SIEMENS

BACnet Terminal Box Controller - Electronic Output

Application Notes

VAV with Electric Heat or Baseboard Radiation

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Overview

In Application 2512, the controller modulates the supply air damper of the terminal box for cooling and controls stages of electric reheat or baseboard radiation for heating. When in heating, the terminal box either maintains minimum airflow or modulates the supply air damper. In order for the terminal box to work properly, the central air-handling unit must provide supply air (Figure 1).

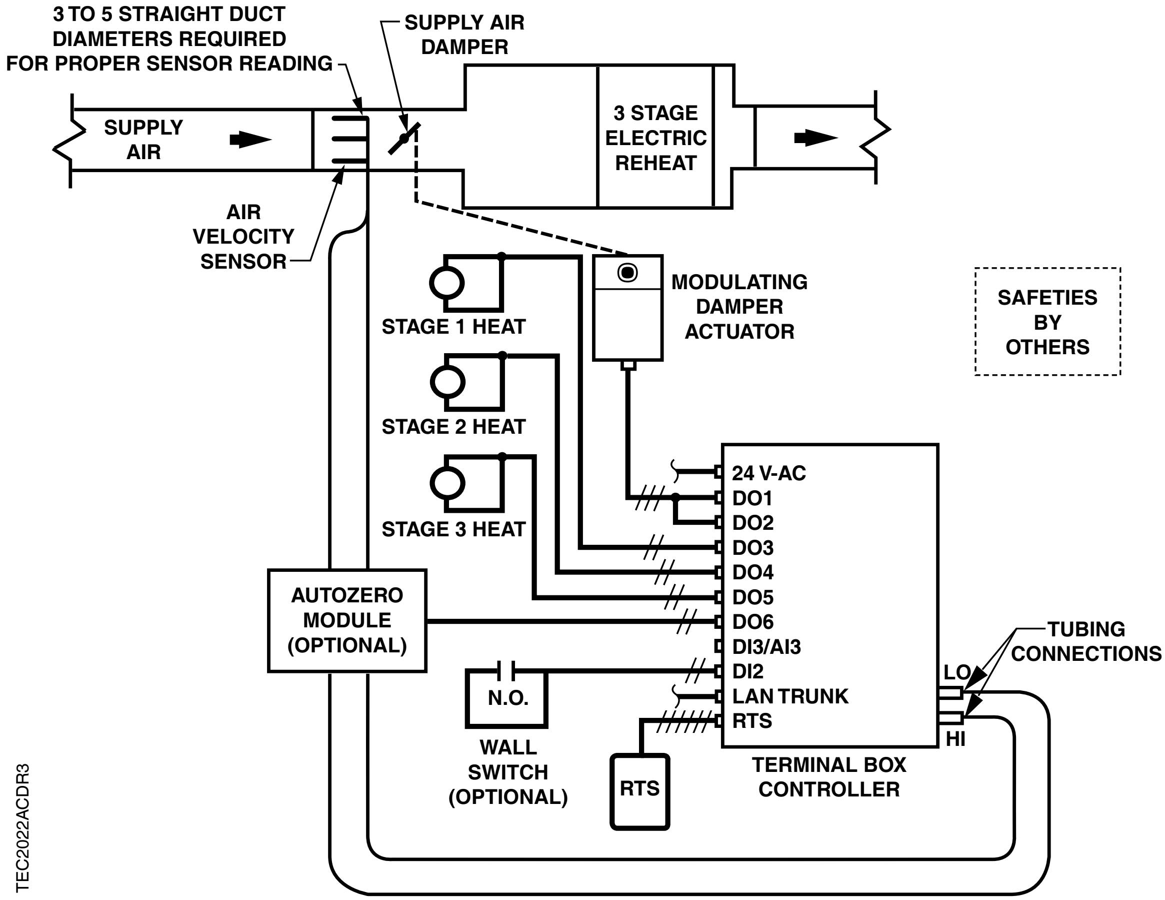

Figure 1. Application 2512 with Electric Heat Control Diagram.

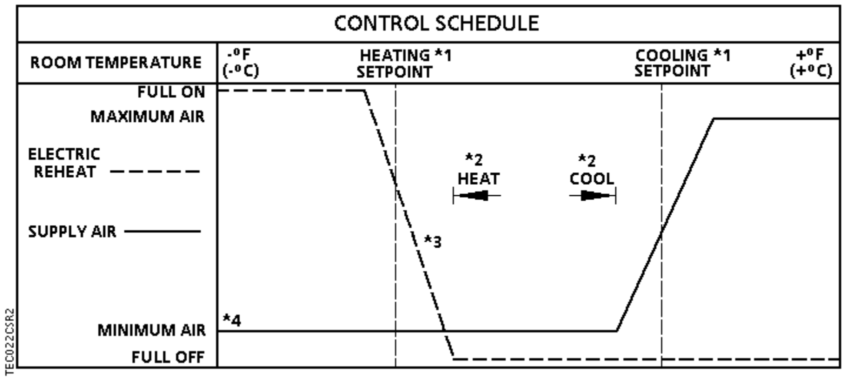

Figure 2. Application 2512 with Electric Heat Control Schedule.

NOTES:

1. See *Sequence of Operation*, *Control Temperature Setpoints*.
2. See *Sequence of Operation*, *Heating/Cooling Switchover*.
3. The electric heat is time modulated. This allows it to be controlled proportionally rather than with deadbands.
4. 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 (Optional)*.

