Room Pressurization Controller – Electronic Output

Application 2216: Variable Air Volume Room Pressurization with Hot Water Reheat

Overview

In Application 2216, the controller modulates the supply and exhaust air for cooling and a reheat valve for heating. The controller also modulates the supply and exhaust air dampers to maintain a fixed cubic feet per minute (cfm) differential between the volumes of supply and exhaust air. When heating, the controller maintains minimum airflow. To work properly, the central air handling unit must provide both supply and exhaust air. See Figure 2216-1 and Figure 2216-2.

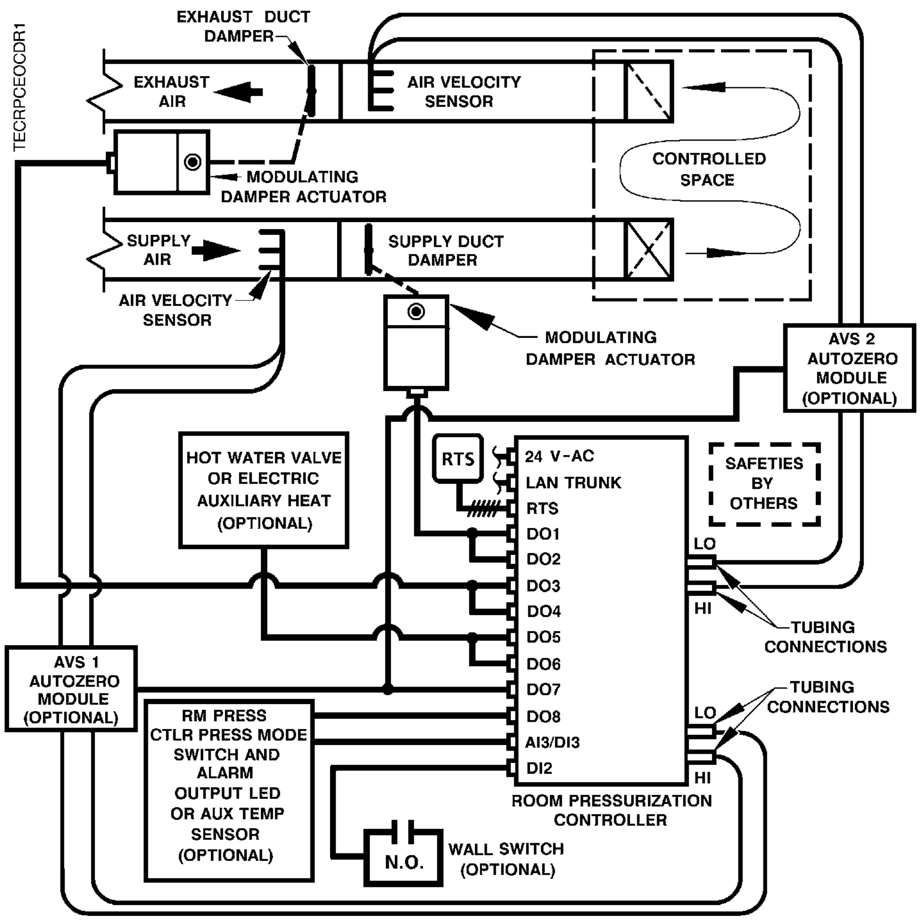
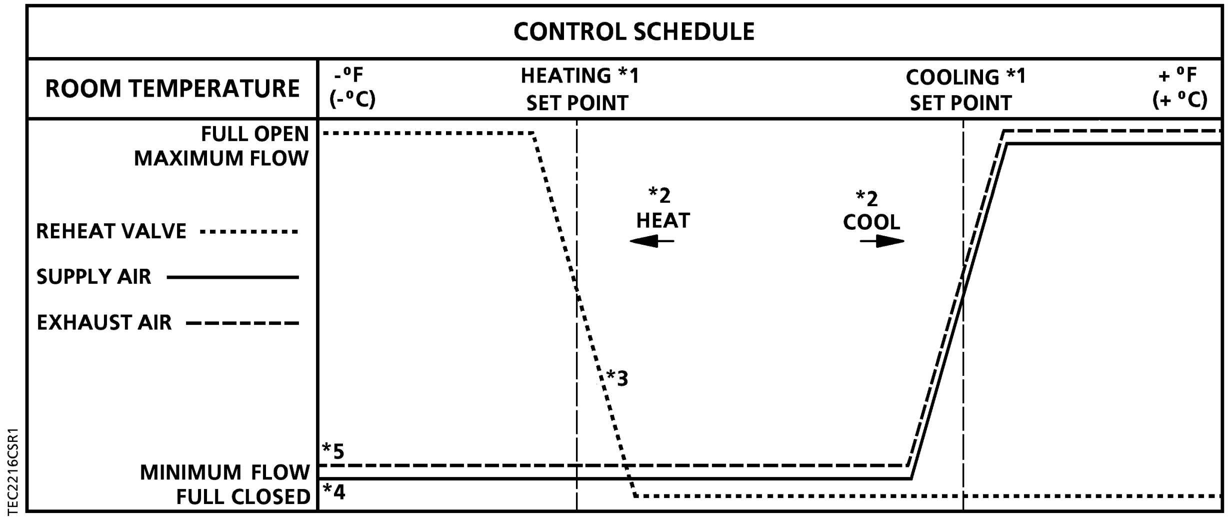


Figure 2216-1. Application 2216 Control Drawing.



