Application 2123: VAV with Hot Water Reheat and Secure Mode

Table of Contents

Overview

In Application 2123, the controller modulates the supply air damper of the terminal box for cooling and modulates a reheat valve (or valves) 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. See Figure 2123-1 through Figure 2123-3.

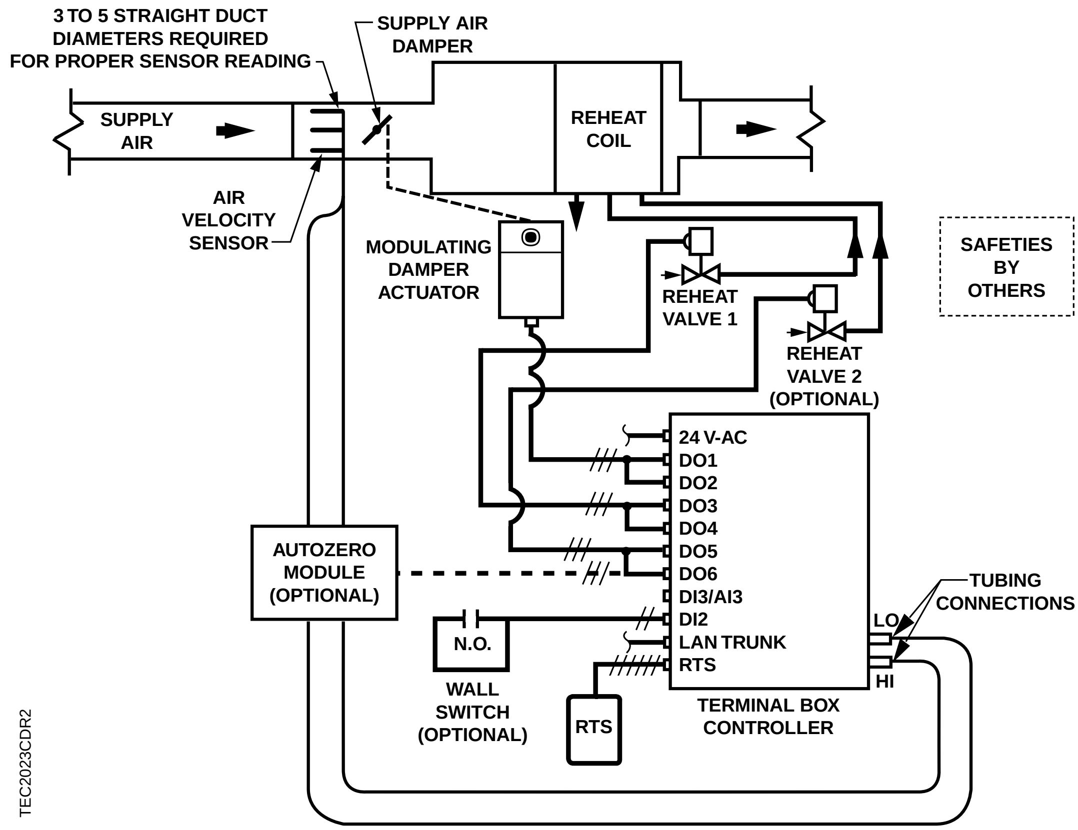
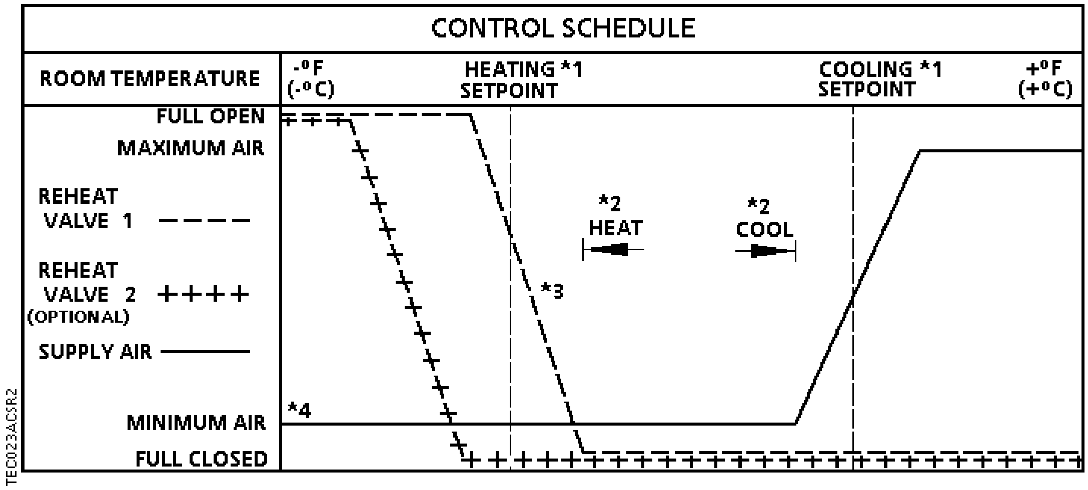
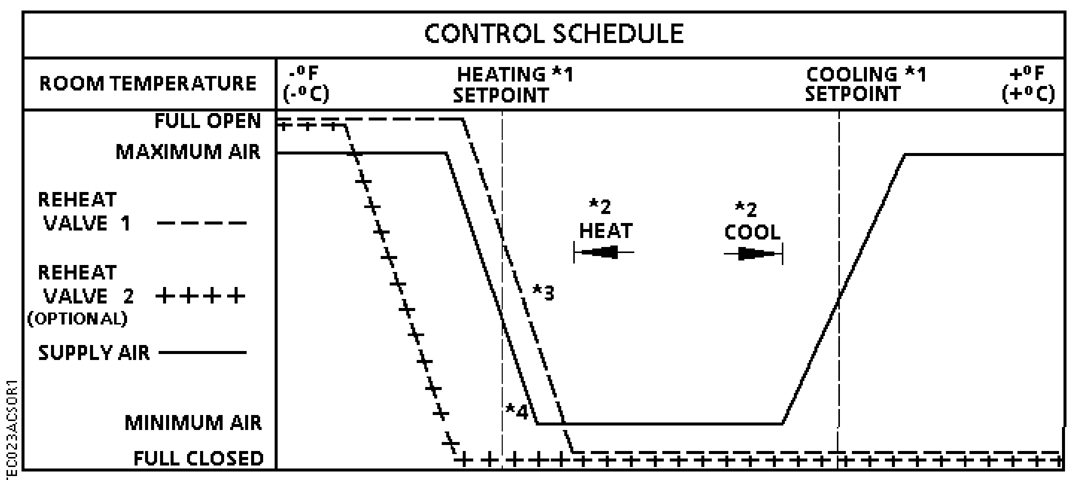


