SIEMENS

Start-up Procedures for Constant Volume and Room Pressurization Controllers with 2-Inch Water Column Measurement Range — Electronic Output

TEC 0831.11a

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Constant Volume Controller with 2-Inch Water Column Measurement Range — Electronic Output

Overview

This section presents start-up procedures for a Constant Volume Controller with 2-Inch Water Column Measurement Range — Electronic Output. Refer to *Figure 1*.

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.

Verifying Power to Controller

Verify that the controller is powered up. 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 *APOGEE Automation Service Procedures* on InfoLink for troubleshooting information.

NOTE: The Controller Interface Software (CIS) used with the Constant Volume Controller with 2-Inch Water Column Measurement Range — Electronic Output (firmware Revision CA10 or higher), must be Revision 2.0 or greater. Voyager's point database may also be used for start-up.

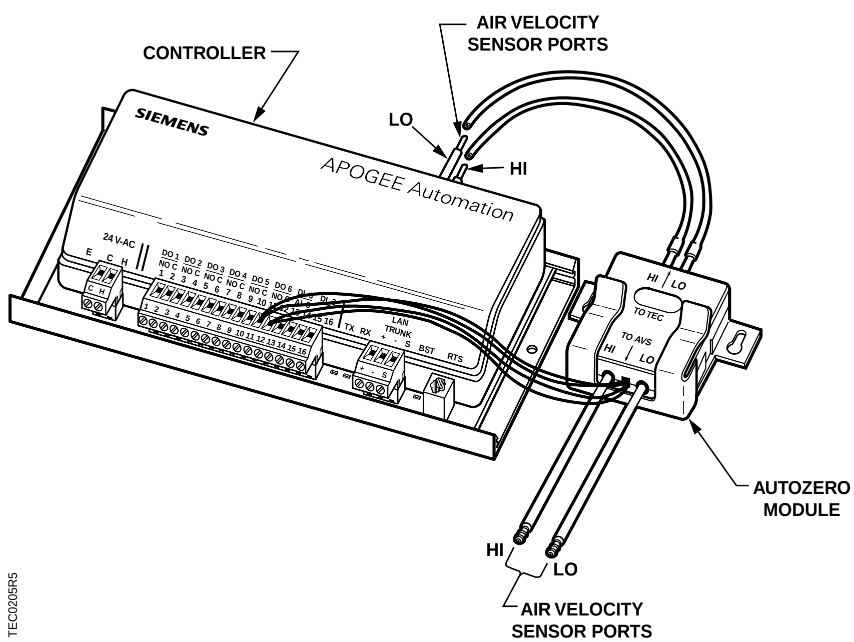

Figure 1. Constant Volume Controller with 2-Inch Water Column Measurement Range — Electronic Output. (Shown with Optional Autozero Module.)

Verifying Slave Mode Application Number

1. Verify APPLICATION (Point 2) is set to **2092** (slave mode).
2. Display the **STARTUP** report.

Setting Motor Timing and Damper Actuator Rotation Angle

The run time of each actuator is indicated by MTR1 TIMING (Point 51) and MTR2 TIMING (Point 55).

Follow these steps to set the point(s) for motor timing:

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.
3. If Motor 2 is a valve actuator, then use Table 2 to set MTR2 TIMING.

Table 1. Damper Actuator Run Time.

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

Table 2. Valve Actuator Run Time.

Valve Actuators	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

The 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 contains values for the most common configurations based on each application.

NOTE: The assumptions for the values in Table 3 are:

- Dampers are Normally Closed (NC)
- Hot water valves are Normally Open (NO)

1. Find the application you are using in Table 3.
2. Set MTR SETUP to the value given for that application.

Table 3. MTR SETUP (Point 58) Value for Most Common Configurations.

Application	Configurations		Value for MTR SETUP
	Motor 1	Motor 2	
2430	damper (normally closed)	not used	1
2432	damper (normally closed)	not available	1
2433	damper (normally closed)	heating valve (normally open)	13

Non-Standard Configuration – If your application does not use one of the listed configurations in Table 3, if one of your actuators has a different normal position than that listed in Table 3, or if you want to use a spare motor, then 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* on InfoLink for more information.

