SIEMENS

Controller Start-up for Custom Solutions Application 2557

VAV with 0-10V Series-Fan Speed Output and 3 Stage Electric Heat

TEC 0851.11

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Before You Begin

CAUTION:

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.

NOTES: WinCIS version 2.1.4 or later must be used to configure Siemens Building Technologies BACnet TECs.

The default MMI baud rate is 1200. If WinCIS will not communicate through the MMI port / RTS sensor, try a different MMI baud rate.

Verifying Power to Controller

Check that the BST LED on the controller is flashing. See Figure 1. If the BST LED does not flash ON/OFF once per second, see the *APOGEE Automation Service Procedures* on InfoLink for troubleshooting information.

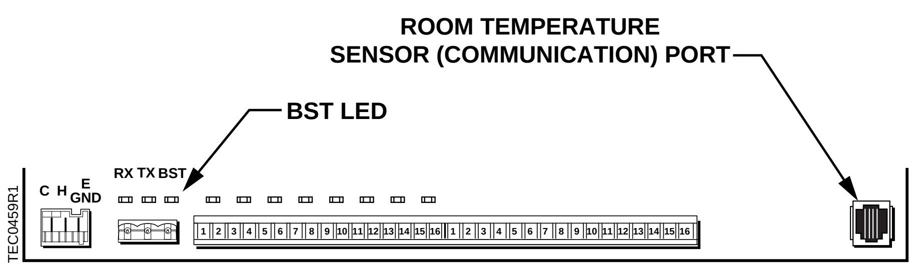

Figure 1. BACnet VAV Controller with 0-10V Series-Fan Speed Output and 3 Stage Electric Heat.

Enabling Damper Actuator

CAUTION:

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

Using an appropriate controller communication tool:

1. Verify that APPLICATION (Point 2) is set to **2599** (slave mode).
2. Display the STARTUP report.

Table 1. Damper Actuator Run Time.

Damper Actuator	Setting (seconds)	
	50 Hz	60 Hz
349-0101	106	88
GDE 131.1U	108	90
GDE 131.1P	108	90
GLB 131.1P	150	125
[1]GBB 171.1U	150	150
[2]GDE 161.1P	108	90
[2]GLB 161.1P	150	125

[1] GBB 171.1U run time is independent of Hz.
[2] Analog output 0-10V.

Table 2. Valve Actuator Run Time.

Valve Actuator	Setting (seconds)	
	50 Hz	60 Hz
SSB81U (Powermite – MZ Series)	180	150
SQS 82	155	130
SQS 65U (analog output 0 to 10V)	35	30
SQS 65.5U (analog output 0 to 10V)	35	30
SSB 61U (analog output 0 to 10V)	N/A	150

3. Set MTR1 TIMING (Point 51) to the correct running time of the actuator (see Tables 1 or 2 for actuator run times).

4. For a damper-actuator rotation-angle value other than 90°, set DPR1 ROT ANG (Point 56) to the appropriate value.

5. Enable the actuator by setting MTR SETUP (Point 58) to 1. Verify that the actuator completely closes the damper or valve and that it remains closed. If it does not close, reverse the action of the actuator by setting MTR SETUP to **3**.

If the damper or valve still does not close completely, then the actuator has been installed or set up incorrectly. See the actuator installation instructions, set up information, or the *APOGEE Automation Service Procedures* (125-3013) on InfoLink for more information.

Neither Application 2557 nor the slave mode (2599) supports the use of a second floating control actuator. Other than this limitation, DOs that are not being used by the application for other purposes are spare.

Setting Controller Address

Set the controller address by setting CTLR ADDRESS (Point 1) to the appropriate number. For BACnet TECs, the controller address is the same as the BACnet MAC address.

Setting the Application

NOTE: If you are going to enter a TEC Definition at the field panel, keep track of the application, override time, controller address, duct shape, and duct dimensions you enter at the portable operator's terminal. You will be required to enter these values again at the field panel.

Set APPLICATION (Point 2) to 2557.

