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TO THE READER

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How To Use This Manual

This manual is written for the owner and user of Siemens Building Technologies Actuating Terminal Equipment Controller—Electronic Output, referred to as ATEC for the remainder of this manual. It is designed to help you become familiar with the ATEC and its applications.

This section covers manual organization, manual conventions, symbols used in the manual, and other information that will help you use this manual.

Manual Organization

This manual contains the following chapters:

- **Chapter 1, Hardware**, describes the hardware components and the accessories that are used with the ATEC.

- **Chapter 2, Applications for ATEC—Base VAV**, describes the control applications available in the base model of the ATEC. Point maps, complete with slopes and intercepts, are included for each application.

- **Chapter 3, Applications for ATEC—VAV with Reheat**, describes the control applications available in the model of the ATEC that includes a terminal block for wireable input/output connections. Point maps, complete with slopes and intercepts, are included for each application.

- **Chapter 4, Point Database**, defines the point database descriptors and includes address and applications.

- **Chapter 5, Troubleshooting**, describes basic corrective measures you can take should you encounter a problem when using the ATEC. For issues not covered in this chapter, consult your local Siemens Building Technologies, Inc., representative.

- The **Glossary** describes the terms and acronyms used in this manual.

- The **Index** helps you locate information presented in this manual.
Manual Conventions

The following table lists conventions to help you use this manual in a quick and efficient manner.

<table>
<thead>
<tr>
<th>Convention</th>
<th>Example</th>
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<tbody>
<tr>
<td>Actions that you should perform are specified in boldface font.</td>
<td>Type F for Field panels. Click OK to save changes and close the dialog box.</td>
</tr>
<tr>
<td>Error and system messages are displayed in Courier New font.</td>
<td>The message Report Definition successfully renamed appears in the status bar.</td>
</tr>
<tr>
<td>New terms appearing for the first time are italicized.</td>
<td>The Open Processor continuously executes a user-defined set of instructions called the control program.</td>
</tr>
</tbody>
</table>

Manual Symbols

The following table lists the symbols used in this owner's manual to draw your attention to important information.

<table>
<thead>
<tr>
<th>Notation</th>
<th>Symbol</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>WARNING:</td>
<td>⚠️</td>
<td>Indicates that personal injury or loss of life may occur to the user if a procedure is not performed as specified.</td>
</tr>
<tr>
<td>CAUTION:</td>
<td>⚠️</td>
<td>Indicates that equipment damage or loss of data may occur if the user does not follow a procedure as specified.</td>
</tr>
</tbody>
</table>

Datamate Software

Datamate is a customer software tool for all controller communications. There are two versions:

- Datamate Base
- Datamate Advanced
Datamate Base works on an IBM-compatible personal computer or a handheld PC or Pocket PC™ running Windows CE. Datamate Advanced works only on an IBM-compatible personal computer. With Datamate, you can back up, restore, and edit any APOGEE® database (but only Datamate Advanced allows you to edit points offline). Backing up and restoring a database can be accomplished while connected to any APOGEE field panel, or to the Building Level Network (BLN) or Floor Level Network (FLN) device in question. A modem and telephone lines can also be used. Databases can be saved to a hard or floppy disk and kept for permanent storage or used as backup.

For more information on Datamate software, see the appropriate user guide based on which version of Datamate you are using (Base or Advanced), or contact your local Siemens Building Technologies, Inc. representative.

**Getting Help**

For more information about the ATEC, contact your local Siemens Building Technologies, Inc. representative.

**Where To Send Comments**

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Chapter 1—Hardware

Chapter Overview

Chapter 1 discusses the following topics:

• The Controller
  – Digital Inputs
  – Analog Inputs
  – Digital Outputs
  – Power Wiring
  – Communication Wiring
  – Controller LED Indicator
  – Damper Actuator
  – Air Velocity Sensor

• Temperature Sensors
  – Room Temperature Sensor
  – Return-Duct Temperature Sensor
  – Supply-Duct Temperature Sensor

• Autozero Module

• Actuators

• Relay Module
The Controller

The Actuating Terminal Equipment Controller (ATEC) is an APOGEE Terminal Equipment Controller (TEC) from Siemens Building Technologies, Inc. It is used in pressure-independent Variable Air Volume (VAV) applications. The ATEC is an electronic-output controller that combines a damper actuator and a TEC into one package. It provides Direct Digital Control (DDC) and can operate independently as a stand-alone DDC room controller or networked with an APOGEE field panel. The controller provides all input/output, system, and local communication connections. Hardware consists of the controller, an air velocity sensor, and a damper actuator assembly.

The base model of the ATEC (Figure 1-1) is designed to control terminal boxes, single duct. It includes Applications 2520 and 2521. It has removable terminal blocks for the floor-level network (FLN) and power terminations.

![Figure 1-1. Actuating Terminal Equipment Controller (ATEC)—Base VAV.](image-url)
The ATEC with Reheat model (Figure 1-2) is designed to control terminal boxes, either single duct or fan powered (series or parallel), with hot water reheat or up to two stages of electric reheat. It includes Applications 2500, 2501, 2522, 2523, 2524, and 2526. It has removable terminal blocks for FLN, I/O, and power terminations. An Autozero Module can be used with this controller for Applications 2500, 2501, and 2522. An Autozero Module is required for applications where continuous airflow is required for an area.

![Figure 1-2. Actuating Terminal Equipment Controller (ATEC)—VAV with Reheat.](image)

Digital Inputs

Both models of the controller have Digital Input (DI) 1. DI 1 is associated with the room-temperature-sensor cable (specifically, the sensor’s override switch) and is displayed on screen as DI OVRD SW (Point 19). This DI cannot be wired is and not available for use as an auxiliary point.

In addition to DI 1, the ATEC with Reheat has DI 3 (terminals 4 and 5) and DI 4 (terminals 5 and 6) These inputs are typically used to monitor the status of a dry contact such as a switch or an auxiliary contact. DI 4 can be used with a wall switch that changes the controller from day mode to night mode and back again. See Chapter 3—Applications for ATEC—VAV with Reheat for more information.

**NOTE:** In all applications for the ATEC with Reheat, the inputs labeled “AI 3” and “AI 4” on the controller can each be used either as a DI point or as an Analog Input (AI) point, but neither can be used for both at the same time.
Analog Inputs

Both models of the controller have Analog Inputs Al 1 and Al 2. Al 1 and Al 2 are used by the room temperature sensor and the setpoint dial respectively. These Als are not wireable and are not available for use as auxiliary analog input points.

In addition to Al 1 and Al 2, the ATEC with Reheat includes Al 3 (screw terminals 4 and 5) and Al 4 (terminals 5 and 6). These inputs can be used for auxiliary temperature inputs to the controller by connecting 100K Ω thermostors. In Application 2501, Al 3 can be used with a duct temperature sensor to control whether the ATEC is in cooling or heating mode. See Chapter 3—Applications for ATEC—VAV with Reheat for more information.

NOTE: In all applications for the ATEC VAV with Reheat, the inputs on the controller labeled “Al 3” and “Al 4” can each be used either as a DI point or as an AI point, but neither can be used for both at the same time.

Digital Outputs

Both models of the controller have Digital Outputs DO 1 and DO 2. These outputs are dedicated to the damper actuator. They are not wireable and are not available for use as auxiliary output points.

In addition to DO 1 and DO 2, the ATEC with Reheat has DO 3 (screw terminals 1 and 2) and DO 4 (terminals 2 and 3). DO 3 is used to cycle the first stage of electric heat or baseboard radiation in Applications 2522, 2524, and 2526. This DO is a spare in Applications 2500 and 2501. In Application 2523, DO 3 and DO 4 control the valve actuator for hot-water reheat. DO 4 can be used to control an Autozero Module in Applications 2500, 2501, and 2522. In Application 2522, it can alternatively be used to cycle a second stage of electric reheat. In Applications 2524 and 2526, DO 4 turns the fan on and off. See Chapter 3—Applications for ATEC—VAV with Reheat for more information.

The DOs are solid-state contact closures that switch only 24 Vac with a maximum rating of 12 VA. If your applications require a higher voltage or higher VA, then you must use interposing relays. See Relay Module in this section for more information.

Power Wiring

The controller is powered by 24 Vac. Power wiring connects to the three screw terminals on the controller labeled "C" (Common) and "H" (Hot), and “E” (Earth) on the terminal block labeled "24 VAC" (Figure 1-3).
Communication Wiring

The controller connects to the field panel by means of a Floor Level Network (FLN) trunk. Communication wiring connects to the three screw terminals on the controller labeled "+" (positive), "-" (negative), and "S" (Shield) (Figure 1-4).

Controller LED Indicator

The controller has one Light Emitting Diode (LED) indicator: the BST/FLN LED ("Basic Sanity Test/Floor Level Network LED") (Figure 1-1 on page 1-2 and Figure 1-2 on page 1-3). When this LED is flashing on and off once per second, the controller is functioning properly and is communicating with the field panel. When the LED is constantly on, the controller is operating in stand-alone mode (not communicating with the field panel).

The LED stops flashing (and stays constantly on) two minutes after losing communication with FLN or two minutes after power up if no FLN is present.
Damper Actuator

The ATEC includes an actuator that modulates a damper in the supply duct, adjusting airflow to meet the room’s demand for cooling or heating.

For more information, contact your local Siemens Building Technologies representative.

Air Velocity Sensor

The ATEC includes an air velocity sensor that provides air-velocity inputs to the controller. The sensor is located in the supply duct, and pneumatic tubing connects it to the controller at the connections labeled “Hi” and “Lo” (Figure 1-1 on page 1-2 and Figure 1-2 on page 1-3).

For more information, contact your local Siemens Building Technologies representative.

Temperature Sensors

Temperature sensors used with the ATEC include an electronic room temperature sensor (or a return-duct temperature sensor) and an optional supply-duct temperature sensor.

Room Temperature Sensor

The Terminal Equipment Controller room temperature sensor connects to the controller by means of a cable terminated at both ends with a six conductor RJ-11 plug-in connector. See Figure 1-1 on page 1-2 and Figure 1-2 on page 1-3 for the location of the room temperature sensor/man machine interface (MMI) port. The room temperature sensor can include a setpoint dial and/or an override switch that temporarily switches the controller from night mode to day mode.

Return-Duct Temperature Sensor

If the room does not offer a suitable location for a room temperature sensor, the ATEC can use a Terminal Equipment Controller temperature sensor located in the return duct. This sensor uses the same RJ-11 connector as the room temperature sensor.

Supply-Duct Temperature Sensor

For Application 2501, an optional duct temperature sensor provides supply-duct air temperature sensing inputs to the controller. This sensor is wired to AI 3.

For more information about temperature sensors from Siemens Building Technologies, Inc., contact your local Siemens Building Technologies representative.
Autozero Module

The optional Autozero Module (Figure 1-5) is required when continuous operation at occupied flow is required for an area. The Autozero Module is connected to the air velocity inlet ports of the ATEC and provides periodic recalibration of the air velocity sensor without changing air volume being delivered to a room. This recalibration ensures long-term precise airflow delivery. See Chapter 2—Applications for ATEC—Base VAV and Chapter 3—Applications for ATEC—VAV with Reheat for more information.

Actuators

Both models of the ATEC include an internally wired damper actuator. Application 2523 uses an externally wired valve actuator. These actuators, powered through the controller, position reheat valves or dampers.

For more information about actuators and valve assemblies from Siemens Building Technologies, Inc., contact your local Siemens Building Technologies representative.
Relay Module

**WARNING:**
The relay module is a high voltage device.

A Terminal Equipment Controller relay module (Figure 1-6) is used in conjunction with the controller when the following situations are present:

- ATEC digital output (DO) is used to drive electric heating coils.
- Controlled load is greater than 12 VA.
- Controlled load is greater than 24 Vac.
- Controlled load is DC.
- Controlled load is powered by a transformer other than the one powering the ATEC.
- Controlled load is suspected of creating electromagnetic interference or noise in the control signal.

![Figure 1-6. Terminal Equipment Controller Relay Module (540-147) in Enclosure.](image)

For more information about controller components and accessories, consult the *Specification Data for APOGEE™ Automation Products* (144-130) or contact your local Siemens Building Technologies representative.
Chapter 2—Applications for ATEC—Base VAV

Chapter Overview

Chapter 2 discusses the following topics:

- Basic Operation of the Actuating Terminal Equipment Controller—Electronic Output
- Control Operation of the Actuating Terminal Equipment Controller—Electronic Output
- Application Illustrations
- Controller Points

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Chapter 2—Applications for ATEC—Base VAV

Introduction

Basic Operation

The Actuating Terminal Equipment Controller—Electronic Output (ATEC) provides Direct Digital Control (DDC) for Variable Air Volume (VAV) terminal box applications. Temperature control varies with the application. If present, heating can be provided by hot water, up to two stages of electric reheat, or optional baseboard radiation. Application 2521 requires the central air-handling unit to provide warm air during the heating mode. For cooling, the controller modulates the supply-air damper of the terminal box.

Control Operation

The ATEC can operate with centralized control or stand-alone control.

