SIEMENS

Application 2329
VAV Series Fan Powered with 2-Speed Fan and Electric Reheat

TEC-0114.08

Table of Contents

This document contains the following topics:

Overview

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

In Application 2329, 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 or modulates the supply air damper. The terminal box also has a two-speed series fan for air circulation. In order for the terminal box to work properly, the central air handling unit must provide supply air. Refer to Figures 2329-1 through 2329-3.

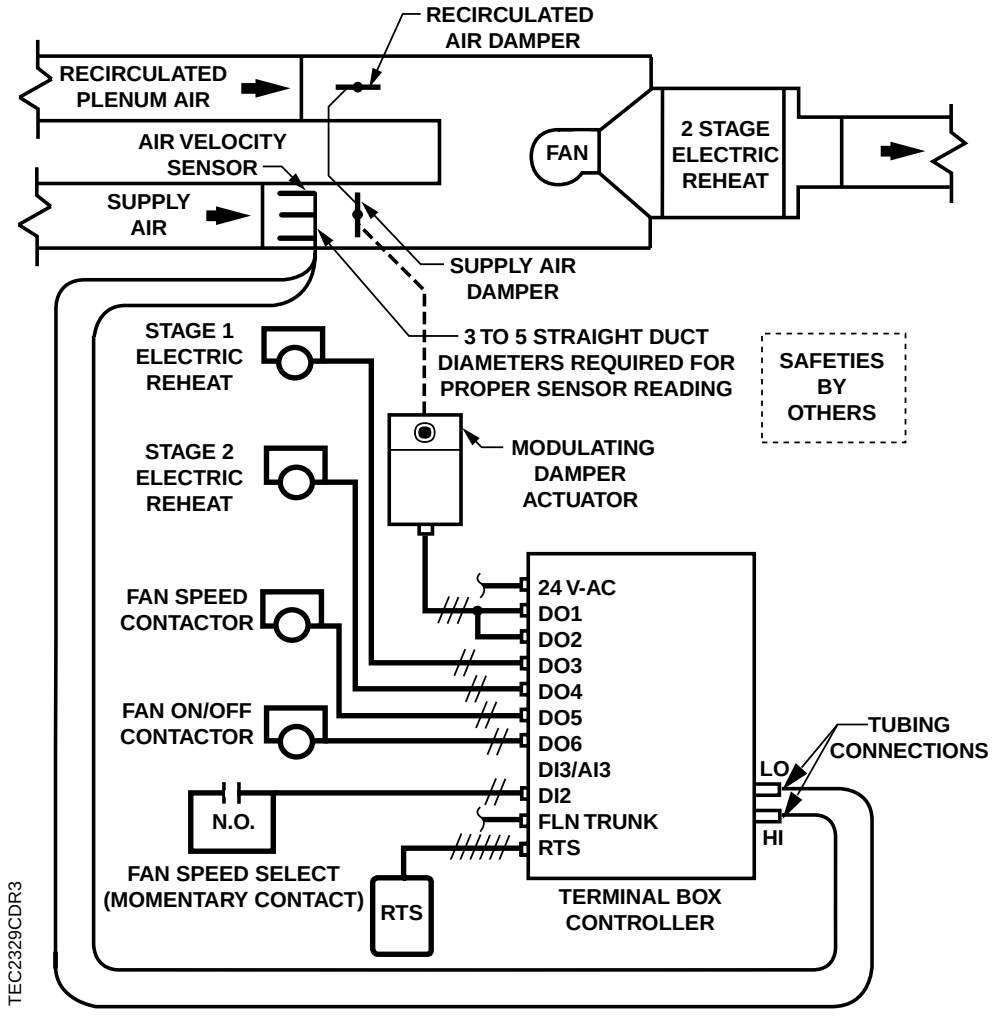
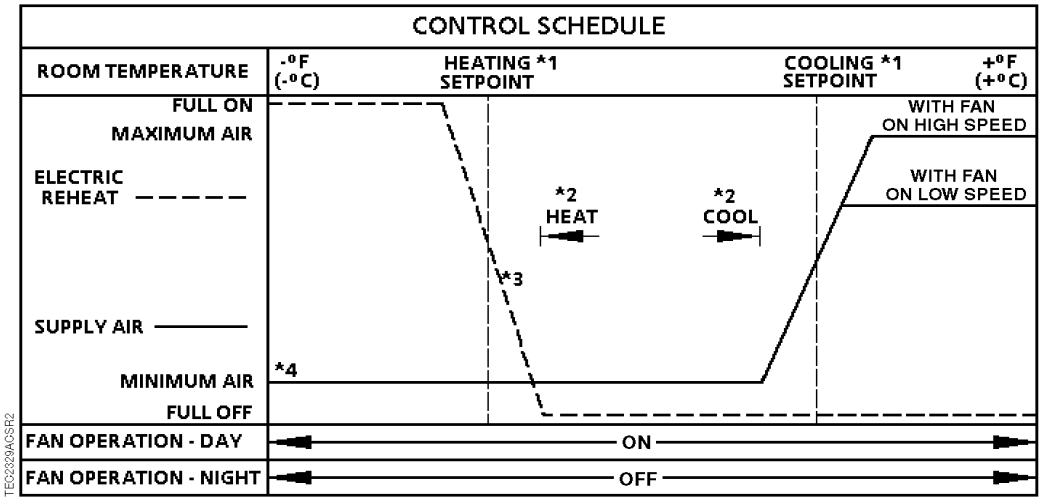
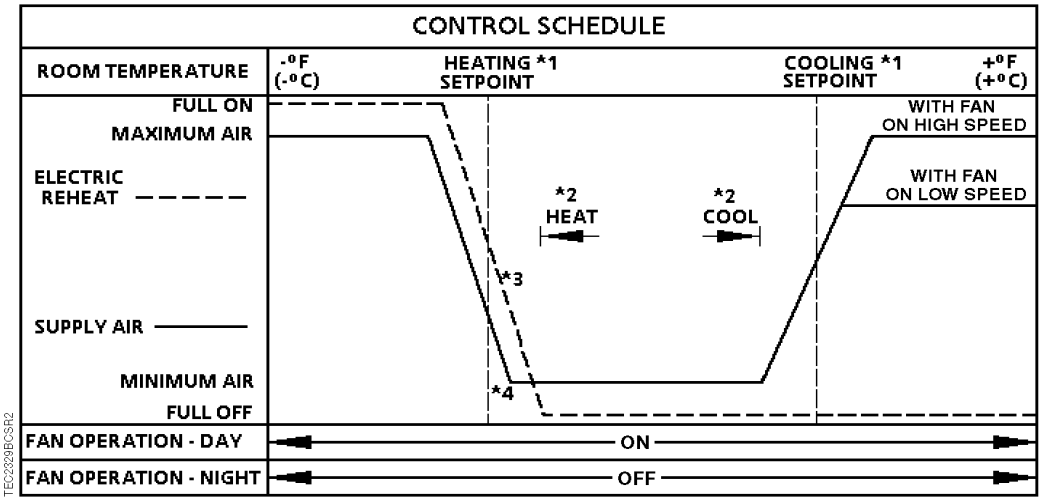