1. See Sequence of Operation, *Control Temperature Setpoints*.
2. See Sequence of Operation, *Heating/Cooling Switchover*.
3. See Sequence of Operation, *Hot Water Reheat* (optional).
4. The supply airflow is shown at minimum flow throughout the entire heating mode. See Sequence of Operation, *Control Loops*.
5. The exhaust airflow is shown with a negative pressure offset from the supply airflow. See Sequence of Operation, *Control Loops*.

Figure 2216-2. Application 2216 Control Schedule.

Hardware Inputs

Analog

- Air velocity sensor (two required)
- Pressure mode switch or auxiliary temperature sensor (optional)
- Room temperature sensor
- Room temperature setpoint dial (optional)

Digital

- Night mode override (optional)
- Wall switch (optional)

Hardware Outputs

Analog

- None

Digital

- Alarm output (optional)
- Autozero Module (optional, two required if used)
- Electronic damper actuator (two required)
- Electronic valve actuator (optional)

Ordering Notes

Room Pressurization Controller – Electronic Output (540-516)

Room Pressurization Controller – Electronic Output with Autozero Modules** (540-517)

**This controller is used in applications:

- In which it is not possible, due to operational restrictions, to calibrate the air velocity transducer by fully closing the damper (for example, clean rooms, laboratories).
- In which a minimum position damper stop is used or dampers leak when closed.

See *APOGEE Automation Configuration and Sizing Guidelines* on InfoLink for product numbers.

Electronic damper actuator (two required)

Electronic valve actuator (optional)

Room Pressurization Controller Pressure Mode Switch (optional)

Terminal Equipment Controller room temperature sensor

Point Database

Table 2216-1 presents the point database information for Application 2216.

Sequence of Operation

The following paragraphs present the sequence of operation for Application 2216, “Variable Air Volume Room Pressurization with Hot Water Reheat”.

Control Temperature Setpoints

Depending on the controller's current operational mode (day or night), the control temperature setpoint, CTL STPT (Point 92) holds the value of the following setpoints:

Day Mode – CTL STPT (Point 92) holds the value of DAY HTG STPT (Point 7) in heating mode or DAY CLG STPT (Point 6) in cooling mode. If the room temperature sensor has a setpoint dial and STPT DIAL (Point 14) = YES, CTL STPT holds the value of RM STPT DIAL (Point 13).

If the setpoint dial is used and the value of RM STPT DIAL (Point 13) < RM STPT MIN (Point 11), CTL STPT (Point 92) holds the value of RM STPT MIN. If RM STPT DIAL > RM STPT MAX (Point 12), CTL STPT holds the value of RM STPT MAX.

Night Mode – CTL STPT (Point 92) holds the value of NGT HTG STPT (Point 9) or NGT CLG STPT (Point 8).

NOTE: The value of CTL TEMP (Point 78) is the same as ROOM TEMP (Point 4), unless CTL TEMP is overridden.

Day and Night Modes

The day/night status of the space is determined by the value of DAY.NGT (Point 29). 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 (Figure 2216-4) and WALL SWITCH (Point 18) = YES, the controller monitors DI 2 (Point 24). When the value of DI 2 is ON (the switch is closed), DAY.NGT will be set to DAY indicating that the controller is in day mode. When the status of 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 (Point 18) = 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, the controller stays in day mode all the time. If the controller is operating with centralized control (that is, connected to a field panel), 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 the *Field Panel User's Manual* (125-1895) 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 (Point 20), pressing the override switch will reset the controller to day operational mode for the amount of time that is set in OVRD TIME. The status of NGT OVRD (Point 21) changes to DAY. After the override time elapses, the controller returns to night mode and the status of NGT OVRD changes back to NIGHT.

Only when the controller is in night mode will the override switch on the room temperature sensor have any effect on the controller.

Heating/Cooling Switchover

HEAT.COOL (Point 5) controls whether the controller is in heating mode or cooling mode. When the controller is in heating mode the status of HEAT.COOL reads HEAT; in cooling mode its status reads COOL.

If the following conditions are met for the length of time set in SWITCH TIME (Point 86), the controller switches from heating to cooling mode by setting HEAT.COOL (Point 5) to COOL.

- HTG LOOPOUT (Point 80) < 5%.
- CTL TEMP (Point 78) > CTL STPT (Point 92) by at least the value set in SWITCH DBAND (Point 90).
- CTL TEMP (Point 78) > the value of the appropriate cooling setpoint minus the value of SWITCH DBAND (Point 90).

If the following conditions are met for the length of time set in SWITCH TIME (Point 86), the controller switches from cooling to heating mode by setting HEAT.COOL (Point 5) to HEAT.

- CLG LOOPOUT (Point 79) < 5%.
- CTL TEMP (Point 78) is below the value of CTL STPT (Point 92) by at least the value of SWITCH DBAND (Point 90).
- CTL TEMP (Point 78) < the value of the appropriate heating setpoint minus the value of SWITCH DBAND (Point 90).

Tracking Mode

TRACK MODE (Point 3) determines which airflow setpoint will lead and which will follow.

