SIEMENS

Controller Start-up for Custom Solutions Application 2417

Constant Volume with Hot Water Reheat and 4-20mA Temperature Input

TEC 0905-2.11

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Verifying Power

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, refer to the *APOGEE Automation Service Procedures* (125-3013) on InfoLink for troubleshooting information.

NOTES: The Controller Interface Software (CIS) must be Rev. 2.0 or greater.

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 tuning, etc.

Verifying Slave Mode

1. Verify that APPLICATION (Point 2) is set to 2482 (slave mode).
2. Display the STARTUP report.

Setting Motor Timing and Damper Actuator Rotation Angle

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

1. Use Table 1 to set MTR1 TIMING.
2. If the damper rotation angle is a value other than 90°, then set DPR1 ROT ANG (Point 56) to the appropriate value.

Table 1. Damper Actuator Run Time.

Damper Actuator	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.

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

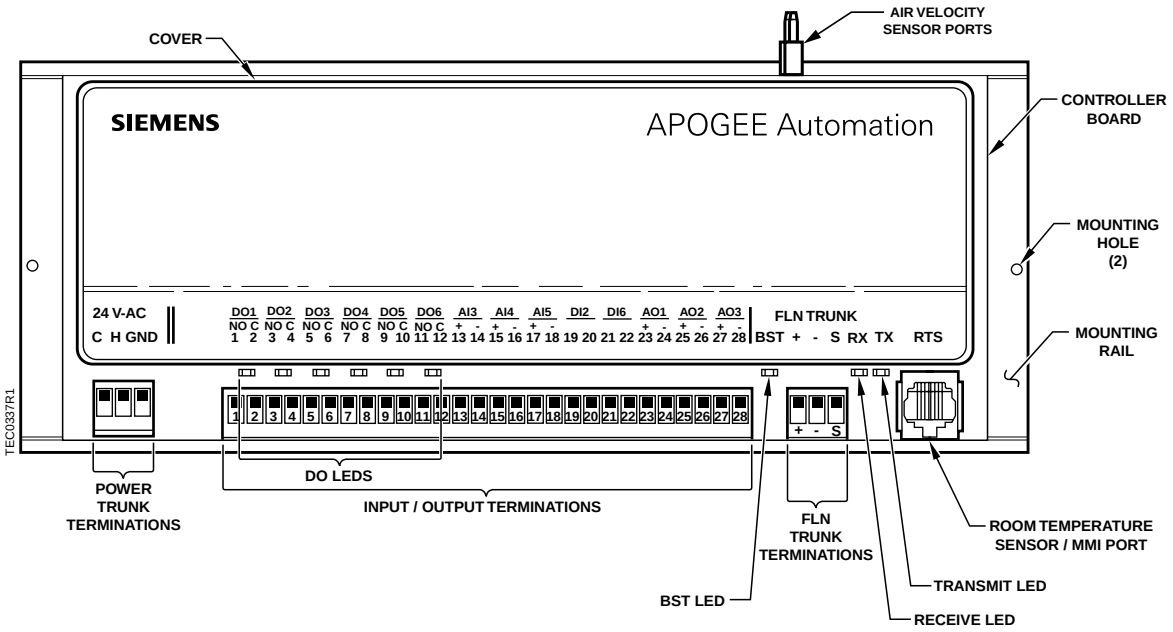

Figure 1. Constant Volume Controller with Hot Water Reheat and 4-20mA Temperature Input.

3. Use Table 2 to set MTR2 TIMING.

Table 2. Valve Actuator Run Time.

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

Enabling Actuators

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

Standard Configuration – Table 3 shows the most common configuration of Application 2417. If this is your configuration, set MTR SETUP to 13. (Calibration occurs when MTR SETUP is changed. If you configure MTR SETUP to 13, wait until calibration finishes before proceeding to the next section, *Verifying Actuator Setup.)*

Table 3. Common Configuration and MTR SETUP (Point 58) Value.

