SIEMENS

BACnet PTEC VAV/Terminal Box Controller

Start-up Procedures

Building Technologies

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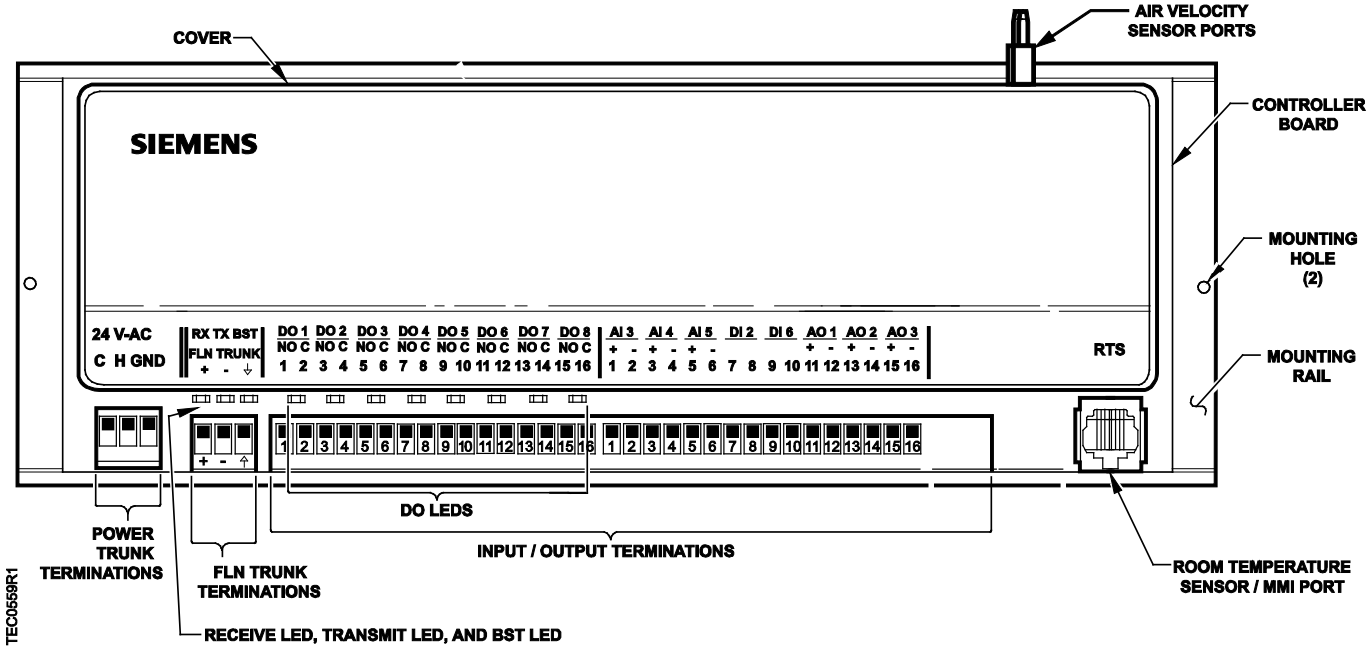
Before You Begin

NOTE:
WCIS version 3.0 or later must be used to configure Siemens BACnet MS/TP Equipment Controllers.
Do not check the Metric check box in the Device Properties dialogue box if the controller is communicating through the MS/TP driver in the field panel. Metric can be checked only if the controller is communicating through a router. If you need metric and the controller is communicating through the MS/TP driver in the field panel, then the Metric check box in the Device Properties dialogue box must be unchecked and the conversion must be handled in the field panel.



Communication and DO Indicators

The Siemens BACnet PTEC VAV/Terminal Box Controller has LEDs to indicate communication (yellow) and DO (digital output) status BST (yellow).

The RX LED will flash for data packets received by the actuator from the MS/TP network. The TX LED will flash for data packets sent by the actuator to the MS/TP network. Each DO has an associated LED located above its termination point. This LED point is on when the associated DO is commanded ON; otherwise, it is OFF. The BACnet PTEC will attempt to communicate with other devices as soon as it powers up. The TX LED will start flashing as it attempts to connect and transfer data.