- If TRACK MODE (Point 3) = ETS (exhaust tracks supply), the supply setpoint will be set to maintain temperature requirements, and based on the supply, the exhaust flow setpoint will be calculated to maintain the volume offset. The supply leads and the exhaust follows.
- If TRACK MODE (Point 3) = STE (supply tracks exhaust), the exhaust setpoint will be set to maintain temperature requirements, and based on the exhaust, the supply flow setpoint will be calculated to maintain the volume offset. The exhaust leads and the supply follows.

Control Volume Setpoints

In cooling mode, CTL FLOW MIN (Point 76) holds the value of CLG FLOW MIN (Point 31), and CTL FLOW MAX (Point 77) holds the value of CLG FLOW MAX (Point 32).

In heating mode, CTL FLOW MIN (Point 76) holds the value of HTG FLOW MIN (Point 33), and CTL FLOW MAX (Point 77) holds the value of HTG FLOW MAX (Point 34).

CLG FLOW MIN (Point 31) can be set equal to, but not greater than, CLG FLOW MAX (Point 32). Similarly, HTG FLOW MIN (Point 33) can be set equal to, but not greater than, HTG FLOW MAX (Point 34). If the heating MIN and MAX points are set equal to each other, the flow loop becomes constant volume with the temperature controlled by the hot water valve.

The supply and exhaust flows are each maintained by modulating the supply and exhaust dampers, respectively. One flow is determined by the room temperature requirements (VAV), while the other is determined by the differential flow requirements for pressurization. TRACK MODE (Point 3) determines which is which. See *Tracking Mode* for details on ETS and STE.

VAV Flow Setpoint – If TRACK MODE (Point 3) = ETS, SUP FLO STPT (Point 93) is calculated as follows:

In cooling mode, SUP FLO STPT (Point 93) is the result of scaling CLG LOOPOUT (Point 79) between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32). First, an intermediate value, the minimum setpoint percentage, is calculated:

$$\frac{\text{CLG FLOW MIN}}{\text{CLG FLOW MAX}} \times 100\% = \text{minimum setpoint}$$

Then SUP FLO STPT (Point 93) is calculated according to the following formula:

$$\left[\text{CLG LOOPOUT} \times \left(100\% - \text{minimum setpoint}\right)\right] + \text{minimum setpoint} = \text{SUP FLO STPT}$$

Thus, when CLG FLOW MIN (Point 31) = 0 cfm, the minimum setpoint is 0 and SUP FLO STPT (Point 93) = CLG LOOPOUT (Point 79). Otherwise, SUP FLO STPT will be larger than CLG LOOPOUT.

Example

- If CLG FLOW MIN (Point 31) = 200 cfm and CLG FLOW MAX (Point 32) = 1000 cfm, the minimum setpoint is (200 cfm / 1000 cfm) × 100% flow = 20%.

  When CLG LOOPOUT (Point 79) is 0%, SUP FLO STPT (Point 93) = 20% flow. [0% × (100% – 20%)] + 20% = 20%. This ensures that the airflow out of the supply duct is no less than CLG FLOW MIN.

  When CLG LOOPOUT is 50%, SUP FLO STPT = 60% flow. [50% × (100% – 20%)] + 20% = 60%.

  When CLG LOOPOUT is 100%, SUP FLO STPT = 100% flow. [100% × (100% – 20%)] + 20% = 100%. This ensures that the airflow out of the supply duct is not more than CLG FLOW MAX.

In heating mode, SUP FLO STPT typically equals the minimum setpoint which is (HTG FLOW MIN/HTG FLOW MAX) × 100% (see *Sequencing Logic* for exception).

If TRACK MODE (Point 3) = STE, EXH FLO STPT (Point 85) is calculated as shown above.

Differential Flow Setpoint – If TRACK MODE (Point 3) = ETS and ACTIVE.NTRAL (Point 10) = ACTIVE, EXH FLO STPT (Point 85) is calculated as follows:

The exhaust flow loop maintains a fixed VOLUME OFFST (Point 88) in cfm (lps) with a positive or negative, POS.NEG (Point 25), differential between the supply and exhaust air volumes. This is accomplished using one of two tracking algorithms, determined by the value of TRACKING (Point 82). If TRACKING = STPT, the exhaust setpoint tracks the supply setpoint.

Example

- If CTL FLOW MAX (Point 77) = 1000 cfm, and VOLUME OFFST (Point 88) = 100 cfm with POS.NEG (Point 25) set to NEG, EXH FLO STPT (Point 85) is 10% more than SUP FLO STPT (Point 93). (100 cfm/1000 cfm) × 100% flow = 10%.

  When SUP FLO STPT is 100%, EXH FLO STPT is 110%.

  When SUP FLO STPT is 50%, EXH FLO STPT is 60%.

  When SUP FLO STPT is 0%, EXH FLO STPT is 10%.

- With POS.NEG (Point 25) set to POS, the EXH FLO STPT (Point 85) is 10% less than the SUP FLO STPT (Point 93). (100 cfm/1000 cfm) × 100% flow = 10%.

  When SUP FLO STPT is 100%, EXH FLO STPT is 90%.

  When SUP FLO STPT is 50%, EXH FLO STPT is 40%.

  When SUP FLO STPT is 10%, EXH FLO STPT is 0%.

NOTE: In this example, the controller would not allow SUP FLO STPT (Point 93) to fall below 10% because EXH FLO STPT (Point 85) cannot be less than 0%.

If ACTIVE.NTRAL (Point 10) = NTRAL, then EXH FLO STPT = SUP FLO STPT and VOLUME OFFST is not used.