Centralized Control—A controller operating under centralized control means that it is connected, by means of a Floor Level Network (FLN), with an APOGEE field panel.

Stand-alone Control—A controller operating under stand-alone control means that it is providing independent DDC control to a space.

Illustrations

Each application in this section contains three types of illustrations: control drawings, control schedules, and wiring diagrams.

Control Drawing—A schematic representation of an ATEC. It shows the associated control components and wiring.

Control Schedule—A graphical representation of the terminal box operation as controlled by a specific ATEC application. Each control drawing has one or two control schedules associated with it.

Wiring Diagram—Each wiring diagram shows the terminations that correspond to a specific ATEC application.

Controller Points

In this manual, controller "points" appear in uppercase letters, the same as if viewed with the Datamate Software tool. For example, DAY.NGT (Point 29). DAY.NGT is the point that indicates the day or night operational mode of the controller.

Chapter 4—Point Database lists and defines all points used by this controller. You may want to refer to this chapter while reading the Sequence of Operation material that describes the various ATEC applications.
Application 2520: VAV Cooling Only

Overview

In Application 2520, the controller modulates the supply air damper of the terminal box for cooling. In order for it to work properly, the central Air Handling Unit must provide cool supply air. See Figure 2-1 and Figure 2-2.

Figure 2-1. Application 2520 Control Drawing.
Hardware Inputs

Analog
- Air velocity sensor
- Room temperature sensor
- Room temperature setpoint dial (optional)

Digital
- Night mode override (optional)

Hardware Outputs

Analog
- None

Digital
- Damper actuator (wired internally)
Ordering Notes

Actuating Terminal Equipment Controller—Electronic Output
   Single unit 550-400
   10-pack 550-400P10

Contact your local Siemens Building Technologies representative for additional product numbers.

Temperature sensor (select one)
   • Terminal Equipment Controller room temperature sensor
   • Duct temperature sensor, 10K Ω, TEC (return-duct sensor)
      4-inch (10.2 cm) 540-128
      18-inch (46 cm) 540-739

Sequence of Operation

Control Temperature Setpoints

Depending on the controller’s current operational mode (day or night), CTL STPT (Point 92) holds the value of one of the following setpoints:

**Day Mode**—CTL STPT holds the value of DAY CLG STPT (Point 6). If the room temperature sensor has a setpoint dial and STPT DIAL (Point 14) is set to YES, CTL STPT holds the value of RM STPT DIAL (Point 13).

If the setpoint dial is used and the value of RM STPT DIAL is less than the value of RM STPT MIN (Point 11), CTL STPT holds the value of RM STPT MIN. If the value of RM STPT DIAL is greater than the value of RM STPT MAX (Point 12), CTL STPT holds the value of RM STPT MAX.

**Night Mode**—CTL STPT holds the value of NGT CLG STPT (Point 8).

**NOTE:** The value of CTL TEMP (Point 78) is the same as ROOM TEMP (Point 4), unless CTL TEMP is overridden.

Day and Night Modes

The day/night status of the space is determined by the status of DAY.NGT (Point 29).

If the controller is operating stand-alone, it stays in day mode all the time. If the controller is operating with centralized control (that is, connected to a field panel), the field panel, can send an operator or PPCL command to override the status of DAY.NGT. See **APOGEE® PPCL User’s Manual** (125-1896) and **Field Panel User’s Manual** (125-1895) for more information.
Night Mode Override Switch

If an override switch is present on the room temperature sensor and a value (in hours) other than zero has been entered into OVRD TIME (Point 20), pressing the override switch resets the controller to day operational mode for the time period that is set in OVRD TIME. The status of NGT OVRD (Point 21) changes to DAY. After the override time elapses, the controller returns to night mode and NGT OVRD changes back to NIGHT.

It is only when the controller is in night mode that the override switch on the room sensor has any effect on the controller.

Control Loops

The terminal box is controlled by two Proportional, Integral, and Derivative (PID) control loops: a temperature loop and a flow loop.

Temperature Loop—The temperature loop uses the values of CTL STPT (Point 92) and CTL TEMP (Point 78) to generate the cooling loopout, which is then used to generate the value of FLOW STPT (Point 93). See Control Temperature Setpoints (page 2-5). FLOW STPT is calculated between the values of CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

Flow Loop—The flow loop maintains the airflow between the values of CTL FLOW MIN (Point 76) and CTL FLOW MAX (Point 77) by modulating DMPR COMD (Point 48).

Calibration

Calibration of the controller's internal air velocity sensor is periodically required to maintain accurate air velocity readings. CAL SETUP (Point 95) is set with the desired calibration option during controller startup. Depending on the value of CAL SETUP, calibration may be set to take place automatically or manually. When CAL AIR (Point 94) has a setting of YES, calibration is in progress. The damper is commanded closed to get a zero airflow reading during calibration.

At the end of a calibration sequence, CAL AIR automatically returns to NO. A setting of NO indicates that the controller is not in a calibration sequence.

Fail-safe Operation

If the air velocity sensor fails, the controller uses pressure-dependent control. The temperature loop controls the operation of the damper.

If the room temperature sensor fails, the controller operates using the last known temperature value.
Automated Checkout

The ATEC has a built-in checkout procedure that can be manually initiated at any time after the controller has been installed. The procedure tests all of the necessary I/O and ensures the controller has the ability to operate within the set airflow range, between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

To perform the checkout procedure, set CHK OUT (Point 10) to YES. When the procedure is completed, CHK OUT returns to NO and the results are displayed in CHK STATUS (Point 3). See Table 2-1.

### Table 2-1. Possible Failure Value and Description.

<table>
<thead>
<tr>
<th>CHK STATUS Values (Point 3)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>Checkout procedure has not been run since last controller initialization.</td>
</tr>
<tr>
<td>0</td>
<td>No errors found.</td>
</tr>
<tr>
<td>1</td>
<td>Room temperature sensor failed</td>
</tr>
<tr>
<td>2</td>
<td>Room setpoint dial failed [If STPT DIAL (Point 14) is set to YES].</td>
</tr>
<tr>
<td>4</td>
<td>Air velocity sensor failed.</td>
</tr>
<tr>
<td>8</td>
<td>Controller could not reach CLG FLOW MIN or below.</td>
</tr>
<tr>
<td>16</td>
<td>Controller could not reach CLG FLOW MAX or above.</td>
</tr>
</tbody>
</table>

**NOTE:** Multiple failures are added together and displayed as one value. For example, if the room temperature sensor failed (1) and the controller could not reach CLG FLOW MAX (16), CHK STATUS displays 17.

Application Notes

1. If temperature swings in the room are excessive or there is trouble maintaining the setpoint, the cooling loop needs to be tuned. If FLOW (Point 75) is oscillating while FLOW STPT (Point 93) is constant, the flow loop requires tuning. Contact your local Siemens Building Technologies representative for more information.

2. The ATEC, as shipped from the factory, keeps all associated equipment off. The controller and its equipment are released to application control at start-up.
Wiring Diagram

The point wiring for Application 2520 is shown in Figure 2-3.

Figure 2-3. Application 2520 Wiring Diagram.
## Point Database

### Table 2-2. Point Database for Application 2520.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>CTLR ADDRESS</td>
<td>99</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>02</td>
<td>APPLICATION</td>
<td>2486</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(03)</td>
<td>CHK STATUS</td>
<td>-1</td>
<td>–</td>
<td>1</td>
<td>-1</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(04)</td>
<td>ROOM TEMP</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>06</td>
<td>DAY CLG STPT</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>08</td>
<td>NGT CLG STPT</td>
<td>82.0 (27.92888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(10)</td>
<td>CHK OUT</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>11</td>
<td>RM STPT MIN</td>
<td>55.0 (12.80888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>12</td>
<td>RM STPT MAX</td>
<td>90.0 (32.40888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(13)</td>
<td>RM STPT DIAL</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>14</td>
<td>STPT DIAL</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>(19)</td>
<td>DI OVRD SW</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>20</td>
<td>OVRD TIME</td>
<td>0 HRS</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(21)</td>
<td>NGT OVRD</td>
<td>NIGHT</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
<tr>
<td>(29)</td>
<td>DAY.NGT</td>
<td>DAY</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
<tr>
<td>31</td>
<td>CLG FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>32</td>
<td>CLG FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(35)</td>
<td>AIR VOLUME</td>
<td>0 (0.0)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>36</td>
<td>FLOW COEFF</td>
<td>1.0</td>
<td>–</td>
<td>0.01</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(41)</td>
<td>DO 1</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(42)</td>
<td>DO 2</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application.
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets { } may be unbundled at the field panel.

*continued on next page...*
Table 2-2. Point Database for Application 2520.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default</th>
<th>Eng. Units</th>
<th>Slope</th>
<th>Intercept</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(SI Units)</td>
<td>(SI Units)</td>
<td>(SI Units)</td>
<td>(SI Units)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>{48}</td>
<td>DMPR COMD</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{49}</td>
<td>DMPR POS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>51</td>
<td>MTR1 TIMING</td>
<td>95</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>56</td>
<td>DMPR ROT ANG</td>
<td>90</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>58</td>
<td>MTR SETUP</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>59</td>
<td>DO DIR. REV</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>63</td>
<td>CLG P GAIN</td>
<td>20.0 (36.0)</td>
<td>–</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>64</td>
<td>CLG I GAIN</td>
<td>0.01 (0.018)</td>
<td>–</td>
<td>0.001</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>65</td>
<td>CLG D GAIN</td>
<td>0.0 (0.0)</td>
<td>–</td>
<td>2</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>66</td>
<td>CLG BIAS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>71</td>
<td>FLOW P GAIN</td>
<td>0.0</td>
<td>–</td>
<td>0.05</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>72</td>
<td>FLOW I GAIN</td>
<td>0.01</td>
<td>–</td>
<td>0.001</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>73</td>
<td>FLOW D GAIN</td>
<td>0</td>
<td>–</td>
<td>2</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>74</td>
<td>FLOW BIAS</td>
<td>50.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>FLOW</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{75}</td>
<td>FLOW</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{76}</td>
<td>CTL FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{77}</td>
<td>CTL FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{78}</td>
<td>CTL TEMP</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{79}</td>
<td>CLG LOOPOUT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{92}</td>
<td>CTL STPT</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{93}</td>
<td>FLOW STPT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{94}</td>
<td>CAL AIR</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>95</td>
<td>CAL SETUP</td>
<td>4</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>96</td>
<td>CAL TIMER</td>
<td>12</td>
<td>HRS</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application.
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets {} may be unbundled at the field panel.

continued on next page...
## Table 2-2. Point Database for Application 2520.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>97</td>
<td>DUCT AREA</td>
<td>1.0 (0.09292)</td>
<td>SQ. FT (SQ M)</td>
<td>0.025 (0.002323)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>98</td>
<td>LOOP TIME</td>
<td>5</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(99)</td>
<td>ERROR STATUS</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets { } may be unbundled at the field panel.
Application 2521: VAV Cooling or Heating

Overview

In Application 2521, the controller modulates the supply air damper of the terminal box for cooling and heating. In order for it to work properly, the central Air Handling Unit must provide cool supply air in cooling mode and warm air in heating mode. See Figure 2-4 and Figure 2-5.

Figure 2-4. Application 2521 Control Drawing.
Hardware Inputs

Analog

- Air velocity sensor
- Room temperature sensor
- Room temperature setpoint dial (optional)

Digital

- Night mode override (optional)

Hardware Outputs

Analog

- None

Digital

- Damper actuator (wired internally)
Ordering Notes

Actuating Terminal Equipment Controller—Electronic Output

Single unit 550-400

10-pack 550-400P10

Contact your local Siemens Building Technologies representative for additional product numbers.

Temperature sensor (select one)
- Terminal Equipment Controller room temperature sensor
- Duct temperature sensor, 10K Ω, TEC (return-duct sensor)

4-inch (10.2 cm) 540-128
18-inch (46 cm) 540-739

Sequence of Operation

Control Temperature Setpoints

Depending on the controller’s current operational mode (day or night), CTL STPT (Point 92) holds the value of one of the following setpoints:

**Day Mode**—CTL STPT holds the value of DAY CLG STPT (Point 6) or DAY HTG STPT (Point 7). If the room temperature sensor has a setpoint dial and STPT DIAL (Point 14) is set to YES, CTL STPT holds the value of RM STPT DIAL (Point 13).

If the setpoint dial is used and the value of RM STPT DIAL is less than the value of RM STPT MIN (Point 11), CTL STPT holds the value of RM STPT MIN. If the value of RM STPT DIAL is greater than the value of RM STPT MAX (Point 12), CTL STPT holds the value of RM STPT MAX.

**Night Mode**—CTL STPT holds the value of NGT CLG STPT (Point 8) or NGT HTG STPT (Point 9).

**NOTE:** The value of CTL TEMP (Point 78) is the same as ROOM TEMP (Point 4), unless CTL TEMP is overridden.

Day and Night Modes

The day/night status of the space is determined by the status of DAY.NGT (Point 29).

