SIEMENS

BACnet PTEC Controller

Dual Duct Two Air Velocity Sensors

Owner's Manual

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Building Technologies

Table of Contents

How To Use This Manual

This manual is written for the owner and user of the Siemens BACnet PTEC Dual Duct 2 AVS Controller. It is designed to help you become familiar with the Siemens BACnet PTEC and its applications.

This section covers manual organization, manual conventions, symbols used in the manual, and other information that will help you use this manual.

Manual Organization

This manual contains the following chapters:

- *Chapter 1 - Hardware,* describes the hardware components and the accessories that are used with the BACnet PTEC.
- *Chapter 2 - Applications,* describes the control applications available in the model of the BACnet PTEC that includes a terminal block for wireable input/output connections.
- *Chapter 3 - Point Database,* defines the point database descriptors and includes address and applications.
- *Chapter 4 – Basic Service and Maintenance,* describes basic corrective measures you can take should you encounter a problem when using the BACnet PTEC. For issues not covered in this chapter, consult your local Siemens Industry representative.
- The *Glossary* describes the terms and acronyms used in this manual.
- The *Index* helps you locate information presented in this manual.

Manual Conventions

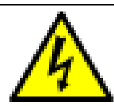
The following table lists conventions to help you use this manual in a quick and efficient manner.

Convention	Examples
Numbered Lists (1, 2, 3…) indicate a procedure with sequential steps.	1. Turn OFF power to the field panel. 2. Turn ON power to the field panel. 3. Contact the local Siemens Industry representative.
Conditions that must be completed or met before beginning a task are designated with a ▹. Intermediate results (what will happen following the execution of a step), are designated with a ⇨. Results, which inform the user that a task was completed successfully, are designated with a ⇨.	▹Composer software is properly installed. ▹A Valid license is available. 1. Select **Start > Programs > Siemens > GMS > Composer**. ⇨The Project Management window displays. 2. Open an existing project or create a new one. ⇨The project window displays.
Actions that should be performed are specified in boldface font.	Type **F** for Field panels. Click **OK** to save changes and close the dialog box.
Error and system messages are displayed in Courier New font.	The message `Report Definition successfully renamed` displays in the status bar.
New terms appearing for the first time are italicized.	The field panel continuously executes a user-defined set of instructions called the *control program*.

Convention	Examples
	This symbol signifies Notes. Notes provide additional information or helpful hints.
Cross references to other information are indicated with an arrow and the page number, enclosed in brackets: [→92]	For more information on creating flowcharts, see Flowcharts [→92].
Placeholders indicate text that can vary based on your selection. Placeholders are specified by italicized letters, and enclosed with brackets [ ].	Type **A C D H** [*username*] [*field panel #]*.

Manual Symbols

The following table lists the safety symbols used in this manual to draw attention to important information.

Symbol	Meaning	Description
NOTICE	CAUTION	Equipment damage may occur if a procedure or instruction is not followed as specified. (For online documentation, the NOTICE displays in white with a blue background.)
	CAUTION	Minor or moderate injury may occur if a procedure or instruction is not followed as specified.
	WARNING	Personal injury or property damage may occur if a procedure or instruction is not followed as specified.
	DANGER	Electric shock, death, or severe property damage may occur if a procedure or instruction is not followed as specified.

Getting Help

For more information about the Siemens BACnet PTEC Dual Duct 2 AVS Controller, contact your local Siemens Industry representative.

Where to Send Comments

Your feedback is important to us. If you have comments about this manual, please submit them to SBT_technical.editor.us.sbt@siemens.com

Chapter 1 – Product Overview

The Siemens BACnet PTEC Dual Duct 2 AVS Controller is the Siemens Industry FLN controller used in pressure independent Variable Air Volume and Constant Volume applications. It provides Direct Digital Control (DDC) for a number of applications.

- The controller can operate as an independent, stand-alone, DDC room controller or it can be networked with a field panel.
- The controller provides all termination, input/output, system and local communication connections.
- The controller hardware consists of the controller with cover and mounting bracket (See Figure Siemens BACnet PTEC Dual Duct 2 AVS Controller).

The following applications are covered:

- Constant Volume - Two Inlet Sensors with Optional Reheat (Application 6665)
- Constant Volume - One Inlet and One Outlet Sensor with Optional Reheat (Application 6666)
- Variable Air Volume – Two Inlet Sensors with Optional Reheat (Application 6667)
- Variable Air Volume – One Inlet and One Outlet Sensor with Optional Reheat (Application 6668)
- Variable Air Volume with Changeover (Application 6669)
- Slave Mode (Application 6693)

Programmability

The Programmable BACnet TEC (PTEC) tool allows the introduction of custom PPCL into a BACnet TEC. This software allows you to create your own custom application and is used to add, remove, modify, back up and restore BACnet Programmable TECs.

Standard BACnet TEC applications reside in the PTEC and can run alongside the custom PPCL. It is important that BACnet TEC custom PPCL applications command points at priority 15 or higher.

The custom PPCL can be used one of the following ways:

- With the PTEC in slave mode, it is controlled exclusively by the custom PPCL.
- PPCL can be used to exclusively control spare I/O.
- With a standard PTEC application running, custom PPCL can command points at a higher priority which will override points in the application.

Our workstation and tool view the PTEC as a regular BACnet TEC.

Hardware Inputs

Analog

Air velocity sensor (two required)	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669
Duct temperature sensor (100K or 10K thermistor software selectable) (optional)	Application 6669
Room temperature sensor	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669
Room temperature setpoint dial (optional)	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669
Spare analog sensor, AI 3 switch selectable 0-10Vdc, 4-20 mA	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669
Spare analog sensor, AI 4 switch selectable 0-10Vdc, 4-20 mA	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669
Spare AI 5 temperature sensor (100K or 10K thermistor software selectable)	Application 6665 Application 6666 Application 6667 Application 6668

Digital

Night mode override (optional)	Application 6667 Application 6668 Application 6669
Unoccupied mode override (optional)	Application 6665 Application 6666
Wall switch (optional)	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669
Spare digital input (DI 6)	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669

Hardware Outputs

Analog

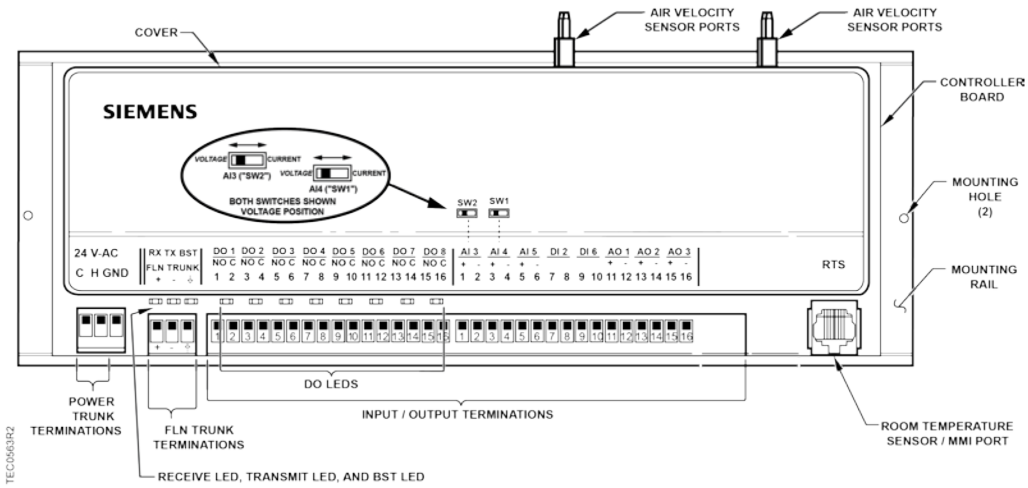
Spare analog output (three) (0-10Vdc)	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669

Digital

Damper actuator (two required)	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669
Autozero module (two) (optional)	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669
Stage 1 electric heat (optional)	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669
Stage 2 electric heat (optional)	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669
Stage 3 electric heat (optional) or Autozero modules (optional)	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669
Valve actuator (optional)	Application 6665 Application 6666 Application 6667 Application 6668 Application 6669

Ordering Notes

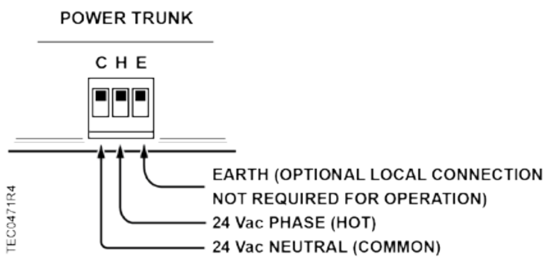
Siemens BACnet PTEC Dual Duct 2 AVS Controller 550-497PA



Siemens BACnet PTEC Dual Duct 2 AVS Controller.