If TRACKING (Point 82) = FLOW, the exhaust setpoint tracks the actual supply flow, not the flow setpoint. Setpoint tracking typically provides more stable control. If the supply flow loop cannot maintain its setpoint, the flow tracking algorithm will maintain the flow differential.

If TRACK MODE (Point 3) = STE, SUP FLO STPT (Point 93) is calculated as shown above.

Control Loops

The Room Pressurization Controller uses four Proportional, Integral, Derivative (PID) control loops: two temperature loops and two flow loops.

Temperature Loops – The two temperature loops include a cooling loop and a heating loop. The active temperature loop maintains room temperature at the value in CTL STPT (Point 92). See *Control Temperature Setpoints*.

In cooling mode, the cooling loop generates CLG LOOPOUT (Point 79) which is then used to generate the VAV flow setpoint.

In heating mode, the heating loop generates HTG LOOPOUT (Point 80) which is then used to control the heating valve in order to maintain the room temperature.

Flow Loops – The *supply flow loop* maintains the SUP FLO STPT (Point 93) by modulating the supply air damper. SUPPLY FLOW (Point 75) is the input value for the supply flow loop and is dependent upon SUP AIR VOL (Point 35) and CTL FLOW MAX (Point 77) according to the following formula:

$$\frac{\text{SUP AIR VOL}}{\text{CTL FLOW MAX}} \times 100\% = \text{SUPPLY FLOW}$$

- If SUP AIR VOL = 0 cfm, SUPPLY FLOW = 0% flow.
- If SUP AIR VOL = CTL FLOW MAX, SUPPLY FLOW = 100% flow.

The *exhaust flow loop* maintains EXH FLO STPT (Point 85) by modulating the exhaust air damper. EXHAUST FLOW (Point 74) is the input value for the exhaust flow loop and is dependent upon EXH AIR VOL (Point 30) and CTL FLOW MAX (Point 77) according to the following formula:

$$\frac{\text{EXH AIR VOL}}{\text{CTL FLOW MAX}} \times 100\% = \text{EXHAUST FLOW}$$

- If EXH AIR VOL = 0 cfm, EXHAUST FLOW = 0% flow.
- If EXH AIR VOL = CTL FLOW MAX, EXHAUST FLOW = 100% flow.

Positive/Negative Pressure Switchover

An optional pressure mode switch can be connected to the termination strip on the controller at AI 3. This switch is designed to let the controller know which pressure mode to use.

If PRES SWITCH (Point 81) = YES:

- In the first position, Protective Isolation, POS.NEG (Point 25) is set to POS, indicating that the controller is in the positive pressure mode and ACTIVE.NTRAL (Point 10) is set to ACTIVE.
- In the second position, Neutral Isolation, ACTIVE.NTRAL (Point 10) is set to NTRAL.
- In the third position, Infectious Isolation, POS.NEG (Point 25) is set to NEG, indicating that the controller is in the negative pressure mode, and ACTIVE.NTRAL (Point 10) is set to ACTIVE.

When ACTIVE.NTRAL (Point 10) = ACTIVE, the differential flow alarm feature is enabled. When ACTIVE.NTRAL = NTRAL, the differential flow alarm feature is disabled (see *Differential Flow Alarm*).

If the pressure mode switch fails, PT FAIL COND (Point 89) is set to ALARM. The controller continues to operate in the last known mode of operation (positive, negative, or neutral). Overriding POS.NEG (Point 25) will return PT FAIL COND back to NORMAL.

If PRES SWITCH (Point 81) = NO, an auxiliary temperature sensor can be monitored on AI 3. AUX TEMP (Point 15) holds the temperature reading.

Differential Flow Alarm

When ALARM OUT (Point 50) is enabled (ACTIVE.NTRAL (Point 10) = ACTIVE), its value changes from OFF to ON and DO8 turns on if either of the following conditions persists longer than the time value of ALARM DELAY (Point 62):

- ACTUAL OFFST (Point 83) > (VOLUME OFFST (Point 88) + OFFSET LMT (Point 61))
- ACTUAL OFFST < (VOLUME OFFST – OFFSET LMT)

Hot Water Reheat

CAUTION:

Do not set HTG FLOW MIN (Point 33) to 0 cfm. A minimum airflow must be provided across the heating coils when the heating valve is open.

The heating loop modulates the heating valve in order to warm up the space. When cooling, the heating valve is closed.

Sequencing Logic (optional)

NOTE: The default setups for FLOW START (Point 16) and FLOW END (Point 17) are 0%. This provides minimum airflow during heating mode. The flow loop should not be sequenced with the reheat unless the supply air is conditioned.

In heating mode, this application includes logic that allows the reheat to operate either in sequence, simultaneously or overlapping with the VAV flow loop. This algorithm is very similar to the spring range sequencing of valves and dampers. Any part of the heating loop output, HTG LOOPOUT (Point 80), from 0 to 100% can be used to drive both the VAV flow loop and the reheat.

See the following three examples. In Figure 2216-3, the horizontal bars (reheat start, flow start, etc.) show the action that occurs when the loop output, the vertical bar, reaches that point. The relative positions shown on the graphs are for illustration purposes only and may differ from the examples.

