SIEMENS

BACnet Pressurized Room Controller (PRC)

PRC-OAVS with Slow Floating Damper Control, AOV or Floating Reheat, Optional Discharge Control and Optional AOV Perimeter Radiation, Application 6763

Start-up Procedures

140-1060
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Building Technologies

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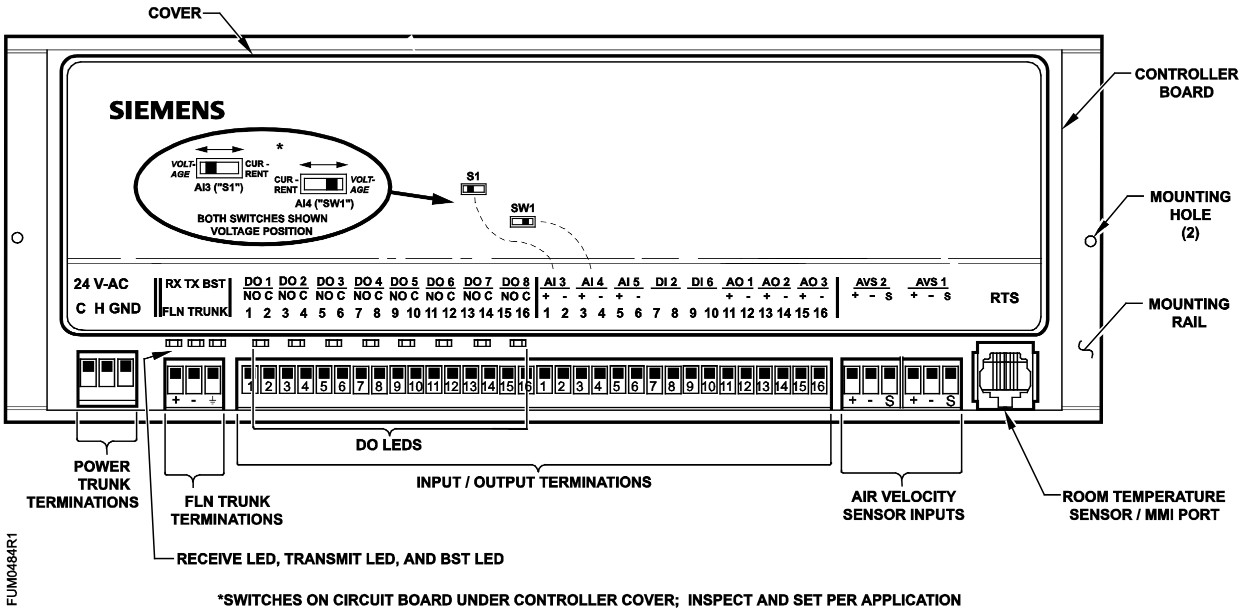
Before You Begin



*SWITCHES ON CIRCUIT BOARD UNDER CONTROLLER COVER; INSPECT AND SET PER APPLICATION

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 Pressurization Room Controller (PRC).

