Room Pressurization Controller—Electronic Output Start-up Procedures

This document presents start-up procedures for Room Pressurization 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.)

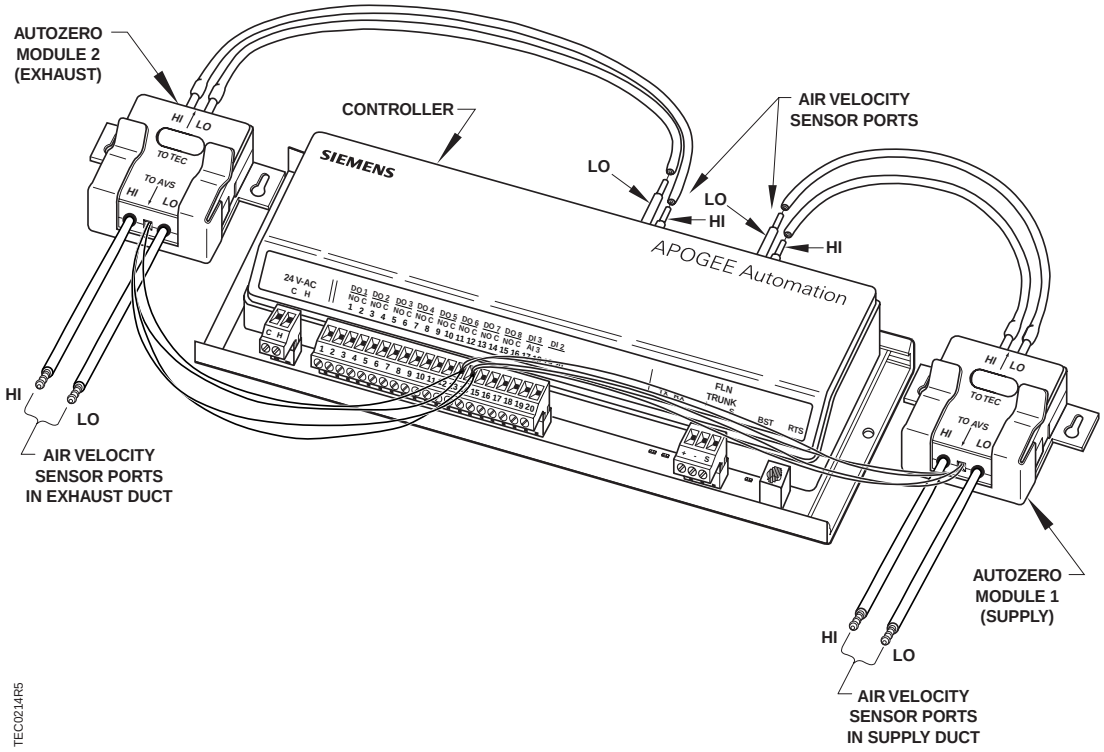

Figure 1. Room Pressurization Controller—Electronic Output with Optional Autozero Modules.

Verifying Power to Controller

Verify that the Room Pressurization 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.

Verifying Slave Mode Application

1. Verify APPLICATION (Point 2) is set to 2293 (slave mode).
2. Display the STARTUP report.

Enabling Actuators

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

Setting Motor Timing and Damper Actuator Rotation Angle

The run time of each actuator is indicated by MTR1 TIMING (Point 51), MTR2 TIMING and MTR3 TIMING (Point 39).

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

1. Set MTR1 TIMING (Point 51) and MTR2 TIMING (Point 55) to the running times of the damper actuators. See Table 1.

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

2. If the damper rotation angles are values other than 90°, set DPR1 ROT ANG (Point 56) and DPR2 ROT ANG (Point 57) to the appropriate values. (Rotation angle for the PTS4 is 90°.)

3. If Motor 3 is a valve actuator, use Table 2 to set MTR3 TIMING (Point 39) to its running time.

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 (Point 58) determines which actuators will be controlled by the application and whether they are direct or reverse acting.

The typical value for MTR SETUP is 31. This corresponds to supply and exhaust flow actuators that stroke clockwise to open and counterclockwise to close and an enabled reheat actuator. Depending on the installation and wiring of the actuators, you may need to use a different value. Set MTR SETUP according to Table 3.

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

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

Verifying Actuator Setup

1. Command all actuators closed. Verify that they close and remain closed. If not, adjust the setting for MTR SETUP according to Table 3.

