SIEMENS

BACnet Programmable TEC

VAV Chilled Beam with Demand Control Ventilation (CO2) and Floating or Analog Output - Application 6658

Start-up Procedures

140-0980

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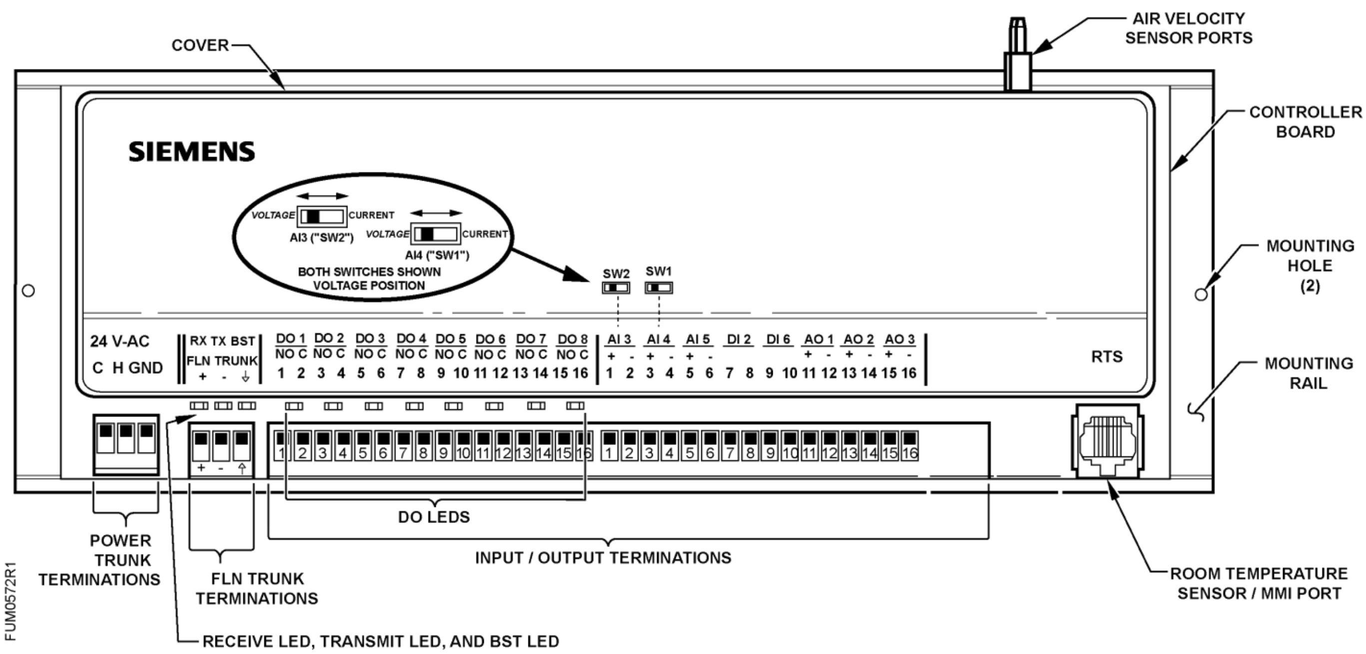
Building Technologies

Table of Contents

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.



Generic Controller I/O Layout. See *Wiring Diagram* for application specific details.

Communication and DO Indicators

The Siemens BACnet PTEC VAV with Chilled Beam, Demand Control Ventilation (CO2) and Floating or Analog Output 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 controller from the MS/TP network. The TX LED will flash for data packets sent by the controller 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.

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:

- DMPR TIMING
- H VLV TIMING
- C VLV TIMING

1. Use the following table(s) to set run time(s) for the actuator(s) used by your application.
2. For damper rotation angles other than 90°, set DMPR ROT ANG to the appropriate value.

