SIEMENS

BACnet PRC-OAVS

Slow Floating Damper Control, AOV or Floating Reheat, Optional Discharge Control and Optional AOV Perimeter Radiation Application 6773

Application Note

140-1337
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Building Technologies

Table of Contents

Overview 5
BACnet 9
Auto Discovery 9
Auto Addressing 9
Hardware Inputs 9
Hardware Outputs 10
Ordering Notes 10
Sequence of Operation 11
Room Airflow Balance 11
External Flow Values 11
Flow Tracking – Supply Tracks Exhaust vs. Exhaust Tracks Supply 12
Calculating Exhaust Flow Setpoint 13
Calculating Supply Flow Setpoint 14
Ventilation 15
Room Temperature, Temp Offset, and CTL TEMP 15
Room Unit Identification 15
Room Unit Operation 16
Sensor Select 16
Room CO2 17
Room RH 17
PPCL STATUS 17
Day and Night Modes 17
Night Mode Override Switch 17
Heating/Cooling Switchover 18
Modulate Damper During Heating Mode (Optional) 18
Floating Control Actuation Auto-correct 18
Control Loops 18
Heating Safety 19
Sequencing Logic (Optional) 20
Heating Sequencer 22
Calibration 24
Alarms 25
Ventilation Alarm 25
Pressurization Alarm 26
Local Annunciation 26
Operation of AVS FAILMODE 27
Fail Mode Operation 29
Wiring Diagrams 30
Point Database Application 6773 33

Point Database (Slave Mode) Application 6775 38

Overview

Application 6773 controls pressurization, ventilation, and room temperature in a laboratory room served by one single-duct supply terminal with a reheat coil, one general exhaust terminal. Pressurization is controlled by maintaining a selected difference between supply and exhaust airflows.

NOTE:
Application 6773 can be set up to operate without a supply box, or without a general exhaust box. See the *Application Notes* section for more information.

Application 6773 uses floating control electronic actuators for both supply and exhaust damper control. A standard 0 to 10 Vdc actuator is used for the optional perimeter heating valve. The box reheat may be driven with either 0 to 10 Vdc or floating control.

To provide cooling, Application 6773 modulates the supply air damper. The way this application provides heating depends on how it has been configured. There are three mode configurations available:

- **Mode 1** - VAV PRC with reheat controlled directly by the room temperature loop
- **Mode 2** - VAV PRC with reheat controlled by discharge loop (discharge temperature sensor required).
- **Mode 3** – VAV PRC with reheat controlled by discharge loop (discharge temperature sensor required), plus additional perimeter radiation heating.

NOTE:
In Mode 3, the heat demand is broken into three stages. In stage one, perimeter radiation heat is off and the discharge temperature rises from discharge min to room setpoint. If heat demand is still not met, the application enters stage two. In stage two, the discharge is held at room setpoint while the perimeter radiation heating modulates from full off to full on. If heat demand is still not met, the application enters stage three. In stage three, the perimeter radiation is full on while the discharge temperature modulates from room setpoint to discharge max. For more information see *Heating Sequencer* section.

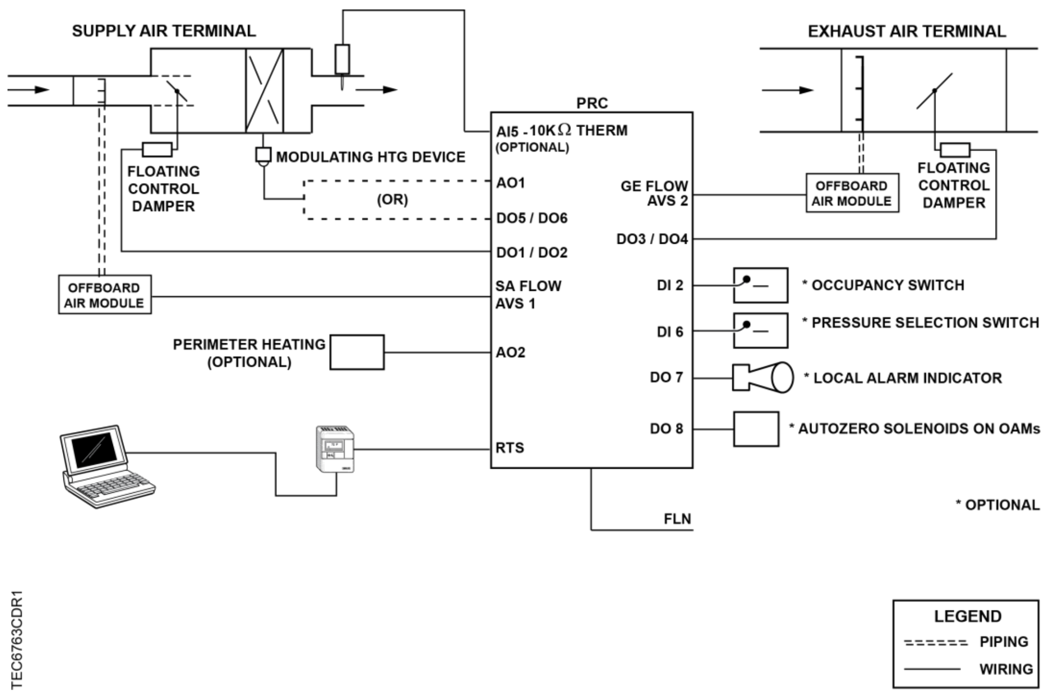
Application 6773, airflow rates can be held constant or modulated. When flow is modulated, it can be sequenced, changed in parallel, or overlapped with heating.

NOTE:
The PRC controls pressure, ventilation, and temperature. When these functions conflict, the priorities are:

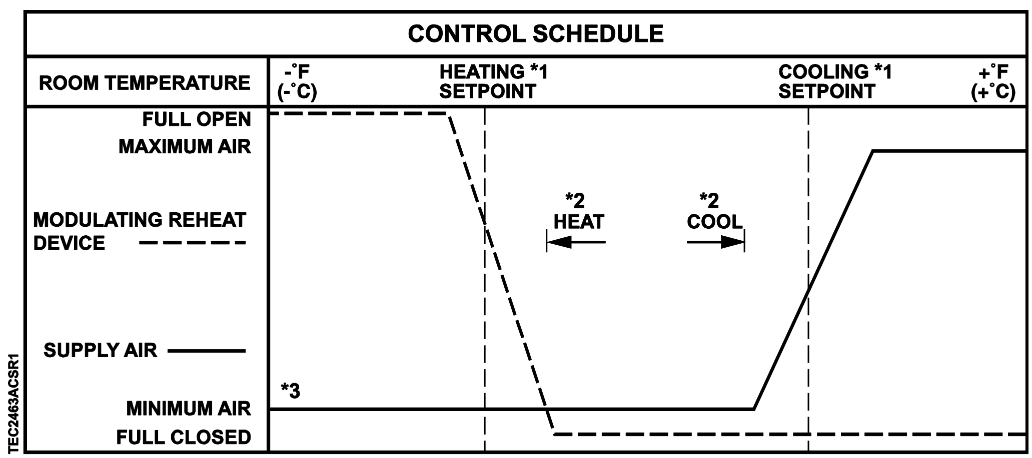
• Pressurization

• Ventilation (supply minimum may be overridden to maintain negative pressurization)

• Temperature

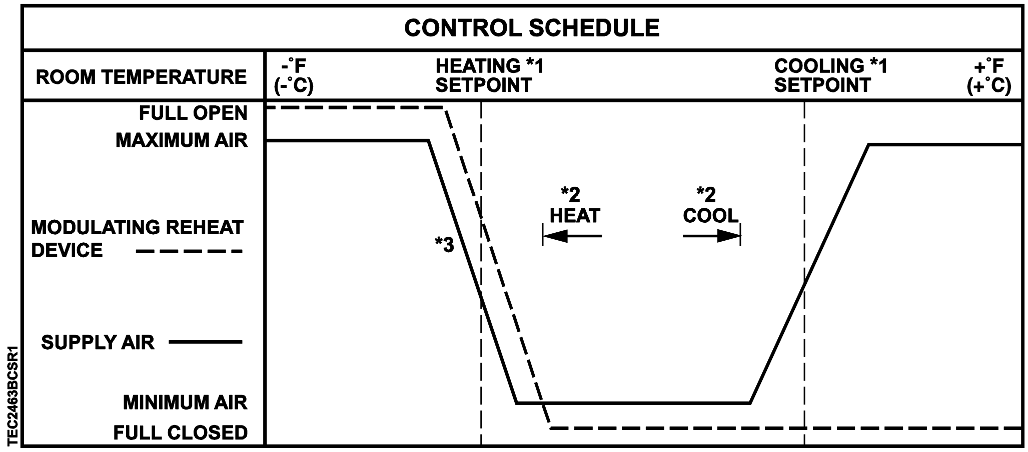


Application 6773 Control Diagram.