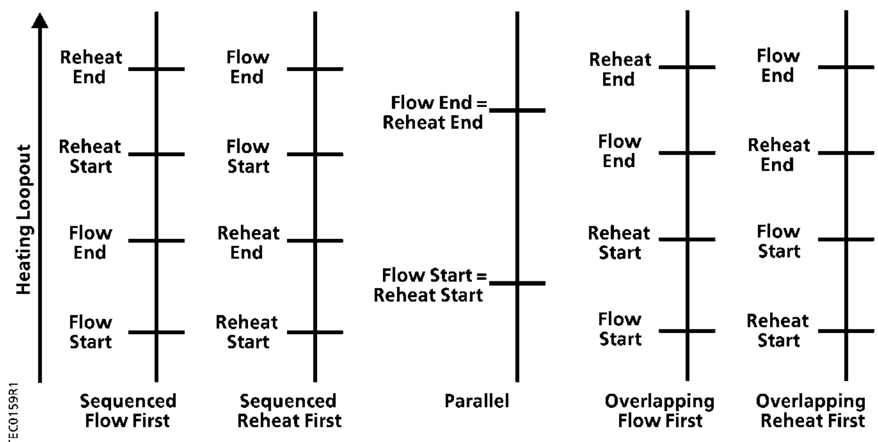


Figure 2216-3. Sequenced, Parallel and Overlapping Flow Loop Operation with Hot Water Reheat.

For simplicity, assume that in these examples HTG FLOW MIN (Point 33) = 0 cfm.

Example 1

Assume reheat operates sequenced to the heating flow loop.

- If FLOW START (Point 16) is 0%, FLOW END (Point 17) is 50%
- If REHEAT START (Point 22) is 50%, REHEAT END (Point 23) is 100%

Then, assuming TRACK MODE (Point 3) = ETS,

- When HTG LOOPOUT (Point 80) is 0%, SUP FLO STPT (Point 93) = 0%
- When HTG LOOPOUT is 25%, SUP FLO STPT = 50%
- When HTG LOOPOUT ≥ 50%, SUP FLO STPT = 100%
- When HTG LOOPOUT ≤ 50%, VALVE COMD (Point 37) = 0% open.
- When HTG LOOPOUT is 75%, VALVE COMD = 50% open.
- When HTG LOOPOUT is 100%, VALVE COMD = 100% open.

Example 2

Assume reheat operates simultaneously to the heating flow loop.

- If FLOW START (Point 16) is 0%, FLOW END (Point 17) is 100%
- If REHEAT START (Point 22) is 0%, REHEAT END (Point 23) is 100%

Then, assuming TRACK MODE (Point 3) = ETS,

- When HTG LOOPOUT (Point 80) is 0%, SUP FLO STPT (Point 93) = 0% and VALVE COMD (Point 37) = 0% open.
- When HTG LOOPOUT is 50%, SUP FLO STPT = 50% and VALVE COMD = 50% open.
- When HTG LOOPOUT is 100%, SUP FLO STPT = 100% and VALVE COMD = 100% open.

Example 3

Assume reheat overlaps the heating flow loop.

- If FLOW START (Point 16) is 0%, FLOW END (Point 17) is 75%
- If REHEAT START (Point 22) is 25%, REHEAT END (Point 23) is 100%

Then, assuming TRACK MODE (Point 3) = ETS,

- When HTG LOOPOUT (Point 80) is 0%, SUP FLO STPT (Point 93) = 0%
- When HTG LOOPOUT is 37.5%, SUP FLO STPT = 50%
- When HTG LOOPOUT ≥ 75%, SUP FLO STPT = 100%
- When HTG LOOPOUT ≤ 25%, VALVE COMD (Point 37) = 0% open.
- When HTG LOOPOUT is 62.5%, VALVE COMD = 50% open.
- When HTG LOOPOUT is 100%, VALVE COMD = 100% open.

Calibration

Air Velocity Transducer – Calibration of the controller's internal air velocity transducers is periodically required to maintain accurate air velocity readings. CAL SETUP (Point 95) is set with the desired calibration option during controller startup. Depending on the value of CAL SETUP, calibration may be set to take place automatically or manually when the override switch on the room temperature sensor is pressed. If CAL AIR (Point 94) = YES, calibration is in progress.

- For a controller used without Autozero Modules, CAL MODULE (Point 87) is set to NO, the dampers are commanded closed simultaneously to get zero airflow readings during calibration.
- For a controller used with Autozero Modules, CAL MODULE (Point 87) is set to YES, calibration occurs without closing the damper. (Exception: During the first calibration after start-up, initialization or return from power loss, the dampers are closed to calibrate the damper positions.)

Hot Water Valve – Calibration of a hot water valve (if used) is performed simultaneously with calibration of the air velocity transducers and is accomplished by commanding the valve closed. Calibration of the valve is not affected by the presence of Autozero Modules.

At the end of a calibration sequence, CAL AIR (Point 94) automatically returns to NO. A value of NO indicates that the controller is not in a calibration sequence.

The Autozero Modules are used during calibration when they are wired to DO7 and CAL MODULE (Point 87) = YES.

Damper Status Operation

Under normal operation DMPR STATUS (Point 84) reads CAL. However, when using the Autozero Modules, it is possible that the calculated damper position may differ from the actual (physical) damper position after a while.

