SIEMENS

Start-up Procedures for Constant Volume Controller — Pneumatic Output with 1 to 10V Flow Signal

TEC 0204.11

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Verifying Power to Controller

Verify that the Constant Volume Controller – Pneumatic Output with 1-10V Flow Signal is powered up. Remove enclosure cover to view BST LED. 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 *APOGEE Automation Service Procedures* on InfoLink for troubleshooting information.

NOTES:

1. 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.

2. The Controller Interface Software (CIS) used with the Constant Volume Controller — Pneumatic Output with 1 to 10V Flow Signal (firmware revision CN11 or higher) must be Rev. 2.0 or greater. Voyager's point database may also be used for start-up.

Verifying Slave Mode Application Number

1. Verify that APPLICATION (Point 2) is set to **2295** (slave mode).
2. Display the **STARTUP** report.

Setting Damper Default Position

Set DMPR SETUP (Point 62) to the default position of the damper (NCLOSE or NOPEN).

Enabling Autozero Module

If an Autozero Module is used, then enable it by setting CAL MODULE (Point 87) to **YES**.

NOTE: For a controller used without an Autozero Module, the damper is commanded closed to get a zero airflow reading during calibration. For a controller used with an Autozero Module, 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.

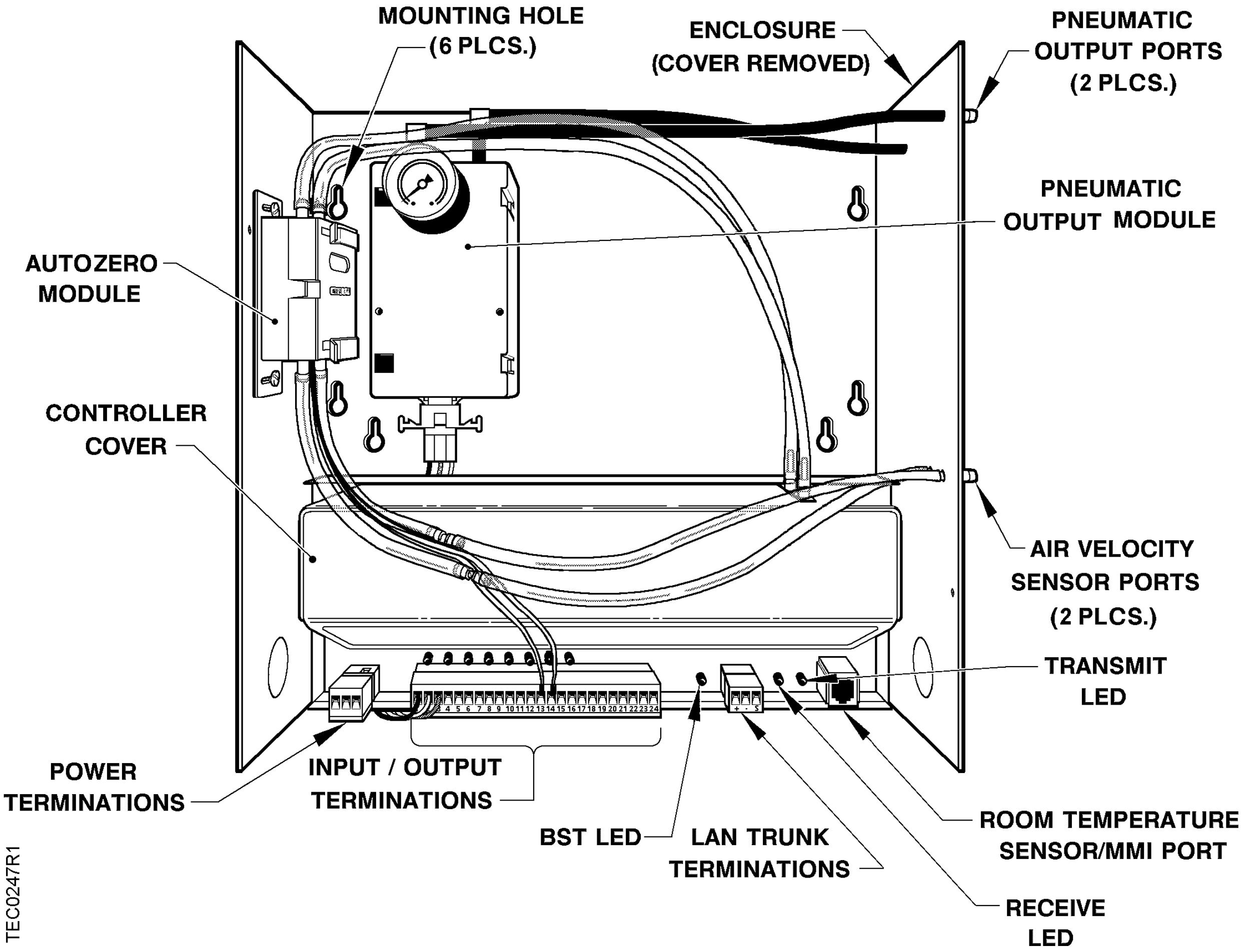

Figure 1. Constant Volume Controller – Pneumatic Output with 1 to 10V Flow Signal.

