SIEMENS

BACnet PRC-OAVS

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

Application Note

140-1059
02/29/2012

CONFIDENTIAL: For internal use only

Building Technologies

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Overview

Application 6763 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 6763 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 6763 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 6763 modulates the supply air damper. The way this application provides heating depends on how it has been configured. There are three mode configurations available:

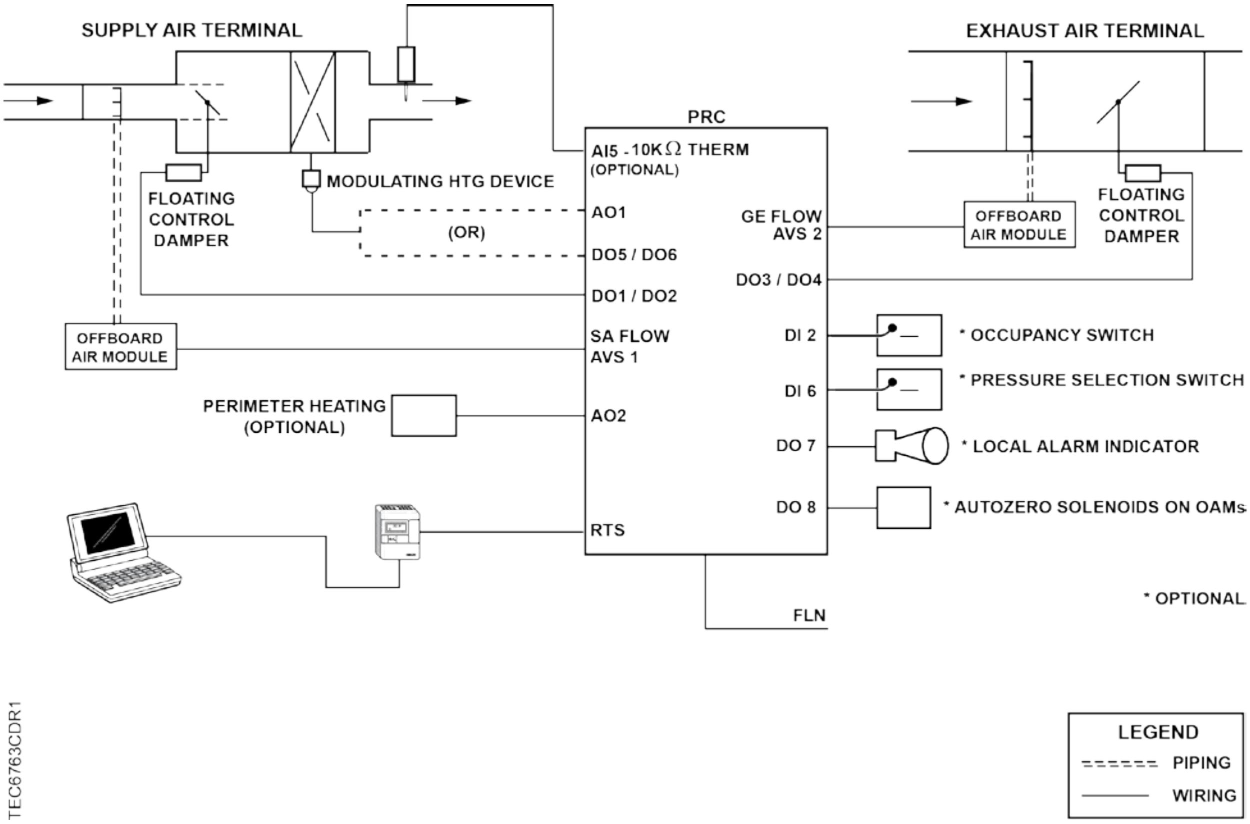
- **Mode 1** - VAV PRC with reheat controlled directly by the room temperature loop
- **Mode 2** - VAV PRC with reheat controlled by discharge loop (discharge temperature sensor required).
- **Mode 3** – VAV PRC with reheat controlled by discharge loop (discharge temperature sensor required), plus additional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

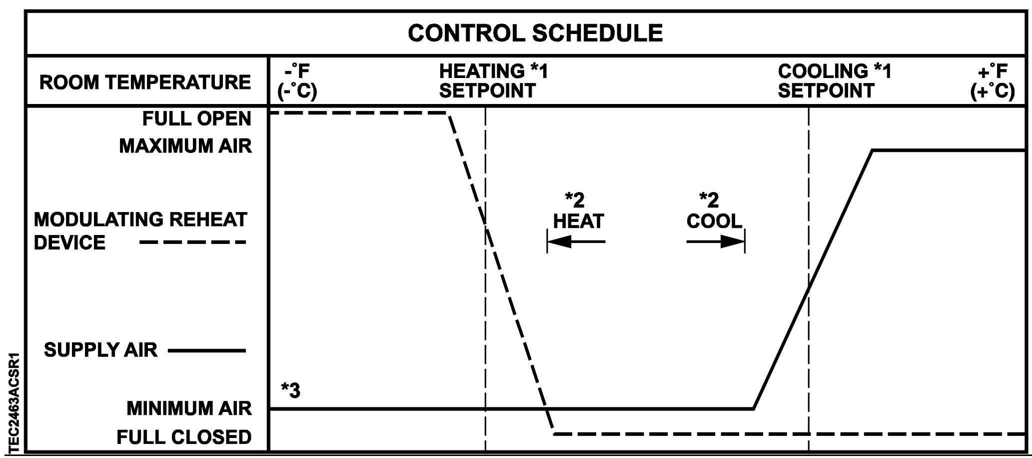
NOTE:
In Mode 3, the heat demand is broken into three stages. In stage one, perimeter radiation heat is off and the discharge temperature rises from discharge min to room setpoint. If heat demand is still not met, the application enters stage two. In stage two, the discharge is held at room setpoint 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 6763, 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