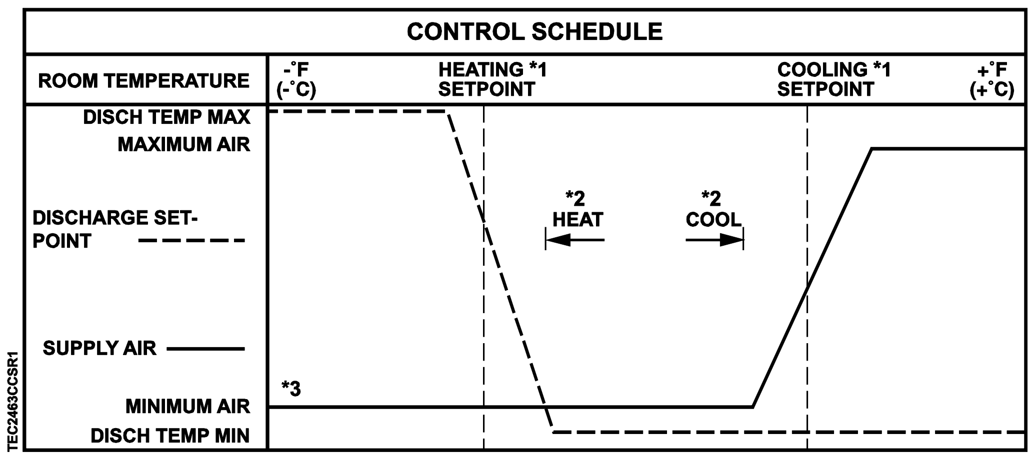
NOTES:
1. See *Control Temperature Setpoints*.
2. See *Heating/Cooling Switchover*.
3. The airflow is shown at minimum flow throughout the entire heating mode (default setting). The airflow can operate sequenced, parallel, or overlapping with the electric reheat (optional). See *Sequencing Logic*.

Application 6773 – Control Schedule – Mode 1.



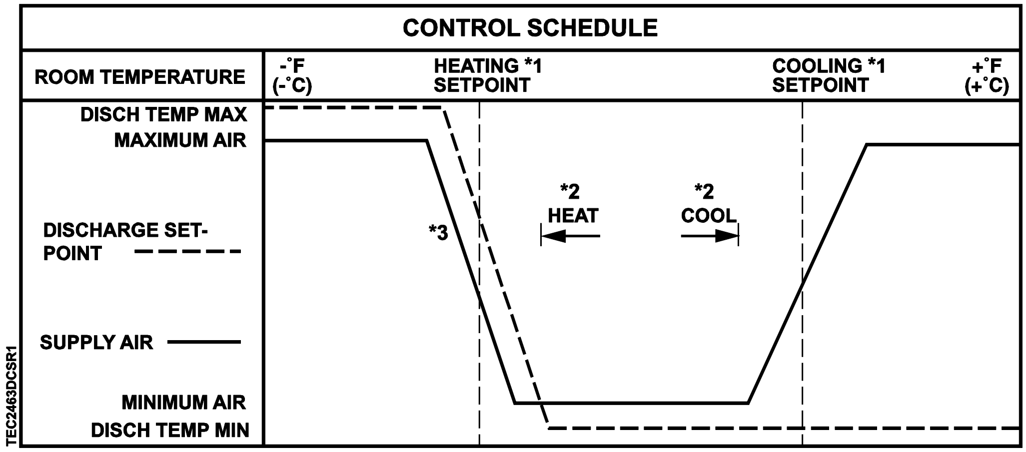
NOTES:
1. See *Control Temperature Setpoints*.
2. See *Heating/Cooling Switchover*.
3. The airflow is shown operating parallel with the reheat valve (optional). The airflow can operate at a minimum flow throughout the entire heating mode (default setting). See *Sequencing Logic*.

Application 6773 – Control Schedule with Modulating Damper in Heating Mode – Mode 1.



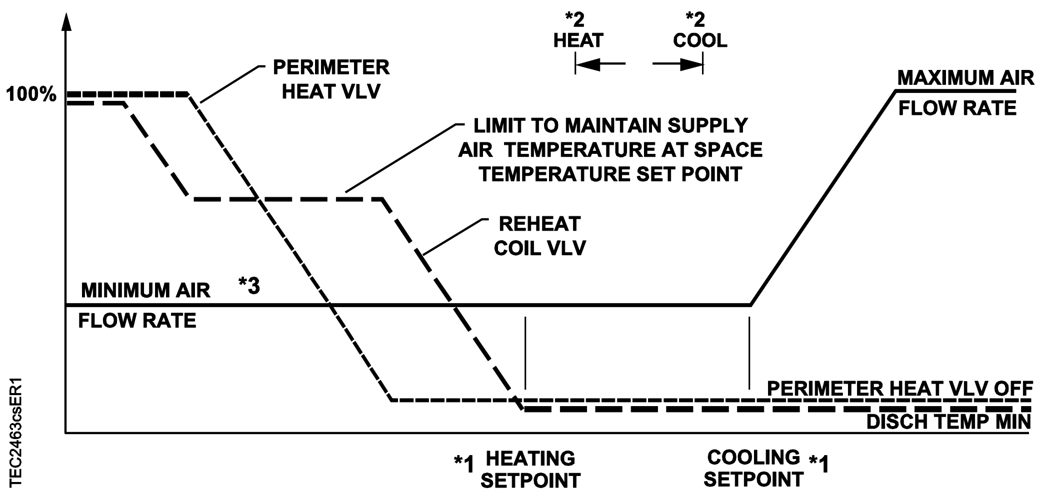
NOTES:
1. See *Control Temperature Setpoints*.
2. See *Heating/Cooling Switchover*.
3. The airflow is shown at minimum flow throughout the entire heating mode (default setting). The airflow can operate sequenced, parallel, or overlapping with the electric reheat (optional). See *Sequencing Logic*.

Application 6773 – Control Schedule – Mode 2.



NOTES:
1. See *Control Temperature Setpoints*.
2. See *Heating/Cooling Switchover*.
3. The airflow is shown operating parallel with the reheat valve (optional). The airflow can operate at a minimum flow throughout the entire heating mode (default setting). See *Sequencing Logic*.

Application 6773 – Control Schedule with Modulating Damper in Heating Mode – Mode 2.



NOTES:
1. See *Control Temperature Setpoints*.
2. See *Heating/Cooling Switchover*.
3. The airflow is shown operating parallel with the reheat valve (optional). The airflow can operate at a minimum flow throughout the entire heating mode (default setting). See *Sequencing Logic*.

Application 6773 – Control Schedule – Mode 3.

BACnet

The controller communicates using BACnet MS/TP protocol for open communications on BACnet MS/TP networks.

Product	Supported BIBBs	BIBB Name
BTEC/PTEC	DS-RP-B B	Data Sharing-Read Property-B
	DS-RPM-B	Data Sharing-Read Property Multiple-B
	DS-WP-B	Data Sharing-Write Property-B
	DM-DDB-B	Device Management-Dynamic Device Binding-B
	DM-DOB-B	Device Management-Dynamic Object Binding-B
	DM-DCC-B	Device Management-Device Communication Control-B
	DM-RD-B	Device Management-Reinitialize Device-B
	DM-BR-B	Device Management-Backup and Restore-B
	DM-OCD-B	Device Management-Object Creation and Deletion-B
	CPT	Confirmed Private Transfer (Auto Discovery)
	UPT	Unconfirmed Private Transfer

Auto Discovery

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

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

Auto Addressing

Auto Addressing allows you to automatically assign device addresses to a PTEC/ATEC controller on the BACnet MS/TP Network. If a controller is not configured with a MAC address, you have the option to auto-address or manually address the controller. During this time the baud rate is automatically detected by the controller.

Controller(s) must be connected on the BACnet/IP network in order for automatic addressing to occur.

Hardware Inputs

Analog

- Air velocity sensor(s) – (one or two depending on setup)
- Room temperature sensor (RTS)
- Discharge Temperature Sensor (10K Ω thermistor)
- *(Optional)* Room temperature set point dial

Digital

- Occupancy button (option on room temperature sensor)
- *(Optional)* Occupancy switch
- *(Optional)* Pressurization selection switch

Hardware Outputs

Analog

- AOV1 reheat valve (can use optional floating control (DO 5, DO 6) if desired)
- *(Optional)* AOV2 perimeter radiation valve

Digital

- Supply damper (two DOs; DO1, DO 2) (optional, in place of analog)
- General exhaust damper (two DOs; DO 3, DO 4) (optional, in place of analog)
- Autozero Solenoid(s) in Offboard Air Module(s) (DO 8)
- Alarm (DO 7) (optional)

Ordering Notes

570-810PA	BACnet PRC-OAVS with Floating Damper, AOV or Floating Reheat, (optional) Discharge Temperature Control and AOV Perimeter Heating Requires Offboard Air Module(s) – order and ship separately
550-819B	Offboard Air Module (OAM) – order and ship separately

Sequence of Operation

The following paragraphs present the sequence of operation for BACnet PRC-OAVS with Floating Damper, AOV or Floating Reheat, (optional) Discharge Temperature Control and AOV Perimeter Heating, Application 6773.

Room Airflow Balance

The difference between total supply flow and total exhaust flow is the room airflow balance as shown in these calculations:

VOL DIFFRNC = TOTL EXHAUST – TOTL SUPPLY

-or-

VOL DIFFRNC = (GEX VOL + OTHER EXH) – (SUP VOL + OTHER SUP)

The controller uses these calculations to maintain VOL DIFFRNC at the VOL DIF STPT.

NOTE:
Because of this definition, VOL DIFFRNC and VOL DIF STPT are positive numbers in a room that is negatively pressurized, and vice versa.

Application 6773 has the ability to switch between two volume differential setpoints, PRS1DIF STPT and PRS2DIF STPT. The status of PRESS STATE determines which differential setpoint is active.

External Flow Values

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

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

Flow Tracking – Supply Tracks Exhaust vs. Exhaust Tracks Supply

The Supply Tracks Exhaust (STE) and Exhaust Tracks Supply (ETS) feature is configured by setting TRACK MODE to STE or ETS to help the controller meet the pressurization needs of the controlled space, such as for negative or positive pressure. TRACK METHOD is used to determine what is being tracked – a flow value or a setpoint value. Regardless of the mode (STE or ETS) in which the controller is operating, the application will change the value of TRACK METHOD from STPT to FLOW (that is, from setpoint tracking to flow tracking) if necessary to maintain proper pressurization. This is important in situations where a room may lack sufficient supply or general exhaust capacity. The following paragraphs explain this in greater detail.