Selecting Automatic Calibration Option

In order to choose the most efficient method of triggering the calibration routine; follow this procedure to set the CAL SETUP (Point 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 1 that best meets your job requirements.

2. Set CAL SETUP to the value chosen.

Table 1. CAL SETUP Options.

CAL SETUP Options	Description
0	Calibration occurs ONLY when the CAL AIR (Point 94) is set to YES.
1	Calibration occurs when the field panel 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 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 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 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. 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**.

Setting 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 CTLR ADDRESS (Point 01) to the appropriate number. Each controller must have a unique address. Normal values are **00** to **31**, but the controller will accept values as high as 98.

Setting Application

Set APPLICATION (Point 2) to the appropriate Constant Volume Controller — Pneumatic Output with 1 to 10V Flow Signal application. Refer to Table 2 for application names and numbers.

Table 2. Constant Volume Controller — Pneumatic Output with 1 to 10V Flow Signal Applications.

Application	Revision CN11 or higher
Constant Volume Controller – Pneumatic Output with 1 to 10V Flow Signal	2330
Slave Mode	2295

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.

Waiting for Air Velocity Sensor Calibration

The air velocity sensor calibration cycle begins within 3 minutes of an application start-up or initialization, depending on the address. After this delay, the calibration cycle takes 2 minutes to complete. The air damper closes during this first calibration.

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

It is not necessary to wait until the calibration cycle is complete (CAL AIR is set to NO) before continuing with this start-up procedure.1

Setting Override Time

1. Display the **STARTUP** report.
2. If using night/unoccupied override, then 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 control, then enable it by setting the WALL SWITCH (Point 18) to **YES**.

Setting Fail-Safe mode

In the event that either air velocity sensor ceases to function, the 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 UNOCC and OCC Airflow Set Points

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

1. Set UNOCC FLOW to the desired/specified unoccupied airflow set point.
2. Set OCC FLOW to the desired/specified occupied airflow set point.

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

Setting the Duct Area

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. Press **ENTER**. The software prompts you for the dimensions of the duct.
3. Enter the dimensions as prompted. Press **ENTER** after each dimension you enter.

   NOTE: When entering the LCTLR point for a Constant Volume Controller — Pneumatic Output with 1 to 10V Flow Signal 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.

Setting Flow Coefficient

1. Display the **BALANCING** report.
2. Set FLOW COEFF (Point 36) to the appropriate value found in *Table 3, 4*, or *5*. This value is a starting point for the air balancer.
3. To fine tune the flow coefficient use the following formula:

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

Table 3. Suggested TEC Initial Flow Coefficients for VAV Manufacturer and Box Sizes.

	Air velocity sensor type	Round ductwork (inlet) sizes in inches.												
		4	5	6	7	8	9	10	12	14	16	18	19	20
Anemostat	PX-2 cross, "P" range		0.77	0.74	0.75	0.78	0.74	0.81	0.81	0.85	0.80			
Anemostat	Traverse, "H" range		0.77	0.74	0.75	0.78	0.74	0.81	0.81	0.85	0.80			
Anemostat	PX-2 cross, "Q" range		0.56	0.51	0.56	0.57	0.59	0.60	0.64	0.65	0.72			
Anemostat	Traverse, "L" range		0.51	0.51	0.56	0.57	0.59	0.60	0.64	0.65	0.72			
Carrier	Linear averaging	0.75	0.71	0.64	0.63	0.62	0.62	0.61	0.61	0.58	0.54	0.58		
Carnes	"Standard sensor"		0.77	0.70	0.69	0.68		0.67	0.69	0.69	0.70			
Carnes	"Cross-flow sensor"		0.68	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	0.99
E.H. Price	CP101	1.04	0.83	0.64	0.68	0.66	0.72	0.75	0.80	0.85	0.80			
Environmental Tech.	sdr, vfr, cfr	0.79	0.78	0.59		0.62		0.64	0.65	0.66	0.66		0.59	0.66
Tuttle & Bailey/ SIEMENS	"Flo-cross" sensor (supply)	0.69	0.67	0.60	0.56	0.57		0.56	0.60	0.57	0.60	0.58		
Tuttle & Bailey/ SIEMENS	Flo-cross w/ total	0.59	0.55	0.50							0.51			
Tuttle & Bailey/ SIEMENS	Orifice ring flow sensor (exhaust)	0.70		0.70		0.75		0.75	0.67	0.67	0.67			
Krueger	General sensor	0.77	0.73	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 (6 DO)								0.50					
* Metal Ind. Dual duct only	fvi, fc, sv, rt, th, ct, dd (8 DO)			0.74		0.68		0.72						
Nailor Industries	Flow sensor	0.74		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	0.92	0.81	0.63	0.61	0.64	0.62	0.63	0.64					
Trane (Rushville)	Air-valve (ring type)		0.64	0.60		0.64		0.65	0.65	0.65				
Tempmaster/York	All VAV, DD round	0.81	0.76		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			

* Inlet "Low Flow" air sensors should not be used if flow is less than 300 FPM.

