SIEMENS

BACnet LCM-OAVS

VAV Room Pressurization with BTU Compensation, HW Reheat and Slow Damper Actuation - Slow Venturi Exhaust Actuation, Application 6724 and 6730

Start-up Procedures

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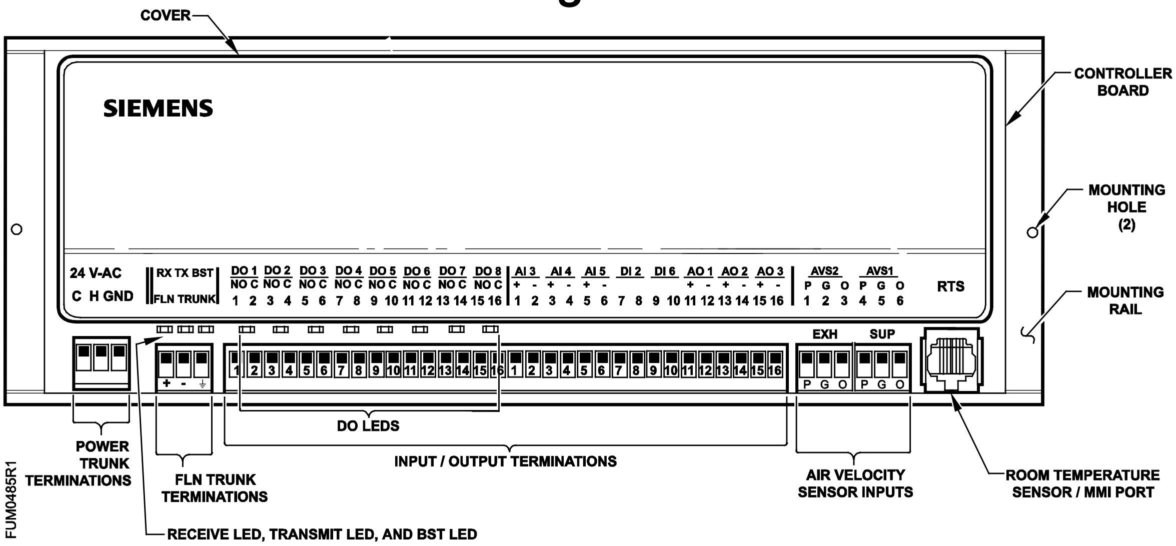
Before You Begin



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 6724 and 6730 contain points with point numbers greater than 99. WCIS must be used to view and configure these points. Point numbers greater than 99 are not available for display on Insight workstations.

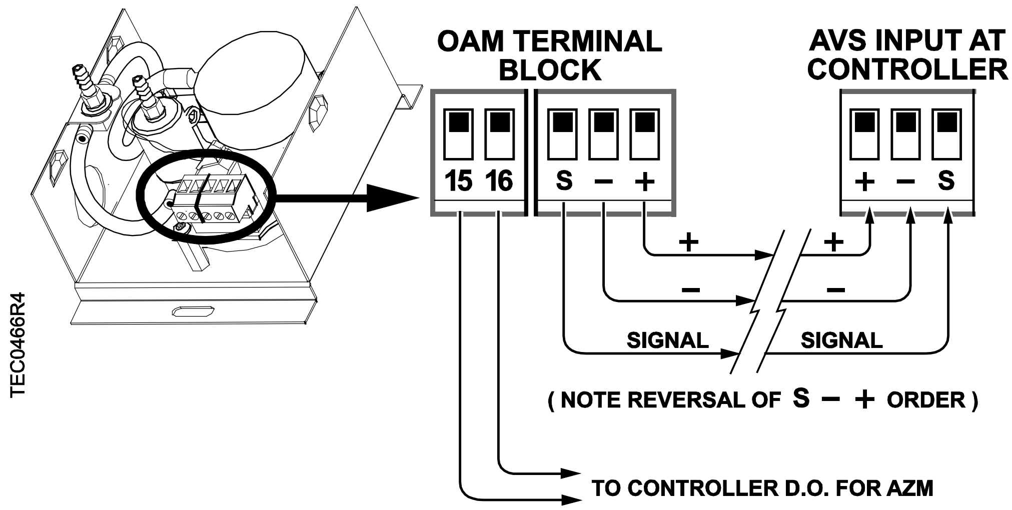
To set up the controller without a supply or general exhaust damper, see *Operation without Supply or Exhaust*.

