SIEMENS

P1 TEC

Dual Duct 2 AVS - VAV Two Inlet Sensors with Optional Reheat and Optional Occupancy Sensor

Start-up Procedures

Building Technologies

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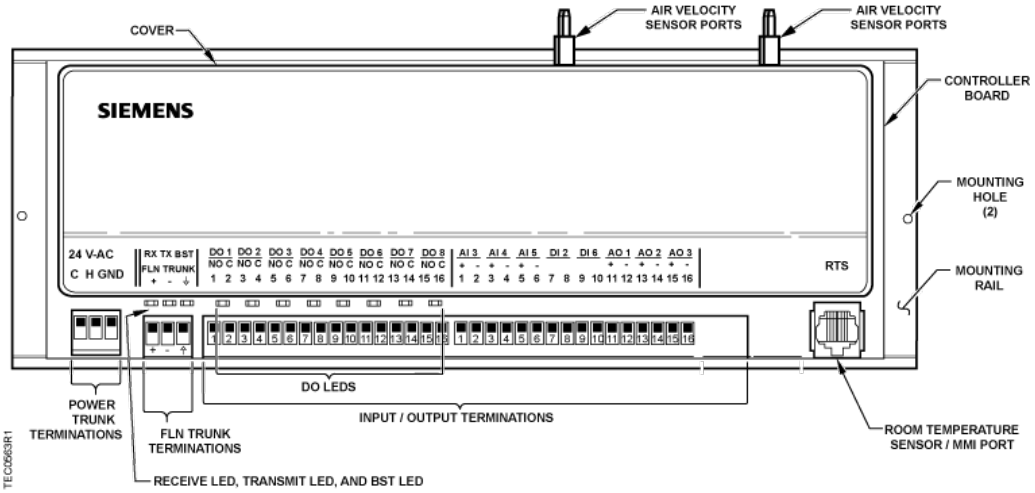
Before You Begin



Generic Controller I/O Layout. See *Wiring Diagram* for application specific details.

At the job site, locate the major control system and the mechanical and electrical drawings. These components include valves, motors, and any other components working in conjunction with the TEC.

1. Verify that the TEC input/output (I/O) points are wired per the installation instructions.
2. Verify that the Basic Sanity Test (BST) LED on the controller flashes once per second, If BST LED does not flash on/off, see the *APOGEE Automation Service Procedures* on InfoLink for troubleshooting information.

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.

Verifying Power to the 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, see the *iKnow Troubleshooting Tool* or contact Field Support for troubleshooting information.

Verifying Slave Mode Application

1. Verify that APPLICATION is set to **2179**.
2. Display the STARTUP report.

Enabling Actuators

⚠ CAUTION

The controller's DOs control only 24 Vac loads.
The maximum rating is 12 VA for each DO.

The point that determines actuator run times are:

- MTR 1 TIMING
- MTR 2 TIMING
- MTR 3 TIMING

Your application may not have or use all three points.

1. Use the following table to set run time(s) for the actuator used by your application.
2. For damper rotation angles other than 90°, set ROT ANG to the appropriate value.

Damper Actuator Run Time		
Damper Actuator	**Setting (seconds)**	
	50 Hz	**60 Hz**
GDE 131.1 (flaoting control)	108	90
GLB 131.1 (floating control)	150	125
GDE 161.1 (0 to 10 V control)	108	90
GLB 161.1 (0 to 10 V control)	150	125
PTS4 electronic-to-pneumatic transducer from ACT	-	90

Valve Actuator Run Time		
Valve Actuator	**Setting (seconds)**	
	50 Hz	**60 Hz**
SSB81U, floating control fail in place	180	150
SSC81U, floating control fail in place	150	125
SSC81.5U, floating control fail-safe	125	125
SQS85.53U, floating control spring return	35	30
SSB61U, 0-10V proportional fail in place	75	75
SSC61U, 0-10V proportional fail in place	30	30
SSC61.5U, 0-10V proportional fail safe	25	25
SQS65U, 0-10V proportional fail in place	35	30

Valve Actuator Run Time		
Valve Actuator	Setting (seconds)	
	50 Hz	60 Hz
SQS65.5U, 0-10V proportional fail safe (SR)	35	30
PTS4 electronic-to-pneumatic	-	90

Specifying Motor Setup

⚠ CAUTION

If an Autozero Module is used, do not enable MTR3 (valve 2).