Enabling Autozero Module (optional)

If an Autozero Module is used, then enable it by setting the point CAL MODULE (number 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.

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 OCC.UNOCC (Point 29) 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. 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 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. 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 Points. 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, 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.

Setting Application

Set APPLICATION (Point 2) to the appropriate Constant Volume Controller application. Refer to Table 6 for application names and points.

Table 6. Constant Volume Controller with 2-Inch Water Column Measurement Range – Electronic Output Applications.

Application	Revision CS10 or higher
Constant Volume Cooling Only with 2-Inch Water Column Measurement Range	2430
Constant Volume Electric Reheat with 2-Inch Water Column Measurement Range	2432
Constant Volume Hot Water Reheat with 2-Inch Water Column Measurement Range	2433
Slave Mode	2092

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

Follow these steps to set the 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

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

Follow these steps to set the unoccupied and occupied airflow set points:

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

If 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 Stages of Electric Heat

Application 2432: Check the hardware to verify of stages of electric heat wired to the controller at DO 3, DO 4, and DO 5. Set STAGE COUNT (Point 88) to this value.

Setting 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.

NOTE: When entering the LCTLR point for a Constant Volume Controller with Two-Inch Water Column Measurement Range 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

Applications 2432 and 2433: Follow these steps to set the 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. 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**.

5. 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

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 7* through *9*. This value is a starting point for the air balancer.

3. Fine-tune the flow coefficient using 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%.

After completing this step, the Start-up will be complete.

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.

Table 7. 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 8. 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 9. 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.

Room Pressurization Controller with 2-Inch Water Column Measurement Range — Electronic Output

Overview

This section presents start-up procedures for a Room Pressurization Controller with 2-Inch Water Column Measurement Range — Electronic Output. Refer to *Figure 2*.

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.

Verifying Power to Controller

Verify that the controller is powered up. 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 *APOGEE Automation Service Procedures* on InfoLink for troubleshooting information.

NOTE: The Controller Interface Software (CIS), used with the Room Pressurization Controller with 2-Inch Water Column Measurement Range — Electronic Output (firmware Revision RF10 or higher), must be Revision 2.0 or greater. Voyager's point database may also be used for start-up.

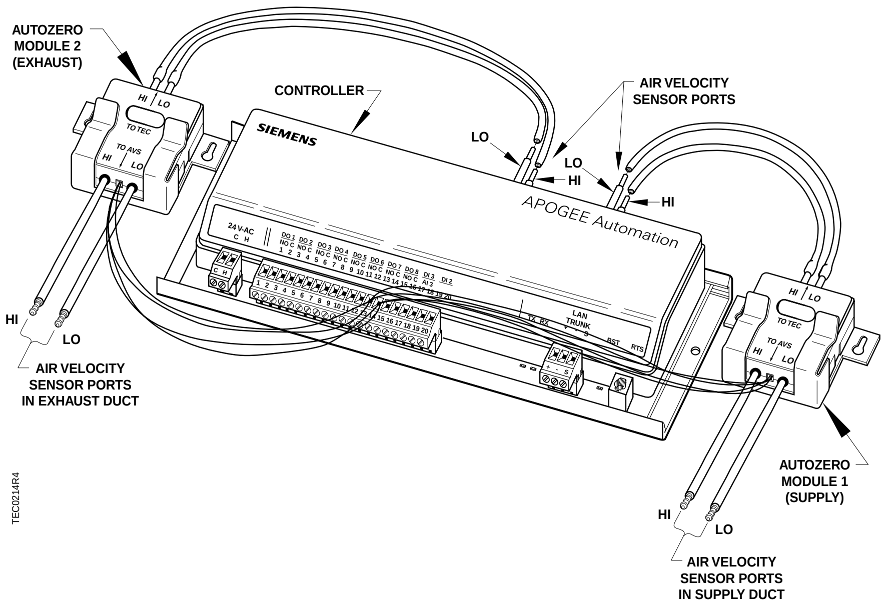

Figure 2. Room Pressurization Controller with 2-Inch Water Column Measurement Range — Electronic Output. (Shown with Optional Autozero Modules.)