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, etc.

WARNING

LCM WILL BE DAMAGED / DESTROYED IF OFFBOARD AIR MODULE(S) ARE NOT WIRED CORRECTLY AND POWER IS APPLIED TO LCM.

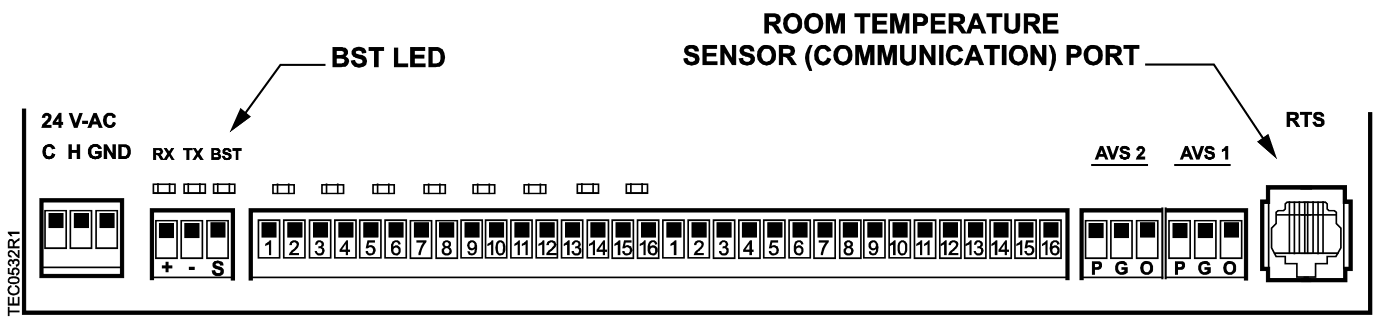


Verifying Power

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.

	⚠ CAUTION
	Earth ground must be wired to the controller.

2. Verify that the Basic Sanity Test (BST) LED on the LCM flashes once per second.



Verifying Slave Mode Application Number

1. Plug the HMI into the Room Temperature Sensor port. See the Figure LCM Showing Location of BST LED and RTS Port.
2. Verify that Application 6797 (Slave Mode) is running at the controller.

Setting the Application

1. Set APPLICATION to the desired number.

- Application 6724: BACnet LCM-OAVS Variable Air Volume Room Pressurization with HW Reheat and Slow Supply Damper Actuation, Slow Venturi Exhaust Actuation
- Application 6730: BACnet LCM-OAVS Variable Air Volume Room Pressurization with HW Reheat and Slow Supply Damper Actuation, Slow Venturi Exhaust Actuation

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 **255** for slave, 99 and 255 are reserved..

Supply Damper Configuration

NOTE:
On a return from power failure, the damper-command DOs (DOs 1 through 2) remain OFF for 5 seconds prior to resuming control. Because of this it is recommended that the supply damper motor setup MTR SETUP be set to Enabled (normally closed) for rooms where negative or neutral pressurization is required and Enabled and Reversed (normally open, where the actuator is retracted) for positively pressurized rooms.

1. Set MTR1 TIMING to the correct running time of the actuator. Applications 6724 and 6730 use GDE 131 actuators to control the damper. Therefore, set MTR1 TIMING to **90 seconds** for 60 Hz operation, or **108 seconds** for 50 Hz operation.
2. For a damper-actuator rotation-angle value other than 90°, set MTR1 ROT ANG to the appropriate value.
3. Enable the actuator by setting MTR SETUP to **1**. Verify that the actuator completely closes the damper and that it remains closed. If it does not close, reverse the action of the actuator by setting MTR SETUP to **3**.
   If the damper still does not close completely, then the actuator has been installed or set up incorrectly. For more information see the actuator installation instructions, set up information, or *Automation Service Procedures* on InfoLink.