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

Setting the Application

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

Table 4. Room Pressurization Controller—Electronic Output Applications.

Application	Revision RE20 or later
Variable Air Volume Room Pressurization with Hot Water Reheat	2216
Constant Volume Room Pressurization with Hot Water Reheat	2218
Slave Mode	2293

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.

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 dampers close 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 must wait until the calibration cycle is complete (CAL AIR is set to NO) before continuing with this start-up procedure.

Enabling Autozero Modules

If Autozero Modules are used, enable them by setting CAL MODULE (Point 87) to **YES**.

NOTE: For a controller without Autozero Modules, the damper is commanded closed to get a zero airflow reading during calibration. For a controller with Autozero Modules, the damper is closed only for the first calibration after controller start-up, initialization, or return from power loss.

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 the field panel commands an occupied/unoccupied or 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 occupied/unoccupied or 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. 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 as in Options 1 and 2, set CAL SETUP to **3**.

Setting Room Temperature Setpoints

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 it is to be used by the controller, set STPT DIAL (Point 14) to **YES**.

Application 2216

NOTE: If STPT DIAL is set to YES, DAY CLG STPT (Point 6) and DAY HTG STPT (Point 7) are not used. The value of RM STPT DIAL (Point 13) is used.

Application 2218

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.

3. Set the night/unoccupied setpoints as appropriate:

Application 2216

- NGT CLG STPT (Point 8)
- NGT HTG STPT (Point 9)

Application 2218

- UNOCC CLG STPT (Point 8)
- UNOCC 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:

Application 2216

- DAY CLG STPT (Point 6)
- DAY HTG STPT (Point 7)
- NGT CLG STPT (Point 8)
- NGT HTG STPT (Point 9)

Application 2218

- OCC CLG STPT (Point 6)
- OCC HTG STPT (Point 7)
- UNOCC CLG STPT (Point 8)
- UNOCC HTG STPT (Point 9)

Setting Override Time

1. Display the STARTUP report.
2. If using night/unoccupied override, set OVRD TIME (Point 20) to the number of whole hours that an override should last. To disable night override, set OVRD TIME to 0.

Enabling Wall Switch

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

Setting Fail-safe Mode

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

Setting Tracking Options

NOTE: Setpoint tracking provides smoother control. Flow tracking provides additional safety—if the lead flow (supply if ETS, or exhaust if STE) cannot make its setpoint for mechanical reasons, the tracking flow tracks the actual lead flow and flow differential can be maintained. Flow tracking is more difficult and time consuming to tune.

For Setpoint Tracking

1. Set TRACKING (Point 82) to STPT.
2. Set TRACK MODE (Point 3) to the appropriate value:
   - ETS (Exhaust Tracks Supply) causes the controller to calculate the exhaust volume setpoint as the supply volume setpoint plus/minus VOLUME OFFST (Point 88).
   - STE (Supply Tracks Exhaust) causes the controller to calculate the supply volume setpoint as the exhaust volume setpoint plus/minus VOLUME OFFST. If TRACK MODE is set to STE, then the flow minimums and maximums will apply to the exhaust flow.

For Flow Tracking

1. Set TRACKING (Point 82) to FLOW.
2. Set TRACK MODE (Point 3) to the appropriate value:

- ETS (Exhaust Tracks Supply) causes the controller to calculate the exhaust volume setpoint as the actual supply flow plus/minus VOLUME OFFST.
- STE (Supply Tracks Exhaust) causes the controller to calculate the supply volume setpoint as the actual exhaust flow plus/minus VOLUME OFFST. If TRACK MODE is set to STE, then the flow minimums and maximums will apply to the exhaust flow.

Setting Pressure Control

CAUTION:

Do not set VOLUME OFFST (Point 88) greater than CTL FLOW MAX (Point 77).

1. Set VOLUME OFFST to the flow difference between supply and exhaust required to maintain the specified pressure differential.
2. If using a pressure mode switch, set PRES SWITCH (Point 81) to **YES**.
3. If not using a pressure mode switch, set PRES SWITCH to **NO** and set POS.NEG (Point 25) as follows:
   - If positive pressure is to be maintained, then set POS.NEG to **POS**.
   - If negative pressure is to be maintained, then set POS.NEG to **NEG**.