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

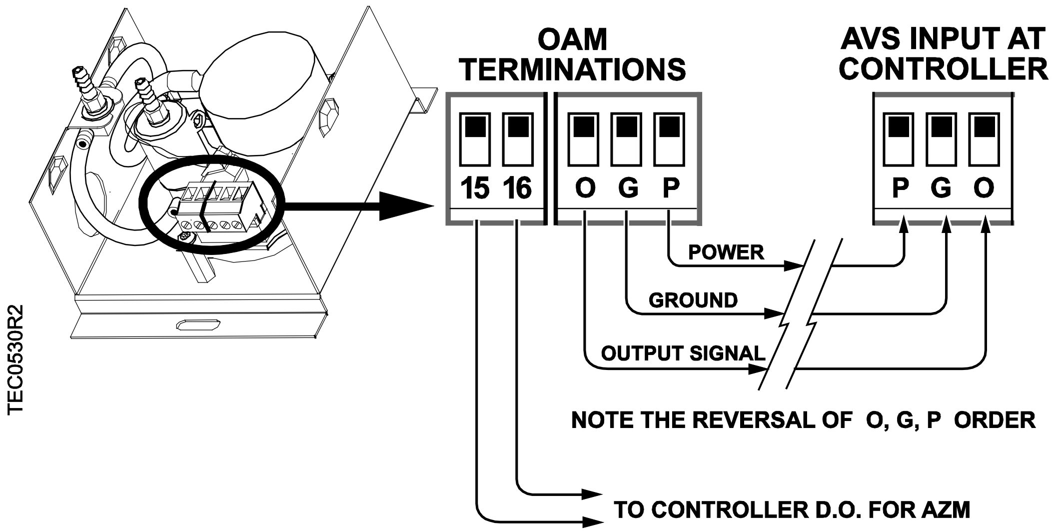
NOTES:
Application 6763 contains points with point numbers greater than 99. WCIS must be used to view and configure these points. Point numbers greater than 99 are not available for display on Insight workstations.

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.

NOTE:
Application 6763 can be set up to operate with or without a discharge loop, and with or without perimeter radiation heating. Reheat may be configured as analog or floating.

⚠	**WARNING**
	PRC WILL BE DAMAGED / DESTROYED IF OFFBOARD AIR MODULE(S) ARE NOT WIRED CORRECTLY AND POWER IS APPLIED TO PRC. The “O” in this OAM wiring illustration is not shield – it is signal. If wired as shield, the unit will be damaged.

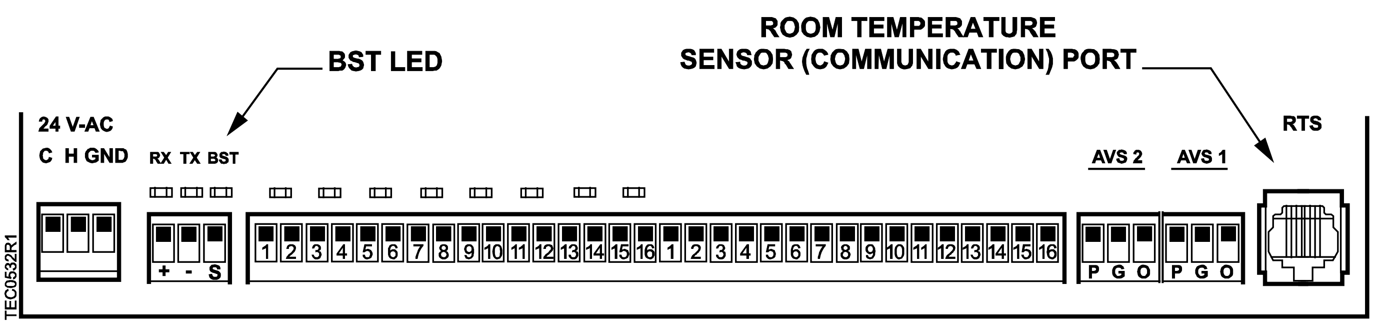


Verifying Power

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 PRC flashes once per second.



Verifying Slave Mode Application Number

1. Plug the HMI into the Room Temperature Sensor port.
2. Verify that Application 6765 (Slave Mode) is running at the controller.

Setting the Application

- Set APPLICATION to desired number:

⇨ 6763 .

- Set CTLR ADDRESS to the correct value obtained from the controller schedule. Each controller must have a unique address. Normal values are from 00 to 31, but the controller will accept values as high as 98.

Setting the Mode of Operation

Set the desired Mode of operation:

Mode 1: VAV PRC with reheat controlled by room temperature. No discharge temperature sensor, no discharge loop, and no perimeter radiation heating. To operate in Mode 1:

- Set DISCH P GAIN = 0 and set DISCH I GAIN = **0**. (No gains being set implies no discharge loop).