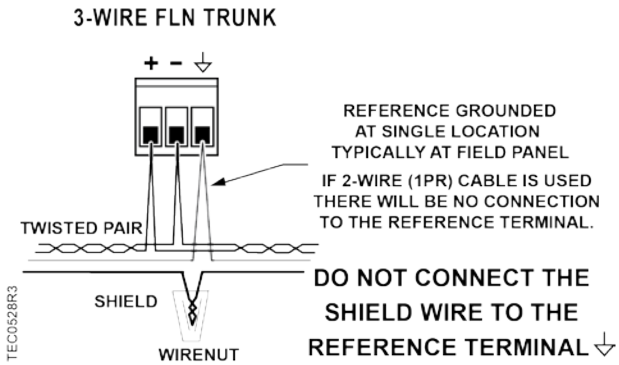
Power Wiring

The controller is powered by 24 Vac. Power wiring connects to the three screw terminals on the controller board labeled “C” (Common), “H” (Hot), and “E” (Earth Ground) on the terminal block labeled “24 Vac”.



Communication Wiring

The controller connects to the field panel by means of a Floor Level Network (FLN) trunk. Communication wiring connects to the three screw terminals on the controller labeled “+” (positive), “-“ (negative), and “⏚ ” (reference).



Controller LED Indicators

NOTE:
The TX and RX LEDs indicate communication over the FLN.

To determine if the controller is powered up and working, verify that the Basic Sanity Test (BST) Light Emitting Diode (LED) is flashing ON/OFF once per second. The controller has eleven Light Emitting Diode (LED) indicators (see Figure Siemens BACnet PTEC Dual Duct 2 AVS Controller). Table *Controller LEDs* lists the type, the abbreviation on the controller, and the indication of each LED.

Controller LEDs.			
LED Type	**Label (if present)***	**LED Number**	**Indication**
DO	DO1 - DO8	1 – 8	Indicates the ON/OFF status of the DO associated with it. A glowing LED indicates that the DO is energized.
Receive	RX	9	Indicates, when flashing, that the controller is receiving information from the field panel.
Transmit	TX	10	Indicates, when flashing, that the controller is transmitting information to the field panel.
BST ”Basic Sanity Test”	BST	11	Indicates, when flashing ON and OFF once per second, that the controller is functioning properly.

The BACnet PTEC will automatically detect the MS/TP baud rate at start up and will communicate with other devices when configured as a master MS/TP device (address 1 through 127). The TX LED will start flashing as it attempts to communicate with other devices.

Temperature Sensors

Temperature sensors used with the Siemens BACnet PTEC Dual Duct 2 AVS Controller include an electronic room temperature sensor and an optional duct temperature sensor.

Room Temperature Sensor

The room temperature sensor connects to the controller by means of a cable terminated at both ends with a six-conductor RJ-11 plug-in connector.

See the Ordering Notes section for the location of the room temperature sensor/Human Machine Interface (HMI) port.

Duct Temperature Sensor

An optional duct temperature sensor provides duct air temperature sensing inputs to the controller.

For more information about temperature sensors, contact your local Siemens Industry representative.

Actuators

Actuators used with the Siemens BACnet PTEC Dual Duct 2 AVS Controller include electronic damper motors, electronic valve motors, and electronic valve assemblies. These actuators are powered through the controller to position cooling and/or reheat valves or supply air dampers.

Related Equipment

- Relay Module
- Damper Actuator(s)
- Room Temperature Sensor
- Valve and valve actuator

Contact your local Siemens Industry representative for product numbers and more information.

Chapter 2 – Applications

Basic Operation

The Siemens BACnet PTEC Dual Duct 2 AVS Controller provides Direct Digital Control (DDC) for Constant Volume (CV) or Variable Air Volume (VAV) applications.

Control Temperature Setpoints

The controller maintains a specified temperature setpoint based on Day/Night mode, the heating/cooling mode, or the setpoint dial (if used).

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.

Occupied/Unoccupied Mode

The controller maintains the specified day setpoint temperature during occupied hours and the specified setpoint during unoccupied hours.

Unoccupied Mode Override Switch

If the RTS has an override switch, it can be used to command the controller into occupied mode for an adjustable amount of time. This only affects a controller in unoccupied mode.

Calibration

Valve calibration may be set to take place automatically or manually.

Valve

Calibration of a hot or chill water valve (if used) is done by briefly commanding the valve closed.

Additional calibration is provided by driving the valve or damper fully closed or open, whenever they are commanded to 0 or 100 percent.

Fail-Mode Operation

If the RTS or the setpoint dial fails, then the controller operates using the last known temperature value.

Notes

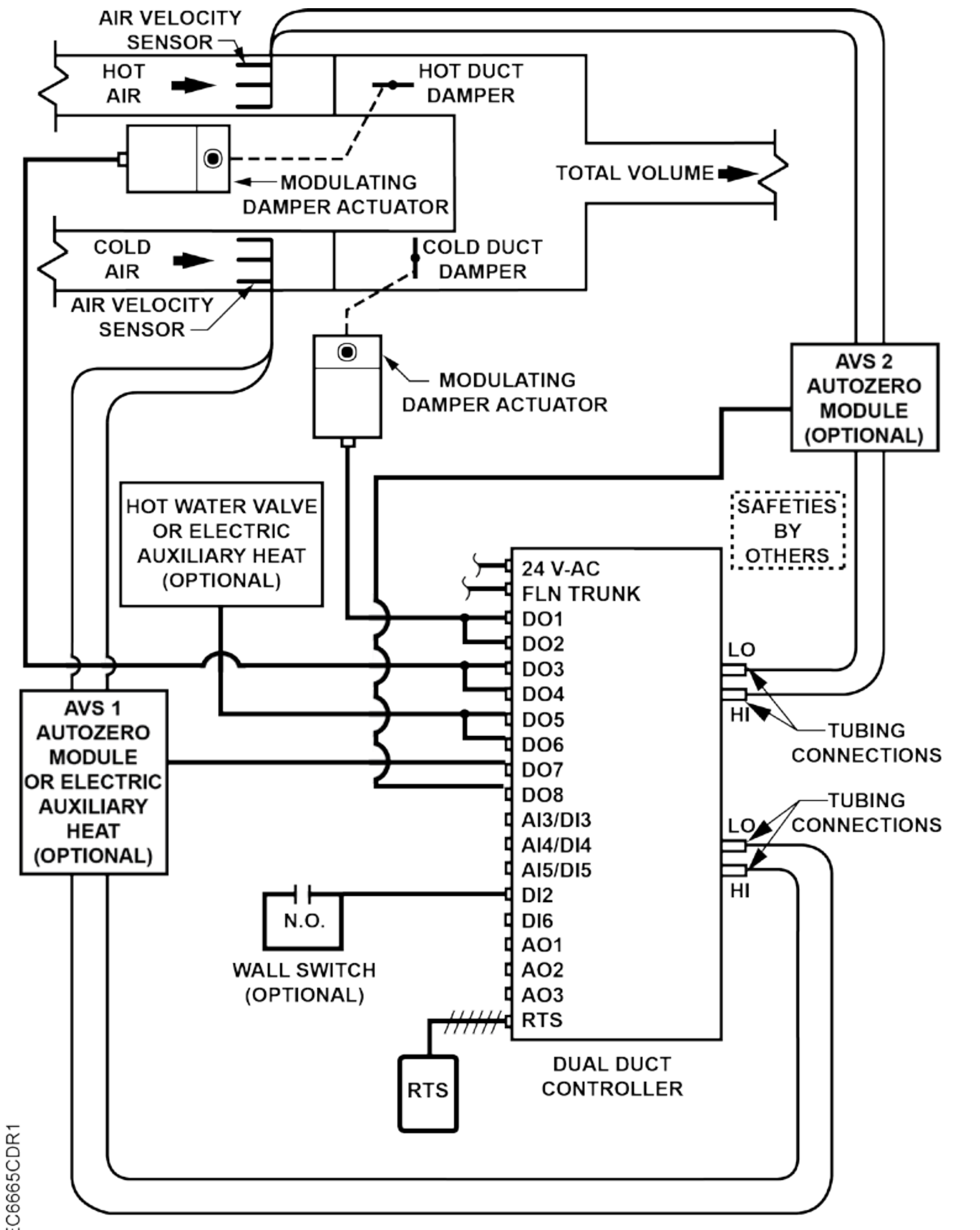
1. If the temperature swings in the room are excessive, or if there is trouble in maintaining the setpoint, contact your local Siemens Industry representative for more information.

