SIEMENS

BACnet PTEC Controller

Dual Duct 2 AVS - VAV One Inlet Sensor with Optional Reheat, Application 6568

Application Note

140-0998

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Restricted

Building Technologies

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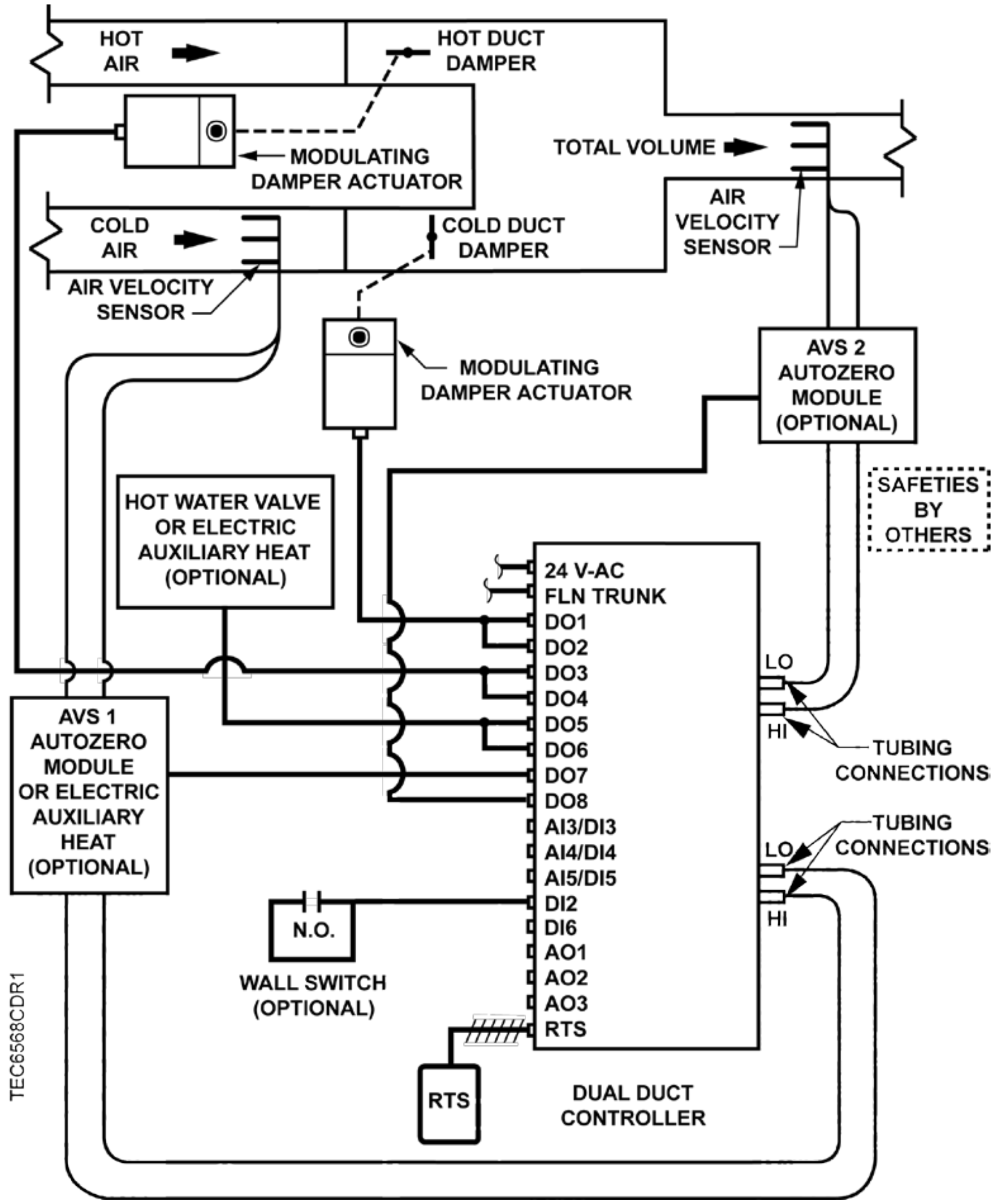
Overview

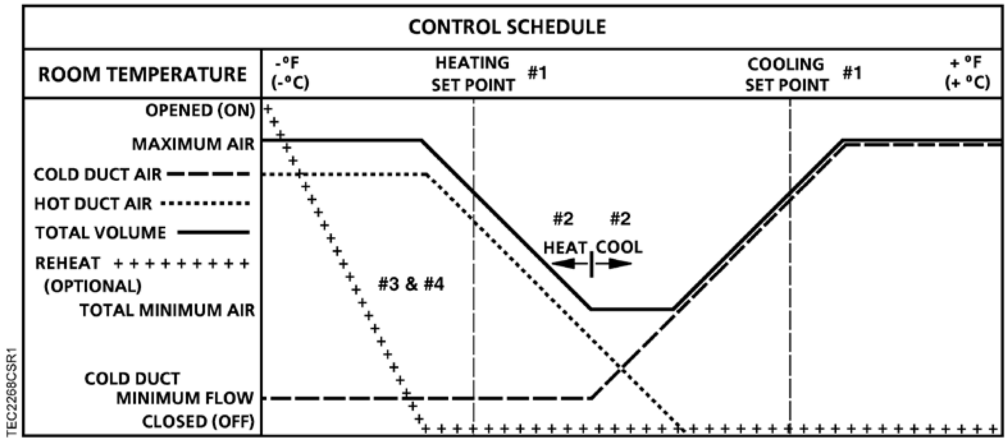
NOTE:
For information on applications with Firmware Revision B*x*40 or earlier, see InfoLink and/or Asset Portal for documentation.