If the controller is operating stand-alone, it stays in day mode all the time. If the controller is operating with centralized control (that is, connected to a field panel), the field panel can send an operator or PPCL command to override the status of DAY.NGT. See APOGEE® PPCL User’s Manual (125-1896) and Field Panel User’s Manual (125-1895) for more information.
Night Mode Override Switch

If an override switch is present on the room temperature sensor and a value (in hours) other than zero has been entered into OVRD TIME (Point 20), pressing the override switch resets the controller to day operational mode for the time period that is set in OVRD TIME. The status of NGT OVRD (Point 21) changes to DAY. After the override time elapses, the controller returns to night mode and NGT OVRD changes back to NIGHT.

It is only when the controller is in night mode that the override switch on the room sensor has any effect on the controller.

Heating/Cooling Switchover

In order for the controller to function properly, use one of the following two options for the heating/cooling switchover for this application.

1. If the controller is connected to a field panel, the field panel can command SUPPLY TEMP (Point 40).

   When SUPPLY TEMP is commanded below the value of COOL TEMP (Point 61), the controller sets HEAT.COOL (Point 5) to COOL, switching the controller to cooling mode.

   When SUPPLY TEMP is commanded above the value of HEAT TEMP (Point 62), the controller sets HEAT.COOL to HEAT, switching the controller to heating mode.

2. If the controller is connected to a field panel, the field panel can switch the controller between heating and cooling modes by commanding HEAT.COOL to HEAT or COOL.

Control Loops

The terminal box is controlled by three Proportional, Integral, and Derivative (PID) control loops: two temperature loops and a flow loop.

The two temperature loops are a cooling loop and a heating loop. The active temperature loop maintains room temperature at the value in CTL STPT (Point 92). See Control Temperature Setpoints (page 2-14).

Cooling Loop—The cooling loop uses the values of CTL STPT and CTL TEMP (Point 78) to generate the cooling loopout, which is then used to generate FLOW STPT (Point 93). FLOW STPT is calculated between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

Heating Loop—The heating loop uses the values of CTL STPT and CTL TEMP to generate the heating loopout, which is then used to generate the FLOW STPT. FLOW STPT is calculated between HTG FLOW MIN (Point 33) and HTG FLOW MAX (Point 34).

Flow Loop—The flow loop maintains airflow between CTL FLOW MIN (Point 76) and CTL FLOW MAX (Point 77) by modulating DMPR COMD (Point 48).
Calibration

Calibration of the controller’s internal air velocity sensor is periodically required to maintain accurate air velocity readings. CAL SETUP (Point 95) is set with the desired calibration option during controller startup. Depending on the value of CAL SETUP, calibration may be set to take place automatically or manually. When CAL AIR (Point 94) has a setting of YES, calibration is in progress. The damper is commanded closed to get a zero airflow reading during calibration.

At the end of a calibration sequence, CAL AIR automatically returns to NO. A setting of NO indicates that the controller is not in a calibration sequence.

Fail-safe Operation

If the air velocity sensor fails, the controller uses pressure-dependent control. The temperature loop controls the operation of the damper.

If the room temperature sensor fails, the controller operates using the last known temperature value.

Automated Checkout

The ATEC has a built-in checkout procedure that can be manually initiated at any time after the controller has been installed. The procedure tests all of the necessary I/O and ensures the controller has the ability to operate within the set airflow range, between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

To perform the checkout procedure, set CHK OUT (Point 10) to YES. When the procedure is completed, CHK OUT returns to NO and the results are displayed in CHK STATUS (Point 3). See Table 2-3.

### Table 2-3. Possible Failure Value and Description.

<table>
<thead>
<tr>
<th>CHK STATUS Values (Point 3)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>Checkout procedure has not been run since last controller initialization.</td>
</tr>
<tr>
<td>0</td>
<td>No errors found.</td>
</tr>
<tr>
<td>1</td>
<td>Room temperature sensor failed.</td>
</tr>
<tr>
<td>2</td>
<td>Room setpoint dial failed [If STPT DIAL (Point 14) is set to YES].</td>
</tr>
<tr>
<td>4</td>
<td>Air velocity sensor failed.</td>
</tr>
<tr>
<td>8</td>
<td>Controller could not reach CLG FLOW MIN or below.</td>
</tr>
<tr>
<td>16</td>
<td>Controller could not reach CLG FLOW MAX or above.</td>
</tr>
</tbody>
</table>

**NOTE:** Multiple failures are added together and displayed as one value. For example, if the room temperature sensor failed (1) and the controller could not reach CLG FLOW MAX (16), CHK STATUS displays 17.
Application Notes

1. If temperature swings in the room are excessive or there is trouble maintaining the setpoint, the cooling loop, the heating loop, or both need to be tuned. If FLOW (Point 75) is oscillating while FLOW STPT (Point 93 is constant, the flow loop requires tuning. Contact your local Siemens Building Technologies representative for more information.

2. The ATEC, as shipped from the factory, keeps all associated equipment off. The controller and its equipment are released to application control at start-up.

Wiring Diagram

The point wiring for Application 2521 is shown in Figure 2-6.

Figure 2-6. Application 2521 Wiring Diagram.
## Point Database

Table 2-4. Point Database for Application 2521.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>CTLR ADDRESS</td>
<td>99</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>02</td>
<td>APPLICATION</td>
<td>2486</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(03)</td>
<td>CHK STATUS</td>
<td>-1</td>
<td>–</td>
<td>1</td>
<td>-1</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(04)</td>
<td>ROOM TEMP</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(05)</td>
<td>HEAT.COOL</td>
<td>COOL</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>HEAT</td>
<td>COOL</td>
</tr>
<tr>
<td>06</td>
<td>DAY CLG STPT</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>07</td>
<td>DAY HTG STPT</td>
<td>70.0 (21.20888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>08</td>
<td>NGT CLG STPT</td>
<td>82.0 (27.92888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>09</td>
<td>NGT HTG STPT</td>
<td>65.0 (18.40888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(10)</td>
<td>CHK OUT</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>11</td>
<td>RM STPT MIN</td>
<td>55.0 (12.80888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>12</td>
<td>RM STPT MAX</td>
<td>90.0 (32.40888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(13)</td>
<td>RM STPT DIAL</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>14</td>
<td>STPT DIAL</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>(19)</td>
<td>DI OVRD SW</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>20</td>
<td>OVRD TIME</td>
<td>0 HRS</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(21)</td>
<td>NGT OVRD</td>
<td>NIGHT</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
<tr>
<td>(29)</td>
<td>DAY.NGT</td>
<td>DAY</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
<tr>
<td>31</td>
<td>CLG FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4</td>
<td>(1.8876)</td>
<td>0</td>
<td>–</td>
</tr>
<tr>
<td>32</td>
<td>CLG FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4</td>
<td>(1.8876)</td>
<td>0</td>
<td>–</td>
</tr>
<tr>
<td>33</td>
<td>HTG FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4</td>
<td>(1.8876)</td>
<td>0</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets ( ) may be unbundled at the field panel.

*continued on next page...*
Table 2-4. Point Database for Application 2521.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>HTG FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(35)</td>
<td>AIR VOLUME</td>
<td>0 (0.0)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>36</td>
<td>FLOW COEFF</td>
<td>1.0</td>
<td>–</td>
<td>0.01</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(40)</td>
<td>SUPPLY TEMP</td>
<td>74.0 (23.495556)</td>
<td>DEG F (DEG C)</td>
<td>0.5 (0.28)</td>
<td>37.5 (3.0555556)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(41)</td>
<td>DO 1</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON OFF</td>
<td></td>
</tr>
<tr>
<td>(42)</td>
<td>DO 2</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON OFF</td>
<td></td>
</tr>
<tr>
<td>(48)</td>
<td>DMPR COMD</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(49)</td>
<td>DMPR POS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>51</td>
<td>MTR1 TIMING</td>
<td>95</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>56</td>
<td>DMPR ROT ANG</td>
<td>90</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>58</td>
<td>MTR SETUP</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>59</td>
<td>DO DIR. REV</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>61</td>
<td>COOL TEMP</td>
<td>65.0 (18.455556)</td>
<td>DEG F (DEG C)</td>
<td>0.5 (0.28)</td>
<td>37.5 (3.0555556)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>62</td>
<td>HEAT TEMP</td>
<td>80.0 (26.855556)</td>
<td>DEG F (DEG C)</td>
<td>0.5 (0.28)</td>
<td>37.5 (3.0555556)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>63</td>
<td>CLG P GAIN</td>
<td>20.0 (36.0)</td>
<td>–</td>
<td>0.25 (0.45)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>64</td>
<td>CLG I GAIN</td>
<td>0.01 (0.018)</td>
<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>65</td>
<td>CLG D GAIN</td>
<td>0 (0.0)</td>
<td>–</td>
<td>2 (3.6)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>66</td>
<td>CLG BIAS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>67</td>
<td>HTG P GAIN</td>
<td>10.0 (18.0)</td>
<td>–</td>
<td>0.25 (0.45)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>68</td>
<td>HTG I GAIN</td>
<td>0.01 (0.018)</td>
<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>69</td>
<td>HTG D GAIN</td>
<td>0 (0.0)</td>
<td>–</td>
<td>2 (3.6)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>70</td>
<td>HTG BIAS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application.
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets { } may be unbundled at the field panel.

*continued on next page...*
### Table 2-4. Point Database for Application 2521.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>FLOW P GAIN</td>
<td>0.0</td>
<td>–</td>
<td>0.05</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>72</td>
<td>FLOW I GAIN</td>
<td>0.01</td>
<td>–</td>
<td>0.001</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>73</td>
<td>FLOW D GAIN</td>
<td>0</td>
<td>–</td>
<td>2</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>74</td>
<td>FLOW BIAS</td>
<td>50.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(75)</td>
<td>FLOW</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(76)</td>
<td>CTL FLOW MIN</td>
<td>220</td>
<td>CFM (LPS)</td>
<td>4</td>
<td>1.8876</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(77)</td>
<td>CTL FLOW MAX</td>
<td>2200</td>
<td>CFM (LPS)</td>
<td>4</td>
<td>1.8876</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(78)</td>
<td>CTL TEMP</td>
<td>74.0</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>0.14</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(79)</td>
<td>CLG LOOPOUT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(80)</td>
<td>HTG LOOPOUT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(92)</td>
<td>CTL STPT</td>
<td>74.0</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>0.14</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(93)</td>
<td>FLOW STPT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(94)</td>
<td>CAL AIR</td>
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<td>–</td>
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<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>95</td>
<td>CAL SETUP</td>
<td>4</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>96</td>
<td>CAL TIMER</td>
<td>12</td>
<td>HRS</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
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<tr>
<td>97</td>
<td>DUCT AREA</td>
<td>1.0</td>
<td>SQ FT (SQ M)</td>
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<td>0.002323</td>
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<td>–</td>
</tr>
<tr>
<td>98</td>
<td>LOOP TIME</td>
<td>5</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(99)</td>
<td>ERROR STATUS</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application.
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets ( ) may be unbundled at the field panel.
Application 2486: Slave Mode

Overview

Application 2486 is the slave mode application for the ATEC—Electronic Output (P/N 550-400). Slave mode is the default application that comes up when power is first applied to the controller. Slave mode provides no control. Its purpose is to allow the operator to perform equipment checkout before a control application is put into effect and to set some basic controller parameters (CLTR ADDRESS, APPLICATION, etc.). A controller in slave mode can also be used as a point extension device by commanding spare I/O points from the field panel.

Using Auxiliary Points

It is possible to have extra points available on an ATEC in addition to the ones used by the current application that is running in the controller. If these extra points are to be controlled by a field panel, then they must be unbundled at the field panel. See Table 2-5 (page 2-22) for point database information.

Using the Controller as a Point Extension Device

If the controller is only used as a point extension device, with no control application in effect, its application must be set to slave mode and points must be unbundled at the field panel. All points must be controlled from the field panel in order to be used.

NOTE: DO 1 and DO 2 are wired internally. They can be used only to rotate a shaft that fits into the ATEC through 90° (or less).

NOTE: If controlling a motor as an auxiliary point, be sure to set MTR SETUP (Point 58) to the correct value. You cannot unbundle DO 1 and DO 2 when using them for a motor. Only MTR1 COMD (Point 48) can be unbundled to control the motor.