Mode2: VAV PRC with reheat controlled by discharge loop. A discharge temperature sensor is required. Discharge reheat is modulated from discharge min to discharge max as heating load increases. There in no perimeter radiation. To operate in Mode 2:

1. Set either (or both) DISCH P GAIN or DISCH I GAIN to a non-zero value. (Non-zero gains imply a discharge loop is being used). The factory default gains are P gain = 2.0; I gain = 0.02.
2. Set RAD START and RAD END both = **0**.

NOTE:
Perimeter radiation is disabled when RAD START = RAD END. You can use any value from 0 to 100. Setting both of these points to 0 instead of another value makes it a little easier to quickly “see” in the point list that they are equal and that there is zero radiation heat.

Mode 3: VAV PRC with reheat controlled by discharge loop, plus perimeter radiation heating. A discharge temperature sensor is required. As the room temperature loop calls for heat, discharge reheat is modulated from discharge min to discharge max and perimeter radiation is also controlled. Except for perimeter radiation, Mode 3 and Mode 2 are the same. To operate in Mode 3:

1. Set either (or both) DISCH P GAIN or DISCH I GAIN to a non-zero value. (Non-zero gains imply a discharge loop is being used). The factory default gains are P gain = 2.0; I gain = 0.02.
2. Set RAD END > RAD START. (The default values for RAD START and RAD END are 30 and 60 respectively. See *Perimeter Radiation Heating* for information on using different values for RAD START and RAD END.)

Specifying Motor Setup

NOTE:
In Application6763, MTR SETUP determines whether the reheat signal output from the controller is floating (DOs 5 and 6) or analog (AOV1). If Motor 3 is not enabled, the reheat signal is automatically converted to a 0-10V signal and routed to AOV1, and DOs 5 and 6 are spare (they are spare but they cannot be used as an additional motor). If MTR SETUP is set to a value that enables Motor 3 (DO 5 and DO 6), then the reheat signal is floating and AOV1 is spare.

Use the values in *Additive Values that Determine the Value of MTR SETUP Table* to determine the value for MTR SETUP. The values are additive. For example, if you want to have Motor 1 (DOs 1 and 2) enabled, Motor 2 (DOs 3 and 4) enabled and reversed, and AOV control of reheat (Motor 3 not used), you would set MTR SETUP equal to 13. This is because the Motor 1 enable value is 1, the Motor 2 enabled and reversed value is 12, and the Motor 3 not used value is 0. (1 + 12 + 0 = 13.)

Additive Values that Determine the Value of MTR SETUP.			
	Not Used	Enabled	Enabled and Reversed
Motor 1 (supply damper) (DO 1and DO 2)	0	1	3
Motor 2 (exhaust damper) (DO 3 and DO 4)	0	4	12
Motor 3 (reheat valve) (DO 5 and DO 6)	0* (AOV1)	16	48
*This is the Motor 3 additive value if reheat is to be controlled by AOV1.			

Reheat Valve Configuration

If reheat uses floating control (Motor 3), skip this section.

Refer to the reheat valve-actuator's technical literature for specific open/close voltages. Otherwise, try different voltages by entering them into AOV1 and checking the action of the actuator. You are looking for the correct open/close voltages, not just whether 0 volts closes the actuator and 10 volts opens it, or vice versa. If 1 volt drives the actuator full closed (or full open), and 8 volts drives it full open (or full closed), then those are the voltages you will enter into AOV1 OPEN and AOV1 CLOSE. (Note that 1 and 8 volts is just an example; actual voltages will depend upon the actuator.)

1. Set AOV1 OPEN to the correct voltage value.
2. Set AOV1 CLOSE to the correct voltage value.
3. 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**.

Radiation Valve Configuration

If the installation has no perimeter radiation, skip this section.