Setting Alarm Function

ALARM OUT (Point 50) will turn ON if ACTUAL OFFST (Point 83) is more than the value of OFFSET LMT (Point 61) away from the point VOLUME OFFST (Point 88) (with the correct sign) for longer than ALARM DELAY (Point 62).

Example

The alarm DO will turn ON if the following two statements are true:

- VOLUME OFFST = 100 cfm, POS.NEG = NEG, OFFSET LMT = 50, and ALARM DELAY = 20 seconds,
- ACTUAL OFFST is above –50 or below –150 cfm for more than 20 seconds.

Follow these steps to set the alarm function:

1. Set OFFSET LMT and ALARM DELAY as appropriate.
2. If not using a pressure mode switch, set ACTIVE.NTRAL (Point 10) as follows:
   - To enable alarming and positive or negative pressure control, set ACTIVE.NTRAL to **ACTIVE**.

- To disable alarming and use neutral pressure control, set ACTIVE.NTRAL to **NTRAL**.

Setting Duct Areas

- If provided, enter the duct area (sq ft or sq m) into EXHDUCT AREA (Point 60) and SUPDUCT 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 EXHDUCT AREA (Point 60) and SUPDUCT AREA (Point 97).

NOTE: When entering the LCTLR point for a Room Pressurization 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 Coefficients

1. Display the BALANCING report.

2. Set SUP FLO COEF (Point 36) and EXH FLO COEF (Point 54) to the appropriate values found in Table 6. 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 EXH AIR VOL (Point 30) and SUP AIR VOL (Point 35).

4. If the TEC volume is not within 2% of the actual volume, then repeat the procedure until it is within 2%.

NOTE: It is extremely important that the flow readings are accurate.

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

Application 2218

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

1. Set UNOCC FLOW to the desired/specified unoccupied airflow setpoint.

2. Set OCC FLOW to the desired/specified occupied airflow setpoint.

   For example, if the controller is required to maintain a constant volume of 2500 cfm during occupied mode and 1500 cfm during unoccupied mode, set OCC FLOW to 2500 cfm and set UNOCC FLOW to 1500 cfm.

NOTE: If TRACK MODE (Point 3) equals Supply Tracks Exhaust (STE), these airflow setpoints apply to the exhaust flow calculations. If the specifications call for the occupied and unoccupied flows to apply to the supply flow and negative pressurization is to be used, set the occupied and unoccupied flow points higher by the amount of VOLUME OFFST (Point 88).

Application 2216

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

1. Set CLG FLOW MIN (Point 31) to the desired/specified minimum cooling airflow setpoint.

2. Set CLG FLOW MAX (Point 32) to the desired/specified maximum cooling airflow setpoint.

3. Set HTG FLOW MIN (Point 33) to the desired/specified minimum heating airflow setpoint.

4. Set HTG FLOW MAX (Point 34) to the desired/specified maximum heating airflow setpoint.

NOTE: If TRACK MODE (Point 3) equals Supply Tracks Exhaust (STE), these minimums and maximums apply to the exhaust flow calculations. If the specifications call for a minimum supply airflow and negative pressurization is used, set the minimums higher than the minimum specified flow by the amount of VOLUME OFFST (Point 88).

Setting Controller Address

NOTE: If you are going to enter an LCTLR point at the field panel, keep track of the controller address and override time 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 (00 to 31 if an LCTLR point will be defined for this controller).

Commissioning

After all points have been set up, follow these procedures to verify that the application is controlling properly:

1. Confirm that the differential flow control is acceptable at minimum and maximum cooling, by monitoring ACTUAL OFFST (Point 83).

2. Confirm that EXH AIR VOL (Point 30) and SUP AIR VOL (Point 35) match the true flows (as measured with other instrumentation) at both minimum and maximum cooling.

3. Confirm acceptable pressure control by using a differential pressure sensor, air velocity measurement in cracked doorway, a slip of paper in a cracked doorway, etc. If pressure is not great enough, increase the value of VOLUME OFFST (Point 88).

4. Confirm that the alarm indication (alarm light or DO8) goes ON when an alarm condition is simulated. (Command one of the flow setpoints to an out of range value to create an alarm condition.) Confirm that the alarm indication goes away when the alarm condition is removed (flow setpoint is released).

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 Room Pressurization Controller—Electronic Output is complete.