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

Waiting for AVS Calibration

At the start of the air velocity sensor calibration cycle, the controller sets CAL AIR (Point 94) to YES. The damper is then commanded closed to get a zero airflow reading during calibration.

NOTE: The calibration cycle takes from 2 to 5 minutes. You must wait until the calibration cycle is complete (CAL AIR is set to NO) before continuing with the rest of the start-up procedures.

Selecting Automatic Calibration Option

In order to choose the most efficient method of triggering the calibration routine, follow this procedure to set CAL SETUP (Point 95):

NOTE: 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.

1. Display the first report in the REPORTS selection box. The report will be named VAV 3STGH SF which is short for Variable Air Volume, 3 Staged (Electric) Heat, Series Fan.

2. Use Table 4 to select the automatic calibration option that best meets your job requirements. Set CAL SETUP to this value.

Table 4. CAL SETUP Options.

CAL SETUP Options	Description
0	Calibration occurs ONLY when 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. The delay is determined by dividing the value of CTLR ADDRESS (Point 1) by 4 and using the remainder as 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 CAL TIMER (Point 96). For example, if CAL TIMER = 12, the calibration period is 12 hours. Actual calibration is subject to a time delay based on the value of CTLR ADDRESS. Refer to the example in Option 1. (Note: Option 1 is recommended when using a controller with an Autozero Module.

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

1. Display the SETPOINTS report.
2. If there is no setpoint dial on the room temperature sensor—or if there is a setpoint dial but it won't be used—verify that STPT DIAL = NO and set the following points to desired values:
   - OCC CLG STPT (Point 6)
   - OCC HTG STPT (Point 7)
   - UOC CLG STPT (Point 8)
   - UOC HTG STPT (Point 9)
3. If the room temperature sensor has a setpoint dial and RM STPT DIAL (Point 13) will be used by the controller, set STPT DIAL (Point 14) to YES and then set the following points to desired values:
   - UOC CLG STPT (Point 8)
   - UOC HTG STPT (Point 9)
   - RM STPT MIN (Point 11) and RM STPT MAX (Point 12)
     Common values for these points are 65°F (18°C) for RM STPT MIN and 80°F (27°C) for RM STPT MAX. Valid values range from 55° to 95°F (13° to 35°C).

Room Temperature Offset

NOTE: The Room Temperature Offset feature is optional.

When the room has stabilized to within 5°F, take a precision temperature reading at the room temperature sensor. Record any difference between this reading and the value of ROOM TEMP (Point 4) and set this difference value (to the nearest 0.25°F) into RMTMP OFFSET (Point 102).

EXAMPLE: If the actual room temperature is 72.0°F, and the value of ROOM TEMP is 73.0°F, then the value entered into RMTMP OFFSET is –1.0. In this case, the value of ROOM TEMP would read 73.0°F, but the value of CTL TEMP would read 72.0°F.

CTL TEMP (Point 78) = ROOM TEMP (Point 4) + RMTMP OFFSET (Point 102)

Setting Override Time

1. Display the STARTUP report.

2. If using night override, then set OVRD TIME (Point 20) to the number of whole hours that an override should last. If set at zero (the default), night override is disabled.

Setting Electric Heat Stages

Check the hardware to verify the number of electric heat stages used. Set STAGE COUNT (Point 88) to this value.

Setting FAN MODE

Set FAN MODE (Point 16) to the desired value, CONST or VARI. (VARI is the default, and means variable volume; CONST means constant volume.)

Setting Fan Flow Points (STAGE COUNT less than 3)

If STAGE COUNT (Point 88) equals 3, then skip this section and proceed to the next section.

