Application 2320 Variable Volume Fan with Flow, Temperature, and Static Pressure Control

Overview

In Application 2320, the Constant Volume Box Fan Coil Controller with Optional VIV (Variable Inlet Vane) controls a fan coil unit equipped with a chilled water coil, a heating coil, and an auxiliary reheat coil.

This application controls supply temperature by directly modulating the coil control devices. It also controls duct static pressure by modulating a variable speed drive or an inlet vane actuator. The flow from a supply duct is maintained at one of several flow set points by modulating a damper. These flow set points are determined by the controller's operational mode (occupied, unoccupied, smoke, etc.). Refer to Figures 2320-1 and 2320-2.

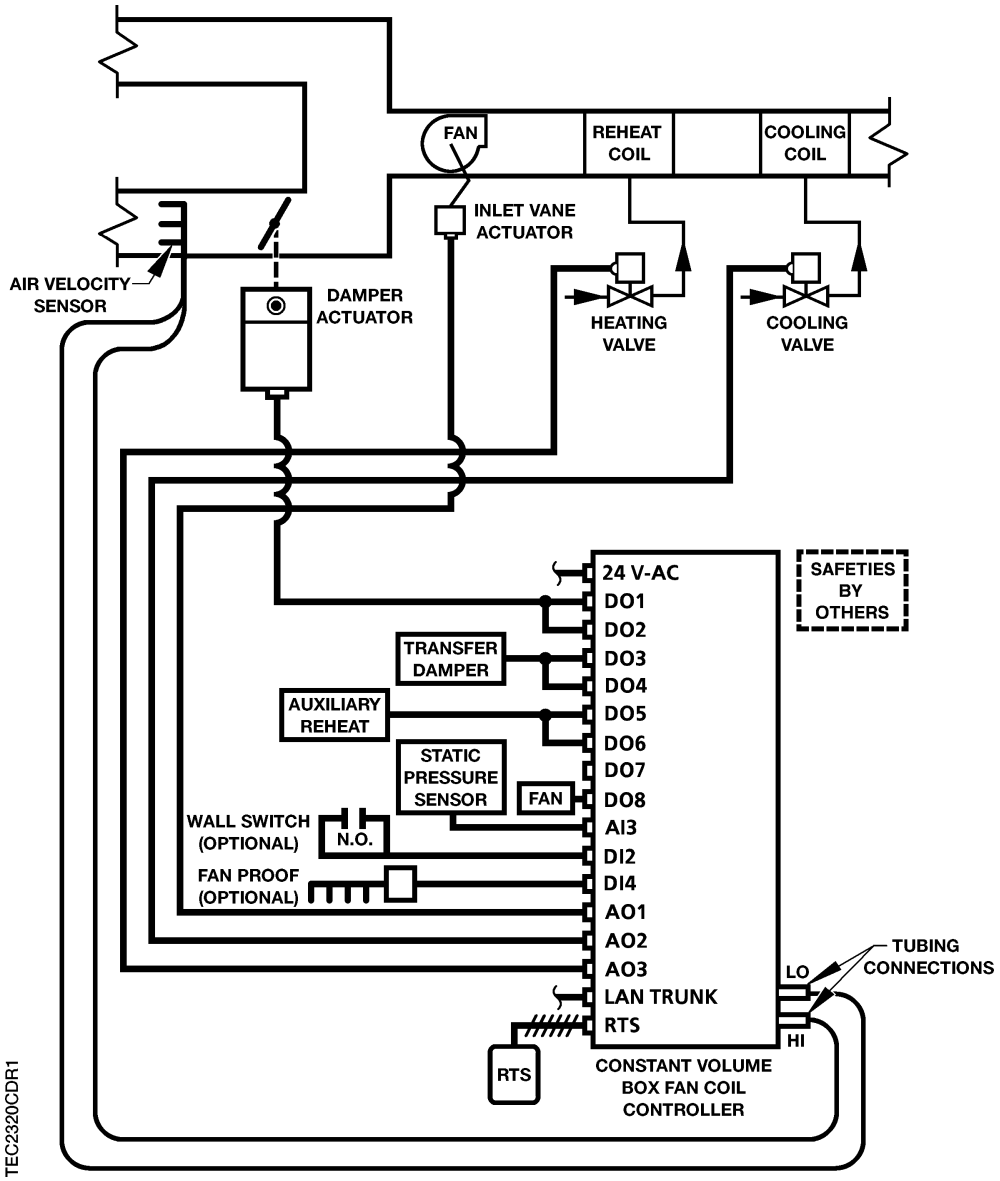
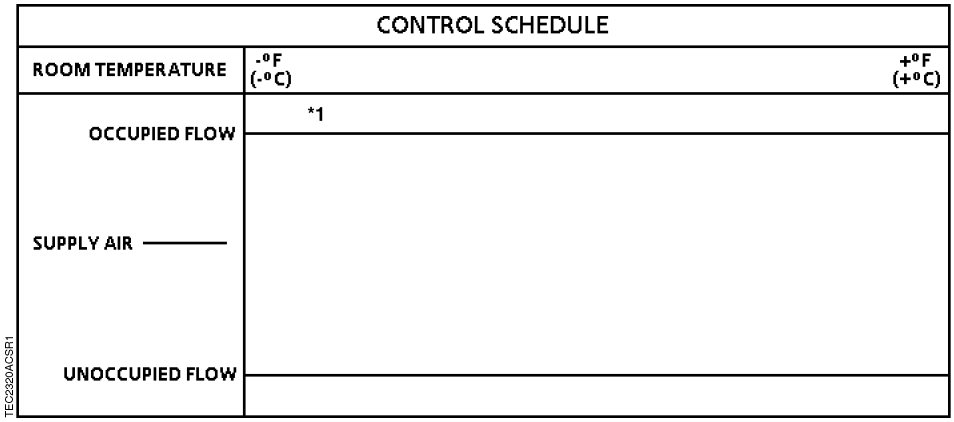