Figure 2329-1. Application 2329 Control Drawing.



1. Refer to *Control Temperature Set Points*.
2. Refer to *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 at minimum flow throughout the entire heating mode (default). The airflow can operate sequenced, parallel, or overlapping with electric reheat (optional). Refer to *Sequencing Logic*.

Figure 2329-2. Application 2329 Control Schedule.



1. Refer to *Control Temperature Set Points*.
2. Refer to *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). Refer to *Sequencing Logic*.

Figure 2329-3. Application 2329 Control Schedule with Modulating Damper in Heating Mode.

Hardware Inputs

Analog

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

Digital

- Day/night switch (momentary contact)
- Fan speed select (momentary contact)

Hardware Outputs

Analog

- None

Digital

- Damper actuator
- Fan on/off contactor
- Fan speed contactor
- Stage 1 electric reheat
- Stage 2 electric reheat (optional)

Ordering Notes

You can either order the VAV Controller, *Series Fan Powered with 2-Speed Fan and Electric Reheat*, as part number 540-796, or, you can order it as Custom Solution 216.

For manual fan speed control you also need the Series 2000 Room Sensor with fan speed switch: 540-652A/B (540-652A is beige; 540-652B is white).

Sequence of Operation

The following paragraphs present the sequence of operation for Application 2329, “VAV Series Fan Powered with 2-Speed Fan and Electric Reheat.”

Control Temperature Set Points

Depending on the controller's current operational mode (day or night), the control temperature, 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, then 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), then 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), then CTL STPT holds the value of RM STPT MAX.

Night Mode – In night mode, all loops are disabled and the supply damper is closed.

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

The day/night status of the space is determined by the status of DAY.NGT (Point 29). The controller monitors the status of the DI switch on the room temperature sensor to determine the day/night status. This switch is a momentary contact. The state of DAY.NGT changes each time the DI switch on the room temperature sensor is pressed.

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), then the controller switches from heating to cooling mode by setting HEAT.COOL (Point 5) to COOL:

The HTG LOOPOUT (Point 80) is less than SWITCH LIMIT (Point 85).

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

If 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 the air temperature in the supply duct.

To change the value of the HEAT.COOL (Point 5) based on the supply air temperature, you must command HEAT.COOL through PPCL. This is required when the flow loop is used as a source of cooling in cooling mode and a source of heat in heating mode. (Refer to Examples 1 through 3 in *Sequencing Logic*.) If the flow loop is used in heating mode just to meet minimum air requirements, then 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*.

The cooling temperature 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 the CLG FLOW MIN (Point 31) and HI FLOW MAX (Point 32). In order to scale it, the loopout is multiplied by the range (MAX – MIN) and then added to the minimum set point.

NOTE: If the fan speed is set to LOW, then the flow set point is not allowed to rise above the percentage corresponding to LO FLOW MAX (Point 40).

When CLG FLOW MIN does not equal 0 CFM, then FLOW STPT does not equal CLG LOOPOUT (Point 79). The minimum flow set point is (CLG FLOW MIN ÷ HI FLOW MAX) × 100% flow. And FLOW STPT is [CLG LOOPOUT × (100% – minimum set point)] + minimum set point.

For example:

If CLG FLOW MIN = 200 CFM and HI FLOW MAX = 1000 CFM and the fan is on high speed, then, the minimum flow set point is (200 CFM ÷ 1000 CFM) × 100% flow = 20%

When CLG LOOPOUT is 0%, FLOW STPT equals 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 equals 60% flow.
[50% × (100% – 20%)] + 20% = 60%

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

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

- Constantly maintain an 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. Refer to *Sequencing Logic* for more information.

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

HTG LOOPOUT adjusts 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 – The 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 equals CLG FLOW MIN and CTL FLOW MAX equals HI FLOW MAX.

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

You can set CLG FLOW MIN equal to, but not greater than, HI 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, then the flow loop becomes a constant volume loop and its ability to control temperature is lost.

LO FLOW MAX may not be higher than HI FLOW MAX nor may it be lower than CLG FLOW MIN.

The flow loop maintains FLOW STPT by modulating the supply air damper point, DMPR COMD (Point 48).

The 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 text, this percentage is referred to as % flow.

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

The low limit of FLOW STPT is 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 is not 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 = 250 CFM, the minimum airflow out of the terminal box is 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 two 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) 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**	
	ON	**OFF**	**ON**	**OFF**
With 1 stage of electric heat:	6	4	--	--
With 2 stages of electric heat:	10	0	2	8

NOTE: If the fan is OFF, then both stages are turned OFF. If the fan is ON at low speed, then the second stage of reheat is kept OFF.