Damper Actuator Run Time		
Damper Actuator	**Setting (seconds)**	
	50 Hz	**60 Hz**
GDE 131.1 (floating control)	108	90
GLB 131.1 (floating control)	150	125
GDE 161.1 (0 to 10V control)	108	90
GLB 161.1 (0 to 10V control)	150	125
PTS4 electronic-to-pneumatic transducer from ACT	-	90

Valve Actuator Run Time		
Valve Actuator	**Setting (seconds)**	
	50 Hz	**60 Hz**
SSB81U, floating control fail-in-place	180	150
SSC81U, floating control fail-in-place	150	125
SSC81.5U, floating control fail-safe	125	125
SQS85.53U, floating control spring return	35	30
SSB61U, 0-10V proportional fail-in-place	75	75
SSC61U, 0-10V proportional fail-in-place	30	30
SSC61.5U, 0-10V proportional fail-safe	25	25
SQS65U, 0-10V proportional fail-in-place	35	30

Valve Actuator Run Time		
Valve Actuator	Setting (seconds)	
	50 Hz	60 Hz
SQS65.5U, 0-10V proportional fail-safe (SR)	35	30
PTS4 electronic-to-pneumatic	-	90

Specifying Motor Setup

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

In Application 6658, the value of MTR SETUP determines the type, not the number, of output control signals generated by the application. The output signals for H VLV COMD and C VLV COMD can be floating or 0 to 10V analog. Use the additive values in the *Motor Enable/Reverse Values for MTR SETUP* table, along with the output signal logic in the *MTR SETUP Values and Corresponding Output Signals* table, to arrive at the MTR SETUP value needed for your job.

The MTR SETUP values are additive. For example, if you needed Motor 1 (DOs 1 and 2) enabled, Motor 2 (DOs 3 and 4) enabled, and Motor 3 (DOs 5 and 6) disabled, you would set MTR SETUP equal to 5. This is because the Motor 1 (for the damper) enable value is 1, the Motor 2 enable value is 4, and the Motor 3 disable value is 0. 1 + 4 + 0 = 5. In this case, you would have a floating signal for damper (DOs 1 and 2), heating (DOs 3 and 4), and a 0 to 10V analog signal for cooling (AOV1).

Motor Enable/Reverse Values for MTR SETUP			
	MTR SETUP Value [a)]		
	Disabled	Enabled	Enabled and Reversed
Motor 1	0	1	3
Motor 2	0	4	12
Motor 3	0	16	48

[a)] The values in this table are additive and must be added per the requirements of the job.

Example motor setup configurations for floating damper with hot water and chill water valves. In each case, motor 1 for the damper, is controlled by DO1 and DO2.

MTR SETUP Sample Configurations.		
MTR SETUP [a) b)]	HVLV COMD	CVLV COMD
Motors 1 and 2 Enabled, Motor	Motor 2 (DO 3 and DO 4)	AOV1

MTR SETUP Sample Configurations.		
MTR SETUP [a) b)]	**HVLV COMD**	**CVLV COMD**
3 Disabled		
Motor 1 Enabled, Motor 2 Disabled, Motor 3 Enabled	AOV2	Motor 3 (DO 5 and DO 6)
Motors 1, 2, and 3 Enabled	Motor 2 (DO 3 and DO 4)	Motor 3 (DO 5 and DO 6)
Motor 1 Enabled, Motors 2 and 3 Disabled	AOV2	AOV1

a) Motor 1 is reserved for the damper. The default value of MTR SETUP is 0 - it must be changed to enable the damper.

b) The MTR SETUP values given in this table assume none of the actuators are reverse acting. If any actuators must be reverse floating acting, use the additive values in the *Motor Enable/Reverse Values for MTR SETUP* table to arrive at the correct value for MTR SETUP.

NOTE:
If Motor 2 (DOs 3 and 4) is being used for floating point control of a valve for heating, then AOV 2 is spare. In this case, although AOV 2 is spare, AOV 2 OPEN and AOV 2 CLOSE are not used for control of the output for this spare analog. Likewise, if Motor 3 is being used for Floating Control of cooling, AOV 1 would be spare but AOV 1 OPEN and AOV 1 CLOSE would not be used for control of AO1 output.
If AOs are used for modulating heating/cooling devices, the associated DOs are spare but unavailable for motor control.