1. Set FAN FLO CMAX (Point 85) to the maximum desired value that FAN FLOW (Point 33) should be during the occupied cooling mode. FAN FLO CMAX is also the value of FAN FLOW if FAN MODE equals CONST and the fan is ON.
   - If FAN MODE (Point 16) equals VARI, proceed with step 2 of this section.
   - If FAN MODE equals CONST, and STAGE COUNT (Point 88) equals 2, skip to step 4.
   - If FAN MODE equals CONST, but STAGE COUNT is less than 2, skip steps 2 through 4, but **READ THE NOTE** at the end of this section, and then go to the *Setting FAN TIME* section.
2. Enter into FAN FLOW MIN (Point 82) the minimum value that you want FAN FLOW to be during the occupied heating and cooling modes.
3. Enter into FAN FLO HMAX (Point 84) the maximum value that you want FAN FLOW to be during the occupied heating mode.
4. Enter into FAN FLOW MID (Point 83) the cfm value that FAN FLOW must be before HEAT STAGE 1 (Point 43) may start modulating. (If you do not want either heating stage to modulate until the airflow out of the fan is equal to FAN FLO HMAX, then set FAN FLOW MID equal to or greater than FAN FLO HMAX.)

NOTE: If FAN MODE = CONST, it is **STRONGLY** recommended that FAN FLO MID be set equal to or greater than FAN FLO HMAX.

Setting Fan Flow Points (STAGE COUNT equals 3)

If STAGE COUNT (Point 88) is less than 3, then skip this section and proceed to the next section.

1. Set FAN FLO CMAX (Point 85) to the maximum desired value that FAN FLOW (Point 33) should be during the occupied cooling mode. FAN FLO CMAX is also the value of FAN FLOW if FAN MODE equals CONST and the fan is ON.

   - If FAN MODE (Point 16) equals VARI, proceed with step 2 of this section.

   - If FAN MODE equals CONST, skip steps 2 through 7 but **READ THE NOTE** at the end of this section, and then proceed with the *Setting FAN TIME* section.

2. Enter into FAN FLOW MIN (Point 82) the minimum value that you want FAN FLOW to be during the occupied heating and cooling modes.

3. Enter into FAN FLO HMAX (Point 84) the maximum value that you want FAN FLOW to be during the occupied heating mode.

4. If you do not want any heating stage to modulate until the airflow out of the fan is equal to FAN FLO HMAX, then set both FAN FLOW MID and FAN FLO MORE (Point 55) equal to or greater than FAN FLO HMAX. Proceed to the Setting FAN TIME section.

5. If you want the 1st heating stage to be able to time modulate at a lower airflow than the 2nd heating stage does and if you want the 2nd heating stage to be able to time modulate at a lower airflow that than the 3rd heating stage does then set FAN FLO MORE less than FAN FLO HMAX and set FAN FLOW MID less than FAN FLO MORE.

   When the fan flow points are set this way, the 1st stage of heat can time modulate when FAN FLOW (Point 33) becomes equal to or greater than FAN FLOW MID, the 2nd stage of heat will be allowed to time modulate when FAN FLOW becomes equal to or greater than FAN FLOW MORE and the 3rd stage of heat can time modulate when FAN FLOW becomes equal to or greater than FAN FLOW HMAX. Proceed to the *Setting FAN TIME* section.

6. If you want the 1st heating stage to be able to time modulate at a lower airflow than the 2nd heating stage does and if you want the 2nd heating stage to time modulate at the same airflow that the 3rd heating stage does then set FAN FLO MID less than FAN FLO HMAX and set FAN FLO MORE greater than FAN FLO HMAX.

   When the fan flow points are set this way, then the 1st stage of heat will be allowed to time modulate when FAN FLOW (Point 33) becomes equal to or greater than FAN FLOW MID, while the 2nd and 3rd stages of heat will not be allowed to time modulate until FAN FLOW becomes equal to or greater than FAN FLOW HMAX. Proceed to the Setting FAN TIME section.

7. If you want the 1st heating stage to time modulate at the same airflow that the 2nd heating stage does and if you want the 2nd heating stage to time modulate at a lower airflow than the 3rd heating stage does then set FAN FLO MID greater than FAN FLO HMAX and set FAN FLO MORE less than FAN FLO HMAX. (Alternatively, you can get the same results by setting FAN FLOW MID less than FAN FLO HMAX and setting FAN FLO MORE less than FAN FLOW MID.)

   When the fan flow points are set this way, then the 1st and 2nd stages of heat won't be allowed to time modulate until FAN FLOW (Point 33) becomes equal to or greater than FAN FLO MORE while the 3rd stage of heat will not be allowed to time modulate until FAN FLOW becomes equal to or greater than FAN FLOW HMAX.