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.

In heating mode, this application includes logic that allows the flow loop to operate either in sequence, parallel, or overlapping with the electric reheat. 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 following three examples. For simplicity, assume that in these examples 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, the FLOW STPT (Point 93) equals 0 when HTG LOOPOUT equals 0. The ladder diagrams in Figure 2329-4 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.

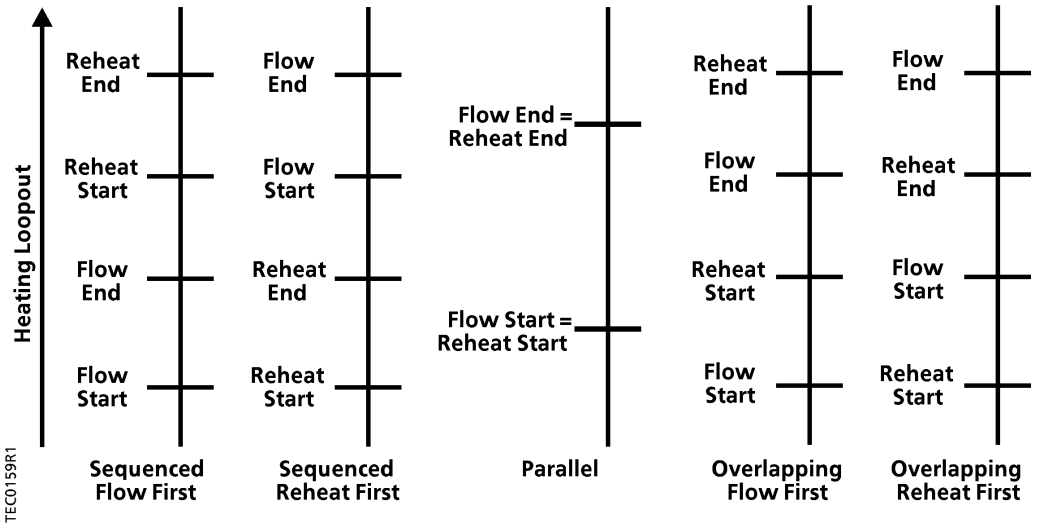


Figure 2329-4. Sequenced, Parallel, and Overlapping Flow Loop Operations with Electric Reheat.

Example 1*:* Assume that your system has electric heat that is to operated in *sequence* with the flow loop. If,

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

then,

- when HTG LOOPOUT equals 0%, FLOW STPT will equal 0% flow.
- when HTG LOOPOUT equals 25%, FLOW STPT will equal 50% flow.
- when HTG LOOPOUT is greater than or equal to 50%, FLOW STPT will equal 100% flow.
- when HTG LOOPOUT is less than or equal to 50%, then the electric heat will be off all the time.
- when HTG LOOPOUT equals 75%, then for every 10 minute period the electric heat will be on for 5 minutes and off for 5 minutes.
- when HTG LOOPOUT equals 100%, then the electric heat will be on all the time.

Example *2:* Assume that your system has electric heat that is to operated in *parallel* with the flow loop. If,

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

then,

- when HTG LOOPOUT equals 0%, FLOW STPT will equal 0% flow.
- when HTG LOOPOUT equals 50%, FLOW STPT will equal 50% flow.
- when HTG LOOPOUT equals 100%, FLOW STPT will equal 100% flow.
- when HTG LOOPOUT equals 0%, then the electric heat will be off all the time.
- when HTG LOOPOUT equals 50%, then for every 10 minute period the electric heat will be on for 5 minutes and off for 5 minutes.
- when HTG LOOPOUT equals 100%, then 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) equals 0%
- FLOW END (Point 17) equals 75%
- REHEAT START (Point 22) equals 25%
- REHEAT END (Point 23) equals 100%

then,

- when HTG LOOPOUT equals 0%, FLOW STPT will equal 0% flow.
- when HTG LOOPOUT equals 37.5%, FLOW STPT will equal 50% flow.