2. The Siemens BACnet PTEC Dual Duct 2 AVS Controller, as shipped from the factory, keeps all associated equipment OFF. The controller and its equipment are released to application control at start-up.

Application 6665 Constant Volume Two Inlet Sensors with Optional Reheat

In Application 6665, the controller provides independent control of the hot duct and cold duct inlet dampers to provide a constant volume of air to the space during occupied periods and a lower constant volume of air during unoccupied periods.

In cooling mode, the cold duct damper is modulated to maintain the room temperature setpoint and the hot duct damper is modulated to maintain the volume setpoint. In heating mode, the hot duct damper is modulated to maintain the volume setpoint. The controller modulates an optional hot water valve or up to three stages of electric reheat to maintain the room temperature setpoint.

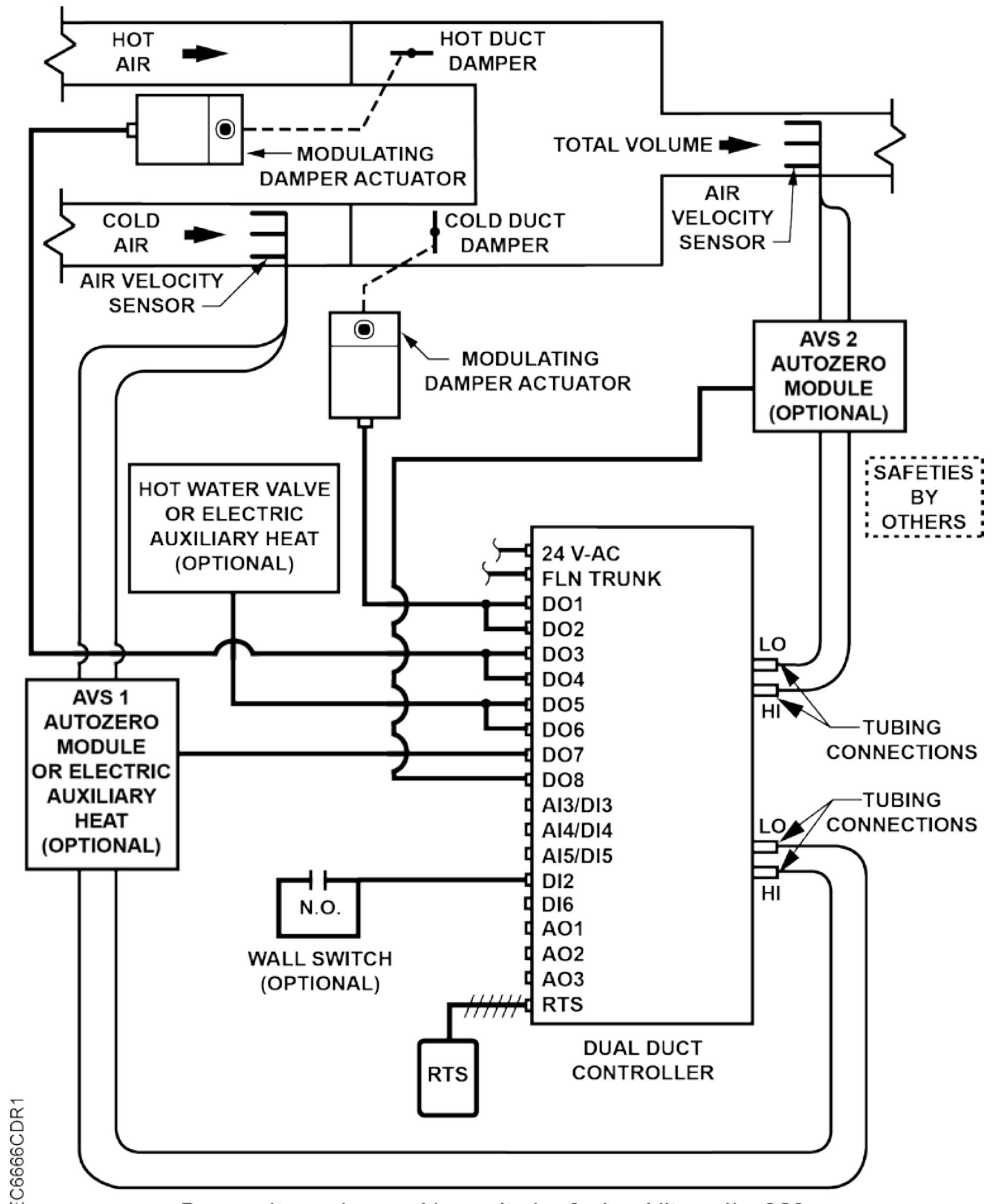


Room unit can also provide monitoring for humidity and/or CO2

Application 6666 Constant Volume One Inlet and One Outlet Sensor with Optional Reheat

In Application 6666, the controller provides independent control of the hot duct and the cold duct inlet dampers to provide a constant volume of air to the space during occupied periods and a lower constant volume of air during unoccupied periods.

In cooling mode, the cold duct damper is modulated to maintain the room temperature setpoint and the hot duct damper is modulated to maintain the volume setpoint. In heating mode, the hot duct damper is modulated to maintain the volume setpoint. The controller modulates an optional hot water valve or up to three stages of electric reheat to maintain the room temperature setpoint.