Verifying Slave Mode Application Number

1. Verify that APPLICATION (Point 2) is set to **2293** (slave mode).
2. Display the **STARTUP** report.

Setting Motor Timing and Damper Actuator Rotation Angle

The run time of each actuator is indicated by MTR1 TIMING (Point 51), MTR2 TIMING (Point 55), and MTR3 TIMING (Point 39).

Follow these steps to set the point(s) for motor timing:

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

1. If Motor 1 and Motor 2 are damper actuators, then use Table 8 to set MTR1 TIMING and MTR2 TIMING.
2. If the damper rotation angles are values other than 90°, then set DPR1 ROT ANG (Point 56) and DPR2 ROT ANG (Point 57) to the appropriate values.
3. If Motor 3 is a valve actuator, then use Table 9 to set MTR3 TIMING.

Table 8. Damper Actuator Run Time.

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

Table 9. Valve Actuator Run Time.

Valve Actuators	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 Autozero Modules (optional)

If Autozero Modules are used, then enable them by setting the point CAL MODULE (number 87) to **YES**.

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

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 10 that best meets your job requirements.

2. Set CAL SETUP to the value chosen.

Table 10. 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 an occupied/unoccupied or 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. 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 occupied/unoccupied or 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. 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 Points. 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 Room Pressurization Controller with 2-Inch Water Column Measurement Range – Electronic Output application. Refer to *Table 11* for application names and points.

Table 11. Room Pressurization Controller with 2-Inch Water Column Measurement Range – Electronic Output.

Application	Revision RF10 or higher
Variable Air Volume Room Pressurization with Hot Water Reheat and 2-Inch Water Column Measurement Range	2416
Constant Volume Room Pressurization with Hot Water Reheat and 2-Inch Water Column Measurement Range	2418
Slave Mode	2293

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 two to five minutes to complete. The air dampers close 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.

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

Enabling Actuators

MTR SETUP (Point 58) determines which actuators will be controlled by the application.

The default value for MTR SETUP is 31. This corresponds to supply and exhaust flow actuators which stroke clockwise to open and counterclockwise to close, and an enabled reheat actuator. Depending on the installation and wiring of the actuators, this default may require adjustment.

Use the following procedure to verify that MTR SETUP is correct for your application and adjust it if incorrect.

1. Display the **CONTROL** report.

2. Follow the instructions for each row in *Table 12*. Pick the number associated with your result from the **Value** column and enter that point in the **Your Value** column.

3. When the last row is complete, add and subtract the numbers from the **Your Value** column.

4. Change MTR SETUP to the new total and release the COMD points that were commanded in this procedure.

NOTE: Table 12 is only valid if the starting value for MTR SETUP (Point 58) is 31.

Table 12. Verification of MTR SETUP.

Instruction	Result	Value	Your Value
Set SUPPLY COMD (Point 48) first to **0**, and then to **100**.	Supply damper opens and closes as commanded.	0	
	Supply damper closes when it should open, and opens when it should close.	subtract 2	
	Supply damper does not move.	* 0	
Set EXHAUST COMD (Point 52) first to **0**, and then to **100**.	Exhaust damper opens and closes as commanded.	0	
	Exhaust damper closes when it should open, and opens when it should close.	subtract 8	
	Exhaust damper does not move.	* 0	
Set VALVE COMD (Point 37) first to **0**, and then to **100**.	No valve used.	subtract 16	
	Valve damper closes when it should open, and opens when it should close.	add 32	
	Valve damper does not move.	* 0	
	Valve damper opens and closes as commanded.	0	
		Total =	

* This result suggests that you may have mechanical problems. Check your damper connections, wiring, and installation instructions, and try again.

When MTR SETUP is changed, all enabled actuators will calibrate.

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 13, or the *APOGEE Automation Service Procedures* on InfoLink for more information.

Table 13. Motor Enable/Reverse Values for MTR SETUP.