Setting the Application

Add the PTEC to your job database and select one of the following applications.

Application Description	Application Number
VAV Cooling Only	6520
VAV Cooling or Heating	6521
VAV with Electric Reheat or Baseboard Radiation	6522
VAV with Hot Water Reheat	6523
VAV Series Fan Powered with Electric Reheat	6524
VAV Series Fan Powered with Hot Water Reheat	6525
VAV Parallel Fan Powered with Electric Reheat	6526
VAV Parallel Fan Powered with Hot Water Reheat	6527
VAV Slave Mode	6587

After you set the application, the controller goes through a shut-down/load sequence as it switches from slave mode to the application selected. After the application loads, the calibration cycle begins.

Add the TEC to your job database and select Application 6587.

At the start of the calibration cycle, the controller automatically sets CAL AIR to YES. When the cycle is complete, CAL AIR returns to NO.

The air velocity sensor calibration cycle begins within three minutes of an application start-up or initialization, depending on the controller's address. After this delay, the calibration cycle takes from 2 to 5 minutes to complete. The air damper closes during calibration.

NOTE:
You can continue the startup procedure while calibration is underway. However, the controller will ignore commands to control end devices (such as the damper) until calibration of the air velocity sensor is finished.

Enabling Actuators

⚠ CAUTION

The controller's DOs control only 24 Vac loads.
The maximum rating is 12 VA for each DO.

The points that determine actuator run times are:

- MTR 1 TIMING
- MTR 2 TIMING
- MTR 3 TIMING

Your application may not have or use all three points.

1. Use and/or to set run time(s) for the actuator(s) used by your application.
2. For damper rotation angles other than 90°, set DMPx ROT ANG to the appropriate value. The names of these points vary.

Specifying Motor Setup

⚠ CAUTION

If an Autozero Module is used,
do not enable MTR3 (valve 2).

MTR SETUP determines which actuators are controlled by the application and whether they are direct or reverse acting. Set MTR SETUP according to Table *MTR SETUP Values*.

NOTE:
When MTR SETUP is changed, all enabled actuators will calibrate. Wait until each actuator has completed its calibration before continuing.

MTR SETUP Values									
	Motor 1 Enabled			Motor 1 Enabled and Reversed			Motor 1 Not Used		
	Motor 2 Not Used	Motor 2 Enabled	Motor 2 Enabled and Reversed	Motor 2 Not Used	Motor 2 Enabled	Motor 2 Enabled and Reversed	Motor 2 Not Used	Motor 2 Enabled	Motor 2 Enabled and Reversed
Motor 3 Not Used	1	5	13	3	7	15	0	4	12
Motor 3 Enabled	17	21	29	19	23	31	16	20	28
Motor 3 Enabled and Reversed	49	53	61	51	55	63	48	52	60

Verifying Actuator Setup

1. Command all actuators closed. Verify that they close and remain closed. If not, adjust the setting for MTR SETUP according to Table *MTR SETUP Values*.

2. If any of the actuators still do not close completely, then the actuators have been installed or set up incorrectly. See the installation instructions (550-101), the iKnow Troubleshooting Tool, or contact Field Support.

Setting Number of Heat Stages or Valves

Depending on the application, STAGE COUNT, HTG STG CNT or VLV CNT (if present) refers to electric heat stages or valves used (enabled), some point names may vary.

- For water or steam valve applications, set VLV CNT to the number of valves used (1 or 2).
- For electric heat applications, check the hardware to verify the number of electric heat stages wired to the controller (1 to 3 stages without fan or 1 to 2 stages with fan) and set STAGE COUNT or HTG STG CNT to this value.

⚠ CAUTION

For installations using electric heat coils and without terminal fans, never set min airflow settings to 0.
Equipment damage can occur if electric heat is on without airflow.