Figure 2123-1. Application 2123 Control Drawing.



1. See Sequence of Operation, *Control Temperature Setpoints*.
2. See Sequence of Operation, *Heating/Cooling Switchover*.
3. One or two reheat valves may be used. Operation in sequence (optional).
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*.

Figure 2123-2. Application 2123 Control Schedule.



1. See Sequence of Operation, *Control Temperature Setpoints*.
2. See Sequence of Operation, *Heating/Cooling Switchover*.
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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*.

Figure 2123-3. Application 2123 Control Schedule with Modulating Damper in Heating Mode.

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

- Damper actuator
- 1st valve actuator (required)
- 2nd valve actuator (optional)
  or
  Autozero Module (optional)

Ordering Notes

Terminal Box Controller – Electronic Output with Secure Mode	540-100C

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

Autozero Module (optional)
Damper Actuator
Terminal Equipment Controller Room Temperature Sensor
1st Valve Actuator (required)
2nd Valve Actuator (optional)

Point Database

Table 2123-1 presents the point database information for Application 2123. Each point number is represented on a line in the point database table.

Secure Mode Operation

Secure Mode prevents unauthorized users from making changes to the TEC through the MMI port or room sensor. This mode can only be enabled/disabled through an Insight command. When Secure Mode is enabled, any attempts to make point changes in the TEC will be rejected and result in an error message indicating that the priority is too low.

Sequence of Operation

The following paragraphs present the sequence of operation for Application 2123, “VAV with Hot Water Reheat and Secure Mode”.

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) or DAY HTG STPT (Point 7). 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) or NGT HTG STPT (Point 9).

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 TEMP (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 (Figure 2123-1 and Figure 2123-5), 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 in stand-alone mode; 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 *APOGEE Powers Process Control Language (PPCL) User’s Manual* (125-1896) and *APOGEE Field Panel User's Manual* (125-3000) 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 that is set in OVRD TIME. The status of NGT OVRD (Point 21) changes to DAY. After the override time elapses, the controller returns to night mode and 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 in 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*).

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 that 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.
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 hot water valve(s).
- Operate parallel with the hot water valve(s).
- Have its operation overlap with the operation of the hot water valve(s). See *Sequencing Logic* for more information.

If the first option described above is chosen, HTG LOOPOUT (Point 80) will control the hot water valve(s) 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 hot water valve(s) in order to maintain the room temperature. See *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 above 100% flow.

