SIEMENS

TEC Custom Solutions
Application 2414
VAV Parallel Fan Powered with Electric Reheat and Modified Damper Sequence

TEC-0147.08

This document contains the following topics:

Overview

NOTE: For the latest on Custom Solution Applications and Controllers, visit the Custom Solutions website.

In Application 2414, the controller modulates the supply air damper of the terminal box for cooling and controls stages of electric reheat for heating. When in heating, the terminal box either maintains minimum airflow out of the supply air duct or modulates the supply air damper. The terminal box also has a parallel fan which recirculates the room air. In application 2414, the supply air damper is under modulating control during the day, while at night it is completely shut. In order for the terminal box to work properly, the central air handling unit must provide supply air. Refer to Figures 2414-1 through 2414-3.

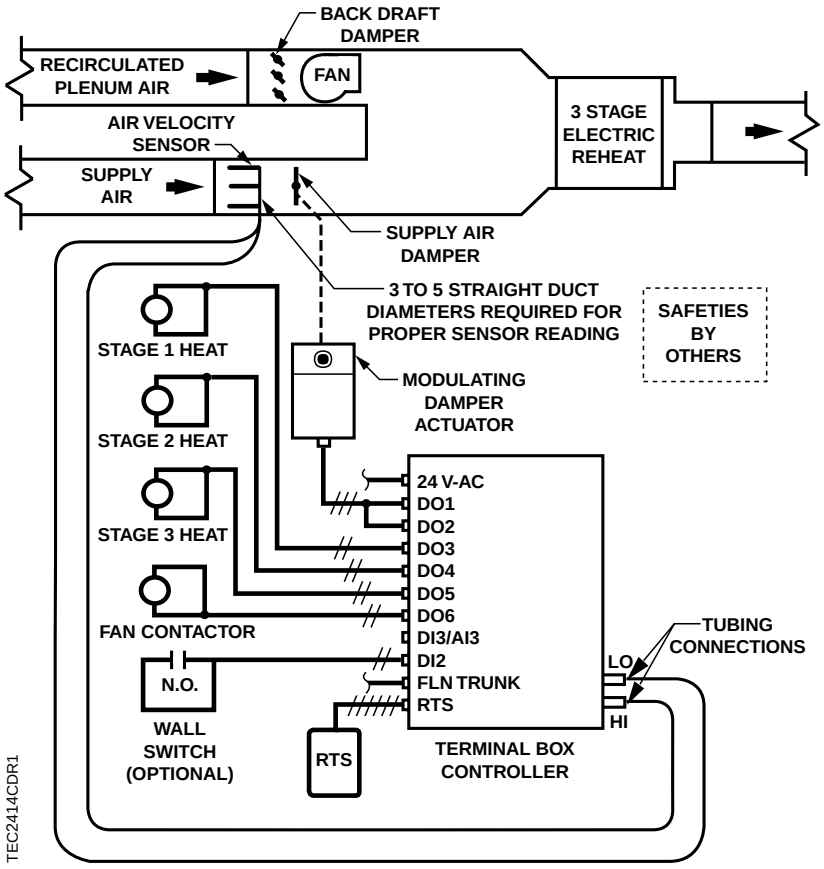
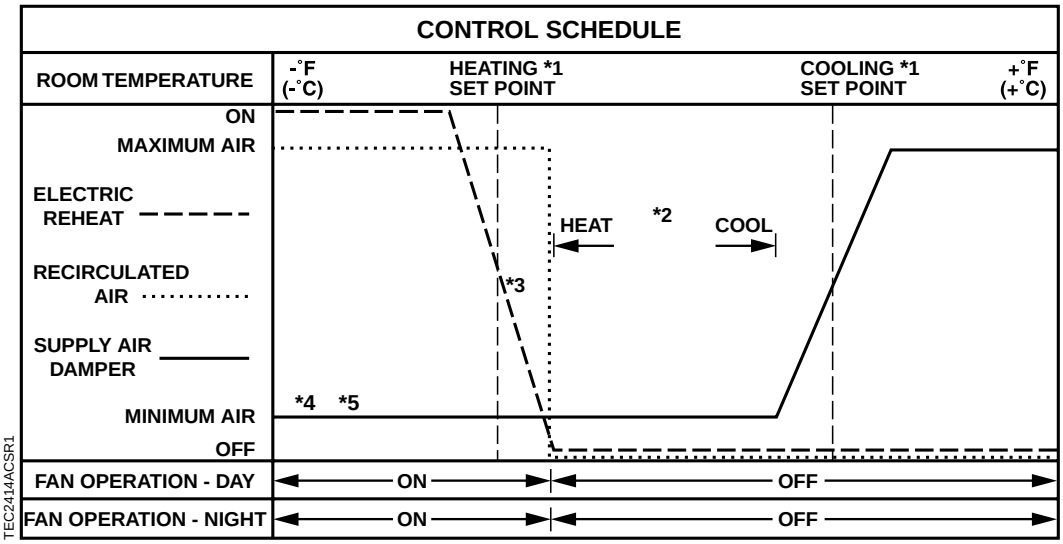
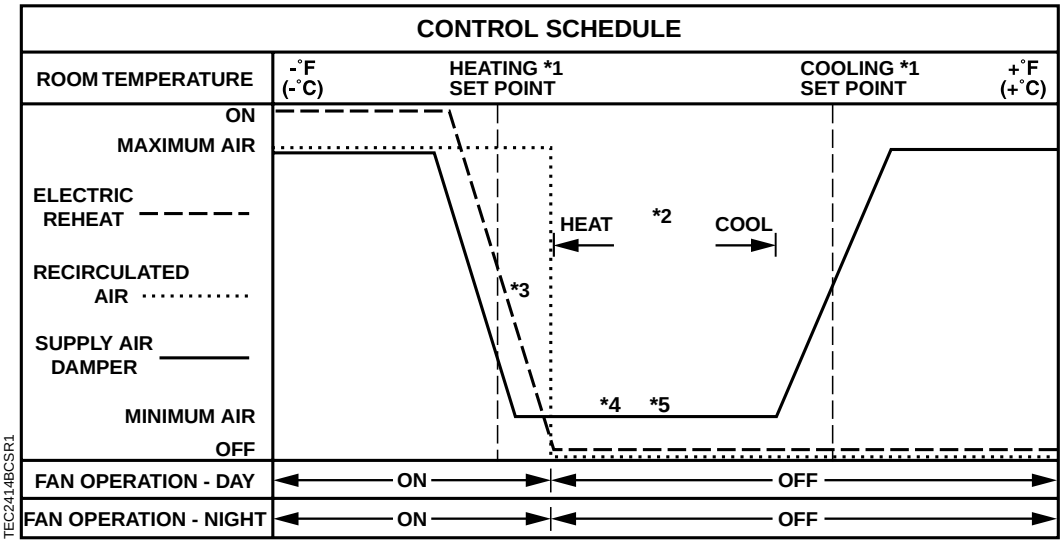