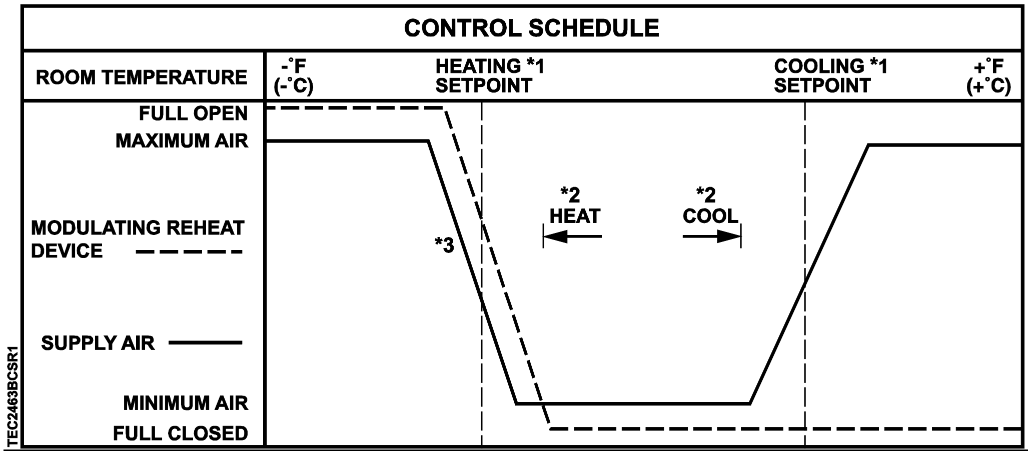




NOTES:

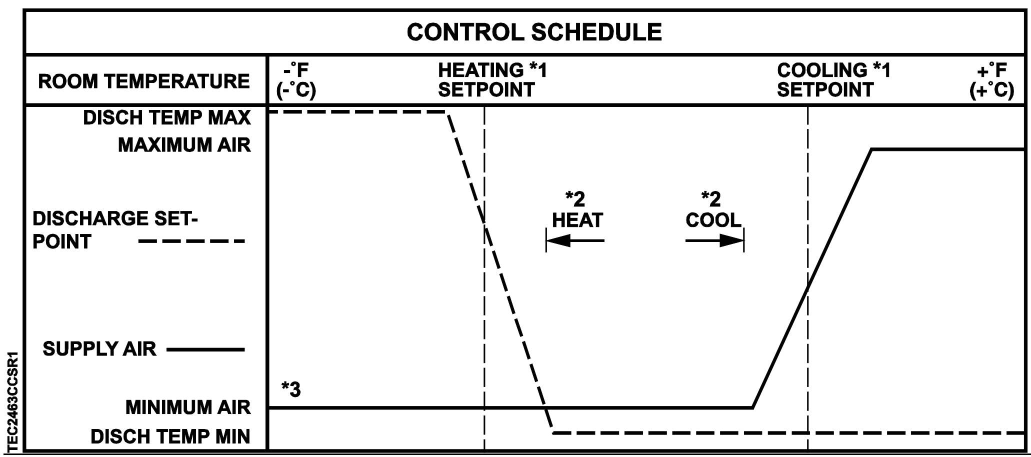
1. See *Control Temperature Setpoints*.
2. See *Heating/Cooling Switchover*.
3. The airflow is shown at minimum flow throughout the entire heating mode (default setting). The airflow can operate sequenced, parallel, or overlapping with the electric reheat (optional). See *Sequencing Logic*.

Application 6763 – Control Schedule – Mode 1.



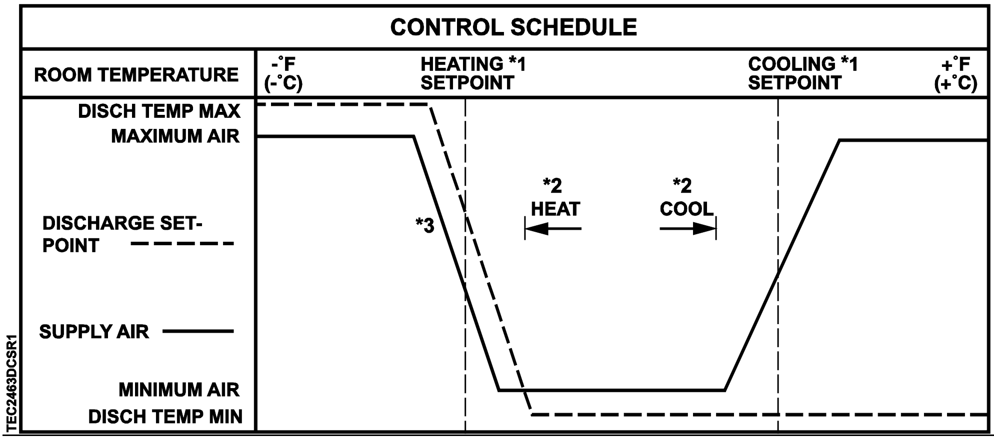
NOTES:
1. See *Control Temperature Setpoints*.
2. See *Heating/Cooling Switchover*.
3. The airflow is shown operating parallel with the reheat valve (optional). The airflow can operate at a minimum flow throughout the entire heating mode (default setting). See *Sequencing Logic*.