Supply Tracks Exhaust mode is useful when trying to maintain negative pressurization. During Supply Tracks Exhaust, the supply air volume "tracks" or follows the exhaust air volume. If the exhaust air is "broke" (for example, general exhaust air valve stuck open/closed), the controller adjusts the supply air volume (it is limited to the range of zero up to HTG FLO MAX in heating mode or CLG FLO MAX in cooling mode) in an attempt to maintain the VOL DIF STPT pressure differential as much as possible, regardless of temperature control concerns.

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 higher level than HTG FLO MIN if necessary for pressurization purposes.

Exhaust Tracks Supply mode is useful when trying to maintain positive pressurization. During Exhaust Tracks Supply, the general exhaust air volume "tracks" or follows the supply air volume. If the supply air is "broke" (for example, supply air valve stuck open/closed), the controller adjusts the exhaust air volume (it is limited to the range of zero up to GEX MAX) in an attempt to maintain the VOL DIF STPT pressure differential as much as possible, regardless of temperature control concerns.

TRACK METHOD

TRACK METHOD is a point associated with TRACK MODE. TRACK MODE determines which airflow (supply or general exhaust) gets tracked and which airflow does the tracking. TRACK METHOD determines how tracking is accomplished.

If TRACK MODE is set up for Exhaust Tracks Supply flow tracking (ETS), then:

If TRACK METHOD is set for FLOW tracking, the general exhaust flow setpoint is calculated according to the measured value, SUP VOL. 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 changeover 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 changes from STPT tracking to FLOW tracking. It stays in that mode until the error comes back to zero, then switches back to the STPT tracking mode.

If TRACK MODE is set up for Supply Tracks Exhaust flow tracking (STE), then:

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

This feature prevents the incorrect pressurization of rooms that lack the required general exhaust capacity. The changeover 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 changes from STPT tracking to FLOW tracking. It stays in that mode until the error comes back to zero, then switches back to the STPT tracking mode.

Calculating Exhaust Flow Setpoint

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

- During VAV operation, the controller calculates GEX FLO STPT by looking at the value of TEMP CTL VOL and determining the general exhaust flow needed to pressurize the room. If TEMP CTL VOL is less than the active supply minimum, the controller ignores TEMP CTL VOL and calculates GEX FLO STPT based on the value of the active supply flow minimum.
- During CV operation, the controller ignores TEMP CTL VOL. Instead, it calculates GEX FLO STPT based on the value of the active supply flow minimum and the amount of general exhaust airflow needed to pressurize the room.

NOTE:
When Supply Tracks Exhaust (STE) flow tracking is being used, the controller does not allow GEX FLO STPT (or the actual general exhaust flow) to rise above the active general exhaust airflow maximum. **However, the general exhaust airflow minimum can be overridden in situations where doing so is necessary to maintain desired room pressurization.**

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 used, the general exhaust airflow setpoint is calculated the same during both VAV and CV operation, as follows:

To calculate GEX FLO STPT, the controller 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 FLO STPT or SUP AIR VOL depending on the value of TRACK METHOD. GEX FLO STPT may not exceed the active general exhaust airflow maximum, but the currently active general exhaust airflow minimum (OCC GEX MIN or UOC GEX MIN) will be overridden if necessary to maintain the desired room pressurization.

When **Exhaust Tracks Supply (ETS)** flow tracking is 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

To calculate SUP FLO STPT, the controller determines the supply flow value that pressurizes the room based on the values of VOL DIF STPT, OTHER EXH, OTHER SUP, and either GEX FLO STPT or GEX AIR VOL depending on the value of TRACK METHOD. SUP FLO STPT may not exceed the currently active supply airflow maximum.

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

- During VAV operation, the controller calculates SUP FLO STPT by looking at the value of TEMP CTL VOL and determining the supply flow needed to pressurize the room. If TEMP CTL VOL is less than the active supply minimum, the controller ignores TEMP CTL VOL and calculates SUP FLO STPT based on the value of the active supply flow minimum.
- During CV operation, the controller ignores TEMP CTL VOL. Instead, it calculates SUP FLO STPT based on the value of the active supply flow minimum and the amount of supply airflow needed to pressurize the room.

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

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 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 supply airflow rise above the CLG FLO MAX or HTG FLO MAX. **However, the currently active supply airflow minimum (CLG FLO MIN or HTG FLO MIN depending on HEAT.COOL) will be overridden if necessary to achieve desired pressurization.**

Ventilation

Application 6773 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.

Room Temperature, Temp Offset, and CTL TEMP

ROOM TEMP is the temperature that is being sensed by the room temperature sensor (RTS).

RMTMP OFFSET (or TEMP OFFSET) is a user-adjustable offset that compensates for deviations between the value of ROOM TEMP and the actual room temperature.

CTL TEMP is the room temperature that is used for control purposes. In other words, the application is trying to maintain CTL TEMP at the control setpoint.

When CTL TEMP is not overridden, CTL TEMP and ROOM TEMP are related by the following equation:

CTL TEMP = ROOM TEMP + RMTMP OFFSET (or TEMP OFFSET)

If CTL TEMP is not overridden, then:

- If ROOM TEMP has a status of Normal, then CTL TEMP will also have a status of Normal. The current value of ROOM TEMP will be used to determine the value of CTL TEMP. If ROOM TEMP has a status of Failed and ROOM TEMP is overridden, then CTL TEMP will have a status of Normal. The current value of ROOM TEMP will be used to determine the value of CTL TEMP.
- If ROOM TEMP has a status of Failed and ROOM TEMP is **not** overridden, then CTL TEMP will have a status of Failed. The last known good value of ROOM TEMP will be used to determine the value of CTL TEMP.
- If CTL TEMP is overridden then, then CTL TEMP equals its overridden value and the points ROOM TEMP and TEMP (RMTMP) OFFSET have no effect on the value of CTL TEMP.
- The status of CTL TEMP will always equal Normal, even if ROOM TEMP is Failed.

Room Unit Identification

- For Analog Room Units (Series 1000) – The revision number is visually identified by its case.
- For Digital Room Units (Series 200/2300 Firmware Revision 25 or earlier) – The revision number displays for 5 seconds when the room unit is first powered up. These room units will display `laptop` when a laptop is connected and will no longer update room temperature sensor values.
- For Digital Room Units (Series 2200/2300 Firmware Revision 26 and later) – The revision number displays for 5 seconds when the room unit is first powered up or when a laptop is disconnected. These room units will continue to display and update the room temperature sensor values when a laptop is connected.

Room Unit Operation

Sensor Select

SENSOR SEL is a configurable, enumerated point (values are additive). This point tells the controller what type of room unit is being used and how to handle loss of communication, for more information see Fail Mode Operation [➔ 29]. It also provides the ability to enable the optional RH and CO2 sensors and indicates which thermistor type is connected.

Room Temperature, Setpoint, RH and CO2

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

Thermistor Inputs

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

SENSOR SEL Value *	Description
0	Analog Room Unit, 10K
1	Select Digital Room Unit (for temperature sensing and setpoint dial), 10K
2	Relative Humidity (RH) sensing, 10K
3	Digital Room Unit, RH, 10K
4	CO_2 sensing, 10K
5	Digital Room Unit, CO2, 10K
7	Digital Room Unit, RH, CO2, 10K
8	Analog Room Unit, 100K
9	Digital Room Unit, 100K
11	Digital Room Unit, RH, 100K
13	Digital Room Unit, CO2, 100K
15	Digital Room Unit, RH, CO2, 100k
16	(Not used)

Example 1: Digital Room Unit with temperature, RH, CO2 and 10K thermistor. 1+2+4+0 = 7

Example 2: Analog Room unit with 100K thermistor. 0+0+0+8 = 8

Room CO2

RM CO2 displays the CO_2 value in units of parts-per-million (PPM). RM CO2 (from the digital 2200/2300 room units) can be used with PPCL in the PTEC/ATEC controller or unbundled for control or monitoring purposes.

Room RH

RM RH displays the relative humidity value in percent. RM RH can be used for PPCL in the PTEC or unbundled for control or monitoring purposes.

RM RH displays the relative humidity value in percent.

PPCL STATUS

PPCL STATUS displays LOADED or EMPTY.

- LOADED = PPCL - programming is present in the controller. A new application number must be assigned (12000 through 12999).
- EMPTY = NO PPCL - programming is present.

The maximum number of PPCL dynamic points is 15.

Day and Night Modes

The day/night status of the space is determined by the status of DAY.NGT. The control of this point differs depending on whether the controller is monitoring the status of a wall switch or if the controller is connected to a field panel.

When a wall switch is physically connected to the termination strip on the controller at DI 2, and WALL SWITCH = YES, the controller monitors the status of DI 2. When DI 2 is ON (the switch is closed), DAY.NGT will be set to DAY indicating that the controller is in day mode. When DI 2 is OFF (the switch is open), DAY.NGT will be set to NIGHT indicating that the controller is in night mode.

When WALL SWITCH = NO, the controller does not monitor the status of the wall switch, even if one is connected to it. In this case, if the controller is operating stand-alone, then the controller stays in day mode all the time. If the controller is operating with centralized control (that is, it is connected to a field panel), then the field panel can send an operator or PPCL command to override the status of DAY.NGT. See the *Powers Process Control Language (PPCL) User's Manual* (125-1896) and *Field Panel User's Manual* (125-3019 or 125-3020) for more information.