Figure 2414-1. Application 2414 Control Drawing.



1. Refer to the *Control Temperature Set Points* section.
2. Refer to the *Heating/Cooling Switchover* section.
3. The electric reheat is time modulated. This allows it to be controlled proportionally rather than with dead bands.
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). Refer to the *Sequencing Logic* section.
5. The supply air damper operation is shown in day mode. At night, the supply air damper is completely closed.

Figure 2414-2. Heating Mode Control Schedule – Damper Set for Minimum Airflow.



1. Refer to the *Control Temperature Set Points* section.
2. Refer to the *Heating/Cooling Switchover* section.
3. The electric reheat is time modulated. This allows it to be controlled proportionally rather than with dead bands.
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). Refer to the *Sequencing Logic* section.
5. The supply air damper operation is shown in day mode. At night, the supply air damper is completely closed.

Figure 2414-3. Heating Mode Control Schedule – Damper Operating Parallel with Electric Reheat.

Hardware Inputs

Analog

- Air velocity sensor
- Room temperature sensor
- Room temperature set point dial (optional)

Digital

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

Hardware Outputs

Analog

- None

Digital

- Damper actuator
- Fan
- Stage 1 electric reheat
- Stage 2 electric reheat (optional)
- Stage 3 electric reheat (optional)

Ordering Notes

You can order the VAV controller (Parallel Fan Powered with Electric Reheat and Modified Damper Sequence) as part number 550-504A or as Custom Solution 263.

Sequence of Operation

The following paragraphs present the sequence of operation for Application 2414, *VAV Parallel Fan Powered with Electric Reheat and Modified Damper Sequence*.

Control Temperature Set Points

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

Day Mode – In day mode, CTL STPT holds the value of DAY CLG STPT (Point 6) or DAY HTG STPT (Point 7). If the room temperature sensor has a set point dial and STPT DIAL (Point 14) is set to YES, CTL STPT holds the value of RM STPT DIAL (Point 13).

If the set point dial is used and the value of RM STPT DIAL is less than the value of RM STPT MIN (Point 11), CTL STPT holds the value of RM STPT MIN. If the value of RM STPT DIAL is greater than the value of RM STPT MAX (Point 12), CTL STPT holds the value of RM STPT MAX.

Night Mode – In night mode, CTL STPT holds the value of NGT CLG STPT (Point 8) or NGT HTG STPT (Point 9).

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

Day and Night Modes

"Day mode" means that **either** DAY.NGT (Point 29) or NGT OVRD (Point 21) equals DAY; "night mode" means that **both** DAY.NGT and NGT OVRD equal NIGHT. The control of DAY.NGT is explained in this section; the control of NGT OVRD is explained in the *Night Mode Override Switch* section.

The status of DAY.NGT can be set either by a field panel or by a wall switch, but not both. That is, if both types of control are attempted at the same time, network control supersedes local control. (Typically, a controller under the command of a field panel should not be configured to monitor a wall switch.) When the controller is operating with centralized control, the field panel can send an operator or PPCL command to override the status of DAY.NGT. Refer to *Powers Process Control Language (PPCL) User's Manual* (125-1896) and *Field Panel User's Manual* (125-1895) for more information.

When a wall switch is connected to DI 2 on the controller's termination strip, and WALL SWITCH (Point 18) equals YES, the controller monitors the status of DI 2. When DI 2 (Point 24) is ON (switch closed), DAY.NGT is set to DAY, indicating that the controller is in day mode. When DI 2 is OFF (switch open), DAY.NGT is set to NIGHT.

NOTE: If WALL SWITCH equals NO, the controller does not monitor the status of a wall switch, even if one is connected to it. In this case, and if the controller is operating stand-alone, the controller stays in day mode (default)—or whatever mode was originally configured—all the time.

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), then by pressing the override switch a room occupant can reset the controller to day mode for the length of time set in OVRD TIME. The status of NGT OVRD (Point 21) changes to DAY and remains there until OVRD TIME elapses, at which point NGT OVRD changes back to NIGHT and the controller returns to night mode.

NOTE: Only during night mode can a room sensor's override switch affect the controller.

Damper Operation

During day mode, the supply air damper is controlled by the flow loop. During night mode, the damper is completely closed (DMPR COMD, Point 48 = 0).

When DAY.NGT (Point 29) changes from NIGHT to DAY, the supply damper is placed under control of the flow loop after the time stored in DELAY TIME (Point 54) elapses. NGT OVRD (Point 21) behaves differently in that there is no delay if this point gets changed from NIGHT to DAY—when this happens, DMPR COMD is immediately placed under flow loop control.

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

- HTG LOOPOUT (Point 80) is less than SWITCH LIMIT (Point 85).
- CTL TEMP (Point 78) is above CTL STPT (Point 92) by at least the value set in SWITCH DBAND (Point 90).
- CTL TEMP is greater than the appropriate cooling set point minus SWITCH DBAND.