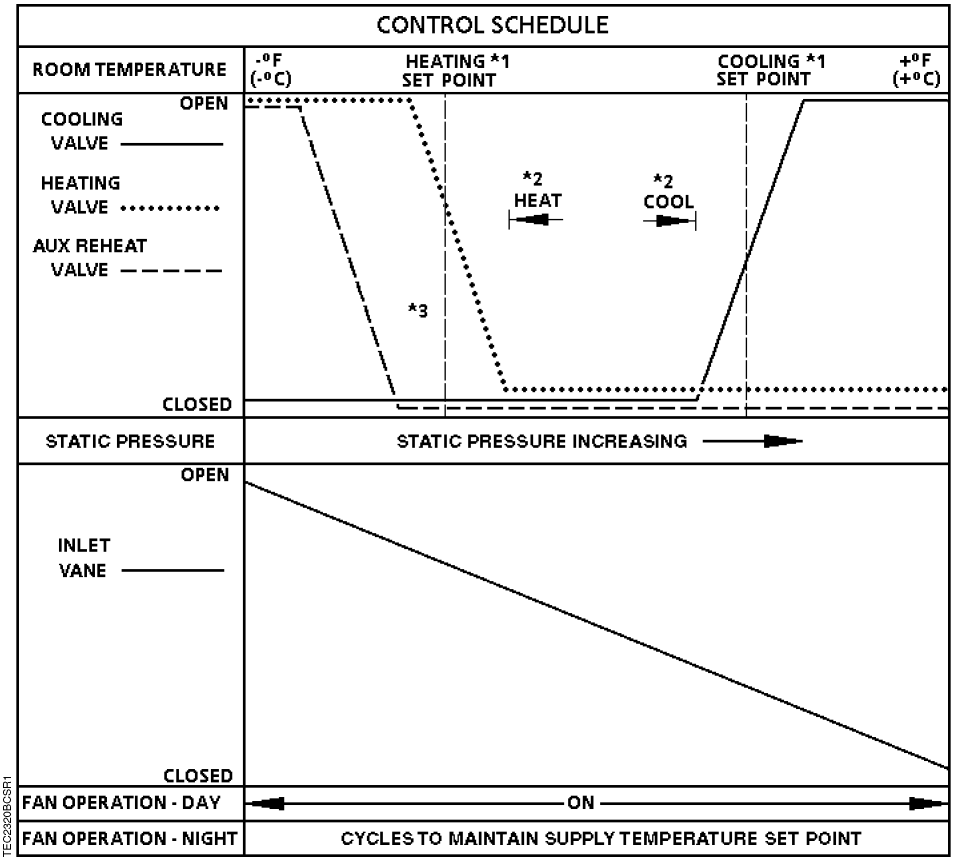
Figure 2320-1. Application 2320 Control Drawing.