Use the values in *MTR SETUP Table* to determine the value for MTR SETUP.

MTR SETUP			
	Not Used	Enabled	Enabled and Reversed
Motor 1 (supply damper) (DO 1 and DO 2)	0	1	3

- Use the value of “0” in special cases where the application uses exhaust only.
- Use the value “1” if the supply damper is enabled and not reversed.
- Use the value “3” if the supply damper is enabled and reversed.

NOTE:
For consistency with other applications, any value from 0-255 will be accepted, but only the values 0, 1, and 3 are appropriate for applications 6724 and 6730.

GEX Venturi Valve Configuration

NOTE:
On a return from power failure, the AOs remain OFF for 5 seconds prior to resuming control. Because of this, it is recommended that the General Exhaust Valve be set to Normally Opened for rooms where negative or neutral pressurization is required and Normally Closed for positively pressurized rooms. Setting of the Venturi direction is using VENTURI ACT.

	VENTURI ACT
0	Exhaust Venturi Valve is Normally Closed (Direct Acting)
1 (default)	Exhaust Venturi Valve is Normally Opened (Reverse Acting)

Values greater than 1 are not valid and will automatically be replaced with a value of 0.

Setting DO DIR.REV

NOTE:
Applies only to DO points that are not used for motor points.

If the normal (de-energized) state of all of the devices controlled by DOs is direct-acting, then leave the point DO DIR.REV at its default value of 0.

Otherwise, reverse the action of the devices as follows:

1. Add the values in the *DO DIR.REV Table* for each DO you want to make reverse-acting.
2. Set DO DIR.REV to this value.

DO DIR.REV Values.	
Reverse-Acting DO	**Value**
DO 1	32
DO 2	16
DO 3	8
DO 4	4
DO 5	2
DO 6	1

DO DIR.REV Values.	
Reverse-Acting DO	**Value**
DO 7	64
DO 8	128

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**.

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 Appendix at the end of this document 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 an LCM 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

Automatic Calibration Option

- Using the following table, set CAL SETUP to the value that best meets your job requirements.
  - 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**.
1	Calibration occurs when the field panel commands an occupied/unoccupied or a day/night mode changeover. Actual calibration is subject to a time delay of 0, 1, 2, or 3 minutes. This delay is determined by the point CTLR ADDRESS divided by 4. The remainder is the time delay in minutes. **Example:** If CTLR ADDRESS = 11, then the controller will wait 3 minutes (11 ÷ 4 = 2 R3) after it receives the day/night mode changeover command before beginning the calibration routine.
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.

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 the following table.

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 Damper operation can cause inaccurate readings.

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

Setting up External Airflow Variables

In this section, the external airflow variables are configured.

This version of the LCM uses conventional supply and exhaust actuation (rather than high speed actuation). Therefore, it should be used only where rapid room response to fume hood volume changes is not required. Fume hoods used in conjunction with these applications should be constant volume or slow actuation.

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 a Fume Hood Flow Module (FFM).
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.

Depending on the specific external hood flow sensing equipment that is connected to AI 3, the range for valid CFM might be 0-10V, 1-10V or perhaps 2-10V. Set MINHOODVOLTS to the voltage that represents zero flow.

- If MINHOODVOLTS is set to 1 or more volts, then the status of HOOD VOL to set to failed if the input voltage falls below .4 volts. (This allows annunciation of an open circuit.)
- If MINHOODVOLTS is set to a value less than 1 volt, (such as 0 volt), there is no HOOD VOL failure at low voltages. All voltage values will be converted to a flow value.

The resulting air flow is displayed 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 LCMwere 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 LCM must be taken into consideration when pressurizing the room, including snorkels, canopies, and other supplies, such as offices within the lab space controlled by constant volume controllers. Since these inputs are not connected to the LCM, the combination of their values must be entered into OTHER SUP and OTHER EXH so the LCM 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

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

MIN and MAX Airflow Setpoints

NOTE:
Airflow readings are most accurate when duct velocity is at least 300 fpm. Minimum values in the *Min and Max Flow Limit PointsTable* 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 the *Min and Max Flow Limit Points Table*.
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 Operation without Supply or Exhaust [→ 32] section.

