SIEMENS

BACnet VAV with CO2 Monitoring and AOV or Floating Point Heating

Start-up Procedures

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Before You Begin

Verify that the controller is powered up. Check to see if the BST LED (Figure 1) on the controller is flashing. If the BST LED does not flash ON/OFF once per second, refer to the *iKnow Troubleshooting Tool*.

Do not perform an update command on a BACnet MS/TP TEC from the Field Panel or from within Insight. This feature is not currently supported.

WinCIS version 2.1.4 or later must be used to configure Siemens Building Technologies BACnet controllers.

The default HMI baud rate is 1200. If WinCIS does not communicate (through the HMI port/RTS sensor), try a different HMI baud rate.

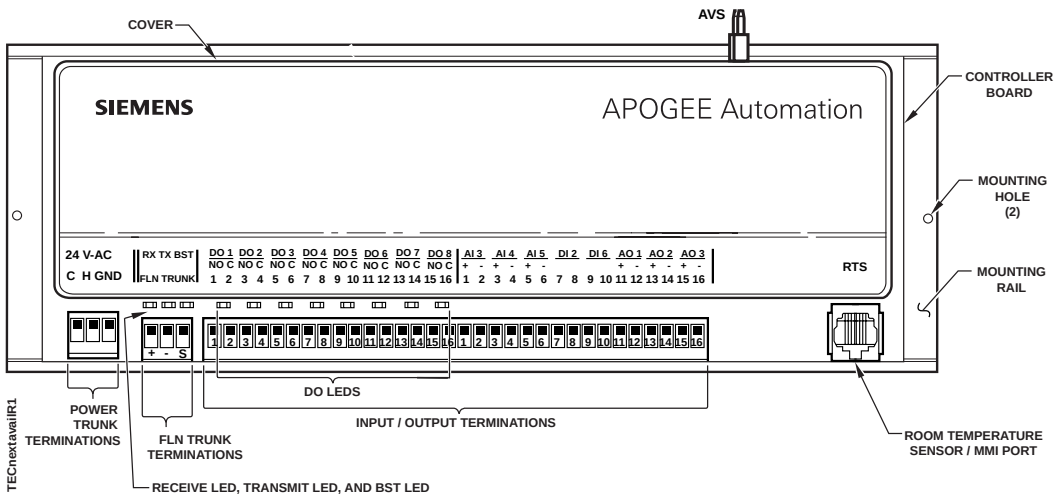

Figure 1. BACnet VAV with CO2 Monitoring, Parallel or Series Fan and AOV and Floating Point Heating.

Enabling Actuators

CAUTION:

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

1. Use Table 1 and Table 2 to set run times for the actuators used by your application. The three run time setup points are MTR1 TIMING (Point 51), MTR2 TIMING (Point 102), and MTR3 TIMING (POINT 105).

2. For a actuator rotation angle other than 90°, set DMPR ROT ANG (Point 56), MTR2 ROT ANG (Point 102) and MTR3 ROT ANG (Point 106) to the appropriate values. (PTS4 rotation angle is 90°.)

Table 1. Damper Actuator Run Time.

Damper Actuator	Setting (seconds)	
	50 Hz	60 Hz
GDE131.1 (floating point control)	108	90
GLB131.1(floating point control)	150	125
GDE161.1 (0 to 10 V control)	108	90
GLB161.1 (0 to 10 V control)	150	125
PTS4 electronic-to-pneumatic transducer from ACT	–	90

Table 2. 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
SQS65.5U, 0-10V proportional fail safe (SR)	35	30
PTS4 electronic-to-pneumatic	–	90

Specifying Motor Setup

MTR SETUP (Point 58) determines how many motors are being used and if they are direct or reversed acting.

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

If Motor 2 (DOs 3 and 4) is being used for floating point control of a valve for heating, then AOV1 is spare. In this case, although AOV1 is spare, AOV1 OPEN (Point 61) and AOV1 CLOSE (Point 62) are not usable, because MODHTG1 COMD is being sent to Motor 2. Likewise, if Motor 3 is being used for Floating Point controlled heat, AOV2 would be spare but AOV2 OPEN (Point 39) and AOV2 CLOSE (Point 40) would not be usable.

If AOs are used for modulating heating devices, the DOs are spare but unavailable for motor control.

The MTR SETUP values in Table 3 are **additive**. For example, if you wanted to have Motor 1 (DOs 1 and 2) enabled, Motor 2 (DOs 3 and 4) enabled and reversed, and Motor 3 not used, you would set MTR SETUP equal to 13. This is because the Motor 1 enable value is 1, the Motor 2 enabled and reversed value is 12, and the Motor 3 not used value is 0. 1 + 12 + 0 = 13.

Table 3. Motor Enable/Reverse Values for MTR SETUP (Point 58).

	MTR SETUP (Point 58) Value[a]		
	Not used	**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.

