SIEMENS

Start-up Procedures for TEC Custom Solutions Application 2452

VAV with Modified Parallel Fan Sequence and Electric Reheat

TEC 0168.11

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Verifying Power to Controller

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

See the *Manufacturer's Installed Controls* (MIC) web page if necessary for specific manufacturers' information (http://iknow.us.abatos.com/MIC/default.asp).

Verify that the controller has 24 Vac power and that the Basic Sanity Test (BST) LED (Figure 1) flashes once per second. If the BST LED does not flash once per second, see the *APOGEE Automation Service Procedures* in InfoLink for troubleshooting information.

Enabling Damper Actuator

1. Verify that APPLICATION (Point 02) is set to **2091** (slave mode).
2. Display the STARTUP report.
3. Set MTR1 TIMING (Point 51) to the correct running time of the actuator. See Table 1.

Table 1. Damper Actuator Run Time.

Damper Actuator	Setting (seconds)	
	50 Hz	60 Hz
349-0100	113	90
SQR 81.1	155	130
GDE 131.1U	108	90
GBB 171.1U	150	150*

*GBB 171.1U run time is independent of Hz.

4. If the damper rotation angle is a value other than 90°, then set DPR1 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, try reversing its action by setting MTR SETUP to **3**.

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

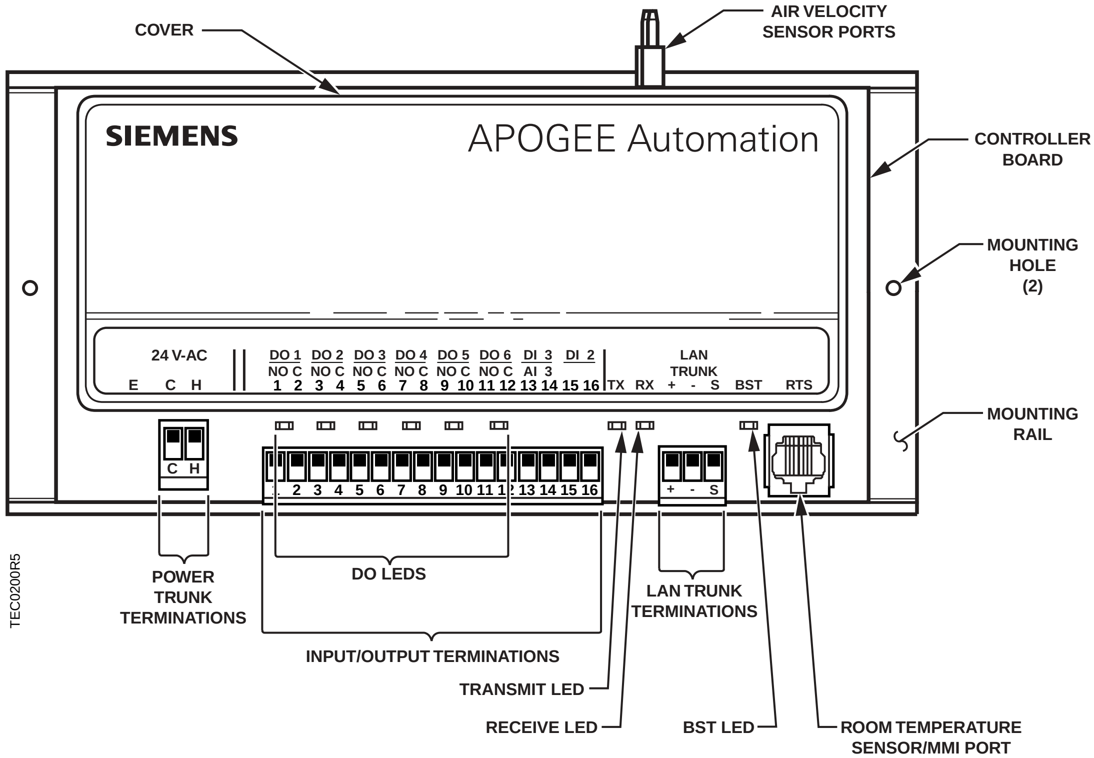

Figure 1. VAV Terminal Box Controller with Modified Parallel Fan Sequence and Electric Reheat.