Flow Loop – The flow loop maintains the 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 2123, 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 its ability to control temperature is lost.

The flow loop maintains FLOW STPT by modulating the supply air damper, DMPR COMD (Point 48). The flow loop maintains the airflow between CLG FLOW MIN and CLG FLOW MAX in cooling mode and between HTG FLOW MIN and HTG FLOW MAX in heating mode.

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.

Hot Water Reheat

CAUTION:

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

The heating loop modulates the heating valve(s) in order to warm up the space as follows:

- If VALVE COUNT (Point 88) = 1,

  When (HTG LOOPOUT – REHEAT START) – (REHEAT END – REHEAT START) × 100% varies from 0 to 100% open of the reheat output range,

  VLV1 COMD (Point 52) varies from 0 to 100% open, and VLV2 COMD (Point 37) is not used in the application.

- If VALVE COUNT = 2,

  When HTG LOOPOUT (Point 80) varies from 0 to 50% of the reheat output range, VLV1 COMD varies from 0 to 100% open.

  When HTG LOOPOUT varies from 50 to 100% of the reheat output range, VLV2 COMD varies from 0 to 100% open.

When the controller is in cooling mode, the heating valve is closed.

Sequencing Logic (optional)

NOTE: The default setups for FLOW START (Point 16) and FLOW END (Point 17) are 0. This 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 hot water valve(s). 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), will drive both the flow loop and the hot water valve(s) from 0 to 100%. See the following three examples.

The ladder diagrams in Figure 2123-4 show sequenced, parallel, and overlapping flow loop operations with hot water 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.

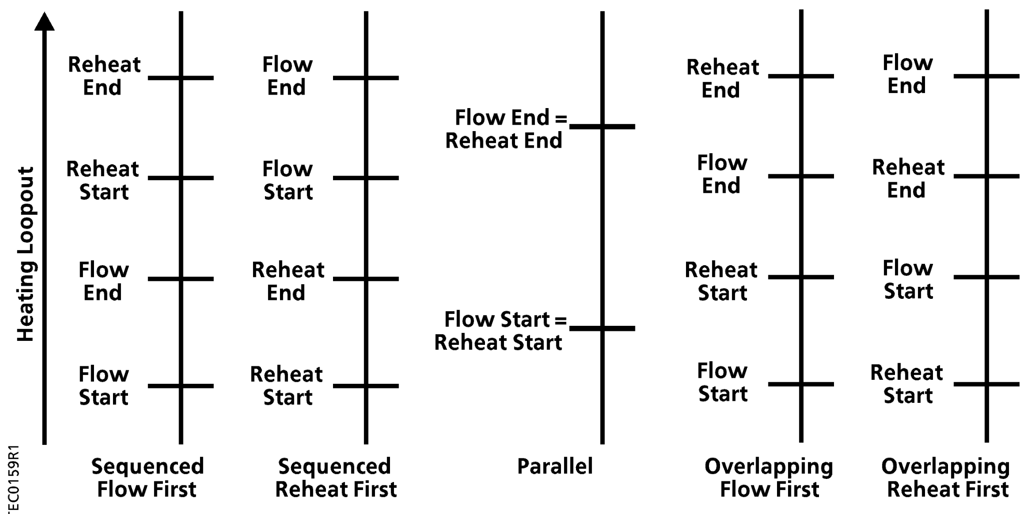

Figure 2123-4. Sequenced, Parallel, and Overlapping Flow Loop Operations with Hot Water Reheat.

For simplicity, assume that in these examples:

- HTG FLOW MIN (Point 33) = 0 cfm.
- There is only one hot water valve (VALVE COUNT (Point 88) = 1).

When this is done, FLOW STPT (Point 93) will equal 0 when HTG LOOPOUT = 0.

Example 1

Assume that your system has a hot water valve 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%, VLV1 COMD will equal 0% open.
- When HTG LOOPOUT = 75%, VLV1 COMD will equal 50% open.
- When HTG LOOPOUT = 100%, VLV1 COMD will equal 100% open.

Example 2

Assume that your system has a hot water valve 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%, VLV1 COMD will equal 0% open.
- When HTG LOOPOUT = 50%, VLV1 COMD will equal 50% open.
- When HTG LOOPOUT = 100%, VLV1 COMD will equal 100% open.

Example 3

Assume that your system has a hot water valve 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%, VLV1 COMD will equal 0% open.
- When HTG LOOPOUT = 62.5%, VLV1 COMD will equal 50% open.
- When HTG LOOPOUT = 100%, VLV1 COMD will equal 100% open.

