Dual Duct Controller with Temperature Control Priority – Two Air Velocity Sensors – Electronic Output

This section presents start-up procedures for the Dual Duct Controller with Temperature Control Priority – Two Air Velocity Sensors – Electronic Output. Refer to 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.).

Verify power to controller

Verify that the Dual Duct Controller with Temperature Control Priority – Two Air Velocity Sensors – Electronic Output 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, then refer to the *System 600 Maintenance and Troubleshooting Manual* (125-1855) for troubleshooting information.

NOTE: The Controller Interface Software (CIS) used with the Dual Duct Controller with Temperature Control Priority – Two Air Velocity Sensors – Electronic Output firmware revision DT10 or higher must be Rev. 2.0 or greater. Voyager's point database may also be used for start-up.

Verify slave mode application number

1. Verify that the point APPLICATION (number 2) is set to 2293 (slave mode).

2. Display the STARTUP report.

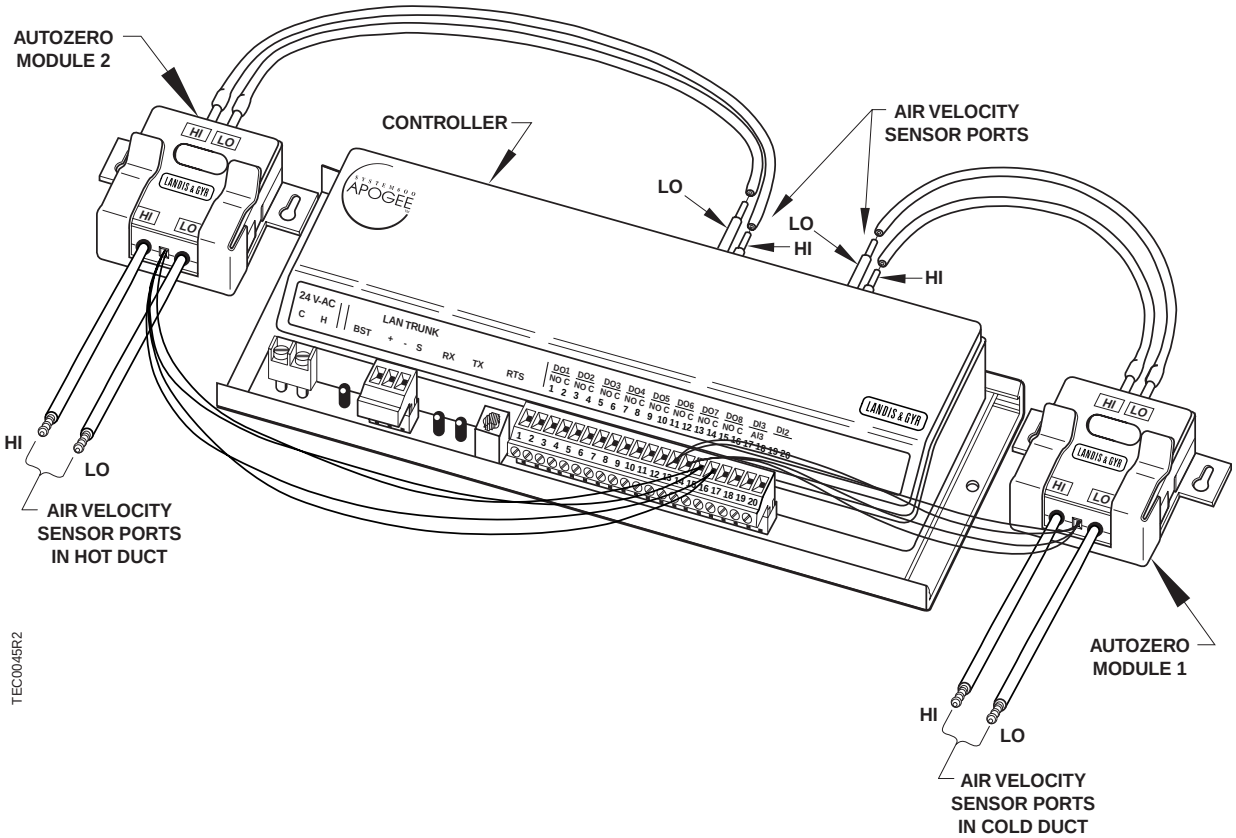

Figure 1. Dual Duct Controller with Temperature Control Priority – Two Air Velocity Sensors – Electronic Output.