In Application 6568, the controller provides independent control of the hot duct and the cold duct inlet dampers to provide variable air volume control to modulate the cold and hot duct dampers via two flow sensors-one in the cold duct and one in the common discharge duct.

In cooling mode, the controller modulates the cold duct damper to maintain the room temperature setpoint and modulates the hot duct damper to ensure minimum airflow. In heating mode, the controller modulates the hot duct damper in order to maintain the room temperature setpoint and modulates the cold duct damper to ensure minimum airflow. If auxiliary heat is used, the controller modulates an optional hot water valve or up to three stages of electric reheat to maintain the room temperature setpoint.



Application 6568 Control Diagram.



Application 6568 Control Schedule.

BACnet

The controller communicates using BACnet MS/TP protocol for open communications on BACnet MS/TP networks.

Product	Supported BIBBs	BIBB Name
BTEC/PTEC	DS-RP-B B	Data Sharing-Read Property-B
	DS-RPM-B	Data Sharing-Read Property Multiple-B
	DS-WP-B	Data Sharing-Write Property-B
	DM-DDB-B	Device Management-Dynamic Device Binding-B
	DM-DOB-B	Device Management-Dynamic Object Binding-B
	DM-DCC-B	Device Management-Device Communication Control-B
	DM-RD-B	Device Management-Reinitialize Device-B
	DM-BR-B	Device Management-Backup and Restore-B
	DM-OCD-B	Device Management-Object Creation and Deletion-B

Hardware Inputs

Analog

- Air velocity sensor (two required)
- Room temperature sensor
- Room temperature setpoint dial (optional)

Digital

- Wall switch (optional)

Hardware Outputs

Analog

- Spare AO 1, AO 2, and AO 3 (0-10V)

Digital

- Damper actuator (two required)
- Stage 1 electric heat (optional)
- Stage 2 electric heat (optional)
- Stage 3 electric heat (optional) or Autozero modules (optional)
- Valve actuator (optional)

Ordering Notes

550-497P	Siemens BACnet PTEC Dual Duct Controller
540-507N	Siemens BACnet PTEC Dual Duct Controller with Autozero Module

Sequence of Operation

The following paragraphs present the sequence of operation for Application 6568 -- VAV One Inlet and One Outlet Sensor with Optional Reheat.

Control Temperature Setpoints

This application has a number of different room temperature setpoints (DAY HTG STPT, NGT CLG STPT, RM STPT DIAL, etc.). The application actually controls using the CTL STPT. CTL STPT is set to different values depending on its override status, the time of day, whether or not a temperature deadband (zero energy band) has been configured, and the type of RTS used.

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 is set based on the value of the setpoint dial and the setpoint deadband.

The setpoint deadband exists to allow the controller to provide a separation of the heating and cooling temperature setpoints when a setpoint dial is enabled.

The setpoint deadband is the difference between the cooling and heating day setpoints (DAY CLG STPT - DAY HTG STPT). The setpoint deadband can be disabled by setting DAY HTG STPT equal to DAY CLG STPT. When DAY HTG STPT does not equal DAY CLG STPT, a setpoint deadband (or zero energy band) is used.

The following values are used in the calculation of CTL STPT:

- *Dial value* is the value of RM STPT DIAL limited between the value of RM STPT MIN and RM STPT MAX.
- *Deadband* is the value of the difference between DAY CLG STPT and DAY HTG STPT, half of which is applied to establish the current heating and cooling setpoints.
  - *Deadband* = (DAY CLG STPT – DAY HTG STPT)

CTL STPT is calculated as follows:

With Deadband disabled:

CTL STPT = *Dial value*

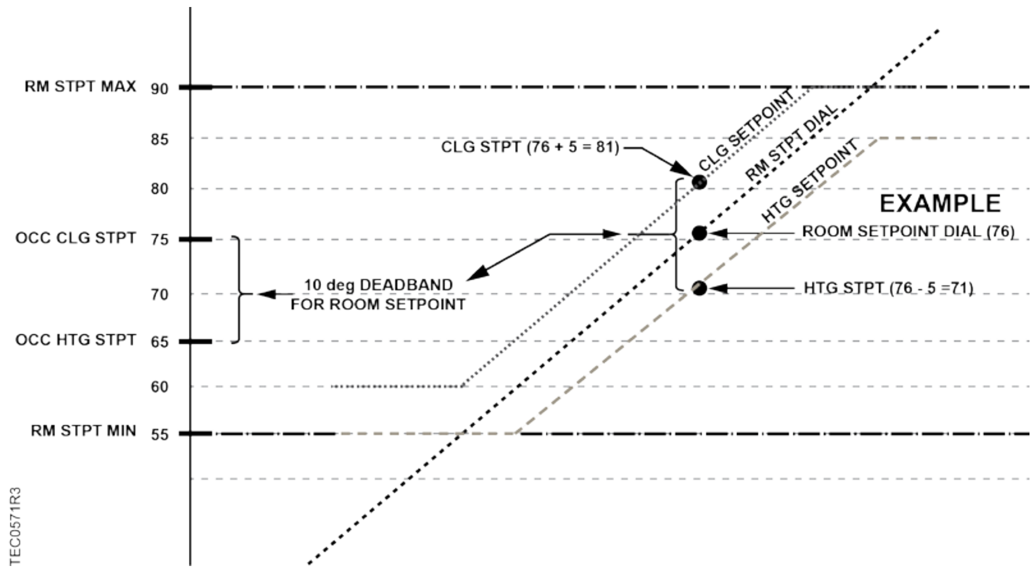
With Deadband enabled in Heat Mode:

CTL STPT = *Dial value* – 0.5 * *Deadband* (limited between the value of RM STPT MIN and RM STPT MAX)

With Deadband enabled in Cool Mode:

CTL STPT = *Dial value* + 0.5 * *Deadband* (limited between the value of RM STPT MIN and RM STPT MAX)

NOTE:
If RM STPT DIAL is failed, it maintains the last known value.



Room Temperature, Room Temperature Offset and CTL TEMP

ROOM TEMP is the temperature that is being sensed by the room temperature sensor (RTS).

RMTMP OFFSET (or TEMP OFFSET) is a user-adjustable offset that will compensate for deviations between the value of ROOM TEMP and the actual room temperature.

CTL TEMP is the room temperature that is used for control purposes. In other words, what the application is trying to do is to maintain CTL TEMP at the control setpoint.

When CTL TEMP is not overridden, CTL TEMP and ROOM TEMP are related by the following equation:

CTL TEMP = ROOM TEMP + RMTMP OFFSET (or TEMP OFFSET)

If CTL TEMP is not overridden, then:

- The current value of ROOM TEMP (normal or overridden) is used to determine the value of CTL TEMP.
- If ROOM TEMP has a status of Failed, then last known good value of ROOM TEMP is used to determine the value of CTL TEMP.

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 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 (see the *Control Diagram* in Overview), and WALL SWITCH = YES, the controller monitors the status of DI 2. When the status of DI 2 is ON (the switch is closed), then DAY.NGT will be set to DAY indicating that the controller is in day mode. When the status of DI 2 is OFF (the switch is open), then 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, if the controller is operating stand-alone, then the controller stays in day 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 DAY.NGT. See the *Powers Process Control Language (PPCL) User's Manual* (125-1896) and *Field Panel User's Manual* (125-3019 or 125-3020) 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 will reset 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 will only affect the controller when it is 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, the controller switches from heating to cooling mode by setting HEAT.COOL to COOL:

- HTG LOOPOUT < 5.2%.
- CTL TEMP > CTL STPT by at least the value set in SWITCH DBAND.
- CTL TEMP > the appropriate cooling setpoint minus SWITCH DBAND.

If AUX HTG USED = YES, and 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 < 5.2%.
- CTL TEMP < CTL STPT by at least the value set SWITCH DBAND.

- CTL TEMP < the appropriate heating setpoint plus SWITCH DBAND.

Control Loops

The dual duct is controlled by four Proportional, Integral, and Derivative (PID) control loops: two temperature loops and two flow loops.

Temperature Loops – The two temperature loops are a cooling loop and a heating loop. The active temperature loop maintains CTL STPT. See Control Temperature Setpoints.

Flow Loops – The two flow loops are a cooling flow loop and a heating flow loop.

The cooling flow loop maintains CLG FLO STPT by modulating the cold duct damper point, CLG DMP CMD. During occupancy, the cooling flow loop maintains the cold duct airflow between the value of CLG FLOW MIN and the value of CLG FLOW MAX. During unoccupied periods, the cooling flow loop maintains the cold duct airflow between 0 cfm and the value of CLG FLOW MAX.

CLG FLOW is the input value for the cooling flow loop. It is calculated as a percentage based on where CLG VOLUME is between 0 cfm and the value of CLG FLOW MAX.

- If CLG VOLUME = 0 cfm, CLG FLOW is 0%.
- If CLG VOLUME = CLG FLOW MAX, CLG FLOW is 100%.

The heating flow loop maintains HTG FLO STPT by modulating HTG DMP CMD. During occupancy, the heating flow loop maintains the hot duct airflow between 0 cfm and the value of HTG FLOW MAX. During unoccupied periods, the heating flow loop maintains the hot duct airflow between 0 cfm and HTG FLOW MAX.

The heating flow loop maintains TOT FLO STPT by modulating HTG DMP CMD. During occupancy, the heating flow loop maintains the hot duct airflow between 0 cfm and the value of TOT FLOW MAX. During unoccupied periods, the heating flow loop maintains the hot duct airflow between 0 cfm and TOT FLOW MAX.

TOT FLOW is the input value for the heating flow loop. It is calculated as a percentage based on where the value of TOT VOLUME is between the value of 0 cfm and TOT FLOW MAX.

