SIEMENS

Actuating Terminal Equipment Controller (ATEC)

VAV with Reheat - Electric Reheat or Baseboard Radiation, Application 2522

Application Note

140-1221
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Building Technologies

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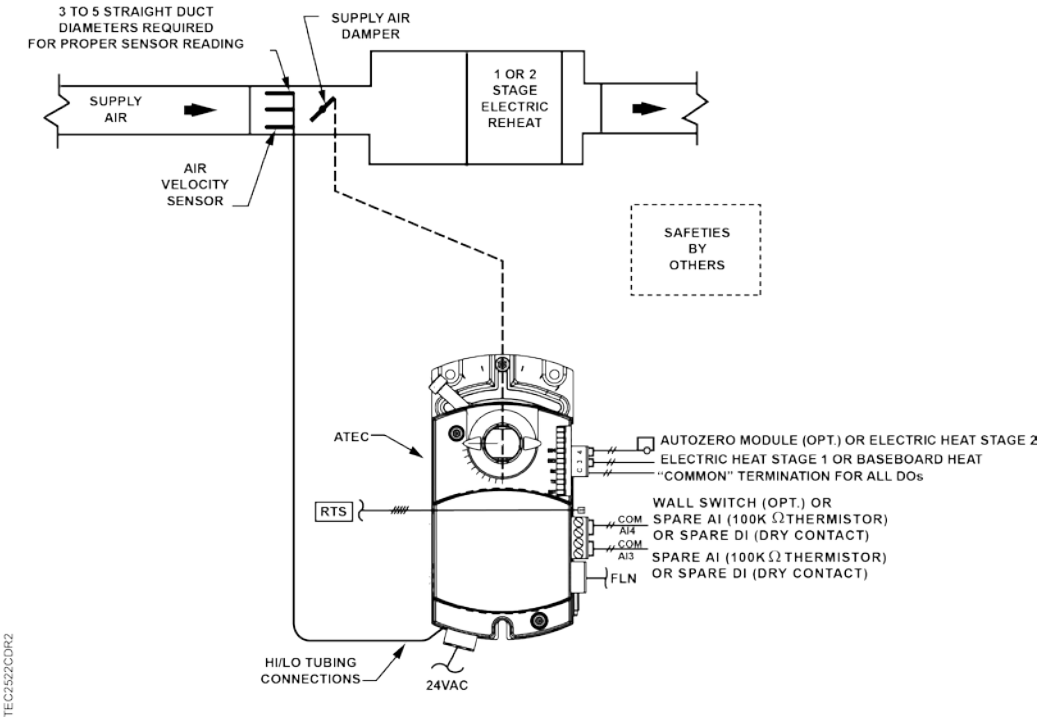
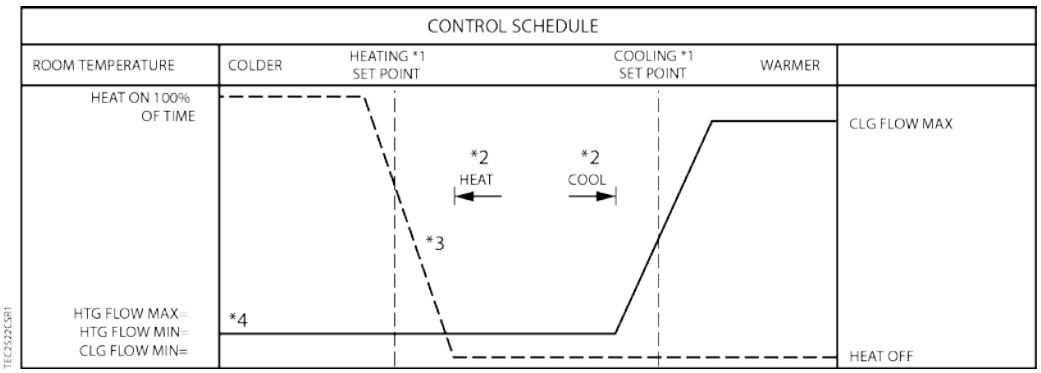
Overview

In Application 2522, the controller modulates the supply air damper of the terminal box for cooling and controls stages of electric reheat or baseboard radiation for heating. When in heating, the terminal box either maintains minimum airflow or modulates the supply air damper. In order for the terminal box to work properly, the central air-handling unit must provide supply air.