NOTE: If FAN MODE = CONST, it is **STRONGLY** recommended that both FAN FLO MID and FAN FLO MORE be set equal to or greater than FAN FLO HMAX.

Setting FAN TIME

FAN TIME (Point 71) is used as a speed limit. It means different things under different circumstances.

- When FAN TIME is set to be less than LOOP TIME (regardless of the value of STAGE COUNT (Point 88)), then the application does not use FAN TIME. When this occurs, FAN FLOW can change its value as fast as the Heating PID Loop wants it to change.
- When FAN MODE (Point 16) equals CONST, FAN TIME is not used (regardless of the value of STAGE TIME). This is because FAN TIME is not needed for constant volume fans.

The following two bullet items describe how FAN TIME functions when FAN TIME is set to equal to or greater than LOOP TIME and FAN MODE equals VARI.

- When STAGE COUNT equals 1, **OR**, when STAGE COUNT equals 2 and FAN FLOW MID is equal to or greater than FAN FLO HMAX, FAN FLOW (Point 33) is not allowed to change from FAN FLOW MIN to FAN FLO HMAX (or vice versa) faster than the length of time set in FAN TIME.
- When STAGE COUNT equals 2 and FAN FLOW MID is **less than** FAN FLO HMAX, FAN FLOW is not allowed to change from FAN FLOW MIN to FAN FLOW MID (or vice versa) faster than the length of time set in FAN TIME. Also, under these conditions, the same length of time is required for FAN FLOW to change from FAN FLOW MID to FAN FLO HMAX (or vice versa).

The rest of the bullet items in this section describe how FAN TIME functions when STAGE COUNT is 3. If you have set STAGE COUNT to be less than 3, you can skip the remainder of this section and proceed to the next section. Otherwise, enter a value for FAN TIME.

- When STAGE COUNT equals 3 and FAN FLOW MID and FAN FLO MORE are both **greater than or equal to** FAN FLO HMAX, FAN FLOW is not allowed to change from FAN FLOW MIN to FAN FLO HMAX (or vice versa) faster than the length of time set in FAN TIME.

- When STAGE COUNT equals 3, and FAN FLOW MID is **less than** FAN FLO HMAX, and FAN FLO MORE is **greater than or equal to** FAN FLO HMAX, FAN FLOW is not allowed to change from FAN FLOW MIN to FAN FLOW MID (or vice versa) faster than the length of time set in FAN TIME. Also, under these conditions, the same length of time is required for FAN FLOW to change from FAN FLOW MID to FAN FLO HMAX (or vice versa).
- When STAGE COUNT equals 3, and FAN FLOW MID is **greater than or equal to** FAN FLO HMAX, and FAN FLO MORE is **less than** FAN FLO HMAX, FAN FLOW is not allowed to change from FAN FLOW MIN to FAN FLO MORE (or vice versa) faster than the length of time set in FAN TIME. Also, under these conditions, the same length of time is required for FAN FLOW to change from FAN FLO MORE to FAN FLO HMAX (or vice versa).
- When STAGE COUNT equals 3, and FAN FLOW MID is **less than** both FAN FLO MORE and FAN FLO HMAX, and FAN FLO MORE is **less than** FAN FLO HMAX, FAN FLOW is not allowed to change from FAN FLOW MIN to FAN FLOW MID (or vice versa) faster than the length of time set in FAN TIME. Also, the same length of time as stored in FAN TIME is required for FAN FLOW to change from FAN FLOW MID to FAN FLO MORE (or vice versa). Furthermore, under these conditions, the same length of time as stored in FAN TIME is required for FAN FLOW to change from FAN FLO MORE to FAN FLO HMAX (or vice versa).

Setting Stage Times

1. If STAGE COUNT (Point 88) equals 2 or 3, enter into STG 1 TIME (Point 27) the amount of time HEAT STAGE 1 (Point 43) must be ON before HEAT STAGE 2 (Point 44) may turn ON.

