Dual Duct Controller—Two Air Velocity Sensors—Electronic Output Start-up Procedures

This document presents start-up procedures for Dual Duct Controllers—Two Air Velocity Sensors (2AVS)—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.).

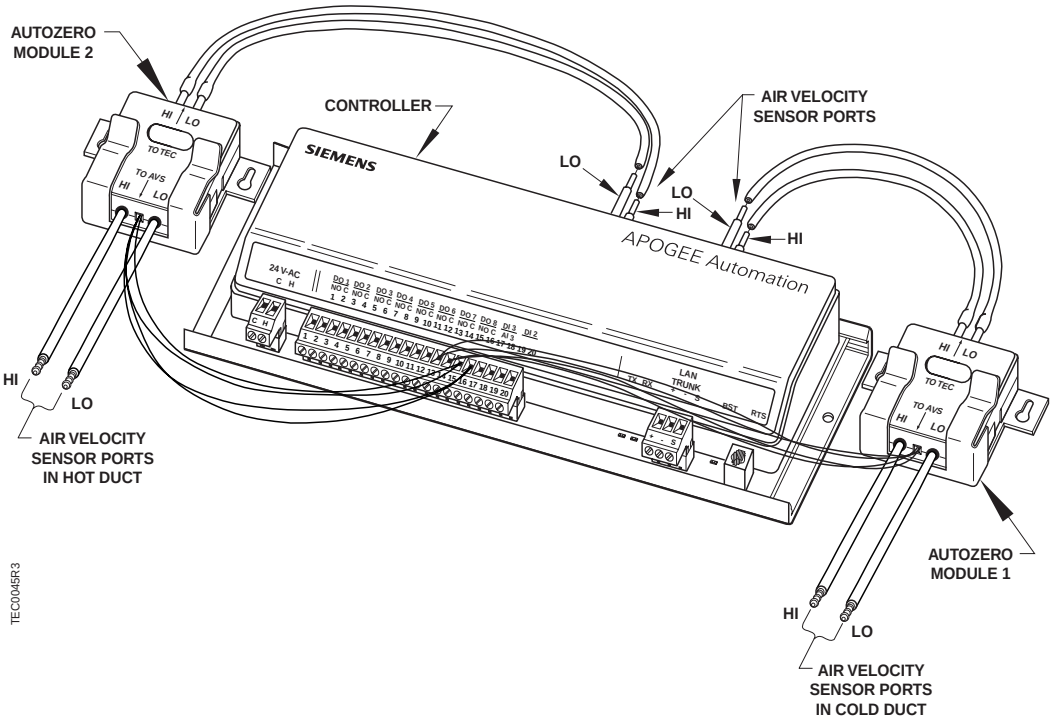

Figure 1. Dual Duct Controller—Two Air Velocity Sensors—Electronic Output with Optional Autozero Modules.

Verifying Power to Controller

Verify the Dual Duct 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 that APPLICATION (Point 2) is set to **2293** for Rev. DD10 or later, and **93** for Rev. DD01–DD02 (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.

Setting Motor Timing and Damper Actuator Rotation Angle

The run time of each actuator is indicated by MTR1 TIMING (Point 51), MTR2 TIMING (Point 55), and MTR3 TIMING (Point 39).

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

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

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.

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.

Standard Configuration

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

NOTE: The assumptions for this table are:

- Dampers are Normally Closed (NC)
- Heating valves are Normally Open (NO)

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

Applications	Configurations			Value for
	Motor 1	Motor 2	Motor 3	MTR SETUP
all applications with valve	cooling damper (normally closed)	heating damper (normally closed)	heating valve (normally open)	53
all applications without valve	cooling damper (normally closed)	heating damper (normally closed)	spare	5

Non-Standard Configuration

If your application does not use one of the listed actuators 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, use Table 4 to set MTR SETUP.

Table 4. Motor Enable/Reverse Values for MTR SETUP.

	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 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 Dual Duct Controller application. See Table 5 for application names and numbers.

Table 5. Dual Duct Controller—2AVS—Electronic Output Applications.

Application	Revision DD01–DD02	Revision DD10 or later
Dual Duct Constant Volume with Two Inlet Sensors with Optional Reheat	37	2237
Dual Duct Constant Volume with One Inlet and One Outlet Sensor with Optional Reheat	38	2238
Dual Duct VAV with Two Inlet Sensors with Optional Reheat	67	2267
Dual Duct VAV with One Inlet and One Outlet Sensor with Optional Reheat	68	2268
Dual Duct VAV with Changeover	69	2269
Slave Mode	93	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 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 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.

Setting Auxiliary Heat Options

1. If not using auxiliary heat (hot water or electric), set AUX HTG USED (Point 82) to NO and skip to *Setting Hot and Cold Duct Temperatures*.

2. If using auxiliary heat (hot water or electric), set AUX HTG USED to **YES**.

3. If the auxiliary heat is hot water, then set AUX HTG TYPE (Point 83) to **HW** and skip to *Setting Hot and Cold Duct Temperatures*.

