Constant Volume Controller—Electronic Output Start-up Procedures

This document presents start-up procedures for Constant Volume Controllers—Electronic Output; see Figure 1.

NOTE: Update each controller at the field panel immediately after you complete the controller start-up procedures, and have made all other changes to the controller's point database (including balancing, tuning, etc.)

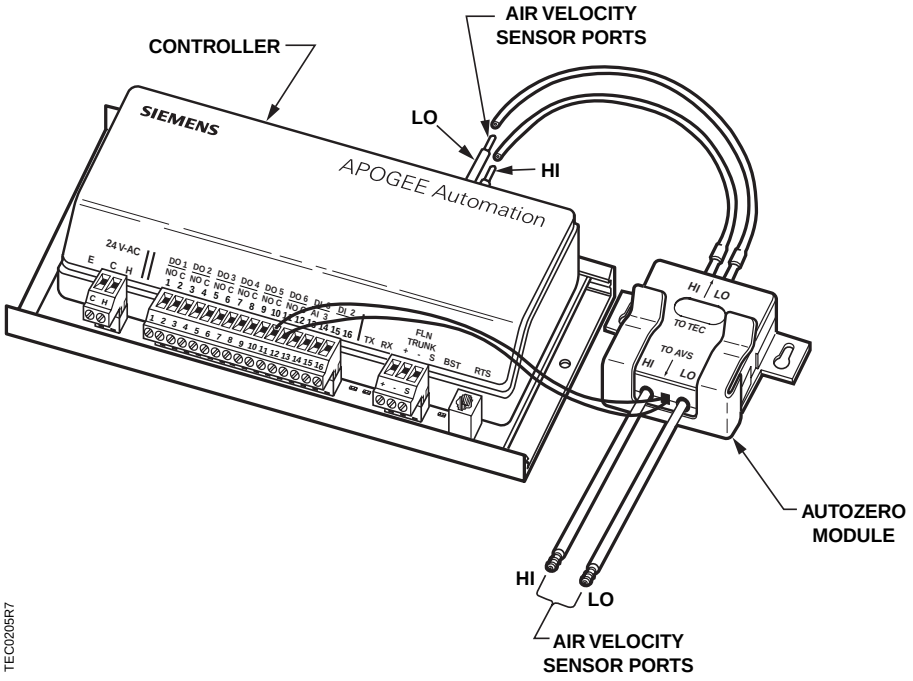

Figure 1. Constant Volume Controller—Electronic Output with Optional Autozero Module.

Verifying Power

Verify that the Constant Volume Controller is powered up. Check that the BST LED on the controller is flashing. If the BST LED does not flash on/off once per second, see the iKnow troubleshooting tool or contact Field Support for troubleshooting information.

Enabling Actuators

CAUTION:

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

Setting up Damper Actuator

NOTE: Check with the box manufacturer's local representative and/or the terminal box submittals to confirm the damper rotation angle.

1. Verify that APPLICATION (Point 2) is set to **2092** for Rev. CV10 or later, and **92** for Rev. CV01–CV03 (slave mode).
2. Display the STARTUP report.
3. Use Table 1 to set MTR1 TIMING (Point 51) to the running time of the damper actuator.

Table 1. Damper Actuator Run Time.

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

4. If the damper rotation angle is a value other than 90°, set DPR1 ROT ANG (Point 56) to the appropriate value. (Rotation angle for the PTS4 is 90°.)

Setting Motor 2 Timing

If Motor 2 is a valve actuator, use Table 2 to set MTR2 TIMING (Point 55).

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

[1] Settings given are for Johnson and Honeywell valves with a 3/4" stroke. Stroke may be from 1/2" to 3/4", depending on the model. Consult the manufacturer's valve literature for actual stroke and calculate the setting accordingly.

Specifying Motor Setup

MTR SETUP determines which actuators will be controlled by the application and whether they are direct or reverse acting.

Standard Configuration

1. Find the application you are using in Table 3.
2. Set MTR SETUP (Point 58) to the value given for that application.

NOTE: The assumptions for the values in Table 3 are:

- Dampers are Normally Closed (NC)
- Hot water valves are Normally Open (NO)

Table 3. MTR SETUP (Point 58) Value for Most Common Configurations.

Applications	Configurations		Value for
	Motor 1	Motor 2	MTR SETUP
2030, 30	Damper (normally closed)	not used	1
2032, 32	Damper (normally closed)	not available	1
2033, 33	Damper (normally closed)	heating valve (normally open)	13

Non-Standard Configuration

If your installation does not use one of the configurations listed in Table 3, if one of your actuators has a different normal position than that listed in Table 3, or if you want to use a spare motor, set MTR SETUP (Point 58) according to Table 4.