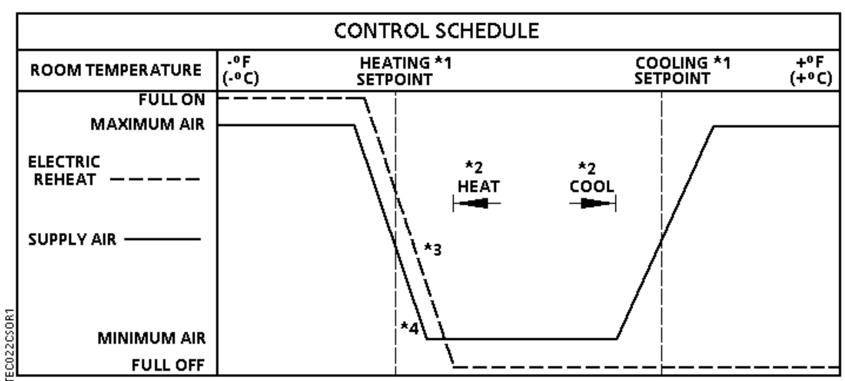

Figure 3. Application 2512 with Electric Heat and Modulating Damper (Heating Mode) Control Schedule.

NOTES:

1. See *Sequence of Operation*, *Control Temperature Setpoints*.
2. See *Sequence of Operation*, *Heating/Cooling Switchover*.
3. The electric reheat is time modulated. This allows it to be controlled proportionally rather than with deadbands.
4. The airflow is shown operating parallel with the electric reheat (optional). The airflow can operate at minimum flow throughout the entire heating mode (default setting). See *Sequencing Logic (Optional)*.

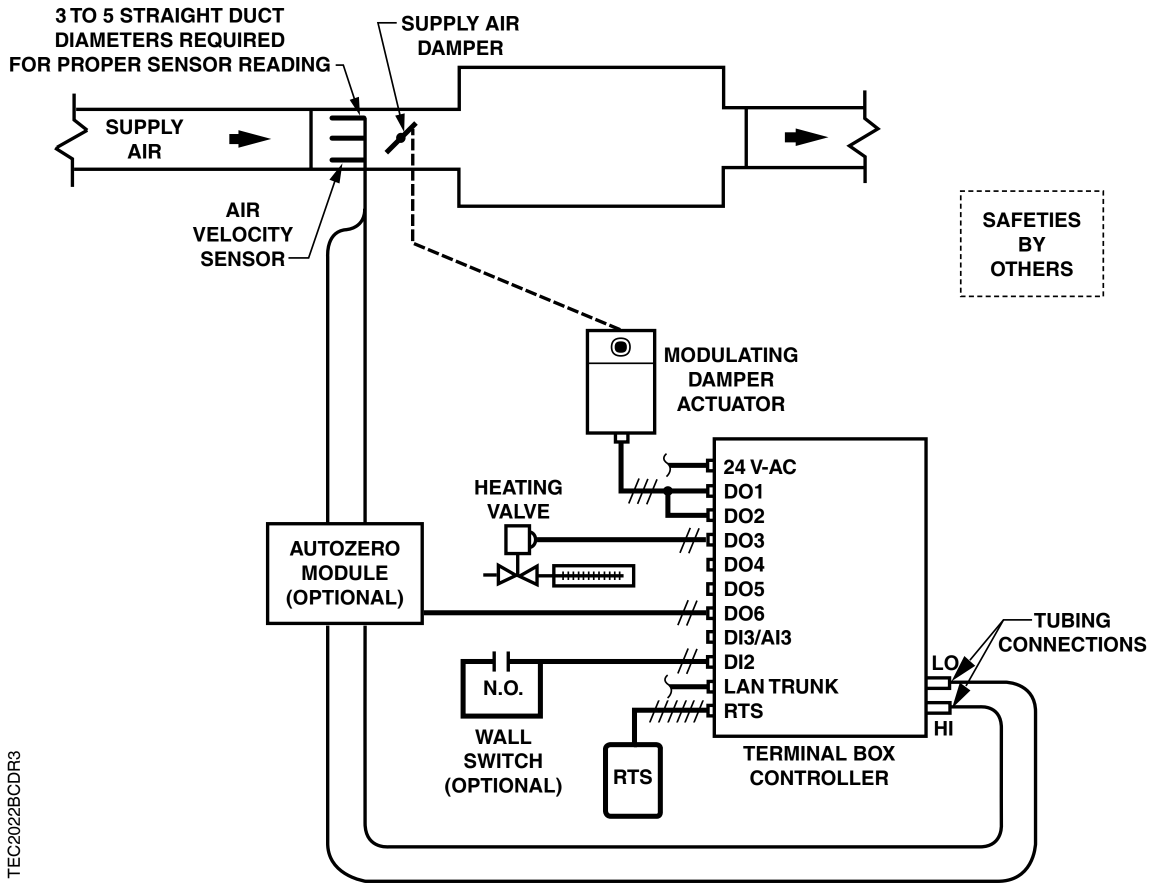

Figure 4. Application 2512 with Baseboard Radiation Control Diagram.

