SIEMENS

Start-up for TEC Custom Solutions Application 2408

Air Velocity Controller with Differential Pressure Sensors

TEC-0635.11

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Before You Begin

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

1. At the job site, locate the major control system and the mechanical and electrical drawings. These components include dampers, motors, and any other components working in conjunction with the TEC.

2. Verify that the TEC's input/output (I/O) points are wired per the installation instructions.

3. Verify that the Controller is powered up. Check that the BST LED on the controller is flashing (Figure 1). If the BST LED does not flash on/off once per second, then refer to the *APOGEE Automation* Service *Procedures* on InfoLink for troubleshooting information.

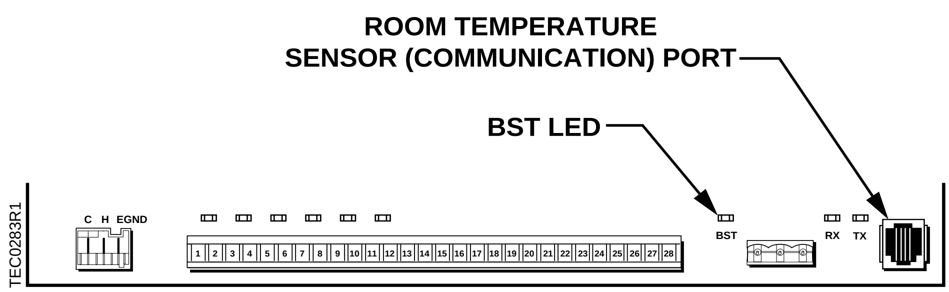

Figure 1. TEC Board Showing Location of BST LED and RTS Port.

Configuring the Controller

This section presents the steps for configuring each controller with the proper application number and initial values. All values are set using Voyager.

1. Plug the MMI into the Room Temperature Sensor port (Figure 1).

2. Verify that the communication indicator on the Voyager Point Database screen is rotating.

3. Verify that Application 2491 (Slave Mode) is running at the controller. The application number, controller address, and report name appear in the title line on the Voyager Point Database screen.

Setting the application

1. Set APPLICATION (Point 2) to 2408.

2. Set CTLR ADDRESS (Point 1) to the correct value obtained from the controller schedule. Each controller must have a unique address. Valid values are 0 through 98.

Setting Up Dampers

1. By commanding EX1 DMP AO2 (Point 57) and observing the motion of the damper actuator in the first exhaust duct, find the value of EX1 DMP AO2 that closes the damper and enter that voltage as EX1 CLOSED (Point 23).

2. Find the value of EX1 DMP AO2 that opens the damper in the first exhaust duct all the way. Enter that voltage as EX1 OPEN (Point 22).

3. Release EX1 DMP AO2.

4. By commanding EX2 DMP AO3 (Point 58) and observing the motion of the damper actuator in the second exhaust duct, find the value of EX2 DMP AO3 that closes the damper and enter that voltage as EX2 CLOSED (Point 73).

5. Find the value of EX2 DMP AO3 that opens the damper in the second exhaust duct all the way. Enter that voltage as EX2 OPEN (Point 72).

6. Release EX2 DMP AO3.

Setting the Ranges of the Differential Pressure Sensors

1. Set EX1DP HI RNG (Point 08) to highest value that EX1 DIF PRES (Point 14) will read. (This is what the differential pressure sensor in exhaust duct 1 will be reading when AI 3 is at 20 mA.)

2. Set EX1DP LO RNG (Point 07) to lowest value that EX1 DIF PRES will read. (This is what the differential pressure sensor in exhaust duct 1 will be reading when AI 3 is at 4 mA.)

3. Set EX2DP HI RNG (Point 61) to highest value that EX2 DIF PRES (Point 67) will read. (This is what the differential pressure sensor in exhaust duct 2 will be reading when AI 4 is at 20 mA.)

4. Set EX2DP LO RNG (Point 60) to lowest value that EX2 DIF PRES will read. (This is what the differential pressure sensor in exhaust duct 2 will be reading when AI 4 is at 4 mA.)

Setting Duct Areas

1. Using Voyager, choose **Duct** to display the Duct menu.

2. At the Duct menu, use the arrow keys to select the applicable duct shape of the first exhaust duct. Press ENTER.

3. Enter the dimensions of the first exhaust duct as prompted. Press ENTER after each dimension is entered.

4. At the Duct Dimensions menu, use the arrow keys to select the applicable duct shape of the second exhaust duct. Press ENTER.

5. Enter the second exhaust duct dimensions as prompted. Press ENTER after each dimension is entered.

NOTE: When entering the LCTLR point for this controller at the field panel, **do not** enter a duct area. (Choose **N** for none when prompted for the duct shape.) This controller does not send an air volume value to the field panel in velocity (FPM). Instead, it sends volume (CFM). Since the field panel does not need to convert FPM into CFM, it doesn't need to know the duct area.

Setting Flow Coefficients

When setting the flow coefficients, set values according to the airflow sensor installed in the terminal. Refer to Table 1. These values may be adjusted later when the controller is calibrated against an independent airflow measurement, usually determined by the air balancer.

Complete the following steps to set the flow coefficient:

1. Set X1 FLO COEF (Point 11) and EX2 FLO COEF (Point 64) to the appropriate values found in Table 1. These values are starting points for the air balancer.

2. Use the following formula to fine-tune the flow coefficient.

   new flow coefficient = (actual volume ÷ controller volume) x old flow coefficient

The actual volume is the actual value obtained from the balancer's measurements. The Controller volume is the value obtained from EX1 VOL (Point 10) and EX2 VOL (Point 63). If the Controller volume is not within 2% of the actual volume, then repeat the procedure until it is within 2%.

