SIEMENS

Start-up Procedures for TEC Custom Solutions VAV Series Fan Powered Cooling Only Controller — Electronic Output

TEC 0136.11

Table of Contents

Verifying Power to the Controller

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 Manual* in InfoLink for troubleshooting information.

NOTES:

1. 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.

2. The Controller Interface Software (CIS) used with the VAV Series Fan Powered, Cooling Only Controller – Electronic Output (firmware revision VG11) must be Rev. 2.0 or greater. Voyager's point database can also be used for start-up.

Enabling the Damper Actuator

Using the portable operator's terminal, follow these steps to set the damper actuator run time:

1. Verify that APPLICATION (Point 2) is set to 2091 (slave mode).

2. Display the STARTUP report.

3. Set MTR1 TIMING (Point 51) to the correct run time of the actuator. Refer to Table 1.

Table 1. Damper Actuator Run Time.

Possible Damper Actuators	Setting (seconds)	
	50 Hz	60 Hz
349-0101	106	88
GDE 131.1U	108	90
GDE 131.1P	108	90
GLB 131.1P	150	125
[1]GBB 171.1U	150	150
[2]GDE 161.1P	108	90
[2]GLB 161.1P	150	125

[1] GBB 171.1U run time is independent of Hz.
[2] Analog output 0-10V.

See the Manufacturer's Installed Controls (MIC) web page on Landscape (http://landscape.us.abatos.com/mic/) for specific manufacturers' damper opening details (90°/60°/etc.).