If this occurs, the controller will automatically compensate for any difference by setting DMPR STATUS (Point 84) to RECAL which readjusts the value of the damper positions. DMPR STATUS will be set to RECAL if all of the following conditions are true:

- SUPPLY POS (Point 49) = 100%
- SUP AIR VOL (Point 35) > 0 cfm
- SUPPLY FLOW (Point 75) < SUP FLO STPT (Point 93)

In this case, the controller resets the value of SUPPLY POS (Point 49) to 75%, strokes the damper to 100%, and checks to see if SUPPLY FLOW (Point 75) ≥ SUP FLO STPT (Point 93). If not, the controller repeats this sequence. If after the fourth attempt the conditions are unchanged, DMPR STATUS (Point 84) remains set to RECAL, but the controller discontinues attempts to recalibrate the damper position.

– or –

- SUPPLY POS (Point 49) = 0%
- SUP AIR VOL (Point 35) > 0 cfm
- SUPPLY FLOW (Point 75) > SUP FLO STPT (Point 93)

In this case, the controller resets the value of SUPPLY POS (Point 49) to 25%, strokes the damper to 0%, and checks to see if SUPPLY FLOW (Point 75) ≤ SUP FLO STPT (Point 93). If not, the controller repeats this sequence. If after the fourth attempt the conditions are unchanged, DMPR STATUS (Point 84) remains set to RECAL, but the controller discontinues attempts to recalibrate the damper position.

DMPR STATUS (Point 84) will also be set to RECAL if these same conditions exist for the exhaust damper.

If DMPR STATUS (Point 84) has been changed to RECAL in response to one of the conditions described above, do one of the following:

1. If flow is now being properly controlled, set DMPR STATUS to CAL and release it.
2. If flow is still not being properly controlled (that is, one of the conditions described above is still present) or if it is important that the damper position be accurate, initialize the controller.

If these steps do not fix the problem of maintaining flow, a mechanical problem might exist.

Fail-safe Operation

If either one of the air velocity sensors fails (SUP AIR VOL (Point 35) or EXH AIR VOL (Point 30)), the supply and exhaust dampers are controlled as follows:

- If FAIL MODE (Point 40) = OPEN, the controller sets the supply and exhaust dampers open.
- If FAIL MODE (Point 40) = CLOSED, the controller sets the supply and exhaust dampers closed.

The hot water valve continues to operate as normal.

If the room temperature sensor fails and ROOM TEMP (Point 4) and CTL TEMP (Point 78) are not overridden, the hot water valve moves to fully open. In ETS mode, the supply damper moves to the minimum airflow position while the exhaust damper continues to maintain a fixed cfm differential between the supply air volume and exhaust air volume. (In STE mode, exhaust moves to the minimum position while the supply follows to maintain the airflow differential.)

PT FAIL COND (Point 89) is set to ALARM if:

- Either one of the air velocity sensors fails.
- The room temperature sensor fails (and neither ROOM TEMP (Point 4) nor CTL TEMP (Point 78) is overridden).
- The pressure mode switch fails and PRES SWITCH (Point 81) is set to YES.
- There is not a pressure mode switch attached to AI 3 and POS.NEG (Point 25) is not overriden.

Otherwise, a NORMAL value displays.

If RM STPT DIAL (Point 13) fails, the controller operates with the last known setpoint dial value.

Application Notes

If temperature swings in the room are excessive or there is trouble maintaining the setpoint, the cooling loop, the heating loop or both need to be tuned. If SUPPLY FLOW (Point 75) is oscillating while SUP FLO STPT (Point 93) is constant, the supply flow loop requires tuning. If the EXHAUST FLOW (Point 74) is oscillating while EXH FLO STPT (Point 85) is constant, the exhaust flow loop requires tuning.

Wiring Diagram

Figure 2216-4 presents the point wiring for Application 2216.

CAUTION:

The controller's DOs control 24 Vac loads only. The maximum rating is 12 VA for each DO. Use an interposing 220V 4-relay module 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