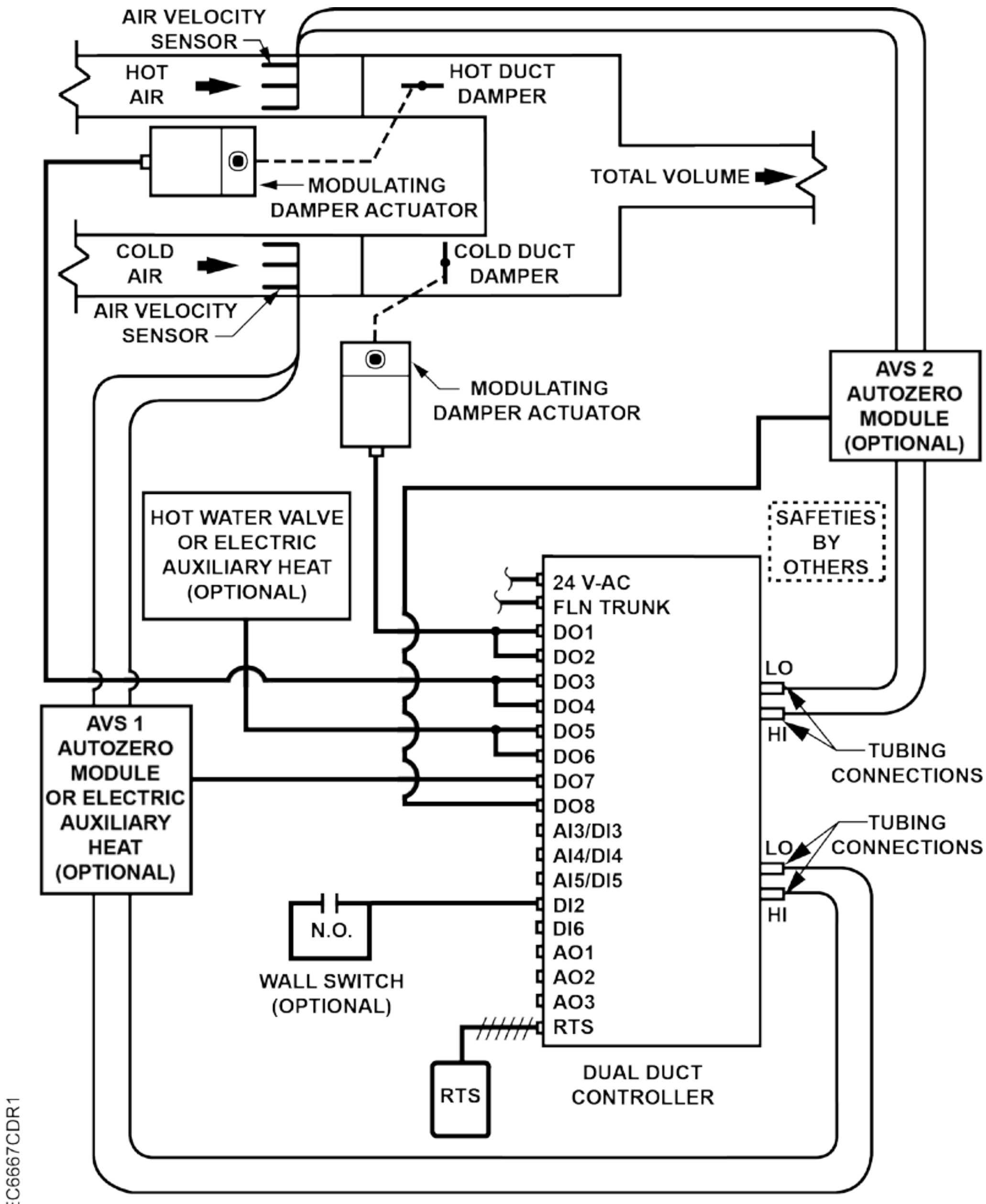


Room unit can also provide monitoring for humidity and/or CO2

Application 6667 VAV - Two Inlet Sensors with Optional Reheat

In Application 6667, the controller modulates two inlet damper actuators–one for the hot duct and one for the cold 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.

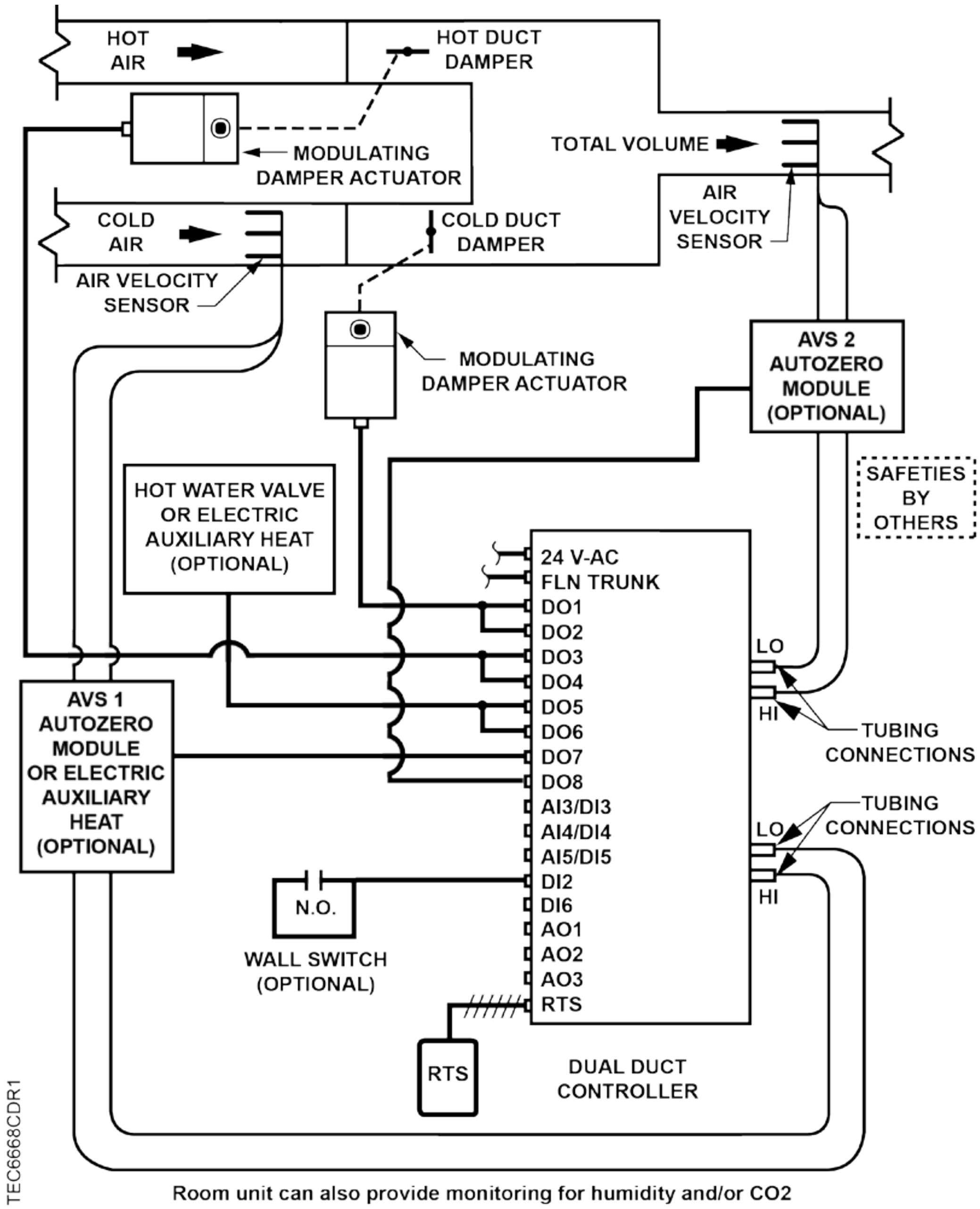


Room unit can also provide monitoring for humidity and/or CO2

Application 6668 VAV - One Inlet and One Outlet Sensor with Optional Reheat

In Application 6668, 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.

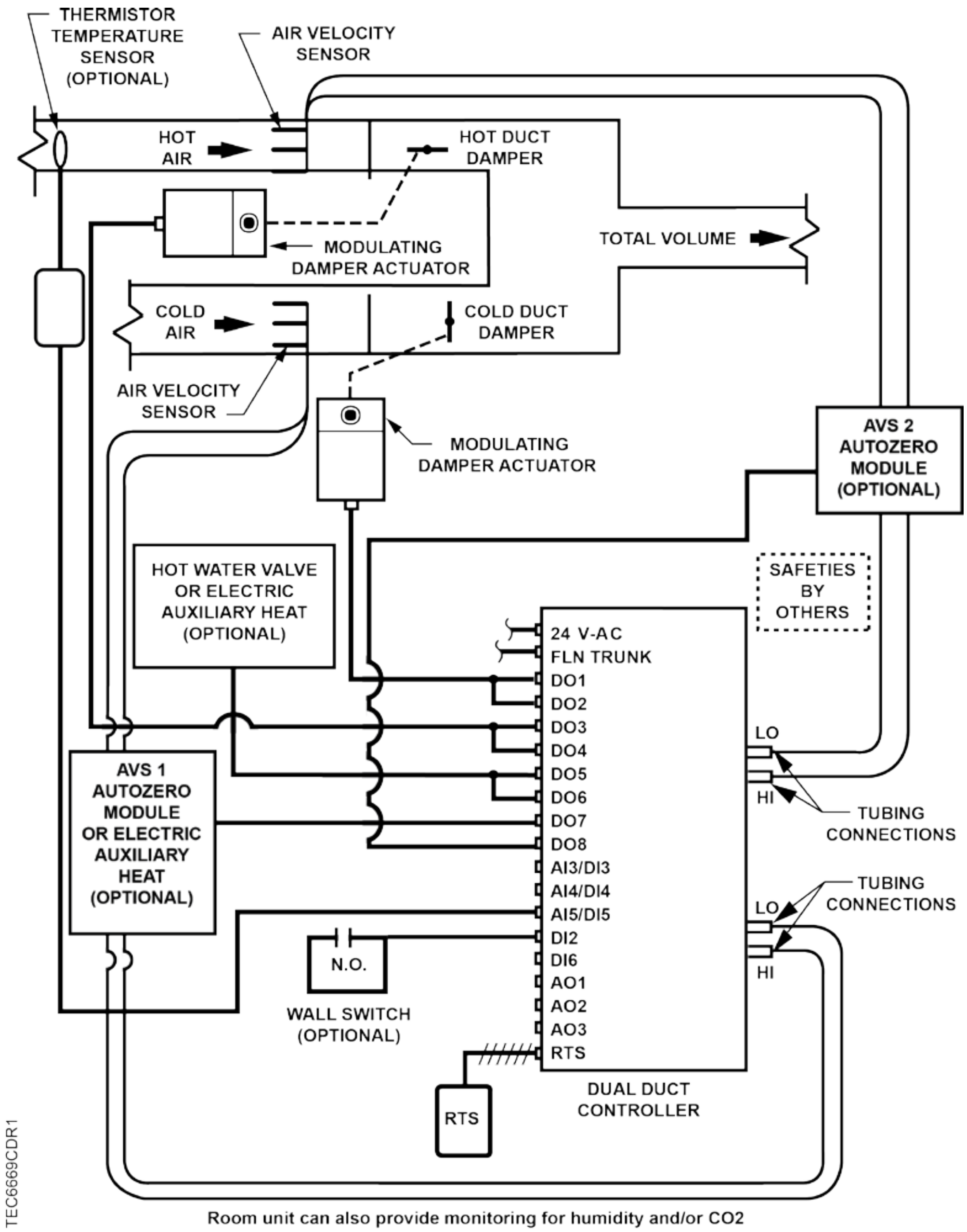
In cooling mode, the controller modulates the cold duct damper to maintain the room temperature setpoint and modulates the hot duct damper to ensure minimum airflow. In heating mode, the controller modulates the hot duct damper in order to maintain the room temperature setpoint and modulates the cold 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.