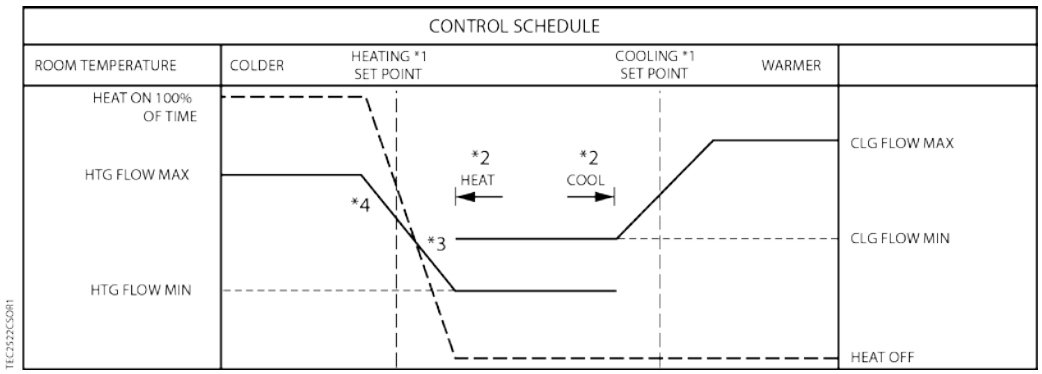


Application 2522 Electric Reheat or Baseboard Radiation Control Diagram.



Application 2522 Control Schedule with Minimum Airflow during Heating (default).

NOTES:
1. See *Control Temperature Setpoints*.
2. See *Heating/Cooling Switchover*.
3. When temperature is near the setpoint, heat is cycled on and off according to the size of the demand. This allows it to be controlled proportionally rather than with deadbands.
4. The airflow is shown at a minimum flow throughout the entire heating mode (default setting). The airflow can optionally operate parallel, sequenced, or overlapping with the heat. See *Sequencing Logic*.



Application 2522 Control Schedule with Damper Modulated during Heating.

NOTES:
1. See *Control Temperature Setpoints*.
2. See *Heating/Cooling Switchover*.
3. When temperature is near the setpoint, heat is cycled on and off according to the size of the demand. This allows it to be controlled proportionally rather than with deadbands.
4. The airflow is shown operating parallel with the electric reheat. The airflow can operate at minimum flow throughout the entire heating mode or sequenced or overlapping with the heat. See *Sequencing Logic*.

Hardware Inputs

Analog

- Air velocity sensor
- Room temperature sensor
- *(Optional)* Room temperature setpoint dial
- Spare sensor (two temperature) (100K Ω thermistor) or Digital Input

Digital

- *(Optional)* Night mode override
- *(Optional)* Wall switch

Hardware Outputs

Analog

- None

Digital

- Damper actuator (internal)
- Stage 1 electric reheat or 2-position heating valve (or spare DO 3)
- *(Optional)* Stage 2 electric reheat or *(Optional)* Autozero Module

Ordering Notes

550-405N	Actuating Terminal Equipment Controller (ATEC) VAV with Reheat

Sequence of Operation

The following paragraphs present the sequence of operation for Application 2522, VAV with Electric Reheat or Baseboard Radiation.

Control Temperature Setpoints

CTL STPT is Overridden

If CTL STPT is overridden, that value is used regardless of any other settings. This disables the setpoint deadband feature.

CTL STPT in Night Mode

The controller is in Night mode if DAY.NGT = NGT and NGT OVRD = NGT.

When the controller is in Night mode, CTL STPT holds the value of NGT CLG STPT or NGT HTG STPT depending on the value of HEAT.COOL. When the controller is in Night mode, the value of RM STPT DIAL is ignored.

CTL STPT in Day Mode

The controller is in Day mode if DAY.NGT = DAY or NGT OVRD = DAY.

Without setpoint dial:

When the controller is in Day mode and STPT DIAL = NO, CTL STPT holds the value of DAY CLG STPT or DAY HTG STPT depending on the value of HEAT.COOL.

With setpoint dial:

When the controller is in Day mode and STPT DIAL = YES, CTL STPT holds a value based on RM STPT DIAL depending on your room unit model/revision.

Heating/Cooling Switchover

Based on Room Temperature (Internal Logic)

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, the controller switches from heating or cooling mode by setting HEAT.COOL to COOL:

- HTG LOOPOUT < SWITCH LIMIT.
- CTL TEMP > CTL STPT by at least the value set in SWITCH DBAND.
- 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 < SWITCH LIMIT.
- CTL TEMP < CTL STPT by at least the value set in SWITCH DBAND.
- CTL TEMP < the appropriate heating setpoint plus SWITCH DBAND.