Night Mode Override Switch

If an override switch is present on the room temperature sensor and a value (in hours) other than zero has been entered into OVRD TIME, pressing the override switch resets the controller to DAY operational mode for the time period that is set in OVRD TIME. The status of NGT OVRD changes to DAY. After the override time elapses, the controller returns to night mode and the status of NGT OVRD changes back to NIGHT.

The override switch on the room sensor only affects the controller when it is in Night mode.

Heating/Cooling Switchover

When the controller switches to heating mode, the span is applied to the DAY HTG STPT (70°F) and you can adjust the heating setpoint from 68°F to 72°F.

Digital Room Units (2200/2300 Series)

The digital room unit will display a graphical bar indicating the number of steps above or below the current operating temperature setpoint. When the controller switches modes (heating to cooling) the span adjustment set will be applied to the new heating/cooling mode center value.

Analog Room Units (1000 Series)

When the controller switches to heating mode, the span is applied to the DAY HTG STPT (70°F) and you are able to adjust the heating setpoint from 68°F to 72°F.

Modulate Damper During Heating Mode (Optional)

CAUTION

The heating/cooling switchover mechanism is not affected by the air temperature in the supply duct.

To change the value of HEAT.COOL based on the supply air temperature, you must command HEAT.COOL through PPCL. This is required when the flow loop will be used as a source of cooling in cooling mode and a source of heat in heating mode. If the flow loop is used in heating mode just to meet minimum air requirements, the heating/cooling switchover mechanism operates as described to control HEAT.COOL. See *Sequencing Logic (optional)* for more information.

Floating Control Actuation Auto-correct

Floating Control Actuation Auto-correct

In addition to the existing options for floating control actuator full stroke actions, all floating control actuators are provided with additional logic to fully drive open or closed when commanded to 100% or 0%.

Control Loops

This application is controlled by five Proportional, Integral, and Derivative (PID) control loops (three temperature loops and two flow loops).

Heating Temperature Loop — The Heating Temperature Loop uses CTL STPT and CTL TEMP to modulate the value of its loopout point HTG LOOPOUT from HTG FLO MIN to HTG FLO MAX.

Cooling Temperature Loop — The Cooling Temperature Loop uses CTL STPT and CTL TEMP to modulate the value of its loopout point CLG LOOPOUT from CLG FLO MIN to CLG FLO MAX.

In Application 6773, you can set CLG FLOW MIN equal to, but not greater than, CLG FLOW MAX, and set HTG FLOW MIN equal to, but not greater than, HTG FLOW MAX. If the minimum and maximum values are set equal, the flow loop becomes a constant volume loop and loses its ability to control temperature.

Discharge Temperature Loop – The Discharge Temperature Loop uses DIS TEMP AI5 and DISCH STPT to modulate the discharge air temperature between the limits of the minimum discharge air temperature DIS TEMP MIN and the maximum discharge air temperature DIS TEMP MAX. Note that the discharge temperature loop is only used in Modes 2 and 3. In Mode 1, there is no separate discharge control loop since the reheat valve is directly controlled by the temperature loop.

Supply Flow Loop - SUP VOL as derived from the AVS1 supply velocity sensor is compared to the SUP STPT to generate the control signal SUP DMP CMD. SUP DMP CMD (a value from 0 to 100) represents the required position of the damper in order to reach the desired setpoint. 0 represents fully closed and 100 represents full open.

Exhaust Flow Loop - GEX VOL as derived from the AVS2 exhaust velocity sensor is compared to the GEX STPT to generate the control signal GEX DMP CMD. GEX DMP CMD (a value from 0 to 100) represents the required position of the damper in order to reach the desired setpoint. 0 represents fully closed and 100 represents full open.

Heating Safety

CAUTION

Do not set HTG FLOW MIN to 0 CFM (0 LPS).

Safeties provided by others should require a minimum airflow moving across the heating coils when the modulating heating device is open.

NOTE:
As a safety feature, these applications include MODHTG FLO to ensure that adequate airflow is present before heating coils are energized. When the supply airflow (in fpm as derived from the supply air velocity sensor) is greater than MODHTG FLO, then the internal point “ok_to_mod” is set to Yes and the modulating heating device is allowed to modulate.

The default value is 300, which means that the airflow over the heating coil must be at least 300 fpm.

Since CFM = FPM x Duct Area x Flow Coefficient, the default value of 300 fpm equates to the following cfms:

In a 12-inch diameter duct and a typical flow coefficient of .7, 300 fpm equates to 158 cfm.

12 inch diameter = .75 sq ft **.75 sq ft * 300 fpm * .7 = 158 cfm**

In an 8-inch diameter duct and a typical flow coefficient of .7, 300 fpm equates to 74 cfm.

8 inch diameter = .35 sq ft **.35 sq ft * 300 fpm * .7 = 74 cfm**

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 allows reheating to occur even if the box is operating below its designated minimum flow setting.

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.

Using fpm flow rather than cfm makes the feature less dependent on duct size.

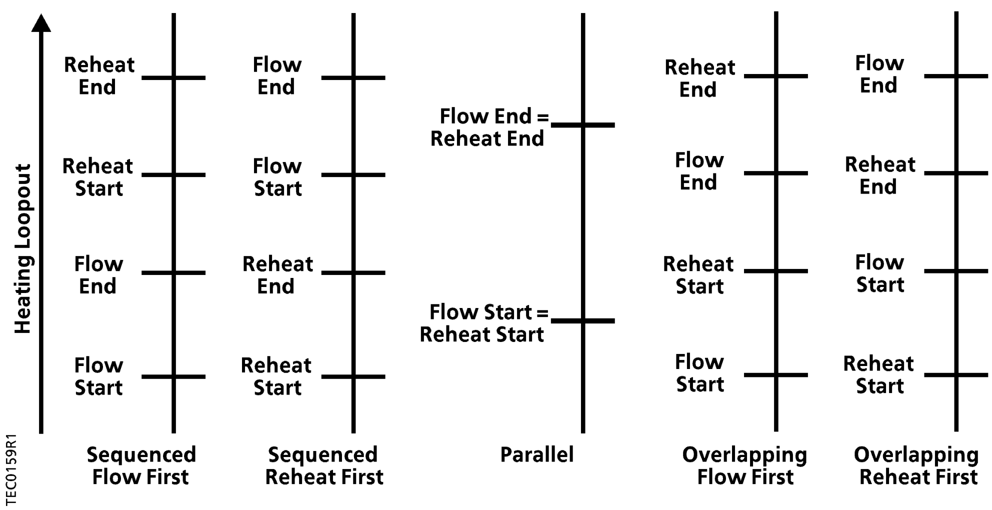
There is hysteresis (deadband) around the flow threshold. The heating turns off below a flow of MODHTG FLO, and does not turn back on until the measured flow rises to a level of 50 fpm more than MODHTG FLO. Between MODHTG FLO and MODHTG FLO + 50, the internal point “ok_to_mod” will not change value.

Sequencing Logic (Optional)

NOTE:
The default setups for FLOW START and FLOW END are 0. This will provide minimum airflow during heating mode.

In heating mode, this application includes logic that allows the flow loop to operate either in sequence, parallel, or overlapping with the auxiliary reheat. This algorithm is very similar to the spring range sequencing of valves and dampers. Portions of the output of the heating loop, HTG LOOPOUT, will drive both the flow loop setpoint and the auxiliary heat (if used) from 0 to 100%. See the following examples.

The ladder diagrams show sequenced, parallel, and overlapping flow loop operations with heating stages. The vertical bars show the output of heating loopout from 0 to 100%. The horizontal bars (reheat start, flow start, etc.) show the action that occurs when the loop output rises above the horizontal bar. The relative positions shown on the graphs are for illustration purposes only and may differ from the examples.



In the following examples, as the flow percentage increases from 0 to 100, the actual flow value TEMP CTL VOL will ramp from HTG FLO MIN to HTG FLO MAX.

CAUTION

Be careful when configuring the FLOW START and REHEAT START points.

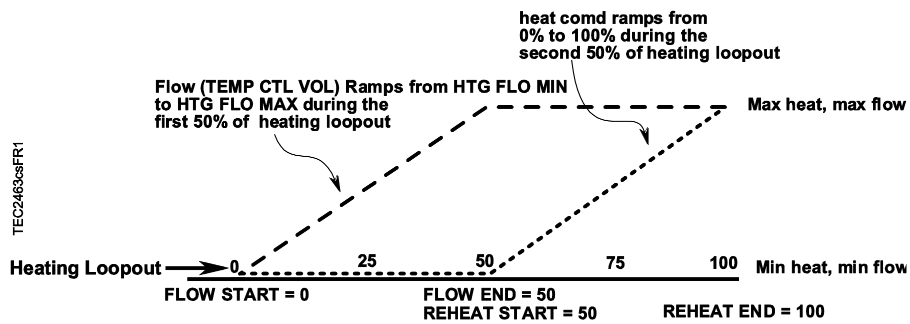
If the air being supplied by the air handler is cold, and the flow is increasing with a call for heat, the room temperature could decrease while the controller is executing its configured logic as it tries to heat the room. See *Example 4* for the typical setup that can be used to prevent an increase in cold air upon a call for heat.

Example 1

Assume that your system has a modulating heating device that is to operate in sequence with the flow loop. In this example the flow goes from min to max in the first 50% of heating loopout and heating goes from min to max in the second 50% of heating loopout. You would use this sequence to increase airflow (and the associated heat transfer) after the modulating heating device is 100% open.