NOTE: Even though this controller is an air velocity controller (FPM) and not an airflow controller (CFM), it is still extremely important that the airflow readings (CFM) are accurate. This is because if the airflow readings (CFM) are inaccurate, it is likely that the air velocity readings (FPM) are also inaccurate.

Table 1. Suggested TEC Initial Flow Coefficients for VAV Manufacturer and Box Sizes.

Manufacturer	**Air Velocity Sensor Type**	**Round Duct (Inlet) Sizes in Inches**											
		4	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**20**
Anemostat	PX-2 Cross, “P” range		0.70	0.74	0.75	0.78	0.74	0.81	0.81	0.85	0.80		
Anemostat	Traverse, “H” range		0.70	0.74	0.75	0.78	0.74	0.81	0.81	0.85	0.80		
Anemostat	PX-2 Cross, “Q” range		0.46	0.51	0.56	0.57	0.59	0.60	0.64	0.65	0.72		
Anemostat	Traverse, “L” range		0.46	0.51	0.56	0.57	0.59	0.60	0.64	0.65	0.72		
Carrier	Linear Averaging		0.64	0.64	0.63	0.62	0.62	0.61	0.61	0.58	0.54	0.58	
Carnes	standard sensor		0.70	0.70	0.69	0.68		0.67	0.69	0.69	0.70		
Carnes	Cross-flow Sensor		0.62	0.60	0.65	0.68		0.65	0.68	0.70	0.69		
Continental	AVS model “RSZ”			0.73		0.67		0.72	0.64	0.62	0.57		0.99
E. H. Price	CP101	0.89	0.75	0.64	0.68	0.66	0.72	0.75	0.80	0.85	0.80		
Environmental Tech	sdr, vfr, cfr	0.78	0.79	0.59		0.62		0.64	0.65	0.68	0.66		0.66
H&C/ Tuttle & Bailey/ Siemens	Flo-Cross Sensor	0.59	0.61	0.60	0.56	0.57		0.56	0.60	0.57	0.60	0.58	
H&C/ Tuttle & Bailey/ Siemens	Flo-Cross Sensor with total	0.50	0.50	0.50							0.51		
Krueger	general sensor	0.66	0.66	0.66	0.68	0.70	0.68	0.69		0.67			
Metal Ind. – Fan Powered Only	fvi, fc, sv, rt, th, ct, dd (6 DO)									0.70	0.70		
Metal Ind. – VAV & Dual Duct	fvi, fc, sv, rt, th, ct, dd								0.50				
Metal Ind. – Dual Duct Only	fvi, fc, sv, rt, th, ct, dd			0.74		0.68		0.72					
Nailor Industries	flow sensor	0.63		0.73		0.75		0.64					
Pottorff Inc.	TU-100			0.85		0.95		0.82	0.91	0.89	0.88		
Reddi-I Inc.	Flowmaster			0.66		0.60		0.61	0.55	0.58	0.65		
Titus Inc.	Flowcross	0.79	0.74	0.63	0.61	0.64	0.62	0.63	0.64				
Trane (Rushville)	Air-valve (ring type)		0.58	0.60		0.64		0.65	0.65	0.65			

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Tempmaster/York	All VAV, DD round	0.69	0.69		0.70	0.71		0.65	0.65	0.72	0.73		
Tempmaster/York	All VAV, DD oval												
Warren Tech.	Kreuter SSS series			1.00		1.00		1.00	1.00	1.00	1.00		

NOTE: Reference Voyager for additional flow coefficient information.

Checking Range of Damper Control

NOTE: It is very important to make sure you can reach the velocity set points that are specified.

Open the damper in the first exhaust duct by setting EX1 DMP AO2 (Point 57) to the value stored in EX1 OPEN (Point 22). Verify that EX1 VEL (Point 09) is greater than EX1 VEL STPT (Point 13). After you verify this, release EX1 DMP AO2. If it is not possible for EX1 VEL to reach EX1 VEL STPT, then the fan system for the first exhaust duct must be adjusted.

Repeat this process for the damper in the second exhaust duct by setting EX2 DMP AO3 (Point 58) to the value stored in EX2 OPEN (Point 72). Verify that EX2 VEL (Point 09) is greater than EX2 VEL STPT (Point 66). After you verify this, release EX2 DMP AO3. If it is not possible for EX2 VEL to reach EX2 VEL STPT, then the fan system for the second exhaust duct must be adjusted.

Tuning the Air Velocity Loops

To tune the air velocity loop in the first exhaust duct, change EX1 VEL STPT (Point 13) and examine the response. If the air velocity as measured by EX1 VEL (Point 09) oscillates or overshoots significantly, reduce the gain that is stored in EX1 PGAIN (Point 16). If it takes too long to reach the set point, increase EX1 PGAIN. Try different values; it should move accurately and with stability. When the desired performance is achieved, release the set point. Repeat this process for the air velocity loop in the second exhaust duct by using EX2 VEL STPT (Point 66), EX2 VEL (Point 62), and EX2 PGAIN (Point 69).

Setting the Fail-Safe Positions of the Exhaust Duct Dampers

1. Set EX1 FAIL POS (Point 18) to the desired fixed position for the damper in the first exhaust duct should the air velocity reading (EX1 VEL, Point 09) in the first exhaust duct fail.

2. Set EX2 FAIL POS (Point 71) to the desired fixed position for the damper in the second exhaust duct should the air velocity reading (EX2 VEL, Point 62) in the second exhaust duct fail.

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

The start-up is complete.