NOTES:

1. Refer to “Flow Set Point Selector” for more information.

Figure 2320-2. Application 2320 Control Schedule.



NOTES:

1. Refer to “Control Temperature Set Points” for more information.
2. Refer to “Heating/Cooling Switchover” for more information.
3. The reheat valves are shown operating sequenced (optional). The reheat valves can operate sequenced, parallel, or overlapping with each other. Refer to “Occupied Heating Operation”.

Figure 2320-3. Application 2320 Control Schedule.

Hardware inputs

analog
- air velocity sensor
- duct temperature sensor
- static pressure sensor (4-20 mA)

digital
- fan proof (optional)
- unoccupied mode override (optional)
- wall switch (optional)

Hardware outputs

The following is a list of devices that can be used by this application depending on your hardware configuration.

analog (0-10V)
- cooling valve actuator
- heating valve actuator
- inlet vane actuator

digital
- auxiliary reheat (2 DOs)
- fan
- transfer damper actuator (2 DOs)
- VAV damper actuator (2 DOs)

Ordering notes

Constant Volume Box Fan Coil Controller with Optional VIV 540-832

Refer to *System 600 Configuration and Sizing Guidelines* (125-1830) for product numbers.

Damper Actuators
Static Pressure Sensor
Terminal Equipment Controller Duct Temperature Sensor
Valve Actuators

Point database

Table 2320-1 presents the point database information for Application 2320.

Sequence of Operation

The following paragraphs present the sequence of operation for Application 2320, “Variable Volume Fan with Flow, Temperature, and Static Pressure Control”.

Control temperature set points

Depending on the controller’s current operational mode (occupied or unoccupied), the control temperature set points, COOLING STPT (number 81) and HEATING STPT (number 82) hold the values of one of the following set points:

Occupied Mode – In occupied mode, COOLING STPT and HEATING STPT hold the values of the points DAY CLG STPT (number 6) and DAY HTG STPT (number 7).

Unoccupied Mode – In unoccupied mode, COOLING STPT and HEATING STPT hold the values of the points NGT CLG STPT (number 8) and NGT HTG STPT (number 9).

NOTE: The value of the point CTL TEMP (number 78) is the same as the value of the point SUPPLY TEMP (number 4), unless CTL TEMP is overridden.

Occupied and unoccupied modes

The occupied/unoccupied status of the space is determined by the status of the point OCC.UNOCC (number 29). The control of this point differs depending on whether the controller is monitoring the status of a wall switch or not.

When a wall switch is physically connected to the termination strip on the controller at DI 2 (Figures 2320-1 and 2320-4), and the point WALL SWITCH (number 18) equals YES, the controller monitors the status of DI 2. When the status of the point DI 2 (number 24) is ON (the switch is closed), then OCC.UNOCC will be set to OCC indicating that the controller is in occupied mode. When the status of DI 2 is OFF (the switch is open), then OCC.UNOCC will be set to UNOCC indicating that the controller is in unoccupied mode.

When WALL SWITCH equals NO, the controller does not monitor the status of the wall switch, even if one is connected to it. In this case, if the controller is operating stand-alone, then the controller stays in occupied mode all the time. If the controller is operating with centralized control (that is, it is connected to a field panel), then the field panel can send an operator or PPCL command to override the status of the point OCC.UNOCC. Refer to *Powers Process Control Language (PPCL) User’s Manual* (125-1896) and *Field Panel User’s Manual* (125-1895) for more information.

Unoccupied 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 the point OVRD TIME (number 20), then by pressing the override switch a room occupant can reset the controller to occupied operational mode for the time period that is set in OVRD TIME. The status of the point NGT OVRD (number 21) changes to OCC. After the override time elapses, the controller returns to unoccupied mode and the status of NGT OVRD changes back to UNOCC.

It is only when the controller is in unoccupied mode that the override switch on the room temperature sensor will have any effect on the controller.