Based on Supply Air Temperature (External Control)

NOTE:
The ATEC's internal heating/cooling switchover mechanism is not affected by the air temperature in the supply duct.

To change the value of HEAT.COOL based on the supply air temperature, you must command HEAT.COOL through PPCL. This is required when the supply duct delivers warm air for heat and cool air for cooling. In this case, you must disable the room-temperature-based switchover by commanding HEAT.COOL and determine the heat/cool mode based on the supply air temperature. When the supply air temperature is warm, the room is in the heating mode. When it is cold, the room is in the cooling mode.

Day and Night Modes

The day/night status of the space is determined by the status of DAY.NGT.

The control of this point differs depending on whether the controller is monitoring the status of a wall switch or is connected to a field panel.

When a wall switch is physically connected to the controller at the AI/DI port labeled AI 4 and WALL SWITCH = YES, the controller monitors the status of DI 4. When DI 4 = ON (the switch is closed), DAY.NGT will be set to DAY indicating that the controller is in day mode. When DI 4 = OFF (the switch is open), DAY.NGT will be set to NIGHT indicating that the controller is in night mode.

If the controller is operating stand-alone, it stays in day mode all the time. If the controller is operating with centralized control (that is, connected to a field panel), the field panel can send an operator or PPCL command to override the status of DAY.NGT. See the *Field Panel User's Manual* (125-1895) for more information.

Night Mode Override Switch

If an override switch is present on the room temperature sensor and a value (in hours) other than zero has been entered into OVRD TIME, pressing the override switch resets the controller to DAY operational mode for the time period that is set in OVRD TIME. The status of NGT OVRD changes to DAY. After the override time elapses, the controller returns to night mode and the status of NGT OVRD changes back to NIGHT.

The override switch on the room sensor only affects the controller when it is in Night mode.

Control Loops

The controller 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. See *Control Temperature Setpoints*.

Cooling Loop – The cooling loop generates cooling loopout which is then used to generate FLOW STPT. FLOW STPT is the result of scaling the cooling loopout to the appropriate range of values determined by flow minimum (CLG FLOW MIN) and flow maximum (CLG FLOW MAX).

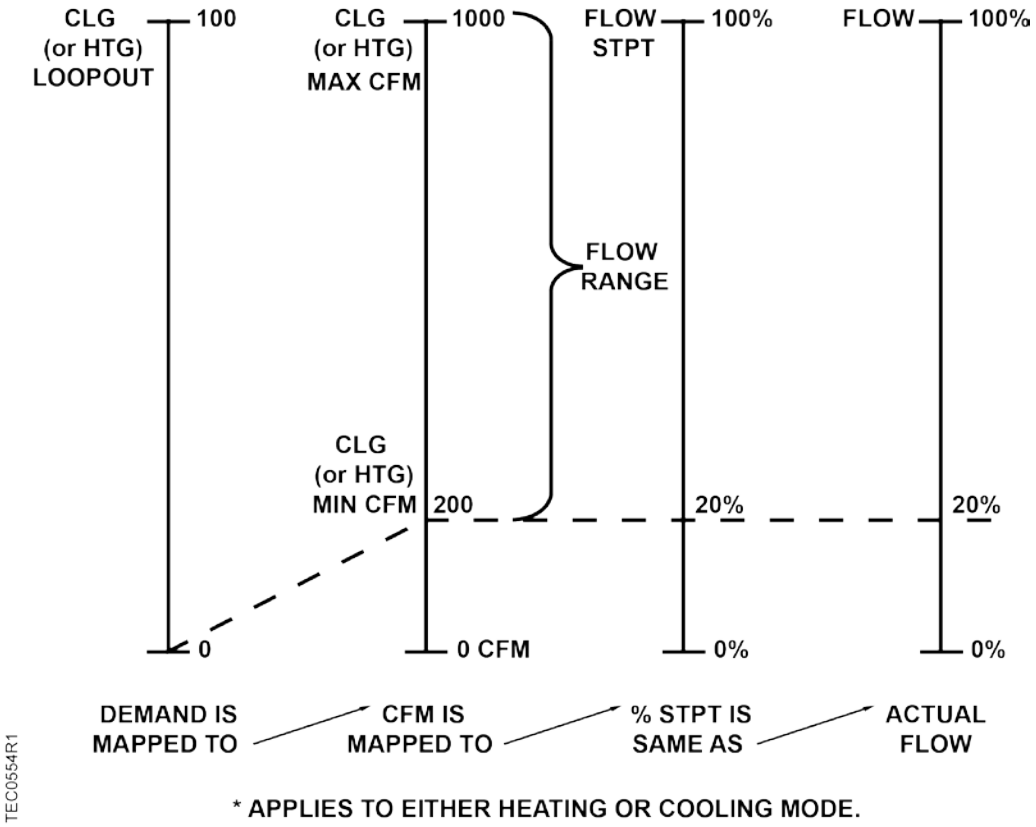
When CLG FLOW MIN ≠ 0 CFM, FLOWSTPT ≠ CLG LOOPOUT, the minimum flow setpoint is (CLG FLOW MIN/CLG FLOW MAX) × 100% flow. And, FLOW STPT is [CLG LOOPOUT × (100% – minimum setpoint)] + minimum setpoint.