In this example,

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



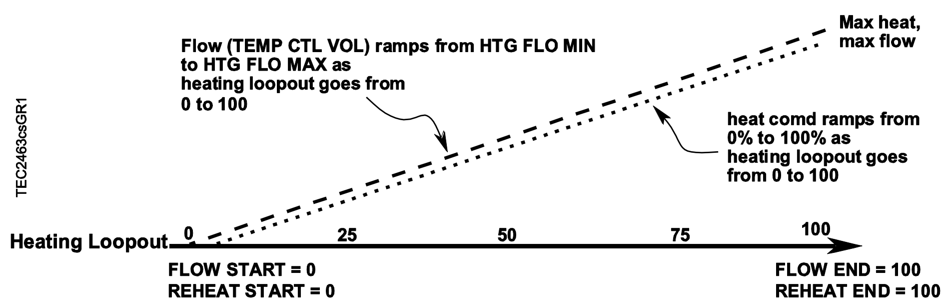
Modulating Heating Device Operating in Sequence with Flow Loop.

Example 2

Assume that your system has a modulating heating device that is to operate in parallel with the flow loop.

In this example,

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



Modulating Heating Device Operating in Parallel with the Flow Loop.

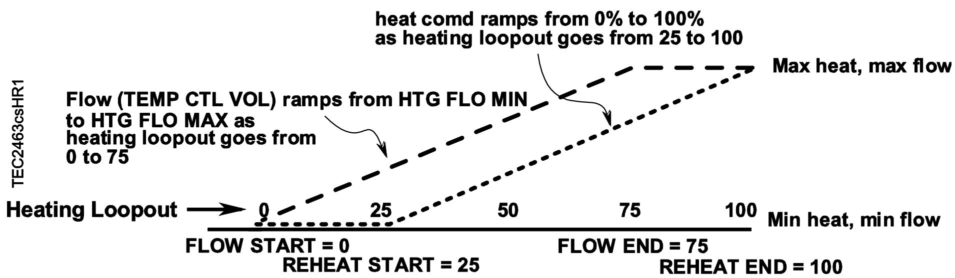
Example 3

Assume that your system has a modulating heating device that is to operate overlapping with the flow loop.

In this example,

- FLOW START = 0%
- FLOW END = 75%

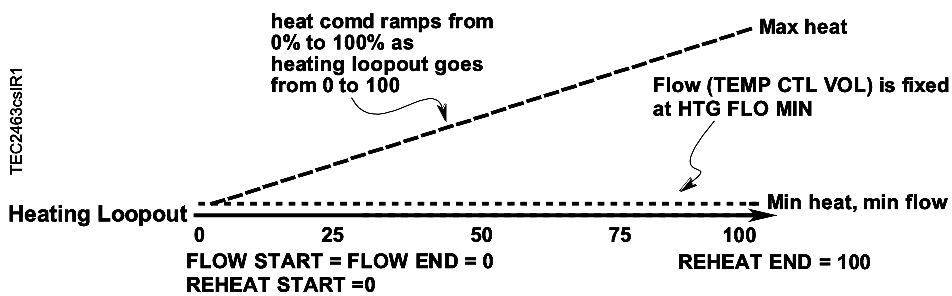
- REHEAT START = 25%
- REHEAT END = 100%



Modulating Heating Device Overlapping with the Flow Loop.

Example 4

Another option that the sequencing logic provides is to have the flow loop provide an airflow equal to HTG FLOW MIN throughout the heating mode with all of the temperature control being done by the modulating heating device. The airflow minimum will be maintained by setting the FLOW START and FLOW END to a value of 0%, resulting in the corresponding minimum flow throughout the entire heating mode, regardless of the value of HTG LOOPOUT.



Modulating Heating Device with Airflow Fixed at Minimum.

Heating Sequencer

In application 6773, the actual heating control (0 through 100) as represented by the internal point heat comd can be used in three different ways.

Mode 1 - no discharge loop, no radiation heating

In the first mode, there is no discharge control loop or discharge control temperature sensor. Heat comd is used to directly drive the reheat valve. To configure this application for Mode 1 operation, set the p and I gains of the discharge loop to **0**. (DISCH P GAIN, DISCH I GAIN).

Mode 2 - with discharge loop, but no radiation heating

In the second mode, there is a discharge loop and a discharge sensor. In this mode, heat comd is used to set the setpoint for the discharge control loop. As heat comd increases from 0 to 100, the discharge setpoint is increased from minimum to maximum discharge temperature. To configure this application to use discharge control, set DISCH P GAIN and/or DISCH I GAIN to a non zero value. To indicate there is no control of radiation heating and that AO 2 is spare, set both RAD START and RAD END to **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 just 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 - with discharge loop and radiation heating.

In the third mode, a discharge loop is active and there is perimeter radiation to be controlled. The heat comd portion of heating loopout is divided into three stages by the heating sequencer module.

1. **Stage One** - Perimeter radiation heat is off as the discharge temperature rises from discharge min to room setpoint. If heat demand is still not met, the application enters stage two.

2. **Stage Two** – The discharge is held at room setpoint while the perimeter radiation heating modulates from full off to full on. If heat demand is still not met, the application enters stage three.

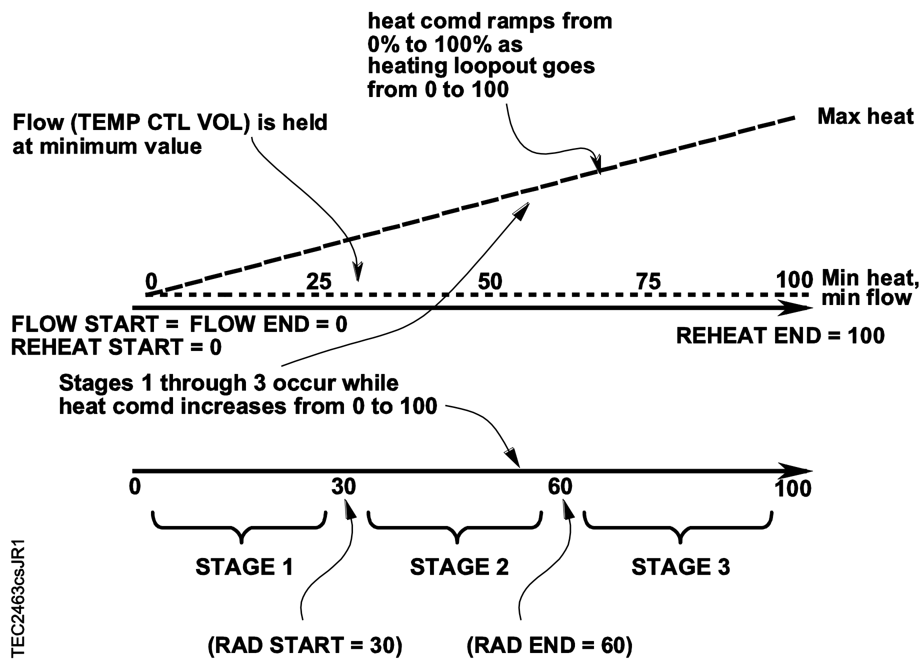
3. **Stage Three** - Perimeter radiation is full on while the discharge temperature modulates from room setpoint to discharge max.

If either DISCH P GAIN or DISCH I GAIN is > 0 and RAD END > RAD START, then the application runs in this third mode.

The default values for RAD START and RAD END are 30 and 60 respectively. With these values, as the need for heat increases from 0 to 100, the first 30% of that need is met with Stage 1 (discharge increasing from min to room temperature setpoint); the next 30% is met with Stage 2 (modulating perimeter radiation heating), and the last 40% will be met with discharge air increasing beyond room temperature setpoint to discharge max as perimeter radiation remains full on.

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 mainly by radiation, then the radiation Stage 2 should be made wider by using a lower value for RAD START and a higher value for RAD END. Similarly if box reheat is the main source of heat, then the radiation stage should be narrowed. (Setting RAD START = RAD END disables the sequencing altogether.)

The following diagram illustrates the relationship between heating loopout, REHEAT START, REHEAT END, RAD START and RAD END.



Mode 3 with Discharge Loop and Radiation Heating.

Calibration

Calibration of the air velocity sensor(s) must be performed at least once every 24 hours to maintain accurate air velocity readings. 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.

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

CAL SETUP is the calibration setup point which determines when calibration occurs and whether it takes place automatically.

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

CAL SETUP Options.	
CAL SETUP (value)	**Description**
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.

Alarms

The controller is equipped with ventilation and pressurization alarms. It does not contain temperature alarms. The controller's alarms are designed to:

- Inform room occupants of hazards.
- Inform building operation personnel that the system is not functioning correctly.
- Supply data for documenting laboratory safety records through trending.

These alarms can be annunciated locally and/or broadcast across a network.

Ventilation Alarm

NOTE:
In the following discussion, the currently active supply flow minimum is assumed to be CLG FLO MIN and the exhaust minimum is assumed to be GEX MIN.

The ventilation alarm, VENT ALM, indicates that there is something wrong with the ventilation to the room. VENT ALM has an adjustable alarm level that can vary with the pressurization status of the room. When PRESS STATE indicates PRS1 (pressure state 1), then P1 V ALM LVL is used as the alarm level. When PRESS STATE indicates PRS2 (pressure state 2), then P2 V ALM LVL is used as the alarm level. An adjustable delay timer, VENT ALM DEL, prevents nuisance alarms.

VENT ALM is turned on when at least one of the following conditions is true:

- The supply flow to the room, TOTL SUPPLY, stays below the alarm level, for a time at least equal to VENT ALM DEL.
- SUP VOL stays below the currently active supply minimum, for a time at least equal to VENT ALM DEL.
- GEX VOL stays below the currently active general exhaust box minimum, for a time at least equal to VENT ALM DEL.