MTR SETUP determines which actuators are controlled by the application and whether they are direct or reverse acting. Set MTR SETUP according to Table *MTR SETUP Values*.

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

MTR SETUP Values									
	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

Verifying Actuator Setup

1. Command all actuators closed. Verify that they close and remain closed. If not, adjust the setting for MTR SETUP according to Table *MTR SETUP Values*.
2. If any of the actuators still do not close completely, then the actuators have been installed or set up incorrectly. See the Installation Instructions, the iKnow Troubleshooting Tool, or contact Technical Support.

Setting the Application

Add the TEC to your job database and select Application 2167.

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 calibration cycle begins.

At the start of the calibration cycle, the controller automatically sets CAL AIR to YES. When the cycle is complete, CAL AIR returns to NO.

The air velocity sensor calibration cycle begins within three minutes of an application start-up or initialization, depending on the controller's address. After this delay, the calibration cycle takes from 2 to 5 minutes to complete. The air damper closes during calibration.

NOTE:
You can continue the startup procedure while calibration is underway. However, the controller will ignore commands to control end devices (such as the damper) until calibration of the air velocity sensor is finished.

Setting Auxiliary Heat Options

1. If not using auxiliary heat, set AUX HTG USED to NO and skip to next section.
2. If using auxiliary heat (hot water or electric), set AUX HTG USED to YES.
3. Set AUX HTG TYPE to HW or ELEC depending on desired type (hot water or electric).

Setting Stages of Electric Reheat

Check the hardware to verify the number of stages of electric reheat used. Set STAGE COUNT to this value.

⚠ CAUTION

If using electric reheat, do not set TOT FLOW MIN to 0 cfm (0 lps).

Equipment damage may occur if the electric heat is on while the box is controlling at a total flow minimum of 0 cfm (0 lps).

Enabling Autozero Module

If an Autozero Module is used, enable it by setting CAL MODULE to **YES**.

⚠ CAUTION

If an Autozero Module is used, do not enable MTR3 (valve 2).

NOTE:
For a controller without an Autozero Module, the damper is commanded closed to get a zero airflow reading during calibration. For a controller with an Autozero Module, the damper is closed only for the first calibration after controller initialization or power up.

Selecting Automatic Calibration Option

1. Using the following table, set CAL SETUP to the value that best meets your job requirements.
2. If appropriate, change CAL TIMER from the default of 12 hours. This setting applies only if your choice for CAL SETUP includes Option 4.

NOTE:
The air velocity sensor should 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.

CAL SETUP Options.

CAL SETUP (value)	Description
0	Calibration occurs ONLY when the point CAL AIR 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 the point CTLR ADDRESS 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 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 the point CAL TIMER. **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 in Options 1 and 2, set CAL SETUP to **3**.

Setting Room Temperature Setpoints

- Day cooling: DAY CLG STPT
- Day heating: DAY HTG STPT
- Night cooling: NGT CLG STPT
- Night heating: NGT HTG STPT
- Standby Offset (STBY OFFSET), optional (default = 0.0 deg)

1. If the room temperature sensor has a setpoint dial that will be used, set STPT DIAL to **YES**. Otherwise, set STPT DIAL to **NO**.
   - Set RM STPT MIN and RM STPT MAX for the minimum and maximum allowable room temperature setpoint values, respectively. Valid values range from 55° to 95°F (13° to 35°C). Default values are 55°F (13°C) for RM STPT MIN and 90°F (32°C) for RM STPT MAX.
2. Setpoint dial configured with a heating/cooling deadband (default).
   - To allow the controller to operate with a heating/cooling deadband (functioning the same as provided when the setpoint dial is not present) the following configuration should be used.
   - Set the DAY HTG STPT less than the DAY CLG STPT by the deadband (or zero energy band) that is desired. (for example, DAY HTG STPT = 70°F; DAY CLG STPT = 74°F, providing a deadband of 4 degrees). Only the difference between these values is used to determine the setpoint that will be used.
   - As described below, the setpoint(s) for heating/cooling will be 1/2 of the deadband above or below the setpoint dial value.
   ⇨ When HEAT.COOL equals HEAT, then:
   ⇨ CTL STPT will equal RM STPT DIAL – 0.5 * (DAY CLG STPT – DAY HTG STPT) and will be limited by RM STPT MIN and RM STPT MAX.
   ⇨ When HEAT.COOL equals COOL, then:
   ⇨ CTL STPT will equal RM STPT DIAL + 0.5 * (DAY CLG STPT – DAY HTG STPT) and will be limited by RM STPT MIN and RM STPT MAX.
   NOTE: A space where the deadband is used can be more energy efficient than a space where the deadband is not being used.
3. Setpoint dial configured for zero heating/cooling deadband.
   - When the job specification requires a common heating and cooling temperature setpoint, the following configuration should be used.
   - Set DAY HTG STPT equal to DAY CLG STPT. This will configure the setpoint deadband equal to zero.