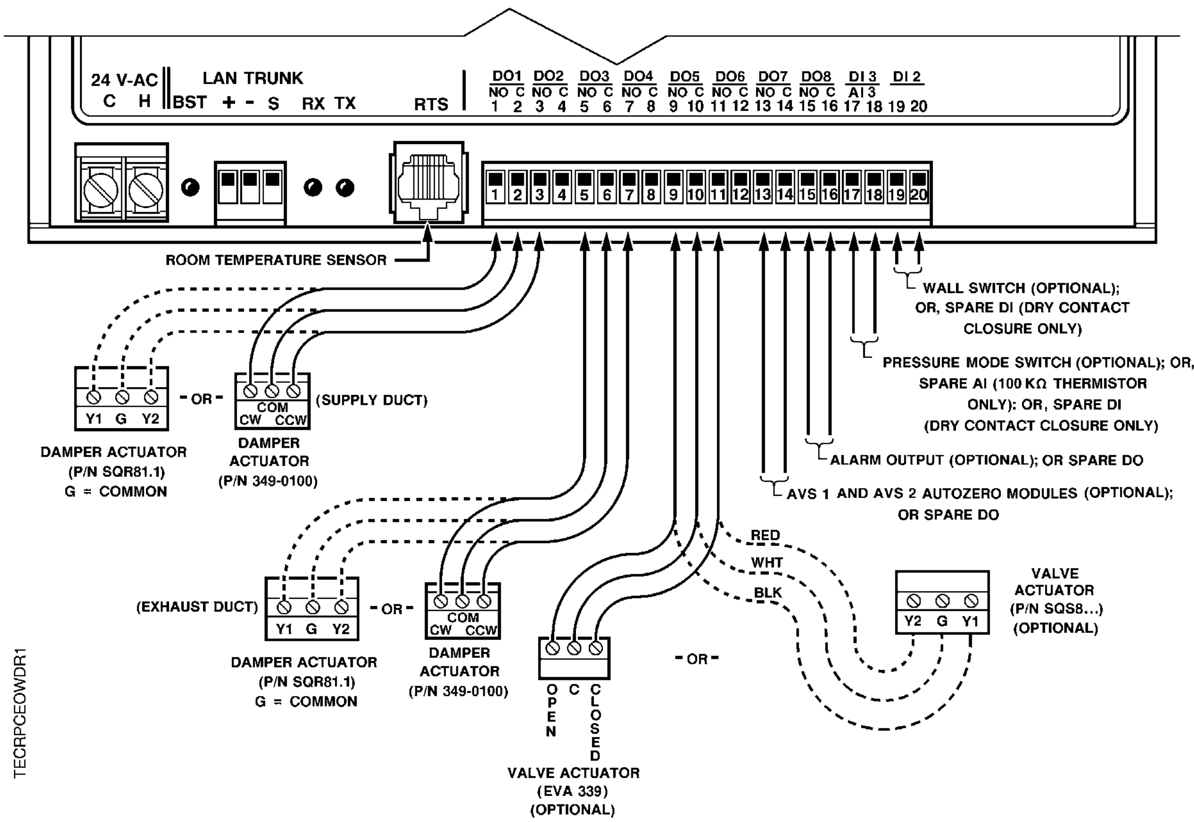


Figure 2216-4. Application 2216 Wiring Diagram with Hot Water Reheat.

Table 2216-1. Point Database for Application 2216.

Point Number	Descriptor	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
01	CTRL ADDRESS	99	–	1	0	–	–
02	APPLICATION	2216	–	1	0	–	–
03	TRACK MODE	ETS	–	–	–	STE	ETS
{04}	ROOM TEMP	74.00 (23.45)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	–	–
{05}	HEAT.COOL	COOL	–	–	–	HEAT	COOL
06	DAY CLG STPT	74.00 (23.45)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	–	–
07	DAY HTG STPT	70.00 (21.21)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	–	–
08	NGT CLG STPT	82.00 (27.93)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	–	–
09	NGT HTG STPT	65.00 (18.41)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	–	–
{10}	ACTIVE.NTRAL	NTRAL	–	–	–	ACTIVE	NTRAL
11	RM STPT MIN	55.00 (12.81)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	–	–
12	RM STPT MAX	90.00 (32.41)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	–	–
{13}	RM STPT DIAL	74.00 (23.45)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	–	–
14	STPT DIAL	NO	–	–	–	YES	NO
{15}	AUX TEMP	74.00 (23.45)	DEG F (DEG C)	0.5 (0.3)	37.5 (3.1)		
16	FLOW START	0.0	PCT	0.4	0.0	–	–
17	FLOW END	0.0	PCT	0.4	0.0	–	–
{18}	WALL SWITCH	NO	–	–	–	YES	NO
{19}	DI OVRD SW	OFF	–	–	–	ON	OFF
20	OVRD TIME	1	HRS	1	0	–	–
{21}	NGT OVRD	NIGHT	–	–	–	DAY	NIGHT
22	REHEAT START	0.0	PCT	0.4	0.0	–	–
23	REHEAT END	100.0	PCT	0.4	0.0	–	–
{24}	DI 2	OFF	–	–	–	ON	OFF

1. Points not listed are not used in this application.
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.

continued on the next page…

Table 2216-1. Point Database for Application 2216.

Point Number	Descriptor	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
{25}	POS.NEG	NEG	–	–	–	POS	NEG
26	EXHFLO PGAIN	0.00	–	0.05	0.00	–	–
27	EXHFLO IGAIN	0.010	–	0.001	0.000	–	–
28	EXHFLO DGAIN	0.0	–	2.0	0.0	–	–
{29}	DAY.NGT	DAY	–	–	–	DAY	NIGHT
{30}	EXH AIR VOL	0.0 (0.0)	CFM (LPS)	4.0 (1.9)	0.0 (0.0)	–	–
31	CLG FLO MIN	220.0 (103.9)	CFM (LPS)	4.0 (1.9)	0.0 (0.0)	–	–
32	CLG FLO MAX	2200.0 (1038.2)	CFM (LPS)	4.0 (1.9)	0.0 (0.0)	–	–
33	HTG FLO MIN	220.0 (103.9)	CFM (LPS)	4.0 (1.9)	0.0 (0.0)	–	–
34	HTG FLO MAX	2200.0 (1038.2)	CFM (LPS)	4.0 (1.9)	0.0 (0.0)	–	–
{35}	SUP AIR VOL	0.0 (0.0)	CFM (LPS)	4.0 (1.9)	0.0 (0.0)	–	–
36	SUP FLO COEF	1.00	–	0.01	0.00	–	–
{37}	VALVE COMD	0.0	PCT	0.4	0.0	–	–
{38}	VALVE POS	0.0	PCT	0.4	0.0	–	–
39	MTR3 TIMING	130.0	SEC	1.0	0.0	–	–
40	FAIL MODE	OPEN	–	–	–	CLOSED	OPEN
{41}	DO1	OFF	–	–	–	ON	OFF
{42}	DO2	OFF	–	–	–	ON	OFF
{43}	DO3	OFF	–	–	–	ON	OFF
{44}	DO4	OFF	–	–	–	ON	OFF
{45}	DO5	OFF	–	–	–	ON	OFF
{46}	DO6	OFF	–	–	–	ON	OFF
{47}	AUTOZERO MOD	OFF	–	–	–	ON	OFF
{48}	SUPPLY COMD	0.0	PCT	0.4	0.0	–	–
{49}	SUPPLY POS	0.0	PCT	0.4	0.0	–	–
{50}	ALARM OUT	OFF	–	–	–	ON	OFF

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

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Table 2216-1. Point Database for Application 2216.