Occupied heating operation

In occupied heating operation, the controller maintains the supply temperature at the value stored in the point HEATING STPT (number 82) by modulating the heating and auxiliary coils based on the difference between the control temperature point, CTL TEMP (number 78), and HEATING STPT. If CTL TEMP goes below HEATING STPT, then the heating valve actuators open. If CTL TEMP goes above HEATING STPT, then the heating valve actuators close.

In occupied heating mode, this application includes logic that allows the auxiliary reheat valve to operate either in sequence, parallel, or overlapping with the hot water valve. This algorithm is very similar to the spring range sequencing of valves and dampers. Portions of the output of the heating loop, point HTG LOOPOUT (number 80), will drive both the auxiliary reheat valve and the hot water valve from 0 to 100%.

For example, assume that your system has a hot water valve that is to operate in *sequence* with the auxiliary reheat valve. If,

- AUXHTG START (number 16) equals 0%
- AUXHTG END (number 17) equals 50%
- HEAT START (number 22) equals 50%
- HEAT END (number 23) equals 100%

then,

- when HTG LOOPOUT equals 0%, the point AUX HTG CMD (number 37) will equal 0% open.
- when HTG LOOPOUT equals 25%, AUX HTG CMD will equal 50% open.

- when HTG LOOPOUT is greater than or equal to 50%, AUX HTG CMD will equal 100% open.
- when HTG LOOPOUT is less than or equal to 50%, the point HTG VALVE (number 70) will equal 0% open.
- when HTG LOOPOUT equals 75%, HTG VALVE will equal 50% open.
- when HTG LOOPOUT equals 100%, HTG VALVE will equal 100% open.

NOTE: The default setups for the points AUXHTG START (number 16) and HEAT START (number 22) are 0. The default setups for the points AUXHTG END (number 17) and HEAT END (number 23) are 100. By default, the valves will open in parallel.

Cooling operation

In both occupied and unoccupied cooling operation the controller maintains the supply temperature at the value stored in the point COOLING STPT (number 81) by modulating the cooling coil valve based on the difference between the control temperature point, CTL TEMP (number 78), and COOLING STPT. If CTL TEMP goes above COOLING STPT, then the cooling valve actuator opens. If CTL TEMP goes below COOLING STPT, then the cooling valve closes.

Unoccupied heating operation

The controller maintains the supply temperature by doing the following:

In unoccupied heating operation, the controller maintains the supply temperature at the value stored in the point HEATING STPT (number 82) by modulating the heating coil based on the difference between the control temperature point, CTL TEMP (number 78), and HEATING STPT. If CTL TEMP goes below HEATING STPT, then the heating valve actuator opens. If CTL TEMP goes above HEATING STPT, then the heating valve actuator closes.

In unoccupied heating operation, the controller also maintains the supply temperature at the value stored in the point AUX STPT (number 83) by modulating the auxiliary coil based on the difference between the control temperature point, CTL TEMP, and AUX STPT. If CTL TEMP goes below AUX STPT, then the auxiliary reheat valve opens. If CTL TEMP goes above AUX STPT, then the auxiliary reheat valve closes.

Each of these two heating loops tries to maintain the supply temperature, but to different set points. The result is that the loop with the higher set point will open first. The loop with the lower set point will not open until the other is unable to maintain it's set point.

Static pressure control

In both occupied and unoccupied modes, the controller maintains the duct static pressure at the value stored in the point STAPRES STPT (number 92) by modulating the inlet vane based on the difference between the duct static pressure point, STATIC PRES (number 25), and STAPRES STPT. If STATIC PRES goes below STAPRES STPT, then the inlet vane actuator opens. If STATIC PRES goes above STAPRES STPT, then the inlet vane actuator closes.

Static pressure calculation

The value of the point STATIC PRES (number 25) is calculated using the 4-20 mA input reading of the point AI3 (number 15) and the set-up point PRES RANGE (number 77).

The 4 mA will correspond to a static pressure of 0, while the 20 mA will correspond to the value of PRES RANGE.