- when HTG LOOPOUT is greater than or equal to 75%, FLOW STPT will equal 100% flow.
- when HTG LOOPOUT is less than or equal to 25%, then the electric heat will be off all the time.
- when HTG LOOPOUT equals 62.5%, then for every 10 minute period the electric heat will be on for 5 minutes and off for 5 minutes.
- when HTG LOOPOUT equals 100%, then 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 is maintained by setting FLOW START and FLOW END to 0%, which causes 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 that provides the temperature control in the heating mode, while the flow loop provides for the minimum air requirements. Assume,

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

If,

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

then,

- when HTG LOOPOUT equals 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 equals 50%, FLOW STPT will equal 17% flow.
- when HTG LOOPOUT equals 100%, FLOW STPT will equal 17% flow.
- when HTG LOOPOUT equals 0%, then the electric heat will be off all the time.
- when HTG LOOPOUT equals 50%, then for every 10 minute period the electric heat will be on for 5 minutes and off for 5 minutes.
- when HTG LOOPOUT equals 100%, then the electric heat will be on all the time.

Calibration

Calibration of the controller's internal air velocity transducers is periodically required to maintain accurate air velocity readings. The 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, then calibration is in progress. Refer to the Start-up document for information on how to set CAL SETUP.

- 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

CAUTION:
On series fan powered terminal boxes, the terminal box fan must be controlled/interlocked to start either before or at the same time as the central air handler. Failure to do so may cause the terminal box fan to rotate backwards and cause consequent damage at start-up.

In day mode, the FAN (Point 46), is ON all of the time.

In night mode, the fan is OFF all the time.

The speed at which the fan runs is determined by monitoring DI 2. This is a momentary contact switch. Each time the fan speed switch is pressed, the fan and FAN SPEED (Point 45) change between high and low.

Fail-safe Operation

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

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

Application Notes

1. If the temperature swings in the room are excessive, or if there is trouble in maintaining the set point, then 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, then the flow loop requires tuning. Refer to the *APOGEE Automation Service Procedures* on InfoLink for more information.

2. The Terminal Box Controller with 2-Speed Fan, as shipped from the factory, keeps all associated equipment OFF. Refer to the *Equipment Controllers* section in the *APOGEE Automation Start-up Procedures* on InfoLink for how to release the controller and its equipment to application control.

Wiring Diagram

The point wiring for Application 2329 is shown in Figure 2329-5.

CAUTION:
The Terminal Box Controller with 2-Speed Fan controls 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