Refer to the perimeter radiation heating valve-actuator's technical literature for specific open/close voltages. Otherwise, try various voltages by entering them into AOV2 and checking the action of the valve actuator. You are looking for the correct open/close voltages, not just whether 0 volts closes the actuator and 10 volts opens it, or vice versa. If 1 volt drives the actuator to full closed (or full open), and 8 volts drives it full open (or full closed), then those are the voltages you will enter into AOV2 OPEN and AOV2 CLOSE. (Note that 1 and 8 volts is just an example; actual voltages will depend upon the actuator.)

1. Set AOV2 OPEN to the correct voltage value.
2. Set AOV2 CLOSE to the correct voltage value.
3. Verify operation of the radiation valve. Override RAD VALV CMD to 0 and verify that the valve closes. Set RAD VALV CMD to 100% and verify that the valve opens.
4. Release RAD VALV CMD.

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.

Note that this safety applies to the reheat heating only. The perimeter heating will continue to function as the application dictates even if the safety has disabled the reheat heating.

Wall Switch

If a wall switch will be used for day/night (occ/unocc) control, enable it by setting WALL SWITCH to **YES**.

Setting Airflow Setpoints

Using values from the job specifications, program the following points:

1. GEX MAX. Set to the maximum flow that the exhaust can accommodate. This is the highest value that the exhaust setpoint will be set to in order to maintain temperature and pressure.
2. GEX MIN. Set to the lowest value that the exhaust can reliably measure.
3. CLG FLO MAX. Set to the maximum flow for cooling mode.
4. CLG FLO MIN. Set to the minimum flow for cooling mode. The value should be set no lower than the minimum ventilation required for the space. In specific circumstances, the actual flow may drop below this value to maintain pressurization.
5. HTG FLO MAX. Set to the maximum flow for heating mode.
6. HTG FLO MIN. Set to the minimum flow for heating mode. The value should be set no lower than the minimum ventilation required for the space. In specific circumstances, the actual flow may drop below this value to maintain pressurization.

NOTE:
Since HTG FLO MAX is used as the upper value for supply pressurization in the heating mode, care should be taken in setting this value. Setting HTG FLO MAX equal to HTG FLO MIN to provide minimum flow in heating mode may be too restrictive when trying to maintain positive pressure. Instead, if minimum airflow is desired in the heating mode, set FLOW START = FLOW END. Setting FLOW START = FLOW END will assure that minimum flow is used for the temperature control, while allowing HTG FLO MAX to be set at a level higher than HTG FLO MIN to make additional flow available if needed for pressurization purposes.

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.

The application supports selection between two volume differential setpoints to provide two different room pressurization states.

The two volume differential setpoint values must be entered into PRS1DIF STPT and PRS2DIF STPT.

1. Set PRS1DIF STPT to desired pressurization. (Entered as a CFM differential.)
2. Set PRS2DIF STPT to desired pressurization. (Entered as a CFM differential.)

NOTE:
The physical switch on DI 6 selects which value the application will use. The position of DI 6 is indicated by PRESS STATE. When PRESS STATE is "off", PRESS STATE has the value of PRS1 and VOL DIFF STPT is set to PRS1DIF STPT. When PRESS STATE is "on", PRESS STATE has the value of PRS2 and VOL DIFF STPT is set to PRS2DIF STPT.

A software command to PRESS STATE can override the physical position of the switch on DI 6. Note that no switch present on DI 6 is equivalent to a switch being there but always in the 'off' (PRS1) setting.

External Flow Values

Airflows not connected to the PRC 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 PRC, the combination of their values must be entered into OTHER SUP and OTHER EXH so the PRC 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

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 is the general exhaust box damper is stuck open or stuck closed) the supply air volume (it is limited to the range of zero up to HTG FLO MAX) in heating mode or CLG FLOW MAX in cooling mode) will be adjusted so VOL DIF STPT is maintained as much as possible.