It is turned off only when all of the following conditions are true:

- The TOTL SUPPLY stays above the alarm level, for a time at least equal to the alarm delay.
- SUP VOL stays above the currently active supply minimum, for a time at least equal to VENT ALM DEL.
- GEX VOL stays above the currently active general exhaust box minimum, for a time at least equal to VENT ALM DEL.

If the current conditions will neither turn on the ventilation alarm nor shut off the alarm, then VENT ALM will keep its current value.

Setting the alarm level to zero means the ventilation alarm will not turn on just because of a low value for 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.

Pressurization Alarm

The pressurization alarm, VOL DIF ALM indicates that the difference between supply and exhaust flow is not what it should be, or that the controller can't calculate the flow difference, VOL DIFFRNC, because it has lost a flow signal. The Figure *Failure Mode Sequence* lists reasons why VOL DIFFRNC may fail.

The pressurization alarm point is turned on when at least one of the following conditions occurs:

- VOL DIFFRNC has a status of Failed.
- VOL DIFFRNC stays below VOL DIF STPT – DIF ALM DBD for a time at least equal to DIF ALM DEL.
- VOL DIFFRNC stays above VOL DIF STPT + DIF ALM DBD for a time at least equal to DIF ALM DEL.

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.

The pressurization alarm point is turned off when all of the following conditions occur:

- VOL DIFFRNC has a status of Normal.
- VOL DIFFRNC stays above VOL DIF STPT – DIF ALM DBD for a time at least equal to DIF ALM DEL.
- VOL DIFFRNC stays below VOL DIF STPT + DIF ALM DBD, for a time at least equal to DIF ALM DEL.
- DIF ALM DBD and DIF ALM DEL can be configured to prevent nuisance alarms.

Local Annunciation

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.

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.	

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

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

CAUTION

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

ALARM DO7 is used to operate a local alarm annunciation device such as a light or horn in or near the room. Inputs can be set up to annunciate alarms from any combination of the following sources:

- Pressurization alarm point, VOL DIF ALM
  (To connect VOL DIF ALM to DO 7, set ALM ENA to a value that enables the pressure alarm (4, 5, 6 or 7)).
- Ventilation alarm point, VENT ALM
  (To connect VENT ALM to DO 7, set ALM ENA to a value that enables the ventilation alarm (1, 3, 5 or 7)).
- Network alarm point, NET ALM CMD
  (NET ALM CMD is always enabled for local annunciation.)

ALARM DO7 turns ON if any of the enabled alarm sources indicate an alarm. ALARM DO7 cannot be overridden.

NET ALM CMD can be commanded with the workstation software or PPCL to send an alarm state from the field panel. This makes it possible to program unique alarm criteria and annunciate alarms in specific rooms.

Operation of 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 both positively pressurized rooms and negatively pressurized rooms.

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

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

AVS FAILMODE values are not additive. For example, if AVS FAILMODE equals **3**, this means to open the supply Damper and hold the general exhaust Damper if an AVS fails.

The first seven values of AVS FAILMODE (0 through 6) describe specific actions taken when an AVS fails. For example, if AVS FAILMODE equals **5**, then whenever an AVS fails, the supply Damper will always close and the general exhaust Damper will always open.

The last two values of AVS FAILMODE do not describe specific actions; that is, when an AVS fails, the supply and general exhaust will react differently depending on the circumstances.

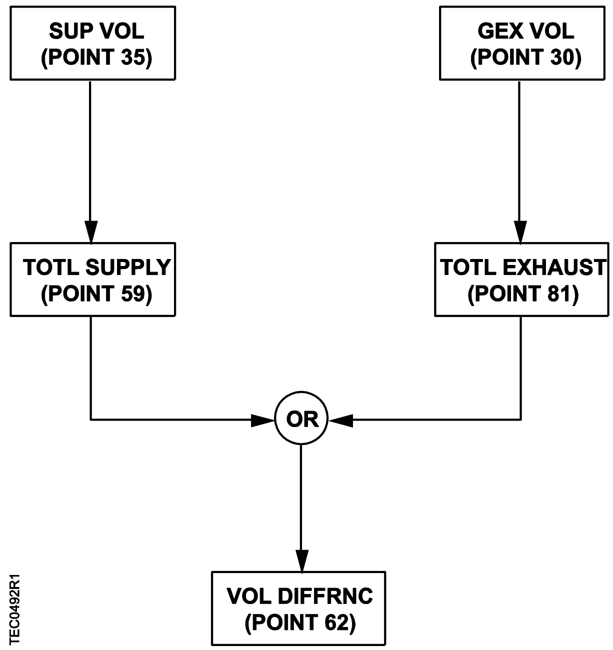
If AVS FAILMODE equals **7**, the supply Damper will hold, and the general exhaust Damper will close if the room is positively pressurized and open if the room is neutral or negatively pressurized (that is if VOL DIF STPT is equal to or greater than 0).

If AVS FAILMODE equals **8**, the supply Damper will open if the room is positively pressurized and close if the room is neutral or negatively pressurized. The general exhaust Damper will close if the room is positively pressurized and open if the room is neutral or negatively pressurized.

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

Fail Mode Operation

If one of the controller's accessories (inputs) fails, a failure mode sequence is initiated that leads to the failure of VOL DIFFRNC. The following figure shows the order in which points will fail.



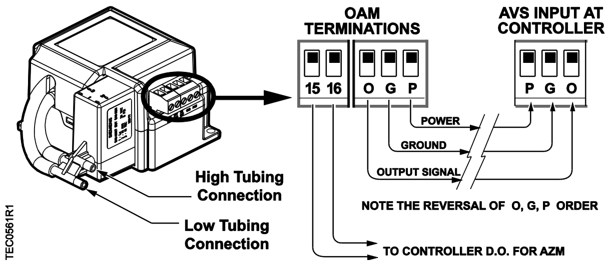
Air Velocity Sensors – If one or both of the PRC air sensor signals (SUP VOL, GEX VOL) are out of range (for example, improper wiring to/from the Offboard Air Module(s), tubing not connected or connected backward), then the actions of the supply and general exhaust dampers will depend on the value of AVS FAILMODE. Once GEX VOL and SUP VOL are normal, the supply and general exhaust dampers return to normal operation.

See *Operation of AVS FAILMODE* for more information.

Room Temperature Setpoint Dial – If the room temperature setpoint dial fails while CTL STPT is not overridden or is not being adjusted by a field panel, then ROOM STPT and CTL STPT both display as "Failed" and the last known good value of ROOM STPT is used to determine the current value of CTL STPT. The rest of the room temperature PID loop is unaffected by the setpoint dial failure. If ROOM STPT is unbundled in a field panel and defined as alarmable, an alarm will be annunciated across the network.

If the room temperature sensor fails while CTL STPT is overridden or is being adjusted by a field panel, then ROOM STPT displays as "Failed". CTL STPT will continue to be overridden or adjusted by the field panel and room temperature control proceeds as normal. CTL STPT will continue to have a status of NORMAL. If ROOM STPT is unbundled in a field panel and defined as alarmable, an alarm will be annunciated across the network.

Wiring Diagrams



Offboard Air Module Wiring.

CAUTION

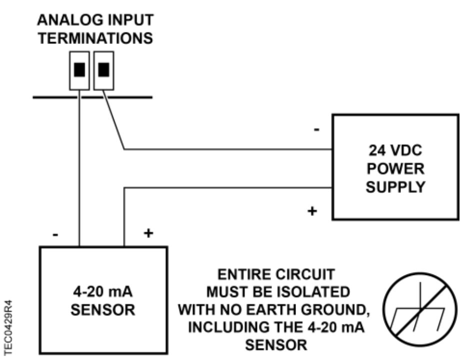
The PRC-OAVS has two terminal blocks with terminations numbered identically (terminations 1 through 16). DO NOT mix these up with each other.

If the PRC-OAVS is not connected as shown, it is not resistant to electrical surges. It is also susceptible to interference from other equipment.

CAUTION

A separate power supply is required if a 4-20 mA sensor is used.

Failure to follow wiring precautions will result in equipment damage.



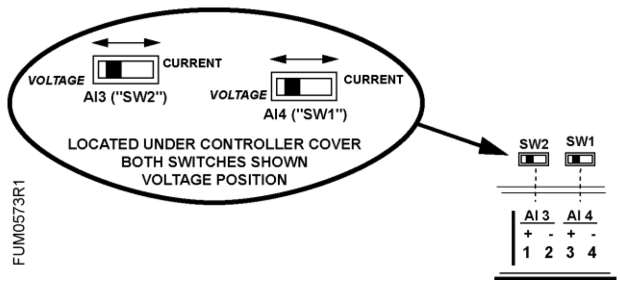
Wiring for AI with a 4 to 20 mA Sensor.

CAUTION

Each 4-20 mA sensor requires a SEPARATE dedicated power limited 24 Vdc power supply.

DO NOT use the same transformer to power both the sensor and the controller.