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.

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 will equal 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.

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, if the general exhaust is stuck open or stuck closed) the supply air volume 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, if the supply 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 will not allow it to go higher than OCC GEX MAX during occupied periods or UOC GEX MAX during unoccupied periods.)

- 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.

TRACK METHOD

ETS Flow Tracking

When Exhaust Tracks Supply (ETS) flow tracking is used, TRACK METHOD determines how the general exhaust flow setpoint is calculated.

- If TRACK METHOD = FLOW, GEX FLO STPT is calculated using the actual supply airflow being read at the controller.
- If TRACK METHOD = STPT, GEX FLO STPT is calculated based on the setpoint for the supply terminal. In most cases, TRACK METHOD should be set to FLOW.

If the supply airflow is bouncing around too much and causing the exhaust setpoint to also bounce around, you can change the TRACK METHOD to STPT to smooth out the control.

If TRACK METHOD = FLOW, but the supply airflow is bouncing around too much and causing the exhaust setpoint to also bounce around, you can change TRACK METHOD to STPT to smooth out the control.

If TRACK METHOD = STPT, but the supply is unable to reach setpoint (actuator gets stuck, not enough static in the system to achieve setpoint), this module changes over to FLOW tracking mode. This feature prevents the incorrect pressurization of rooms that lack the required supply capacity. The change-over is based on the error of the supply flow loop. If the error is greater than FAIL LIMIT for a longer period of time than FAIL TIME, the module shifts over to the FLOW tracking mode and remains there until the error comes back to zero, at which point it switches back to STPT tracking.

STE Flow Tracking

When Supply Tracks Exhaust (STE) flow tracking is used, TRACK METHOD determines how the supply air setpoint is calculated.

- If TRACK METHOD = FLOW, SUP FLO STPT is calculated using the actual general exhaust airflow that is being read at the controller.
- If TRACK METHOD = STPT, SUP FLO STPT is calculated based on the setpoint for the general exhaust terminal.

In most cases, TRACK METHOD should be set to FLOW. If the general exhaust airflow is bouncing around too much and causing the supply air setpoint to also bounce around, you can change the TRACK METHOD to STPT to smooth out the control.

If TRACK METHOD = STPT, but the general exhaust terminal is unable to reach setpoint (actuator gets stuck, not enough static in the system to achieve setpoint), this module changes to FLOW tracking mode. This prevents the incorrect pressurization of rooms that lack the required exhaust capacity. The change over is based on the error of the general exhaust flow loop. If the error is greater than FAIL LIMIT, and stays that way for a time longer than FAIL TIME, then the module shifts over to FLOW tracking mode. It stays in that mode until the error comes back to zero, then switches back to the STPT tracking.

- Set TRACK METHOD to the desired value.

AVS FAILMODE

AVS FAILMODE is an enumerated point that describes how the Supply Damper and the General Exhaust Venturi Air Valve will respond if one or both Air Velocity Sensors (AVS) fail. It can handle positively pressurized rooms as well as negatively pressurized rooms.

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

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

AVS FAILMODE Values.	
AVS FAILMODE (value)	**Description**
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	Automatic VENTILATION
8	Automatic PRESSURIZATION

If AVS FAILMODE equals **7**, the Supply Damper will hold. The General Exhaust Venturi Air Valve will also hold if a fume hood is present (that is, if MAX HOOD VOL > 0). If a fume hood is absent, then the General Exhaust Venturi Air Valve will close if the room is being positively pressurized and open if the room is neutral or is being negatively pressurized (that is if VOL DIF STPT is equal to or greater than 0).