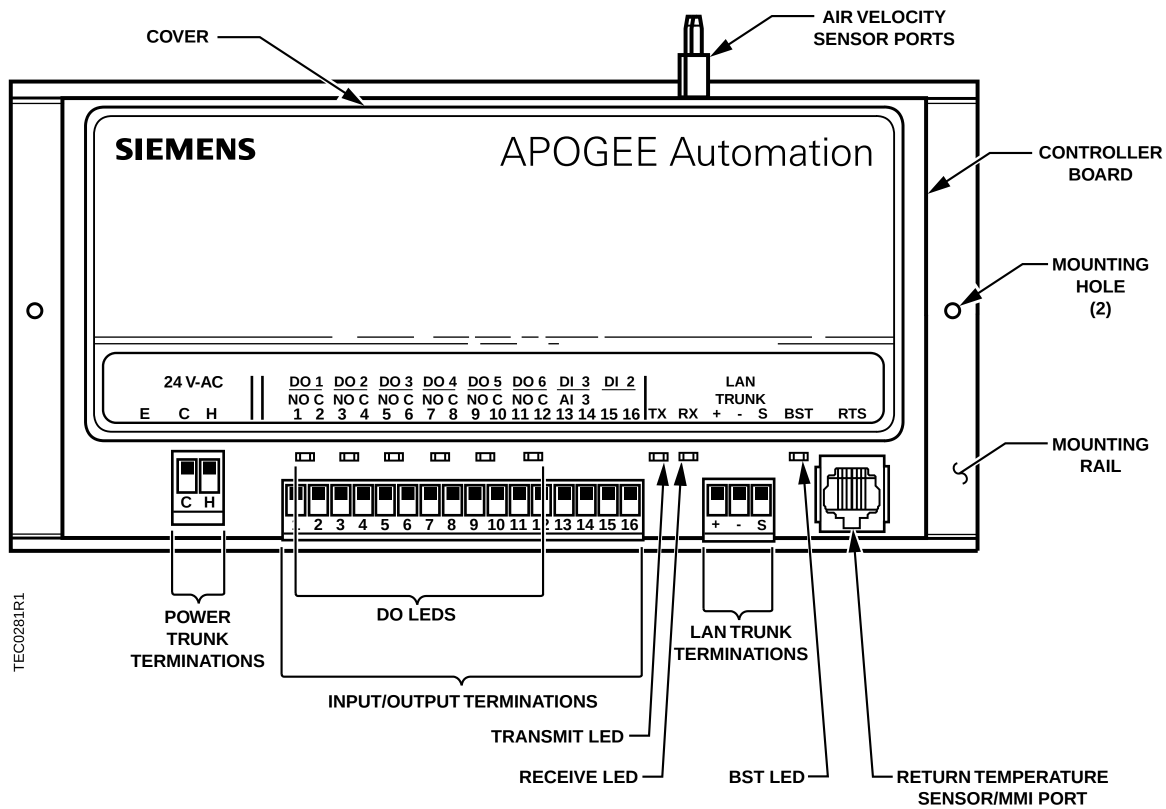

Figure 1. VAV Series Fan Powered Cooling Only Controller – Electronic Output.

4. If the damper rotation angle is a value other than 90°, then set DMPR ROT ANG (Point 56) to the appropriate value.

5. Enable the damper actuator by setting MTR SETUP (Point 58) to 1. Verify that the damper closes completely. If it does not close completely, reverse the action of the damper actuator by setting MTR SETUP to **3**.

If the damper still does not close completely, then the actuator has been installed or set up incorrectly. Refer to the damper actuator installation instructions, set up information, Table 2, or the *APOGEE Automation Service Procedures Manual* in InfoLink for more information.

Table 2. Motor Enable/Reverse Values for MTR SETUP (Point 58).

	Motor 1 Not Used	Motor 1 Enabled	Motor 1 Enabled and Reversed
Motor 2 Not Used	0	1	3
Motor 2 Enabled	4	5	7
Motor 2 Enabled and Reversed	12	13	15

Enabling the Motor 2 Actuator (optional)

If applicable, follow these steps to enable the motor 2 actuator. Even though Application 2401 does not use this actuator, you might want to use it as a spare valve for other purposes. If so, you must unbundle MTR2 COMD (Point 52) at a field panel and control this motor through PPCL.

1. Set MTR2 TIMING (Point 55) to the correct run time of the motor 2 actuator. Refer to Table 3.

Table 3. Valve Actuator Run Time.

Possible Valve Actuators	**Setting (seconds)**	
	50 Hz	**60 Hz**
SSB81U (Powermite – MZ Series)	180	150
SQS 82	155	130
SQS 65U (analog output 0-10V)	35	30
SQS 65.5U (analog output 0-10V)	35	30
SSB 61U (analog output 0-10V)	N/A	150

2. Enable the motor 2 actuator by changing MTR SETUP (Point 58) as follows:
   - If a damper actuator is present and is enabled (MTR SETUP = 1), then enable the motor 2 actuator by changing MTR SETUP to **5**.
   - If a damper actuator is present, enabled, and reverse acting (MTR SETUP = 3), then enable the motor 2 actuator by changing MTR SETUP to **7**.
3. Verify that the valve being controlled by motor 2 closes and remains closed. If the valve does not close, then reverse the action of the motor 2 actuator by changing MTR SETUP as follows:
   - If the damper actuator is enabled, then change MTR SETUP to **13**.
   - If the damper actuator is enabled and reverse acting, then change MTR SETUP to **15**.

Setting the Application

NOTE: If you are going to enter an LCTLR point at the field panel, then keep track of the application, override time, controller address, duct shape, and duct dimensions you enter at the portable operator’s terminal. You will be required to enter these values again at the field panel.

Set APPLICATION (Point 2) to the appropriate application. Refer to Table 4 for application names and numbers.

Table 4. VAV Series Fan Powered Cooling Only Controller – Electronic Output Applications.

Application	Revision VG11 or Higher
VAV Series Fan Powered Cooling Only	2401
Slave Mode	2091

After you set the application, the controller goes 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 the Air Velocity Sensor Calibration

The air velocity sensor calibration cycle takes from 2 to 5 minutes to complete. The air damper closes during calibration to get a zero airflow reading across the air velocity sensor.

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**.

Wait until the calibration cycle is complete (CAL AIR is set to **NO**) before continuing with this start-up procedure.