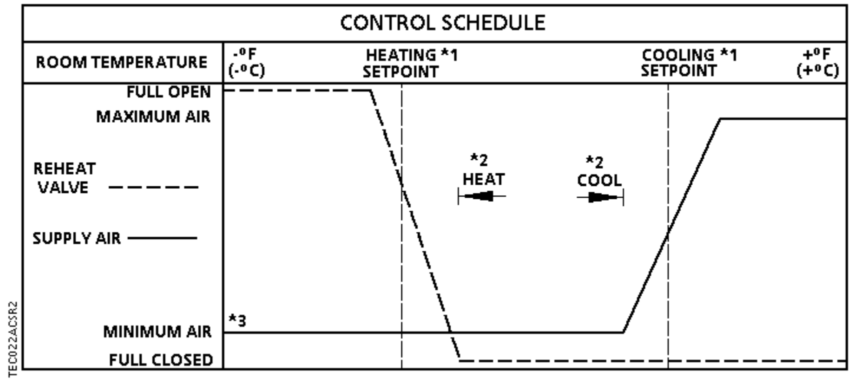

Figure 5. Application 2512 with Baseboard Radiation Control Schedule.

NOTES:

1. See *Sequence of Operation*, *Control Temperature Setpoints*.
2. See *Sequence of Operation*, *Heating/Cooling Switchover*.
3. The 2-position reheat valve is time modulated. This allows it to be controlled proportionally rather than with deadbands.
4. The airflow is shown at minimum flow throughout the entire heating mode (default setting). The airflow can operate sequenced, parallel, or overlapping with the reheat valve (optional). See *Sequencing Logic (Optional)*.

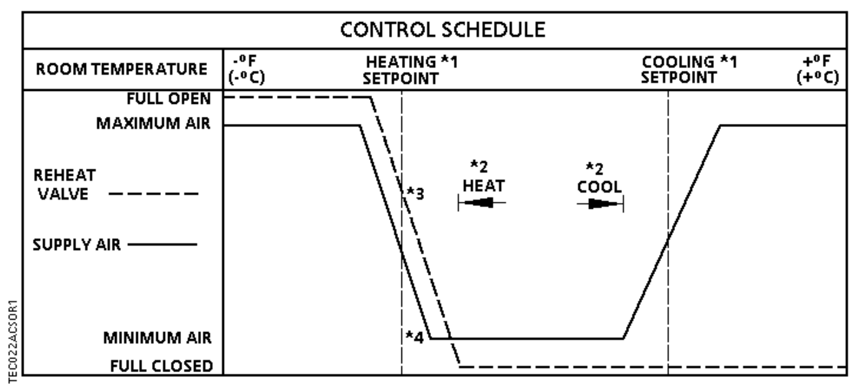

Figure 6. Application 2512 with Baseboard Radiation and Modulating Damper (Heating Mode) Control Schedule.

NOTES:

1. See *Sequence of Operation*, *Control Temperature Setpoints*.
2. See *Sequence of Operation*, *Heating/Cooling Switchover*.
3. The 2-position reheat valve is time modulated. This allows it to be controlled proportionally rather than with deadbands.
4. The airflow is shown operating parallel with the reheat valve (optional). The airflow can operate at minimum flow throughout the entire heating mode (default setting). See *Sequencing Logic (Optional)*.

BACnet

The BACnet Terminal Box Controller - Electronic Output communicates using BACnet MS/TP protocol for open communications on BACnet MS/TP networks.

Table 1. Supported BIBBS.

Product	Supported BIBBs	BIBB Name
BTEC	DS-RP-B	Data Sharing-ReadProperty-B
	DS-WP-B	Data Sharing-WriteProperty-B
	DM-DDB-B	Device Management-Dynamic Device Binding-B
	DM-DOB-B	Device Management-Dynamic Object Binding-B
	DM-DDC-B	Device Management-Device Communication Control-B

Hardware Inputs

Analog

- Air velocity sensor
- Room temperature sensor
- Room temperature setpoint dial (optional)

Digital

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

Hardware Outputs

Analog

- None

Digital

- Autozero Module (optional)
- Damper actuator
- Stage 1 electric heat or 2-position heating valve
- Stage 2 electric heat (optional)
- Stage 3 electric heat (optional)

Ordering Notes

BACnet Terminal Box Controller - Electronic Output	550-788A

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

Autozero Module (optional)
Damper Actuator
Terminal Equipment Controller Room Temperature Sensor

Point Database

Table 2 presents the point database information for Application 2512.

Sequence of Operation

The following paragraphs present the sequence of operation for Application 2512, “VAV with Electric Heat or Baseboard Radiation”.

Control Temperature Setpoints

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

Day Mode – CTL STPT holds the value of DAY CLG STPT (Point 6). 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 RM STPT DIAL < RM STPT MIN (Point 11), CTL STPT 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 holds the value of NGT CLG STPT (Point 8).

Room Temperature Offset

Room Temperature Offset, RMTMP OFFSET (Point 3), is a user-adjustable offset that will compensate for deviations between the value of ROOM TEMP (Point 4) and the actual room temperature. This corrected value is displayed in CTL TEMP (Point 78).

CTL TEMP (Point 78) = ROOM TMP (Point 4) + RMTMP OFFSET (Point 3).