Application 6763 – Control Schedule with Modulating Damper in Heating Mode – Mode 1.



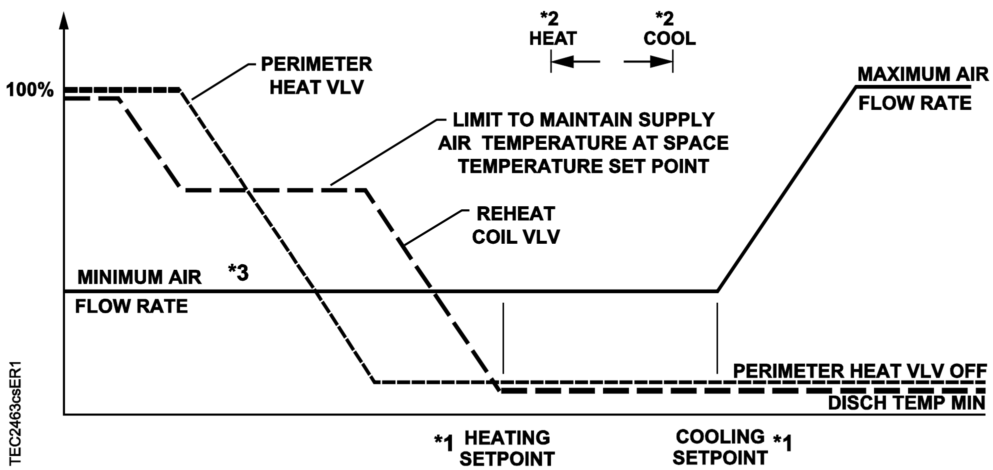
NOTES:
1. See *Control Temperature Setpoints*.
2. See *Heating/Cooling Switchover*.
3. The airflow is shown at minimum flow throughout the entire heating mode (default setting). The airflow can operate sequenced, parallel, or overlapping with the electric reheat (optional). See *Sequencing Logic*.

Application 6763 – 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 6763 – 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 6763 – 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	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

Hardware Inputs

Analog

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

Digital

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

Hardware Outputs

Analog

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

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)
- Floating control of reheat valve (DO 5, DO 6) (optional alternative of default AOV1 control)

Ordering Notes

570-810P	BACnet PRC-OAVS with Floating Damper Control, AOV or Floating Reheat, Optional Discharge Control and Optional AOV Perimeter Radiation 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 Control, AOV or Floating Reheat, Optional Discharge Control and Optional AOV Perimeter Radiation, Application 6763.

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 6763 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 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

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

A point associated with TRACK MODE is TRACK METHOD. 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 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 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 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.

Control Temperature Setpoints

This application has a number of different room temperature setpoints (DAY HTG STPT, NGT CLG STPT, RM STPT DIAL, etc.). The application actually controls to CTL STPT. CTL STPT is set to different values depending on its override status, the time of day, whether or not a temperature deadband (zero energy band) has been configured, and the type of RTS used.

CTL STPT is Overridden:

If CTL STPT is overridden, that value is used regardless of any other settings. This disables the setpoint deadband feature.

CTL STPT in Night Mode:

The controller is in Night Mode if DAY.NGT = NGT and NGT OVRD = NGT.

When the controller is in night mode, CTL STPT holds the value of NGT CLG STPT or NGT HTG STPT depending on the value of HEAT.COOL. When the controller is in night mode the value of RM STPT DIAL is ignored.

CTL STPT in Day Mode:

The controller is in Day Mode if DAY.NGT = DAY or NGT OVRD = DAY.

Without setpoint dial:

When the controller is in day mode and STPT DIAL = NO, CTL STPT holds the value of DAY CLG STPT or DAY HTG STPT depending on the value of HEAT.COOL.

With setpoint dial:

When the controller is in day mode and STPT DIAL = YES. CTL STPT is set based on the value of the setpoint dial and the setpoint deadband. The setpoint deadband exists to allow the controller to provide a separation of the heating and cooling temperature setpoints when a setpoint dial is enabled. The setpoint deadband is the difference between the cooling and heating day setpoints (DAY CLG STPT - DAY HTG STPT). The setpoint deadband is disabled by setting DAY HTG STPT equal to DAY CLG STPT. When DAY HTG STPT does not equal DAY CLG STPT, a setpoint deadband (or zero energy band) is used.

The following values are used in the calculation of CTL STPT:

- *Dial value* is the value of RM STPT DIAL limited between the value of RM STPT MIN and RM STPT MAX.
- *Deadband* is the value half the difference between DAY CLG STPT and DAY HTG STPT.
  - *Deadband* = [0.5*(DAY CLG STPT – DAY HTG STPT)]

CTL STPT is calculated as follows:

With Deadband Disabled:

CTL STPT = *Dial value*

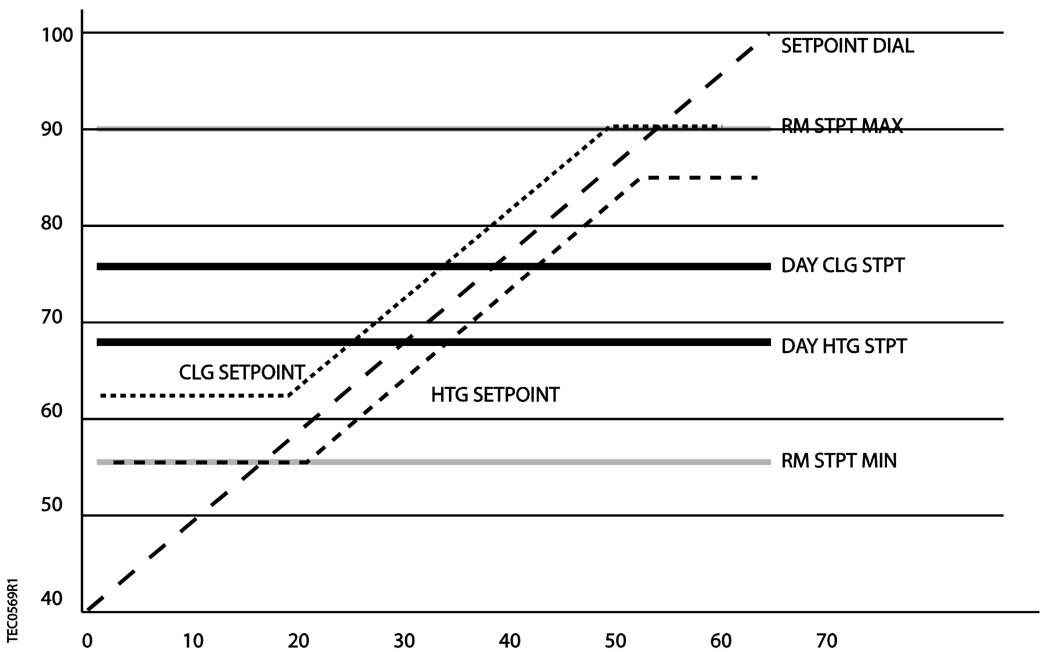
With Deadband enabled in Heat Mode:

CTL STPT = *Dial value – Deadband* (limited between the value of RM STPT MIN and RM STPT MAX)

With Deadband enabled in Cool Mode:

CTL STPT = *Dial value* + *Deadband* (limited between the value of RM STPT MIN and RM STPT MAX).

NOTE:
If RM STPT DIAL is failed, it maintains the last known value.



Room Temperature, Temp Offset, and CTL TEMP

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

TEMP OFFSET is a user-adjustable offset that will compensate 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, what the application is trying to do is to maintain CTL TEMP at CTL STPT.

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

CTL TEMP = ROOM TEMP + 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:

- CTL TEMP equals its overridden value and the points, ROOM TEMP and TEMP 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 Operation

Stat Supervision

STAT SUPV is a configurable, enumerated point (values are additive). This point tells the controller what kind of room unit is connected and how to respond to a loss of communication between a Series 2200 and 3200 type Room Units, thermistor inputs, and the controller.

The default value for STAT SUPV using Series 2200 or 3200 units must be set to a value greater than 0 (zero), to define temperature sensing and thermistor inputs. See the *Start-up Procedures* for more information.

A value of 1 means that if communication is lost for at least one minute, CTL TEMP will have a status of Failed. A value of 3 means that both CTL TEMP and RM RH will be Failed and a value of 7 means CTL TEMP, RM RH and RM CO_2 will be Failed.

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

See *Sensors and Transducers Configuration and Sizing* for part numbers and ordering information.

CO2 Monitoring

RM CO2 displays the CO_2 value in units of parts-per-million (PPM). RM CO2 can be unbundled for monitoring purposes.

Room RH

RM RH displays the relative humidity value in percent. RM RH can be unbundled for monitoring purposes.

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.

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 *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 will reset 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 will only affect the controller when in night mode.

Heating/Cooling Switchover

The heating/cooling switchover determines whether the controller is in heating or cooling mode by monitoring the room temperature and the demand for heating and cooling (as determined by the temperature control loops).

If the following conditions are met for the length of time set in SWITCH TIME, the controller switches from heating to cooling mode by setting HEAT.COOL to COOL:

- HTG LOOPOUT < SWITCH LIMIT.
- CTL TEMP > CTL STPT by at least the value set in SWITCH DBAND.
- CTL TEMP > the appropriate cooling setpoint minus SWITCH DBAND.

If the following conditions are met for the length of time set in SWITCH TIME, the controller switches from cooling to heating mode by setting HEAT.COOL to HEAT:

- CLG LOOPOUT < SWITCH LIMIT.
- CTL TEMP < CTL STPT by at least the value set SWITCH DBAND.
- CTL TEMP < the appropriate heating setpoint plus SWITCH DBAND.

Application 6763 performs heating/cooling switchover based on room load. To perform heating/cooling switchover based on some other criteria, such as time of year, outside air temperature or supply air temperature, unbundle the HEAT.COOL point at a field panel and use PPCL to control it.

- Heating only, set HC.ENDIS = 1.
- Cooling only, set HC.ENDIS = 2

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

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 6763, 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 would allow 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.