Example

If controlling a motor as an auxiliary point, follow these steps:

1. Set MTR SETUP to 1 (if direct-acting) or 3 (if reverse-acting) to enable the motor.

2. Unbundle MTR1 COMD at the field panel to command the motor from the field panel.

You may want to contact your local Siemens Building Technologies representative for complete motor enable/reverse procedures.
### Point Database

Table 2-5. Point Database for Application 2486.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>CTLR ADDRESS</td>
<td>99</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>02</td>
<td>APPLICATION</td>
<td>2486</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(03)</td>
<td>CHK STATUS</td>
<td>-1</td>
<td>–</td>
<td>1</td>
<td>-1</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(04)</td>
<td>ROOM TEMP</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(10)</td>
<td>CHK OUT</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>(13)</td>
<td>RM STPT DIAL</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(19)</td>
<td>DI OVRD SW</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(29)</td>
<td>DAY.NGT</td>
<td>DAY</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
<tr>
<td>(35)</td>
<td>AIR VOLUME</td>
<td>0 (0.0) CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>36</td>
<td>FLOW COEFF</td>
<td>1.0</td>
<td>–</td>
<td>0.01</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(41)</td>
<td>DO 1</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(42)</td>
<td>DO 2</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(48)</td>
<td>MTR1 COMD</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(49)</td>
<td>MTR1 POS</td>
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<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>51</td>
<td>MTR1 TIMING</td>
<td>95</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>56</td>
<td>DPR1 ROT ANG</td>
<td>90</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>58</td>
<td>MTR SETUP</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>59</td>
<td>DO DIR. REV</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(94)</td>
<td>CAL AIR</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>95</td>
<td>CAL SETUP</td>
<td>4</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>96</td>
<td>CAL TIMER</td>
<td>12</td>
<td>HRS</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>97</td>
<td>DUCT AREA</td>
<td>1.0 (0.09292)</td>
<td>SQ. FT (SQ M)</td>
<td>0.025</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(99)</td>
<td>ERROR STATUS</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application.
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets ( ) may be unbundled at the field panel.
Chapter 3—Applications for ATEC—VAV with Reheat

Chapter Overview

Chapter 3 discusses the following topics:

- Basic Operation of the Actuating Terminal Equipment Controller—Electronic Output
- Control Operation of the Actuating Terminal Equipment Controller—Electronic Output
- Application Illustrations
- Controller Points

Applications Overview

<table>
<thead>
<tr>
<th>Application Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application 2500: VAV Cooling Only</td>
<td>3-3</td>
</tr>
<tr>
<td>Application 2501: VAV Cooling or Heating</td>
<td>3-13</td>
</tr>
<tr>
<td>Application 2522: VAV with Electric Reheat or Baseboard Radiation</td>
<td>3-24</td>
</tr>
<tr>
<td>Application 2523: VAV with Hot Water Reheat (only one reheat valve)</td>
<td>3-40</td>
</tr>
<tr>
<td>Application 2524: VAV Series Fan Powered with One Stage of Electric Reheat</td>
<td>3-53</td>
</tr>
<tr>
<td>Application 2526: VAV Parallel Fan Powered with One Stage of Electric Reheat</td>
<td>3-67</td>
</tr>
<tr>
<td>Application 2473: Slave Mode</td>
<td>3-81</td>
</tr>
</tbody>
</table>
Introduction

Basic Operation

The Actuating Terminal Equipment Controller—Electronic Output (ATEC) provides Direct Digital Control (DDC) for Variable Air Volume (VAV) terminal box applications. Temperature control varies with the application. If present, heating can be provided by hot water, up to two stages of electric reheat, or optional baseboard radiation. Application 2501 requires the central air-handling unit to provide warm air during the heating mode. For cooling, the controller modulates the supply-air damper of the terminal box.

Control Operation

The ATEC can operate with centralized control or stand-alone control.

Centralized Control—A controller operating under centralized control means that it is connected, by means of a Floor Level Network (FLN), with an APOGEE field panel.

Stand-alone Control—A controller operating under stand-alone control means that it is providing independent DDC control to a space.

Illustrations

Each application in this section contains three types of illustrations: control drawings, control schedules, and wiring diagrams.

Control Drawing—A schematic representation of an ATEC. It shows the associated control components and wiring.

Control Schedule—A graphical representation of the terminal box operation as controlled by a specific ATEC application. Each control drawing has one or two control schedules associated with it.

Wiring Diagram—Each wiring diagram shows the terminations that correspond to a specific ATEC application.

Controller Points

In this manual, controller "points" appear in uppercase letters, the same as if viewed with the Datamate Software tool. For example, DAY.NGT (Point 29). DAY.NGT is the point that indicates the day or night operational mode of the controller.

Chapter 4—Point Database lists and defines all points used by this controller. You may want to refer to this chapter while reading the Sequence of Operation material that describes the various ATEC applications.
Application 2500: VAV Cooling Only

Overview

In Application 2500, the controller modulates the supply air damper of the terminal box for cooling. In order for it to work properly, the central air-handling unit must provide cool supply air. See Figure 3-1 and Figure 3-2.

Figure 3-1. Application 2500 Control Drawing.
1. See Sequence of Operation, Control Temperature Setpoints.

Figure 3-2. Application 2500 Control Schedule.

### Hardware Inputs

**Analog**
- Air velocity sensor
- Room temperature sensor
- Room temperature setpoint dial (optional)

**Digital**
- Night mode override (optional)
- Wall switch (optional)

### Hardware Outputs

**Analog**
- None

**Digital**
- Autozero module (optional)
- Damper actuator (wired internally)
Ordering Notes

Actuating Terminal Equipment Controller with Reheat—Electronic Output
- Single unit
- 10-pack

Contact your local Siemens Building Technologies, Inc., representative for additional product numbers.

Autozero module (optional)
Temperature sensor (select one)
- Terminal Equipment Controller room temperature sensor
- Duct temperature sensor, 10K Ω, TEC (return-duct sensor)

Sequence of Operation

Control Temperature Setpoints

Depending on the controller’s current operational mode (day or night), CTL STPT (Point 92) holds the value of one of the following setpoints:

**Day Mode**—CTL STPT holds the value of DAY CLG STPT (Point 6). If the room temperature sensor has a setpoint dial and STPT DIAL (Point 14) is set to YES, CTL STPT holds the value of RM STPT DIAL (Point 13).

If the setpoint dial is used and the value of RM STPT DIAL is less than the value of RM STPT MIN (Point 11), CTL STPT holds the value of RM STPT MIN. If the value of RM STPT DIAL is greater than the value of RM STPT MAX (Point 12), CTL STPT holds the value of RM STPT MAX.

**Night Mode**—CTL STPT holds the value of NGT CLG STPT (Point 8).

*NOTE:* The value of CTL TEMP (Point 78) is the same as ROOM TEMP (Point 4), unless CTL TEMP is overridden.

Day and Night Modes

The day/night status of the space is determined by the status of DAY.NGT (Point 29). The control of this point differs depending on whether the controller is monitoring the status of a wall switch or is connected to a field panel.

When a wall switch is physically connected to the controller at the AI/DI port labeled “AI 4” (Figure 3-1 on page 3-3 and Figure 3-3 on page 3-9), and WALL SWITCH (Point 18) is set to YES, the controller monitors the status of DI 4 (Point 24). When DI 4 is ON (the switch is closed), DAY.NGT is set to DAY indicating that the controller is in day mode. When DI 4 is OFF (the switch is open), DAY.NGT is set to NIGHT indicating that the controller is in night mode.
If the controller is operating stand-alone, it stays in day mode all the time. If the controller is connected to a field panel, the field panel can send an operator or PPCL command to override the status of DAY. NGT. See the APOGEE® PPCL User’s Manual (125-1896) and Field Panel User’s Manual (125-1895) for more information.

Night Mode Override Switch

If an override switch is present on the room temperature sensor and a value (in hours) other than zero has been entered into OVRD TIME (Point 20), pressing the override switch resets the controller to day operational mode for the time period that is set in OVRD TIME. The status of NGT OVRD (Point 21) changes to DAY. After the override time elapses, the controller returns to night mode and NGT OVRD changes back to NIGHT.

It is only when the controller is in night mode that the override switch on the room sensor has any effect on the controller.

Control Loops

The terminal box is controlled by two Proportional, Integral, and Derivative (PID) control loops: a temperature loop and a flow loop.

Temperature Loop—The temperature loop uses the values of CTL STPT (Point 92) and CTL TEMP (Point 78) to generate the cooling loopout, which is then used to generate the value of FLOW STPT (Point 93). See Control Temperature Setpoints (page 3-5). FLOW STPT is calculated between the values of CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

Flow Loop—The flow loop maintains the airflow between the values of CTL FLOW MIN (Point 76) and CTL FLOW MAX (Point 77) by modulating DMPR COMD (Point 48).

Calibration of Air Velocity Sensor

Calibration of the controller’s internal air velocity sensor is periodically required to maintain accurate air velocity readings. CAL SETUP (Point 95) is set with the desired calibration option during controller startup. Depending on the value of CAL SETUP, calibration may be set to take place automatically or manually. When CAL AIR (Point 94) has a setting of YES, calibration is in progress.

- For a controller used without an Autozero Module (CAL MODULE, Point 87, is set to NO), the damper is commanded closed to get a zero airflow reading during calibration.
- For a controller used with an Autozero Module (CAL MODULE is set to YES), calibration occurs without closing the damper.

At the end of a calibration sequence, CAL AIR automatically returns to NO. A setting of NO indicates that the controller is not in a calibration sequence.
Recalibration of Damper when Autozero Module is Used

The Autozero Module is enabled when it is wired to DO 4 and CAL MODULE (Point 87) is set to YES.

Under normal operation DMPR STATUS (Point 84) reads CAL. However, if using an Autozero Module, it is possible after a period of operation for the calculated damper position point, DMPR POS (Point 49), to differ from the actual (physical) damper position.

If this occurs, the controller automatically compensates for any difference by setting DMPR STATUS to RECAL, which readjusts the value of DMPR POS, allowing accurate flow control to continue. DMPR STATUS is set to RECAL if all of the following conditions are true:

- DMPR POS = 100%
- Air velocity > 200 ft/min (1.016 m/sec)
- FLOW (Point 75) < FLOW STPT (Point 93)

-or-

- DMPR POS = 0%
- Air velocity > 200 ft/min (1.016 m/sec)
- FLOW > FLOW STPT

NOTE: For a system using English units, air velocity (fpm) equals AIR VOLUME (Point 35, cfm) divided by DUCT AREA (Point 97, sq ft). For a system using SI units, air velocity (mps) equals 0.001 times AIR VOLUME (lps) divided by DUCT AREA (sq m).

NOTE: To change DMPR STATUS from RECAL back to CAL, set DMPR STATUS to CAL, and then release it.

Fail-safe Operation

If the air velocity sensor fails, the controller uses pressure-dependent control. The temperature loop controls the operation of the damper.

If the room temperature sensor fails, the controller operates using the last known temperature value.
Automated Checkout

The ATEC has a built-in checkout procedure that can be manually initiated at any time after the controller has been installed. The procedure tests all of the necessary I/O and ensures the controller has the ability to operate within the set airflow range, between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

To perform the checkout procedure, set CHK OUT (Point 10) to YES. When the procedure is completed, CHK OUT returns to NO and the results are displayed in CHK STATUS (Point 3). See Table 3-1.

Table 3-1. Possible Failure Value and Description.

<table>
<thead>
<tr>
<th>CHK STATUS Values (Point 3)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>Checkout procedure has not been run since last controller initialization.</td>
</tr>
<tr>
<td>0</td>
<td>No errors found.</td>
</tr>
<tr>
<td>1</td>
<td>Room temperature sensor failed.</td>
</tr>
<tr>
<td>2</td>
<td>Room setpoint dial failed [If STPT DIAL (Point 14) is set to YES].</td>
</tr>
<tr>
<td>4</td>
<td>Air velocity sensor failed.</td>
</tr>
<tr>
<td>8</td>
<td>Controller could not reach CLG FLOW MIN or below.</td>
</tr>
<tr>
<td>16</td>
<td>Controller could not reach CLG FLOW MAX or above.</td>
</tr>
</tbody>
</table>

NOTE: Multiple failures are added together and displayed as one value. For example, if the room temperature sensor failed (1) and the controller could not reach CLG FLOW MAX (16), CHK STATUS displays 17.

Application Notes

1. If temperature swings in the room are excessive or there is trouble maintaining the setpoint, the cooling loop needs to be tuned. If FLOW (Point 75) is oscillating while FLOW STPT (Point 93) is constant, the flow loop requires tuning. Contact your local Siemens Building Technologies representative for more information.

2. The ATEC, as shipped from the factory, keeps all associated equipment off. The controller and its equipment are released to application control at start-up.
Wiring Diagram

The point wiring for Application 2500 is shown in Figure 3-3.

**CAUTION:**

The controller’s DOs control 24 Vac loads only. The maximum rating is 12 VA for each DO. Use an interposing relay for any of the following:

- VA requirements higher than the maximum
- 110 or 220 Vac requirements
- DC power requirements
- Separate transformers used to power the load

![Application 2500 Wiring Diagram](image)

Figure 3-3. Application 2500 Wiring Diagram.
## Point Database

Table 3-2. Point Database for Application 2500.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>CTLR ADDRESS</td>
<td>99</td>
<td></td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>02</td>
<td>APPLICATION</td>
<td>2473</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>03</td>
<td>CHK STATUS</td>
<td>-1</td>
<td>–</td>
<td>1</td>
<td>-1</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>04</td>
<td>ROOM TEMP</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>06</td>
<td>DAY CLG STPT</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>08</td>
<td>NGT CLG STPT</td>
<td>82.0 (27.92888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>CHK OUT</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>11</td>
<td>RM STPT MIN</td>
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<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>12</td>
<td>RM STPT MAX</td>
<td>90.0 (32.40888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>RM STPT DIAL</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>14</td>
<td>STPT DIAL</td>
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<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>AI 3</td>
<td>74.0 (23.495556)</td>
<td>DEG F (DEG C)</td>
<td>0.5</td>
<td>37.5 (3.055556)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>18</td>
<td>WALL SWITCH</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>DI OVRD SW</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>20</td>
<td>OVRD TIME</td>
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<td>0</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>21</td>
<td>NGT OVRD</td>
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<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
<tr>
<td></td>
<td>DI 4</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>25</td>
<td>DI 3</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>29</td>
<td>DAY.NGT</td>
<td>DAY</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
<tr>
<td>31</td>
<td>CLG FLOW MIN</td>
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<td>CFM (LPS)</td>
<td>4</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>32</td>
<td>CLG FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application.
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets { } may be unbundled at the field panel.