Day and Night Modes

The day/night status of the space is determined by the status 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 (see Figure 1 and Figure 4) and WALL SWITCH (Point 18) = YES, the controller monitors the status of DI 2. When DI 2 (Point 24) 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, the controller is operating stand-alone, it stays in day mode all the time. If the controller is operating with centralized control, connected to a field panel, 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 (125-1895)* 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 mode for the time period 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 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 (Point 86), the controller switches from heating to cooling mode by setting HEAT.COOL (Point 5) to COOL:

- HTG LOOPOUT (Point 80) < SWITCH LIMIT (Point 85).
- CTL TEMP (Point 78) > CTL STPT (Point 92) by at least the value set in SWITCH DBAND (Point 90).
- 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 (Point 79) < SWITCH LIMIT.
- CTL TEMP < CTL STPT by at least the value set SWITCH DBAND.
- CTL TEMP < the appropriate heating setpoint plus SWITCH DBAND.

Modulate Damper During Heating Mode (optional)

CAUTION:

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

To change the value of HEAT.COOL (Point 5) 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 (see Examples 1 through 3 in Sequencing Logic). If the flow loop is used in heating mode just to meet minimum air requirements, the heating/cooling switchover mechanism operates as described in this section to control HEAT.COOL (see Example 4 in *Sequencing Logic (Optional)*).

Control Loops

The terminal box is controlled by three Proportional, Integral, and Derivative (PID) control loops; two temperature loops and a flow loop.

The two temperature loops are 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*.

Cooling Loop – Generates cooling loopout which is then used to generate FLOW STPT (Point 93). FLOW STPT is the result of scaling the cooling loopout to the appropriate range of values determined by CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32). In order to scale it, the loopout is multiplied by the range (MAX – MIN) and then added to the minimum setpoint.

When CLG FLOW MIN ≠ 0 CFM, FLOW STPT ≠ CLG LOOPOUT (Point 79). The minimum flow setpoint is (CLG FLOW MIN / CLG FLOW MAX) × 100% flow. And FLOW STPT is [CLG LOOPOUT × (100% – minimum setpoint)] + minimum setpoint.

Example

If CLG FLOW MIN = 200 CFM, and CLG FLOW MAX = 1000 CFM, the minimum flow setpoint is (200 CFM / 1000 CFM) × 100% flow = 20%.

When CLG LOOPOUT is 0%, FLOW STPT = 20% flow.
[0% × (100% – 20%)] + 20% = 20%
This ensures that the airflow out of the terminal box is no less than CLG FLOW MIN.

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

When CLG LOOPOUT is 100%, FLOW STPT = 100% flow.
[100% × (100% – 20%)] + 20% = 100%

Heating Loop – If the controller is in heating mode, the operation of the flow loop is flexible. It can be set up to do one of the following:

- Constantly maintain airflow out of the terminal box equal to HTG FLOW MIN (Point 33).
- Operate in sequence with the electric reheat.
- Operate parallel with the electric reheat.
- Have its operation overlap with the operation of the electric reheat. See *Sequencing Logic (Optional)* for more information.

If the first option described above is chosen, HTG LOOPOUT (Point 80) will control the electric reheat in order to maintain the room temperature. If any one of the last three options is chosen, HTG LOOPOUT will control both the flow loop setpoint (FLOW STPT) and the electric reheat in order to maintain the room temperature. See *Sequencing Logic (Optional)* for more information.

HTG LOOPOUT will adjust the value of FLOW STPT differently depending on which flow loop setup is chosen. However, the following rule applies no matter what setup is chosen.

In heating mode, FLOW STPT is never set below (HTG FLOW MIN / HTG FLOW MAX) × 100% flow or above 100% flow.

Flow Loop – Maintains minimum airflow and maximum airflow through CTL FLOW MIN (Point 76) and CTL FLOW MAX (Point 77).

When the controller is in cooling mode, CTL FLOW MIN = CLG FLOW MIN, and CTL FLOW MAX = CLG FLOW MAX.

When the controller is in heating mode, CTL FLOW MIN = HTG FLOW MIN, and CTL FLOW MAX = HTG FLOW MAX.

In Application 2512, 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.

The flow loop maintains FLOW STPT by modulating the supply air damper, DMPR COMD (Point 48). The flow loop maintains the airflow between CTL FLOW MIN and CTL FLOW MAX.

FLOW (Point 75) is the input value for the flow loop. It is calculated as a percentage based on where AIR VOLUME (Point 35) is between 0 CFM and CTL FLOW MAX. This percentage is referred to as % flow.

- If AIR VOLUME = 0 CFM, FLOW is 0% flow.
- If AIR VOLUME = CTL FLOW MAX, FLOW is 100% flow.

The low limit of FLOW STPT will be the percentage that corresponds to the volume given in CTL FLOW MIN. This percentage can be calculated as:

(CTL FLOW MIN / CTL FLOW MAX) × 100% flow

The flow loop ensures that the supply air will not be less than CTL FLOW MIN.

Example

If CTL FLOW MIN = 250 CFM, and CTL FLOW MAX = 1000 CFM,
the low limit of FLOW STPT = (250 CFM / 1000 CFM) × 100% flow
= 0.25 × 100% flow
= 25% flow.

Since 25% of 1000 CFM = 250 CFM, the minimum airflow out of the terminal box will be 250 CFM.

Electric Reheat

CAUTION:

Verify that the equipment is supplied with safeties by others to ensure that there is airflow across the heating coils when they are to be energized.

The heating loop controls up to three stages of electric reheat to warm up the room. The electric reheat is time modulated using a duty cycle as shown in the following example. When the controller is in cooling mode, the electric heat is OFF at all times.