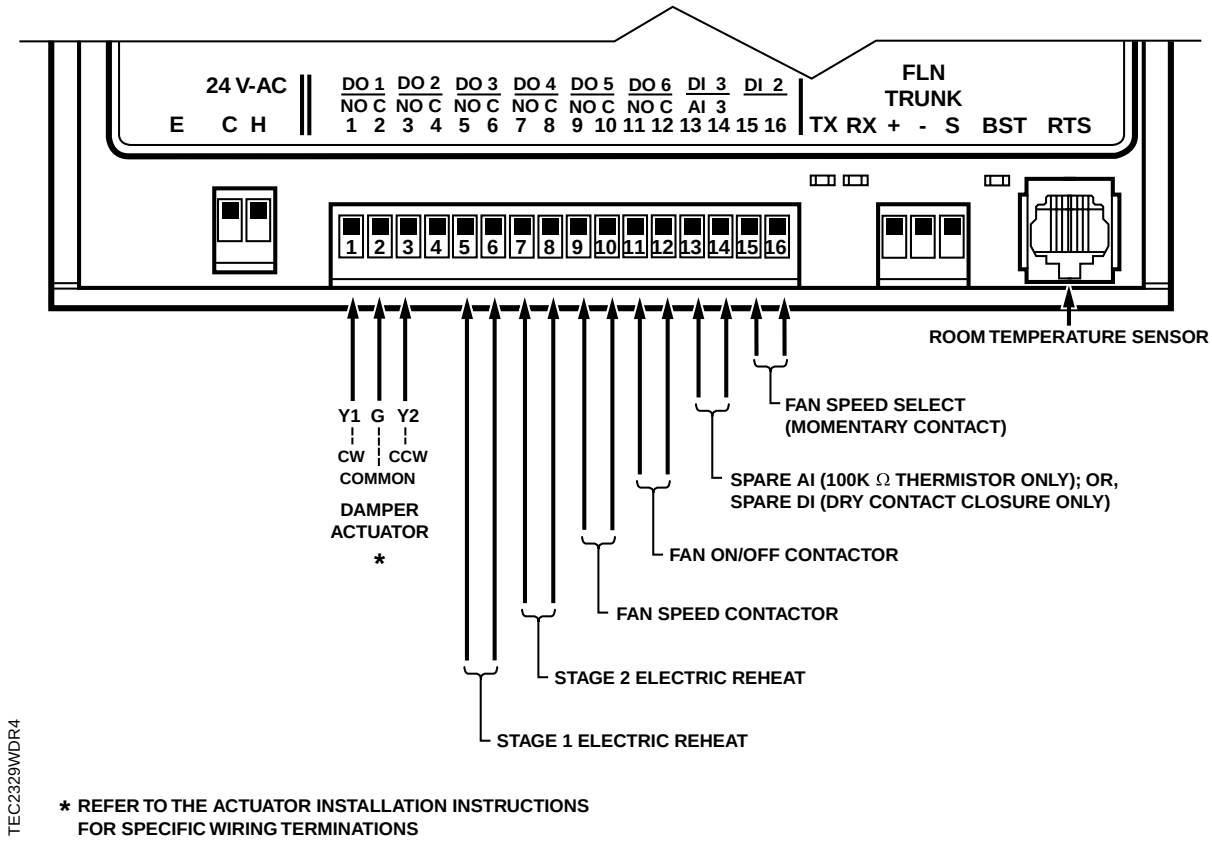


Figure 2329-5. Application 2329 Wiring Diagram.

Point Database

Table 2329-1. Point Database for Application 2329.

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	74.00 (23.44888)	DEG F (DEG C)	0.25 (0.14000)	48.00 (8.88888)	--	--
{05}	HEAT.COOL	COOL	--	--	--	HEAT	COOL
06	DAY CLG STPT	74.00 (23.44888)	DEG F (DEG C)	0.25 (0.14000)	48.00 (8.88888)	--	--
07	DAY HTG STPT	70.00 (21.20888)	DEG F (DEG C)	0.25 (0.14000)	48.00 (8.88888)	--	--
08	NGT CLG STPT	82.00 (27.92888)	DEG F (DEG C)	0.25 (0.14000)	48.00 (8.88888)	--	--
09	NGT HTG STPT	65.00 (18.40888)	DEG F (DEG C)	0.25 (0.14000)	48.00 (8.88888)	--	--
11	RM STPT MIN	55.00 (12.80888)	DEG F (DEG C)	0.25 (0.14000)	48.00 (8.88888)	--	--
12	RM STPT MAX	90.00 (32.40888)	DEG F (DEG C)	0.25 (0.14000)	48.00 (8.88888)	--	--
{13}	RM STPT DIAL	74.00 (23.44888)	DEG F (DEG C)	0.25 (0.14000)	48.00 (8.88888)	--	--
14	STPT DIAL	NO	--	--	--	YES	NO
16	FLOW START	0.0	PCT	0.4	0.0	--	--
17	FLOW END	0.0	PCT	0.4	0.0	--	--
{19}	DI 1	OFF	--	--	--	ON	OFF
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
{29}	DAY.NGT	DAY	--	--	--	NIGHT	DAY
31	CLG FLOW MIN	220 (103.8180)	CFM (LPS)	4 (1.8876)	0 (0.0000)	--	--
32	HI FLOW MAX	2200 (1038.1799)	CFM (LPS)	4 (1.8876)	0 (0.0000)	--	--
33	HTG FLOW MIN	220 (103.8180)	CFM (LPS)	4 (1.8876)	0 (0.0000)	--	--
34	HTG FLOW MAX	2200 (1038.1799)	CFM (LPS)	4 (1.8876)	0 (0.0000)	--	--
{35}	AIR VOLUME	0 (0.0000)	CFM (LPS)	4 (1.8876)	0 (0.0000)	--	--
36	FLOW COEFF	1.00	--	0.01	0.00	--	--