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

- CLG LOOPOUT (Point 79) is less than SWITCH LIMIT.
- CTL TEMP is below CTL STPT by at least the value set SWITCH DBAND.
- CTL TEMP is less than the appropriate heating set point plus SWITCH DBAND.

Modulate Damper During Heating Mode (optional)

CAUTION: :

This heating/cooling switchover mechanism is not affected by 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. (Refer to Examples 1-3 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. (Refer to Example 4 in *Sequencing Logic*.)

Control Loops

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

Temperature Loops – 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). Refer to *Control Temperature Set Points* for more information.

The cooling loop generates CLG LOOPOUT (Point 79), which is used to calculate FLOW STPT (Point 93). FLOW STPT is the result of scaling the cooling loopout to the appropriate range of values as determined by CLG FLOW MAX (Point 32) and CLG FLOW MIN (Point 31), and as shown in the following equation:

$$\frac{[\text{CLG LOOPOUT} \times (\text{CLG FLOW MAX} - \text{CLG FLOW MIN})] + \text{CLG FLOW MIN}}{\text{CLG FLOW MAX}} \times 100\% = \text{FLOW STPT}$$

For example:

If CLG FLOW MIN = 200 CFM and CLG FLOW MAX = 1000 CFM, then,

when CLG LOOPOUT is 0%, FLOW STPT equals 20% flow.

$$\frac{[0\% \times (1000 - 200)] + 200}{1000} \times 100\% = 20\%$$

(This ensures that the airflow out of the terminal box is not less than CLG FLOW MIN.)

When CLG LOOPOUT is 50%, FLOW STPT equals 60% flow.

$$\frac{[50\% \times (1000 - 200)] + 200}{1000} \times 100\% = 60\%$$

When CLG LOOPOUT is 100%, FLOW STPT equals 100% flow.

$$\frac{[100\% \times (1000 - 200)] + 200}{1000} \times 100\% = 100\%$$

During heating mode, the operation of the flow loop is flexible. It can be set up to do one of the following:

- 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.

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 of the last three options is chosen, HTG LOOPOUT will control both the electric reheat and the flow loop set point (FLOW STPT) in order to maintain the room temperature. Refer to *Sequencing Logic* 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 will never be set below (HTG FLOW MIN ÷ HTG FLOW MAX) × 100% flow, or set above 100% flow.

Flow Loop – During day mode, the flow loop maintains minimum and maximum airflows through CTL FLOW MIN (Point 76) and CTL FLOW MAX (Point 77), respectively.

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

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

In Application 2414, you can set CLG FLOW MIN equal to, but not greater than, CLG FLOW MAX, and HTG FLOW MIN can be set 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 its ability to control temperature is lost.)

By modulating the supply air damper point (DMPR COMD, Point 48), the flow loop keeps the airflow between CLG FLOW MIN and CLG FLOW MAX while maintaining FLOW STPT.

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. In the following, this percentage is referred to as *% flow*.

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

The low limit of FLOW STPT is the percentage that corresponds to the volume given in CLG 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.)

For example:

If CTL FLOW MIN equals 250 CFM, and if CTL FLOW MAX equals 1000 CFM, then,

the low limit of FLOW STPT = (250 CFM ÷ 1000 CFM) × 100% flow
= 0.25 × 100% flow
= 25% flow

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

NOTE: During night mode, the flow loop is disabled and the supply air damper stays completely shut.

Electric Reheat

CAUTION:

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

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

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

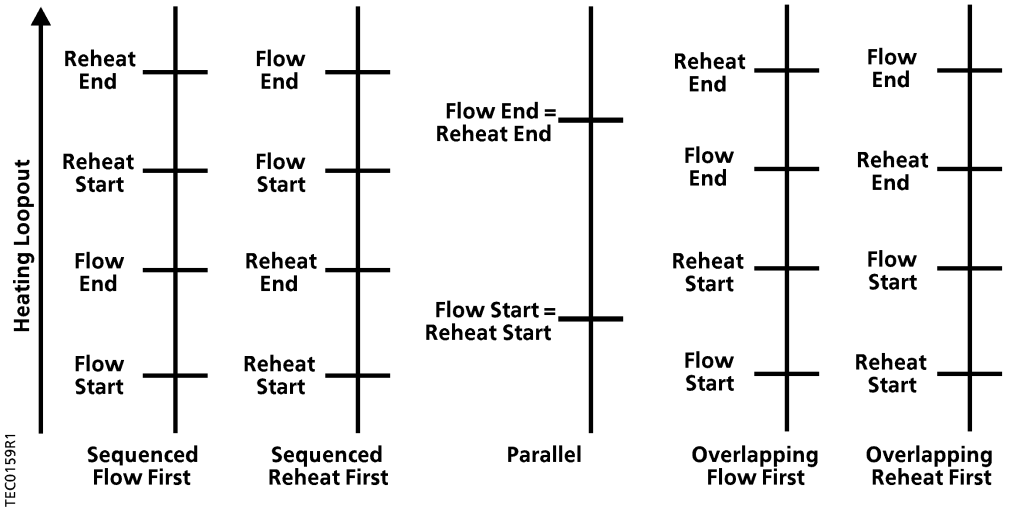
	Stage 1: minutes		Stage 2: minutes		Stage 3: minutes	
	ON	OFF	ON	OFF	ON	OFF
With 1 stage of electric heat	6	4	--	--	--	--
With 2 stages of electric heat	10	0	2	8	--	--
With 3 stages of electric heat	10	0	8	2	0	10

Sequencing Logic (optional)

NOTES: In application 2414, sequencing occurs only during day mode. During night mode, the damper is completely shut and only the electric reheat and fan are operational. (HTG LOOPOUT (Point 80) controls the electric reheat during night mode exactly as is does during the day.)

Default for both FLOW START (Point 16) and FLOW END (Point 17) is 0. This provides 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 electric 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 (Point 80), drive both the flow loop and the electric reheat from 0 to 100%. Refer to the three examples that follow the ladder diagram below (Figure 2414-4). For simplicity, assume that HTG FLOW MIN (Point 33) equals 0 CFM, that there is one stage of electric heat (STAGE COUNT, Point 88 equals 1), and that the cycle time of the electric heat is 10 minutes (STAGE TIME, Point 89 equals 10)—when this is done, FLOW STPT (Point 93) will equal 0 when HTG LOOPOUT equals 0.



Note: 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 2414-4. Sequenced, Parallel, and Overlapping Flow Loop Operations with Electric Reheat.

Example 1: Assume that your system has electric heat operating *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 = 0% flow.
- When HTG LOOPOUT = 25%, FLOW STPT = 50% flow.
- When HTG LOOPOUT is greater than or equal to 50%, FLOW STPT = 100% flow.
- When HTG LOOPOUT is less than or equal to 50%, the electric heat is always OFF.

- 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 is ON all the time.

Example 2: Assume that your system has electric heat operating *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 = 0% flow.
- When HTG LOOPOUT = 50%, FLOW STPT = 50% flow.
- When HTG LOOPOUT = 100%, FLOW STPT = 100% flow.
- When HTG LOOPOUT = 0%, the electric heat is 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 is 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 = 0% flow.
- When HTG LOOPOUT = 37.5%, FLOW STPT = 50% flow.
- When HTG LOOPOUT is greater than or equal to 75%, FLOW STPT = 100% flow.
- When HTG LOOPOUT is less than or equal to 25%, the electric heat is always OFF.
- 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 is 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 temperature control being done by the electric heat. The airflow minimum will be maintained by setting the FLOW START and FLOW END to 0% which will cause FLOW STPT to hold the value corresponding to 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 providing temperature control in the heating mode, while the flow loop provides for 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 =
  (170 CFM ÷ 1000 CFM) × 100% flow = 17% flow.
  This causes the flow loop to maintain an airflow of 170 CFM out of the terminal box.
- When HTG LOOPOUT = 50%, FLOW STPT = 17% flow.
- When HTG LOOPOUT = 100%, FLOW STPT = 17% flow.
- When HTG LOOPOUT = 0%, the electric heat is 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 is ON all the time.