- For applications with Electric Heat and no terminal fan and when the heating coil is located in the terminal unit, supply airflow is required to allow heat transfer from the coil to the room. EHEAT FLOW (in percent of HTG FLOW MAX) provides a means to ensure that there is sufficient air flow present before activating any heating stage.

Enabling Autozero Module

If an Autozero Module is used, enable it by setting CAL MODULE to **YES**.

⚠ CAUTION

If an Autozero Module is used,
do not enable MTR3 (valve 2).

NOTE:
For a controller without an Autozero Module, the damper is commanded closed to get a zero airflow reading during calibration. For a controller with an Autozero Module, the damper is closed only for the first calibration after controller initialization or power up.

Selecting Automatic Calibration Option

Using Table *CAL SETUP Options* set CAL SETUP to the value that best meets your job requirements.

If appropriate, change CAL TIMER from the default of 12 hours. This setting applies only if your choice for CAL SETUP includes Option 4.

NOTE:
The air velocity sensor should be calibrated at least once every 24 hours. Make sure that the sensor has been calibrated before balancing takes place, as this will affect the balancer's results.

CAL SETUP Options	
CAL SETUP	**Description**
0	Calibration occurs ONLY when the point CAL AIR is set to YES.
1	Calibration occurs when the field panel commands a day/night mode changeover. Actual calibration is subject to a time delay of 0, 1, 2, or 3 minutes. This delay is determined by the point CTLR ADDRESS divided by 4. The remainder is the time delay in minutes. For example, If CTLR ADDRESS = 11, then the controller will wait 3 minutes (11 ÷ 4 = 2 R3) after it receives the day/night mode changeover command before beginning the calibration routine.
2	Calibration occurs immediately after the override switch is depressed.
4 (factory default value)	Calibration occurs on the time interval set in the point CAL TIMER. For example, if CAL TIMER = 12, then the calibration period is 12 hours. Actual calibration is subject to a time delay based on the value of CTLR ADDRESS. See the example in Option 1.

NOTE:
Options can be combined by summing their numbers. For example, to calibrate as in Options 1 and 2, set CAL SETUP to 3.

Setting Room Temperature Setpoints

- Day (or occupied) cooling setpoint: DAY CLG STPT
- Day (or occupied) heating setpoint: DAY HTG STPT
- Night (or unoccupied) cooling setpoint: NGT CLG STPT
- Night (or unoccupied) heating setpoint: NGT HTG STPT

1. If the room temperature sensor has a setpoint dial that will be used, set STPT DIAL to **YES**. Otherwise, set STPT DIAL to **NO**.
   - Set RM STPT MIN and RM STPT MAX for the minimum and maximum allowable room temperature setpoint values, respectively. Valid values range from 55° to 95°F (13° to 35°C). Default values are 55°F (13°C) for RM STPT MIN and 90°F (32°C) for RM STPT MAX.

2. Setpoint dial configured with a heating/cooling deadband (default).
   - To allow the controller to operate with a heating/cooling deadband (functioning the same as provided when the setpoint dial is not present) the following configuration should be used.
   - Set the DAY HTG STPT less than the DAY CLG STPT by the deadband (or zero energy band) that is desired. (for example, DAY HTG STPT = 70°F; DAY CLG STPT = 74°F, providing a deadband of 4 degrees). Only the difference between these values is used to determine the setpoint that will be used.
   - As described below, the setpoint(s) for heating/cooling will be 1/2 of the deadband above or below the setpoint dial value.

   ⇨ When HEAT.COOL equals HEAT, then:

   ⇨ CTL STPT will equal RM STPT DIAL – 0.5 * (DAY CLG STPT – DAY HTG STPT) and will be limited by RM STPT MIN and RM STPT MAX.