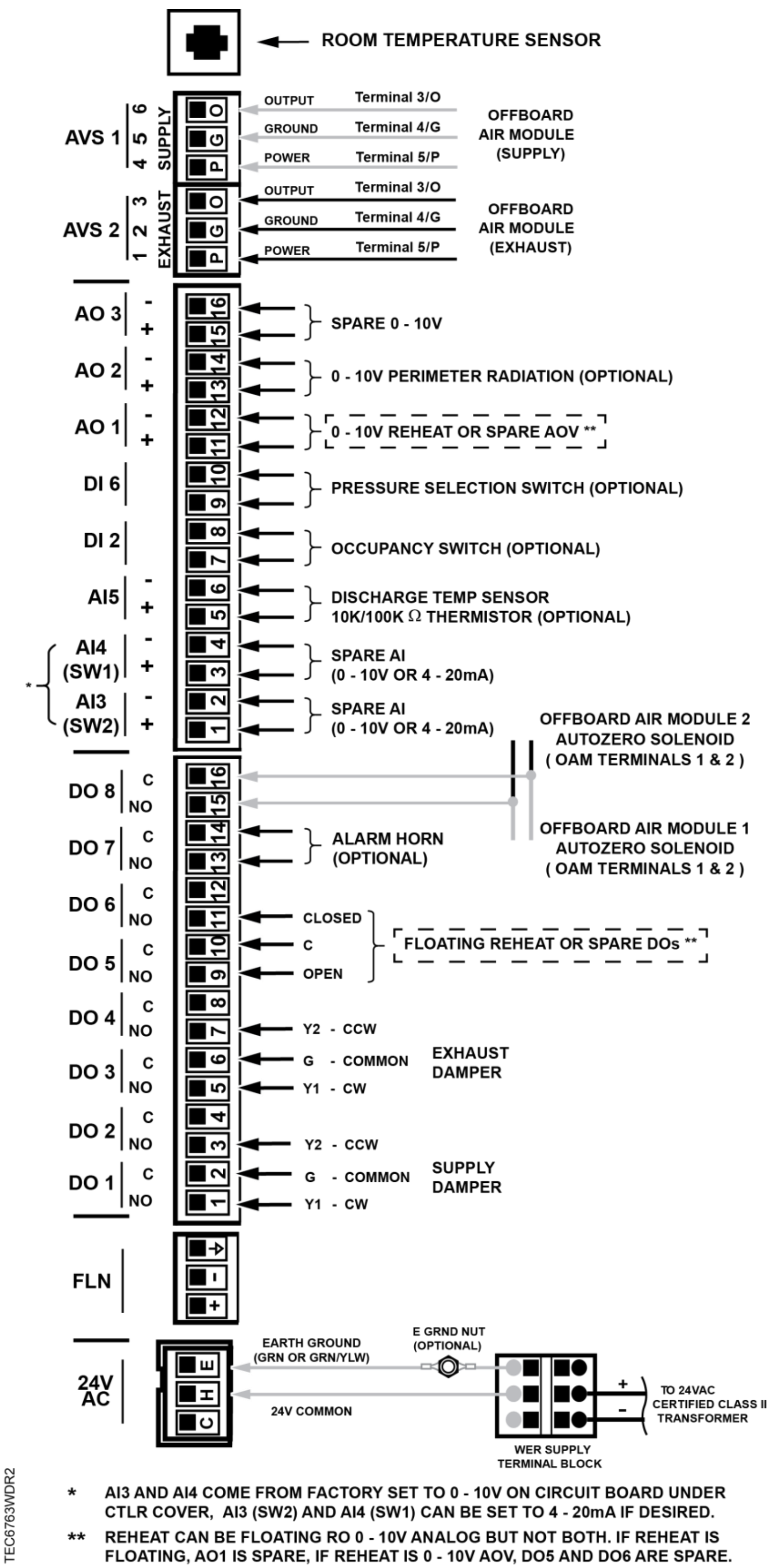
NOTE:
If the voltage/current switch is set to current and a 4 to 20 mA sensor is connected to an AI, then special wiring requirements must be followed.



NOTE:
The controller's DOs control 24 Vac loads only. The maximum rating is 12 VA for each DO. An external interposing relay is required for any of the following:

- VA requirements higher than the maximum
- 110 or 220 Vac requirements
- DC power requirements
- Separate transformers used to power the load
(for example, part number 540-147, Terminal Equipment Controller Relay Module)

NOTE:
Thermistor inputs are 10K (default) or 100K software selectable (AI X).



* AI3 AND AI4 COME FROM FACTORY SET TO 0 - 10V ON CIRCUIT BOARD UNDER CTLR COVER, AI3 (SW2) AND AI4 (SW1) CAN BE SET TO 4 - 20mA IF DESIRED.

** REHEAT CAN BE FLOATING RO 0 - 10V ANALOG BUT NOT BOTH. IF REHEAT IS FLOATING, AO1 IS SPARE, IF REHEAT IS 0 - 10V AOV, DO5 AND DO6 ARE SPARE.

BACnet Pressurized Room Controller (PRC) – Application 6773 Wiring Diagram.

Point Database Application 6773

Object Type	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
AO	1	CTLR ADDRESS	255	--	0-255	--	--
AO	2	APPLICATION	6775	--	0-32767	--	--
BO	3	TRACK MODE	ETS	--	Binary	STE	ETS
AI	{04}	ROOM TEMP	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
BO	{05}	HEAT.COOL	COOL	--	Binary	HEAT	COOL
AO	6	DAY CLG STPT	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
AO	7	DAY HTG STPT	70.0 (21.20888)	DEG F (DEG C)	48-111.75	--	--
AO	8	NGT CLG STPT	82.0 (27.92888)	DEG F (DEG C)	48-111.75	--	--
AO	9	NGT HTG STPT	65.0 (18.40888)	DEG F (DEG C)	48-111.75	--	--
BO	{10}	AZM DO8	OFF	--	Binary	ON	OFF
AO	11	RM STPT MIN	55.0 (12.80888)	DEG F (DEG C)	48-111.75	--	--
AO	12	RM STPT MAX	90.0 (32.40888)	DEG F (DEG C)	48-111.75	--	--
AI	{13}	RM STPT DIAL	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
BO	14	STPT DIAL	NO	--	Binary	YES	NO
AO	15	DISCH P GAIN	2.0 (3.6)	--	0-1638.35	--	--
AO	16	FLOW START	0	PCT	0-102	--	--
AO	17	FLOW END	0	PCT	0-102	--	--
BO	18	WALL SWITCH	NO	--	Binary	YES	NO
BI	{19}	DI OVRD SW	OFF	--	Binary	ON	OFF
AO	20	OVRD TIME	0	HRS	0-255	--	--
BO	{21}	NGT OVRD	DAY	--	Binary	NIGHT	DAY
BO	{22}	VOL DIF ALM	OFF	--	Binary	ON	OFF
BO	{23}	NET ALM CMD	OFF	--	Binary	ON	OFF
BI	{24}	DI 2	OFF	--	Binary	ON	OFF
AI	{25}	AI 4	0	PCT	0-102.3	--	--
AO	26	GEX P GAIN	0.015	--	0-4.095	--	--
AO	27	CLG I GAIN	0.01 (0.018)	--	0-1.023	--	--

Object Type	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
AO	28	SENSOR SEL	0	--	0-255	--	--
BO	{29}	DAY.NGT	DAY	--	Binary	NIGHT	DAY
AI	{30}	GEX VOL	0 (0.0)	CFM (LPS)	0-32764	--	--
AO	31	CLG FLO MIN	220 (103.818)	CFM (LPS)	0-32764	--	--
AO	32	CLG FLO MAX	2200 (1038.18)	CFM (LPS)	0-32764	--	--
AO	33	HTG FLO MIN	220 (103.818)	CFM (LPS)	0-32764	--	--
AO	34	HTG FLO MAX	2200 (1038.18)	CFM (LPS)	0-32764	--	--
AI	{35}	SUP VOL	0 (0.0)	CFM (LPS)	0-32764	--	--
AO	36	SUP FLO COEF	0.68	--	0-2.55	--	--
AO	{37}	REHEAT CMD	0	PCT	0-102	--	--
AO	{38}	RAD VALV CMD	0	PCT	0-102	--	--
AO	{39}	DIS TEMP MAX	90.0 (32.456)	DEG F (DEG C)	37.5-165	--	--
AO	40	AVS FAILMODE	0	--	0-255	--	--
BO	{41}	DO 1	OFF	--	Binary	ON	OFF
BO	{42}	DO 2	OFF	--	Binary	ON	OFF
BO	{43}	DO 3	OFF	--	Binary	ON	OFF
BO	{44}	DO 4	OFF	--	Binary	ON	OFF
BO	{45}	DO 5	OFF	--	Binary	ON	OFF
BO	{46}	DO 6	OFF	--	Binary	ON	OFF
BO	{47}	ALARM DO7	OFF	--	Binary	ON	OFF
AO	{48}	SUP DMP CMD	0	PCT	0-102	--	--
AO	{49}	SUP DMP POS	0	PCT	0-102	--	--
AO	50	REHEAT START	0	PCT	0-102	--	--
BI	{51}	PRESS STATE	PRS1	--	Binary	PRS2	PRS1
AO	{52}	GEX DMP CMD	0	PCT	0-102	--	--
AO	{53}	GEX DMP POS	0	PCT	0-102	--	--
AO	54	GEX FLO COEF	0.72	--	0-2.55	--	--
AO	{55}	AOV3	0	VOLTS	0-10.23	--	--
AO	56	PRS1DIF STPT	100 (47.1899)	CFM (LPS)	-8000-8380	--	--
AO	57	PRS2DIF STPT	124 (58.5155)	CFM (LPS)	-8000-8380	--	--
AO	58	REHEAT END	100	PCT	0-102	--	--