Calibration

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 upon the value of CAL SETUP, calibration may be set to take place automatically or manually. If the status of CAL AIR (Point 94) is YES, calibration is in progress.

- The damper is commanded closed to get a zero airflow reading during calibration.

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

Fan Operation

The fan is controlled as follows:

FAN (Point 46) will turn ON only when **both** of the following two conditions have been met:

- The first stage of electric heat (HEAT STAGE 1, Point 43) is ON.
- The airflow out of the supply duct (FLOW, Point 75) is less than the value stored in PARALLEL ON (Point 28)—this means that there is not enough airflow out of the supply duct to allow for safe operation of the electric heat.

The fan turns OFF when **either** of the following two conditions is met:

- The airflow out of the supply duct, FLOW, is greater than the value stored in PARALLEL OFF, Point 30 (supply duct airflow only needs to be above PARALLEL ON for safe operation of the electric heat).
- The first stage of electric heat (HEAT STAGE 1) stays OFF for at least 1 full duty cycle longer than STAGE TIME (Point 89).

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 velocity sensor returns from failure during day mode, the supply damper is placed under flow loop control immediately.

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

Application Notes

1. If the temperature swings in the room are excessive or there is trouble maintaining the set point, either the cooling loop, the heating loop, or both need to be tuned. If FLOW (Point 75) is oscillating while FLOW STPT (Point 93) is constant, the flow loop requires tuning. Refer to *APOGEE Automation Service Procedures* on InfoLink for more information.

2. The terminal box controller as shipped from the factory keeps all associated equipment OFF. Refer to *APOGEE Automation Start-up Procedures* on InfoLink for information on how to release the controller and its equipment to application control.

Wiring Diagram

CAUTION:

The Terminal Box Controller controls 24 Vac loads only. The maximum rating is 12 VA for each DO. Use an interposing 220V 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