   ⇨ When HEAT.COOL equals COOL, then:

   ⇨ CTL STPT will equal RM STPT DIAL + 0.5 * (DAY CLG STPT – DAY HTG STPT) and will be limited by RM STPT MIN and RM STPT MAX.
   NOTE: A space where the deadband is used can be more energy efficient than a space where the deadband is not being used
3. Setpoint dial configured for zero heating/cooling deadband.
   - When the job specification requires a common heating and cooling temperature setpoint, the following configuration should be used.
   - Set DAY HTG STPT equal to DAY CLG STPT. This will configure the setpoint deadband equal to zero.
   - In addition, when a setpoint deadband equals zero, then:
   - CTL STPT will equal RM STPT DIAL, and will be limited by RM STPT MIN and RM STPT MAX.
     NOTE: A space where the heating/cooling deadband is zero may be more comfortable than a space where the deadband is being used, but may use more energy.
4. Set the room temperature setpoints to the desired values. Heating setpoints are not present in cooling only applications.)

Setting STAT SUPV

The point STAT SUPV is used when a digital room unit is used with the PTEC. The value set, allows the temperature, humidity, and CO2 subpoints to read failed when the room unit is not functioning or is disconnected.

If a value is not selected, the points will not fail. If you enable supervision for a feature that is not being used (such as humidity or CO2), that value always displays as failed.

- If a standard room unit (Series 1000 or 2000) is being used, STAT SUPV must be set to a value of 0 (zero).
- If the digital room unit (Series 2200 or 3200) is being used, STAT SUPV must be set to a value greater than 0 (zero).

Configure STAT SUPV using one of the following values:

Value	Description
1	Temperature sensing only
3	Temperature and Relative Humidity (RH) sensing
5	Temperature and CO_2 sensing [a]
7	Temperature and Relative Humidity (RH) and CO_2 sensing [a]

[a] Currently not available, for future use.

Setting Override Time

If using night/unoccupied override, set OVRD TIME to the number of whole hours that an override should last. If OVRD TIME equals 0 (default), this feature is disabled.

Enabling Wall Switch

If a wall switch is used for day/night (occupied/unoccupied) control, enable it by setting WALL SWITCH to **YES**.

Otherwise, leave WALL SWITCH at its default value of **NO**.

Setting Duct Area

If provided, enter the duct area (sq ft or sq m) into DUCT AREA (and also into HTGDUCT AREA, where applicable) and continue to *Setting Flow Coefficient*.

If you do not know the duct area, use the following table:

Area =	Round Duct	Rectangular Duct
Area in Sq. Ft. (Dimensions in inches)	$(\pi \times R^2)/144$	Width x Height/144
Area in Sq. M (Dimensions in centimeters)	$(\pi \times R^2)/10{,}000$	Width x Height/10,000

Setting Flow Coefficient

1. Set FLOW COEFF to the appropriate value found in Table *Box Manufacturer Flow Coefficients*. This value is a starting point for the air balancer.
2. To fine tune the flow coefficient use the following formula:

   ⇨ **new flow coefficient = (actual volume/controller volume) x old flow coefficient**

   The actual volume is the actual value obtained from the balancer's

measurements. The controller volume is the value obtained from AIR VOLUME.

3. If the controller volume is not within 5% of the actual volume, repeat the procedure until it is within 5%.

Box Manufacturer Flow Coefficients		
Manufacturer	**Sensor Type**	**Value**
Anemostat	2-pipe without orifice 2-pipe with orifice Spider without orifice Spider with orifice	0.79 0.59 0.73 0.39
Carnes	2-pipe Flow cross	0.66 0.59
Carrier		0.59
E.H. Price / Siemens Building Technologies Lab Terminal Boxes		0.78
Environmental Technologies		0.79
Krueger		0.68
Metal Aire		0.72
Nailor Industries		0.69
Titus		0.60
Trane		0.66

Setting Airflow Setpoints

NOTE:
Maximum flow(s) must be set ≥ minimum flow(s).

1. Set CLG FLOW MIN to the desired minimum cooling airflow setpoint.
2. Set CLG FLOW MAX to the desired maximum cooling airflow setpoint.

