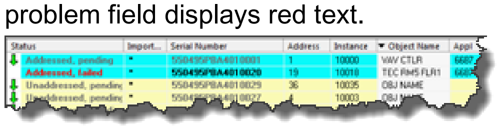


2. When all fields are defined, click **Configure**.



   ⇨ All devices defined properly displays `Addressed`.

   ⇨ If a device has not been defined properly, it displays `Unaddressed` and the problem field displays red text.



3. Correct any issues and click **Configure**.

Commissioning a Controller

Learning the Application Point Team

Once a device has been addressed, select your application.

- Do one of the following:
  – Right-click in the **Application** column and select the desired Application.
  – Click **Configure** to load the device for your application.
  – Right-click on the controller and select **Learn Point Team Descriptor**.

Import Data

1. Click the **Import Pre-Engineered Data** button.
   ⇨ The **Import Configuration Data** dialog box displays.
2. Browse to the desired .csv file and click **Open**.

⇨ The imported files are listed in the **Pre-Engineered Data** section of the **Auto-Discovery** window.

Each line in the window is a grouping of data for a controller. For more information see .csv File Format [→ 38].

Assigning Import Data to Controller

1. Click in the **Import ID** column of the desired controller in the devices section.
2. Select the appropriate **Import ID number** of the **Pre-Engineered Data** you want to assign.

⇨ The **Application** and **Configuration** tabs are updated with the new (Pre-Engineered) data. You can manually change/update any data.

Assigning Import Data to Multiple Controllers

1. Click on the desired **Import Data** from the list in the Pre-Engineered Data section.
2. Select all desired controllers in the Devices window.
3. Right-click the selection in the Devices window and then select **Assign Import Data from Import ID x**.
4. Click **Configure**.

⇨ The Application will load into each controller selected. The **Application** and **Configuration** tabs are updated with the new (Pre-Engineered) data.

Commissioning Multiple Controllers

If you're commissioning multiple controllers with the same application all values can be loaded to each controller selected.

You can select multiple controllers by holding down either the **SHIFT** or **CTRL** key and clicking on multiple controllers listed.

You can configure values for multiple controllers with different applications by first selecting and making changes to one controller and then selecting all controllers and clicking **Configure.**

NOTE:
Once you select multiple controllers with different applications the Application tab goes blank. However, WCIS retains all changes and send the data for all selected controllers.

.csv File Format

The .csv file is auto generated from CT (is the old manufacture installed output file) and can be imported into WCIS. It has the following format and must be manually created.

First line must be – **IDENTIFIER**, **FIELDID**, **FIELDVAL;** all additional lines will be data in that format.

IDENTIFIER

This field is used to create groupings of data. Each group can be thought of as a collection of information (configuration data and point initial values) that will be loaded into one or more TEC's. The groups cannot be subdivided into smaller collections.

FIELDID

This is the specific data that will be set. All configuration data will have a key word associated with it and all points will be referenced by their point number (object ID). The following is a list of fields:

- ObjectName – Sets the device object name.
- Instance – Sets the device instance number.
- Description – Sets the device description.
- Location – Sets the device location.
- MaxMaster – Sets the device max master.
- MMIBaud – Sets the baud rate of the MMI tool port.
- MMIPriority – Sets priority for P1 commands received through the MMI tool port.
- IsMetric – Sets the units to SI.
- IsSlave – Sets the unit to a MSTP slave device.
- Comment – Creates comments in the file to make it more readable and are not imported into the tool.

FIELDVAL

This value must be set to the FIELDID. The format of this data is specific to the ID.

Description	Acceptable Values
ObjectName	30 RAD50 characters
Instance	0 – 4194302
Description	60 ASCII characters
Location	60 ASCII characters
MaxMaster	1 – 127
Point numbers	Depend on the specific points
MMIBaud	1200, 2400, 4800, 9600, 19200, 38400
MMIPriority	8 – 16

Description	Acceptable Values
IsMetric	0 – No, 1 – Yes
IsSlave	0 – No, 1 – Yes

The Pre-Engineered Data file can be used in different ways. For example, you can create a group or collection of information for every TEC. You can then assign the correct group to the TEC based on the location as indicated by the job schedule. The schedule will display the serial numbers for all TEC's and the location where the TEC was installed. The groups of data are set up for a specific location and you simply select the correct group for the TEC that has the serial number associated with that location.

You can also set up groups that contain information that must be set in multiple TEC's. Select all TEC's that need the specific data and assign the ID.

Sample .csv file:

IDENTIFIER,FIELDID,FIELDVAL

Building100_TEC_VAV001,ObjectName,VAV in Building 100

Building100_TEC_VAV001,Instance,5400

Flashing Controller Firmware

NOTE:
When re-loading/flashing firmware, existing PPCL may no longer function correctly.

FLT Procedure

Use the Firmware Loading Tool (FLT) for this procedure.

1. Connect to the RTS port of the PTEC.
2. Set Communications to **1200 baud**.
3. Click the **Identify** button.
4. Browse to the folder where the new firmware is saved.
5. Double-click the firmware file and then click **Load**.