- If TOT VOLUME = 0 cfm, TOT FLOW is 0%.
- If TOT VOLUME = TOT FLOW MAX, TOT FLOW is 100%.

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

Cooling Operation

The output of the cooling loop, CLG LOOPOUT, is used to calculate the setpoint for the cooling flow loop, CLG FLO STPT. This flow loop maintains the space temperature. The cooling flow loop limits the airflow supplied by the cold duct to the value of CLG FLOW MAX. In day mode, the minimum airflow from the cold duct will be CLG FLOW MIN. In night mode, the minimum airflow from the cold duct will be 0 cfm. The heating flow loop provides any make up air that is necessary to ensure that the airflow from the dual duct box is at least the value stored in TOT FLOW MIN. When the cooling loop provides an airflow equal to or greater than the value of TOT FLOW MIN from the cold duct, the HTG FLO STPT = 0, causing the hot duct damper to close.

In day cooling mode (HEAT.COOL = COOL), the cooling flow loop controls the space temperature using the following calculation (scaling CLG LOOPOUT between CLG FLOW MIN and CLG FLOW MAX):

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

In night cooling mode, the CLG FLO STPT = CLG LOOPOUT.

Heating Operation

In both day and night heating modes, the value of the TOT FLO STPT depends on the value of HTG LOOPOUT. Room temperature control is then done by the heating flow loop and the auxiliary heat working in sequence, simultaneously, or overlapping. See *Sequencing Logic* for more information.

In heating mode, the heating flow loop is used to provide any additional air needed in order to ensure that the airflow out of the dual duct box is at least the same as the value stored in TOT FLOW MIN. If the cold duct is unable to provide enough flow so that the total flow is equal to, or greater than, the TOT FLOW MIN, the heating flow damper will open to make up the difference.

In day heating mode, the hot duct damper modulates the total flow to be between CLG FLOW MAX and TOT FLOW MIN or CLG FLOW MIN, whichever is greater. The cold duct damper is set to provide the cooling flow minimum.

See Optional Auxiliary Heat [→ 12] for more information.

Optional Auxiliary Heat

If AUX HTG USED = YES, this application also controls auxiliary heat. The value of AUX HTG TYPE indicates the type of auxiliary heat control. If AUX HTG USED = NO, no auxiliary heat is used and HEAT.COOL is automatically set to COOL.

CAUTION

If using electric heat, 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 or equipment damage may result.

Do not set TOT FLOW MIN to zero.

Hot Water Auxiliary Heat – If AUX HTG TYPE = HW, the application controls auxiliary hot water heat. The heating loop modulates the heating valve point, VALVE COMD in order to warm the space. When the controller is in cooling mode, the heating valve is closed.

Electric Auxiliary Heat – If AUX HTG TYPE = ELEC, the heating loop controls up to three 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. STAGE COUNT must be set equal to the number of stages of electric reheat being used.

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:

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

NOTE:
If three stages of electric heat are used, Autozero Modules cannot be used. If two stages or less are used, Autozero Modules can be used.

Sequencing Logic

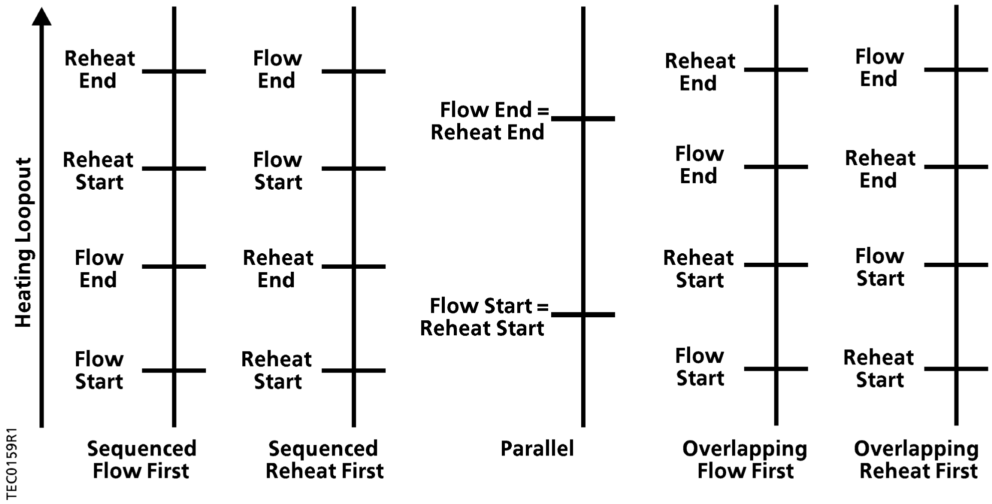
In heating mode, this application includes logic that allows the flow loop to operate either in sequence, parallel, or overlapping with the auxiliary reheat. This algorithm is very similar to the spring range sequencing of valves and dampers. Portions of the output of the heating loop, HTG LOOPOUT, will drive both the flow loop setpoint and the auxiliary heat (if used) from 0 to 100%. See the following examples.

For simplicity, assume that in these examples:

- AUX HTG USED = YES
- AUX HTG TYPE = HW, and there is a hot water valve for auxiliary heat. (When this is done, HTG FLO STPT will equal 0 when HTG LOOPOUT = 0).