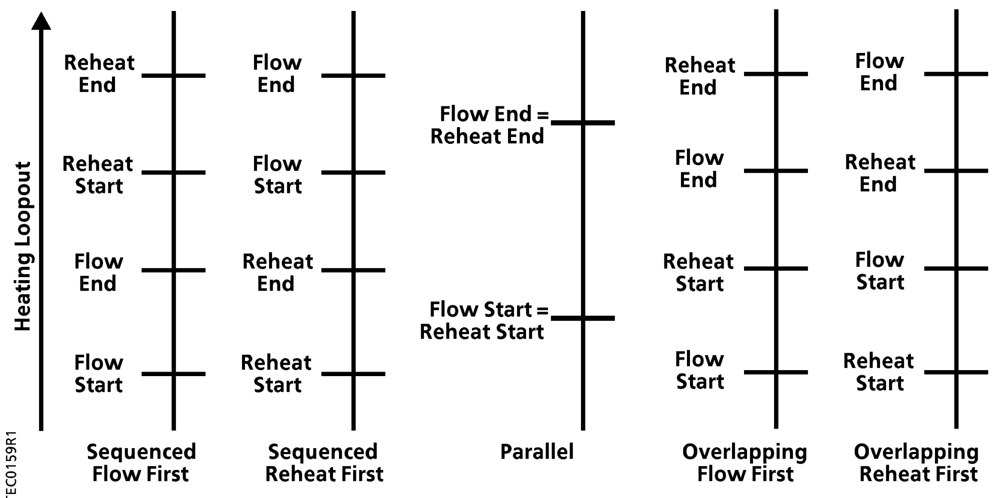
There is hysteresis (deadband) around the flow threshold. The heating turns off below a flow of MODHTG FLO, and does not turn back on until the measured flow rises to a level 50 fpm more than MODHTG FLO. Between MODHTG FLO and MODHTG FLO + 50, the internal point “ok_to_mod” will not change value.

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.

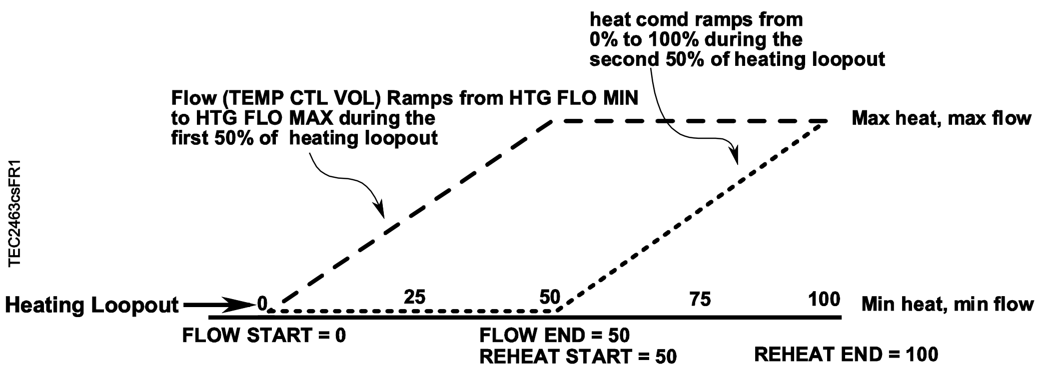
If the air being supplied by the air handler is cold, and the flow is increasing with a call for heat, the room temperature could decrease while the controller is executing its configured logic as it tries to heat the room. See *Example 4* for the typical setup that can be used to prevent an increase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



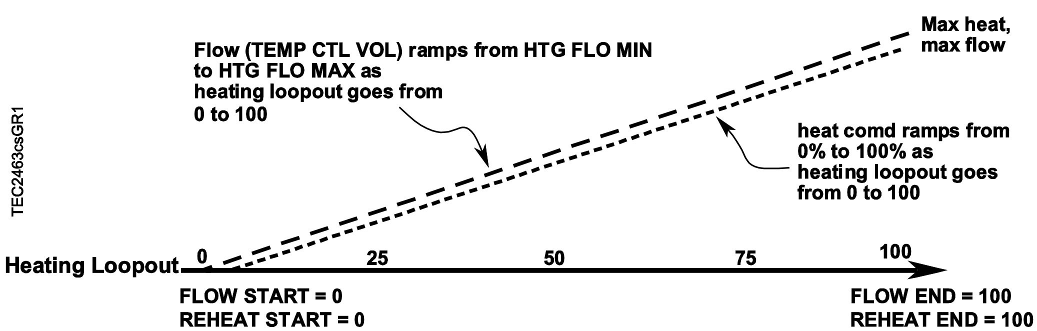
Modulating Heating Device Operating in Sequence with Flow Loop.

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%



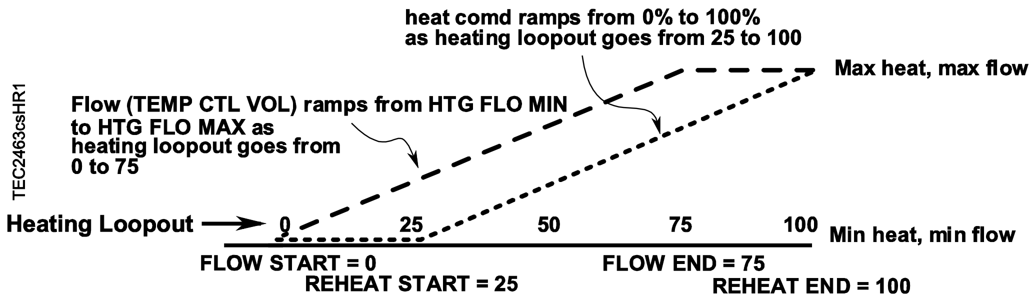
Modulating Heating Device Operating in Parallel with the Flow Loop.