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 Siemens BACnet PTEC VAV with Chilled Beam, Demand Control Ventilation (CO2) and Floating or Analog Output Controller Installation Instructions (550-112), the iKnow Troubleshooting Tool, or contact Field Support.

Setting Voltages to Open and Close 0 to 10V Actuators

If AOV control is used for modulating a valve instead of floating control, the open/close voltages must be set. Otherwise, this section can be skipped.

1. Set AO 1 OPEN to the voltage that fully opens the modulating cooling device connected to AOV 1.
2. Set AOV 1 CLOSE to the voltage that completely closes the modulating cooling device connected to AOV 1.

3. Set AOV 2 OPEN to the voltage that fully opens the modulating heating device connected to AOV 2. (If an SCR is connected to AOV 2, then AOV 2 OPEN is the voltage that causes the SCR to be fully on.)
4. Set AOV 2 CLOSE to the voltage that completely closes the modulating heating device connected to AOV 2. (If an SCR is connected to AOV 2, then AOV 2 CLOSE is the voltage that causes the SCR to be fully off.)

NOTE:
The maximum voltage output for an AO is 10V. The controller will not control the modulating heating device beyond 10V.

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 [→ 18].

Setting the Application

Add the TEC to your job database and select Application 6658

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.

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.

Air Velocity Sensor Calibration

The air velocity sensor calibration cycle takes from 2 to 5 minutes to complete. The air damper closes during calibration. At the start of the calibration cycle, the controller automatically sets the point CAL AIR to YES. When the cycle is complete, it sets CAL AIR to NO.

NOTE:
For a controller used without an Autozero Module, the damper is commanded closed to get a zero airflow reading during calibration. For a controller used with an Autozero Module, calibration occurs without closing the damper.

Wait until the calibration cycle is complete (CAL AIR is set to NO) before continuing with this startup procedure.

Selecting Automatic Calibration Option

1. Using the following table, set CAL SETUP to the value that best meets your job requirements.
2. 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 (value)	**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. **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 pressed.
4 (factory default value)	Calibration occurs on the time interval set in the point CAL TIMER. **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 in Options 1 and 2, set CAL SETUP to **3**.

Setting Room Temperature Setpoints

- Day (or OCC) cooling setpoint: DAY CLG STPT
- Day (or OCC) heating setpoint: DAY HTG STPT
- Night (or UOC) cooling setpoint: NGT CLG STPT
- Night (or UOC) 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), use the following configuration:
   - 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, use the following configuration:
   - Set DAY HTG STPT equal to DAY CLG STPT. This will configure the setpoint deadband equal to zero.
   - If 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 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 (or TEMP OFFSET).

Example

If the actual room temperature is 72.0°F (22.2°C), but the value of ROOM TEMP is showing 73.0°F (23.8°C), then the value to be entered into RMTMP OFFSET (or TEMP OFFSET) would be –1.0 (negative 1 degree). In this case, ROOM TEMP would read the raw value 73.0°F (23.8°C), but CTL TEMP would equal 72.0°F (22.2°C).

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

Setting STAT SUPV

STAT SUPV is a configurable, enumerated point (values are additive). This point tells the controller what kind of room unit is connected and how to respond to thermistor inputs and the controller.

Room Temperature

- When the digital room unit (Series 2200/2300) is used, STAT SUPV enables:
  - Temperature sensing with value of 1.
  - Relative humidity sensing with value of 2.
  - CO2 sensing with value of 4.
- When the analog room unit (Series 1000/2000) is used, default temperature sensing (0) is enabled (relative humidity and CO2 sensing are not available).

Thermistor Inputs

- Default for either input is 10K.
- To enable 100K thermistor on input, see table for additive values of 8.

Other Inputs (only available on Digital Room Unit)

- Use the following able to enable relative humidity or CO2 for additive values of 2 or 4.