The following figure describes how the flow setpoint is calculated:

FLOW STPT = [CLG LOOPOUT × (100% – % minimum setpoint)] + % minimum setpoint.

Where percent minimum setpoint is:

% minimum setpoint = (CLG FLOW MIN/CLG FLOW MAX) x 100%



FLOW STPT and FLOW % are relative to MIN and MAX STPTS of corresponding heating or cooling mode.

Example

If CLG FLOW MIN = 200 cfm, and CLG FLOW MAX = 1000 cfm, the minimum flow setpoint is (200 cfm/000 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:

- Option 1: Constantly maintain airflow out of the terminal box equal to CTL FLOW MIN.
- Option 2: Operate in sequence with the reheat.
- Option 3: Operate parallel with the reheat.
- Option 4: Overlap its operation with the operation of the electric reheat.

If Option 1 is chosen, HTG LOOPOUT controls the electric reheat in order to maintain the room temperature. If Options 2, 3, or 4 is chosen, HTG LOOPOUT controls both the flow loop setpoint (FLOW STPT) and the electric reheat in order to maintain the room temperature. See Sequencing Logic [➞ 11] 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 (CTL FLOW MIN/HTG FLOW MAX) × 100% flow or above 100% flow.

In heating mode, CTL FLOW MIN is equal to HTG FLOW MIN.

Flow Loop – The flow loop maintains FLOW STPT by modulating the supply air damper, DMPR COMD. The flow loop maintains the airflow between CTL FLOW MIN and CTL FLOW MAX.

To enhance stable flow control, an advanced algorithm is used to calculate a controllable setpoint as the value approaches zero cfm (lps).

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.

You can set CLG FLOW MIN equal to, but not greater than, CLG FLOW MAX. If the minimum and maximum values are set equal, the flow loop becomes a constant volume loop and loses its ability to control temperature.

FLOW is the input value for the flow loop. It is calculated as a percentage based on where AIR VOLUME 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 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 will not be less than CTL FLOW MIN.

Example

If CTL FLOW MIN = 250 cfm, and CTL FLOW MAX = 1000 cfm,
the low limit of FLOW STPT = (250 cfm/1000 cfm) × 100% flow
= 0.25 × 100% flow
= 25% flow.
Since 25% of 1000 cfm = 250 cfm, the minimum airflow out of the terminal box will be 250 cfm.

Electric Reheat

⚠ CAUTION

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

The heating loop controls 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 = 10 minutes), and the heating loop is calling for 60% of heating (HTG LOOPOUT = 60%) for every 10-minute period, the stages of electric auxiliary heat cycle as follows:

	One stage of heat		Two stages of heat			
	minutes		Stage 1: minutes		Stage 2: minutes	
HTG LOOPOUT	ON	OFF	ON	OFF	ON	OFF
40%	4	6	8	2	0	10
60%	6	4	10	0	2	8
100%	10	0	10	0	10	0