Heating/cooling switchover

The heating/cooling switchover determines whether the controller is in heating or cooling mode by monitoring the supply 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 the point SWITCH TIME (number 86), then the controller switches from heating to cooling mode by setting the point HEAT.COOL (number 5) to COOL:

- The point HTG LOOPOUT (number 80) is less than the point SWITCH LIMIT (number 85).
- The point CTL TEMP (number 78) is above the greater of the points HEATING STPT (number 82) and AUX STPT (number 83) by at least the value set in the point SWITCH DBAND (number 90).
- CTL TEMP is greater than the point COOLING STPT (number 81) 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:

- The point CLG LOOPOUT (number 79) is less than SWITCH LIMIT.
- CTL TEMP is below COOLING STPT by at least the value set in SWITCH DBAND.
- CTL TEMP is less than the greater of HEATING STPT and AUX STPT plus SWITCH DBAND.

Control loops

This application uses five Proportional, Integral, and Derivative (PID) control loops; a heating loop, a cooling loop, an auxiliary heating loop, a static pressure loop, and a flow loop.

Heating Loop – The heating loop uses the values of the points HEATING STPT (number 82) and CTL TEMP (number 78) to modulate the value of the point HTG LOOPOUT(number 80). During the occupied mode, the points HTG VALVE (number 70) and AUX HTG CMD (number 37), the heating valve and auxiliary reheat valve commands, are calculated from HTG LOOPOUT. During the unoccupied mode, only the heating valve position is calculated from HTG LOOPOUT.

Cooling Loop – The cooling loop uses the values of the points COOLING STPT (number 81) and CTL TEMP to modulate the value of the point CLG LOOPOUT (number 79). The point CLG VALVE (number 66), the cooling valve command, is calculated from CLG LOOPOUT.

Auxiliary Loop – The auxiliary loop only runs during unoccupied mode and uses the value of the point AUX STPT (number 83) and CTL TEMP to modulate the value of the point AUX LOOPOUT (number 84). The point AUX HTG POS, the auxiliary reheat valve position, is calculated from AUX LOOPOUT.

Static Pressure Loop – The static pressure loop uses the value of the points STAPRES STPT (number 92) and STATIC PRESS (number 25) to modulate the value of the point INLET VANE (number 54).

Flow Loop – The flow loop uses the value of the points FLOW STPT (number 93) and FLOW (number 75) to modulate the value of the point VAV DMPR CMD (number 48).

Transfer damper control

The transfer damper is commanded to the value of the point TRANS POS (number 76) during occupied mode or the unoccupied override mode. This damper is closed during the unoccupied mode. In addition, if the fan proof is being used (USE PROOF (number 27) = YES), and the fan has not proofed (FAN PROOF (number 26) = OFF), then the transfer damper is closed.

Fan control

The fan will turn ON if *one or more* of the following conditions occurs:

- There is a smoke condition (SMOKE = YES).
- The fan coil needs to supply make-up air (EXHAUST = YES).
- The application is in occupied mode (OCC.UNOCC = OCC).
- The application is in unoccupied override mode (UNOCC OVRD = OCC).

- CLG LOOPOUT is above 10% during unoccupied mode.
- HTG LOOPOUT is above 10% during unoccupied mode.
- AUX LOOPOUT is above 10%.

The fan will turn OFF if *all* of the following conditions occur:

- There is no smoke condition (SMOKE = NO).
- The fan coil does not need to supply make-up air (EXHAUST = NO).
- The application is in unoccupied mode (OCC.UNOCC = UNOCC) and (UNOCC OVRD = UNOCC).
- HTG LOOPOUT, CLG LOOPOUT, and AUX LOOPOUT are all below 5% in unoccupied mode.

In unoccupied mode, if at least one of CLG LOOPOUT, HTG LOOPOUT, or AUX LOOPOUT is between 5% and 10% and none of these is above 10%, then the fan remains in its last commanded state. That is, if it was ON before, then it remains ON now. If it was OFF before, then it remains OFF now.

Flow set point selector

This module selects the appropriate flow set point based on existing conditions. This set point is used by the flow PID loop to control the VAV damper.

A flow set point of 100% means that the set point in CFM is equal to the CFM value of the point OCC FLOW (number 32). The other set points are a percentage fraction of OCC FLOW. For example, if OCC FLOW is 1000 CFM and the point SMOKE FLOW (number 34) is 1570 CFM, then the flow set point during a smoke condition is 157%.