NOTE:
In the examples shown, HTG FLOW STPT is internally derived from TOT FLO STPT through CLG FLOW STPT.

The ladder diagrams show sequenced, parallel, and overlapping flow loop operations with heating stages. 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.



Example 1 (Airflow Sequenced First)

Assume that your system has a hot water valve 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%, HTG FLO STPT will equal 0% flow.
- When HTG LOOPOUT = 25%, HTG FLO STPT will equal 50% flow.
- When HTG LOOPOUT ≥ 50%, HTG FLO STPT will equal 100% flow.
- When HTG LOOPOUT ≤ 50%, VALVE COMD will equal 0% open.
- When HTG LOOPOUT = 75%, VALVE COMD will equal 50% open.
- When HTG LOOPOUT = 100%, VALVE COMD will equal 100% open.

Example 2 (Airflow and Heat Sequenced Together)

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

- When HTG LOOPOUT = 100%, VALVE COMD will equal 100% open.

Example 3 (Airflow Sequenced First with Overlap for Heating)

Assume that your system has a hot water valve 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%, HTG FLO STPT will equal 0% flow.
- When HTG LOOPOUT = 37.5%, HTG FLO STPT will equal 50% flow.
- When HTG LOOPOUT ≥ 75%, HTG FLO STPT will equal 100% flow.
- When HTG LOOPOUT ≤ 25%, VALVE COMD will equal 0% open.
- When HTG LOOPOUT = 62.5%, VALVE COMD will equal 50% open.
- When HTG LOOPOUT = 100%, VALVE COMD will equal 100% open.

Another option that the sequencing logic provides is to have the flow loop provide an airflow equal to TOT 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 the FLOW START and FLOW END to 0% which will cause HTG FLO STPT to hold the value corresponding to minimum flow throughout the entire heating mode, regardless of the value of HTG LOOPOUT.

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.

NOTE:
The first time after startup or initialization, the controller will calibrate the dampers as if not using Autozero Modules, although the Autozero Modules will be activated. All subsequent calibrations will use the Autozero Modules only.

Calibration of the valve is not affected by the presence of Autozero Modules.

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.

The Autozero Modules are used during calibration when they are wired to DO 7 and DO 8 and CAL MODULE = YES.

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%.

AI 4/AI 5 OFFSET (Optional)

AI 4 OFFSET works like RMTMP OFFSET. It can be used to calibrate AI 4 aux temp sensor input if necessary. The actual temperature plus AI 4 OFFSET will equal AI 4 display temperature.

AI 5 OFFSET works the same as AI 4 OFFSET.

Room Unit Operation

Stat Supervision

STAT SUPV is a configurable, enumerated point (values are additive). This point tells the controller how to handle loss of data when used with a digital room unit.

Room Temperature

- When the digital room unit (Series 2200/2300) is used, STAT SUPV enables loss of communications indication:
  - Temperature sensing with a value of 1.
  - Relative humidity sensing (from the room unit) with a value of 2.
  - CO2 sensing (from the room unit) with a value of 4.
- Communication for Series 2200 sensor baud rate must be set to 1200.
- When the analog room unit (Series 1000/2000) is used, default temperature sensing (0) is enabled (relative humidity and CO2 sensing are not available on the room units and should not be selected with STAT SUPV).

Other Inputs (only available on Digital Room Unit)

- Use the following table to enable communications supervision of room temperature, relative humidity or CO2 for additive values of 2 or 4.

STAT SUPV Value * (additive)	Description (include values to enable feature)
1	Room temperature sensing
2	Relative Humidity (RH) sensing
4	CO_2 sensing

	⚠ CAUTION
	Digital Room Units that have the RH and/or the CO2 feature will always update the present value and put the associated points (RM TEMP, RM RH, and RM CO2) in override mode, preventing external (or PPCL) commands from being used. STAT SUPV is only provided to allow these points to report a FAIL mode when the room unit fails to update these points. If an alternative source is selected you must insure that the room unit is not provided with the same sensor option.

See *Sensors and Transducers Configuration and Sizing* for part numbers and ordering information.

Room CO2

RM CO2 displays the CO_2 value in units of parts-per-million (PPM). RM CO2 can be used with PPCL in the PTEC controller or unbundled for control or monitoring purposes.

Room RH

RM RH displays the relative humidity value in percent. RM RH can be used for PPCL in the PTEC or unbundled for control or monitoring purposes.

Fail Mode Operation

If the air velocity sensor points, HTG VOLUME and/or CLG VOLUME are failed, the dampers are controlled in one of two ways:

If the air velocity sensor point, TOT VOLUME is failed, or if both air velocity sensor points (TOT VOLUME and CLG VOLUME) are failed, damper control depends on the status of HEAT.COOL.

- If FAIL MODE = OPEN, the controller sets CLG DMP CMD and HTG DMP CMD to 100% open.
- If FAIL MODE = CLOSED, the controller sets CLG DMP CMD and HTG DMP CMD to 0% open.
- If HEAT.COOL reads HEAT, the following occurs:
  - HTG DMP CMD is set equal to the total flow setpoint, TOT FLO STPT,
  - CLG DMP CMD is set equal to 100% minus TOT FLO STPT.