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.

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Table 2329-1. Point Database for Application 2329.

Point Number	Descriptor	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
40	LO FLOW MAX	1100 (519.0900)	CFM (LPS)	4 (1.8876)	0 (0.0000)	--	--
{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}	FAN SPEED	HIGH	--	--	--	LOW	HIGH
{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	--	--
56	DMPR ROT ANG	90	--	1	0	--	--
58	MTR SETUP	0	--	1	0	--	--
59	DO DIR.REV	0	--	1	0	--	--
63	CLG P GAIN	20.00 (36.00)	--	0.25 (0.45)	0.00 (0.00)	--	--
64	CLG I GAIN	0.010 (0.0180)	--	0.001 (0.0018)	0.000 (0.0000)	--	--
65	CLG D GAIN	0 (0.0)	--	2 (3.6)	0 (0.0)	--	--
66	CLG BIAS	0.0	PCT	0.4	0.0	--	--
67	HTG P GAIN	10.00 (18.00)	--	0.25 (0.45)	0.00 (0.00)	--	--
68	HTG I GAIN	0.010 (0.0180)	--	0.001 (0.0018)	0.000 (0.0000)	--	--
69	HTG D GAIN	0 (0.0)	--	2 (3.6)	0 (0.0)	--	--
70	HTG BIAS	0.0	PCT	0.4	0.0	--	--
71	FLOW P GAIN	0.00	--	0.05	0.00	--	--
72	FLOW I GAIN	0.010	--	0.001	0.000	--	--
73	FLOW D GAIN	0	--	2	0	--	--
74	FLOW BIAS	50.0	PCT	0.4	0.0	--	--
{75}	FLOW	0.00	PCT	0.25	0.00	--	--
{76}	CTL FLOW MIN	220 (103.8180)	CFM (LPS)	4 (1.8876)	0 (0.0000)	--	--
{77}	CTL FLOW MAX	2200 (1038.1799)	CFM (LPS)	4 (1.8876)	0 (0.0000)	--	--
{78}	CTL TEMP	74.00 (23.44888)	DEG F (DEG C)	0.25 (0.14000)	48.00 (8.88888)	--	--

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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.

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Table 2329-1. Point Database for Application 2329.

Point Number	Descriptor	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
{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	--	2	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	1.00 (0.56)	DEG F (DEG C)	0.25 (0.14)	0.00 (0.00)	--	--
{91}	TOTAL VOLUME	0 (0)	CF (L)	4 (113)	0 (0)	--	--
{92}	CTL STPT	74.00 (23.44888)	DEG F (DEG C)	0.25 (0.14000)	48.00 (8.88888)	--	--
{93}	FLOW STPT	0.00	PCT	0.25	0.00	--	--
{94}	CAL AIR	NO	--	--	--	YES	NO
95	CAL SETUP	4	--	1	0	--	--
96	CAL TIMER	12	HRS	1	0	--	--
97	DUCT AREA	1.000 (0.092920)	SQ. FT (SQ M)	0.025 (0.002323)	0.000 (0.000000)	--	--
98	LOOP TIME	5	SEC	1	0	--	--
{99}	ERROR STATUS	0	--	1	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.