During Exhaust Tracks Supply, the general exhaust air volume "tracks" or follows the supply air volume. If the supply air is "broke" (for instance is the supply box damper is stuck open or stuck closed) the general exhaust air volume (it is limited to the range of zero up to GEN MAX) will be adjusted such that VOL DIF STPT is maintained as much as possible.

- Set TRACK MODE to the desired value ETS or STE.

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

This section explains how TRACK METHOD works with TRACK MODE to determine how the controller calculates flow setpoints.

TRACK METHOD and Exhaust Tracks Supply

When Exhaust Tracks Supply (ETS) flow tracking is being used, TRACK METHOD determines how the General Exhaust Terminal will calculate what the setpoint should be.

- 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 the airflow on the supply differs from the supply setpoint (actuator gets stuck, not enough static in the system to achieve setpoint), the exhaust terminal would track the actual supply airflow reading and maintain the volume offset of the room.

If TRACK METHOD is set for STPT tracking, the general exhaust flow setpoint is ordinarily calculated according to the supply flow setpoint. **However, this module changes over to FLOW tracking mode if the supply is unable to reach the setpoint.**

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, and stays that way for a time longer than FAIL TIME, then the module shifts over to the FLOW tracking mode. It stays in that mode until the error comes back to zero, then switches back to the STPT tracking mode.

TRACK METHOD and Supply Tracks Exhaust

When Supply Tracks Exhaust (STE) flow tracking is being used, TRACK METHOD determines how the Supply Air Terminal will calculate what the setpoint should be.

- 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 the airflow on the general exhaust differs from the general exhaust setpoint (actuator gets stuck, not enough static in the system to achieve setpoint), the supply air terminal would track the actual general exhaust airflow reading and maintain the volume offset of the room.

CAUTION

If setpoint tracking is used initially, this module changes over to FLOW tracking mode if the supply is unable to reach the setpoint.

This 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, 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 mode.

- Set TRACK METHOD to the desired value.

Calculating Exhaust Flow Setpoint

When **Supply Tracks Exhaust** (STE) flow tracking is being used, the general exhaust airflow setpoint is calculated as follows:

During VAV operation, the application calculates GEX STPT by looking at the value of TEMP CTL VOL and determining the general exhaust flow needed to pressurize the room.

NOTE:
When Supply Tracks Exhaust (STE) flow tracking is being used, the controller will not let the actual general exhaust flow rise above the active general exhaust airflow maximum regardless of the value of GEX STPT. **However, the controller allows the actual general exhaust flow to dip below the active general exhaust flow minimum if needed in order to maintain the desired room pressurization.**

When **Exhaust Tracks Supply (ETS)** flow tracking is being used, the general exhaust airflow setpoint is calculated as follows:

To calculate GEX STPT, the application determines the general exhaust airflow value that pressurizes the room based on the values of VOL DIF STPT, OTHER EXH, OTHER SUP and either SUP STPT or SUP VOL depending on the value of TRACK METHOD. GEX STPT may not exceed the active general exhaust airflow maximum. If necessary, the general exhaust airflow minimum (GEX MIN), will be overridden to maintain the desired room pressurization.

Calculating Supply Flow Setpoint

When **Supply Tracks Exhaust (STE)** flow tracking is used, the supply airflow setpoint is calculated as follows:

To calculate SUP STPT, the application determines the supply flow value that pressurizes the room based on the values of VOL DIF STPT, OTHER EXH, OTHER SUP, and either GEX STPT or GEX VOL depending on the value of TRACK METHOD. SUP STPT may not exceed the currently active supply airflow maximum (CLG FLO MAX or HTG FLO MAX depending on HEAT.COOL mode).

When Exhaust Tracks Supply (ETS) flow tracking is being used, the supply airflow setpoint is set to TEMP CTL VOL.