*Continued on next page*...
### Table 3-2. Point Database for Application 2500.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>(35)</td>
<td>AIR VOLUME</td>
<td>0 (0.0)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>36</td>
<td>FLOW COEFF</td>
<td>1.0</td>
<td>–</td>
<td>0.01</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(40)</td>
<td>AI 4</td>
<td>74.0 (23.495556)</td>
<td>DEG F (DEG C)</td>
<td>0.5 (0.28)</td>
<td>37.5 (3.055556)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(41)</td>
<td>DO 1</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(42)</td>
<td>DO 2</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(43)</td>
<td>DO 3</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(44)</td>
<td>DO 4</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(48)</td>
<td>DMPR COMD</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(49)</td>
<td>DMPR POS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>51</td>
<td>MTR1 TIMING</td>
<td>95 (sec)</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(52)</td>
<td>MTR2 COMD</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(53)</td>
<td>MTR2 POS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>55</td>
<td>MTR2 TIMING</td>
<td>130 (sec)</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>56</td>
<td>DMPR ROT ANG</td>
<td>90 (sec)</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>58</td>
<td>MTR SETUP</td>
<td>1</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>59</td>
<td>DO DIR. REV</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>63</td>
<td>CLG P GAIN</td>
<td>20.0 (36.0)</td>
<td>–</td>
<td>0.25 (0.45)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>64</td>
<td>CLG I GAIN</td>
<td>0.01 (0.018)</td>
<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>65</td>
<td>CLG D GAIN</td>
<td>0 (0.0)</td>
<td>–</td>
<td>2 (3.6)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>66</td>
<td>CLG BIAS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>71</td>
<td>FLOW P GAIN</td>
<td>0.0</td>
<td>–</td>
<td>0.05</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>72</td>
<td>FLOW I GAIN</td>
<td>0.01</td>
<td>–</td>
<td>0.001</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>73</td>
<td>FLOW D GAIN</td>
<td>0</td>
<td>–</td>
<td>2</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>74</td>
<td>FLOW BIAS</td>
<td>50.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(75)</td>
<td>FLOW</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(76)</td>
<td>CTL FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application.
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets { } may be unbundled at the field panel.

*Continued on next page...*
<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>(77)</td>
<td>CTL FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(78)</td>
<td>CTL TEMP</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(79)</td>
<td>CLG LOOPOUT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(84)</td>
<td>DMPR STATUS</td>
<td>CAL</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>RECAL</td>
<td>CAL</td>
</tr>
<tr>
<td>87</td>
<td>CAL MODULE</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>(92)</td>
<td>CTL STPT</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(93)</td>
<td>FLOW STPT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(94)</td>
<td>CAL AIR</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>95</td>
<td>CAL SETUP</td>
<td>4</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>96</td>
<td>CAL TIMER</td>
<td>12</td>
<td>HRS</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>97</td>
<td>DUCT AREA</td>
<td>1.0 (0.09292)</td>
<td>SQ. FT (SQ M)</td>
<td>0.025 (0.002323)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
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<tr>
<td>98</td>
<td>LOOP TIME</td>
<td>5</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(99)</td>
<td>ERROR STATUS</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

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Application 2501: VAV Cooling or Heating

Overview

In Application 2501, the controller modulates the supply air damper of the terminal box for cooling and heating. In order for it to work properly, the central air-handling unit must provide cool supply air in cooling mode and warm air in heating mode. See Figure 3-4 and Figure 3-5.

Figure 3-4. Application 2501 Control Drawing.
1. See Sequence of Operation, Control Temperature Setpoints.

Figure 3-5. Application 2501 Control Schedule.

Hardware Inputs

Analog
- Air velocity sensor
- Duct temperature sensor (optional)
- Room temperature sensor
- Room temperature setpoint dial (optional)

Digital
- Night mode override (optional)
- Wall switch (optional)

Hardware Outputs

Analog
- None

Digital
- Autozero module (optional)
- Damper actuator (wired internally)
Ordering Notes

Actuating Terminal Equipment Controller with Reheat—Electronic Output
Single unit 550-405
10-pack 550-405P10

Contact your local Siemens Building Technologies representative for additional product numbers.

Autozero module (optional)
Duct temperature sensor, 100K Ω (supply-duct sensor, optional)
Temperature sensor (select one)
  • Terminal Equipment Controller room temperature sensor
  • Duct temperature sensor, 10K Ω, TEC (return-duct sensor)
    4-inch (10.2 cm) 540-128
    18-inch (46 cm) 540-739

Sequence of Operation

Control Temperature Setpoints

Depending on the controller’s current operational mode (day or night), CTL STPT (Point 92) holds the value of one of the following setpoints:

Day Mode—CTL STPT holds the value of DAY CLG STPT (Point 6) or DAY HTG STPT (Point 7). If the room temperature sensor has a setpoint dial and STPT DIAL (Point 14) is set to YES, CTL STPT holds the value of RM STPT DIAL (Point 13).

If the setpoint dial is used and the value of RM STPT DIAL is less than the value of RM STPT MIN (Point 11), CTL STPT holds the value of RM STPT MIN. If the value of RM STPT DIAL is greater than the value of RM STPT MAX (Point 12), CTL STPT holds the value of RM STPT MAX.

Night Mode—CTL STPT holds the value of NGT CLG STPT (Point 8) or NGT HTG STPT (Point 9).

NOTE: The value of CTL TEMP (Point 78) is the same as ROOM TEMP (Point 4), unless CTL TEMP is overridden.
Day and Night Modes

The day/night status of the space is determined by the status of DAY.NGT (Point 29). The control of this point differs depending on whether the controller is monitoring the status of a wall switch or is connected to a field panel.

When a wall switch is physically connected to the controller at the AI/DI port labeled “AI 4” (Figure 3-4 on page 3-13 and Figure 3-6 on page 3-20), and WALL SWITCH (Point 18) is set to YES, the controller monitors the status of DI 4 (Point 24). When DI 4 is ON (the switch is closed), DAY.NGT is set to DAY indicating that the controller is in day mode. When DI 4 is OFF (the switch is open), DAY.NGT is set to NIGHT indicating that the controller is in night mode.

When WALL SWITCH is set to NO, the controller does not monitor the status of the wall switch, even if one is connected to it. If the controller is operating stand-alone, it stays in day mode all the time. If the controller is operating with centralized control (that is, connected to a field panel), the field panel can send an operator or PPCL command to override the status of DAY.NGT. See the Powers Process Control Language (PPCL) User’s Manual (125-1896) and Field Panel User’s Manual (125-1895) for more information.

Night Mode Override Switch

If an override switch is present on the room temperature sensor and a value (in hours) other than zero has been entered into OVRD TIME (Point 20), pressing the override switch resets the controller to day operational mode for the time period that is set in OVRD TIME. The status of NGT OVRD (Point 21) changes to DAY. After the override time elapses, the controller returns to night mode and NGT OVRD changes back to NIGHT.

It is only when the controller is in night mode that the override switch on the room sensor has any effect on the controller.

Heating/Cooling Switchover

There are three options for the heating/cooling switchover for this application. In order for the controller to function properly, one of the following three options must be used:

1. A temperature sensor is installed in the supply air ductwork. The controller uses the measured temperature point, SUPPLY TEMP (Point 15), to determine whether it is in heating or cooling mode.

   When the value of SUPPLY TEMP is less than the value of COOL TEMP (Point 61), the controller sets HEAT.COOL (Point 5) to COOL, switching the controller to cooling mode.

   When the value of SUPPLY TEMP is greater than the value of HEAT TEMP (Point 62), the controller sets HEAT.COOL to HEAT, switching the controller to heating mode.
2. If the controller is connected to a field panel, the field panel can command SUPPLY TEMP.

When SUPPLY TEMP is commanded below the value of COOL TEMP, the controller sets HEAT.COOL to COOL, switching the controller to cooling mode.

When SUPPLY TEMP is commanded above the value of HEAT TEMP, the controller sets HEAT.COOL to HEAT, switching the controller to heating mode.

3. If the controller is connected to a field panel, the field panel can switch the controller between heating and cooling modes by commanding HEAT.COOL to HEAT or COOL.

Control Loops

The terminal box is controlled by three Proportional, Integral, and Derivative (PID) control loops: two temperature loops and a flow loop.

The two temperature loops are a cooling loop and a heating loop. The active temperature loop maintains room temperature at the value in CTL STPT (Point 92). See Control Temperature Setpoints (page 3-15).

**Cooling Loop**—The cooling loop uses the values of CTL STPT and CTL TEMP (Point 78) to generate the cooling loopout, which is then used to generate FLOW STPT (Point 93). FLOW STPT is calculated between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

**Heating Loop**—The heating loop uses the values of CTL STPT and CTL TEMP to generate the heating loopout, which is then used to generate the FLOW STPT. FLOW STPT is calculated between HTG FLOW MIN (Point 33) and HTG FLOW MAX (Point 34).

**Flow Loop**—The flow loop maintains airflow between CTL FLOW MIN (Point 76) and CTL FLOW MAX (Point 77) by modulating DMPR COMD (Point 48).

Calibration of Air Velocity Sensor

Calibration of the controller’s internal air velocity sensor is periodically required to maintain accurate air velocity readings. CAL SETUP (Point 95) is set with the desired calibration option during controller startup. Depending on the value of CAL SETUP, calibration may be set to take place automatically or manually. When CAL AIR (Point 94) has a setting of YES, calibration is in progress.

- For a controller used without an Autozero Module (CAL MODULE, Point 87, is set to NO), the damper is commanded closed to get a zero airflow reading during calibration.

- For a controller used with an Autozero Module (CAL MODULE is set to YES), calibration occurs without closing the damper.

At the end of a calibration sequence, CAL AIR automatically returns to NO. A setting of NO indicates that the controller is not in a calibration sequence.
Recalibration of Damper when Autozero Module is Used

The Autozero Module is enabled when it is wired to DO 4 and CAL MODULE (Point 87) is set to YES.

Under normal operation DMPR STATUS (Point 84) reads CAL. However, if using an Autozero Module, it is possible after a period of operation for the calculated damper position point, DMPR POS (Point 49), to differ from the actual (physical) damper position.

If this occurs, the controller automatically compensates for any difference by setting DMPR STATUS to RECAL, which readjusts the value of DMPR POS, allowing accurate flow control to continue. DMPR STATUS is set to RECAL if all of the following conditions are true:

- DMPR POS = 100%
- Air velocity > 200 ft/min (1.016 m/sec)
- FLOW (Point 75) < FLOW STPT (Point 93)

-or-

- DMPR POS = 0%
- Air velocity > 200 ft/min (1.016 m/sec)
- FLOW > FLOW STPT

**NOTE:** For a system using English units, air velocity (fpm) equals AIR VOLUME (Point 35, cfm) divided by DUCT AREA (Point 97, sq ft). For a system using SI units, air velocity (mps) equals 0.001 times AIR VOLUME (lps) divided by DUCT AREA (sq m).

**NOTE:** To change DMPR STATUS from RECAL back to CAL, set DMPR STATUS to CAL, and then release it.

Fail-safe Operation

If the air velocity sensor fails, the controller uses pressure-dependent control. The temperature loop controls the operation of the damper.

If the room temperature sensor fails, the controller operates using the last known temperature value.
Automated Checkout

The ATEC has a built-in checkout procedure that can be manually initiated at any time after the controller has been installed. The procedure tests all of the necessary I/O and ensures the controller has the ability to operate within the set airflow range, between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

To perform the checkout procedure, set CHK OUT (Point 10) to YES. When the procedure is completed, CHK OUT returns to NO and the results are displayed in CHK STATUS (Point 3). See Table 3-3.

Table 3-3. Possible Failure Value and Description.

<table>
<thead>
<tr>
<th>CHK STATUS Values (Point 3)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>Checkout procedure has not been run since last controller initialization.</td>
</tr>
<tr>
<td>0</td>
<td>No errors found.</td>
</tr>
<tr>
<td>1</td>
<td>Room temperature sensor failed.</td>
</tr>
<tr>
<td>2</td>
<td>Room setpoint dial failed [If STPT DIAL (Point 14) is set to YES].</td>
</tr>
<tr>
<td>4</td>
<td>Air velocity sensor failed.</td>
</tr>
<tr>
<td>8</td>
<td>Controller could not reach CLG FLOW MIN or below.</td>
</tr>
<tr>
<td>16</td>
<td>Controller could not reach CLG FLOW MAX or above.</td>
</tr>
</tbody>
</table>

NOTE: Multiple failures are added together and displayed as one value. For example, if the room temperature sensor failed (1) and the controller could not reach CLG FLOW MAX (16), CHK STATUS displays 17.