2. If STAGE COUNT equals 2, enter into STG 2 TIME (Point 28) the amount of time HEAT STAGE 2 must be OFF before HEAT STAGE 1 may turn OFF.

   If STAGE COUNT equals 3, then enter into STG 2 TIME the amount of time HEAT STAGE 2 must be OFF before HEAT STAGE 1 may turn OFF and the amount of time that HEAT STAGE 2 must be on before HEAT STAGE 3 (Point 45) may turn ON.

3. If STAGE COUNT equals 3, then enter into STG 3 TIME (Point 57) the amount of time HEAT STAGE 3 must be OFF before HEAT STAGE 2 may turn OFF.

Setting HTG DBAND

BASE DO6 (Point 46) cannot turn ON in the unoccupied mode unless CTL TEMP (Point 78) < CTL STPT (Point 92) − HTG DBAND (Point 73).

Enter the desired value for HTG DBAND.

Setting MORN DBAND

At the beginning of the occupied mode WARMUP (Point 60) cannot turn ON unless CTL TEMP (Point 78) < CTL STPT (Point 92) − MORN DBAND (Point 74).

Enter the desired value for MORN DBAND.

Setting TEMP HLIMIT and TEMP LLIMIT

The supply air damper cannot modulate in the unoccupied mode until CTL TEMP (Point 78) rises above TEMP HLIMIT (Point 69).

1. Enter the desired value for TEMP HLIMIT.

   The electric heat will not be allowed to time modulate in the unoccupied mode until CTL TEMP drops below TEMP LLIMIT (Point 65).

2. Enter the desired value for TEMP LLIMIT.

Setting the Heat Sequencing Points (STAGE COUNT less than 3)

If STAGE COUNT (Point 88) equals 3, then skip this section and proceed to the next section.

When FAN MODE equals CONST, the airflow out of the fan is constant at FAN FLO CMAX. In this case, the electric heat works best if FLOW END (Point 17) is set equal to 0.

- If FAN MODE equals CONST, enter the desired value for FLOW END and skip the rest of this section. If FAN MODE equals VARI, continue with the rest of this section.

When Application 2557 is configured with only one stage of electric heat (STAGE COUNT, Point 88 equals 1), FAN FLOW (Point 33) will be set equal to FAN FLO HMAX (Point 84) and the heat stage will time modulate whenever HTG LOOPOUT (Point 80) is equal to or greater than FLOW END (Point 17).

- Enter the desired value for FLOW END and skip the rest of this section. (If you are not sure where to set FLOW END, try setting it to 33.)

If the application is configured with two stages of electric heat (STAGE COUNT equals 2), and FAN FLOW MID (Point 83) is set **equal to or greater than** FAN FLO HMAX, FAN FLOW will be set equal to FAN FLO HMAX (and both heat stages will time modulate) whenever HTG LOOPOUT is equal to or greater than FLOW END.

- Enter the desired value for FLOW END and skip the rest of this section. (If you are not sure where to set FLOW END, it is recommended that you set it to 33.)

If the application is configured with two stages of electric heat, and FAN FLOW MID (Point 83) is set **less than** FAN FLO HMAX, then the following four conditions and caution apply:

- When HTG LOOPOUT is equal to FLOW 1 END (Point 23), FAN FLOW will be set equal to FAN FLOW MID.
- When HTG LOOPOUT is between FLOW 1 END and FLOW 2 START (Point 22), HEAT STAGE 1 (Point 43) will time modulate.
- When HTG LOOPOUT goes from FLOW 2 START to FLOW END, FAN FLOW will go from FAN FLOW MID to FAN FLO HMAX.
- When HTG LOOPOUT is greater than FLOW END, HEAT STAGE 2 (Point 44) will time modulate.

CAUTION:

Make sure that FLOW 1 END < FLOW 2 START < FLOW END. If this is not done, the application can lock up. (For example, if FLOW 2 START is ≤ FLOW 1 END, the fan flow and electric heat will remain frozen in place indefinitely.)

