Constant Volume Controller—Electronic Output with Secure Mode Start-up Procedures

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Workflow for Controller Setup

1. The initial database values for the controller(s) are created and stored. This should be done in the office by the design engineer using the Commissioning Tool.
2. The database is handed off to field personnel.
3. At the job site, the controllers are loaded (preferably automatically) using an appropriate communication tool.
4. The specialist uses the TBC tool to check out and commission the controllers.
5. The field panel(s) must then be updated with the controller values.

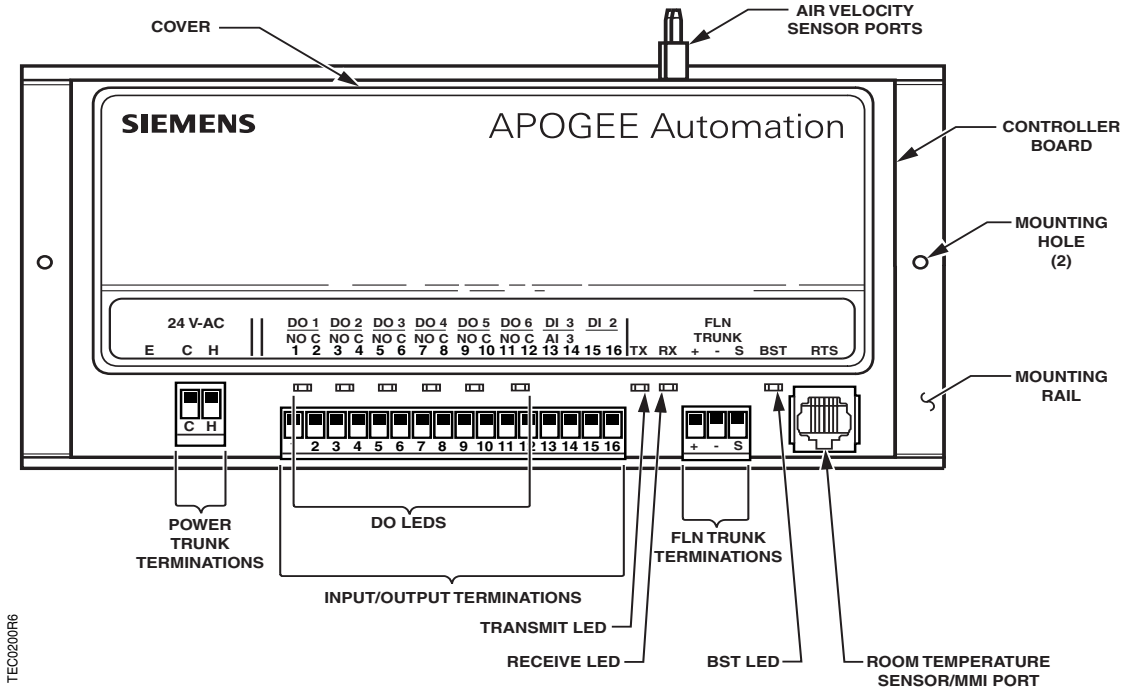

Figure 1. Constant Volume Controller—Electronic Output with Secure Mode.

Enabling Actuators

CAUTION:

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

The points that determine actuator run times are:

- MTR1 TIMING (Point 51)
- MTR2 TIMING (Point 55)
- MTR3 TIMING (Point 39)

Your application may not use all three points.

1. Use Table 1 and/or Table 2 to set run time(s) for the actuator(s) used by your application.
2. For damper rotation angles other than 90°, set Point 56 (and/or Point 57) to the appropriate value. (PTS4 rotation angle is 90°.)

Table 1. Damper Actuator 90° Run Time.

Damper Actuator	Setting (seconds)[1]	
	50 Hz	60 Hz
GDE131.1	125	90
GLB131.1	150	125
PTS4 electronic-to-pneumatic transducer from ACT	--	90

Table 2. Valve Actuator Run Time.

Valve Actuator	Setting (seconds)[1]	
	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
PTS4 electronic-to-pneumatic transducer from ACT	–	90

Specifying Motor Setup

CAUTION:

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

MTR SETUP (Point 58) determines which motors are enabled to control floating control actuators. Table 3 also provides options to specify direct or reverse action for each actuator.

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

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

	Motor 1 Not Used	Motor 1 Enabled	Motor 1 Enabled and Reversed
Motor 2 Not Used	0	1	3
Motor 2 Enabled	4	5	7
Motor 2 Enabled and Reversed	12	13	15

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.

Set APPLICATION (Point 2) to the appropriate Constant Volume Controller application. See Table 4 for application names and numbers.

Table 4. Constant Volume Controller—Electronic Output with Secure Mode Applications.

Application	Revision PV10 or later
Constant Volume Cooling Only	2130
Constant Volume with Electric Reheat	2132
Constant Volume with Hot Water Reheat	2133
Slave Mode	2192

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 OVERVIEW report displays and the calibration cycle begins.

At the start of the calibration cycle, the controller automatically sets CAL AIR (Point 94) 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 address. After this delay, the calibration cycle takes from two to five minutes to complete. The air damper closes during this first calibration.

NOTE: You can continue the start-up 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.

Setting Number of Heat Stages or Valves

NOTE: Depending on the application, Point 88 (if present) refers to electric heat stages or the number of valves used (enabled).

Water or Steam Valves: Set STAGE COUNT (Point 88) to the number of valves used (enabled).

Electric Heat: Check the hardware to verify the number of electric heat stages wired to the controller and set Point 88 to this value. (If the installation has no heat, leave Point 88 at the default value.)