Setting Voltages that Open and Close 0 to 10 V Actuators

If AOV control is used for modulating heat instead of floating point, the open/close voltages need to be set. Otherwise this section can be skipped.

Set AOV1 OPEN (Point 61) to the voltage that fully opens the modulating heating device connected to AOV1. (If an SCR is connected to AOV1, then AOV1 OPEN is the voltage that causes the SCR to be fully on.)

Set AOV1 CLOSE (Point 62) to the voltage that completely closes the modulating heating device connected to AOV1. (If an SCR is connected to AOV1, then AOV1 CLOSE is the voltage that causes the SCR to be fully off.)

Set AOV2 OPEN (Point 39) to the voltage that fully opens the modulating heating device connected to AOV2. (If an SCR is connected to AOV2, then AOV2 OPEN is the voltage that causes the SCR to be fully on.)

Set AOV2 CLOSE (Point 40) to the voltage that completely closes the modulating heating device connected to AOV2. (If an SCR is connected to AOV2, then AOV2 CLOSE is the voltage that causes the SCR to be fully off.)

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

Setting Controller Address

Set the controller address by setting CTLR ADDRESS to the appropriate number, see *Configuring BACnet Parameters*.

For BACnet TECs, the controller address is the same as the BACnet MAC address.

Setting the Application

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

Table 4. VAV Applications.

Application Description	Application Number
BACnet VAV with CO2 Monitoring and AOV or Floating Point Heating	2580
BACnet VAV with CO2 Monitoring, Series Fan and AOV and Floating Point Heating	2581
BACnet VAV with CO2 Monitoring, Parallel Fan and AOV or Floating Point Heating	2582

Set Application (Point 2) to the application number that you have chosen.

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.

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 (number 94) to YES. When the cycle is complete, it sets CAL AIR to NO.

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 Table 5, set CAL SETUP (Point 95) to the value that best meets your job requirements.
2. If appropriate, change CAL TIMER (Point 96) from the default of 12 hours. This setting applies only if your choice for CAL SETUP includes Option 4.

The air velocity sensor must 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.

Table 5. CAL SETUP Options.

CAL SETUP (Point 95)	Description
0	Calibration occurs ONLY when the point CAL AIR (Point 94) 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 (Point 1) 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 depressed.
4 (factory default value)	Calibration occurs on the time interval set in the point CAL TIMER (Point 96). 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.

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Table 5. CAL SETUP Options. ***(continued)***

CAL SETUP (Point 95)	Description
	See the example in Option 1. This is the recommended option when using a controller with an Autozero Module.

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

Points 6, 7, 8, and 9 are the room temperature setpoints. The following list shows the function of each point (point names vary per application):

- Point 6: DAY (or OCC) cooling setpoint.
- Point 7: DAY (or OCC) heating setpoint.
- Point 8: NGT (or UOC) cooling setpoint.
- Point 9: NGT (or UOC) heating setpoint.

1. If the room temperature sensor has a setpoint dial that will be used, set STPT DIAL (Point 14) to **YES**. Otherwise set STPT DIAL to **NO**.

2. Set Points 6 through 9 to desired values. If STPT DIAL is set to YES, Points 6 and 7 are not used as setpoints by the application; the value of RM STPT DIAL (Point 13) is used instead. (Points 6 and 7 will still need to be set to determine the size of the temperature deadband (If any) around RM STPT DIAL.

3. Set RM STPT MIN (Point 11) and RM STPT MAX (Point 12) for the minimum and the maximum allowable room temperature setpoint values respectively. Valid values range from 55°F to 95°F (13°C to 35°C). Default values are 55°F (13°C) for RM STPT MIN and 90°F (32°C) for RM STPT MAX.

If STPT DIAL is set to YES and DAY CLG STPT is equal to DAY HTG STPT, then DAY HTG STPT and DAY CLG STPT will not be used. Only the value of RM STPT DIAL will be used, and CTL STPT (Point 92) will be set equal to RM STPT DIAL.

However, if STPT DIAL is set to YES and DAY CLG STPT is not equal to DAY HTG STPT, then DAY CLG STPT and DAY HTG STPT will be used to set up a temperature deadband (or zero energy band) around RM STPT DIAL. (This deadband can help reduce energy use.) When HEAT.COOL (Point 5) equals HEAT, CTL STPT will be set equal to RM STPT DIAL – 0.5 * (DAY CLG STPT – DAY HTG STPT) and when HEAT.COOL equals COOL, CTL STPT will be set equal to RM STPT DIAL + 0.5 * (DAY CLG STPT – DAY HTG STPT).

Whether or not there is a temperature deadband around RM STPT DIAL, the application limits CTL STPT to the temperature range of RM STPT MIN to RM STPT MAX.

Setting HC.ENDIS

Set HC.ENDIS HC.ENDIS (Point 22) determines whether the application is heating only, cooling only, or if it uses both heating and cooling modes. The default value for HC.ENDIS is 3, both heating and cooling are enabled. 1 = heating only; 2 = cooling only. Set HC.ENDIS to the desired value.