Example

If the duty cycle is 10 minutes (STAGE TIME (Point 89) = 10 minutes), and the heating loop is calling for 60% of heating (HTG LOOPOUT (Point 80) = 60%) for every 10-minute period, the stages of electric auxiliary heat cycle are as follows:

	Stage 1: minutes		**Stage 2: minutes**		**Stage 3: minutes**	
	ON	**OFF**	**ON**	**OFF**	**ON**	**OFF**
With 1 stage of electric heat:	6	4	–	–	–	–
With 2 stages of electric heat:	10	0	2	8	–	–
With 3 stages of electric heat:	10	0	8	2	0	10

Baseboard Radiation

The baseboard radiation can be either a two-position valve or electrical resistance heating. If the controller is in cooling mode, the heating valve is closed. When in heating mode, the controller will operate the heating valve to maintain the heating setpoint as if it was a single stage of heat.

Sequencing Logic (Optional)

The default setups for FLOW START (Point 16) and FLOW END (Point 17) are 0. This will provide minimum airflow during heating mode.

In heating mode, this application includes logic that allows the flow loop to operate in sequence, parallel, or overlapping with the electric reheat. Portions of the output of the heating loop, HTG LOOPOUT (Point 80), will drive both the flow loop and the electric reheat from 0 to 100%. See the following three examples.

The ladder diagrams in Figure 7 show sequenced, parallel, and overlapping flow loop operations with electric reheat. 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.

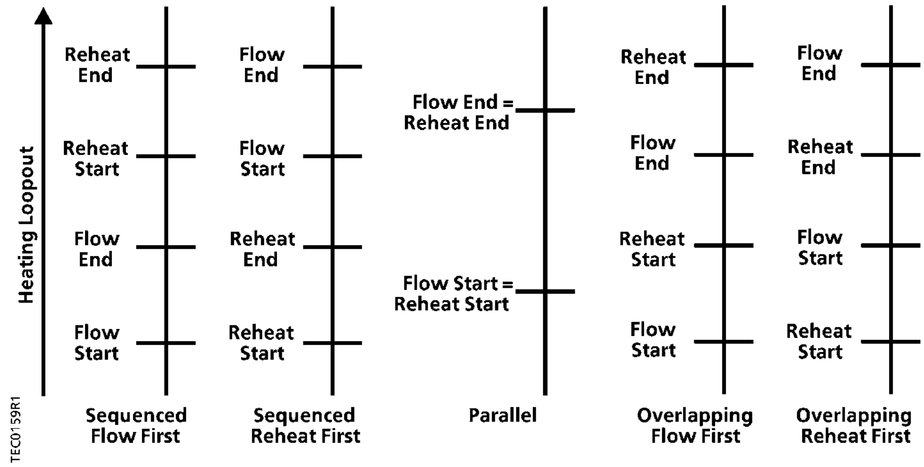

Figure 7. Sequenced, Parallel, and Overlapping Flow Loop Operations with Electric Heat.

For simplicity, assume that in these examples:

- HTG FLOW MIN (Point 33) = 0 CFM.
- There is one stage of electric heat (STAGE COUNT (Point 88) = 1).
- The cycle time of the electric heat is 10 minutes (STAGE TIME (Point 89) = 10). (When this is done, FLOW STPT (Point 93) will equal 0 when HTG LOOPOUT = 0)

Example 1

Assume that your system has electric heat that is to operate in sequence with the flow loop. If:

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

then,

- When HTG LOOPOUT = 0%, FLOW STPT will equal 0% flow.
- When HTG LOOPOUT = 25%, FLOW STPT will equal 50% flow.
- When HTG LOOPOUT ≥ 50%, FLOW STPT will equal 100% flow.
- When HTG LOOPOUT ≤ 50%, the electric heat will be off all the time.

- When HTG LOOPOUT = 75%, for every 10-minute period the electric heat will be on for 5 minutes and off for 5 minutes.
- When HTG LOOPOUT = 100%, the electric heat will be on all the time.

Example 2

Assume that your system has electric heat that is to operate in parallel with the flow loop. If:

- FLOW START (Point 16) = 0%
- FLOW END (Point 17) = 100%
- REHEAT START (Point 22) = 0%
- REHEAT END (Point 23) = 100%

then,

- When HTG LOOPOUT = 0%, FLOW STPT will equal 0% flow.
- When HTG LOOPOUT = 50%, FLOW STPT will equal 50% flow.
- When HTG LOOPOUT = 100%, FLOW STPT will equal 100% flow.
- When HTG LOOPOUT = 0%, the electric heat will be off all the time.
- When HTG LOOPOUT = 50%, for every 10-minute period the electric heat will be on for 5 minutes and off for 5 minutes.
- When HTG LOOPOUT = 100%, the electric heat will be on all the time.

Example 3

Assume that your system has electric heat that is to operate overlapping with the flow loop. If:

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

then,

- When HTG LOOPOUT = 0%, FLOW STPT will equal 0% flow.
- When HTG LOOPOUT = 37.5%, FLOW STPT will equal 50% flow.
- When HTG LOOPOUT ≥ 75%, FLOW STPT will equal 100% flow.

- When HTG LOOPOUT ≤ 25%, the electric heat will be off all the time.
- When HTG LOOPOUT = 62.5%, for every 10-minute period the electric heat will be on for 5 minutes and off for 5 minutes.
- When HTG LOOPOUT = 100%, the electric heat will be on all the time.