Object Type	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
AI	{59}	TOTL SUPPLY	0 (0.0)	CFM (LPS)	0-32764	--	--
AO	60	GEXDUCT AREA	1.0 (0.09292)	SQ. FT (SQ M)	0-6.375	--	--
AO	{61}	OTHER SUP	0 (0.0)	CFM (LPS)	0-16380	--	--
AI	{62}	VOL DIFFRNC	0 (-0.0001)	CFM (LPS)	-8000-8380	--	--
AO	63	CLG P GAIN	20.0 (36.0)	--	0-63.75	--	--
AI	{64}	DIS TEMP AI5	74.0 (23.496)	DEG F (DEG C)	37.5-165	--	--
AO	{65}	DIS TEMP MIN	50.0 (10.056)	DEG F (DEG C)	37.5-165	--	--
AO	66	TEMP OFFSET	0.0 (0.0)	DEG F (DEG C)	-31.75-32	--	--
AO	67	HTG P GAIN	10.0 (18.0)	--	0-63.75	--	--
BO	{68}	VENT ALM	OFF	--	Binary	ON	OFF
AO	{69}	DISCH STPT	60.0 (15.656)	DEG F (DEG C)	37.5-165	--	--
AI	{70}	AI 3	0	PCT	0-102.3	--	--
AO	71	SUP P GAIN	0.015	--	0-4.095	--	--
AO	72	HTG I GAIN	0.01 (0.018)	--	0-1.023	--	--
BO	{73}	PPCL STATE	EMPTY	--	Binary	LOADED	EMPTY
AO	{74}	AOV1	0	VOLTS	0-10.23	--	--
AO	{75}	AOV2	0	VOLTS	0-10.23	--	--
AO	{76}	TEMP CTL VOL	0 (0.0)	CFM (LPS)	0-32764	--	--
AO	77	RAD START	30	PCT	0-102	--	--
AO	{78}	CTL TEMP	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
AO	{79}	CLG LOOPOUT	0	PCT	0-102	--	--
AO	{80}	HTG LOOPOUT	0	PCT	0-102	--	--
AI	{81}	TOTL EXHAUST	0 (0.0)	CFM (LPS)	0-32764	--	--
BO	82	TRACK METHOD	STPT	--	Binary	FLOW	STPT
AO	83	RAD END	60	PCT	0-102	--	--
AO	84	STPT SPAN	0.0 (0.0)	DEG F (DEG C)	0-63.75	--	--
AO	{85}	GEX STPT	0 (0.0)	CFM (LPS)	0-16380	--	--
AO	86	GEX MIN	340 (160.446)	CFM (LPS)	0-32764	--	--
AO	87	GEX MAX	1100 (519.09)	CFM (LPS)	0-32764	--	--
AO	{88}	VOL DIF STPT	100 (47.1899)	CFM (LPS)	-8000-8380	--	--

Object Type	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
AO	{89}	OTHER EXH	0 (0.0)	CFM (LPS)	0-16380	--	--
AO	90	SWITCH DBAND	1.0 (0.56)	DEG F (DEG C)	0-63.75	--	--
AO	91	HC.ENDIS	3	--	1-256	--	--
AO	{92}	CTL STPT	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
AO	{93}	SUP STPT	0 (0.0)	CFM (LPS)	0-16380	--	--
BO	{94}	CAL AIR	NO	--	Binary	YES	NO
AO	95	CAL SETUP	4	--	0-255	--	--
AO	96	CAL TIMER	12	HRS	0-255	--	--
AO	97	SUPDUCT AREA	1.0 (0.09292)	SQ. FT (SQ M)	0-6.375	--	--
AO	98	LOOP TIME	5	SEC	0-255	--	--
AO	{99}	ERROR STATUS	0	--	0-255	--	--
AO	101	MTR3 TIMING	130	SEC	0-511	--	--
AO	102	MTR3 ROT ANG	90	--	0-255	--	--
AO	103	SWITCH TIME	10	MIN	0-255	--	--
BO	104	CAL MODULE	YES	--	Binary	YES	NO
AO	105	AOV1 OPEN	0	VOLTS	0-10.23	--	--
AO	106	AOV1 CLOSE	10	VOLTS	0-10.23	--	--
AO	107	AOV2 OPEN	0	VOLTS	0-10.23	--	--
AO	108	AOV2 CLOSE	10	VOLTS	0-10.23	--	--
AO	109	MTR1 ROT ANG	90	--	0-255	--	--
AO	110	MTR2 ROT ANG	90	--	0-255	--	--
AO	111	SWITCH LIMIT	5.2	PCT	0-102	--	--
AO	112	MTR1 TIMING	95	SEC	0-511	--	--
AO	113	MTR2 TIMING	95	SEC	0-511	--	--
AO	114	FAIL LIMIT	40 (18.876)	CFM (LPS)	0-32764	--	--
AO	115	MODHTG FLO	300 (1.524)	FPM (MPS)	0-4095	--	--
AI	{116}	RM CO2	1000	PPM	0-8191	--	--
AI	{117}	RM RH	50	PCT	0-102	--	--
AO	118	DIF ALM DEL	30	SEC	0-255	--	--
AO	119	P1 V ALM LVL	40 (18.876)	CFM (LPS)	0-32764	--	--
AO	120	P2 V ALM LVL	40 (18.876)	CFM (LPS)	0-32764	--	--
AO	121	FAIL TIME	60	SEC	0-510	--	--
AO	122	ALARM ENA	0	--	0-255	--	--
AO	123	MTR SETUP	0	--	0-255	--	--

Object Type	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
AO	124	DO DIR.REV	0	--	0-255	--	--
AO	125	VENT ALM DEL	30	SEC	0-255	--	--
AO	126	DIF ALM DBD	100 (47.19)	CFM (LPS)	0-4092	--	--
AO	127	DISCH I GAIN	0.02 (0.036)	--	0-6.5534	--	--

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3) Point numbers that appear in brackets { } may be unbundled at the field panel.

Point Database (Slave Mode) Application 6775

Object Type	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
AO	1	CTLR ADDRESS	255	--	0-255	--	--
AO	2	APPLICATION	6775	--	0-32767	--	--
AI	{04}	ROOM TEMP	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
BO	{10}	DO 8	OFF	--	Binary	ON	OFF
AI	{13}	RM STPT DIAL	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
BO	18	WALL SWITCH	NO	--	Binary	YES	NO
BI	{19}	DI OVRD SW	OFF	--	Binary	ON	OFF
BO	{23}	NET ALM CMD	OFF	--	Binary	ON	OFF
BI	{24}	DI 2	OFF	--	Binary	ON	OFF
AI	{25}	AI 4	0	PCT	0-102.3	--	--
AO	28	SENSOR SEL	0	--	0-255	--	--
BO	{29}	DAY.NGT	DAY	--	Binary	NIGHT	DAY
AI	{30}	VOLUME 2	0 (0.0)	CFM (LPS)	0-32764	--	--
AI	{35}	VOLUME 1	0 (0.0)	CFM (LPS)	0-32764	--	--
AO	36	FLOW COEF 1	0.68	--	0-2.55	--	--
AO	{37}	MTR3 COMD	0	PCT	0-102	--	--
BO	{41}	DO 1	OFF	--	Binary	ON	OFF
BO	{42}	DO 2	OFF	--	Binary	ON	OFF
BO	{43}	DO 3	OFF	--	Binary	ON	OFF
BO	{44}	DO 4	OFF	--	Binary	ON	OFF
BO	{45}	DO 5	OFF	--	Binary	ON	OFF
BO	{46}	DO 6	OFF	--	Binary	ON	OFF
BO	{47}	DO 7	OFF	--	Binary	ON	OFF
AO	{48}	MTR1 COMD	0	PCT	0-102	--	--
AO	{49}	MTR1 POS	0	PCT	0-102	--	--
BI	{51}	DI 6	OFF	--	Binary	ON	OFF
AO	{52}	MTR2 COMD	0	PCT	0-102	--	--
AO	{53}	MTR2 POS	0	PCT	0-102	--	--
AO	54	FLOW COEF 2	0.72	--	0-2.55	--	--
AO	{55}	AOV3	0	VOLTS	0-10.23	--	--
AO	60	DUCT AREA 2	1.0 (0.09292)	SQ. FT (SQ M)	0-6.375	--	--

Object Type	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
AI	{64}	AI 5	74.0 (23.496)	DEG F (DEG C)	37.5-165	--	--
AO	66	TEMP OFFSET	0.0 (0.0)	DEG F (DEG C)	-31.75-32	--	--
AI	{70}	AI 3	0	PCT	0-102.3	--	--
BO	{73}	PPCL STATE	EMPTY	--	Binary	LOADED	EMPTY
AO	{74}	AOV1	0	VOLTS	0-10.23	--	--
AO	{75}	AOV2	0	VOLTS	0-10.23	--	--
AO	{78}	CTL TEMP	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
BO	{94}	CAL AIR	NO	--	Binary	YES	NO
AO	95	CAL SETUP	4	--	0-255	--	--
AO	96	CAL TIMER	12	HRS	0-255	--	--
AO	97	DUCT AREA 1	1.0 (0.09292)	SQ. FT (SQ M)	0-6.375	--	--
AO	{99}	ERROR STATUS	0	--	0-255	--	--
AO	101	MTR3 TIMING	130	SEC	0-511	--	--
AO	102	MTR3 ROT ANG	90	--	0-255	--	--
BO	104	CAL MODULE	YES	--	Binary	YES	NO
AO	109	MTR1 ROT ANG	90	--	0-255	--	--
AO	110	MTR2 ROT ANG	90	--	0-255	--	--
AO	112	MTR1 TIMING	95	SEC	0-511	--	--
AO	113	MTR2 TIMING	95	SEC	0-511	--	--
AI	{116}	RM CO2	1000	PPM	0-8191	--	--
AI	{117}	RM RH	50	PCT	0-102	--	--
AO	123	MTR SETUP	0	--	0-255	--	--
AO	124	DO DIR.REV	0	--	0-255	--	--

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