   ⇨ **Application 6521 through 6527**
3. Set HTG FLOW MIN to the desired minimum heating airflow setpoint.
4. Set HTG FLOW MAX to the desired maximum heating airflow setpoint.
5. Set FLOW START to the heating loopout percentage that the flow will start to modulate in the heating mode. (that is, at HTG FLOW MIN).
6. Set FLOW END to the heating loop out percentage that the flow will end modulation (that is, at HTG FLOW MAX).

⇨ In addition to the flow setpoints in the heating mode (HTG FLOW MIN and HTG FLOW MAX), the parameters FLOW START (default is 0) and FLOW END (default is 100) will determine what portion of the HTG LOOPOUT the flow will modulate

the heating mode. CAUTION: If FLOW START equals FLOW END, the flow will not modulate even if HTG FLOW MAX is greater than HTG FLOW MIN.

NOTE:
For Applications 6522, 6523, 6524 and 6566, HTG FLOW MAX should be less than CLG FLOW MAX. Otherwise, cold supply air may cool rather than heat the space in heating mode. A typical setting for HTG FLOW MAX is 50% or less of CLG FLOW MAX.

⚠ CAUTION

For electric heating coils in the air terminal unit without a terminal fan, do not set HTG FLOW MIN to 0.
Equipment damage may occur if insufficient air flow is present with electric heat ON.

Setting Room Temperature Offset (optional)

When the room has stabilized, take a precision temperature reading over a period of time at the room temperature sensor, record any difference between this reading and the value of ROOM TEMP and set this difference value (to the nearest 0.25°F (0.14°C)) into RMTMP OFFSET.

Example

If the actual room temperature is 72.0°F (22.2°C), and the value of ROOM TEMP is 73.0°F (23.8°C), then the value entered into RMTMP OFFSET is –1.0. In this case, the value of ROOM TEMP would read the raw value 73.0°F (23.8°C), but the value of CTL TEMP would read 72.0°F (22.2°C).

CTL TEMP = ROOM TEMP + RMTMP OFFSET

Setting AI4/AI5 OFFSET

AI 5 OFFSET works like RMTMP OFFSET. It can be used to calibrate AI5 aux temp sensor input if necessary. The actual temperature plus AI 5 OFFSET will equal AI5 display temperature.

AI 4 OFFSET works exactly like AI 5 OFFSET.

Setting Controller Address

Set CTLR ADDRESS to the BACnet MS/TP MAC address. (0 through 127 = Master; 128 through 254 = Slave).

NOTE:
Set the controller address and MS/TP network baud rate prior to connecting the controller to the network. See Configuring BACnet Parameters [→ 13].

Configuring BACnet Parameters

NOTE:
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Using WCIS, do the following:

1. From the **Device** menu, select **Device Properties** to configure BACnet parameters.
   - **Object Name** – unique to BACnet network, (12 character limit).
   - **Object ID** – unique to BACnet network (valid values are 0 through 4,194,303).
   - **Description** – description of controller (60 character limit).
   - **Location** – physical location of controller (60 character limit).
   - **MSTP Network Baud Rate** – options; 9600, 19200, 38400 or 76800 (default is19200).
2. Configuring the Room Unit port.
   - If using a sensing only Room Unit, the baud rate can be 1200 to 76800. For optimal use with WCIS use 38400.
   - If using a communicating Room Unit, the baud rate must be set to 1200.
3. Press the **Write** button. The controller accepts the configuration values and then resets.

⇨ When the BACnet MS/TP TEC is successfully installed, the RX and TX LEDs flash On/Off rapidly and continuously (indicating proper communication with other devices on the network).

Flashing Controller Firmware

FLT Procedure

Use Commissioning Tool Firmware Loading Tool (FLT) for this procedure.

1. Connect to RTS port of PTEC.
2. Set Communications to **1200 baud** and **ID**.
   - Click the **Identify** button in FLT.

3. Browse for new firmware.
4. Select **Load**.

WCIS Procedure

1. Connect to device.
2. Select **Load TEC Firmware** from Device pull-down menu.
3. Click the **Browse** button in Load TEC Firmware dialog box.
4. Select the firmware.
5. Select **Load**.