Set motor timing and damper actuator rotation angle

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

Follow these steps to set the point(s) for motor timing:

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

1. If Motor 1 and Motor 2 are damper actuators, then use Table 1 to set MTR1 TIMING and MTR2 TIMING.

2. If the damper rotation angles are values other than 90°, then set the points DPR1 ROT ANG (number 56) and DPR2 ROT ANG (number 57) to the appropriate values.

3. If Motor 3 is a valve actuator, then use Table 2 to set MTR3 TIMING.

Table 1. Damper Actuator Run Time.

Damper Actuator	Setting (seconds)	
	50 Hz	60 Hz
349-0100	113	90
SQR 81.1	155	130

Table 2. Valve Actuator Run Time.

Valve Actuator	Setting (seconds)	
	50 Hz	60 Hz
SQS 82	155	130
Powers VE 339 series actuator with a 1/2 in. (13 mm) stroke (used with Powertop valves)	25	21
Powers VE 339 series actuator with a 3/4 in. (19 mm) stroke[1]	38	32

[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.

Enable Autozero Modules

If Autozero Modules are used, then enable them by setting the point CAL MODULE (number 87) to YES.

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

Select automatic calibration option

In order to choose the most efficient method of triggering the calibration routine, follow this procedure to set the point CAL SETUP (number 95):

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.

1. Select the automatic calibration option desired from Table 3 that best meets your job requirements.

2. Set CAL SETUP to the value chosen.

Table 3. CAL SETUP Options.

CAL SETUP Options	Description
0	Calibration occurs ONLY when the point CAL AIR (number 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 (number 1) divided by 4 and 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 (number 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. Refer to 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**.

Set MTR SETUP

The point MTR SETUP (number 58) determines which actuators will be controlled by the application and whether they are direct or reverse acting.

Standard Configuration – Refer to Table 4 to set MTR SETUP as follows:

1. Refer to Table 4 for the MTR SETUP values for the most common configurations based on each application.

2. Find the application you are setting up in Table 4.

3. 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)

Non-Standard Configuration – If your application does not use one of the listed actuators in Table 4, if one of your actuators has a different normal

position than that listed in Table 4, or if you want to use a spare motor, then refer to Table 5 to set MTR SETUP as follows:

1. Table 5 is divided into 3 main sections based on how Motor 1 is to be used. Choose the section that corresponds to how Motor 1 will be used in your application.

2. The section you have chosen is divided into 3 columns based on how Motor 2 is to be used. Choose the column that corresponds to how Motor 2 will be used in your application.

3. The column you have chosen is further divided into 3 rows based on how Motor 3 is to be used. Choose the row that corresponds to how Motor 3 will be used in your application.

4. Set MTR SETUP to the value of the number in the row and column you have chosen.

Table 4. MTR SETUP (number 58) Value for Most Common Configurations.

Applications	Configurations			Value for MTR SETUP
	Motor 1	Motor 2	Motor 3	
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

If any of the actuators still do not close completely, then the actuators have been installed or set up incorrectly. Refer to the actuator installation instructions, set up information, Table 5, or the *System 600 Maintenance and Troubleshooting Manual* (125-1855) for more information.

Table 5. 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

Set controller address

NOTE: If you are going to enter an LCTLR point at the field panel, then 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 the point CTLR ADDRESS (number 1) to the appropriate number (00-31 if an LCTLR point will be defined for this controller).

Set application

Set the point APPLICATION (number 2) to the appropriate Dual Duct Controller with Temperature Control Priority – Two Air Velocity Sensors – Electronic Output application. Refer to Table 6 for application names and numbers.

Table 6. Dual Duct Controller with Temperature Control Priority – Two Air Velocity Sensors – Electronic Output Applications.

Application	Revision DT10 or higher
Dual Duct Constant Volume with Two Inlet Sensors with Optional Reheat and Temperature Control Priority	2340
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 the point CAL AIR (number 94) to YES. When the cycle is complete, it sets CAL AIR to NO.

Set override time

Follow these steps to set the override time:

1. Display the STARTUP report.

2. If using night/unoccupied override, then set the point OVRD TIME (number 20) to the number of whole hours that an override should last. If set at zero (the default), then night/unoccupied override is disabled.