NOTE:
Regardless of the flow tracking method (STE or ETS) being used, the controller does not let the actual airflow rise above the currently active supply airflow maximum. **However, the currently active supply airflow minimum (CLG FLO MIN or HTG FLO MIN) will be overridden if necessary to achieve desired pressurization.**

Ventilation

Application 6763 does not have separate points for minimum ventilation. Verify that the values chosen for HTG FLO MIN and CLG FLO MIN have not been set below the minimum ventilation requirements. If necessary, the application raises the general exhaust flow to keep the supply flow from dropping below these minimums. However, the currently active supply minimum (HTG FLO MIN or CLG FLO MIN) may be overridden to maintain negative pressurization, if necessary.

Duct Area

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 PRC-OAVS 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

Follow the steps to set the supply and exhaust flow coefficients.

1. Set SUP FLO COEF to the appropriate value found in *Box Manufacturer Flow Coefficients Table*. This value is a starting point for the air balancer.
2. Compare the TEC volume shown in SUP VOL to the actual volume obtained from the balancer's measurements. The TEC volume should be within 5% of actual volume.
3. If necessary, adjust SUP FLO COEF until SUP VOL is within 5% of actual volume. If for example the balancer's measurements are 8% higher than the value shown in SUP VOL, then increase SUP FLO COEF by 8%. Repeat these steps as necessary until SUP VOL and actual volume are within 5%.
4. Repeat the above steps to set GEX FLO COEF, this time using GEX FLO COEF and GEX VOL instead of SUP FLO COEF and SUP VOL.

Box Manufacturer Flow Coefficients		
Manufacturer	**Sensor Type**	**Value**
Anemostat	2-pipe without orifice 2-pipe with orifice Spider without orifice Spider with orifice	0.79 0.59 0.73 0.39
Carnes	2-pipe Flow cross	0.66 0.59
Carrier		0.59
E.H. Price/Lab Terminal Boxes		0.78
Environmental Technologies		0.79
Krueger		0.68
Metal Aire		0.72
Nailor Industries		0.69
Titus		0.60
Trane		0.66

Offboard Air Module

When Autozero solenoid(s) from Offboard Air Module(s) are wired to DO 8 and CAL MODULE = YES, the Autozero function is enabled.

For a controller **with** the Autozero function enabled, the damper is:

- Held still during calibration
- Driven towards closed for ½ of the actuator's configured Motor Timing at start-up or on return from power loss

For a controller **without** the Autozero function enabled, the damper is commanded closed:

- During calibration to get a zero airflow reading
- At start-up or on return from power loss

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 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.
2	Calibration occurs immediately after the override switch is depressed.
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.

Tuning the Flow Loops

1. Set VOL DIF STPT to **0**.
2. Change the flow by commanding SUP 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 STPT.
3. Repeat the process for GEX STPT.
4. Release VOL DIF STPT.

CAUTION

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

Discharge Temperature Control

If the application is configured for Mode 1(no discharge control), then skip this section. (The application operates in Mode 1 if DISCH P GAIN and DISCH I GAIN both equal 0.)

If the discharge temperature limits are called out in the specification, set DIS TEMP MIN and DIS TEMP 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 DIS TEMP 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 DIS TEMP MAX should be set 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 DIS TEMP 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, DIS TEMP 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 DIS TEMP AI5. 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 Control

See the *APOGEE Automation Service Procedures* on InfoLink for additional information on room temperature control problems.

To set room temperature control, enter the room temperature setpoint (RM STPT DIAL) 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.

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 corrected value is displayed 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, etc.

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 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.

Setting Override Time

If using night/unoccupied override, set OVRD TIME to the number of whole hours that an override should last. If OVRD TIME equals 0 (default), this feature is disabled.

Setting HC.ENDIS

HC.ENDIS determines whether the application is heating only, cooling only, or if it uses both heating and cooling modes. Set HC.ENDIS to the desired value.