\- or -

- If HEAT.COOL reads COOL, the following occurs:
  - CLG DMP CMD is set equal to the output of the cooling loop, CLG LOOPOUT,
  - HTG DMP CMD is set equal to 100% minus CLG LOOPOUT.

This causes the hot duct and the cold duct dampers to be controlled as pressure dependent dampers by the cooling temperature loop.

If only the air velocity sensor point CLG VOLUME is failed, the heating damper is controlled normally. Control of the cold duct damper depends on the status of HEAT.COOL as follows:

- If HEAT.COOL reads HEAT, CLG DMP CMD is set to 0% open closing the cold duct damper.
- If HEAT.COOL reads COOL, CLG DMP CMD is set equal to the output of the cooling loop, CLG LOOPOUT.

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

Application Notes

- If the temperature swings in the room are excessive or there is trouble maintaining the setpoint, then either the cooling loop, the heating loop, or both need to be tuned. If CLG FLOW is oscillating while CLG FLOW STPT is constant, then the flow loop requires tuning. If HTG FLOW is oscillating while HTG FLO STPT is constant, the heating flow loop requires tuning.
- The controller as shipped from the factory keeps all associated equipment OFF. See the *Start-up* document for how to release the controller and its equipment to application control.
- 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 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.

For more information, contact your nearest Siemens Industry, Inc. representative.

Wiring Diagrams

CAUTION

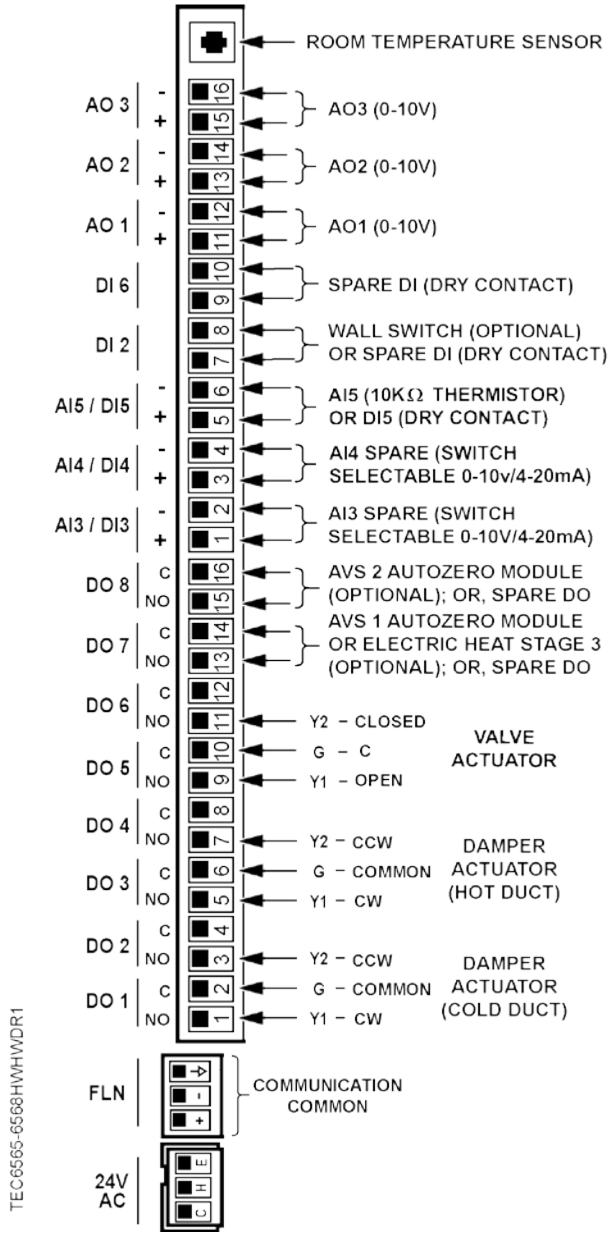
The controller’s DOs control 24 Vac loads only. The maximum rating is 12 VA for each DO. An external interposing relay is required for any of the following:

• VA requirements higher than the maximum

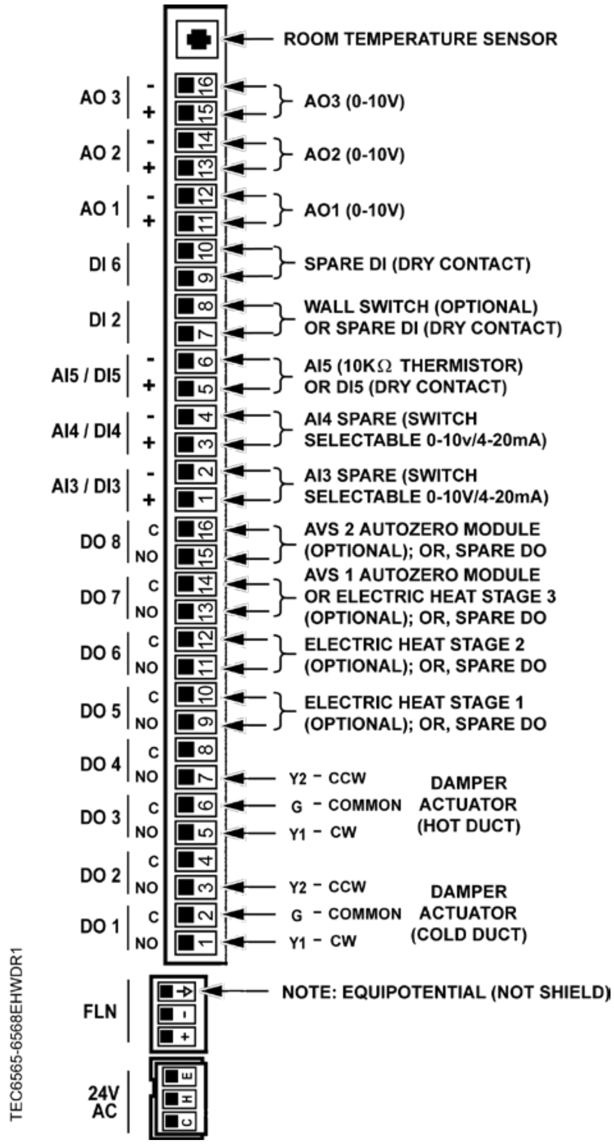
• 110 or 220 Vac requirements

• DC power requirements

• Separate transformers used to power the load
(for example part number 540-147, Terminal Equipment Controller Relay Module)



Applications 6565, 6566, 6567, and 6568 with Hot Water Reheat.



Applications 6565, 6566, 6567, and 6568 with Electric Auxiliary Reheat.

Application 6568 Point Database

Object Type	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
AO	1	CTLR ADDRESS	99	--	0-255	--	--
AO	2	APPLICATI ON	6593	--	0-32767	--	--
AI	{04}	ROOM TEMP	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
BO	{05}	HEAT.COO L	COOL	--	Binary	HEAT	COOL
AO	{06}	DAY CLG STPT	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
AO	{07}	DAY HTG STPT	70.0 (21.20888)	DEG F (DEG C)	48-111.75	--	--
AO	{08}	NGT CLG STPT	82.0 (27.92888)	DEG F (DEG C)	48-111.75	--	--
AO	{09}	NGT HTG STPT	65.0 (18.40888)	DEG F (DEG C)	48-111.75	--	--
AO	{11}	RM STPT MIN	55.0 (12.80888)	DEG F (DEG C)	48-111.75	--	--
AO	{12}	RM STPT MAX	90.0 (32.40888)	DEG F (DEG C)	48-111.75	--	--
AI	{13}	RM STPT DIAL	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
BO	{14}	STPT DIAL	NO	--	Binary	YES	NO
AI	{15}	AUX TEMP AI5	74.0 (23.495556)	DEG F (DEG C)	37.5-165	--	--
AO	{16}	FLOW START	0	PCT	0-102	--	--
AO	{17}	FLOW END	100	PCT	0-102	--	--
BO	{18}	WALL SWITCH	NO	--	Binary	YES	NO
BI	{19}	DI OVRD SW	OFF	--	Binary	ON	OFF
AO	{20}	OVRD TIME	0	HRS	0-255	--	--
BO	{21}	NGT OVRD	NIGHT	--	Binary	NIGHT	DAY
AO	{22}	REHEAT START	50	PCT	0-102	--	--
AO	{23}	REHEAT END	100	PCT	0-102	--	--
BI	{24}	DI 2	OFF	--	Binary	ON	OFF

Object Type	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
BI	{25}	DI 3	OFF	--	Binary	ON	OFF
AO	{26}	TOTFLO PGAIN	0	--	0-51.15	--	--
AO	{27}	TOTFLO IGAIN	0.018	--	0-1.023	--	--
AO	{28}	TOTFLO DGAIN	0	--	0-510	--	--
BO	{29}	DAY.NGT	DAY	--	Binary	NIGHT	DAY
AI	{30}	TOT VOLUME	0 (0.0)	CFM (LPS)	0-131068	--	--
AO	{32}	CLG FLOW MAX	2200 (1038.18)	CFM (LPS)	0-131068	--	--
AO	{33}	TOT FLOW MIN	220 (103.818)	CFM (LPS)	0-131068	--	--
AO	{34}	TOT FLOW MAX	2200 (1038.18)	CFM (LPS)	0-131068	--	--
AI	{35}	CLG VOLUME	0 (0.0)	CFM (LPS)	0-131068	--	--
AO	{36}	CLG FLO COEF	1	--	0-2.55	--	--
AO	{37}	VALVE COMD	0	PCT	0-102	--	--
AO	{38}	VALVE POS	0	PCT	0-102	--	--
AO	{39}	MTR3 TIMING	130	SEC	0-511	--	--
BO	{41}	DO 1	OFF	--	Binary	ON	OFF
BO	{42}	DO 2	OFF	--	Binary	ON	OFF
BO	{43}	DO 3	OFF	--	Binary	ON	OFF
BO	{44}	DO 4	OFF	--	Binary	ON	OFF
BO	{45}	DO 5	OFF	--	Binary	ON	OFF
BO	{46}	DO 6	OFF	--	Binary	ON	OFF
BO	{47}	DO 7	OFF	--	Binary	ON	OFF
AO	{48}	CLG DMP CMD	0	PCT	0-102	--	--
AO	{49}	CLG DMP POS	0	PCT	0-102	--	--
BO	{50}	DO 8	OFF	--	Binary	ON	OFF
AO	{51}	MTR1 TIMING	95	SEC	0-511	--	--
AO	{52}	HTG DMP CMD	0	PCT	0-102	--	--
AO	{53}	HTG DMP	0	PCT	0-102	--	--