Set FLOW 1 END, FLOW 2 START, and FLOW END to the desired values. (If you are not sure what value to set these points to, it is recommended that you set FLOW 1 END to 25, FLOW 2 START to 50 and FLOW END to 75.)

Setting the Heat Sequencing Points (STAGE COUNT equals 3)

If STAGE COUNT (Point 88) is less than 3, then skip this section and proceed to *Setting Box Size*.

When FAN MODE equals CONST, the airflow out of the fan is constant at FAN FLO CMAX. In this case, the electric heat works best if FLOW END (Point 17) is set equal to 0.

- If FAN MODE equals CONST, enter the desired value for FLOW END and skip the rest of this section. If FAN MODE equals VARI, continue with the rest of this section.

If the application is configured with three stages of electric heat (STAGE COUNT equals 3), and FAN FLOW MID (Point 83) and FAN FLO MORE (Point 55) are both set **equal to or greater than** FAN FLO HMAX, FAN FLOW will be set equal to FAN FLO HMAX (and all three heat stages will be allowed to time modulate) whenever HTG LOOPOUT is equal to or greater than FLOW END.

- Enter the desired value for FLOW END and skip the rest of this section. (If you are not sure where to set FLOW END, it is recommended that you set it to 25.)

If the application is configured with three stages of electric heat, and FAN FLOW MID (Point 83) is set **less than** FAN FLO HMAX, and FAN FLO MORE is **greater than or equal to** FAN FLO HMAX, then the following four conditions and caution apply:

- When HTG LOOPOUT is equal to FLOW 1 END (Point 23), FAN FLOW will be set equal to FAN FLOW MID.
- When HTG LOOPOUT is between FLOW 1 END and FLOW 2 START (Point 22), HEAT STAGE 1 (Point 43) will time modulate.

- When HTG LOOPOUT goes from FLOW 2 START to FLOW 2 END (Point 52), FAN FLOW will go from FAN FLOW MID to FAN FLO HMAX.
- When HTG LOOPOUT is greater than FLOW 2 END, HEAT STAGE 2 (Point 44) and HEAT STAGE 3 (Point 45) will time modulate.

CAUTION:

Make sure that FLOW 1 END < FLOW 2 START < FLOW 2 END. If this is not done, the application can lock up. (For example, if FLOW 2 END is ≤ FLOW 2 START, the fan flow and electric heat will remain frozen in place indefinitely.)

Set FLOW 1 END, FLOW 2 START, and FLOW 2 END to the desired values and skip the rest of this section. (If you are not sure what value to set these points to, it is recommended that you set FLOW 1 END to 20, FLOW 2 START to 40, and FLOW 2 END to 60.)

If the application is configured with three stages of electric heat, and FAN FLOW MID (Point 83) is set **greater than or equal to** FAN FLO HMAX, and FAN FLO MORE is **less than** FAN FLO HMAX, then the following four conditions and caution apply:

- When HTG LOOPOUT is equal to FLOW 1 END (Point 23), FAN FLOW will be set equal to FAN FLO MORE.
- When HTG LOOPOUT is between FLOW 1 END and FLOW 3 START (Point 53), HEAT STAGE 1 (Point 43) and HEAT STAGE 2 (Point 44) will time modulate.
- When HTG LOOPOUT goes from FLOW 3 START to FLOW END, FAN FLOW will go from FAN FLO MORE to FAN FLO HMAX.
- When HTG LOOPOUT is greater than FLOW END, HEAT STAGE 3 (Point 45) will time modulate.

CAUTION:

Make sure that FLOW 1 END < FLOW 3 START < FLOW END. If this is not done, the application can lock up. (For example, if FLOW END is ≤ FLOW 3 START, the fan flow and electric heat will remain frozen in place indefinitely.)

Set FLOW 1 END, FLOW 3 START, and FLOW END to the desired values and skip the rest of this section. (If you are not sure what value to set these points to, it is recommended that you set FLOW 1 END to 20, FLOW 3 START to 60, and FLOW END equal to 80.)