Point Number	Descriptor	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
51	MTR1 TIMING	95.0	SEC	1.0	0.0	–	–
{52}	EXHAUST COMD	0.0	PCT	0.4	0.0	–	–
{53}	EXHAUST POS	0.0	PCT	0.4	0.0	–	–
54	EXH FLO COEF	1.00	–	0.01	0.00	–	–
55	MTR2 TIMING	95.0	SEC	1.0	0.0	–	–
56	DPR1 ROT ANG	90.0	–	1.0	0.0	–	–
57	DPR2 ROT ANG	90.0	–	1.0	0.0	–	–
58	MTR SETUP	31.0	–	1.0	0.0	–	–
59	DO DIR.REV	0.0	–	1.0	0.0	–	–
60	EXHDUCT AREA	1.000 (0.092)	SQ.FT (SQ.M)	0.025 (0.003)	0.000 (0.000)	–	–
61	OFFSET LMT	16.0 (7.6)	CFM (LPS)	4.0 (1.9)	0.0 (0.0)	–	–
62	ALARM DELAY	10.0	SEC	1.0	0.0	–	–
63	CLG P GAIN	20.00 (36.00)	–	0.25 (0.45)	0.00 (0.00)	–	–
64	CLG I GAIN	0.010 (0.018)	–	0.001 (0.002)	0.000 (0.000)	–	–
65	CLG D GAIN	0.0 (0.0)	–	2.0 (3.6)	0.0 (0.0)	–	–
66	CLG BIAS	0.0	PCT	0.4	0.0	–	–
67	HTG P GAIN	10.00	–	0.25 (0.45)	0.00 (0.00)	–	–
68	HTG I GAIN	0.010 (0.018)	–	0.001 (0.002)	0.000 (0.000)	–	–
69	HTG D GAIN	0.0 (0.0)	–	2.0 (3.6)	0.0 (0.0)	–	–
70	HTG BIAS	0.0	PCT	0.4	0.0	–	–
71	SUPFLO PGAIN	0.00	–	0.05	0.00	–	–
72	SUPFLO IGAIN	0.010	–	0.001	0.000	–	–
73	SUPFLO DGAIN	0.0	–	2.0	0.0	–	–
{74}	EXHAUST FLOW	0.00	PCT	0.25	0.00	–	–
{75}	SUPPLY FLOW	0.00	PCT	0.25	0.00	–	–

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

Table 2216-1. Point Database for Application 2216.

Point Number	Descriptor	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
{76}	CTL FLOW MIN	220.0 (103.9)	CFM (LPS)	4.0 (1.9)	0.0 (0.0)	–	–
{77}	CTL FLOW MAX	2200.0 (1038.2)	CFM (LPS)	4.0 (1.9)	0.0 (0.0)	–	–
{78}	CTL TEMP	74.00 (23.45)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	–	–
{79}	CLG LOOPOUT	0.0	PCT	0.4	0.0	–	–
{80}	HTG LOOPOUT	0.0	PCT	0.4	0.0	–	–
81	PRES SWITCH	YES	–	–	–	YES	NO
82	TRACKING	STPT	–	–	–	FLOW	STPT
{83}	ACTUAL OFFST	0 (0)	CFM (LPS)	4 (2)	-8000 (-3776)	–	–
{84}	DMPR STATUS	CAL	–	–	–	RECAL	CAL
{85}	EXH FLO STPT	0.00	PCT	0.25	0.00	–	–
86	SWITCH TIME	10.0	MIN	1.0	0.0	–	–
87	CAL MODULE	NO	–	–	–	YES	NO
{88}	VOLUME OFFST	0.0 (0.0)	CFM (LPS)	4.0 (1.9)	0.0 (0.0)	–	–
{89}	PT FAIL COND	ALARM	–	–	–	ALARM	NORMAL
90	SWITCH DBAND	1.00 (0.56)	DEG F (DEG C)	0.25 (0.14)	0.00 (0.00)	–	–
{92}	CTL STPT	74.00 (23.45)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	–	–
{93}	SUP FLO STPT	0.00	PCT	0.25	0.00	–	–
{94}	CAL AIR	NO	–	–	–	YES	NO
95	CAL SETUP	4.0	–	1.0	0.0	–	–
96	CAL TIMER	12.0	HRS	1.0	0.0	–	–
97	SUPDUCT AREA	1.000 (0.092)	SQ.FT (SQ.M)	0.025 (0.003)	0.000 (0.000)	–	–
98	LOOP TIME	5.0	SEC	1.0	0.0	–	–
{99}	ERROR STATUS	0.0	–	1.0	0.0	–	–

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