Selecting the Automatic Calibration Option

In order to choose the most efficient method of triggering the calibration routine, follow this procedure to set 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. Display the first report in the REPORTS selection box. (The report is named "VAV SF CLG.")

2. Select the automatic calibration option desired from Table 5 that best meets your job requirements.

3. Set CAL SETUP to the desired value.

Table 5. 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 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 and the remainder is the time delay in minutes. **Example:** If CTLR ADDRESS = 11, then the controller waits 3 minutes (11 ÷ 4 = 2 **R3**) after it receives the 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. Refer to the example in Option 1.

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 the Return Air Temperature Set Points

Follow these steps to set the return air temperature set points:

1. Display the SETPOINTS report.
2. Set the following set points to their desired values:
   - DAY CLG STPT (Point 6)
   - NGT CLG STPT (Point 8)

Setting MIN DIS STPT and MAX DIS STPT

Determine the minimum discharge air temperature set point and enter this value into MIN DIS STPT (Point 9). (Note: The discharge duct is the duct leaving the series fan.) Determine the maximum discharge air temperature set point and enter this value into MAX DIS STPT (Point 10).

NOTE: Do not set DISCH STPT (Point 7). Application 2401 varies the value of DISCH STPT automatically during normal operation (between the values of MIN DIS STPT and MAX DIS STPT).

Setting the Controller Address

Set the controller address by setting CTLR ADDRESS (Point 1) to the appropriate number.

Setting the Duct Area

Set the duct area 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. 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.

Setting the Flow Coefficient

Follow these steps to set the flow coefficient:

1. Display the BALANCING report.
2. Set FLOW COEFF (Point 36) to the appropriate value found in Tables 6 through 8. This value is a starting point for the air balancer.

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 6. 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
H&C/Tuttle & Bailey	"Flo-cross" sensor	0.69	0.67	0.60	0.56	0.57		0.56	0.60	0.57	0.60	0.58		
H&C/Tuttle & Bailey	Flo-cross w/ total	0.59	0.55	0.50							0.51			
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									0.70	0.70			
	(6 DO)													
Metal Ind. VAV & dual duct.	fvi, fc, sv, rt, th, ct, dd								0.50					
	(6 DO)													
* Metal Ind. Dual duct only	fvi, fc, sv, rt, th, ct, dd			0.74		0.68		0.72						
	(8 DO)													
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.

Table 7. 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
H&C/Tuttle & Bailey	"Flo-cross" sensor														
H&C/Tuttle & Bailey	Flo-cross w/ total.														
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.

Table 8. 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					
H&C/Tuttle&Bailey	"Flo-cross" sensor												
H&C/Tuttle&Bailey	Flo-cross w/ total												
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.

Setting MAX CFM Airflow Upper Limit

Set MAX CFM (Point 32) to the desired maximum airflow for the supply duct. (Note: The supply duct is the duct that comes from the central AHU and ends at the entrance to the series fan. This is the duct that the air velocity probe is located in.)

CAUTION:

It is strongly recommended that you set MAX CFM to a high enough value such that the supply airflow is not greater than MAX CFM when the supply air damper is at minimum position.

Setting the Supply Air Damper Minimum Position

Follow these steps to set the supply air damper minimum position:

1. Display the STARTUP report.
2. If the minimum position for the supply air damper is a value other than the default value of 0 %, then set DMPR MIN POS (Point 50) to the desired value.

CAUTION:

It is strongly recommended that you set DMPR MIN POS to a low enough value such that the supply airflow is not greater than MAX CFM (Point 32) when the supply air damper is at minimum position.

Setting OFFSET

Application 2401 reduces airflow in the supply duct when it rises above CTL FLOW MAX (Point 77). The speed at which this happens depends on the value of OFFSET (Point 34). The larger the value of OFFSET, the faster the supply airflow will be reduced when it is too high. Set OFFSET to the desired value.

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.