Setting the Application Number

NOTE: If you are going to enter an LCTLR point at the field panel, 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 02) to **2452**.

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 calibration cycle lasts 2 to 5 minutes.

CAL AIR (Point 94) is automatically set to YES at the start of calibration. You must wait until the calibration cycle is complete (CAL AIR automatically returns to NO) before continuing with the following procedures.

Selecting 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 will be named *VAV ERH PF* in Application 2452.)

2. Select the automatic calibration option value from Table 2 that best meets your job requirements and set CAL SETUP to this option value.

Table 2. CAL SETUP Option Values.

Option	
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 when you divide CTLR ADDRESS (Point 01) 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 day/night mode changeover command before beginning the calibration routine.
2	Calibration occurs immediately after the override switch is pressed.
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.

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 Room Temperature Setpoints

1. Display the SETPOINTS report.

2. If the room temperature sensor has a setpoint dial, and if RM STPT DIAL (Point 13) will be used by the controller, set STPT DIAL (Point 14) to **YES**; otherwise, set STPT DIAL to **NO**. (If STPT DIAL is set to YES, then DAY HTG STPT (Point 07) and DAY CLG STPT (Point 06) are not used. Instead, the value of RM STPT DIAL is used.)

3. If there is no setpoint dial on the room temperature sensor, verify that STPT DIAL is set to NO and set the following points to the appropriate values:
   - DAY CLG STPT (Point 06)
   - DAY HTG STPT (Point 07)
   - NGT CLG STPT (Point 08)
   - NGT HTG STPT (Point 09)
4. If the room temperature sensor has a setpoint dial and the setpoint dial is to be used, set RM STPT MIN (Point 11) and RM STPT MAX (Point 12) for the minimum and maximum allowable room temperature setpoint values, respectively. Valid values range from 55°F to 95°F (13°C 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.

Setting Override Time

1. Display the STARTUP report.
2. If using night override, set OVRD TIME (Point 20) to the number of whole hours an override should last. If set at zero (the default), then night override is disabled.

Setting Controller Address

Set CTLR ADDRESS (Point 1) to the correct value obtained from the controller schedule. Each controller must have a unique address. Normal values are **00** to **31**, but the controller will accept values as high as 98.

Configuring the Parallel Fan

If you want the parallel fan of Application 2452 to behave exactly as the parallel fan of Application 2026 (*VAV Parallel Fan Powered with Electric Reheat*), then set PARALLEL OFF (Point 30) to a value greater than the value of PARALLEL ON (Point 28). (With the fan configured in this way, Application 2452 functions exactly like Application 2026.)

If you want the parallel fan to be the first stage of heating, then do the following three things:

1. Set PARALLEL ON (Point 28) greater than PARALLEL OFF (Point 30).
2. Set REHEAT START (Point 22) greater than PARALLEL ON.
3. Set REHEAT END (Point 23) greater than REHEAT START.

NOTE: In Application 2452, default values for these points are set up this way.

Set 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.

Setting Duct Area

Set the duct area by following these steps:

1. Display the Duct Dimensions Menu.
2. Select and enter the applicable duct shape.
3. Enter the duct dimensions.

Setting 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 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%.

NOTE: It is **extremely important** that the TEC volume be within 5% of the actual volume.

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
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 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
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" × 15.875") rectangular area is 3.555 sq/ft.

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					
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 MIN and MAX Airflow Setpoints

The maximum flow must be greater than or equal to the minimum flow.

1. Set CLG FLOW MIN (Point 31) to the desired minimum cooling airflow setpoint.
2. Set CLG FLOW MAX (Point 32) to the desired maximum cooling airflow setpoint.
3. Set HTG FLOW MIN (Point 33) to the desired minimum heating airflow setpoint.
4. Set HTG FLOW MAX (Point 34) to the desired maximum heating airflow setpoint.

Enabling Wall Switch

If a wall switch is used for day/night control, then enable it by setting WALL SWITCH (Point 18) to **YES**.

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

Start-up is complete.