

Custom Solutions Start-up Documentation for Constant Volume Controller – Electronic Output with Hot Water Reheat, Humidity Control, and Secure Mode

TEC-1330A.11

Table of Contents

Workflow for Controller Setup	2
Verifying Slave Mode Application Number	2
Enabling Actuators.....	2
Specifying Motor Setup	3
Setting the Application	4
Enabling Autozero Module	5
Selecting Automatic Calibration Option	5
Setting Humidity Sensor Type	6
Setting Relative Humidity Setpoint.....	6
Setting Room Temperature Setpoints	6
Setting Override Time	6
Enabling Wall Switch	6
Setting Fail-safe Mode	6
Setting Duct Area	7
Setting Flow Coefficient.....	7
Setting Airflow Setpoints	8
Setting Room Temperature Offset (optional)	8
Setting Controller Address	8
Secure Mode	9

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.

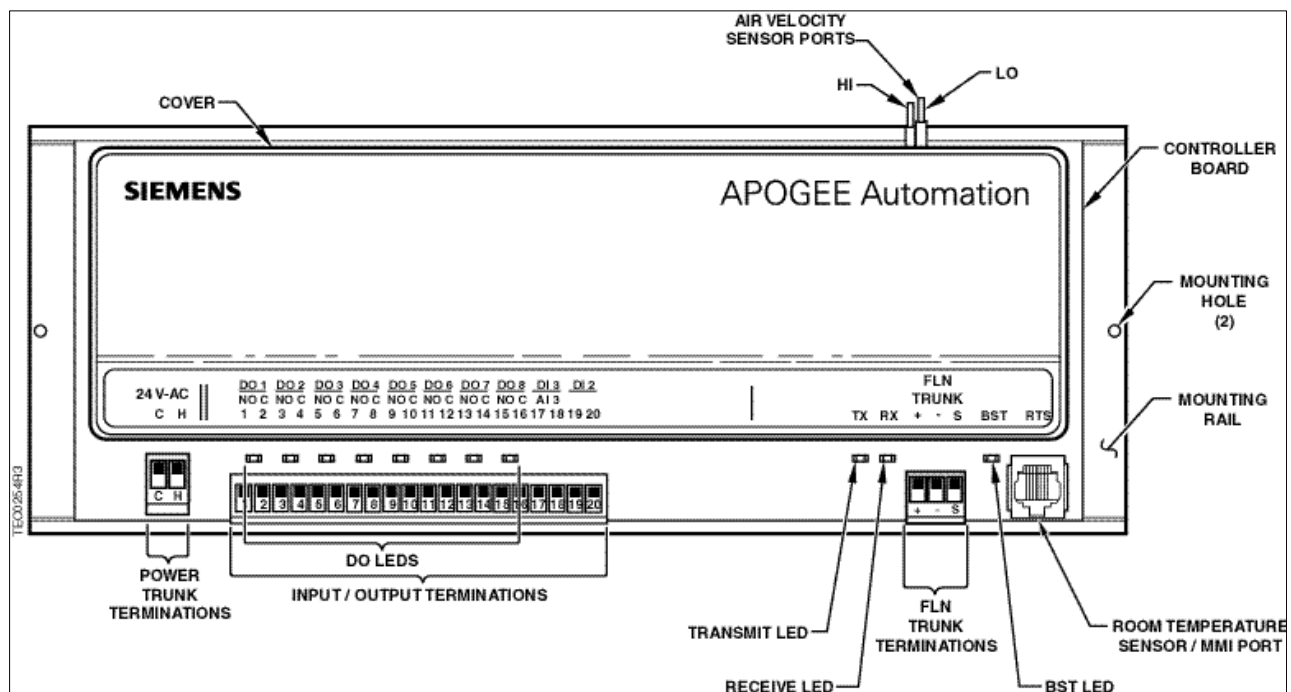


Figure 1. Constant Volume Controller with Hot Water Reheat, Humidity Control, Electronic Output, and Secure Mode.

Verifying Slave Mode Application Number

1. Verify that APPLICATION (Point 2) is set to **2190** for Rev. PH10 or higher (slave mode).
2. Display the STARTUP report.

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 Run Time for 90° Opening or Closing.

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.

Note: See the Manufacturer Installed Controls (MIC) Web page at (<http://landscape.us.abatos.com/mic/>) for specific manufacturers' damper opening details (90°/60°/etc.).

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

Specifying Motor Setup

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

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 with Hot Water Reheat, Humidity Control, Electronic Output, and Secure Mode Applications.

Application	Revision PH10 or higher
Constant Volume with Hot Water Reheat and Humidity control	2100
Slave Mode	2190

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.

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.

Enabling Autozero Module

If an Autozero Module is used, set CAL MODULE (Point 87) to **YES**.

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. Every subsequent calibration occurs without closing the damper. Calibration of a hot water valve (if used) is done by commanding the valve to closed. Calibration of the valve is not affected by the presence of an 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 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 time delay is determined by the remainder of CTRLR ADDRESS (Point 1) divided by 4 in minutes. Example: If CTRLR ADDRESS = 11, then the controller will wait 3 minutes ($11 \div 4 = 2 \text{ R}3$) 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 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 CTRLR ADDRESS. See 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 Humidity Sensor Type

The humidity sensor may be of current (4 - 20 mA) or voltage (0 - 10V) type. Set the value of AI3 VOLT.CUR (Point 54) to the appropriate value.

Setting Relative Humidity Setpoint

Set the Relative Humidity setpoint by changing the value of ROOM RH STPT (Point 16) to the appropriate value.

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 setpoint dial 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 occupied/unoccupied control, then 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 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 \times Height/144
Area in Sq M (Dimensions in centimeters)	$(\pi \times R^2)/10,000$	Length \times 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) to the appropriate value. This value is a starting point for the air balancer.
2. Fine tune the flow coefficient using the following formula:

$$\text{new flow coefficient} = (\text{actual volume} \div \text{TEC volume}) \times \text{old flow coefficient}$$

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).

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	0.79
	2-pipe with orifice	0.59
	Spider without orifice	0.73
	Spider with orifice	0.39
Carnes	2-pipe	0.66
	Flow cross	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

UNOCC FLOW (Point 31) must be set equal to or less than OCC FLOW (Point 32).

Follow these steps to set the unoccupied and occupied airflow setpoints:

1. Set OCC FLOW to the desired occupied airflow setpoint.
2. Set UNOCC FLOW to the desired unoccupied airflow setpoint.

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 Hot Water Reheat, Humidity Control, and Secure Mode is complete.