Application	Motor 1	Motor 2	Value for MTR SETUP
2417	damper (normally closed)	heating valve (normally open)	13

Non-Standard Configuration – If your application will not use the configuration in Table 3, refer to Table 4 to set MTR SETUP as follows:

1. Choose the column in Table 4 that corresponds to how Motor 1 will be used in your application.

2. Choose the row in Table 4 that corresponds to how Motor 2 will be used in your application.

3. Set MTR SETUP to the value in the row and column you have chosen.

When MTR SETUP is changed, all enabled actuators will calibrate. Wait until each actuator has completed its calibration.

Table 4. 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

Verifying Actuator Setup

Command all actuators closed. Verify that they close and remain closed as follows:

- If Motor 1 is enabled and the actuator on Motor 1 does not close, then reverse the action of that actuator by adding the value 2 to MTR SETUP (Point 58).

- If Motor 1 is enabled and reversed and the actuator on Motor 1 does not close, then reverse the action of that actuator by subtracting the value 2 from MTR SETUP.

- If Motor 2 is enabled and the actuator on Motor 2 does not close, then reverse the action of that actuator by adding the value 8 to MTR SETUP.

- If Motor 2 is enabled and reversed and the actuator on Motor 2 does not close, then reverse the action of that actuator by subtracting the value 8 from MTR SETUP.

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 4, or the *APOGEE Automation Service Procedures* (125-3013) on InfoLink for more information.

Enabling Autozero Module

If an Autozero Module is used, 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 initialization or power up. 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 an Autozero Module.

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

2. Set CAL SETUP to the value chosen.

Setting Controller Address

NOTE: If you are going to enter an LCTLR point at the field panel, then keep track of the controller address, application, override time, and duct area 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.

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 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 depressed.
4 (factory default value)	Calibration occurs on the time interval set in CAL TIMER (Point 96). For example, if CAL TIMER = 12, 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 Application

Set APPLICATION (Point 2) to 2417.

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 damper closes during this first calibration.

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.

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.

Setting Override Time

1. Display the STARTUP report.

2. If using 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 unoccupied override is disabled.

Setting UNOCC and OCC Airflow Set Points

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

1. Set OCC FLOW to the desired occupied airflow set point.

2. Set UNOCC FLOW to the desired unoccupied airflow set point.

Enabling Wall Switch

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

Setting Fail-Safe Mode

In the event the air velocity sensor ceases to function, 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 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 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 Room Temperature Set Points

1. Display the SETPOINTS report.

2. If the room temperature sensor has a set point dial, and if RM STPT DIAL (Point 13) is to be used by the controller, then set STPT DIAL (Point 14) to YES; otherwise, set STPT DIAL to NO.

NOTE: If STPT DIAL is set to YES, then OCC CLG STPT (Point 6) and OCC HTG STPT (Point 7) will not be used. Instead, the value of RM STPT DIAL will be used in occupied mode.

3. If the room temperature sensor has a set point dial and the set point dial is to be used, then set RM STPT MIN (Point 11) and RM STPT MAX (Point 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 (Point 6)
- OCC HTG STPT (Point 7)
- UOC CLG STPT (Point 8)
- UOC HTG STPT (Point 9)

Setting Flow Coefficient

1. Display the BALANCING report.

2. Set FLOW COEFF (Point 36) to the appropriate value found in Table 7. This value is a starting point for the air balancer.

3. 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 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 5. Suggested TEC Initial Flow Coefficients for VAV Manufacturer and Box Sizes.
Refer to Voyager for additional flow coefficient information.

	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**									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 6. Suggested TEC Initial Flow Coefficients for VAV Manufacturer and Box Sizes.
Refer to Voyager for additional flow coefficient information.

	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.

Table 7. Suggested TEC Initial Flow Coefficients for VAV Manufacturer and Box Sizes.
Refer to Voyager for additional flow coefficient information.

	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: 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 Custom Solution Constant Volume Controller start-up is complete.