If AVS FAILMODE equals **8**, the Supply Damper will open if the room is being positively pressurized and close if the room is neutral or is being negatively pressurized. The General Exhaust Venturi Air Valve will hold if a fume hood is present. If a fume hood is absent, then the General Exhaust Venturi Air Valve will close if the room is being positively pressurized and open if the room is neutral or is being negatively pressurized.

NOTE:
If AVS FAILMODE is set greater than 8, it will default to 0.

Control Modes

In Applications 6724 and 6730, VAV means that temperature is controlled by varying flow in conjunction with the reheat valve. CV means that the application controls temperature by using the reheat valve only. (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.)

Depending on how VOLUME STATE is configured, Application(s) 6724 and 6730 can operate either as a variable air volume (VAV) LCM or a constant volume (CV) LCM. Also, these operational modes can vary between the occupied and unoccupied periods, if desired.

- Set VOLUME STATE to the desired value. See the following table.

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 Airflow Control

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 several 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* 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 Documents; LCM-OAVS Application 6724 for or LCM-OAVS Application 6730 on

InfoLink. 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
	It is possible, under certain conditions, that a Venturi calibration sequence will 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*. 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 *Venturi Airflow @ 350 fpm Table* and the values from the previous step, 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. Set SUP FLO STPT to either **OCC SUP MIN** or **UOC SUP MIN** (whichever is less) and verify that SUP AIR VOL can reach that value. Then set SUP FLO STPT to either **OCC SUP MAX** or **UOC SUP MAX** (whichever is greater) and verify that SUP AIR VOL can reach that value.
(If it is not possible to achieve minimum and maximum airflow, then the fan system must be adjusted.) When done, release SUP FLO STPT.
2. 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).
3. 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).
4. Release GEX DMPR AO3.

Venturi Table Evaluation and Editing (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, you should not 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 *Venturi Air Valve Table Statement Table*.

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 a 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 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 *Venturi Air Valve Table Statement Table* 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, 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 *Venturi Air Valve Table Statement Table* for swap value). This is necessary because the application does not allow active values to be manually overridden.

The exception to this rule that active values cannot be manually overridden. The first element in the active portion of the table—the low flow point—can be edited directly. See the *Venturi Air Valve Table Statement Table* for 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 VOLTSV. See the *Venturi Air Valve Table Statement Table* for more detail.

3. Set V TABLE PT once again to the swap value that 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 portion of the table.

Venturi Air Valve Table Statement.		
	V TABLE PT	**Description**
Active Exhaust	31	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 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.
	32 - 46	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. Table entries marked as failed display FAIL for both flow and voltage.
Inactive Exhaust	91 - 105	This portion of the table can be viewed and edited. The user enters a point (any value 91 through 106) into **V TABLE PT** and the corresponding cfm and voltage values display in **TABLE FLOW** and **TABLE VOLTS** where they can be edited.
Exhaust Swap	121	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.

- If **GEX FLO COEF** is 0, the table edit feature uses a general exhaust flow coefficient of 1.
- If **GEXDUCT AREA** is 0, the table edit feature will use a general exhaust 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 **NO** 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 **YES**.
3. Initiate the Venturi calibration sequence as described earlier in this document
4. Remove the flow sensor.
5. Set **G OPEN LOOP** to **NO** 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.

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.

Room Pressurization (OCC VAV MODE)

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

1. Set OTHER EXH and OTHER SUP to take into account any supply or exhaust airflow values from equipment or sources not connected to the LCM.

   NOTE: 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.

2. Set NET OCC CMD to **OCC** if it is not there already. This ensures that the LCM is in the occupied mode.
3. Verify correct pressurization by checking the value of VOL DIFFRNC in each of the following four airflow operating conditions. The system should operate at the VOL DIF STPT. During occupied mode VOL DIF STPT equals OCC DIF STPT.
   – Hoods open, minimum cooling
   – Hoods closed, minimum cooling
   – Hoods open, maximum cooling
   – 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.

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

Room Pressurization (UNOCC VAV MODE)

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

1. Set OTHER EXH and OTHER SUP to take into account any supply or exhaust airflow values from equipment or sources not connected to the LCM.