Enabling the Autozero Module

If an Autozero Module is used, enable it by setting CAL MODULE (Point 87) to **YES** (Figure 2).

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.

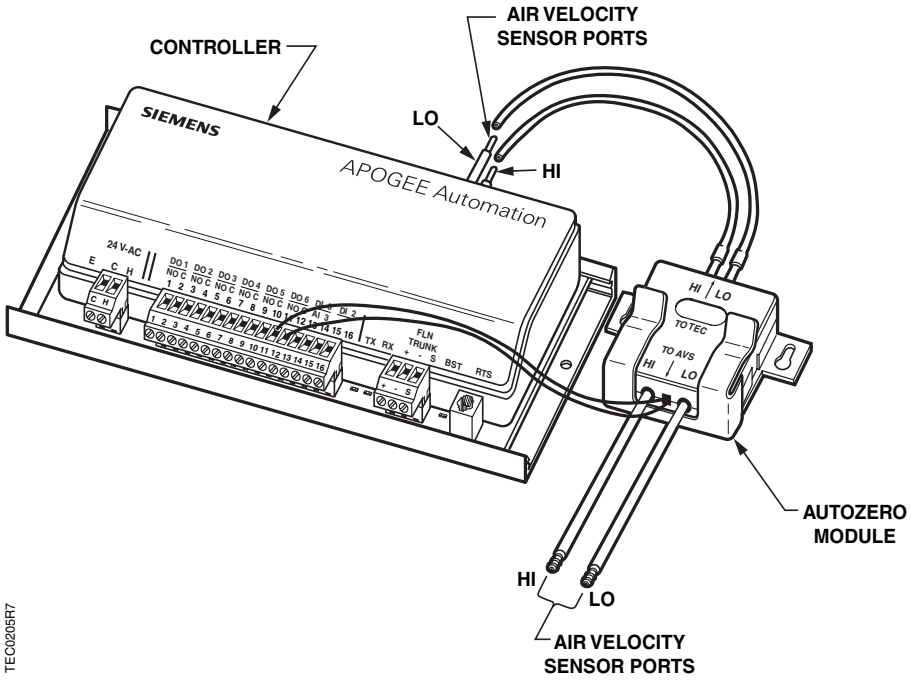

Figure 2. Constant Volume Controller—Electronic Output with Autozero Module.

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.

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.

Table 5. CAL SETUP Options.

CAL SETUP Options	Description
0	Calibration occurs ONLY when the point CAL AIR (Point 94) is set to YES.
1	Calibration occurs when OCC.UNOCC (Point 29) commands an occupied/unoccupied 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 occupied/unoccupied 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. See the example in Option 1. This is the recommended option when using a controller with an Autozero Module.

NOTE: Options can be combined by summing their numbers. For example, to calibrate for 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. (Points 7 and 9 are not present in certain cooling only applications.)

   NOTE: If STPT DIAL is set to **YES**, Points 6 and 7 can be skipped; the value of RM STPT DIAL (Point 13) is used instead.

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.

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.

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**.

Setting Fail-safe Mode

In the event the air velocity sensor ceases to function, FAIL MODE (Point 40) causes the damper to either fail OPEN or CLOSED. Set FAIL MODE to the fail-safe position desired for the damper.

Setting Duct Area

If provided, enter the duct area (sq ft or sq m) into DUCT AREA (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 appropriate tool to calculate it, or use one of the following equations to calculate it manually:

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

NOTE: For TEC Applications 2000 and above, an entry for duct area is neither required nor used when configuring these controllers at the field panel.

Setting Flow Coefficient

CAUTION:

To avoid airflow reading inaccuracies, the controller must be powered on for at least 30 minutes prior to taking readings for flow coefficient adjustments.

1. Use Table 6 and set FLOW COEFF (Point 36) (and Point 54, if named HTG FLO COEF or TOT FLO COEF) to the appropriate value(s). This value is a starting point for the air balancer.
2. 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) (and Point 30 if named HTG VOLUME or TOT VOLUME).

3. Repeat the procedure if necessary until the TEC volume is within 5% of actual volume.

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
Nailor Industries		0.69
Titus		0.60
Trane		0.66

Setting Airflow Setpoints

Applications 2130, 2132, and 2133: UNOCC FLOW (Point 31) must be set equal to or less than OCC FLOW (Point 32).

CAUTION:

If using electric reheat, **do not** set UNOCC FLOW (Point 31) to 0 cfm (0 lps). Equipment damage may occur at 0 cfm (0 lps) with electric heat ON.

Setting Room Temperature Offset (optional)

When the room has stabilized, take a precision temperature reading at the location of the room temperature sensor. Record any difference between this reading and the value of ROOM TEMP (Point 4), and set it (to the nearest 0.25 °F) into RMTMP OFFSET (Point 3).

CTL TEMP (Point 78) = ROOM TEMP (Point 4) + RMTMP OFFSET (Point 3).

Example

If the precision temperature reading 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.

Setting Controller Address

Set CTLR ADDRESS (Point 1) to the appropriate number. (Valid addresses are 0 to 31. Recommendation is 32 devices per FLN.)

NOTE: Update each controller at the field panel immediately after you complete all changes to the controller's point database, including balancing and tuning as well as any setup procedures.

Secure Mode

After updating the controller at the field panel, Secure Mode can be enabled/disabled through the Insight workstation.

NOTE: Once enabled, modification of any configuration or override points is prevented. See application documentation for more information.

Start-up of the Constant Volume Controller—Electronic Output with Secure Mode is complete.