Application Notes

1. If temperature swings in the room are excessive or there is trouble maintaining the setpoint, the cooling loop, the heating loop, or both need to be tuned. If FLOW (Point 75) is oscillating while FLOW STPT (Point 93) is constant, the flow loop requires tuning. Contact your local Siemens Building Technologies representative for more information.

2. The ATEC, as shipped from the factory, keeps all associated equipment off. The controller and its equipment are released to application control at start-up.
Wiring Diagram

The point wiring for Application 2501 is shown in Figure 3-6.

**CAUTION:**

The controller’s DOs control 24 Vac loads only. The maximum rating is 12 VA for each DO. Use an interposing relay for any of the following:

- VA requirements higher than the maximum
- 110 or 220 Vac requirements
- DC power requirements
- Separate transformers used to power the load

![Figure 3-6. Application 2501 Wiring Diagram.](image-url)
## Point Database

**Table 3-4. Point Database for Application 2501**

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>CTLR ADDRESS</td>
<td>99</td>
<td>-</td>
<td>1</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
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<td>1</td>
<td>0</td>
<td>-</td>
<td>-</td>
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<tr>
<td>(03)</td>
<td>CHK STATUS</td>
<td>-1</td>
<td>-</td>
<td>1</td>
<td>-1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(04)</td>
<td>ROOM TEMP</td>
<td>74.0</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(05)</td>
<td>HEAT.COOl</td>
<td>COOL</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>HEAT</td>
<td>COOL</td>
</tr>
<tr>
<td>06</td>
<td>DAY CLG STPT</td>
<td>74.0</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>07</td>
<td>DAY HTG STPT</td>
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<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>08</td>
<td>NGT CLG STPT</td>
<td>82.0</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>09</td>
<td>NGT HTG STPT</td>
<td>65.0</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(10)</td>
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<td>-</td>
<td>-</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>11</td>
<td>RM STPT MIN</td>
<td>55.0</td>
<td>(21.20888) DEG F</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>RM STPT MAX</td>
<td>90.0</td>
<td>(32.08888) DEG F</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(13)</td>
<td>RM STPT DIAL</td>
<td>74.0</td>
<td>(21.20888) DEG F</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>14</td>
<td>STPT DIAL</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>(15)</td>
<td>SUPPLY TEMP</td>
<td>74.0</td>
<td>(23.48888) DEG F</td>
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<td>37.5 (3.05556)</td>
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<td>-</td>
</tr>
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<td>18</td>
<td>WALL SWITCH</td>
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<td>-</td>
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<td>NO</td>
</tr>
<tr>
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<td>DI OVRD SW</td>
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<td>-</td>
<td>-</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>20</td>
<td>OVRD TIME</td>
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<td>1</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(21)</td>
<td>NGT OVRD</td>
<td>NIGHT</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
<tr>
<td>(24)</td>
<td>DI 4</td>
<td>OFF</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(25)</td>
<td>DI 3</td>
<td>OFF</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(29)</td>
<td>DAY.NGT</td>
<td>DAY</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
</tbody>
</table>

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*Continued on next page...*
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<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
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</thead>
<tbody>
<tr>
<td>31</td>
<td>CLG FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>32</td>
<td>CLG FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>33</td>
<td>HTG FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>34</td>
<td>HTG FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(35)</td>
<td>AIR VOLUME</td>
<td>0 (0.0)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>36</td>
<td>FLOW COEFF</td>
<td>1.0</td>
<td>–</td>
<td>0.01</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(40)</td>
<td>AI 4</td>
<td>74.0 (23.495556)</td>
<td>DEG F (DEG C)</td>
<td>0.5 (0.28)</td>
<td>37.5 (3.055556)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(41)</td>
<td>DO 1</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(42)</td>
<td>DO 2</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(43)</td>
<td>DO 3</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(44)</td>
<td>DO 4</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(48)</td>
<td>DMPR COMD</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(49)</td>
<td>DMPR POS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>51</td>
<td>MTR1 TIMING</td>
<td>95 (36.0)</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(52)</td>
<td>MTR2 COMD</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(53)</td>
<td>MTR2 POS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>55</td>
<td>MTR2 TIMING</td>
<td>130 (36.0)</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>56</td>
<td>DMPR ROT ANG</td>
<td>90 (36.0)</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>58</td>
<td>MTR SETUP</td>
<td>1 (0.018)</td>
<td>–</td>
<td>0.25 (0.018)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>59</td>
<td>DO DIR. REV</td>
<td>0 (0.018)</td>
<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets { } may be unbundled at the field panel.

Continued on next page...
### Table 3-4. Point Database for Application 2501

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>CLG D GAIN</td>
<td>0 (0.0)</td>
<td>–</td>
<td>2 (3.6)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>66</td>
<td>CLG BIAS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>67</td>
<td>HTG P GAIN</td>
<td>10.0 (18.0)</td>
<td>–</td>
<td>0.25 (0.45)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>68</td>
<td>HTG I GAIN</td>
<td>0.01 (0.018)</td>
<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>69</td>
<td>HTG D GAIN</td>
<td>0 (0.0)</td>
<td>–</td>
<td>2 (3.6)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>70</td>
<td>HTG BIAS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>71</td>
<td>FLOW P GAIN</td>
<td>0.0</td>
<td>–</td>
<td>0.05</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>72</td>
<td>FLOW I GAIN</td>
<td>0.01</td>
<td>–</td>
<td>0.001</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>73</td>
<td>FLOW D GAIN</td>
<td>0</td>
<td>–</td>
<td>2</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>74</td>
<td>FLOW BIAS</td>
<td>50.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(75)</td>
<td>FLOW</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(76)</td>
<td>CTL FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(77)</td>
<td>CTL FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(78)</td>
<td>CTL TEMP</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(79)</td>
<td>CLG LOOPOUT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(80)</td>
<td>HTG LOOPOUT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(84)</td>
<td>DMPR STATUS</td>
<td>CAL</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>RECAL</td>
<td>CAL</td>
</tr>
<tr>
<td>87</td>
<td>CAL MODULE</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>(92)</td>
<td>CTL STPT</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(93)</td>
<td>FLOW STPT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(94)</td>
<td>CAL AIR</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>95</td>
<td>CAL SETUP</td>
<td>4</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>96</td>
<td>CAL TIMER</td>
<td>12</td>
<td>HRS</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>97</td>
<td>DUCT AREA</td>
<td>1.0 (0.09292)</td>
<td>SQ. FT (SQ M)</td>
<td>0.025 (0.002323)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>98</td>
<td>LOOP TIME</td>
<td>5</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(99)</td>
<td>ERROR STATUS</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets ( ) may be unbundled at the field panel.
Application 2522: VAV with Electric Reheat or Baseboard Radiation

Overview

In Application 2522, the controller modulates the supply air damper of the terminal box for cooling and controls stages of electric reheat or baseboard radiation for heating. When in heating, the terminal box either maintains minimum airflow or modulates the supply air damper. In order for the terminal box to work properly, the central air-handling unit must provide supply air. See Figure 3-7 through Figure 3-10.

Figure 3-7. Application 2522 Control Drawing for Electric Reheat.
Figure 3-8. Application 2522 Control Drawing for Baseboard Radiation.
### ROOM TEMPERATURE CONTROL SCHEDULE

<table>
<thead>
<tr>
<th></th>
<th>COLDER</th>
<th>HEATING (^*1) SET POINT</th>
<th>COOLING (^*1) SET POINT</th>
<th>WARMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEAT ON 100% OF TIME</td>
<td></td>
<td>HEAT (^2)</td>
<td>COOL (^2)</td>
<td></td>
</tr>
<tr>
<td>HTG FLOW MAX</td>
<td></td>
<td>(^*3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTG FLOW MIN</td>
<td></td>
<td>(^*4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. See Sequence of Operation, Control Temperature Setpoints.
3. When temperature is near the setpoint, heat is cycled on and off according to the size of the demand. This allows it to be controlled proportionally rather than with deadbands.
4. The airflow is shown operating parallel with the electric reheat. The airflow can operate at minimum flow throughout the entire heating mode (default setting). See Sequencing Logic.

**Figure 3-9. Application 2522 Control Schedule with Minimum Airflow during Heating (default).**

---

### ROOM TEMPERATURE CONTROL SCHEDULE

<table>
<thead>
<tr>
<th></th>
<th>COLDER</th>
<th>HEATING (^*1) SET POINT</th>
<th>COOLING (^*1) SET POINT</th>
<th>WARMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEAT ON 100% OF TIME</td>
<td></td>
<td>HEAT (^2)</td>
<td>COOL (^2)</td>
<td></td>
</tr>
<tr>
<td>HTG FLOW MAX</td>
<td></td>
<td>(^*3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTG FLOW MIN</td>
<td></td>
<td>(^*4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. See Sequence of Operation, Control Temperature Setpoints.
3. When temperature is near the setpoint, heat is cycled on and off according to the size of the demand. This allows it to be controlled proportionally rather than with deadbands.
4. The airflow is shown operating parallel with the electric reheat. The airflow can operate at minimum flow throughout the entire heating mode (Figure 3-9) or sequenced or overlapping with the heat. See Sequencing Logic.

**Figure 3-10. Application 2522 Control Schedule with Damper Modulated during Heating.**
Hardware Inputs

Analog
- Air velocity sensor
- Room temperature sensor
- Room temperature setpoint dial (optional)

Digital
- Night mode override (optional)
- Wall switch (optional)

Hardware Outputs

Analog
- None

Digital
- Autozero Module (optional)
- Damper actuator (wired internally)
- Stage 1 electric reheat or 2-position heating valve
- Stage 2 electric reheat (optional) or Autozero module (optional)

Ordering Notes

Actuating Terminal Equipment Controller with Reheat—Electronic Output
- Single unit 550-405
- 10-pack 550-405P10

Contact your local Siemens Building Technologies representative for additional product numbers.

Autozero Module (optional)
Temperature sensor (select one)
- Terminal Equipment Controller room temperature sensor
- Duct temperature sensor, 10K Ω, TEC (return-duct sensor)
  - 4-inch (10.2 cm) 540-128
  - 18-inch (46 cm) 540-739
Sequence of Operation

Control Temperature Setpoints

Depending on the controller’s current operational mode (day or night), CTL STPT (Point 92) holds the value of one of the following setpoints:

**Day Mode**—CTL STPT holds the value of DAY CLG STPT (Point 6) or DAY HTG STPT (Point 7). If the room temperature sensor has a setpoint dial and STPT DIAL (Point 14) is set to YES, CTL STPT holds the value of RM STPT DIAL (Point 13).

If the setpoint dial is used and the value of RM STPT DIAL is less than the value of RM STPT MIN (Point 11), CTL STPT holds the value of RM STPT MIN. If the value of RM STPT DIAL is greater than the value of RM STPT MAX (Point 12), CTL STPT holds the value of RM STPT MAX.

**Night Mode**—CTL STPT holds the value of NGT CLG STPT (Point 8) or NGT HTG STPT (Point 9).

**NOTE:** The value of CTL TEMP (Point 78) is the same as ROOM TEMP (Point 4), unless CTL TEMP is overridden.

Day and Night Modes

The day/night status of the space is determined by the status of DAY.NGT (Point 29). The control of this point differs depending on whether the controller is monitoring the status of a wall switch or is connected to a field panel.

When a wall switch is physically connected to the controller at the AI/DI port labeled “AI 4” (Figure 3-7 on page 3-24, Figure 3-8 on page 3-25, and Figure 3-11 on page 3-35), and WALL SWITCH (Point 18) is set to YES, the controller monitors the status of DI 4 (Point 24). When DI 4 is ON (the switch is closed), DAY.NGT is set to DAY indicating that the controller is in day mode. When DI 4 is OFF (the switch is open), DAY.NGT is set to NIGHT indicating that the controller is in night mode.

When WALL SWITCH is set to NO, the controller does not monitor the status of the wall switch, even if one is connected to it. If the controller is operating stand-alone, it stays in day mode all the time. If the controller is operating with centralized control (that is, connected to a field panel), the field panel can send an operator or PPCL command to override the status of DAY.NGT. See the *Powers Process Control Language (PPCL) User’s Manual* (125-1896) and *Field Panel User’s Manual* (125-1895) for more information.

Night Mode Override Switch

If an override switch is present on the room temperature sensor and a value (in hours) other than zero has been entered into OVRD TIME (Point 20), pressing the override switch resets the controller to day operational mode for the time period that is set in OVRD TIME. The status of NGT OVRD (Point 21) changes to DAY. After the override time elapses, the controller returns to night mode and NGT OVRD changes back to NIGHT.
It is only when the controller is in night mode that the override switch on the room sensor has any effect on the controller.