NOTE: Consult the local representative if terminations are missing or different

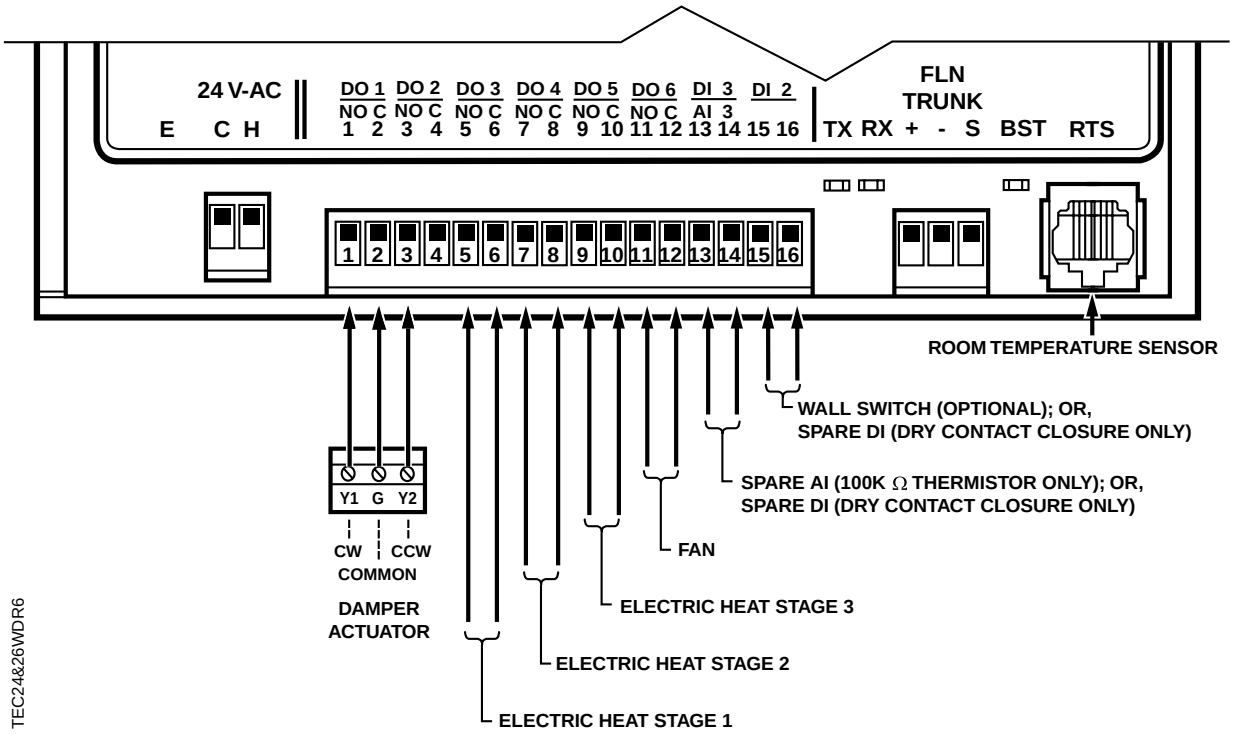


Figure 2414-5. Application 2414 Wiring Diagram.

Point Database

Point Database for Application 2414.

Point Number	Descriptor	Factory Default (SI Units)	Engr Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
01	CTLR ADDRESS	99	--	1	0	--	--
02	APPLICATION	2091	--	1	0	--	--
{04}	ROOM TEMP	74.0 (23.44888)	DEG F (DEG C)	0.25 (0.14)	48.0(8.88888)	--	--
{05}	HEAT.COOL	COOL	--	--	--	HEAT	COOL
06	DAY CLG STPT	74.0 (23.44888)	DEG F (DEG C)	0.25 (0.14)	48.0(8.88888)	--	--
07	DAY HTG STPT	70.0 (21.20888)	DEG F (DEG C)	0.25 (0.14)	48.0(8.88888)	--	--
08	NGT CLG STPT	82.0 (27.92888)	DEG F (DEG C)	0.25 (0.14)	48.0(8.88888)	--	--
09	NGT HTG STPT	65.0 (18.40888)	DEG F (DEG C)	0.25 (0.14)	48.0(8.88888)	--	--
11	RM STPT MIN	55.0 (12.80888)	DEG F (DEG C)	0.25 (0.14)	48.0(8.88888)	--	--
12	RM STPT MAX	90.0 (32.40888)	DEG F (DEG C)	0.25 (0.14)	48.0(8.88888)	--	--
{13}	RM STPT DIAL	74.0 (23.44888)	DEG F (DEG C)	0.25 (0.14)	48.0(8.88888)	--	--
14	STPT DIAL	NO	--	--	--	YES	NO
{15}	AUX TEMP	74.0 (23.495556)	DEG F (DEG C)	0.5 (0.28)	37.5(3.055556)	--	--
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	0	HRS	1	0	--	--
{21}	NGT OVRD	NIGHT	--	--	--	NIGHT	DAY
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
{25}	DI 3	OFF	--	--	--	ON	OFF
26	SERIES ON	20.0	PCT	0.4	0.0	--	--
27	SERIES OFF	10.0	PCT	0.4	0.0	--	--
28	PARALLEL ON	20.0	PCT	0.4	0.0	--	--
{29}	DAY.NGT	DAY	--	--	--	NIGHT	DAY
30	PARALLEL OFF	30.0	PCT	0.4	0.0	--	--
31	CLG FLOW MIN	220 (103.818)	CFM (LPS)	4 (1.8876)	0	--	--

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…

Point Database for Application 2414.