Value	Description (include values to enable feature)
1	Room temperature sensing (Digital Room Unit only)
2	Relative Humidity (RH) sensing
4	CO_2 sensing
8	Long board: 100K Ω thermistor on AI 5 (else input is 10K Ω)
16	(not used)

NOTE:
To use the room unit CO2 input for the demand control ventilation program, both STAT SUPV must be set (additive value 4) and CO2 CONFIG set to 1.

Example 1: If you are using a Series 2200 or 2300 room unit and want temperature and CO_2 sensing and a 100K thermistor on AI 5, the value set in STAT SUPV would be 13 (1 + 4 + 8 = 13).

Example 2: If you are using a Series 1000 or 2000 room unit and want temperature sensing and a 100K thermistor on AI 5/AI 3, the value set in STAT SUPV would be 8 (0 + 8 = 8).

NOTE:
Digital room unit: If a temperature, humidity, or CO_2 value is not included in the configured value for STAT SUPV, the related point will still be correctly read (after a short delay). If STAT SUPV is not configured, the related points will only fail if connection is lost.
Analog room unit: If you enable supervision for room temperature, the controller will not report temperature and will always display as failed. ROOM TEMP and RM STPT DIAL will fail if out of range or connection is lost.

Setting HC.ENDIS

HC.ENDIS determines whether the application is heating only, cooling only, or if it uses both heating and cooling modes. Set HC.ENDIS to the desired value.

- 3 = heating and cooling (default)
- 1 = heating only
- 2 = cooling only

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.

Setting Duct Area

If provided, enter the duct area (sq ft or sq m) into DUCT AREA 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.	$(\pi \times R^2)/144$ (where π = 3.14 and R = radius of duct in inches)	Width x Height⁄144 (in inches)
Area in Sq. M	$(\pi \times R^2)/10,000$ (where π = 3.14 and R = radius of duct in centimeters)	Width x Height⁄10,000 (in centimeters)

Setting Flow Coefficient

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 Industry 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.
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 VENT DMD MIN to the desired minimum ventilation airflow setpoint.
6. Set VNT FLOW MAX to the highest controlled ventilation airflow when the demand control ventilation (DCV) for CO2 is enabled.
7. Set NGT FLOW MIN to the airflow for night (unoccupied) mode.
   – During night mode, airflow will modulate to CLG FLOW MAX or HGT FLOW MAX to satisfy the unoccupied temperature setpoints.
   – During night mode, the demand control ventilation (DVC), when configured, will increase airflow (from NGT FLOW MIN to VNT FLOW MAX) in response to increased CO2 levels.

	⚠ CAUTION
	If using electric heat, enter a value for HTG FLOW MIN. Equipment damage may occur at 0 cfm with electric heat ON.

	⚠ CAUTION
	As a safety feature, the application includes MODHTG FLOW to ensure that adequate airflow is present before an electric heating element is energized. The standard default for MODHTG FLOW is 20, ensuring adequate airflow (20% of Max setpoint) is provided before a heating coil is enabled. **For installations that include radiant heating panels or hot water coils (either ceiling or wall mounted), MODHTG FLOW should be set to zero** If the application does use electric heat, it is imperative that MODHTG FLOW be set to a value such as 5 which means that airflow must be at least 5% of maximum heating flow before H VLV COMD will turn on.

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**.

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.

Heating/Cooling Start and End

The following configuration points establish whether the flow should ramp up before, during, or in parallel with the ramping of the temperature valves. See the *Application Note: Sequencing Logic* section for additional information.