Table 4. 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

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

Verifying Actuator Setup

1. Command all actuators closed. Verify that they close and remain closed. If not, adjust the value for MTR SETUP (Point 58) according to Table 4.

2. If any of the actuators still does not close completely, then the actuators have been installed or set up incorrectly. See the actuator installation instructions, setup information, or the iKnow troubleshooting tool, or contact Field Support.

Setting the Application

Set APPLICATION (Point 2) to the appropriate Constant Volume Controller application. See Table 5 for application names and numbers.

Table 5. Constant Volume Controller—Electronic Output Applications.

Application	Revision CV01–CV03	Revision CV10 or later
Constant Volume Cooling Only	30	2030
Constant Volume with Electric Reheat	32	2032
Constant Volume with Hot Water Reheat	33	2033
Slave Mode	92	2092

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.

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 2 to 5 minutes to complete. The air damper closes during this first calibration.

At the start of the calibration cycle, the controller automatically sets CAL AIR (Point 94) to YES. When the cycle is complete, it sets CAL AIR to NO.

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 Stages of Electric Heat

Applications 2032 and 32: Check the hardware to verify the number of stages of electric heat wired to the controller at DO 3, DO 4, and DO 5. Set STAGE COUNT (Point 88) to this value.

Enabling the Autozero Module

If an Autozero Module is used, enable it by setting 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.

Selecting Automatic Calibration Option

1. Using Table 6, 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 6. 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 delay is determined by 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 pressed.
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 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 (Applications 2032, 2033, 32, and 33)

If the Controller is to Use a Setpoint Dial

1. Display the SETPOINTS report.
2. If the room temperature sensor has a setpoint dial, and if RM STPT DIAL (Point 13) is to be used by the controller, set STPT DIAL (Point 14) to **YES**.

   NOTE: If STPT DIAL is set to YES, OCC CLG STPT (Point 6) and OCC HTG STPT (Point 7) are not used. The value of RM STPT DIAL is used in occupied mode.
3. Set unoccupied-mode setpoints to the appropriate values:
   - UOC CLG STPT (Point 8)
   - UOC HTG STPT (Point 9)
4. 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).

If No Setpoint Dial is Used

1. Display the SETPOINTS report.
2. Verify that STPT DIAL (Point 14) is set to **NO**.
3. Set the following points to the appropriate values:
   - OCC CLG STPT (Point 6)
   - OCC HTG STPT (Point 7)
   - UOC CLG STPT (Point 8)
   - UOC HTG STPT (Point 9)

Setting Override Time

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

Enabling the Wall Switch

Applications 2030, 2032, and 2033: If a wall switch is used for occupied/unoccupied control, enable it by setting WALL SWITCH (Point 18) to **YES**.

Applications 30, 32, and 33: If a wall switch is used for occupied/unoccupied control, enable it by setting LIGHT 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, follow these steps:

  1. Using *Voyager*; click the **HVAC Technical Reference** button (bottom of main screen).
  2. Click the **Air & Water Distribution** button.
  3. Select **Air Distribution** and then **Duct Areas**.
  4. Enter the dimensions and click **Calculate**.
  5. Enter the duct area calculations into DUCT AREA (Point 97).

  NOTE: When entering the LCTLR point for a Constant Volume Controller at the field panel, do not enter a duct area. (When asked for the duct shape, choose **N** for None.) This controller does not send the value of air volume to the field panel in velocity (fpm). Instead, it uses volume (cfm), so a conversion is not necessary.

Setting Flow Coefficient

1. Display the BALANCING report.

2. Set FLOW COEFF (Point 36) to the appropriate value found in Table 7. This value is a starting point for the air balancer.

3. Use the following formula to fine-tune the flow coefficient:

   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) of the TEC.

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

Table 7. 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 UNOCC and OCC Airflow Setpoints

Applications 2030, 2032, and 2033: UNOCC FLOW (Point 31) must be set equal to or less than OCC FLOW (Point 32).

Applications 30, 32, and 33: UNOCC FLOW must be set equal to or less than 30% of OCC FLOW.

1. Set OCC FLOW to the desired occupied airflow setpoint.

2. Set UNOCC FLOW to the desired unoccupied airflow setpoint.

Setting Controller Address

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

Set the controller address by setting CTLR ADDRESS (Point 1) to the appropriate number.

NOTE: Update each controller at the field panel immediately after you complete the controller start-up procedures, and have made all other changes to the controller's point database (including balancing, tuning, etc.)

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