- If a setpoint deadband equals zero, then:
  CTL STPT will equal RM STPT DIAL, and will be limited by RM STPT MIN and RM STPT MAX.
  NOTE: A space where the heating/cooling deadband is zero may be more comfortable than a space where the deadband is being used, but may use more energy.

4. Set the room temperature setpoints to the desired values. Heating setpoints are not present in cooling only applications.
5. STBY OFFSET (standby offset). This optional temperature offset setpoint is used only in conjunction with an optional occupancy sensor to provide additional energy reduction during occupied modes. If an occupancy sensor is being used and no activity is detected (no one present) in the zone during occupied times, OCC STBY (occupied standby) will be set to YES. When OCC STBY = YES, the airflow is switched/reduced to the night flow setpoints, but the temperature control will remain at normal occupied setpoints unless STBY OFFSET has been configured. STBY OFFSET (default 0.0 deg) can be set to raise the cooling setpoint and lower the heating setpoint when OCC STBY = YES, providing an additional reduction in energy consumption.

Setting Room Temperature Offset (optional)

When the room has stabilized, take a precision temperature reading over a period of time at the room temperature sensor, record any difference between this reading and the value of ROOM TEMP and set this difference value (to the nearest 0.25°F (0.14°C)) into RMTMP OFFSET (or TEMP OFFSET).

Example

If the actual room temperature is 72.0°F (22.2°C), but the value of ROOM TEMP is showing 73.0°F (23.8°C), then the value to be entered into RMTMP OFFSET (or TEMP OFFSET) would be –1.0 (negative 1 degree). In this case, ROOM TEMP would read the raw value 73.0°F (23.8°C), but CTL TEMP would equal 72.0°F (22.2°C).

CTL TEMP = ROOM TEMP + RMTMP OFFSET (or TEMP OFFSET)

Setting Stat Supervision

STAT SUPV is a configurable point (values are additive). Configuration will differ depending on the type of room unit (stat) being used. (Note: If the room unit is analog, STAT SUPV is used **only** to specify thermistor inputs as 10K or 100K.Therefore for analog room units the only values possible for STAT SUPV are 0, 8, or 16. See the table below.

If the room unit is digital, STAT SUPV defines the thermistors **and also** enables the room unit temperature, humidity and/or CO_2 points to be read by the controller. For digital room units, if a temperature, humidity, or CO_2 value (see table) is not included in the configured value for STAT SUPV, then the related point cannot be read (or ever display as failed). Conversely, if you enable supervision for a feature that the room unit does not support, then the related point will always display as failed.

Example: If you are using a digital room unit and need temperature and CO_2 sensing and a 100K thermistor on AI 5, you would set STAT SUPV = 13 (1 + 4 + 8 = 13). See the table below.

STAT SUPV Additive Values	
Value	**Description**
0 (default)	10K Ω thermistor(s)
1	Temperature sensing [1]
2	Relative Humidity (RH) sensing [1]
4	CO_2 sensing [1]
8	If short board: 100K Ω thermistor on AI 3 If long board: 100K Ω thermistor on AI 5
16	Long board only: 100K Ω thermistor on AI 4 (AI 4 must be a thermistor input, not a 0-10V/4-20 mA input.)

1) Additive values 1, 2, 4 **must not** be used with Series 1000 / 2000 analog room units.

Setting Override Time

If using night/unoccupied override, set OVRD TIME to the number of whole hours that an override should last. If OVRD TIME equals 0 (default), this feature is disabled.

Setting Duct Area

If provided, enter the duct area (sq ft or sq m) into DUCT AREA and HTGDUCT AREA and continue to *Setting Flow Coefficient*.