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 electric heat. 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. Example 4 clarifies this:

Example 4

Assume that your system has electric heat that provides the temperature control in the heating mode, while the flow loop provides for the minimum air requirements. Assume:

- HTG FLOW MIN = 170 CFM
- HTG FLOW MAX = 1000 CFM
- STAGE COUNT = 1
- STAGE TIME = 10 Minutes

If:

- FLOW START (Point 16) = 0%
- FLOW END (Point 17) = 0%
- REHEAT START (Point 22) = 0%
- REHEAT END (Point 23) = 100%

then,

- When HTG LOOPOUT = 0%, FLOW STPT will equal (170 CFM / 1000 CFM) × 100% flow = 17% flow. This will cause the flow loop to maintain an airflow of 170 CFM out of the terminal box.
- When HTG LOOPOUT = 50%, FLOW STPT will equal 17% flow.
- When HTG LOOPOUT = 100%, FLOW STPT will equal 17% flow.
- When HTG LOOPOUT = 0%, the electric heat will be off all the time.
- When HTG LOOPOUT = 50%, for every 10 minute period the electric heat will be on for 5 minutes and off for 5 minutes.
- When HTG LOOPOUT = 100%, the electric heat will be on all the time.

Electric Heat Interlock

The electric heat stages will be enabled as long as FLOW (Point 75) > EHEAT FLOW (Point 60). The electric heat stages will not be disabled (turned OFF) until FLOW < EHEAT FLOW - 5%. Once disabled, FLOW must become greater than EHEAT FLOW before the electric heat stages will return to normal control.

CAUTION:

Do not set EHEAT FLOW to less than 5%, otherwise the electric heat interlock will be disabled.

Calibration

Air Velocity Sensor – Calibration of the controller's internal air velocity sensor (AVS) 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. If CAL AIR (Point 94) = YES, calibration is in progress.

- For a controller used without an Autozero Module (CAL MODULE, (Point 87) = NO), the damper is commanded closed to get a zero airflow reading during calibration.
- For a controller used with an Autozero Module (CAL MODULE = YES), calibration occurs without closing the damper.

Hot Water Valve – Calibration of a hot water valve (if used) is done by commanding the valve to closed.

At the end of a calibration sequence, CAL AIR automatically returns to NO. A status of NO indicates that the controller is not in a calibration sequence.

Damper Status Operation

Under normal operation DMPR STATUS (Point 84) reads CAL. However, if using an Autozero Module, it is possible after a period of operation for the calculated damper position, DMPR POS (Point 49), to differ from the actual (physical) damper position.

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

- DMPR POS = 100%
- AIR VOLUME (Point 35) > 0 CFM
- FLOW (Point 75) < FLOW STPT (Point 93)

OR

- DMPR POS = 0%
- AIR VOLUME > 0 CFM
- FLOW > FLOW STPT

To change DMPR STATUS from RECAL back to CAL, set DMPR STATUS to CAL, and then release it.

The Autozero Module is enabled when it is wired to DO 6 and CAL MODULE (Point 87) is set to YES.

Fail-safe Operation

If the air velocity sensor fails, the controller uses pressure dependent control. The temperature loop controls the operation of the damper.

If the room temperature sensor fails, the controller operates using the last known temperature value.

Application Notes

1. If temperature swings in the room are excessive or there is trouble maintaining the setpoint, the cooling loop needs to be tuned. If FLOW (Point 75) is oscillating while FLOW STPT (Point 93) is constant, the flow loop requires tuning. See *iKnow Troubleshooting Tool* for more information.
2. BACnet Terminal Box Controller - Electronic Output, as shipped from the factory, keeps all associated equipment OFF. See the *Equipment Controllers* section in the *APOGEE Automation Start-up Procedures* on InfoLink for information on how to release the controller and its equipment to application control.
3. Spare DOs can be used as auxiliary points that are controlled by the field panel after being defined in the field panel's database. DO 3 and DO 4 or DO 5 and DO 6 may be used as auxiliary motor points. If using a pair of spare DOs to control a motor, you must unbundle the corresponding motor command point.

Wiring Diagram

The point wiring for Application 2512 is shown in Figure 8 and Figure 9.

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.

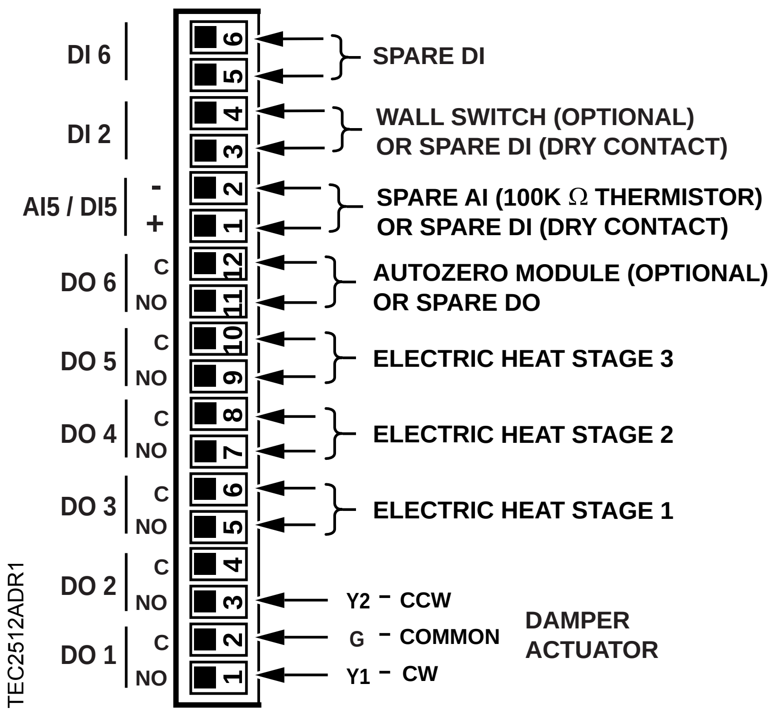

Figure 8. Application 2512 with Electric Heat Wiring Diagram.