	Motor 1 Enabled			**Motor 1 Enabled and Reversed**			**Motor 1 Not Used**		
	Motor 2 Not Used	**Motor 2 Enabled**	**Motor 2 Enabled and Reversed**	**Motor 2 Not Used**	**Motor 2 Enabled**	**Motor 2 Enabled and Reversed**	**Motor 2 Not Used**	**Motor 2 Enabled**	**Motor 2 Enabled and Reversed**
Motor 3 Not Used	1	5	13	3	7	15	0	4	12
Motor 3 Enabled	17	21	29	19	23	31	16	20	28
Motor 3 Enabled and Reversed	49	53	61	51	55	63	48	52	60

Setting Override Time

Follow these steps to set the 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 or occupied/unoccupied control, then enable it by setting WALL SWITCH (Point 18) to **YES**.

Setting Fail-safe mode

In the event that either air velocity sensor ceases to function, FAIL MODE (Point 40) causes the dampers to either fail OPEN or CLOSED. Set FAIL MODE to the fail-safe position desired for the dampers.

Setting the Tracking Options

The tracking control strategy is determined by setting TRACK MODE (Point 3) and TRACKING (Point 82).

For set point tracking, set TRACKING to **STPT**.

- When TRACK MODE is set to ETS (Exhaust Tracks Supply), the exhaust volume set point is calculated as the supply volume set point plus/minus VOLUME OFFST (Point 88).

- When TRACK MODE is set to STE (Supply Tracks Exhaust), the supply volume set point is calculated as the exhaust volume set point plus/minus VOLUME OFFST. If TRACK MODE is set to STE, then the flow minimums and maximums will apply to the exhaust flow.

  Set TRACK MODE to the appropriate value.

For flow tracking, set TRACKING to **FLOW**.

- When TRACK MODE is set to ETS (Exhaust Tracks Supply), the exhaust volume set point is calculated as the actual supply flow plus/minus VOLUME OFFST.
- When TRACK MODE is set to STE (Supply Tracks Exhaust), the supply volume set point is calculated as the actual exhaust flow plus/minus VOLUME OFFST. If TRACK MODE is set to STE, then the flow minimums and maximums will apply to the exhaust flow.

  Set TRACK MODE to the appropriate value.

NOTE: Set point tracking provides smoother control. Flow tracking provides an additional safety—if the lead flow (supply if ETS, or exhaust if STE) can not make its set point for mechanical reasons, then the tracking flow will track the actual lead flow and flow differential can be maintained. Flow tracking is more difficult and time consuming to tune.

Setting Pressure Control

Follow these steps to set the pressure control:

CAUTION:

Do not set VOLUME OFFST (Point 88) greater than CTL FLOW MAX (Point 77).

1. Set VOLUME OFFST to the flow difference between supply and exhaust that is required to maintain the specified pressure differential.
2. If using a pressure mode switch, then set PRES SWITCH (Point 81) to **YES**.
3. If not using a pressure mode switch, then set PRES SWITCH to **NO,** and set POS.NEG (Point 25) as follows:
   - If positive pressure is to be maintained, then set POS.NEG to **POS**.
   - If negative pressure is to be maintained, then set POS.NEG to **NEG**.

Setting Alarm Function

Follow these steps to set the alarm function:

1. Set OFFSET LMT and ALARM DELAY as appropriate. The alarming function works as follows:

   ALARM OUT (Point 50) turns ON if ACTUAL OFFST (Point 83) is more than the value of OFFSET LMT (Point 61) away from VOLUME OFFST (Point 88) (with the correct sign) for longer than ALARM DELAY (Point 62).

   Example: If VOLUME OFFST = 100 CFM, POS.NEG = NEG, OFFSET LMT = 50, and ALARM DELAY = 20 seconds, then the alarm DO will turn ON if ACTUAL OFFST is above -50 or below -150 CFM for more than 20 seconds.

2. If **not** using a pressure mode switch, then set ACTIVE.NTRAL (Point 10) as follows:

   - To enable alarming and positive or negative pressure control, set ACTIVE.NTRAL to **ACTIVE**.
   - To disable alarming and use neutral pressure control, set ACTIVE.NTRAL to **NTRAL**.

Setting UNOCC and OCC airflow set points

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

Application 2418: Follow these steps to set the unoccupied and occupied airflow set points:

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.