**Heating/Cooling Switchover**

**Based on Room Temperature (Internal Logic)**

The heating/cooling switchover determines whether the controller is in heating or cooling mode by monitoring the room temperature and the demand for heating and cooling (as determined by the temperature control loops).

If the following conditions are met for the length of time set in SWITCH TIME (Point 86), the controller switches from heating to cooling mode by setting HEAT.COOL (Point 5) to COOL:

- HTG LOOPOUT (Point 80) is less than SWITCH LIMIT (Point 85).
- CTL TEMP (Point 78) is greater than CTL STPT (Point 92) by at least the value set in SWITCH DBAND (Point 90).
- CTL TEMP is greater than the appropriate cooling setpoint minus SWITCH DBAND.

If the following conditions are met for the length of time set in SWITCH TIME, the controller switches from cooling to heating mode by setting HEAT.COOL to HEAT:

- CLG LOOPOUT (Point 79) is less than SWITCH LIMIT.
- CTL TEMP is less than CTL STPT by at least the value set in SWITCH DBAND.
- CTL TEMP is less than the appropriate heating setpoint plus SWITCH DBAND.

**Based on Supply Air Temperature (External Control)**

**CAUTION:**

The ATEC’s internal heating/cooling switchover mechanism is not affected by the air temperature in the supply duct.

To change the value of HEAT.COOL (Point 5) based on the supply air temperature, HEAT.COOL must be commanded through PPCL. This is required when the supply duct delivers warm air for heat and cool air for cooling. In this case, the room-temperature-based switchover must be disabled by commanding HEAT.COOL and the heat/cool mode setting must be based on the supply air temperature. When the supply air temperature is warm, the room is in the heating mode. When it is cold, the room is in the cooling mode.
Control Loops

The terminal box is controlled by three Proportional, Integral, and Derivative (PID) control loops: two temperature loops and a flow loop.

The two temperature loops are a cooling loop and a heating loop. The active temperature loop maintains room temperature at the value in CTL STPT (Point 92). See Control Temperature Setpoints (page 3-28).

Cooling Loop—The cooling loop uses the values of CTL STPT and CTL TEMP (Point 78) to generate the cooling loopout, which is then used to generate FLOW STPT (Point 93). FLOW STPT is calculated between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

Heating Loop—If the controller is in heating mode, the operation of the flow loop is flexible. As described in Sequencing Logic (page 3-31), it can be set up to do one of the following:

- Constantly maintain an airflow out of the terminal box equal to HTG FLOW MIN (Point 33).
- Operate in sequence with the electric reheat.
- Operate parallel with the electric reheat.
- Have its operation overlap with the operation of the electric reheat.

If the first option described above is chosen, HTG LOOPOUT (Point 80) controls the electric reheat in order to maintain the room temperature. If any one of the last three options is chosen, HTG LOOPOUT controls both the flow loop setpoint (FLOW STPT) and the electric reheat in order to maintain the room temperature. See Sequencing Logic for more information.

HTG LOOPOUT adjusts the value of FLOW STPT differently depending on which flow loop setup is chosen. However, in all cases FLOW STPT is between HTG FLOW MIN (Point 33) and HTG FLOW MAX (Point 34).

Flow Loop—The flow loop maintains the airflow between CTL FLOW MIN (Point 76) and CTL FLOW MAX (Point 77) by modulating DMPR COMD (Point 48).
Electric Reheat

⚠️ **CAUTION:**
Verify that the equipment is supplied with safeties by others to ensure that there is airflow across the heating coils when they are to be energized.

⚠️ **CAUTION:**
Do not set HTG FLOW MIN (Point 33) to 0 cfm (0 lps). A minimum airflow should be provided across the heating coils, for ventilation and for dispersing heat.

The heating loop controls up to two stages of electric reheat to warm up the room. The electric reheat is time-modulated using a duty cycle as shown in the following example. When the controller is in cooling mode, the electric heat is off at all times.

**Example**

Assume the duty cycle (STAGE TIME, Point 89) is 10 minutes, REHEAT START (Point 22) is 0%, and REHEAT END (Point 23) is 100%. The following table shows the intervals during which heat is on and off for various levels of demand from the heating loopout (HTG LOOPOUT, Point 80).

<table>
<thead>
<tr>
<th>HTG LOOPOUT</th>
<th>One stage of heat: minutes</th>
<th>Two stages of heat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stage 1: minutes</td>
<td>Stage 2: minutes</td>
</tr>
<tr>
<td>40%</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>60%</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>100%</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

**Baseboard Radiation**

The baseboard radiation can be either a two-position valve or electrical resistance heating.

If the controller is in cooling mode, the heating valve is closed.

When in heating mode, the controller operates the heating valve to maintain the heating setpoint as if it were a single stage of reheat.

**Sequencing Logic (Optional)**

The settings of FLOW START (Point 16), FLOW END (Point 17), REHEAT START (Point 22), and REHEAT END (Point 23) determine how the damper and reheat modulation are sequenced while in heating mode. These points represent the values of HTG LOOPOUT (Point 80) at which modulation of the damper and reheat begin and end.
The damper moves from minimum position to fully open as HTG LOOPOUT increases from FLOW START to FLOW END. If FLOW START and FLOW END are both set to 0% (default value), the damper stays at minimum position while in heating mode.

The cycle for the reheat ranges from always off to always on as HTG LOOPOUT increases from REHEAT START to REHEAT END. Default values for these points are 0% and 100% respectively. See *Electric Reheat* (page 3-31) for more information.

By varying the values of these start and end points, the damper and the reheat can be sequenced in series, parallel, or overlapping, as shown in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Series</th>
<th>Parallel</th>
<th>Overlapping</th>
<th>Minimum Flow (Default Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLOW START</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>FLOW END</td>
<td>50%</td>
<td>100%</td>
<td>75%</td>
<td>0%</td>
</tr>
<tr>
<td>REHEAT START</td>
<td>50%</td>
<td>0%</td>
<td>25%</td>
<td>0%</td>
</tr>
<tr>
<td>REHEAT END</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Electric Heat Interlock**

The electric heat stages are enabled as long as FLOW (Point 75) is greater than EHEAT FLOW (Point 60). The electric heat stages are not disabled (turned off) until FLOW is less than EHEAT FLOW minus 5%. Once disabled, FLOW must become greater than EHEAT FLOW before the electric heat stages return to normal control.

**CAUTION:**

Do not set EHEAT FLOW to less than 5%, otherwise the electric heat interlock will be disabled.

**Calibration of Air Velocity Sensor**

Calibration of the controller’s internal air velocity sensor is periodically required to maintain accurate air velocity readings. CAL SETUP (Point 95) is set with the desired calibration option during controller startup. Depending on the value of CAL SETUP, calibration may be set to take place automatically or manually. When CAL AIR (Point 94) has a setting of YES, calibration is in progress.

- For a controller used without an Autozero Module (CAL MODULE, Point 87, is set to NO), the damper is commanded closed to get a zero airflow reading during calibration.

- For a controller used with an Autozero Module (CAL MODULE is set to YES), calibration occurs without closing the damper.

At the end of a calibration sequence, CAL AIR automatically returns to NO. A setting of NO indicates that the controller is not in a calibration sequence.
Recalibration of Damper when Autozero Module is Used

The Autozero Module is enabled when it is wired to DO 4 and CAL MODULE (Point 87) is set to YES.

Under normal operation DMPR STATUS (Point 84) reads CAL. However, if using an Autozero Module, it is possible after a period of operation for the calculated damper position point, DMPR POS (Point 49), to differ from the actual (physical) damper position.

If this occurs, the controller automatically compensates for any difference by setting DMPR STATUS to RECAL, which readjusts the value of DMPR POS, allowing accurate flow control to continue. DMPR STATUS is set to RECAL if all of the following conditions are true:

- DMPR POS = 100%
- Air velocity > 200 ft/min (1.016 m/sec)
- FLOW (Point 75) < FLOW STPT (Point 93)

-or-

- DMPR POS = 0%
- Air velocity > 200 ft/min (1.016 m/sec)
- FLOW > FLOW STPT

NOTE: For a system using English units, air velocity (fpm) equals AIR VOLUME (Point 35, cfm) divided by DUCT AREA (Point 97, sq ft). For a system using SI units, air velocity (mps) equals 0.001 times AIR VOLUME (lps) divided by DUCT AREA (sq m).

NOTE: To change DMPR STATUS from RECAL back to CAL, set DMPR STATUS to CAL, and then release it.

Fail-Safe Operation

If the air velocity sensor fails, the controller uses pressure-dependent control. The temperature loop controls the operation of the damper.

If the room temperature sensor fails, the controller operates using the last known temperature value.
Automated Checkout

The ATEC has a built-in checkout procedure that can be manually initiated at any time after the controller has been installed. The procedure tests all of the necessary I/O and ensures the controller has the ability to operate within the set airflow range, between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

To perform the checkout procedure, set CHK OUT (Point 10) to **YES**. When the procedure is completed, CHK OUT returns to NO and the results are displayed in CHK STATUS (Point 3). See Table 3-5.

<table>
<thead>
<tr>
<th>CHK STATUS Values (Point 3)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>Checkout procedure has not been run since last controller initialization.</td>
</tr>
<tr>
<td>0</td>
<td>No errors found.</td>
</tr>
<tr>
<td>1</td>
<td>Room temperature sensor failed.</td>
</tr>
<tr>
<td>2</td>
<td>Room setpoint dial failed [If STPT DIAL (Point 14) is set to YES].</td>
</tr>
<tr>
<td>4</td>
<td>Air velocity sensor failed.</td>
</tr>
<tr>
<td>8</td>
<td>Controller could not reach CLG FLOW MIN or below.</td>
</tr>
<tr>
<td>16</td>
<td>Controller could not reach CLG FLOW MAX or above.</td>
</tr>
</tbody>
</table>

**NOTE:** Multiple failures are added together and displayed as one value. For example, if the room temperature sensor failed (1) and the controller cannot reach CLG FLOW MAX (16), CHK STATUS displays 17.

Application Notes

1. If temperature swings in the room are excessive or there is trouble maintaining the setpoint, the cooling loop, the heating loop, or both need to be tuned. If FLOW (Point 75) is oscillating while FLOW STPT (Point 93) is constant, the flow loop requires tuning. Contact your local Siemens Building Technologies representative for more information.

2. The ATEC, as shipped from the factory, keeps all associated equipment off. The controller and its equipment are released to application control during start-up.
Wiring Diagram

The point wiring for Application 2522 is shown in Figure 3-11.

**CAUTION:**

The controller’s DOs control 24 Vac loads only. The maximum rating is 12 VA for each DO. Use an interposing relay for any of the following:

- VA requirements higher than the maximum
- 110 or 220 Vac requirements
- DC power requirements
- Separate transformers used to power the load

![Figure 3-11. Application 2522 Wiring Diagram.](image-url)
Table 3-6. Point Database for Application 2522.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>CT LR ADDRESS</td>
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<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>02</td>
<td>APPLICATION</td>
<td>2473</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>03</td>
<td>CHK STATUS</td>
<td>-1</td>
<td>–</td>
<td>1</td>
<td>-1</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>04</td>
<td>ROOM TEMP</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>05</td>
<td>HEAT.COO L</td>
<td>COOL</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>HEAT</td>
<td>COOL</td>
</tr>
<tr>
<td>06</td>
<td>DAY CLG STPT</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>07</td>
<td>DAY HTG STPT</td>
<td>70.0 (21.20888)</td>
<td>DEG F (DEG C)</td>
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<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>08</td>
<td>NGT CLG STPT</td>
<td>82.0 (27.92888)</td>
<td>DEG F (DEG C)</td>
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<td>48.0 (8.88888)</td>
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<td>–</td>
</tr>
<tr>
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<td>NGT HTG STPT</td>
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<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>10</td>
<td>CHK OUT</td>
<td>NO</td>
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<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>11</td>
<td>RM STPT MIN</td>
<td>55.0 (12.80888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>12</td>
<td>RM STPT MAX</td>
<td>90.0 (32.40888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>13</td>
<td>RM STPT DIAL</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
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<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
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<td>14</td>
<td>STPT DIAL</td>
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<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
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<td>37.5 (3.055556)</td>
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<td>–</td>
</tr>
<tr>
<td>16</td>
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<td>PCT</td>
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<td>0.0</td>
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<td>–</td>
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<td>0.0</td>
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<td>–</td>
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<td>–</td>
<td>–</td>
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<td>NO</td>
</tr>
<tr>
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<td>DI OVRD SW</td>
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<td>–</td>
<td>–</td>
<td>–</td>
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<td>OFF</td>
</tr>
<tr>
<td>20</td>
<td>OVRD TIME</td>
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<td>0</td>
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<td>–</td>
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<td>21</td>
<td>NGT OVRD</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
<tr>
<td>22</td>
<td>REHEAT START</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets ( ) may be unbundled at the field panel.