Room unit can also provide monitoring for humidity and/or CO2

Application 6669 VAV with Changeover

In Application 6669, in cooling mode, 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 duct damper to maintain the room temperature setpoint and the hot duct damper to ensure minimum flow. Under severe cooling loads, the hot duct can be operated as a secondary cold duct. In heating mode, the controller modulates the hot duct damper to maintain the room temperature setpoint and the cold duct damper to ensure minimum flow. 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.



Room unit can also provide monitoring for humidity and/or CO2

Application 6693 Dual Duct 2 AVS Slave Mode

Application 6693 is the slave mode application for the BACnet PTEC (see Ordering Notes for product numbers). Slave mode is the default application that comes up when power is first applied to the controller. Slave mode provides no control. Its purpose is to allow the operator to perform equipment checkout before a control application is put into effect and to set some basic controller parameters (CTLR ADDRESS, APPLICATION, etc.).

Chapter 3 – Point Database

Chapter 3 presents a description of the Siemens BACnet PTEC Dual Duct 2 AVS Controller point database, including point descriptors, point addresses, and a listing of applications in which each point is found.

Descriptor	Address[1]	Application	Description
CTLR ADDRESS	01	All	Identifies the controller on the LAN trunk.
APPLICATION	02	All	Identification number of the program running in the controller.
HOT.COLD	03	6669	Indicates the operating mode of the hot duct damper. HOT indicates that the hot duct damper is operating normally. COLD indicates that the hot duct damper is operating as a secondary cold duct damper.
ROOM TEMP	{04}	All	Actual reading from the room temperature sensor.
HEAT.COOL	{05}	6665-6669	Current mode of operation for applications that can be in either a heating mode or a cooling mode.
DAY CLG STPT	06	6667-6669	The temperature setpoint in degrees that the controller maintains during day periods in cooling mode if a room temperature sensor setpoint dial is not present or is not used. See *STPT DIAL*.
OCC CLG STPT	06	6665, 6666	The temperature setpoint, in degrees, that the controller maintains during occupied periods in cooling mode if a room temperature sensor setpoint dial is not present or is not used. See *STPT DIAL*.
DAY HTG STPT	07	6667-6669	The temperature setpoint in degrees that the controller maintains during day periods in heating mode if a room temperature sensor setpoint dial is not present or is not used. See *STPT DIAL*.
OCC HTG STPT	07	6665, 6666	The temperature setpoint, in degrees, that the controller maintains during occupied periods in heating mode if a room temperature sensor setpoint dial is not present or is not used. See *STPT DIAL*.
NGT CLG STPT	08	6667-6669	The temperature setpoint in degrees that the controller maintains during the night periods in cooling mode.
UOC CLG STPT	08	6665, 6666	The temperature setpoint, in degrees, that the controller maintains during unoccupied periods in cooling mode.
NGT HTG STPT	09	6667-6669	The temperature setpoint in degrees that the controller maintains during the night periods in heating mode.
UOC HTG STPT	09	6665, 6666	The temperature setpoint, in degrees, that the controller maintains during unoccupied periods in heating mode.
SER.PAR	10	6669	SERIES indicates that the controller is to operate the hot duct damper in series (or simultaneously) with the cold duct damper. PAR indicates the controller is to operate the hot duct damper in parallel (or in sequence) with the cold duct damper. Valid input: SERIES or PAR.
RM STPT MIN	11	6665-6669	The minimum temperature setpoint, in degrees, that the controller can use from the setpoint dial. This overrides any temperature setpoint from the set point dial that falls below this minimum.

Descriptor	Address[1]	Application	Description
RM STPT MAX	12	6665-6669	The maximum temperature setpoint in degrees that the controller can use from the setpoint dial. This overrides any temperature setpoint from the setpoint dial that falls above this maximum.
RM STPT DIAL	{13}	All	The temperature setpoint in degrees from the room temperature sensor (not available on all temperature sensor models). This setpoint will be used for control in day mode (heating or cooling) when enabled by STPT DIAL.
STPT DIAL	14	6665-6669	YES indicates that there is a room setpoint dial on the room temperature sensor and it should be used as the temperature setpoint for control in day/occupied mode. NO indicates that the appropriate preset setpoint will be used as the temperature setpoint for control in day/occupied heating or cooling mode. Valid input: YES or NO.
AUX TEMP AI5	{15}	6665-6669	Actual reading from a 100K or 10K thermistor connected to the controller's AI 5 input. When a thermistor is connected at AI 5, DI 5 is not available. See *DI 5*.
HTG DUCTTEMP	{15}	6669	Actual reading from a 100K or 10K thermistor located in the hot duct connected to the controller's AI 5 input. When a thermistor is connected at AI 5, DI 5 is not available. See *DI 5*.
FLOW START	16	6667-6669	Determines how the damper modulation will be sequenced while in heating mode. When HTG LOOPOUT is above this value, then FLOW STPT starts to increase.
FLOW END	17	6667-6669	Determines how the damper modulation will be sequenced while in heating mode. When HTG LOOPOUT is below this value, then FLOW STPT starts to decrease.
WALL SWITCH	18	All	YES indicates that the controller is to monitor the status of a wall switch that is connected to UI 2. NO indicates that the controller will not monitor the status of a wall switch, even if one is connected. Valid input: YES or NO.
DI OVRD SW	{19}	All	Actual indication of the status of the override switch (not physically available on all temperature sensor models) at the room temperature sensor. ON indicates that the switch is being pressed. OFF indicates that the switch is released. Valid input: ON or OFF.
OVRD TIME	20	6665-6669	The amount of time in hours that the controller will operate in day/occupied mode when the override switch is pressed while the controller is in night/unoccupied mode.
NGT OVRD	{21}	6667-6669	Indicates the mode that the controller is operating in with respect to the override switch. NIGHT indicates that the switch has not been pressed and the override timer is not active. DAY indicates that the switch has been pressed and the override timer is active. The controller then uses a day mode temperature setpoint. This point is only in effect when DAY.NGT indicates night mode.
UNOCC OVRD	{21}	6665, 6666	Indicates the mode that the controller is operating in with respect to the override switch. UNOCC indicates that the switch has not been pressed and the override timer is not active. OCC indicates that the switch has been pressed and the override timer is active. The controller then uses an occupied mode temperature set point. This point is only in effect when OCC.UNOCC indicates UNOCC mode.
REHEAT START	22	6667-6669	Determines how the reheat modulation will be sequenced