NOTE: If TRACK MODE (Point 3) equals Supply Tracks Exhaust (STE), then these airflow set points apply to the exhaust flow calculations. If the specifications call for the occupied and unoccupied flows to apply to the supply flow and negative pressurization is to be used, then set the occupied and unoccupied flow points higher by the amount of VOLUME OFFST (Point 88).

Setting MIN and MAX airflow set points

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

Application 2416: Follow these steps to set the minimum and maximum airflow set points:

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

   NOTE: If TRACK MODE (Point 3) equals Supply Tracks Exhaust (STE), then these minimums and maximums apply to the exhaust flow calculations. If the specifications call for minimum supply airflow, and negative pressurization will be used, then set the minimums higher than the minimum specified flow by the amount of VOLUME OFFST (Point 88).

Setting Duct Areas

Set the duct areas 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 of the exhaust duct. Press **ENTER**. The software prompts you for the dimensions of the duct.
3. Enter the exhaust duct dimensions as prompted. Press **ENTER** after each dimension you enter.
4. At the Duct Dimensions Menu, use the arrow keys to select the applicable duct shape of the supply duct. Press **ENTER**. The software prompts you for the dimensions of the duct.
5. Enter the supply duct dimensions as prompted. Press **ENTER** after each dimension you enter.

   NOTE: When entering the LCTLR point for a Room Pressurization 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

Follow these steps to set the room temperature set points:

1. Display the **SETPOINTS** report.

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

   NOTE: **Application 2416:** If STPT DIAL is set to YES, then DAY CLG STPT (Point 6) and DAY HTG STPT (Point 7) are not used. Instead, the value of RM STPT DIAL (Point 13) is used.

   Application 2418: If STPT DIAL is set to YES, then OCC CLG STPT (Point 6) and OCC HTG STPT (Point 7) are not used. Instead, the value of RM STPT DIAL is used.

3. If the room temperature sensor has a set point dial and it will 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 will not be used, then verify that STPT DIAL is set to **NO**.

5. Set the following points to the appropriate values:

   Application 2416:

   - DAY CLG STPT (Point 6)
   - DAY HTG STPT (Point 7)
   - NGT CLG STPT (Point 8)
   - NGT HTG STPT (Point 9)

   Application 2418:

   - OCC CLG STPT (Point 6)
   - OCC HTG STPT (Point 7)
   - UOC CLG STPT (Point 8)
   - UOC HTG STPT (Point 9)

Setting Flow Coefficients

Follow these steps to set the flow coefficients:

1. Display the **BALANCING** report.

2. Set SUP FLO COEF (Point 36) and EXH FLO COEF (Point 54) to the appropriate values found in *Tables 14* through *16*. This value is a starting point for the air balancer.

3. Fine-tune the flow coefficient using the following formula:

   new flow coefficient = (actual volume ÷ TEC volume) × old flow coefficient

4. The actual volume is the actual value obtained from the balancer's measurements. The TEC volume is the value obtained from EXH AIR VOL (Point 30) and SUP AIR VOL (Point 35). If the TEC volume is not within 2% of the actual volume, then repeat the procedure until it is within 2%.

NOTE: It is extremely important that the flow readings are accurate.

Table 14. 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 15. 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.16. 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.

Commissioning

After all the points have been set up, follow these procedures to verify that the application is controlling properly:

1. Confirm that the differential flow control is acceptable at minimum and maximum cooling by monitoring ACTUAL OFFST (Point 83).

2. Confirm that EXH AIR VOL (Point 30) and SUP AIR VOL (Point 35) match the true flows (as measured with other instrumentation) at both minimum and maximum cooling.

3. Confirm acceptable pressure control by using a differential pressure sensor, air velocity measurement in cracked doorway, a slip of paper in a cracked doorway, etc. If pressure is not great enough, increase the value of VOLUME OFFST (Point 88).

4. Confirm that the alarm indication (alarm light or DO8) goes ON when an alarm condition is simulated. (Command one of the flow set points to an out of range value to create an alarm condition.) Confirm that the alarm indication goes away when the alarm condition is removed (flow set point is released).

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.