If you do not know the duct area, use the following table:

Area =	Round Duct	Rectangular Duct
Area in Sq. Ft.	$(\pi \times R^2)/144$ (where π = 3.14 and R = radius of duct in inches)	Width x Height/144 (in inches)
Area in Sq. M	$(\pi \times R^2)/10{,}000$ (where π = 3.14 and R = radius of duct in centimeters)	Width x Height/10,000 (in centimeters)

NOTE:
When entering the LCTLR point for a Dual Duct Controller—Two Air Velocity Sensors at the field panel, do not enter a duct area. (When asked for the duct shape, choose **N**, for None.) This controller does not send the value of air volume to the field panel in velocity (fpm). Instead, it uses volume (cfm) so a conversion is not necessary.

Setting Flow Coefficient

1. Set CLG FLO COEFF and HTG FLO COEFF to TOT FLO COEF to the appropriate value found in *Box Manufacturer Flow Coefficients Table*. This value is a starting point for the air balancer.
2. To fine tune the flow coefficient, use the following formula:

   ⇨ **New Flow Coefficient = (Actual Volume ÷ Controller Volume) × Old Flow Coefficient**
   The actual volume is the value obtained from the balancer's measurements. The controller volume is the value obtained from HTG VOLUME or TOT VOLUME, depending on the application and CLG VOLUME.
3. If the controller volume is not within 5% of the actual volume, repeat this procedure until it is within 5%.

Box Manufacturer Flow Coefficients		
Manufacturer	**Sensor Type**	**Value**
Anemostat	2-pipe without orifice 2-pipe with orifice Spider without orifice Spider with orifice	0.79 0.59 0.73 0.39
Carnes	2-pipe Flow cross	0.66 0.59
Carrier		0.59
E.H. Price/Siemens Industry Terminal Boxes		0.78
Environmental Technologies		0.79
Krueger		0.68
Metal Aire		0.72
Nailor Industries		0.69
Titus		0.60
Trane		0.66

Setting Airflow Setpoints

NOTE:
Maximum flow(s) must be set ≥ minimum flow(s).

⚠ CAUTION

For electric heating coils in the air terminal unit without a terminal fan, do not set HTG FLOW MIN to 0.

Equipment damage may occur if insufficient air flow is present with electric heat ON.

1. Set CLG FLOW MIN to the desired minimum cooling airflow from the cold duct in daytime cooling mode.
2. Set CLG FLOW MAX to the desired maximum cooling airflow from the cold duct in cooling mode.
3. Set TOT FLOW MIN to the desired minimum airflow needed for ventilation from the dual duct box.
4. Set HTG FLOW MAX to the desired maximum heating airflow from the hot duct in heating mode.
5. Set VENT DMD MIN flow setpoint to an initial value to provide the required zone ventilation. Ventilation air is applied to the cold duct only.
   VENT DMD MIN can be set above, equal to, or below CLG FLOW MIN and can be controlled (reset) externally for ventilation demands. Minimum airflow will be the larger of the cooling or heating flow minimums and VENT DMD MIN. The control maximum flow setpoint(s) are not affected by VENT DMD MIN.
   Optional occupancy sensor: During occupied times, when the occupancy sensor detects that no one is in the room and OCC STBY = YES, the control minimum will use the value of NGT FLOW MIN. If the occupancy sensor detects activity, OCC STBY will be set to NO and the minimum airflow will be the larger of the cooling or heating flow minimums and VENT DMD MIN.
6. Set NGT FLOW MIN to provide reduced (or zero) airflow during night unoccupied times (or when OCC STBY = YES during occupied times with occupancy sensor). Control will (still) modulate to the maximum flow control setpoints (heating or cooling) if the zone temperature exceeds the control temperature setpoints.

Enabling Wall Switch

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

Otherwise, leave WALL SWITCH at its default value of **NO**.

Enabling Occupancy Sensor

If an optional occupancy sensor will be used, set WALL SWITCH = NO and OCC SENSOR = YES. (See the application documentation for a description of how control is affected during Day modes.)

Setting Controller Address

NOTE:
If you are going to enter an LCTLR point at the field panel, keep track of the controller address and override time you enter at the WCIS. You will be required to enter these values again at the field panel.

Set the controller address by setting CTLR ADDRESS to the appropriate number. (Addresses 00 to 98 are valid; 00 to 31 are typically used.)

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.

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