Descriptor	Address[1]	Application	Description
			while in heating mode. When HTG LOOPOUT is above this value, then the reheat modulates upward.
REHEAT END	23	6667-6669	Determines how the reheat modulation will be sequenced while in heating mode. When HTG LOOPOUT is below this value, then the reheat modulates downward.
DI 2	{24}	All	Actual status of a contact connected to the controller at DI 2. ON indicates that the contact is closed; OFF indicates that the contact is open. If a wall switch is used, it is connected to DI 2. See *WALL SWITCH*.
DI 3	{25}	All	Actual status of a contact connected to the controller at DI 3/AI 3. ON indicates that the contact is closed; OFF indicates that the contact is open. When a contact is connected at DI 3, AI 3 is not available.
HTGFLO PGAIN	26	6665-6667, 6669	The proportional gain value for the heating flow control loop.
TOTFLO PGAIN	26	6668	The proportional gain value for the total flow control loop.
HTGFLO IGAIN	27	6665-6667, 6669	The integral gain value for the heating flow control loop.
TOTFLO IGAIN	27	6668	The integral gain value for the total flow control loop.
HTGFLO DGAIN	28	6665-6667, 6669	The derivative gain value for the heating flow control loop.
TOTFLO DGAIN	28	6668	The derivative gain value for the total flow control loop.
DAY.NGT	{29}	6667-6669, 6693	Indicates the mode in which the controller is operating. Day temperature setpoints will be used in day mode. Night temperature setpoints will be used in night mode. This point is normally set by the field panel.
OCC.UNOCC	{29}	6665, 6666	Indicates the mode in which the controller is operating. Occupied temperature setpoints will be used in OCC mode. Unoccupied temperature setpoints will be used in UNOCC mode. This point is normally set by the field panel.
AIR VOLUME 2	30	6693	Actual amount of air in CFM (LPS) currently passing through the air velocity sensor 2.
HTG VOLUME	{30}	6665, 6667, 6669	Actual amount of air in CFM (LPS) currently passing through the hot air duct.
TOT VOLUME	{30}	6666, 6668	Actual amount of air in CFM (LPS) currently passing through the discharge air duct.
UNOCC FLOW	{31}	6665, 6666	The amount of air in CFM (LPS) to be supplied to the space during unoccupied periods.
CLG FLOW MAX	{32}	6667-6669	The maximum amount of air in CFM (LPS) to be supplied to the space in cooling mode.
OCC FLOW	{32}	6665, 6666	The amount of air in CFM (LPS) to be supplied to the space during occupied periods.
TOT FLOW MIN	{33}	6667-6669	The total minimum amount of air in CFM (LPS) to be supplied to the space.
HTG FLOW MAX	{34}	6667, 6669	The maximum amount of air in CFM (LPS) to be supplied to the space in heating mode.
TOT FLOW MAX	34	6668	The total maximum amount of air in CFM (LPS) to be supplied to the space.
AIR VOLUME 1	35	6693	Actual amount of air in CFM (LPS) currently passing through the air velocity sensor 1.
CLG VOLUME	{35}	6665-6669	Actual amount of air in CFM (LPS) currently passing through

Descriptor	Address[1]	Application	Description
			the cooling air duct.
CLG FLO COEF	36	6665-6669	Calibration factor for the cold duct airflow sensor.
FLOW COEFF 1	36	6693	Calibration factor for air flow 1.
MTR3 COMD	37	6693	The value to which the Motor 3 actuator is commanded in percent of full travel.
VALVE COMD	{37}	6665-6669	The value to which the valve actuator is commanded in percent of full travel for applications using a water valve.
MTR3 POS	{38}	6693	The current position of the Motor 3 actuator in percent of full travel. This value is calculated based on motor run time.
VALVE POS	{38}	6665-6669	The current position of the valve in percent of full travel for applications using a water valve. This value is calculated based on motor run time. See *MTR3 TIMING*.
MTR3 TIMING	39	All	The time, in seconds, required for the Motor 3 actuator to travel from the full closed position to the full open position.
FAIL MODE	40	6665, 6666	Indicates the desired position of the dampers if the air flow sensor(s) fail. Valid input: CLOSED or OPEN.
DO 1	{41}	All	Digital output 1 controls a 24 Vac load with an ON or OFF status. If Motor 1 is enabled, then DO 1 is coupled with DO 2 to control an actuator.
DO 2	{42}	All	Digital output 2 controls a 24 Vac load with an ON or OFF status. If Motor 1 is enabled, then DO 2 is coupled with DO 1 to control an actuator.
DO 3	{43}	All	Digital output 3 controls a 24 Vac load with an ON or OFF status. If Motor 2 is enabled, then DO 3 is coupled with DO 4 to control an actuator.
DO 4	{44}	All	Digital output 4 controls a 24 Vac load with an ON or OFF status. If Motor 2 is enabled, then DO 4 is coupled with DO 3 to control an actuator.
DO 5	{45}	All	In applications with electric reheat, this digital output controls the contact for the first stage of heating and has a status of ON or OFF. In applications with hot water reheat, this point is coupled with DO 6 to control a hot water valve.
DO 6	{46}	All	In applications with electric reheat and CAL MODULE set to NO, this output controls the contact for the second stage of heating and has a status of ON or OFF. In applications with hot water reheat, this point is coupled with DO 5 to control a hot water valve.
DO 7	{47}	All	Digital output 7 controls a 24 Vac load with an ON or OFF status. In applications with CAL MODULE set to YES, this digital output controls Autozero Module 1 for calibration of the controller's internal air velocity transducer that is piped to the cold duct flow sensor. In applications with electric reheat and CAL MODULE set to NO, this digital output controls the contact for the third stage of heating and has a status of ON or OFF.
CLG DMP CMD	{48}	6665-6669	The value to which the cold duct damper motor is commanded in percent of full travel.

Descriptor	Address[1]	Application	Description
MTR1 CMD	{48}	6693	The value to which the Motor 1 actuator is commanded in percent of full travel.
CLG DMP POS	{49}	6665-6669	The current position of the damper motor in percent of full travel. This value is calculated based on motor run time.
MTR1 POS	{49}	6693	The current position of Motor 1 in percent of full travel. This value is calculated based on motor run time. See *MTR1 TIMING*.
DO 8	{50}	All	Digital output 8 controls a 24 Vac load with an ON or OFF status. In applications with CAL MODULE set to YES, this output controls Autozero Module 2 for calibration of the controller's internal air velocity transducer piped to the hot duct flow sensor in Applications 6665, 6667, and 6669, or the volume duct flow sensor in Applications 6666 and 6568.
MTR1 TIMING	51	All	The time, in seconds, required for the Motor 1 actuator to travel from full closed to the full open position.
HTG DMP CMD	{52}	6665-6669	The value to which the hot duct damper motor is commanded in percent of full travel.
MTR2 COMD	{52}	6693	The value to which the Motor 2 actuator is commanded in percent of full travel (for use as an auxiliary slave point).
HTG DMP POS	53	6665-6669	The current position of the hot duct damper motor in percent of full travel. This value is calculated based on motor run time. See *MTR2 TIMING*.
MTR2 POS	{53}	6693	The current position of the Motor 2 actuator in percent of full travel (for use as an auxiliary slave point). This value is calculated based on motor run time. See *MTR2 TIMING*.
HTG FLO COEF	54	6665,6667,6669	Calibration factor for the hot duct flow sensor.
FLOW COEFF 2	54	6693	Calibration factor for the airflow sensor 2.
TOT FLO COEF	54	6666, 6668	Calibration factor for the volume duct flow sensor.
MTR2 TIMING	55	All	The time, in seconds, required for the Motor 2 actuator to travel from full closed to the full open position.
DPR1 ROT ANG	56	All	The number of degrees that damper 1 is free to travel.
DPR2 ROT ANG	57	All	The number of degrees that damper 2, the hot duct damper, is free to travel.
MTR SETUP	58	All	The configuration setup code for Motors 1 and 2. This enables the motors individually and sets each motor to be either direct or reverse acting. **Note:** When a motor is enabled, its associated DOs are enabled.
DO DIR.REV	59	All	The configuration setup code for DOs. Allows the DOs to be direct or reverse acting (enabled equals energized or disabled equals de-energized).
DUCT AREA 2	60	6693	Area, in square feet (square meters), of duct 2 where the air velocity sensor is located. This value is calculated by the portable operator's terminal or by the field panel depending on duct shape and size. It is used in calculating all points in units of CFM, CF, LPS, and L.
HTGDUCT AREA	60	6665,6667,6669	Area, in square feet (square meters), of the hot duct where the air velocity sensor is located. This value is calculated by the portable operator's terminal or by the field panel