If the application is configured with three stages of electric heat, FAN FLOW MID (Point 83) is set **less than** both FAN FLO MORE and FAN FLO HMAX and FAN FLO MORE is **less than** FAN FLO HMAX, then the following six conditions and caution apply:

- When HTG LOOPOUT is equal to FLOW 1 END (Point 23), FAN FLOW will be set equal to FAN FLOW MID.
- When HTG LOOPOUT is between FLOW 1 END and FLOW 2 START (Point 22), HEAT STAGE 1 (Point 43) will time modulate.

- When HTG LOOPOUT goes from FLOW 2 START to FLOW 2 END (Point 52), FAN FLOW will go from FAN FLOW MID to FAN FLO MORE.
- When HTG LOOPOUT is between FLOW 2 END and FLOW 3 START (Point 53), HEAT STAGE 2 (Point 44) will time modulate.
- When HTG LOOPOUT goes from FLOW 3 START to FLOW END, FAN FLOW will go from FAN FLO MORE to FAN FLO HMAX.
- When HTG LOOPOUT is greater than FLOW END, HEAT STAGE 3 (Point 45) will time modulate.

CAUTION:

Make sure that FLOW 1 END < FLOW 2 START < FLOW 2 END < FLOW 3 START < FLOW END. If this is not done, the application can lock up. (For example, if FLOW 3 START is ≤ FLOW 2 END, the fan flow and electric heat will remain frozen in place indefinitely.)

Set FLOW 1 END, FLOW 2 START, FLOW 2 END, FLOW 3 START and FLOW END to the desired values. (If you are not sure what value to set these points to, it is recommended that you set FLOW 1 END to 10, FLOW 2 START to 30, FLOW 2 END equal to 45, FLOW 3 START equal to 65 and FLOW END equal to 80.)

Setting Box Size

One of the functions of Application 2557 is to determine the proper airflow value for the terminal box's VAV fan. This value is stored in FAN FLOW (Point 33). Once a value for FAN FLOW has been determined, a Table Statement embedded in Application 2557's firmware uses it to determine the proper value for FAN AOV1 (Point 66). The application actually contains four such Table Statements, but only one will be used. Selecting the correct Table Statement depends on the value of BOX SIZE (Point 31).

- BOX SIZE (Point 31) should be set to 3, 5, or 7 when a Nailor box is using a size of 3, 5, or 7. When this is done, the application will use one of three pre-coded Table Statements with pre-determined FAN AOV1 voltage levels that correspond to airflow values of FAN FLOW. The voltage and flow values in these pre-coded Table Statements are fixed and cannot be changed by the user.
- BOX SIZE should be set to 0 when a box other than a Nailor box is being used, or when a Nailor Box is using a size *other* than 3, 5 or 7. When this is done, the application uses an embedded, general purpose Table Statement to adjust the value of FAN AOV1 based on the value of FAN FLOW (Point 33). The flow and voltage values of this table statement are not pre-coded and must be entered into the TEC.

Enter the desired value for BOX SIZE.

If BOX SIZE is set to a value other than 0, skip the following, but **READ THE NOTE** at the end of this section, then proceed with *Setting Controller Address.*

If BOX SIZE is set to 0, the controller needs to have the following fan AOV Table Statement parameters entered into it:

- FLO LO (Point 39) – This is the lowest flow the fan can produce. (FLO LO must be equal to or less than FAN FLOW MIN (Point 82.)

CAUTION:

Make sure that FLO LO is high enough that the fan can actually maintain it. If FLO LO is set too low, the fan could shut off without the application being aware of it. If this happens, there is a possibility that the electric heat could turn on while the fan is off. Consult with the fan manufacturer to find out what the lowest airflow is that the fan can maintain.

- FLO LO VOLTS (Point 37) – This is the voltage value that FAN AOV1 must have in order to get the fan to produce the amount of airflow that is stored in FLO LO.
- FLO HI (Point 87) – This is the highest flow that the fan can produce. FLO HI must be set greater than or equal to both FAN FLO HMAX (Point 84) and FAN FLO CMAX (Point 84).
- FLO HI VOLTS (Point 38) – This is the voltage value that FAN AOV1 (Point 66) must have in order to get the fan to produce the amount of airflow that is stored in FLO HI.