Baseboard Radiation

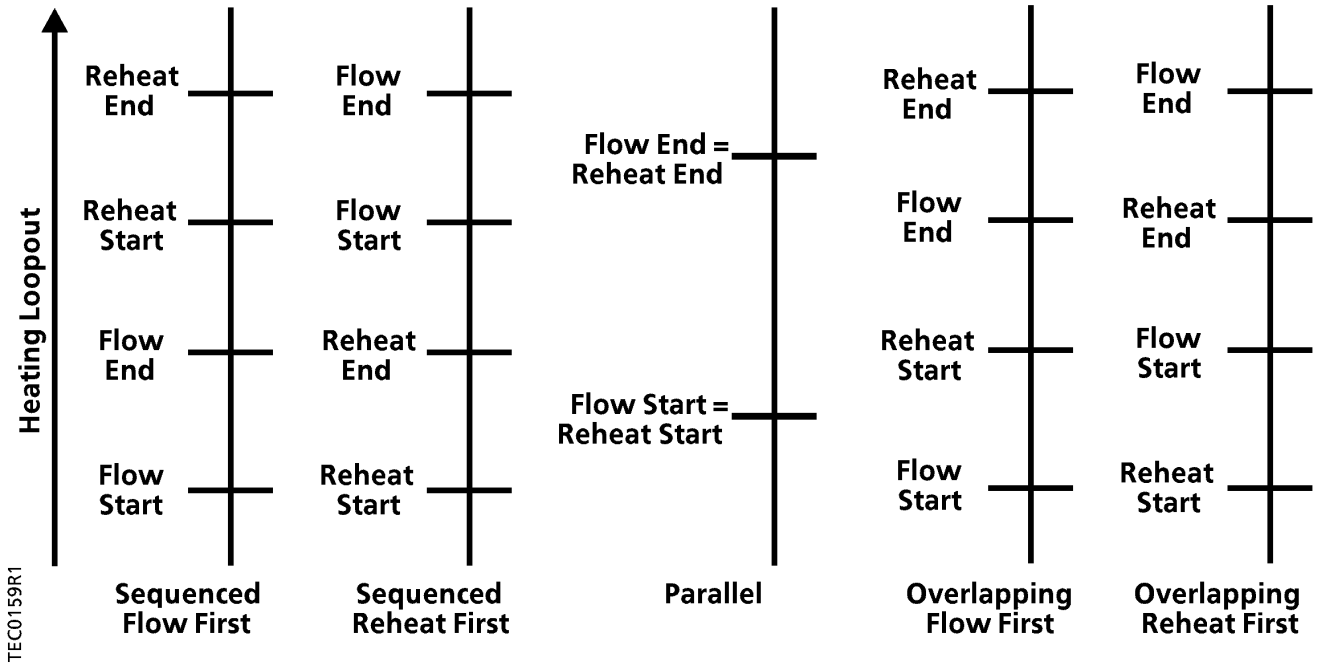
The baseboard radiation can be either a two-position valve or electrical resistance heating. If the controller is in cooling mode, the heating valve is closed. When in heating mode, the controller will operate the heating valve to maintain the heating setpoint as if it was a single stage of heat.

Sequencing Logic

NOTE:
The default setpoints, FLOW START = 0 and FLOW END = 0, provides minimum modulating supply 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 heating device. Selected portions of the output of the heating loop, HTG LOOPOUT, will drive both the flow loop and the heating from 0 to 100%. See the *Examples* section.

The ladder diagram shows sequenced, parallel, and overlapping flow loop operations with the heating device(s). The vertical bars show the output of heating loopout from 0 to 100%. The horizontal bars (reheat start, flow start, and so on.) 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.



For simplicity, assume that in these examples:

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

Examples

Example 1 (Airflow Sequenced First)

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

- FLOW START = 0%
- FLOW END = 50%
- REHEAT START = 50%
- REHEAT END = 100%

then,

- When HTG LOOPOUT = 0%, FLOW STPT will equal 0% flow.
- When HTG LOOPOUT = 25%, FLOW STPT will equal 50% flow.
- When HTG LOOPOUT ≥ 50%, FLOW STPT will equal 100% flow.
- When HTG LOOPOUT ≤ 50%, the electric heat will be off all the time.
- When HTG LOOPOUT = 75%, for every 10-minute period the electric heat will be on for 5 minutes and off for 5 minutes.
- When HTG LOOPOUT = 100%, the electric heat will be on all the time.