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 hot water valve(s). The airflow minimum will be maintained by setting 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 a hot water valve 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
- VALVE COUNT = 1

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%, VLV1 COMD will equal 0% open.
- When HTG LOOPOUT = 50%, VLV1 COMD will equal 50% open.
- When HTG LOOPOUT = 100%, VLV1 COMD will equal 100% open.

Assume:

- VALVE COUNT = 2

then,

- When HTG LOOPOUT = 0%, VLV2 COMD will equal 0% open, VLV1 COMD = 0%.
- When HTG LOOPOUT = 50%, VLV2 COMD will equal 0% open,
  VLV1 COMD = 100%.
- When HTG LOOPOUT = 100%, VLV2 COMD will equal 100% open.

Calibration

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

- For a controller used without an Autozero Module (point 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(s) 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 point, 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 < FLOW STPT

-or-

- DMPR POS = 0%
- AIR VOLUME > 0 cfm
- FLOW (Point 75) > FLOW STPT (Point 93)

NOTE: 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, 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. See *iKnow Troubleshooting Tool* for more information.
2. In order for the heating loopout to work, MTR2 and MTR3 must be enabled using the correct setting for VALVE COUNT (Point 88).
3. The 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.
4. 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 as described in the *APOGEE Automation Start-up Procedures* on InfoLink.

Wiring Diagrams

The point wiring for Application 2123 is shown in Figure 2123-5 and Figure 2123-6.

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

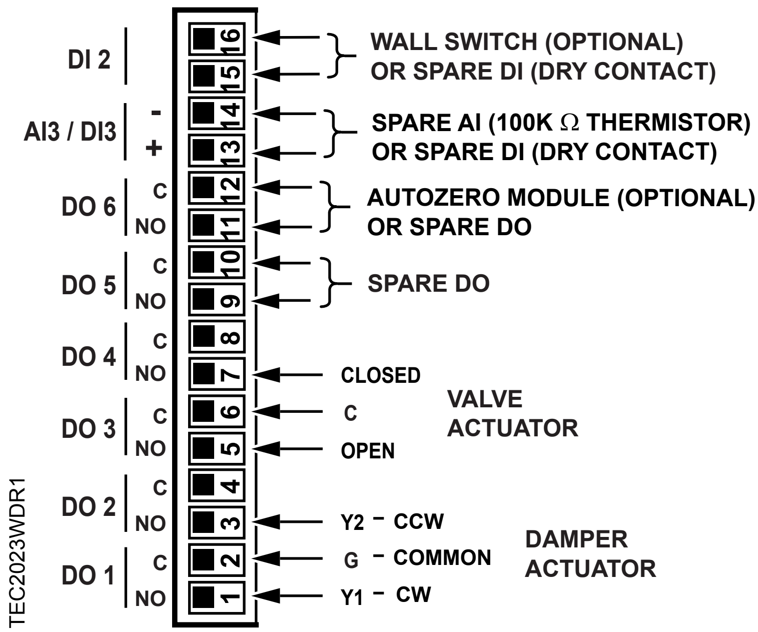

Figure 2123-5. Application 2123 Wiring Diagram for 1 Hot Water Valve with Optional Autozero Module.

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

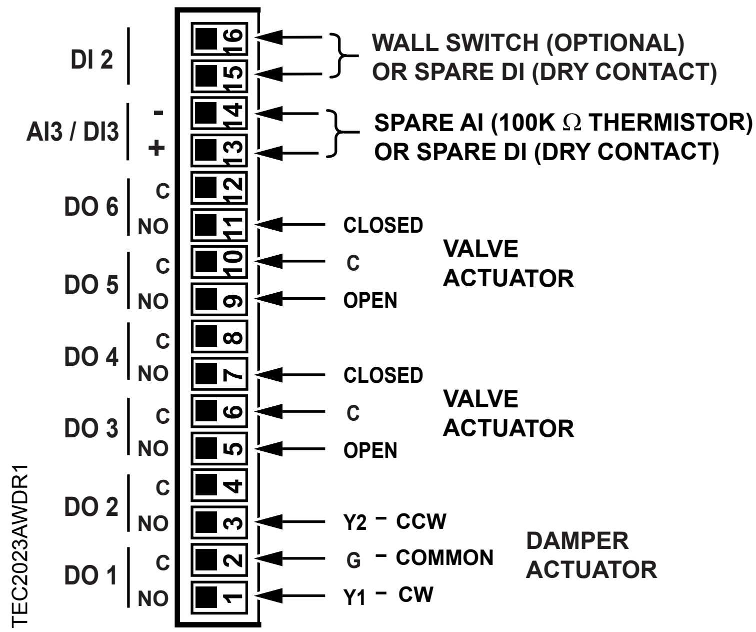

Figure 2123-6. Application 2123 Wiring Diagram for 2 Hot Water Valves.