Point Number	Descriptor	Factory Default (SI Units)	Engr Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
32	CLG FLOW MAX	2200 (1038.18)	CFM (LPS)	4 (1.8876)	0	--	--
33	HTG FLOW MIN	220 (103.818)	CFM (LPS)	4 (1.8876)	0	--	--
34	HTG FLOW MAX	2200 (1038.18)	CFM (LPS)	4 (1.8876)	0	--	--
{35}	AIR VOLUME	0 (0.0)	CFM (LPS)	4 (1.8876)	0	--	--
36	FLOW COEFF	1.0	--	0.01	0.0	--	--
{41}	DO 1	OFF	--	--	--	ON	OFF
{42}	DO 2	OFF	--	--	--	ON	OFF
{43}	HEAT STAGE 1	OFF	--	--	--	ON	OFF
{44}	HEAT STAGE 2	OFF	--	--	--	ON	OFF
{45}	HEAT STAGE 3	OFF	--	--	--	ON	OFF
{46}	FAN	OFF	--	--	--	ON	OFF
{48}	DMPR COMD	0.0	PCT	0.4	0.0	--	--
{49}	DMPR POS	0.0	PCT	0.4	0.0	--	--
51	MTR1 TIMING	95	SEC	1	0	--	--
54	DELAY TIME	30	SEC	1	0	--	--
56	DMPR ROT ANG	90	--	1	0	--	--
58	MTR SETUP	0	--	1	0	--	--
59	DO DIR. REV	0	--	1	0	--	--
63	CLG P GAIN	20.0 (36.0)	--	0.25 (0.45)	0.0	--	--
64	CLG I GAIN	0.01 (0.018)	--	0.001 (0.0018)	0.0	--	--
65	CLG D GAIN	0 (0.0)	--	2 (3.6)	0	--	--
66	CLG BIAS	0.0	PCT	0.4	0.0	--	--
67	HTG P GAIN	10.0 (18.0)	--	0.25 (0.45)	0.0	--	--
68	HTG I GAIN	0.01 (0.018)	--	0.001 (0.0018)	0.0	--	--
69	HTG D GAIN	0 (0.0)	--	2 (3.6)	0	--	--
70	HTG BIAS	0.0	PCT	0.4	0.0	--	--
71	FLOW P GAIN	0.0	--	0.05	0.0	--	--
72	FLOW I GAIN	0.01	--	0.001	0.0	--	--
73	FLOW D GAIN	0	--	2	0	--	--
74	FLOW BIAS	50.0	PCT	0.4	0.0	--	--
{75}	FLOW	0.0	PCT	0.25	0.0	--	--

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…

Point Database for Application 2414.

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 (103.818)	CFM (LPS)	4 (1.8876)	0	--	--
{77}	CTL FLOW MAX	2200 (1038.18)	CFM (LPS)	4 (1.8876)	0	--	--
{78}	CTL TEMP	74.0 (23.44888)	DEG F (DEG C)	0.25 (0.14)	48.0(8.88888)	--	--
{79}	CLG LOOPOUT	0.0	PCT	0.4	0.0	--	--
{80}	HTG LOOPOUT	0.0	PCT	0.4	0.0	--	--
{81}	AVG HEAT OUT	0.0	PCT	0.4	0.0	--	--
82	STAGE MAX	90.0	PCT	0.4	0.0	--	--
83	STAGE MIN	10.0	PCT	0.4	0.0	--	--
85	SWITCH LIMIT	5.2	PCT	0.4	0.0	--	--
86	SWITCH TIME	10	MIN	1	0	--	--
88	STAGE COUNT	1	--	1	0	--	--
89	STAGE TIME	10	MIN	1	0	--	--
90	SWITCH DBAND	1.0 (0.56)	DEG F (DEG C)	0.25 (0.14)	0.0	--	--
{91}	TOTAL VOLUME	0 (0)	CF (L)	4 (113)	0	--	--
{92}	CTL STPT	74.0 (23.44888)	DEG F (DEG C)	0.25 (0.14)	48.0(8.88888)	--	--
{93}	FLOW STPT	0.0	PCT	0.25	0.0	--	--
{94}	CAL AIR	NO	--	--	--	YES	NO
95	CAL SETUP	4	--	1	0	--	--
96	CAL TIMER	12	HRS	1	0	--	--
97	DUCT AREA	1.0 (0.09292)	SQ. FT (SQ M)	0.025 (0.002323)	0.0	--	--
98	LOOP TIME	5	SEC	1	0	--	--
{99}	ERROR STATUS	0	--	1	0	--	--

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