Enable wall switch

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

Set fail-safe mode

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

Set UNOCC and OCC airflow set points

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

1. Set the point OCC FLOW (number 32) to the desired/specified occupied airflow set point.

2. If the point UNOCC FLOW (number 31) is equal to or less than OCC FLOW, then set UNOCC FLOW to the desired/specified unoccupied airflow set point.

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.

Set MIN airflow set points

Set the point CLG FLOW MIN (number 91) to the desired/specified minimum cooling airflow set point.

Set duct areas

Set the duct areas by following these steps:

1. Using the portable operator's terminal, press **<F4>** to display the **Duct Dimensions Menu.**

2. At the Duct Dimensions Menu, use the arrow keys to select the applicable duct shape of the cooling duct. Press **<ENTER>.** The software prompts you for the dimensions of the duct.

3. Enter the cooling duct dimensions as prompted. Press **<ENTER>** after each dimension you enter.

4. At the Duct Dimensions Menu, use the arrow keys to select the applicable duct shape of the heating duct. Press **<ENTER>.** The software prompts you for the dimensions of the duct.

5. Enter the heating duct dimensions as prompted. Press **<ENTER>** after each dimension you enter.

NOTE: When entering the LCTLR point for a Dual Duct Controller with Temperature Control Priority – Two Air Velocity Sensors – Electronic Output at the field panel, do not enter a duct area. (Choose **N**, for None, when asked for the duct shape.) 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.

Set auxiliary heat options

Set the auxiliary heat options by following these steps:

1. If not using auxiliary heat (hot water or electric), then set the point AUX HTG USED (number 82) to NO and skip to the part titled *"Set room temperature set points"*.

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

3. If the auxiliary heat is hot water, then set the point AUX HTG TYPE (number 83) to HW and skip to the part titled *"Set room temperature set points"*.

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

Set stages of electric reheat

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

Set room temperature set points

Follow these steps to set the room temperature set points:

1. Display the SETPOINTS report.

2. If the room temperature sensor has a set point dial, and if it is to be used by the controller, then set the point STPT DIAL (number 14) to YES; otherwise, set STPT DIAL to NO.

   NOTE: If STPT DIAL is set to YES, then the points OCC CLG STPT (number 6) and OCC HTG STPT (number 7) will not be used. The value of RM STPT DIAL will be used.

3. If the room temperature sensor has a set point dial and it is to be used, then set the points RM STPT MIN (number 11) and RM STPT MAX (number 12) for the minimum and the maximum allowable room temperature set point values, respectively. Valid values range from 55° to 95°F (13° to 35°C). Common values for these points are 65°F (18°C) for RM STPT MIN and 80°F (27°C) for RM STPT MAX.

4. If there is no set point dial on the room temperature sensor or if the existing set point dial is not to be used, then verify that STPT DIAL is set to NO.

   Set the following points to the appropriate values:

   - OCC CLG STPT (number 6)
   - OCC HTG STPT (number 7)
   - UOC CLG STPT (number 8)
   - UOC HTG STPT (number 9)

Set flow coefficients

Follow these steps to set the flow coefficients:

1. Display the BALANCING report.

2. Set the points CLG FLO COEF (number 36) and HTG FLO COEF (number 54) to the appropriate values found in Table 7. This value is a starting point for the air balancer.

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 points HTG VOLUME (number 30) and CLG VOLUME (number 35) of the TEC. If the TEC volume is not within 5% of the actual volume, then repeat the procedure until it is within 5%.

Table 7. Box Manufacturer Flow Coefficients.

Box Manufacturer	Sensor Type	Flow Coefficient
Anemostat	2-pipe sensor without orifice 2-pipe sensor with orifice Spider sensor without orifice Spider sensor with orifice	0.79 0.59 0.73 0.39
Carnes	2-pipe sensor Flow cross	0.66 0.59
Carrier		0.59
Continental Air Products		0.79
E.H. Price		0.78
Environmental Technologies		0.79
Hart & Cooley/Tuttle & Bailey	Flow cross Orifice	0.59 0.73
Krueger		0.68
Metal Aire		0.72
Nailor Industries		0.69
Redd-I-Inc.		0.59
Tempmaster		0.73
Titus		0.60
Trane		0.66

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.).

Dual Duct Controller with Temperature Control Priority – Two Air Velocity Sensors – Electronic Output start-up is complete.