4. If the auxiliary heat is electric, set AUX HTG TYPE to **ELEC**.

Setting Stages of Electric Reheat

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

CAUTION:

If using electric reheat, do not set TOT FLOW MIN (Point 33) to 0 cfm (0 lps). Equipment damage may occur if the electric heat is on while the box is controlling at a total flow minimum of 0 cfm (0 lps).

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 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 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 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 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 Hot and Cold Duct Temperatures

Applications 2269 and 69: If using temperatures for the hot and cold duct temperatures supply other than the default values, set them as follows:

- Set CLG TEMP (Point 61) to the desired value.
- Set HTG TEMP (Point 62) to the desired value.

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

   Applications 2237, 2238, 37, and 38:

   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.

   Applications 2267, 2268, 2269, 67, 68, and 69:

   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.

3. Set the unoccupied/night setpoints to the appropriate values:

   Applications 2237, 2238, 37, and 38:

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

   Applications 2267, 2268, 2269, 67, 68, and 69:

   - NGT CLG STPT (Point 8)
   - NGT 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° to 95°F (13° 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:

   Applications 2237, 2238, 37, and 38:

   - OCC CLG STPT (Point 6)
   - OCC HTG STPT (Point 7)

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

Applications 2267, 2268, 2269, 67, 68, and 69:

- DAY CLG STPT (Point 6)
- DAY HTG STPT (Point 7)
- NGT CLG STPT (Point 8)
- NGT 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. If set at zero (the default), then night/unoccupied override is disabled.

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

Applications 2237, 2238, 37, and 38: In the event that either air velocity sensor ceases to function, FAIL MODE (Point 40) causes the dampers to either **OPEN** or **CLOSE**. Set FAIL MODE to the fail-safe position desired for the dampers.

Setting Duct Areas

- If provided, enter the duct areas (sq ft or sq m) into HTGDUCT AREA (Point 60) and CLGDUCT AREA (Point 97), and continue to *Setting Flow Coefficients*.
- 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 HTGDUCT AREA (Point 60) and CLGDUCT AREA (Point 97).

NOTE: When entering the LCTLR point for a Dual Duct Controller—Two Air Velocity Sensors 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 Point 36 (CLG FLO COEF) and Point 54 (either HTG FLO COEF or TOT FLO COEF, depending on the application) to the appropriate values 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 Point 30 (HTG VOLUME or TOT VOLUME, depending on the application) and Point 35 (CLG VOLUME).

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 Airflow Setpoints

Applications 2237, 2238, 37, and 38

Use job specifications to set:

Applications 2237 and 2238

- CLG FLOW MIN (Point 91), the minimum airflow from the cold duct in occupied mode

All Four Applications

- OCC FLOW (Point 32), the setpoint for airflow in occupied mode
- UNOCC FLOW (Point 31), the setpoint for airflow in unoccupied mode

NOTE: The controller will not use a setting for UNOCC FLOW that is greater than the setting for OCC FLOW. If UNOCC FLOW is greater than OCC FLOW, the controller uses the setting OCC FLOW at all times.

NOTE: For Applications 37 and 38, it is recommended that UNOCC FLOW be set no greater than 0.3 times OCC FLOW. If UNOCC FLOW is set greater than this value, the flow loop becomes less stable.

For example, if the controller must maintain a constant volume of 2500 cfm during occupied mode, UNOCC FLOW should be set to no more than 750 cfm.

NOTE: If the application will always be in occupied mode, then set UNOCC FLOW to 0 cfm or to a value that is 10 percent of the value of OCC FLOW.

Applications 2267, 2269, 67, and 69

Use job specifications to set:

Applications 2267 and 2269

- CLG FLOW MIN (Point 91), the minimum airflow from the cold duct in daytime cooling mode

All Four Applications

- CLG FLOW MAX (Point 32), the maximum airflow from the cold duct in cooling mode
- TOT FLOW MIN (Point 33), the minimum airflow needed for ventilation from the dual-duct box
- HTG FLOW MAX (Point 34), the maximum airflow from the hot duct in heating mode

Applications 2268 and 68

Use job specifications to set:

Application 2268

- CLG FLOW MIN (Point 91), the minimum airflow from the cold duct in daytime cooling mode

Both Applications

- CLG FLOW MAX (Point 32), the maximum airflow from the cold duct
- TOT FLOW MIN (Point 33), the minimum airflow needed for ventilation from the dual-duct box
- TOT FLOW MAX (Point 34), the maximum airflow from the dual-duct box

NOTE: For Application 68, it is recommended that TOT FLOW MIN be set no greater than 0.3 times TOT FLOW MAX. If TOT FLOW MIN is set greater than this value, the flow loop becomes less stable.

For example, if the maximum flow is to be 2500 cfm, TOT FLOW MIN should be set to no more than 750 cfm.

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. (Addresses 00 to 98 are valid; 00 to 31 are typically used.)

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 Dual Duct Controller—Two Air Velocity Sensors—Electronic Output is complete.