Object Type	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
		POS					
AO	{54}	TOT FLO COEF	1	--	0-2.55	--	--
AO	{55}	MTR2 TIMING	95	SEC	0-511	--	--
AO	{56}	DPR1 ROT ANG	90	--	0-255	--	--
AO	{57}	DPR2 ROT ANG	90	--	0-255	--	--
AO	{58}	MTR SETUP	0	--	0-255	--	--
AO	{59}	DO DIR. REV	0	--	0-255	--	--
AO	{60}	TOTDUCT AREA	1.0 (0.09292)	SQ. FT (SQ M)	0-6.375	--	--
AO	{63}	CLG P GAIN	20.0 (36.0)	--	0-63.75	--	--
AO	{64}	CLG I GAIN	0.012 (0.0216)	--	0-1.023	--	--
AO	{65}	CLG D GAIN	0 (0.0)	--	0-510	--	--
AO	{66}	CLG BIAS	50	PCT	0-102	--	--
AO	{67}	HTG P GAIN	10.0 (18.0)	--	0-63.75	--	--
AO	{68}	HTG I GAIN	0.012 (0.0216)	--	0-1.023	--	--
AO	{69}	HTG D GAIN	0 (0.0)	--	0-510	--	--
AO	{70}	HTG BIAS	50	PCT	0-102	--	--
AO	{71}	CLGFLO PGAIN	0	--	0-51.15	--	--
AO	{72}	CLGFLO IGAIN	0.018	--	0-1.023	--	--
AO	{73}	CLGFLO DGAIN	0	--	0-510	--	--
AO	{74}	TOT FLOW	0	PCT	0-1023.75	--	--
AO	{75}	CLG FLOW	0	PCT	0-1023.75	--	--
AO	{78}	CTL TEMP	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
AO	{79}	CLG LOOPOUT	50	PCT	0-102	--	--
AO	{80}	HTG LOOPOUT	0	PCT	0-102	--	--

Object Type	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
AO	{81}	AVG HEAT OUT	0	PCT	0-409.2	--	--
BO	{82}	AUX HTG USED	NO	--	Binary	YES	NO
BO	{83}	AUX HTG TYPE	ELEC	--	Binary	ELEC	HW
BO	{84}	DMPR STATUS	CAL	--	Binary	RECAL	CAL
AO	{85}	TOT FLO STPT	0	PCT	0-255.75	--	--
AO	{86}	SWITCH TIME	10	MIN	0-255	--	--
BO	{87}	CAL MODULE	NO	--	Binary	YES	NO
AO	{88}	STAGE COUNT	1	--	0-255	--	--
AO	{89}	STAGE TIME	10	MIN	0-255	--	--
AO	{90}	SWITCH DBAND	1.0 (0.56)	DEG F (DEG C)	0-63.75	--	--
AO	{91}	CLG FLOW MIN	220 (103.818)	CFM (LPS)	0-131068	--	--
AO	{92}	CTL STPT	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
AO	{93}	CLG FLO STPT	0	PCT	0-255.75	--	--
BO	{94}	CAL AIR	NO	--	Binary	YES	NO
AO	{95}	CAL SETUP	4	--	0-255	--	--
AO	{96}	CAL TIMER	12	HRS	0-255	--	--
AO	{97}	CLGDUCT AREA	1.0 (0.09292)	SQ. FT (SQ M)	0-6.375	--	--
AO	{98}	LOOP TIME	5	SEC	0-255	--	--
AO	{99}	ERROR STATUS	0	--	0-255	--	--
AO	{102}	AOV 1	0	VOLTS	0-10.23	--	--
AO	{103}	AOV 2	0	VOLTS	0-10.23	--	--
AO	{104}	AOV 3	0	VOLTS	0-10.23	--	--
AI	{105}	AI 3	0	PCT	0-102	--	--
AI	{106}	AI 4	0	PCT	0-102	--	--
AO	{107}	RMTMP OFFSET	0.0 (0.0)	DEG F (DEG C)	-63.75	--	--
BI	{108}	DI 4	OFF	--	Binary	ON	OFF

Object Type	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Eng Units (SI Units)	Range	Active Text	Inactive Text
BI	{109}	DI 5	OFF	--	Binary	ON	OFF
BI	{110}	DI 6	OFF	--	Binary	ON	OFF
AO	{123}	AI 5 OFFSET	0.0 (0.0)	DEG F (DEG C)	-63.75	--	--
AO	{124}	STAT SUPV	0	--	0-255	--	--
AI	{125}	RM CO2	1000	PPM	0-8191	--	--
AI	{126}	RM RH	50	PCT	0-102	--	--
BO	{127}	PPCL STATE	EMPTY	--	Binary	LOADED	EMPTY

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