Specifically:

- The user enters into SMOKE FLOW the CFM desired for a smoke condition.
- In the point EXHAUST FLOW (number 40) the user enters the CFM desired for make-up air purposes.
- In OCC FLOW, the user enters the CFM desired during occupied mode.
- In the point PARTL OCCFLO (number 33), the user enters the CFM desired for the unoccupied override mode.
- In the point UNOCC FLOW (number 31), the user enters the CFM desired during the unoccupied mode.

If a fan proof is used (USE PROOF (number 27) = YES) and the fan has not proofed (FAN PROOF (number 26) = OFF), then the VAV box is controlled to provide the amount of airflow as stored in UNOCC FLOW. If a fan proof is not used or if it is used and the fan has proofed, then this module controls to one of the following set points. When a smoke condition occurs, the flow set point is set to the smoke flow set point. This is equal to (SMOKE FLOW ÷ OCC FLOW) × 100%. When make-up air is needed, the flow set point is set to the make-up flow set point. This is equal to (EXHAUST FLOW ÷ OCC FLOW) × 100%. The flow set point is set to 100% during occupied mode. When unoccupied override occurs, the flow set point is set equal to the unoccupied override flow set point. This is equal to

(PARTL OCCFLO ÷ OCC FLOW) × 100%. During unoccupied mode, the flow set point is set equal to the unoccupied flow set point. This is equal to (UNOCC FLOW ÷ OCC FLOW) × 100%.

NOTE: This application will react to the value of the point SMOKE (number 28), the point EXHAUST (number 30), and the point OCC.UNOCC (number 29), but it will not control any of them. These points must be controlled by a field panel.

Calibration

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

Other Actuators – The following steps explain the calibration sequence of all actuators:

1. The heating valve is closed by setting the point HTG VALVE (number 70) to 0%.
2. The auxiliary reheat valve is closed by setting the point AUX HTG CMD (number 37) to 0%.
3. The cooling valve is closed by setting the point CLG VALVE (number 66) to 0%.
4. The fan is turned off.
5. The transfer damper is closed by setting the point TRFR DPR CMD (number 52) to 0%.
6. The VAV damper is closed by setting the point VAV DMPR CMD (number 48) to 0%.
7. The inlet vane is sent to 0.
8. The airflow sensor is calibrated.

When done calibrating, all actuators are released to normal control.

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.

If a fan proof is used (USE PROOF (number 27) = YES) and the fan has not proofed (FAN PROOF (number 26) = OFF), then the following actions occur:

- Cooling valve is closed.
- Transfer damper is closed.
- Heating valve is closed.
- Auxiliary heating valve is closed.
- VAV flow set point will be set to the value of the point UNOCC FLOW (number 31).
- Fan continues to run.

Wiring diagrams

The point wiring for Application 2320 is shown in Figures 2320-4.

CAUTION: The Controller's Digital Outputs (DOs) control 24 Vac loads only. The maximum rating is 12 VA for each DO. For higher VA requirements, 110 or 220 Vac requirements, separate transformers used to power the load, or DC power requirements, use an interposing 220 V 4-relay module (P/N 540-147).