   NOTE:
   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.
2. 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.
3. Verify correct pressurization by checking the value of VOL DIFFRNC in each of the following four airflow operating conditions. The system should operate at the VOL DIF STPT. During occupied mode VOL DIF STPT equals UOC

DIF STPT.

– Hoods open, minimum cooling
– Hoods closed, minimum cooling
– Hoods open, maximum cooling
– 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.

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

Room Pressurization (OCC CV MODE)

If VOLUME STATE is **0** or **2** (that is, if the LCM 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 OTHER EXH and OTHER SUP to take into account any supply or exhaust airflow values from equipment or sources not connected to the LCM.

   NOTE:
   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

2. Set NET OCC CMD to **OCC** if it is not there already. This ensures that the LCM is in the occupied mode.

3. Set OCC SUP MIN to the same value as OCC SUP MAX. This raises the constant volume setpoint as high as possible during the occupied period.

4. Verify correct pressurization by checking the value of VOL DIFFRNC when the hood is opened and also when the hood is closed. The system should operate at the VOL DIF STPT. During occupied mode VOL DIF STPT equals OCC DIF STPT.

5. Set OCC SUP MIN down to its desired value for the job. This sets the constant volume setpoint to be as low as possible during the occupied period. (No need to reduce OCC SUP MAX down to equal the value of OCC SUP MIN.)

6. Once again verify correct pressurization by checking the value of VOL DIFFRNC when the hood is opened and when the hood is closed.
7. When all conditions have been checked, make sure both OCC SUP MIN and OCC SUP MAX are at their desired values for the job. If NET OCC CMD is overridden, release it.

Room Pressurization (UNOCC CV MODE)

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

1. Set OTHER EXH and OTHER SUP to take into account any supply or exhaust airflow values from equipment or sources not connected to the LCM.

   NOTE:

   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.
2. 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.
3. Set UOC SUP MIN to the same value as UOC SUP MAX. This raises the constant volume setpoint as high as possible during the unoccupied period.
4. Verify correct pressurization by checking the value of VOL DIFFRNC when the hood is opened and also when the hood is closed. The system should operate at the VOL DIF STPT. During unoccupied mode, VOL DIF STPT equals UOC DIF STPT.
5. Set UOC SUP MIN down to its desired value for the job. This sets the constant volume setpoint to be as low as possible during the unoccupied period. (No need to reduce UOC SUP MAX down to equal the value of UOC SUP MIN.)
6. Once again verify correct pressurization by checking the value of VOL DIFFRNC when the hood is opened and when the hood is closed.
7. When all conditions have been checked, set both UOC SUP MIN and UOC SUP MAX to their desired values for the job. If NET OCC CMD is overridden,

release it.

Optional Rate Limiting of Actuators

Under specific circumstances, one actuator may consistently reach its set point faster than the other. This inequity may cause pressurization anomalies. Through the use SUP MAX RATE and GEX MAX RATE, CFM change rates can be adjusted to improve pressurization control. See the application guides for a more thorough explanation BACnet LCM-OAVS Variable Air Volume Room Pressurization with HW Reheat and Slow Supply Damper Actuation, Slow Venturi Exhaust Actuation Application 6724 and BACnet LCM-OAVS Variable Air Volume Room Pressurization with HW Reheat and Slow Supply Damper Actuation, Slow Venturi Exhaust Actuation Application 6730 on InfoLink.

SUP MAX RATE is used to effectively limit the speed of the supply actuator. The default is 0 which means no rate limiting is being done.

GEX MAX RATE is used to effectively limit the speed of the exhaust actuator. The default is 0 which means no rate limiting is being done.

As a simple example, if an actuator flow changes 1800 cfm in 90 seconds, the current change rate is 20 cfm per second. If a lower value of 10 is entered, the full travel would now take twice as long – 180 seconds.

Since actuator flows are non-linear, the value entered is a rough approximation. Values would likely require adjustments.

SUP MAX RATE and **GEX MAX RATE** should be changed to values other than 0 only after a thorough analysis has been made of the job specific scenarios. For example, slowing down a given supply actuator to match a general exhaust actuator may actually be detrimental overall if the installation includes faster acting fume hoods.