Descriptor	Address[1]	Application	Description
			depending on duct shape and size. It is used in calculating all points in units of CFM, CF, LPS, and L.
TOTDUCT AREA	60	6666,6668	Area, in square feet (square meters), of the volume duct where the air velocity sensor is located. This value is calculated by the portable operator's terminal or by the field panel depending on duct shape and size. It is used in calculating all points in units of CFM, CF, LPS, and L.
CLG TEMP	61	6669	When HTG DUCTTEMP is above the value of this point, the hot duct damper operates as a secondary cold duct damper.
HTG TEMP	62	6669	When HTG DUCTTEMP is above the value of this point, the hot duct damper operates as a hot duct damper.
CLG P GAIN	63	6665-6669	The proportional gain value for the cooling temperature control loop.
CLG I GAIN	64	6665-6669	The integral gain value for the cooling temperature control loop.
CLG D GAIN	65	6665-6669	The derivative gain value for the cooling temperature control loop.
CLG BIAS	66	6665-6669	The biasing of the cooling temperature control loop. See *CLG LOOPOUT*.
HTG P GAIN	67	6665-6669	The proportional gain value for the heating temperature control loop.
HTG I GAIN	68	6665-6669	The integral gain value for the heating temperature control loop.
HTG D GAIN	69	6665-6669	The derivative gain value for the heating temperature control loop.
HTG BIAS	70	6665-6669	The biasing of the heating temperature control loop. See *HTG LOOPOUT*.
CLGFLO PGAIN	71	6665-6669	The proportional gain value for the cooling flow control loop.
CLGFLO IGAIN	72	6665-6669	The integral gain value for the cooling flow control loop.
CLGFLO DGAIN	73	6665-6669	The derivative gain value for the cooling flow control loop.
HTG FLOW	{74}	6665-6667,6669	Indicates the actual amount of air currently passing the air velocity sensor in the hot duct.
TOT FLOW	74	6668	Indicates the actual amount of air currently passing the air velocity sensor in the volume duct.
CLG FLOW	{75}	6665-6669	Indicates the actual amount of air currently passing the air velocity sensor in the cold duct. The value is calculated as a percentage based on where the value of CLG VOLUME is in the range between the values 0% and the values set in CLG FLOW MAX.
NGT FLOW MIN	76	6667,6668,6669	Optional air flow setpoint to be used for CTL FLOW MIN in NIGHT mode.
VENT DMD MIN	{77}	6665-6669	Optional air flow setpoint (commandable) to be used with the larger of CLG FLOW MIN in cooling or HTG FLOW MIN in heating for CTL FLOW MIN in DAY mode.
CTL TEMP	{78}	6665-6669	The temperature used as input for the temperature control loops. This value will be the same as the value in ROOM TEMP, unless it is overridden.
CLG LOOPOUT	{79}	6665-6669	The cooling temperature control loop output value in percent.

Descriptor	Address[1]	Application	Description
HTG LOOPOUT	{80}	6665-6669	The heating temperature control loop output value in percent.
AVG HEAT OUT	{81}	6665-6669	This point is used to determine what stages of electric heat are used for a given loop output value. The ranges for the value are determined by the number of stages used: 0 to 100 for 1 stage of electric heat, 0 to 200 for 2 stages of electric heat, and 0 to 300 for 3 stages of electric heat. With electric heat, this value is equal to: HTG LOOPOUT × STAGE COUNT.
AUX HTG USED	82	6665-6669	YES indicates that auxiliary heat is used. NO indicates auxiliary is not being used. Valid input: YES or NO.
AUX HTG TYPE	83	6665-6669	Indicates the type of auxiliary heat control. If the value is HW, then the applications controls auxiliary hot water heat. If the value is ELEC, then the application controls auxiliary electric heat. Valid input: HW or ELEC.
HTG FLO STPT	{85}	6665-6669	The setpoint of the heating flow loop.
TOT FLO STPT	85	6668	The setpoint of the total volume flow loop.
SWITCH TIME	86	6665-6669	The time, in minutes, before the heat/cool mode can change over when the other parameters are appropriate.
CAL MODULE	87	All	Indicates the presence of Autozero Modules at DO 7 and DO 8. YES indicates that Autozero Modules are to be used to calibrate the controller’s air velocity transducers. NO indicates that calibration will take place without the Autozero Modules. Valid input: YES or NO.
STAGE COUNT	88	6665-6669	The number of electric heating stages used by the application. DOs associated with unused stages may be used as spare DOs.
STAGE TIME	89	6665-6669	The cycle time in minutes for the electric reheat stages. For example, if there are three stages of electric heat and STAGE TIME = 10 minutes, STAGE COUNT = 3, and AVG HEAT OUT = 150% then, Stage 1 is ON for 10 minutes (100% of the time), Stage 2 is ON for 5 minutes (50% of 10 minutes) and OFF for 5 minutes, and Stage 3 is OFF.
SWITCH DBAND	90	6665-6669	The temperature range in degrees which is compared to the difference between CTL TEMP and CTL STPT. The difference must exceed this value for temperature control mode to change over. Changeover is also subject to the active temperature control loop output being below SWITCH LIMIT (Point 85) and SWITCH TIME being expired.
CLG FLOW MIN	{91}	6665-6669	The minimum amount of air in CFM (LPS) to be supplied to the space in cooling mode.
CTL STPT	{92}	6665-6669	The actual setpoint value being used as input for the active temperature control loop.
CLG FLO STPT	{93}	6665-6669	The setpoint of the cooling flow control loop.
CAL AIR	{94}	All	YES commands the controller to go through calibration sequence for the air velocity transducers. YES is also displayed when the calibration sequence is started automatically. CAL AIR automatically returns to NO after the calibration sequence is completed. Valid input: YES or NO.

Descriptor	Address[1]	Application	Description
CAL SETUP	95	All	The configuration setup code for the calibration sequence options.
CAL TIMER	96	All	Time interval, in hours, between the calibration sequence initiations if a timed calibration option is selected in CAL SETUP.
CLGDUCT AREA	97	6665-6669	Area, in square feet (square meters), of the cooling duct where the air velocity sensor is located. This value is calculated by the portable operator's terminal or by the field panel depending on duct shape and size. It is used in calculating all points in units of CFM, CF, LPS, and L.
DUCT AREA 1	97	6693	Area, in square feet (square meters), of duct 1 where the air velocity sensor is located. This value is calculated by the portable operator's terminal or by the field panel depending on duct shape and size. It is used in calculating all points in units of CFM, CF, LPS, and L.
LOOP TIME	98	6665-6669	The time, in seconds, between control loop calculations.
ERROR STATUS	{99}	All	The status code indicating any errors detected during controller power up. A status of 0 indicates there are no problems.
AOV1	{102}	All	Displays the voltage signal to AO1.
AOV2	{103}	All	Displays the voltage signal to AO2.
AOV3	{104}	All	Displays the voltage signal to AO3.
AI 3	{105}	All	Spare Analog input (0 to 10V or 4-20 mA). Point is not available if DI 3 is in use.
AI 4	{106}	All	Spare Analog input (0 to 10V or 4-20 mA). Point is not available if DI 4 is in use.
RMTMP OFFSET	{107}	All	Compensates for deviations between the value of ROOM TEMP and the actual room temperature. This corrected value is displayed in CTL TEMP. RMTMP OFFSET + ROOM TEMP = CTL TEMP.
DI 4	{108}	All	Spare Digital input. Actual status of a contact connected to the controller. ON indicates that the contact is closed; OFF indicates that the contact is open. Point is not available if AI 4 is in use.
DI 5	{109}	All	Actual status of a contact connected to the controller at AI 5/DI 5. ON indicates that the contact is closed; OFF indicates that the contact is open. When a contact is connected at DI 5, AI 5 is not available. See *AUX TEMP/DISCH TEMP/MA TEMP*.
DI 6	{110}	All	Actual status of a contact connected to the controller. ON indicates that the contact is closed; OFF indicates that the contact is open.
STPT SPAN	111	6665-6669	The configuration value for room units to function in warmer/cooler adjustments. A value of 0 allows room units to function in standard/absolute temperature setpoint mode.
SENSOR SEL	{124}	All	Used to determine which version of room unit is connected and how the SENSOR SEL point responds to a possible communication loss between the controller and the room unit. The different versions of room units (legacy Series 1000 and 2000 stats; and the Series 2200 and 2300 stats) display

Descriptor	Address[1]	Application	Description
			the communication failure uniquely. This is an indicator for the occupant to know that there is a communication problem between the controller and room unit.
RM CO2	{125}	All	This point may be used in a control strategy as occupancy increases (CO2 levels increase) in the room being controlled.
RM RH	{126}	All	This point may be used in a control strategy as humidity levels varies in the room being controlled.
PPCL STATE	{127}	All	This point is an indicator that customized programming has been added in addition to the normal control strategy of the application being used. This point is read as LOADED or EMPTY. A status of LOADED indicates that there is PPCL programming in the controller, and it is providing unique control to meet a customer's job specification. A status of EMPTY indicates that no unique programming is present.