Example 2 (Airflow and Heat Sequenced Together)

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

- FLOW START = 0%
- FLOW END = 100%
- REHEAT START = 0%
- REHEAT END = 100%

then,

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

Example 3 (Airflow Sequenced First with Overlap for Heating)

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

- FLOW START = 0%
- FLOW END = 75%
- REHEAT START = 25%
- REHEAT END = 100%

then,

- When HTG LOOPOUT = 0%, FLOW STPT will equal 0% flow.
- When HTG LOOPOUT = 37.5%, FLOW STPT will equal 50% flow.
- When HTG LOOPOUT ≥ 75%, FLOW STPT will equal 100% flow.
- When HTG LOOPOUT ≤ 25%, the electric heat will be off all the time.
- When HTG LOOPOUT = 62.5%, for every 10-minute period the electric heat will be on for 5 minutes and off for 5 minutes.
- When HTG LOOPOUT = 100%, the electric heat will be on all the time.

Another option that the sequencing logic provides is to have the flow loop provide an airflow equal to HTG FLOW MIN throughout the heating mode with all of the temperature control being done by the electric heat. The airflow minimum is maintained by setting the FLOW START and FLOW END to a value of 0%, resulting in the corresponding minimum flow throughout the entire heating mode, regardless of the value of HTG LOOPOUT. Example 4 clarifies this:

Example 4 (Airflow Remains Fixed; Heating Modulates)

If the job requirement specifies that the supply airflow in heating will remain fixed, set HTG FLOW MIN = HTG FLOW MAX so that the fixed value in heating is indicated. An alternative setting, would be to set FLOW START = FLOW MIN = 0, which would fix the flow at HTG FLOW MIN.

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.

- HTG FLOW MIN = 170 cfm
- HTG FLOW MAX = 1000 cfm
- STAGE COUNT = 1

- STAGE TIME = 10 minutes

If:

- FLOW START=0%
- FLOW END=0% (or/and HTG FLOW MIN = HTG FLOW MAX)
- REHEAT START = 0%
- REHEAT END = 100%

then,

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

Calibration

Calibration of the controller's internal air velocity sensor(s) is periodically required to maintain accurate air velocity readings. CAL SETUP 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 = YES, calibration is in progress.

- For a controller used without an Autozero Module (CAL MODULE = 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.

NOTE:
(Optional) Heat Stage 2 and Autozero Module points can't be used at the same time. If Autozero Module is used, it must be set to Stage Count 1; however, the point name will still display as Heat Stage 2.

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.

Floating Control Actuation Auto-correct

In addition to the existing options for floating control actuator full stroke actions, all floating control actuators are provided with additional logic to fully drive open or closed when commanded to 100% or 0%.

Fail Mode 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.

Performing the Automated Fault Detection and Diagnostics

VAV ATEC controllers have a built-in checkout procedure that performs a basic fault detection and diagnostic routine. It can be manually initiated at any time after the controller has been installed. This procedure tests all of the necessary I/O and ensures the controller can operate within the set airflow range, between CLG FLOW MIN and CLG FLOW MAX.

To perform the checkout procedure, set CHK OUT to **YES**. When the procedure has completed, CHK OUT returns to NO and the results display in CHK STATUS, Table *Possible Failure Value and Description*.

Possible Failure Value and Description	
CHK STATUS Values	**Description**
-1	Checkout procedure has not been run since last controller initialization.
0	No errors found.
1	RTS failed.
2	Room Setpoint dial failed (If STPT DIAL = YES).
4	AVS failed.
8	Controller could not reach CLG FLOW MIN or below.
16	Controller could not reach CLG FLOW MAX or above.
32	Controller did not read low (zero) flow when damper closed.

NOTE:
Multiple failures are added together and displayed as one value. For example, if the RTS failed (1) and the controller could not reach CLG FLOW MAX (16), CHK STATUS displays 17.

Failure codes indicate the following possible problems.

Room temperature sensor failed—CHK STATUS = 1

1. The cable for the room temperature sensor may be unplugged or loose. Check both ends to ensure that the cable is securely seated.
2. Connect directly to the controller through the room temperature sensor connection on the VAV Actuator and check whether communication is possible. If so, the problem lies in the room temperature sensor or its cable. If not, the problem is with the controller.

3. Contact your local Siemens Industry representative.

Room setpoint dial failed—CHK STATUS = 2

1. The cable for the room temperature sensor may be unplugged or loose. Check both ends to ensure that the cable is securely seated.
2. The controller may be incorrectly set to use a setpoint dial with a sensor that does not have the dial. If the sensor has no dial, change STPT DIAL from **YES** to **NO**.
3. Connect directly to the controller through the room temperature sensor connection on the VAV Actuator and check whether communication is possible. If so, the problem lies in the room temperature sensor or its cable. If not, the problem is with the controller.
4. Contact your local Siemens Industry representative.