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.

ALARM ENA Values.	
	ALARM ENA
3	Vent Alarm and Alarm Switch are enabled
4	Dif Alarm is enabled.
5	Vent Alarm and Dif Alarm are enabled
6	Alarm Switch and Dif Alarm are enabled
7	Vent Alarm, Alarm Switch, and Dif Alarm are all enabled

NOTE:
If ALARM ENA is set greater than 7, it will display a 0 and act like it was set 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.

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.

Hardware Switch

The hardware 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 ALM ENA to a value that enables the Alarm Switch (2, 3, 6 or 7).

Network Alarms

If there are other alarms to be indicated 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 LCM to enable this function.

Occupancy Control

OCC ENA is an analog point whose value determines whether or not OCC BUTN DI1, or OCC SWIT DI2, is enabled.

The following table shows what is enabled when OCC ENA is at a particular value.

OCC ENA Values.	
OCC ENA (value)	**Description**
0 (default)	Both OCC BUTN DI1 and OCC SWIT DI2 are disabled.
1	Only OCC BUTN DI1 is enabled.
2	Only OCC SWIT DI2 is enabled.

NOTE:
OCC ENA does not allow both OCC BUTN DI1 and OCC SWIT DI2 to be enabled 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.

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:
   a. Set OCC ENA to **0** (default).
   b. Set NET OCC CMD to **OCC** (default).

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, etc.

Discharge Temperature Control

Application 6730 only

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.

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.

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:
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, but 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.

Room Temperature Offset

NOTE:
The Room Temperature Offset feature is optional.

1. When the room has stabilized to within 5°F, take a precision temperature reading at the room temperature sensor.
2. Record any difference between this reading and the value of ROOM TEMP and set this difference value (to the nearest 0.25°F) into TEMP OFFSET.

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.

- 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, etc.

Setting STAT SUPV

The point STAT SUPV is used when a digital room unit is used with the all controllers. The value set, allows the temperature, humidity, and CO_2 subpoints to read failed when the room unit is not functioning or is disconnected. It also defines the thermistor input being used.

If a value is not selected, the points will not fail. If you enable supervision for a feature that is not being used, such as humidity or CO_2, that value always displays as failed.

- If the digital room unit (Series 2200 or 3200) is being used, STAT SUPV must be set to a value greater than 0 (zero), to define temperature sensing and thermistor inputs.

Configure STAT SUPV using the following values, these values are additive.

For example, If using a Series 2200 or 3200 room unit and you want temperature and CO_2 sensing and a 100K thermistor on AI 5/AI 3, the value set in STAT SUPV would be 13 (1 + 4 + 8 = 13).

Value	Description
1	Temperature sensing only
2	Relative Humidity (RH) sensing
4	CO_2 sensing
8	To select a 100K Ω Thermistor on AI 5 (for long board), AI 3 (for short board)
16	To select a 100K Ω Thermistor on AI 4

(a Currently not available, for future use.

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 (differing from cfm) 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 manufacturers 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 MODHTG 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.

Operation without Supply or Exhaust

These applications can operate without a supply box or without an exhaust box. These operations should only be used when the associated sources of exhaust air are constant volume or have slow actuation.

Exhaust Only

Application 6724 operates without a supply box. If a supply box is not being controlled, then set SUP FLO COEF to 0. When SUP FLO COEF equals 0, SUP AIR VOL will always read 0 and will never show up as Failed. Also, you should set both OCC SUP MIN and UOC SUP MIN to 0. If this isn't done, then you will get a false ventilation alarm because since SUP AIR VOL will read 0, it would be less than the currently active supply box minimum.

- Set TRACK METHOD to **FLOW**. Also, set TRACK MODE to **0**. (STE FLOW tracking should be used in both the occupied and unoccupied modes.)