Example 3

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

In this example,

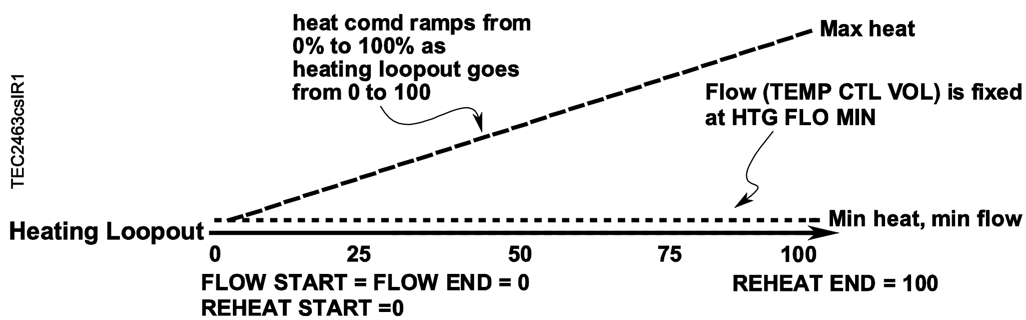
- FLOW START = 0%
- FLOW END = 75%
- REHEAT START = 25%
- REHEAT END = 100%



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 6763, 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.

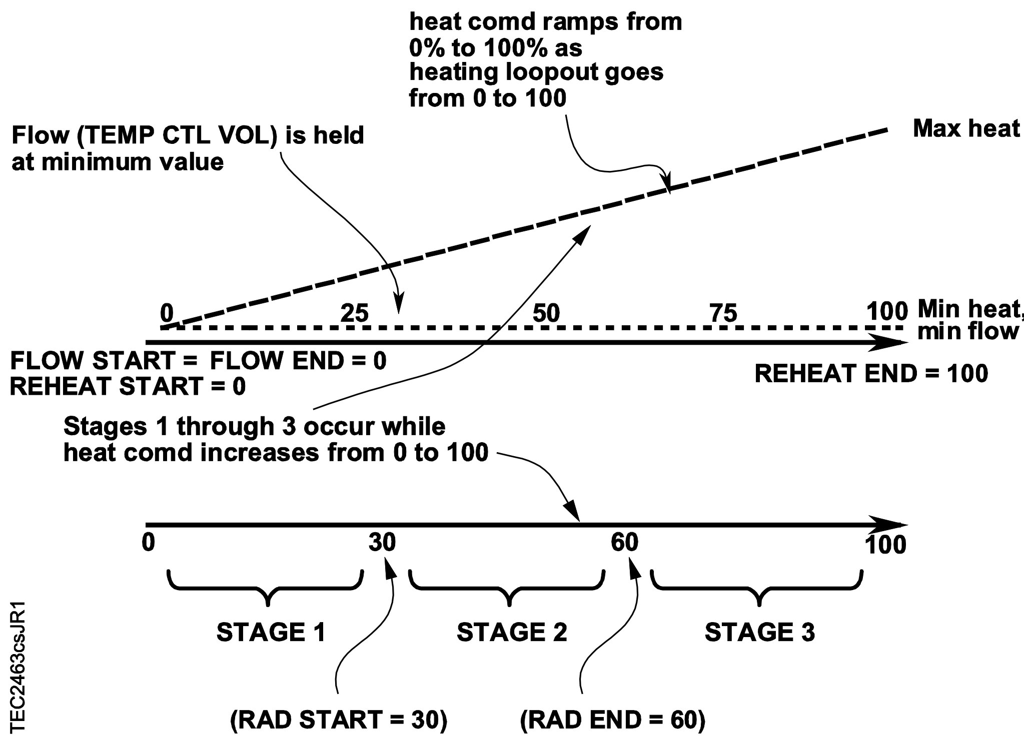
3. Stage Three - Perimeter radiation is full on while the discharge temperature modulates from room setpoint to discharge max.

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**.

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

Damper Status (Floating Control)

When an Autozero solenoid from an Offboard Air Module is wired to DO 8, the physical damper position may vary from what the application's position point is indicating. A Damper Status firmware algorithm will detect and correct situations where airflow velocity is greater than 200 fpm and the following is true:

- SUP DMP POS (or GEX DMP POS) = 100% and SUP VOL < SUP STPT (or GEX VOL < GEX STPT)

  OR

- SUP DMP POS (or GEX DMP POS) = 0% and SUP VOL > SUP STPT (or GEX VOL > GEX STPT)

When initiated, the firmware module sets DMPR STATUS from CAL to RECAL and decrements/increments the damper position in a reiterative sequence until sensed airflow matches setpoint.

NOTE:
It is important to realize that when the damper status module runs, the damper position point (SUP DMP POS or GEX DMP POS) will change in value but the flow point (SUP VOL or GEX VOL) might not.

To change DMPR STATUS from RECAL back to CAL, set DMPR STATUS to CAL and then release it. A status of RECAL will not prevent the recalibration sequence from running if needed.

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 *Failure Mode Sequence* figure 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 would activate ALARM DO7, but the alarm switch would 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 Insight 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 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.