- 3 = heating and cooling (default)
- 1 = heating only
- 2 = cooling only

REHEAT START, REHEAT END, FLOW START, FLOW END (Optional)

In the heating mode, flow can be held constant while the heating is modulated, or can ramp from minimum flow to maximum flow before, during, or after the heat modulation.

The default application setting is for flow to be held at heating flow minimum while heat modulates form full off to full on. The default point values are as follows:

- REHEAT START = 0
  REHEAT END = 100
- FLOW START = 0
  FLOW END = 0

To increase flow from min to max in parallel with heat modulating from full off to full on, set:

- REHEAT START = 0
  REHEAT END = 100
- FLOW START = 0
  FLOW END = 100

To sequence flow so that it increases from min to max only after reheat has modulated from full off to full on, set:

- REHEAT START = 0
  REHEAT END = 50
- FLOW START = 50
  FLOW END = 100

To overlap the flow and reheat, so that heating begins modulating before flow starts increasing, and then heating reaches full on while flow is still increasing, set:

- REHEAT START = 0
  REHEAT END = 70
- FLOW START = 30
  FLOW END = 100

The above values are one set of typical examples only. See *Application Guide TEC-0668.08* (140-1059) for complete information on how the FLOW START/END and REHEAT START/END points work together to coordinate heating flow and reheat modulation.

Perimeter Radiation Heating (Optional)

If you understand how RAD START and RAD END function in 6763, then set them to desired values and skip the remaining text in this section. Otherwise, read the remainder of this section and then set RAD START and RAD END to desired values. Additional information on Perimeter Radiation is also available in the application guide.

If necessary, see *Setting the Mode of Operation* to determine the operating mode of the application.

If the application operates in Mode 1 or Mode 2, then RAD START and RAD END both = 0 and this section can be skipped because perimeter radiation is disabled.

If Mode 3 is active then perimeter radiation is controlled and the reheat signal (0-100) can be divided into three stages.

- **Stage 1** – Discharge temperature rises from discharge temp minimum (DIS TEMP MIN) to room setpoint (CTL STPT). Perimeter radiation is off.
- **Stage 2** – Discharge holds at room setpoint while perimeter radiation modulates from full off to full on.
- **Stage 3** – Perimeter radiation is full on while the discharge temperature modulates from room setpoint to discharge max (DIS TEMP MAX).

The values of RAD START and RAD END establish the proportion of the heating effort allocated to stage 2, the radiation heating portion. For example, with the default values of RAD START = 30 and RAD END = 60, as the need for heat increases from 0 to 100, the first 30% of that need will be met with stage 1 (discharge increasing from min to room temperature setpoint, the next 30% of that need will be met with modulating perimeter radiation heating, and the last 40% will be met with discharge air increasing beyond room temperature setpoint as perimeter radiation remains full on.

NOTE:
The values for RAD START and RAD END should be chosen based on the relative heat contribution by the box reheat compared to the radiation heating. If the room heating is predominately by radiation, then the radiation stage 2 should be allocated a higher percentage. This means a greater "range" between RAD START and RAD END. For example, instead of the default of RAD START = 30 and RAD END = 60, which is a range of 30 to 60, you could configure a range of 30 to 85, or 15 to 80—these are just examples. Similarly, if box reheat is the predominant source of heat, then the radiation stage should be allocated a lower percentage.

One other consideration is the relative sizes of stage 1 versus stage 3.

For example, if.

- DIS TEMP MIN = 50
- CTL STPT (room setpoint) = 70
- DIS TEMP MAX = 90

then the difference from 50 to 70 is the same as 70 to 90. The percentage allocated to stage 1 should be about the same percentage as allocated to stage 3.

However, if,

- DIS TEMP MIN = 55
- CTL STPT (room setpoint) = 70
- DIS TEMP MAX = 110

then the percentage allocated to stage 1 should be reduced and the percentage allocated to stage 3 should be increased.