WCIS Procedure

1. Connect to the RTS port of the PTEC.
2. From the **Device** menu, select **Load TEC Firmware**.
   ⇨ The **Load TEC Firmware** dialog box displays.
3. Click the **Browse** button.
4. Browse to the folder where the new firmware is saved.
5. Double-click the firmware file and then click **Load**.

Start-up Notes

This section includes notes on operating with only a supply or general exhaust box.

Configuring Supply Only

Do the following if Application 6750 is run without a general exhaust box:

1. Set TRACK METHOD to **FLOW**.
2. Set the following points:
   – If HOOD MAX VOL = 0, then set TRACK MODE to **3**
   A value of 3 = ETS (exhaust tracks supply) Flow Tracking, which should be used for both the occupied and unoccupied modes.
   – If HOOD MAX VOL > 0, then set TRACK MODE to **0**
   A value of 0 = STE (supply tracks exhaust) Flow Tracking, which should be used for both the occupied and unoccupied modes.
   – GEX FLO COEF to **0**
   When GEX FLO COEF = 0, GEX AIR VOL will always read 0, but will never display as Failed.
   – OCC GEX MIN and UOC GEX MIN to **0**
   If these two points are not set to 0, GEX AIR VOL—which will read 0 since GEX FLO COEF was set to 0—will be less than the general exhaust box minimum, resulting in a false ventilation alarm.
   – OCC GEX MAX and UOC GEX MAX left at default or a higher value.
   These two points should be set to the highest value:
   ☐Default value
   ☐OCC SUP MAX / UOC SUP MAX.
   Zero or small values will result in the supply box not being able to reach higher flow setpoints.
3. In this setup, the application varies the supply airflow as the fume hood flow changes in order to maintain the proper room pressurization. The supply airflow is not varied as a source of cooling; all temperature control is done by the reheat valve. Therefore, START should be set to **100** to allow the reheat valve to be controlled by the full range of TEMP LOOPOUT and to prevent the room temperature PID Loop from winding up.

Configuring Supply Only with BTU Compensation

Do the following if Application 6756 is run without a general exhaust box:

1. Set TRACK METHOD to **FLOW**.
2. Set the following points:
   – If HOOD MAX VOL = 0, then set TRACK MODE to **3**
   A value of 3 = ETS (exhaust tracks supply) Flow Tracking, which should be used for both the occupied and unoccupied modes.

- If HOOD MAX VOL > 0, then set TRACK MODE to **0**
  A value of 0 = STE (supply tracks exhaust) Flow Tracking, which should be used for both the occupied and unoccupied modes.
- GEX FLO COEF to **0**
  When GEX FLO COEF equals 0, GEX AIR VOL will always read 0, but will never show as Failed.
- OCC GEX MIN and UOC GEX MIN to **0**
  If these two points are not set to 0, GEX AIR VOL—which will read 0 since GEX FLO COEF was set to 0—will be less than the general exhaust box minimum, resulting in a false ventilation alarm.
- OCC GEX MAX and UOC GEX MAX left at default or a higher value.
  These two points should be set to the highest value:
  1) Default value
  2) OCC SUP MAX / UOC SUP MAX.
  Zero or small values will result in the supply box not being able to reach higher flow setpoints.
- VOLUME STATE
  When a general exhaust box is not present, the application will vary the supply airflow as the fume hood flow changes, in order to maintain the proper room pressurization. In this setup, the supply airflow is not varied for cooling purposes; all temperature control is done by the reheat valve. Therefore, VOLUME STATE should be set to 0 to prevent the BTU Compensator from trying to use the supply airflow for cooling.

Configuring Exhaust Only

Do the following if Application 6750 is run without a supply box:

1. Set TRACK METHOD to **FLOW**.
2. Set the following points to **0**:
   - TRACK MODE
     A value of 0 = STE (supply tracks exhaust) Flow Tracking, which should be used for both the occupied and unoccupied modes.
   - SUP FLO COEF
     When SUP FLO COEF equals 0, SUP AIR VOL will always read 0, but will never display as Failed.
   - OCC SUP MIN and UOC SUP MIN
     If these two points are not set to 0, SUP AIR VOL—which will read 0 since SUP FLO COEF was set to 0—will be less than the supply box minimum, resulting in a false ventilation alarm.
   - OCC SUP MAX and UOC SUP MAX left at default or a higher value.
     These two points should be set to the highest value:
     ☐Default value
     ☐OCC GEX MAX / UOC GEX MAX
     Zero or small values will result in the exhaust box not being able to reach higher flow setpoints.
   - This setup is useful when the room has a constant source of supply air from other equipment or sources not connected to the LCM.

– If you enter this constant supply air volume value into OTHER SUP, the application will vary the general exhaust airflow as the fume hood flow changes in order to maintain the proper room pressurization.
– Since all temperature control will be done by the reheat valve, START should be set to 100 to allow the reheat valve to be controlled by the full range of TEMP LOOPOUT and to prevent the room temperature PID Loop from winding up.

Configuring Exhaust Only with BTU Compensation

BTU compensation in Application 6756 will not function without supply airflow. Use Application 6750.

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