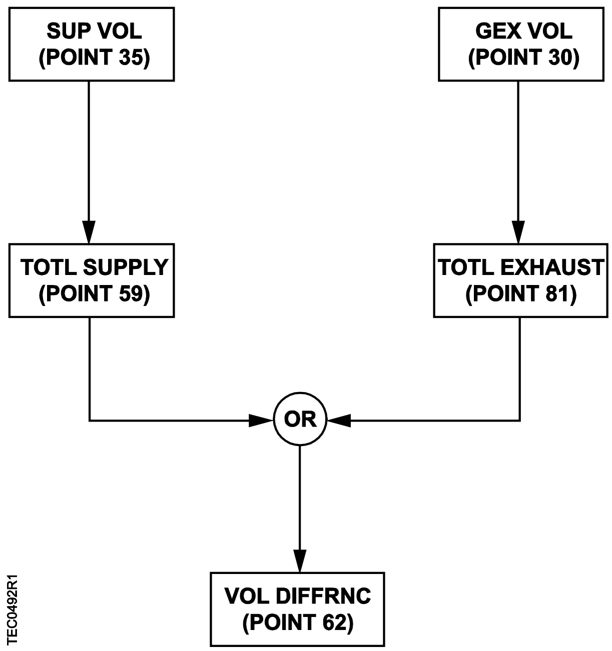
AVS failure and AVS FAILMODE values.	
	AVS FAILMODE
0 (default)	Hold Supply, Hold General Exhaust
1	Hold Supply, Open General Exhaust
2	Hold Supply, Close General Exhaust
3	Open Supply, Hold General Exhaust
4	Close Supply, Hold General Exhaust
5	Close Supply, Open General Exhaust
6	Open Supply, Close 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.

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 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.

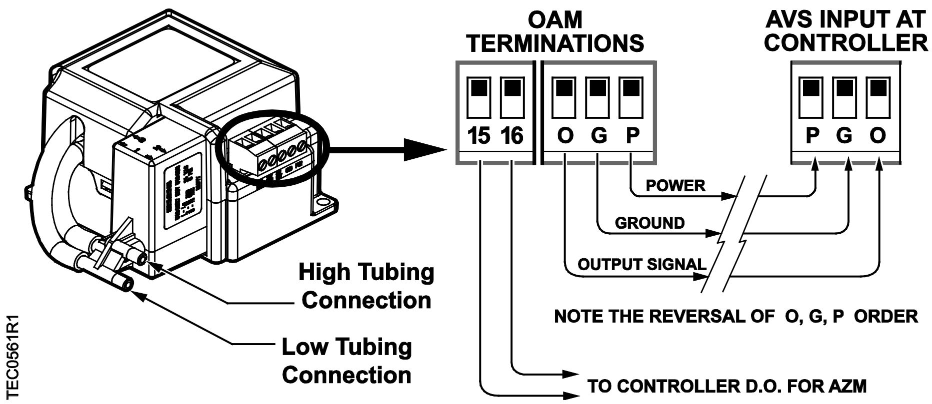
See *Operation of AVS FAILMODE* for more information.

Wiring Diagrams

CAUTION

Controllers will be damaged/destroyed if offboard air module(s) are not wired correctly and power is applied.

NOTE:
For OAMs prior to 3/09 "**O G P**" is labeled as "**S + -**".



Offboard Air Module Wiring.

CAUTION

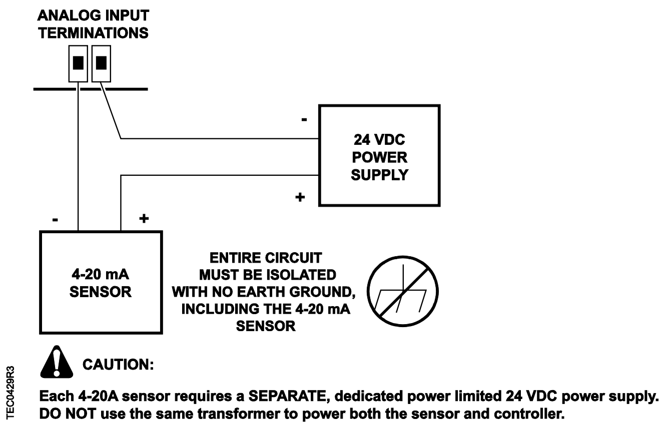
The LCM-OAVS has two terminal blocks with terminations numbered identically (terminations 1 through 16). DO NOT get these mixed up with each other.

If the LCM-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 3 with a 4 to 20mA Sensor.

NOTE:
If the voltage/current switch is set to current and a 4 to 20mA sensor is connected to AI 3, then special wiring requirements must be followed.