When a general exhaust box is not being used, then this application will vary the supply airflow in order to track the fume hood and maintain proper room pressurization. In this setup, the application will not vary the supply airflow as a source of cooling; all of the temperature control will be done by the reheat valve. Because of this, START should be set to 100. This will cause the reheat valve to be controlled by the full range of TEMP LOOPOUT and prevent the room temperature PID Loop from winding up.

Supply Only

Application 6724 can operate without a general exhaust box. If a general exhaust box is not being controlled, then set GEX FLO COEF to 0. When GEX FLO COEF equals 0, GEX AIR VOL will always read 0 and will never show up as Failed. Also, you should set both OCC GEX MIN and UOC GEX MIN to 0. If this isn't done, then you will get a false ventilation alarm because since GEX AIR VOL will read 0, it would be less than the currently active general exhaust box minimum.

- Set TRACK METHOD to **FLOW**. Also, set TRACK MODE to **3**. (ETS FLOW tracking should be used in both the occupied and unoccupied modes.)

This arrangement is useful when the room has a constant source of supply air. If you enter this constant supply air volume value into OTHER SUP, then the application will vary the general exhaust air volume as the fume hood airflow changes, in order to maintain the proper room pressurization.

Since the supply airflow is constant, the application will not try to vary it as a source of cooling. All of the temperature control will be done by the reheat valve. Because of this, START should be set to 100. This will cause the reheat valve to be controlled by the full range of TEMP LOOPOUT and prevent the room temperature PID Loop from winding up.

Exhaust Only

Application 6730 can operate without a supply box. If a supply box is not being controlled, then set SUP FLO COEF to 0. When SUP FLO COEF equals 0, SUP AIR VOL will never show up as Failed.

- Set TRACK METHOD to **FLOW**. Also, set TRACK MODE to **0**. (STE FLOW tracking should be used in both the occupied and unoccupied modes.)

When a general exhaust box is not being used, then this application will vary the supply airflow in order to track the fume hood and maintain proper room pressurization. In this setup, the application will not vary the supply airflow as a source of cooling; all of the temperature control will be done by the reheat valve. Because of this, VOLUME STATE should be set to 0. This will prevent the BTU Compensator from trying to use the supply airflow as a source of cooling.

Supply Only

Application 6730 can operate without a general exhaust box. If a general exhaust box is not being controlled, then set GEX FLO COEF to 0. When GEX FLO COEF equals 0, GEX AIR VOL will always read 0 and will never show up as Failed. Also, you should set both OCC GEX MIN and UOC GEX MIN to 0. If this isn't done, then you will get a false ventilation alarm because since GEX AIR VOL will read 0, it would be less than the currently active general exhaust box minimum.

- Set TRACK METHOD to **FLOW**. Also, set TRACK MODE to **3**. (ETS FLOW tracking should be used in both the occupied and unoccupied modes.)

This arrangement is useful when the room has a constant source of supply air. If you override SUP AIR VOL to be equal to this constant supply air volume value, then the application will vary the general exhaust air volume as the fume hood airflow changes, in order to maintain the proper room pressurization. Also, you should set both OCC SUP MIN and UOC SUP MIN to be less than the constant supply volume value. If this isn't done, then you will get a false ventilation alarm because since SUP AIR VOL is overridden to the constant supply volume value, it would be less than the currently active supply box minimum.

Since the supply airflow is constant, the application will not try to vary it as a source of cooling. All of the temperature control will be done by the reheat valve. Because of this, VOLUME STATE should be set to 0. Also, both OCC SUP MAX and UOC SUP MAX should be set equal SUP AIR VOL (the airflow value of the constant supply source). This will prevent the BTU Compensator from trying to use the supply airflow as a source of cooling.

Flashing Controller Firmware

FLT Procedure

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

1. Connect to RTS port of PTEC.
2. Set Communications to **1200 baud** and **ID**.
3. Click the **Identify** button in FLT.
4. Browse for new firmware.
5. Select **Load**.

WCIS Procedure

1. Connect to device.
2. From the **Device** menu, select, **Load TEC Firmware**
3. Click the **Browse** button in **Load TEC Firmware** dialog box.
4. Select the firmware.
5. Select **Load**.

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