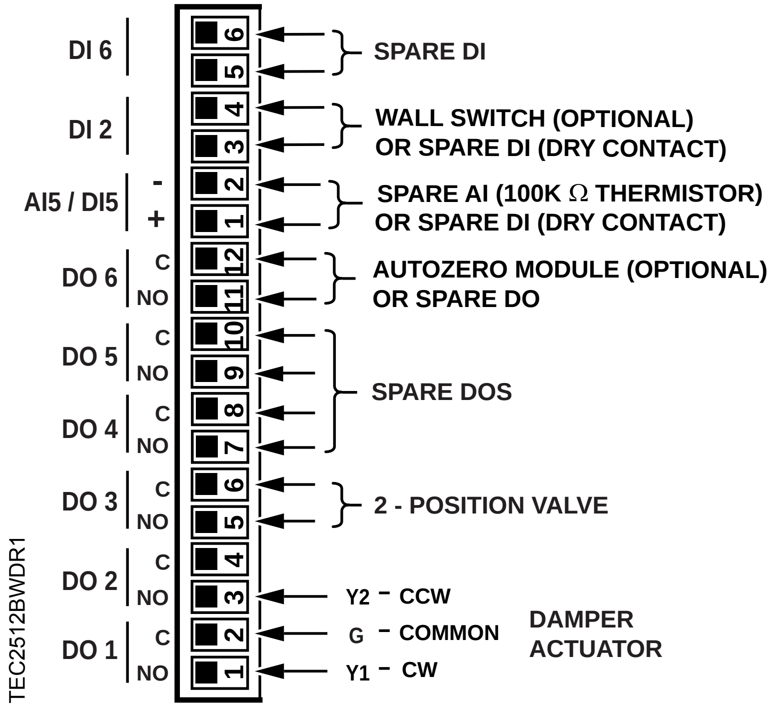

Figure 9. Application 2512 with Baseboard Radiation Wiring Diagram.

Table 2. Point Database for Application 2512.

Object Type[a]	Object Instance (Point Number)[b]	Object Name and Description	Factory Default (SI Units)[c]	Eng Units (SI Units)[c]	Range	Active Text	Inactive Text
AO	1	CTLR ADDRESS	99	–	0 to 254	–	–
AO	2	APPLICATION	2587	–	2510 to 2517 and 2587	–	–
AO	3	RMTMP OFFSET	0.0 (0.0)	DEG F (DEG C)	-31.75 to 32.0	–	–
AI	{04}[d]	ROOM TEMP	74.0 (23.44888)	DEG F (DEG C)	48 to 111.75	–	–
BO	{05}	HEAT.COOL	COOL	–	Binary	HEAT	COOL
AO	6	DAY CLG STPT	74.0 (23.44888)	DEG F (DEG C)	48 to 111.75	–	–
AO	7	DAY HTG STPT	70.0 (21.20888)	DEG F (DEG C)	48 to 111.75	–	–
AO	8	NGT CLG STPT	82.0 (27.92888)	DEG F (DEG C)	48 to 111.75	–	–
AO	9	NGT HTG STPT	65.0 (18.40888)	DEG F (DEG C)	48 to 111.75	–	–
BI	{10}	DI 6	OFF	–	Binary	ON	OFF
AO	11	RM STPT MIN	55.0 (12.80888)	DEG F (DEG C)	48 to 111.75	–	–
AO	12	RM STPT MAX	90.0 (32.40888)	DEG F (DEG C)	48 to 111.75	–	–
AI	{13}	RM STPT DIAL	74.0 (23.44888)	DEG F (DEG C)	48 to 111.75	–	–
BO	14	STPT DIAL	NO	–	Binary	YES	NO
AI	{15}	AUX TEMP AI5	37.5 (3.055556)	DEG F (DEG C)	37.5 to 165	–	–
AO	16	FLOW START	0	PCT	0 to 102	–	–
AO	17	FLOW END	0	PCT	0 to 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 to 255	–	–
BO	{21}	NGT OVRD	NIGHT	–	Binary	NIGHT	DAY

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Table 2. Point Database for Application 2512. ***(continued)***