Setting Override Time

If using night/unoccupied override, set OVRD TIME (Point 20) to the number of whole hours that an override should last. If OVRD TIME equals 0 (default), this feature is disabled.

Setting Number of Heating Devices

MODHTG COUNT (Point 88) determines the number of heating devices that the TEC is controlling. These heating devices can be either floating or modulating heating valves or SCRs.

If you set MODHTG COUNT to a value greater than 2, then MODHTG COUNT will display as 0 when viewed on the screen, and the application will control as though MODHTG COUNT was set to 0.

This application cannot directly control an SCR. It can only control an SCR provided that the SCR has a built-in controller that will modulate the SCR based on a 0 – 10 Volt input signal. If this is the case, then the application can control the SCR by connecting either AOV1 or AOV2 on the TEC to the 0 – 10 Volt input on the controller that resides on the SCR.

Setting Duct Area

If provided, enter the duct area (sq ft or sq m) into Point 97 (and also into Point 60 in applications where Point 60 is named HTGDUCT 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. (Dimensions in inches)	(π xR2)/144	Length x Height/144
Area in Sq. M (Dimensions in centimeters)	(π xR2)/10, 000	Length x Height/10,000

Setting Flow Coefficient

1. Set FLOW COEFF (Point 36) to the appropriate value found in Table 6. This value is a starting point for the air balancer.

2. To fine tune the flow coefficient use the following formula:

   The actual volume is the actual value obtained from the balancer's measurements. The TEC volume is the value obtained from AIR VOLUME (Point 35).

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

Table 6. 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

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Table 6. Box Manufacturer Flow Coefficients. ***(continued)***

Manufacturer	Sensor Type	Value
Nailor Industries		0.69
Titus		0.60
Trane		0.66

Setting Airflow Setpoints

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

1. Set CLG FLOW MIN (Point 31) to the desired minimum cooling airflow setpoint.
2. Set CLG FLOW MAX (Point 32) to the desired maximum cooling airflow setpoint.
3. Set HTG FLOW MIN (Point 33) to the desired minimum heating airflow setpoint.
4. Set HTG FLOW MAX (Point 34) to the desired maximum heating airflow setpoint.

CAUTION:

If using electric heat in a unit without a terminal fan, **do not** set HTG FLOW MIN to 0. Equipment damage may occur at 0 cfm with electric heat ON.

As a safety feature, Application 2580 includes MODHTG FLOW (Point 107) to ensure that adequate airflow is present before heating coils are energized. The default value is 20, which means that the airflow must be at least 20% of HTG FLOW MAX before heating outputs are enabled. (Note that if CTL FLOW MAX is overridden, MODHTG FLOW becomes the minimum required percentage of CTL FLOW MAX rather than the minimum required percentage of HTG FLOW MAX.) If hot water heat is used rather than electric heat, the value of MODHTG FLOW may be set to a lower value to allow heating at lower airflows.

Enabling Wall Switch

If a wall switch is used for day/night (occ/unocc) control, enable it by setting WALL SWITCH (Point 18) to **YES**.

Enabling Autozero Module

If an Autozero Module is used, enable it by setting CAL MODULE (Point 87) to **YES**.

Only Application 2580 supports an Autozero Module.

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.

Setting Room Temperature Offset (optional)

When the room has stabilized (within 5°F) take a precision temperature reading at the room temperature sensor. Record the difference between this reading and the value of ROOM TEMP (Point 4) in RMTMP OFFSET (Point 3).

Setting the CO_2 Sensor

1. Set CO2 SCALE (Point 10) to the value, in PPM, represented by a sensor reading of 10V or 20 mA.
2. Set the dip switch (located on circuit board) to indicate the sensor type, either current or voltage (Figure 1).

Configuring BACnet Parameters

WinCIS version 2.1.4 or later must be used to configure Siemens Building Technologies BACnet MS/TP TECs.

Do not check the Metric checkbox in the Device Properties dialogue if the controller is communicating through the MS/TP driver. 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, then the Metric checkbox in the Device Properties dialogue must be unchecked and the conversion must be handled separately.

Using WinCIS: From the Device menu, select Device Properties to configure BACnet parameters.

1. Object Name – unique to BACnet network, default = VAV CTLR (12 character RAD50 limit).
2. Object ID – unique to BACnet network, valid values = 0 to 4,194,303.
3. Description – description of controller (60 character limit).

4. Location – physical location of controller (60 character limit).
5. Baud Rate – options; 9600, 19200, 38400 or 76800, default = 19200.
6. MSTP Master/Slave – do one of the following:
    - Check the Slave checkbox if the controller communicates with a Field Panel using the MS/TP driver.
    - Uncheck the Slave checkbox if the controller is communicating through a router.
7. Press the 'Write' button — the controller accepts the configuration values and then resets.

The startup is complete.