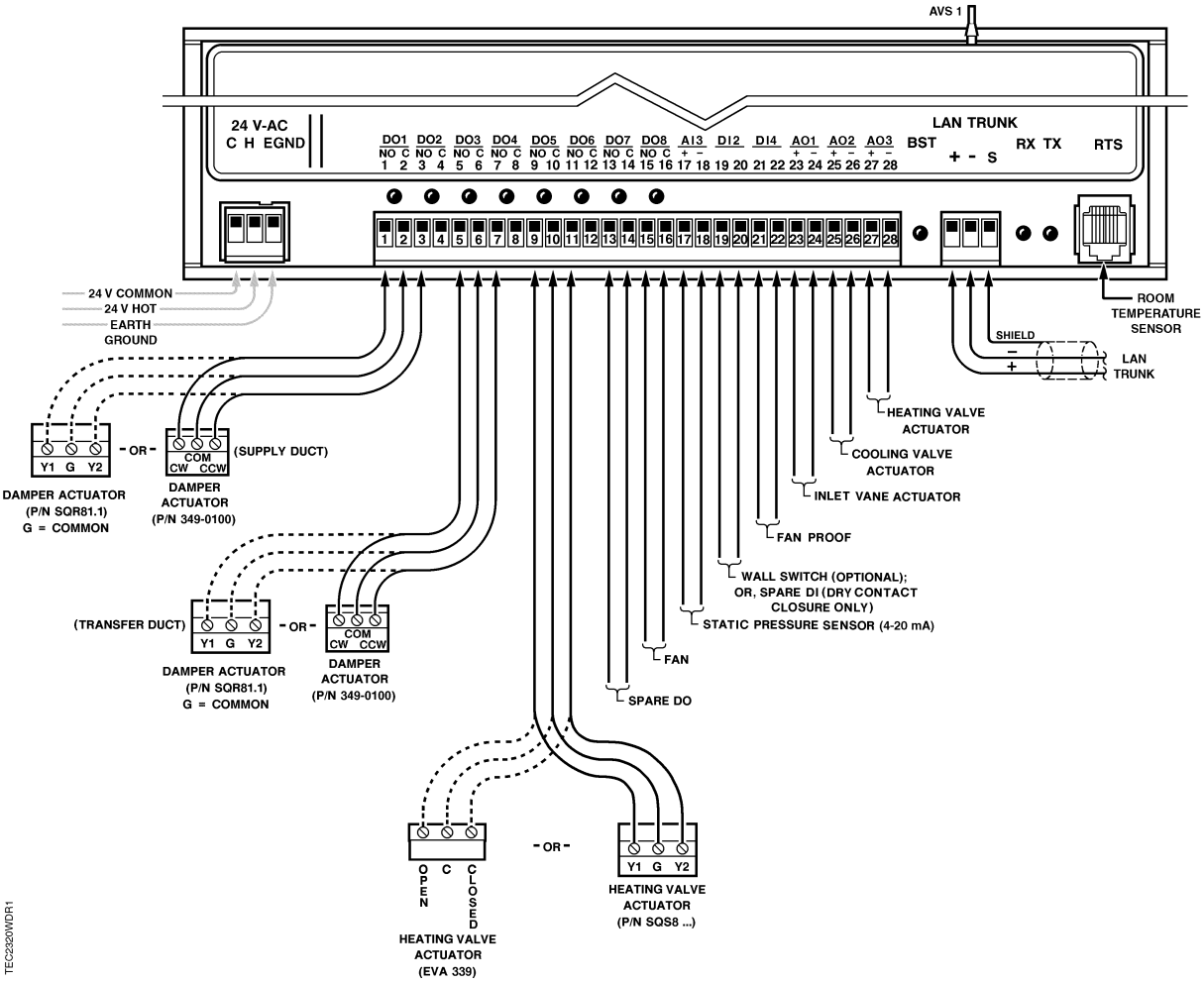


Figure 2320-4. Application 2320 Wiring Diagram.

Table 2320-1. Point Database for Application 2320.

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	2397	--	1	0	--	--
{04}	SUPPLY 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	85.00 (29.61)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	--	--
09	NGT HTG STPT	57.00 (13.93)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	--	--
{15}	AI3	4.000	MA	0.064	4.000	--	--
16	AUXHTG START	0.0	PCT	0.4	0.0	--	--
17	AUXHTG END	100.0	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	UNOCC	--	--	--	UNOCC	OCC
22	HEAT START	0.0	PCT	0.4	0.0	--	--
23	HEAT END	100.0	PCT	0.4	0.0	--	--
{24}	DI 2	OFF	--	--	--	ON	OFF
{25}	STATIC PRES	0.000	IN	0.004	0.000	--	--
{26}	FAN PROOF	OFF	--	--	--	ON	OFF
27	USE PROOF	NO	--	--	--	YES	NO
28	SMOKE	NO	--	--	--	YES	NO
{29}	OCC.UNOCC	OCC	--	--	--	UNOCC	OCC
30	EXHAUST	NO	--	--	--	YES	NO
31	UNOCC FLOW	0 (0.0000)	CFM (LPS)	4 (1.8876)	0 (0.0000)	--	--
32	OCC FLOW	2200 (1038.1799)	CFM (LPS)	4 (1.8876)	0 (0.0000)	--	--
33	PARTL OCCFLO	1100 (519.0900)	CFM (LPS)	4 (1.8876)	0 (0.0000)	--	--
34	SMOKE FLOW	220 (103.8180)	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	--	--
{37}	AUX HTG CMD	0.0	PCT	0.4	0.0	--	--
{38}	AUX HTG POS	0.0	PCT	0.4	0.0	--	--
39	MTR3 TIMING	130	SEC	1	0	--	--
40	EXHAUST FLOW	2200 (1038.1799)	CFM (LPS)	4 (1.8876)	0 (0.0000)	--	--
{41}	DO 1	OFF	--	--	--	ON	OFF
{42}	DO 2	OFF	--	--	--	ON	OFF

NOTES:

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.