Table 2123-1. Point Database for Application 2123.

Point Number	Descriptor	Factory Default (SI Units)	Eng. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
01	CTLR ADDRESS	99	–	1	0	–	–
02	APPLICATION	2191	–	1	0	–	–
03	RMTMP OFFSET	0.0 (0.0)	DEG F (DEG C)	0.25 (0.14)	-31.75 (-17.78)	–	–
{04}	ROOM TEMP	74.0 (23.449)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.889)	–	–
{05}	HEAT.COOL	COOL	–	–	–	HEAT	COOL
06	DAY CLG STPT	74.0 (23.449)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.889)	–	–
07	DAY HTG STPT	70.0 (21.209)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.889)	–	–
08	NGT CLG STPT	82.0 (27.929)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.889)	–	–
09	NGT HTG STPT	65.0 (18.409)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.889)	–	–
11	RM STPT MIN	55.0 (12.809)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.889)	–	–
12	RM STPT MAX	90.0 (32.409)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.889)	–	–
{13}	RM STPT DIAL	74.0 (23.449)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.889)	–	–
14	STPT DIAL	NO	–	–	–	YES	NO
{15}	AUX TEMP	74.0 (23.496)	DEG F (DEG C)	0.5 (0.28)	37.5 (3.056)	–	–
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

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 next page…

Table 2123-1. Point Database for Application 2123.

Point Number	Descriptor	Factory Default (SI Units)	Eng. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
{29}	DAY.NGT	DAY	–	–	–	NIGHT	DAY
31	CLG FLOW MIN	220 (103.818)	CFM (LPS)	4 (1.888)	0	–	–
32	CLG FLOW MAX	2200 (1038.18)	CFM (LPS)	4 (1.888)	0	–	–
33	HTG FLOW MIN	220 (103.818)	CFM (LPS)	4 (1.888)	0	–	–
34	HTG FLOW MAX	2200 (1038.18)	CFM (LPS)	4 (1.888)	0	–	–
{35}	AIR VOLUME	0 (0.0)	CFM (LPS)	4 (1.888)	0	–	–
36	FLOW COEFF	1.0	–	0.01	0.0	–	–
{37}	VLV2 COMD	0.0	PCT	0.4	0.0	–	–
{38}	VLV2 POS	0.0	PCT	0.4	0.0	–	–
39	MTR3 TIMING	130	SEC	1	0	–	–
{41}	DO 1	OFF	–	–	–	ON	OFF
{42}	DO 2	OFF	–	–	–	ON	OFF
{43}	DO 3	OFF	–	–	–	ON	OFF
{44}	DO 4	OFF	–	–	–	ON	OFF
{45}	DO 5	OFF	–	–	–	ON	OFF
{46}	DO 6	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	–	–
{52}	VLV1 COMD	0.0	PCT	0.4	0.0	–	–
{53}	VLV1 POS	0.0	PCT	0.4	0.0	–	–
55	MTR2 TIMING	130	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	–	–

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 2123-1. Point Database for Application 2123.

Point Number	Descriptor	Factory Default (SI Units)	Eng. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
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	–	–
{76}	CTL FLOW MIN	220 (103.818)	CFM (LPS)	4 (1.888)	0	–	–
{77}	CTL FLOW MAX	2200 (1038.18)	CFM (LPS)	4 (1.888)	0	–	–
{78}	CTL TEMP	74.0 (23.449)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.889)	–	–
{79}	CLG LOOPOUT	0.0	PCT	0.4	0.0	–	–
{80}	HTG LOOPOUT	0.0	PCT	0.4	0.0	–	–
{84}	DMPR STATUS	CAL	–	–	–	RECAL	CAL
85	SWITCH LIMIT	5.2	PCT	0.4	0.0	–	–
86	SWITCH TIME	10	MIN	1	0	–	–
87	CAL MODULE	NO	–	–	–	YES	NO
88	VALVE COUNT	1	–	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	–	–

1. Points not listed are not used in this application.
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3. Point numbers that appear in brackets {} may be unbundled at the field panel.

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Table 2123-1. Point Database for Application 2123.

Point Number	Descriptor	Factory Default (SI Units)	Eng. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
{92}	CTL STPT	74.0 (23.449)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.889)	–	–
{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 (0.093)	SQ. FT (SQ M)	0.025 (0.002)	0.0	–	–
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.