1) Points not listed are not used in this application.

2) Point numbers that appear in brackets { } may be unbundled at the field panel.

Chapter 4 – Basic Service and Maintenance

This chapter describes basic service and maintenance measures you can take when using a BACnet PTEC.

You may want to contact your local Siemens Industry representative if a problem occurs or you have any questions about the controller.

NOTE:
When troubleshooting, record the problem and what actions were performed immediately before the problem occurred. Being able to describe the problem in detail is important should you need assistance from your local Siemens Industry representative.

Basic Service Information

Always remove power to the BACnet PTEC when installing or replacing it. Since the controller does not have a power switch, the recommended method of removing power to a locally powered controller is to turn OFF the power to the 24 Vac transformer. The recommended method of removing power to a controller on a power cable (even to service a single controller) is to turn OFF the power at the transformer.

NOTE:
When removing power to a controller to perform maintenance or service, make sure that the person in charge of the facility is aware of this and that appropriate steps are taken to keep the building in control.

Never remove the cover from the BACnet PTEC. There are no serviceable parts inside. If a problem is found with this device, contact your local Siemens Industry representative for replacement. An anti-static wrist strap is recommended when installing or replacing controllers.

Preventive Maintenance

Most controller components are designed so that, under normal circumstances, they do not require preventive maintenance. Periodic inspections, voltage checks, and point checks are normally not required. The rugged design makes most preventive maintenance unnecessary. However, devices that are exposed to dusty or dirty environments may require periodic cleaning to function properly.

Safety Features

The controller board stores the controller's address, applications, and point values. In the event of a power failure or a reset, these values are retrieved from the controller's permanent memory and are used by the controller unless overridden by a field panel. If one of the following conditions occurs, the controller will activate safety features present in its fail-safe mode.

- Sensor failure.
- Loss of power. Upon controller power loss, communication with the controller is also lost. The controller will appear as failed (*F*) at the field panel.

Glossary

This glossary contains the collected terms and acronyms that are used in Siemens BACnet PTEC and TEC Controllers. For definitions of point database descriptors, see Chapter 3 - Point Database, in this manual.

airflow

Rate at which a volume of air moves through a duct. Usually expressed in cubic feet per minute (cfm) or liters per second (lps).

algorithm

Mathematical formula and control logic that uses varying inputs to calculate an output value.

AVS

Air Velocity Sensor. An electronic device that converts differential pressure from a pilot tube or multi-point pickup to an analog rate of fluid flow (air velocity in fpm, m/s) to provide calculations of air volume rate (cfm, lps) in a duct. The air velocity sensor may be an external device or an internal component of a controller.

centralized control

Type of control offered by a controller that is connected by means of Field Level Network (FLN).

cfm

Cubic Feet per Minute.

Chilled Beam

A cooling device that provides a cooling system by taking care of both the sensible and latent heat gains of a room in a single package by a series of chilled water coils mounted near or in the ceiling. Coupled with a CV or VAV terminal ventilation system, a chilled beam induces air movement over the coil in the way that it discharges fresh air into the room. This allows for both fresh air and cooling to be taken care of at the same time.

control loop

An algorithm, such as PI or PID, that is used to control an output based on a setpoint and an input reading from a sensor.

CO_2

Carbon dioxide, a naturally occurring chemical compound composed of two oxygen atoms and a single carbon atom. Among other production sources, carbon dioxide is produced as the result of breathing of humans and animals and can therefore be an indirect indication of the concentration of humans in a zone.

CV

Constant air volume. Ventilation system that provides a fixed air volume supplied to and exhausted from the rooms served. The fixed volume may be different during occupied and unoccupied times

Demand Control Ventilation

A control algorithm that provides for the control or reduction of outdoor air intake below design rates when the actual occupancy of spaces served by the system is at less than design occupancy.

DCV

Demand Control Ventilation.

DDC

Direct Digital Control.

Direct digital control

The automated control of a condition or process by a digital device (computer).

DO

Digital Output. Physical output point that sends a two-state signal (ON/OFF, OPEN/CLOSED, YES/NO).

English units

The foot-pound-second system of units for weights and measurements.

equipment controller

FLN device, such as a BACnet PTEC or ATEC, that provides individual room or mechanical equipment control or additional point capacity to a field panel.

field panel

A DDC control device containing a microprocessor for centralized control and monitoring of system components and equipment controllers.

Floating Control

The combination of a modulating controlled device with the use of a pair of two position outputs. The control signal will either activate one or the other outputs to drive the controlled device towards its open or closed position. When both outputs are off, the controlled device maintains its last position. Also referred to as tri-state control.

FLN

Field Level Network. Network consisting of equipment controllers, FLN end devices, fume hoods, etc.

lps

Liters per Second.

loopout

Output of the control loop expressed as a percentage.

Heat pump

An HVAC device used for both space heating and space cooling. When a heat pump is used for heating, it employs the same basic refrigeration-type cycle used by an air conditioner but in the opposite direction, releasing heat into the conditioned-space rather than the surrounding environment. In this use, heat pumps generally draw heat from the cooler external air or from the ground.

HMI
Human Machine Interface. Terminal and its interface program that allows you to communicate with a field panel or equipment controller.

Occupancy sensor
A control device that detects presence of people in a space by using infrared or ultrasonic technology. Occupancy sensors are used to save energy by controlling lighting and temperature and, along with CO2 sensors, to provide control input of demand control ventilation (DCV) algorithms.

override switch
Button on a room temperature sensor that an occupant can press to change the status of a room from unoccupied to occupied (or from night to day) for a predetermined time.

pressure dependent
Variable Air Volume (VAV) room temperature control system in which the temperature drives a damper such that the air volume delivered to the space at any damper position is dependent on the duct static pressure.

pressure independent
Variable Air Volume (VAV) room temperature control system in which the temperature drives an airflow setpoint such that the air volume delivered to the space is independent of variations in the duct static pressure.

PID
Proportional, Integral, Derivative.

RTS
Room Temperature Sensor.

setpoint
Data point that stores a value such as a temperature setting. In contrast, points that monitor inputs, such as temperature, report actual values.

SI units
Systeme International d'Unites. The international metric system.

slave mode
Default application that displays when power is first applied to an equipment controller. No control action is initiated in the slave mode. Input and output points in the slave application can be monitored or controlled by a field panel (or by PPCL in a BACnet PTEC controller).

stand-alone control
Type of control offered by a controller that is providing independent DDC control to a space.

Terminal Equipment Controller
Siemens Industry, Inc. product family of equipment controllers (one is the Siemens BACnet PTEC Dual Duct 2 AVS Controller) that house the applications software used to control terminal units, such as heat pumps, VAV terminal boxes, fan coil units, unit ventilators, etc.

UI

Universal Input. Can be used as an AI or DI. An AI input is a point receiving a signal that represents a condition that has more than two states. A DI input is a physical input point that receives a two-state signal.

unbundle

Term used to describe the entering of a point that resides in a controller's database into the field panel's database so that it can be monitored and controlled from the field panel.

VAV

Variable air volume. Ventilation system that changes the amount of air supplied to and exhausted from the rooms served.

Index

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