Air velocity sensor failed—CHK STATUS = 4

1. The sensor tubing may be blocked, leaking, or disconnected. Check for pinched, disconnected, or cracked sensor tubing. Correct as needed.
2. The tubing connections for the air velocity sensor may be reversed. Re-pipe if HI and LO connections are incorrect.
3. The sensor or the VAV Actuator may be faulty.

Controller could not reach CLG FLOW MIN or below—CHK STATUS = 8

1. The actuator may be loose on the shaft. Check that the set screw is fully tightened against the damper shaft. Follow these torque guidelines:
   - 70 ± 5 inch pounds—solid metal
   - 37 ± 2 inch pounds—plastic, graphite, composite, or hollow metal (Hollow metal shafts require an insert to prevent shaft damage.)
2. The tubing for the air velocity sensor may be pinched, disconnected, or cracked. Check the tubing and correct as needed.
3. The tubing connections for the air velocity sensor may be reversed. Re-pipe if HI and LO connections are incorrect.
4. Box sizing information may be incorrect. Check the values of the following points and correct as needed:
   - DUCT AREA
   - FLOW COEFF
   - CLG FLOW MIN
   - CLG FLOW MAX
5. Motor setup information may be incorrect. Check the values of the following points and correct as needed:
   - MTR SETUP
   - MTR1 TIMING
   - DMPR ROT ANG

6. The box may not have been balanced correctly. Contact your local Siemens Industry representative.
7. The air velocity sensor may need calibration. Set CAL AIR to **YES** to run the calibration sequence. When CAL AIR returns to NO, indicating that the sequence is finished, run the checkout procedure again to see whether the problem has been corrected.

Controller could not reach CLG FLOW MAX or above—CHK STATUS = 16

1. Check for the problems described immediately above for CLG FLOW MIN.
2. The box may be starved for air, because either the central air-handling unit is off or there is low duct static.

Controller did not read low (zero) flow when damper closed—CHK STATUS = 32

1. Check for the problems described above for CLG FLOW MIN.
2. The damper shaft may not be secured correctly to the actuator so that when the actuator is fully closed, the damper does not completely shut off airflow.
3. Airflow calibration (at zero) may need to be performed ensuring the damper is fully closed and/or the air handling unit is off.

Application Notes

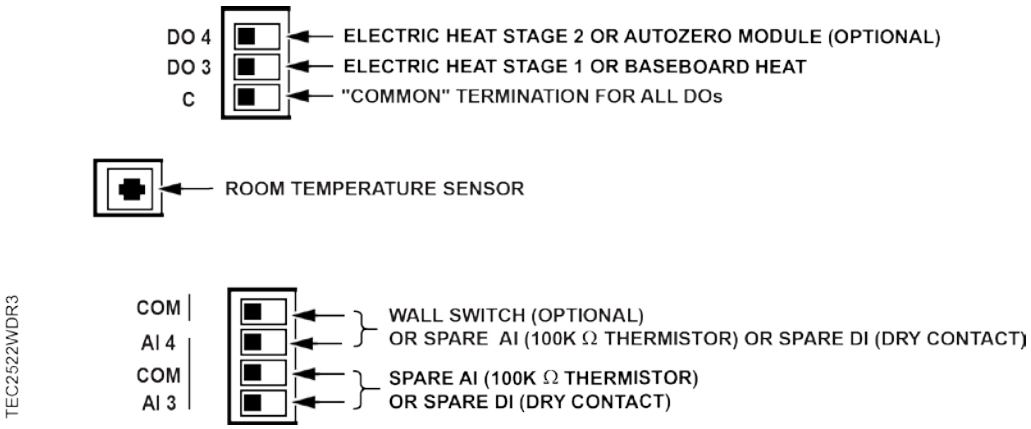
- If temperature swings in the room are excessive or there is trouble maintaining the setpoint, the cooling loop must be tuned. If FLOW is oscillating while FLOW STPT is constant, the flow loop requires tuning.
- The controller, as shipped from the factory, keeps all associated equipment OFF.

For more information, contact your local Siemens Industry representative.

Wiring Diagram

NOTE:
The controller's DOs control 24 Vac loads only. The maximum rating is 12 VA for each DO. An external interposing relay is required 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
(for example, part number 540-147, Terminal Equipment Controller Relay Module)



Application 2522 VAV with Electric Reheat or Baseboard Radiation Wiring Diagram.