Enter the desired values for FLO LO, FLO HI, FLO LO VOLTS and FLO HI VOLTS.

When properly set up, the Table Statement works as follows:

- When FAN FLOW is equal to or less than FLO LO, FAN AOV1 will be set to FAN LO VOLTS.
- When FAN FLOW is equal to or greater than FAN HI, FAN AOV1 will be set to FAN HI VOLTS.
- When FAN FLOW is in between FLO LO and FLO HI, the Table Statement will use linear interpolation to set the value of FAN AOV1 to a value that is between FAN LO VOLTS and FAN HI VOLTS.

NOTE: Once FAN AOV1 is set to a particular voltage, this signal is sent to an intelligent motor controller that controls the fan and which is **provided by others**. This controller must be configured to know what airflow corresponds to a given voltage of FAN AOV1. Consult the operating instructions provided by the manufacturer of the intelligent motor controller for proper set-up information.

Setting Controller Address

Set CTLR ADDRESS (Point 1) to the appropriate number. Each controller requires a unique address. Normal values are 00 to 31, but the controller will accept values as high as 98.

Setting Duct Area

If provided, enter the duct area into Point 97. Otherwise, use the table to determine duct area.

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

Setting Flow Coefficient

1. Display the BALANCING report.
2. Set FLOW COEFF (Point 36) to the appropriate value found in Table 5.
3. The value found in Table 5 is a starting point for the air balancer. To fine tune the flow coefficient, use the following formula:

   new flow coefficient = (actual volume ÷ TEC volume) × old flow coefficient

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). If the TEC volume is not within 5% of the actual volume, then repeat the procedure until it is within 5%. (It is **crucial** that the volume reading is accurate.)

Table 5. Box Manufacturer Flow Coefficients.

Box Manufacturer	Sensor Type	Flow Coefficient
Anemostat	2-pipe sensor without orifice 2-pipe sensor with orifice Spider sensor without orifice Spider sensor with orifice	0.79 0.59 0.73 0.39
Carnes	2-pipe sensor Flow cross	0.66 0.59
Carrier		0.59
Continental Air Products		0.79
E.H. Price		0.78
Environmental Technologies		0.79
Hart & Cooley/Tuttle & Bailey	Flow cross Orifice	0.59 0.73
Krueger		0.68
Metal Aire		0.72
Nailor Industries		0.69
Redd-I-Inc.		0.59
Tempmaster		0.73
Titus		0.60
Trane		0.66

Set MIN and MAX Airflow Setpoints

NOTE: The maximum flow must be greater than or equal to the minimum flow.

Follow these steps to set the minimum and maximum airflow setpoints:

1. Set CTL FLOW MIN (Point 76) to the desired minimum airflow setpoint. (This will be used as both the heating and cooling minimum airflow.)
2. Set CLG FLOW MAX (Point 32) to the desired maximum cooling airflow setpoint.
3. Set HTG FLOW MAX (Point 34) to the desired maximum heating airflow setpoint.

Enabling the Wall Switch

If a wall switch will be used for day/night control, set WALL SWITCH (Point 18) to **YES**.

Configuring BACnet Parameters

NOTE: 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 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 checkbox in the Device Properties dialogue must be unchecked and the conversion must be handled in the field panel.

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.

NOTE: The Start-up is complete upon completion of the BACnet parameters configuration. When the BACnet MS/TP TEC is successfully installed, the RX and TX LEDs flash On/Off very rapidly and continuously.

Start-up Notes

Under certain circumstances, how Application 2557 controls depends on whether VAV AHU is ON or OFF. When VAV AHU is ON, the application interprets this to mean that the central air handling unit that this terminal box is connected to is ON. Likewise, when VAV AHU is OFF, the application interprets this to mean that the central air handling unit is OFF.

Application 2557 only reacts to VAV AHU; it does not command it. In order to command VAV AHU, this point needs to be unbundled at a field panel and PPCL written to control it. (See the Control Loops section in the application bulletin for more information on how the application uses VAV AHU.)