1. Set C FLOW START to the value of CLG LOOPOUT (0 through 100) at which the flow will begin to modulate up from CLG FLOW MIN.
2. Set C FLOW END to the value of CLG LOOPOUT (0 through 100) at which the flow will reach CLG FLOW MAX.
3. Set CHW START to the value of CLG LOOPOUT (0 through 100) at which the chilled water valve will begin to modulate open from fully closed.
4. Set CHW END to the value of CLG LOOPOUT (0 through 100) at which the chilled water valve will be fully open.
5. Set H FLOW START to the value of HTG LOOPOUT (0 through 100) at which the flow will begin to modulate up from HTG FLOW MIN.
6. Set H FLOW END to value of HTG LOOPOUT (0 through 100) at which the flow will reach HTG FLOW MAX.
7. Set REHEAT START to the value of HTG LOOPOUT (0 through 100) at which the hot water valve will begin to modulate open from fully closed.
8. Set REHEAT END to the value of HTG LOOPOUT (0 through 100) at which the hot water valve will be fully open.

The second stage of cooling can be delayed. Set CLG STG DLY to the number of delay minutes.

NOTE:
If C FLOW START > CHW START, flow will not begin modulating until CLG LOOPOUT has been greater than C FLOW START for more than CLG STG DLY minutes.
If CHW START > C FLOW START, the chilled water valve will not begin to open until CLG LOOPOUT has been greater than C FLOW START for more than CLG STG DLY minutes.
If C FLOW START = CHW START, there is no delay.

Setting the CO2 Parameters

For additional information, see the *Ventilation Control* section Application Note.

- Set CO2 SCALE to the value, in parts per million (PPM), represented by a sensor reading of 10V or 20 mA (Default is 2000).

For the following configuration points, *CO2 differential* means the difference between room and outdoor CO2 concentrations as measured in parts per million.

1. Set CO2DIFF STPT to the targeted CO2 differential to be controlled to when the application is in the ventilation mode. (The default is 100 PPM.)

2. Set CO2DIFF HLIM to the CO2 differential which when exceeded causes the application to enter the ventilation control mode. (The default is 500 PPM.)
3. Set CO2DIFF LLIM to the CO2 differential which when succeeded (becomes less than) causes the application to exit ventilation mode and return to temperature control mode. (The default is 400 PPM.)
4. Set CO2 ALM DLY to the desired number of minutes that must elapse before an alarm will occur. (The default is 10 minutes.) CO2 ALARM is set to ALARM state when the CO2 differential (CO2DIFF) has been greater than CO2DIFF HLIM for longer than the time in CO2 ALM DLY.
5. Set CO2 RST DLY to the number of minutes that the CO2 differential must be below CO2DIFF LLIM before FLO CTL MODE switches from ventilation control mode (VENT) to temperature control mode (TEMP).
6. Set OUTDOOR CO2.
For the most accurate representation of CO2 differential, OUTDOOR CO2 should receive its value using PPCL from a CO2 sensor that is measuring the outdoor CO2 concentration level in parts per million (PPM). The signal may need filtering to reduce fluctuation in the sent value. If the value fluctuates needlessly, it will cause unstable control. If there is no outdoor sensor, OUTDOOR CO2 should be set to a typical outdoor CO2 concentration level in PPM. The default is 450 PPM which should be good for most situations.
7. Set CO2 CONFIG to the type of operation required.

CO2 CONFIG values for Demand Control Ventilation	
CO2 CONFIG value	**Application Operation**
0	Demand Control Ventilation feature is disabled.
1	CO2 based demand control ventilation is enabled. AI3 and AI4 are spare. The value of RM CO2 that is used for CO2 control is set via PPCL from a field panel or in the 3 way digital room unit.
2	Not used (returns to 0).
3	CO2 based demand control ventilation is enabled. AI3 is the input used for calculating RM CO2.
4	CO2 based demand control ventilation is enabled. AI4 is the input used for calculating RM CO2.

NOTES:
If RM CO2 is overridden while in modes 1, 3 or 4, the overridden value is used for CO2 control purposes. If RM CO2 is overridden while in mode 0, there will be no CO2 control, even with large values.
If AI 3 or AI4 is used for CO2 sensing, set the associated DIP switch (located on circuit board) to indicate the sensor type, either current or voltage, voltage is default.
Since CO2 sensors may have an accuracy of + or – 50 PPM, some CO2 default values may need adjustment. Ventilation mode default values are: 500 PPM for entering the Demand Control Ventilation mode; 400 PPM for leaving the Demand Control Ventilation mode; 100 PPM is the default CO2DIFF STPT. Refer to the appropriate industry standards and guidelines when configuring the CO2 differential levels and setpoints.