Application 2522 Point Database

Point Number	Descriptor	Factory Default (SI Units)[2]	Eng Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
1	CTLR ADDRESS	99	--	1	0	--	--
2	APPLICATION	2473	--	1	0	--	--
{03}	CHK STATUS	-1	--	1	-1	--	--
{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
6	DAY CLG STPT	74.0 (23.44888)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.88888)	--	--
7	DAY HTG STPT	70.0 (21.20888)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.88888)	--	--
8	NGT CLG STPT	82.0 (27.92888)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.88888)	--	--
9	NGT HTG STPT	65.0 (18.40888)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.88888)	--	--
{10}	CHK OUT	NO	--	--	--	YES	NO
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}	AI 3	74.0 (23.495556)	DEG F (DEG C)	0.5 (0.28)	37.5 (3.055556)	--	--
16	FLOW START	0	PCT	0.4	0	--	--
17	FLOW END	0	PCT	0.4	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	PCT	0.4	0	--	--
23	REHEAT END	100	PCT	0.4	0	--	--
{24}	DI 4	OFF	--	--	--	ON	OFF
{25}	DI 3	OFF	--	--	--	ON	OFF
{29}	DAY.NGT	DAY	--	--	--	NIGHT	DAY
31	CLG FLOW MIN	220 (103.818)	CFM (LPS)	4 (1.8876)	0	--	--

Point Number	Descriptor	Factory Default (SI Units)[2]	Eng 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	--	0.01	0	--	--
{40}	AI 4	74.0 (23.495556)	DEG F (DEG C)	0.5 (0.28)	37.5 (3.055556)	--	--
{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
{48}	DMPR COMD	0	PCT	0.4	0	--	--
{49}	DMPR POS	0	PCT	0.4	0	--	--
51	MTR1 TIMING	95	SEC	1	0	--	--
56	DMPR ROT ANG	90	--	1	0	--	--
58	MTR SETUP	1	--	1	0	--	--
59	DO DIR. REV	0	--	1	0	--	--
60	EHEAT FLOW	20	PCT	0.4	0	--	--
63	CLG P GAIN	20.0 (36.0)	--	0.25 (0.45)	0	--	--
64	CLG I GAIN	0.01 (0.018)	--	0.001 (0.0018)	0	--	--
65	CLG D GAIN	0 (0.0)	--	2 (3.6)	0	--	--
66	CLG BIAS	0	PCT	0.4	0	--	--
67	HTG P GAIN	10.0 (18.0)	--	0.25 (0.45)	0	--	--
68	HTG I GAIN	0.01 (0.018)	--	0.001 (0.0018)	0	--	--
69	HTG D GAIN	0 (0.0)	--	2 (3.6)	0	--	--
70	HTG BIAS	0	PCT	0.4	0	--	--
71	FLOW P GAIN	0	--	0.05	0	--	--
72	FLOW I GAIN	0.01	--	0.001	0	--	--
73	FLOW D GAIN	0	--	2	0	--	--
74	FLOW BIAS	50	PCT	0.4	0	--	--
{75}	FLOW	0	PCT	0.25	0	--	--
{76}	CTL FLOW MIN	220 (103.818)	CFM (LPS)	4 (1.8876)	0	--	--
{77}	CTL FLOW MAX	2200	CFM (LPS)	4 (1.8876)	0	--	--

Point Number	Descriptor	Factory Default (SI Units)[2]	Eng Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
		(1038.18)					
{78}	CTL TEMP	74.0 (23.44888)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.88888)	--	--
{79}	CLG LOOPOUT	0	PCT	0.4	0	--	--
{80}	HTG LOOPOUT	0	PCT	0.4	0	--	--
{81}	AVG HEAT OUT	0	PCT	0.4	0	--	--
82	STAGE MAX	90	PCT	0.4	0	--	--
83	STAGE MIN	10	PCT	0.4	0	--	--
{84}	DMPR STATUS	CAL	--	--	--	RECAL	CAL
85	SWITCH LIMIT	5.2	PCT	0.4	0	--	--
86	SWITCH TIME	10	MIN	1	0	--	--
87	CAL MODULE	NO	--	--	--	YES	NO
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	--	--
{92}	CTL STPT	74.0 (23.44888)	DEG F (DEG C)	0.25 (0.14)	48.0 (8.88888)	--	--
{93}	FLOW STPT	0	PCT	0.25	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	--	--
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.