CAUTION

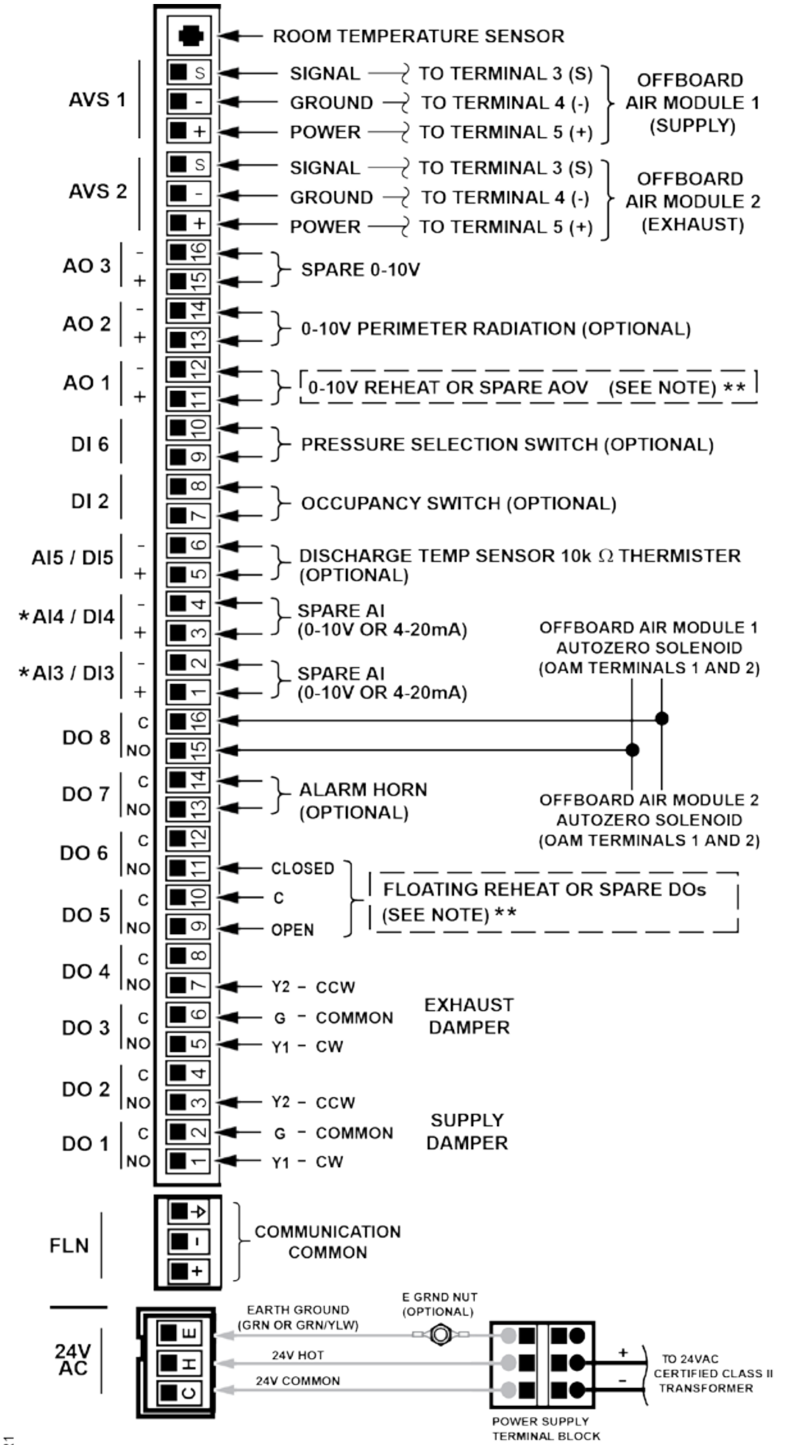
The controller's DOs control 24 Vac loads only.

The maximum rating is 12 VA for each DO. Use an interposing 24 Vac relay module (such as 540-147) for any of the following:
- VA requirements higher than 12 VA
- Separate transformers to power the load
- Direct current (DC) power requirements

CAUTION

The controller has two terminal blocks with terminations numbered identically (termination 1 though 16). DO NOT get these mixed up with each other.

If the controller is not connected as shown, it is not resistant to electrical surges. It is also susceptible to interference from other equipment .
See the *Offboard Air Module Wiring* figure to correctly wire the Offboard Air Module(s).
See the *Wiring of Optional 4-20 mA Sensor* figure to wire a 4-20 mA at AI 4 (optional).



* AI3 AND AI4 COME FROM FACTORY SET TO 0-10V. ON CIRCUIT BOARD UNDER CTLR COVER, SWITCH "S1" CONTROLS AI3, SWITCH "SW1" CONTROLS AI4. AI3 AND AI4 CAN BE SET TO 4-20mA IF DESIRED USING SWITCHES S1, SW1.

** REHEAT CAN BE FLOATING OR 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 6763 Wiring Diagram.

Point Database Application 6763

Object Type	Object Number	Object Name Descriptor	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
AO	1	CTLR ADDRESS	99	--	0-255	--	--
AO	2	APPLICATION	6765	--	0-32767	--	--
BO	3	TRACK MODE	ETS	--	Binary	STE	ETS
AO	{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	--	--
AO	{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
BO	{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	--	--
AO	26	GEX P GAIN	0.015	--	0-4.095	--	--
AO	27	CLG I GAIN	0.01 (0.018)	--	0-1.023	--	--
AO	{28}	STAT SUPV	0	--	0-255	--	--

Object Type	Object Number	Object Name Descriptor	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
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	--	--
AI	{59}	TOTL SUPPLY	0 (0.0)	CFM	0-32764	--	--

Object Type	Object Number	Object Name Descriptor	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
				(LPS)			
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	--	--
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	{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	-8000-8380	--	--

Object Type	Object Number	Object Name Descriptor	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
				(LPS)			
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	--	--
AO	{116}	RM CO2	1000	PPM	0-8191	--	--
AO	{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	0-32764	--	--

Object Type	Object Number	Object Name Descriptor	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
				(LPS)			
AO	121	FAIL TIME	60	SEC	0-510	--	--
AO	122	ALARM ENA	0	--	0-255	--	--
AO	123	MTR SETUP	0	--	0-255	--	--
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	--	--

1) Object Types are; Analog Input (AI), Analog Output (AO), Binary Input (BI) and Binary Output (BO).

2) A single value in a column means that the value is the same in English units and in SI units.

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

Issued by
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