NOTE: Refer to Voyager for additional flow coefficient information.

Table 4. Suggested TEC Initial Flow Coefficients for VAV manufacturer and Box Sizes.

	Air velocity sensor type	Rectangular ductwork (inlet) sizes in inches													
		4x7	4x10	6x9	6x12	6x15	8x11	8x14	8x17	8x20	8x24	9x12	9x14	19(-3)	22(-3)
Anemostat	PX-2 cross, "P" range														
Anemostat	Traverse, H" range														
Anemostat	PX-2 cross, "Q" range														
Anemostat	Traverse, "L" range														
Carrier	Linear averaging														
Carnes	"Standard sensor"											0.68			
Carnes	"Cross-flow sensor"											0.65			
Continental	AVS model "RSZ"														
E.H. Price	CP101														
***Environmental Tech.	sdr, vfr, cfr													0.61	0.64
Krueger	General sensor														
Metal Ind. Fan powered only.	Fvi ,fc, sv, rt, th, ct, dd														
	(6 DO)														
Metal Ind. VAV & dual duct.	fvi, fc, sv, rt, th, ct, dd														
	(6 DO)														
* Metal Ind. Dual duct only.	fvi, fc, sv, rt, th, ct, dd														
	(8 DO)														
Nailor Industries	Flow sensor														
Pottorff Inc.	TU-100														
Reddi-I-Inc.	Flowmaster														
Titus Inc.	Flowcross														
Trane (Rushville)	Air-valve (ring type)														
Tempmaster/York	All VAV, DD round														
**Tempmaster/York	All VAV, DD Oval	0.72	0.73	0.73	0.73	0.72	0.73	0.74	0.72	0.72	0.74				
Warren Tech.	Kreuter SSS series														

* Inlet "Low Flow" air sensors should not be used if flow is less than 300 FPM.

** Tempmaster oval duct area and COF were calculated as rectangular duct shapes.
***ETI 19" has a rectangular area of 2.72 sq/ft. ETI 22" (32.25" x 15.875") rectangular area is 3.555 sq/ft.

NOTE: Refer to Voyager for additional flow coefficient information.

Table 5. Suggested TEC Initial Flow Coefficients for VAV manufacturer and Box Sizes.

	Air velocity sensor type	Rectangular ductwork (inlet) sizes In Inches									Oval sizes		
		12x14	12x16	12x18	12x28	12x24	16x18	16x24	16x28	20x26	12"	14"	16"
Anemostat	PX-2 cross, "P" range							0.79					
Anemostat	Traverse, "H" range												
Anemostat	PX-2 cross, "Q" range												
Anemostat	Traverse, "L" range												
Carrier	Linear averaging												
Carnes	"Standard sensor"						0.68	0.75					
Carnes	"Cross-flow sensor"						0.70	0.75					
Continental	AVS model "RSZ"												
E.H. Price	CP101		0.76					0.76					
Krueger	General sensor							0.71					
Metal Ind. Fan powered only.	fvi, fc, sv, rt, th, ct, dd												
	(6 DO)												
Metal Ind. VAV & dual duct.	fvi, fc, sv, rt, th, ct, dd	0.56	0.57	0.58	0.62	0.57				0.58	0.50	0.70	0.70
	(6 DO)												
* Metal Ind. Dual duct only	fvi, fc, sv, rt, th, ct, dd									0.60	0.64	0.67	0.68
	(8 DO)												
Nailor Industries	Flow sensor										0.58	0.63	0.68
Pottorff Inc.	TU-100							0.80					
Reddi-I-Inc.	Flowmaster												
Titus Inc.	Flowcross												
Trane(Rushville)	Air-valve (ring type)												
Tempmaster/York	All VAV, DD round												
**Tempmaster/York	All VAV, DD Oval												
Warren Tech.	Kreuter SSS series												

* Inlet "Low Flow" air sensors should not be used if flow is less than 300 FPM.

** Tempmaster oval duct area and COF were calculated as rectangular duct shapes.

NOTE: Refer to Voyager for additional flow coefficient information.

Setting Flow Range

Set the FLOW RANGE (Point 16) to the CFM value that will correspond to 10V on the 1 to 10V output flow signal. 1 volt corresponds to 0 CFM.

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.

The start-up is complete.