Object Type[a]	Object Instance (Point Number)[b]	Object Name and Description	Factory Default (SI Units)[c]	Eng Units (SI Units)[c]	Range	Active Text	Inactive Text
AO	22	REHEAT START	0	PCT	0 to 102	–	–
AO	23	REHEAT END	100	PCT	0 to 102	–	–
BI	{24}	DI 2	OFF	–	Binary	ON	OFF
BI	{25}	DI 5	OFF	–	Binary	ON	OFF
BO	{29}	DAY.NGT	DAY	–	Binary	NIGHT	DAY
AO	31	CLG FLOW MIN	220 (103.818)	CFM (LPS)	0 to 131068	–	–
AO	32	CLG FLOW MAX	2200 (1038.18)	CFM (LPS)	0 to 131068	–	–
AO	33	HTG FLOW MIN	220 (103.818)	CFM (LPS)	0 to 131068	–	–
AO	34	HTG FLOW MAX	2200 (1038.18)	CFM (LPS)	0 to 131068	–	–
AI	{35}	AIR VOLUME	0 (0.0)	CFM (LPS)	0 to 131068	–	–
AO	36	FLOW COEFF	1	–	0 to 2.55	–	–
AO	{37}	MTR3 COMD	0	PCT	0 to 102	–	–
AO	{38}	MTR3 POS	0	PCT	0 to 102	–	–
AO	39	MTR3 TIMING	130	SEC	0 to 511	–	–
BO	{41}	DO 1	OFF	–	Binary	ON	OFF
BO	{42}	DO 2	OFF	–	Binary	ON	OFF
BO	{43}	HEAT STAGE 1	OFF	–	Binary	ON	OFF
BO	{44}	HEAT STAGE 2	OFF	–	Binary	ON	OFF
BO	{45}	HEAT STAGE 3	OFF	–	Binary	ON	OFF
BO	{46}	DO 6	OFF	–	Binary	ON	OFF
AO	{48}	DMPR COMD	0	PCT	0 to 102	–	–
AO	{49}	DMPR POS	0	PCT	0 to 102	–	–
AO	51	MTR1 TIMING	95	SEC	0 to 511	–	–
AO	56	DMPR ROT ANG	90	–	0 to 255	–	–
AO	58	MTR SETUP	0	–	0 to 255	–	–

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Table 2. Point Database for Application 2512. ***(continued)***

Object Type[a]	Object Instance (Point Number)[b]	Object Name and Description	Factory Default (SI Units)[c]	Eng Units (SI Units)[c]	Range	Active Text	Inactive Text
AO	59	DO DIR. REV	0	–	0 to 255	–	–
AO	60	EHEAT FLOW	20	PCT	0 to 102	–	–
AO	63	CLG P GAIN	20.0 (36.0)	–	0 to 63.75	–	–
AO	64	CLG I GAIN	0.01 (0.018)	–	O to 1.023	–	–
AO	65	CLG D GAIN	0 (0.0)	–	0 to 510	–	–
AO	67	HTG P GAIN	10.0 (18.0)	–	0 to 63.75	–	–
AO	68	HTG I GAIN	0.01 (0.018)	–	O to 1.023	–	–
AO	69	HTG D GAIN	0 (0.0)	–	0 to 510	–	–
AO	71	FLOW P GAIN	0	–	0 to 51.15	–	–
AO	72	FLOW I GAIN	0.01	–	O to 1.023	–	–
AO	73	FLOW D GAIN	0	–	0 to 510	–	–
AO	74	FLOW BIAS	50	PCT	0 to 102	–	–
AO	{75}	FLOW	0	PCT	0 to 1023.75	–	–
AO	{76}	CTL FLOW MIN	220 (103.818)	CFM (LPS)	131068	–	–
AO	{77}	CTL FLOW MAX	2200 (1038.18)	CFM (LPS)	131068	–	–
AO	{78}	CTL TEMP	74.0 (23.44888)	DEG F (DEG C)	48 to 111.75	–	–
AO	{79}	CLG LOOPOUT	0	PCT	0 to 102	–	–
AO	{80}	HTG LOOPOUT	0	PCT	0 to 102	–	–
AO	{81}	AVG HEAT OUT	0	PCT	0 to 409.2	–	–
AO	82	STAGE MAX	90	PCT	0 to 102	–	–
AO	83	STAGE MIN	10	PCT	0 to 102	–	–
BO	{84}	DMPR STATUS	CAL	–	Binary	RECAL	CAL
AO	85	SWITCH LIMIT	5.2	PCT	0 to 102	–	–
AO	86	SWITCH TIME	10	MIN	0 to 255	–	–
BO	87	CAL MODULE	NO	–	Binary	YES	NO
AO	88	STAGE COUNT	1	–	0 to 255	–	–
AO	89	STAGE TIME	10	MIN	0 to 255	–	–

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Table 2. Point Database for Application 2512. ***(continued)***

Object Type[a]	Object Instance (Point Number)[b]	Object Name and Description	Factory Default (SI Units)[c]	Eng Units (SI Units)[c]	Range	Active Text	Inactive Text
AO	90	SWITCH DBAND	1.0 (0.56)	DEG F (DEG C)	0 to 63.75	–	–
AO	{92}	CTL STPT	74.0 (23.44888)	DEG F (DEG C)	48 to 111.75	–	–
AO	{93}	FLOW STPT	0	PCT	0 to 255.75	–	–
BO	{94}	CAL AIR	NO	–	Binary	YES	NO
AO	95	CAL SETUP	4	–	0 to 255	–	–
AO	96	CAL TIMER	12	HRS	0 to 255	–	–
AO	97	DUCT AREA	1.0 (0.09292)	SQ. FT (SQ M)	0 to 6.375	–	–
AO	98	LOOP TIME	5	SEC	0 to 255	–	–
AO	{99}	ERROR STATUS	0	–	0 to 255	–	–

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

[b] Points not listed are not used in this application.

[c] A single value in a column means that the value is the same in English units and in SI units.

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