Table 2320-1. Point Database for Application 2320.

Point Number	Descriptor	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
{43}	DO 3	OFF	--	--	--	ON	OFF
{44}	DO 4	OFF	--	--	--	ON	OFF
{45}	DO 5	OFF	--	--	--	ON	OFF
{46}	DO 6	OFF	--	--	--	ON	OFF
{47}	DO 7	OFF	--	--	--	ON	OFF
{48}	VAV DMPR CMD	0.0	PCT	0.4	0.0	--	--
{49}	VAV DMPR POS	0.0	PCT	0.4	0.0	--	--
{50}	FAN	OFF	--	--	--	--	--
51	MTR1 TIMING	95	SEC	1	0	--	--
{52}	TRFR DPR CMD	0.0	PCT	0.4	0.0	--	--
{53}	TRFR DPR POS	0.0	PCT	0.4	0.0	--	--
{54}	INLET VANE	0.0	PCT	0.4	0.0	--	--
55	MTR2 TIMING	95	SEC	1	0	--	--
56	DPR1 ROT ANG	90	--	1	0	--	--
57	DPR2 ROT ANG	90	--	1	0	--	--
58	MTR SETUP	0	--	1	0	--	--
59	DO DIR.REV	0	--	1	0	--	--
60	AUX P GAIN	5.00 (9.00)	--	0.25 (0.45)	0.00 (0.00)	--	--
61	AUX I GAIN	0.010 (0.0180)	--	0.001 (0.0018)	0.000 (0.0000)	--	--
62	AUX D GAIN	0 (0.0)	--	2 (3.6)	0 (0.0)	--	--
63	CLG P GAIN	5.00 (9.00)	--	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 VALVE	0.0	PCT	0.4	0.0	--	--
67	HTG P GAIN	5.00 (9.00)	--	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 VALVE	0.0	PCT	0.4	0.0	--	--
71	FLOW P GAIN	0.00	--	0.25	0.00	--	--
72	FLOW I GAIN	0.010	--	0.001	0.000	--	--
73	SP P GAIN	5.00	--	0.25 (0.45)	0.00 (0.00)	--	--
74	SP I GAIN	1.000	--	0.001 (0.0018)	0.000 (0.0000)	--	--
{75}	FLOW	0.00	PCT	0.25	0.00	--	--
76	TRANS POS	100.0	PCT	0.4	0.0	--	--
77	PRES RANGE	2.5	IN	0.1	0.0	--	--
{78}	CTL TEMP	74.00 (23.45)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	--	--

NOTES:
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.

Table 2320-1. Point Database for Application 2320.

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}	COOLING STPT	74.00 (23.45)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	--	--
{82}	HEATING STPT	70.00 (21.21)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	--	--
83	AUX STPT	60.00 (15.61)	DEG F (DEG C)	0.25 (0.14)	48.00 (8.89)	--	--
{84}	AUX LOOPOUT	0.0	PCT	0.4	0.0	--	--
85	SWITCH LIMIT	4.8	PCT	0.4	0.0	--	--
86	SWITCH TIME	1	MIN	1	0	--	--
{87}	AOV1	0.00	VOLTS	0.01	0.00	--	--
{88}	AOV2	0.00	VOLTS	0.01	0.00	--	--
{89}	AOV3	0.00	VOLTS	0.01	0.00	--	--
90	SWITCH DBAND	1.00 (0.56)	DEG F (DEG C)	0.25 (0.14)	0.00 (0.00)	--	--
91	AO DIR.REV	0	--	1	0	--	--
92	STAPRES STPT	1.000	IN	0.004	0.000	--	--
{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	--	--

NOTES:
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.