DCV Modes

Demand Control Ventilation can operate in two basics modes: threshold monitoring and PID control (proportional control only).

DCV Mode 1 – Threshold Monitoring

This is the factory default. In this mode, when the CO2 measurement for the indoor air becomes greater than the CO2 measurement for the outdoor air by a configurable amount, the damper will move to the ventilation maximum until the differential CO2 level drops below a second lower configurable limit. When the differential CO2 level has been at or below the lower limit for a specified number of minutes, the application returns to normal temperature control. If the CO2 differential rises again, the process repeats. With factory default settings, as the differential between indoor and outdoor CO2 concentrations rises above 500 ppm, the damper will open to the ventilation maximum until the CO2 differential level drops below 400 ppm for 10 minutes.

To operate in this mode:

- Set CO2 P GAIN equal to or greater than 1
- Set CO2DIFF STPT to a value at least 100 ppm below CO2DIFF LLIM

DCV Mode 2 – with PID Loop Proportional Control only

This mode allows you to adjust CO2 P GAIN and CO2DIFF STPT to establish a desired CO2 steady state level. For example, CO2DIFF STPT could be set to 250 and the gain set to 0.33. With these settings, a CO2 steady state level would establish itself somewhere between an indoor/outdoor differential of 250 and 550 ppm. In this example, the upper limit CO2DIFF HLIM should be set to slightly above 550 ppm to avoid alarms when the controller is controlling near the upper limit of its PID range.

NOTE:
Using I gain (CO2 I GAIN) is not recommended in this application.

The following table shows the relationship between gain and proportional band. Due to the tendency of CO2 levels to drift, the lowest gain possible is recommended when using proportional control.

CO2 P GAIN	Proportional Band
1	Control range will be from setpoint to 100 ppm above setpoint
0.33	Control range will be from setpoint to 300 ppm above setpoint
0.2	Control range will be from setpoint to 500 ppm above setpoint

To operate in DCV Mode 2 (PID Loop – Proportional Control only):

- Set CO2 P GAIN and CO2DIFF STPT as desired according to the above guidelines.

DCV Used/Not Used

DCV Used — When DCV is enabled (CO2 CONFIG = 1, or 3), set CLG FLOW MIN and HTG FLOW MIN to values that assure adequate ventilation for the building component. This is typically about 30% of a ventilation flow rate based on full occupancy. If 400 cfm is minimum flow based on occupancy, 120 cfm (30% of 400) might be used for the CLG FLOW MIN and HTG FLOW MIN values. The number of occupants will be inferred by measuring the level of CO2. In this case, as occupancy goes from no occupancy to full occupancy the ventilation would ramp from 120 to 400 cfm.

DCV Not Used — Setting CO2 CONFIG to zero disables the DCV feature. If CO2 CONFIG = 0, set CLG FLOW MIN and HTG FLOW MIN to values that will assure adequate ventilation based on full occupant capacity and the square footage of the space. Consult ASHRAE or other appropriate guidelines.

NOTE:
Always refer to the appropriate industry standards and design guides for selecting minimum ventilation levels. ASHRAE guidelines base ventilation needs on a building component and an occupant component.

Configuring BACnet Parameters

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.

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**.
     NOTE: If using a communicating digital 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 the Firmware Loading Tool (FLT) for this procedure.

1. Connect to RTS port of PTEC.
2. Set Communications to **1200 baud** and **ID**.
3. Click the **Identify** button in FLT.
4. Browse for new firmware.
5. Select **Load**.

WCIS Procedure

1. Connect to device.
2. From the **Device** menu, select, **Load TEC Firmware**.
   ⇨ The **Load TEC Firmware** dialog box displays.
3. Click the **Browse** button.
4. Select the firmware.
5. Select **Load**.

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