Room Pressurization

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 TEC.
   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 separately from the startup instructions.
2. Verify correct pressurization in the four airflow operating conditions that follow. Verify that flow differential VOL DIFFRNC matches desired VOL DIF STPT. To achieve the required conditions, first set TEMP CTL VOL equal to CLG FLO MIN for minimum cooling, then set TEMP CTL VOL equal to CLG FLO MAX for maximum cooling.
   - Maximum external exhaust(s), maximum cooling
   - Minimum external exhaust(s), maximum cooling
   - Maximum external exhaust(s), minimum cooling
   - Minimum external exhaust(s), minimum cooling

When all conditions have been checked, release TEMP CTL VOL.

AVS FAILMODE

AVS FAILMODE is an enumerated point that describes how the Supply Damper and the General Exhaust Damper 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 Failure and 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 failure and AVS FAILMODE 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

AVS FAILMODE values are not additive. If AVS FAILMODE equals **7**, the Supply Damper will hold. The Exhaust Damper 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 Damper will close if the room is being positively pressurized and open if the room is neutral or is being negatively pressurized.

Alarms

The controller is equipped with ventilation and pressurization alarms. It does not contain temperature alarms.

Ventilation Alarm

1. Set P1 V ALM LVL to the specified value for the PRS1 pressure state. It may be specified in air changes per hour. If so, convert it to cfm (lps). If no ventilation alarm is required, set P1 V ALM LVL to 0.
2. Set P2 V ALM LVL to the specified value for the PRS2 pressure state. If no minimum ventilation is stated for the second pressure state, use the same value as used for the first pressure state. If ventilation alarms are not required during unoccupied mode, set P2 V ALM LVL to 0.

NOTE:
Setting the alarm level to zero only disables the alarm on low TOTL SUPPLY. Even if the alarm level is set to zero, the ventilation alarm will still turn on if:

- SUP VOL stays below the currently active supply minimum for a time at least equal to VENT ALM DEL and/or
- GEX VOL stays below the currently active general exhaust box minimum for a time at least equal to VENT ALM DEL.

3. For the alarm delay, set VENT ALM DEL to the value specified. If no value is specified, use the default value.

Pressurization Alarm

CAUTION

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.

The pressurization alarm, VOL DIF ALM, indicates that VOL DIFFRNC has fallen below the active pressure state alarm level for a time greater than or equal to DIF ALM DEL, or that the controller can't calculate the flow difference because it has lost a flow signal.

1. Set DIF ALM DBD to a value less than the absolute value of VOL DIF STPT. Since VOL DIF STPT gets its value from PRS1DIF STPT or PRS2DIF STPT, DIF ALM DBD must be set to a value less than whichever of the two points (PRS1DIF STPT or PRS2DIF STPT) has a smaller absolute value.
2. Set DIF ALM DEL to desired value. This is the pressurization alarm delay point that may be of use in the prevention of nuisance alarms.

Local Annunciation

ALARM ENA does not enable alarms. It only determines whether a particular alarm activates ALARM DO7. The *ALARM ENA Values Table* shows what is enabled when ALARM ENA is at a particular value.

If ALN ENA is set to any value other than 0, 1, 4, or 5, it will display a 0 and like it was set to 0.

NOTE:
If the job specification requires annunciation of the ventilation alarm through a local alarm device connected to ALARM DO7, then ALARM ENA must be set to a value that enables the ventilation alarm (1 or 5).

- Set ALARM ENA to desired value.

ALARM ENA Values.	
	ALARM ENA
0 default	ALARM DO7 will not be activated
1	Vent Alarm activate ALARM DO7
4	Vol Dif Alarm activate ALARM DO7
ALM ENA is additive. For example, if ALM ENA equals 5, then either a ventilation or a pressurization alarm would activate ALARM DO7.	

CAUTION

DO NOT override ALARM DO7 or use it as a spare output point when ALARM ENA is not set to zero.

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 PRC to enable this function.

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**.

The Start-up is complete.

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