Continued on next page...
### Table 3-6. Point Database for Application 2522.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
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<tbody>
<tr>
<td>23</td>
<td>REHEAT END</td>
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<td>PCT</td>
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<td>0.0</td>
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<td>–</td>
</tr>
<tr>
<td>{24}</td>
<td>DI 4</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>{25}</td>
<td>DI 3</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>{29}</td>
<td>DAY.NGT</td>
<td>DAY</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
</tr>
<tr>
<td>31</td>
<td>CLG FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>32</td>
<td>CLG FLOW MAX</td>
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<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>33</td>
<td>HTG FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
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<td>–</td>
</tr>
<tr>
<td>34</td>
<td>HTG FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
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<td>–</td>
</tr>
<tr>
<td>{35}</td>
<td>AIR VOLUME</td>
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<td>CFM (LPS)</td>
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<tr>
<td>36</td>
<td>FLOW COEFF</td>
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<tr>
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<td>AI 4</td>
<td>74.0 (23.495556)</td>
<td>DEG F (DEG C)</td>
<td>0.5 (0.28)</td>
<td>37.5 (3.055556)</td>
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<td>–</td>
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<tr>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>{42}</td>
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<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
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<td>{43}</td>
<td>HEAT STAGE 1</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
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<td>{44}</td>
<td>HEAT STAGE 2</td>
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<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>{48}</td>
<td>DMPR COMD</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
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<td>MTR1 TIMING</td>
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<td>MTR SETUP</td>
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<td>59</td>
<td>DO DIR. REV</td>
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<td>EHEAT FLOW</td>
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<td>PCT</td>
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</tr>
<tr>
<td>63</td>
<td>CLG P GAIN</td>
<td>20.0 (36.0)</td>
<td>–</td>
<td>0.25 (0.45)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>64</td>
<td>CLG I GAIN</td>
<td>0.01 (0.018)</td>
<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>65</td>
<td>CLG D GAIN</td>
<td>0 (0.0)</td>
<td>–</td>
<td>2 (3.6)</td>
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<td>–</td>
</tr>
<tr>
<td>66</td>
<td>CLG BIAS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>67</td>
<td>HTG P GAIN</td>
<td>10.0 (18.0)</td>
<td>–</td>
<td>0.25 (0.45)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application.
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3. Point numbers that appear in brackets ( ) may be unbundled at the field panel.

Continued on next page...
### Table 3-6. Point Database for Application 2522.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>68</td>
<td>HTG I GAIN</td>
<td>0.01 (0.018)</td>
<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
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<td>69</td>
<td>HTG D GAIN</td>
<td>0 (0.0)</td>
<td>–</td>
<td>2 (3.6)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>70</td>
<td>HTG BIAS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
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<tr>
<td>72</td>
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<td>–</td>
<td>0.001</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
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<td>2</td>
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<tr>
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<td>PCT</td>
<td>0.4</td>
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<tr>
<td>(75)</td>
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<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
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<td>–</td>
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<tr>
<td>(76)</td>
<td>CTL FLOW MIN</td>
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<tr>
<td>(78)</td>
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<td>DEG F (DEG C)</td>
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<tr>
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<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>82</td>
<td>STAGE MAX</td>
<td>90.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>83</td>
<td>STAGE MIN</td>
<td>10.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(84)</td>
<td>DMPR STATUS</td>
<td>CAL</td>
<td>–</td>
<td>–</td>
<td>RECAL</td>
<td>CAL</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>SWITCH LIMIT</td>
<td>5.2</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>86</td>
<td>SWITCH TIME</td>
<td>10</td>
<td>MIN</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>87</td>
<td>CAL MODULE</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>88</td>
<td>STAGE COUNT</td>
<td>1</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>89</td>
<td>STAGE TIME</td>
<td>10</td>
<td>MIN</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>90</td>
<td>SWITCH DBAND</td>
<td>1.0 (0.56)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(92)</td>
<td>CTL STPT</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(93)</td>
<td>FLOW STPT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(94)</td>
<td>CAL AIR</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
<td></td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets ( ) may be unbundled at the field panel.

*Continued on next page...*
Table 3-6. Point Database for Application 2522.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>CAL SETUP</td>
<td>4</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>96</td>
<td>CAL TIMER</td>
<td>12</td>
<td>HRS</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>97</td>
<td>DUCT AREA</td>
<td>1.0 (0.09292)</td>
<td>SQ. FT (SQ M)</td>
<td>0.025 (0.002323)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>98</td>
<td>LOOP TIME</td>
<td>5</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(99)</td>
<td>ERROR STATUS</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets { } may be unbundled at the field panel.
Application 2523: VAV with Hot Water Reheat (only one reheat valve)

Overview

In Application 2523, the controller modulates the supply air damper of the terminal box for cooling and modulates a reheat valve for heating. When in heating, the terminal box either maintains minimum airflow or modulates the supply air damper. In order for the terminal box to work properly, the central air-handling unit must provide supply air. See Figure 3-12 through Figure 3-14.

Figure 3-12. Application 2523 Control Drawing.
**Application 2523: VAV with Hot Water Reheat (only one reheat valve)**

**CONTROL SCHEDULE**

<table>
<thead>
<tr>
<th>ROOM TEMPERATURE</th>
<th>COLDER</th>
<th>HEATING *1 SET POINT</th>
<th>COOLING *1 SET POINT</th>
<th>WARMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEAT ON 100% OF TIME</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTG FLOW MAX=</td>
<td>*2 HEAT</td>
<td>*2 COOL</td>
<td>CLG FLOW MAX</td>
<td>HEAT OFF</td>
</tr>
<tr>
<td>HTG FLOW MIN=</td>
<td>*3</td>
<td></td>
<td>CLG FLOW MIN</td>
<td></td>
</tr>
<tr>
<td>COOLING SET POINT</td>
<td></td>
<td></td>
<td>HEATING SET POINT</td>
<td></td>
</tr>
</tbody>
</table>

1. See Sequence of Operation, Control Temperature Setpoints.
3. When temperature is near the setpoint, heat is modulated according to the size of the demand. This allows it to be controlled proportionally rather than with deadbands.
4. The airflow is shown operating parallel with the electric reheat. The airflow can operate at minimum flow throughout the entire heating mode (default setting). The airflow can optionally operate parallel (Figure 3-13), sequenced, or overlapping with the heat. See Sequencing Logic.

**Figure 3-13. Application 2523 Control Schedule with Minimum Airflow during Heating (default).**

---

**CONTROL SCHEDULE**

<table>
<thead>
<tr>
<th>ROOM TEMPERATURE</th>
<th>COLDER</th>
<th>HEATING *1 SET POINT</th>
<th>COOLING *1 SET POINT</th>
<th>WARMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEAT ON 100% OF TIME</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTG FLOW MAX=</td>
<td>*2 HEAT</td>
<td>*2 COOL</td>
<td>CLG FLOW MAX</td>
<td>HEAT OFF</td>
</tr>
<tr>
<td>HTG FLOW MIN=</td>
<td>*3</td>
<td></td>
<td>CLG FLOW MIN</td>
<td></td>
</tr>
<tr>
<td>COOLING SET POINT</td>
<td></td>
<td></td>
<td>HEATING SET POINT</td>
<td></td>
</tr>
</tbody>
</table>

1. See Sequence of Operation, Control Temperature Setpoints.
3. When temperature is near the setpoint, heat is modulated according to the size of the demand. This allows it to be controlled proportionally rather than with deadbands.
4. The airflow is shown operating parallel with the electric reheat. The airflow can operate at minimum flow throughout the entire heating mode (Figure 3-13) or sequenced or overlapping with the heat. See Sequencing Logic.

**Figure 3-14. Application 2523 Control Schedule with Damper Modulated during Heating.**
Hardware Inputs

Analog
- Air velocity sensor
- Room temperature sensor
- Room temperature setpoint dial (optional)

Digital
- Night mode override (optional)
- Wall switch (optional)

Hardware Outputs

Analog
- None

Digital
- Damper actuator (wired internally)
- Valve actuator (required)

Ordering Notes

Actuating Terminal Equipment Controller with Reheat—Electronic Output
Single unit 550-405
10-pack 550-405P10

Contact your local Siemens Building Technologies representative for additional product numbers.

Valve actuator
Temperature sensor (select one)
- Terminal Equipment Controller room temperature sensor
- Duct temperature sensor, 10K Ω, TEC (return-duct sensor)
  4-inch (10.2 cm) 540-128
  18-inch (46 cm) 540-739
Sequence of Operation

Control Temperature Setpoints

Depending on the controller’s current operational mode (day or night), CTL STPT (Point 92) holds the value of one of the following setpoints:

**Day Mode**—CTL STPT holds the value of DAY CLG STPT (Point 6) or DAY HTG STPT (Point 7). If the room temperature sensor has a setpoint dial and STPT DIAL (Point 14) is set to YES, CTL STPT holds the value of RM STPT DIAL (Point 13).

If the setpoint dial is used and the value of RM STPT DIAL is less than the value of RM STPT MIN (Point 11), CTL STPT holds the value of RM STPT MIN. If the value of RM STPT DIAL is greater than the value of RM STPT MAX (Point 12), CTL STPT holds the value of RM STPT MAX.

**Night Mode**—CTL STPT holds the value of NGT CLG STPT (Point 8) or NGT HTG STPT (Point 9).

**NOTE:** The value of CTL TEMP (Point 78) is the same as ROOM TEMP (Point 4), unless CTL TEMP is overridden.

Day and Night Modes

The day/night status of the space is determined by the status of DAY.NGT (Point 29). The control of this point differs depending on whether the controller is monitoring the status of a wall switch or is connected to a field panel.

When a wall switch is physically connected to the controller at the AI/DI port labeled “AI 4” (Figure 3-12 on page 3-40 and Figure 3-15 on page 3-48), and WALL SWITCH (Point 18) is set to YES, the controller monitors the status of DI 4 (Point 24). When DI 4 is ON (the switch is closed), DAY.NGT is set to DAY indicating that the controller is in day mode. When DI 4 is OFF (the switch is open), DAY.NGT is set to NIGHT indicating that the controller is in night mode.

When WALL SWITCH is set to NO, the controller does not monitor the status of the wall switch, even if one is connected to it. If the controller is operating stand-alone, it stays in day mode all the time. If the controller is operating with centralized control (that is, connected to a field panel), the field panel can send an operator or PPCL command to override the status of DAY.NGT. See the *Powers Process Control Language (PPCL) User’s Manual* (125-1896) and *Field Panel User’s Manual* (125-1895) for more information.
**Night Mode Override Switch**

If an override switch is present on the room temperature sensor and a value (in hours) other than zero has been entered into OVRD TIME (Point 20), pressing the override switch resets the controller to day operational mode for the time period that is set in OVRD TIME. The status of NGT OVRD (Point 21) changes to DAY. After the override time elapses, the controller returns to night mode and NGT OVRD changes back to NIGHT.

It is only when the controller is in night mode that the override switch on the room sensor has any effect on the controller.

**Heating/Cooling Switchover**

**Based on Room Temperature (Internal Logic)**

The heating/cooling switchover determines whether the controller is in heating or cooling mode by monitoring the room temperature and the demand for heating and cooling (as determined by the temperature control loops).

If the following conditions are met for the length of time set in SWITCH TIME (Point 86), the controller switches from heating to cooling mode by setting HEAT.COOL (Point 5) to COOL:

- HTG LOOPOUT (Point 80) < SWITCH LIMIT (Point 85).
- CTL TEMP (Point 78) > CTL STPT (Point 92) by at least the value set in SWITCH DBAND (Point 90).
- CTL TEMP > the appropriate cooling setpoint minus SWITCH DBAND.

If the following conditions are met for the length of time set in SWITCH TIME, the controller switches from cooling to heating mode by setting HEAT.COOL to HEAT:

- CLG LOOPOUT (Point 79) < SWITCH LIMIT.
- CTL TEMP < CTL STPT by at least the value set in SWITCH DBAND.
- CTL TEMP < the appropriate heating setpoint plus SWITCH DBAND.

**Based on Supply Air Temperature (External Control)**

**CAUTION:**

The ATEC’s internal heating/cooling switchover mechanism is not affected by the air temperature in the supply duct.

To change the value of HEAT.COOL (Point 5) based on the supply air temperature, HEAT.COOL must be commanded through PPCL. This is required when the supply duct delivers warm air for heat and cool air for cooling. In this case, the room-temperature-based switchover must be disabled by commanding HEAT.COOL, and the heat/cool mode must be based on the supply air temperature. When the supply air temperature is warm, the room is in the cooling mode. When it is cold, the room is in the cooling mode.
Control Loops

The terminal box is controlled by three Proportional, Integral, and Derivative (PID) control loops: two temperature loops and a flow loop.

The two temperature loops are a cooling loop and a heating loop. The active temperature loop maintains room temperature at the value in CTL STPT (Point 92). See Control Temperature Setpoints (page 3-43).

Cooling Loop—The cooling loop uses the values of CTL STPT and CTL TEMP (Point 78) to generate the cooling loopout, which is then used to generate FLOW STPT (Point 93). FLOW STPT is calculated between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

Heating Loop—If the controller is in heating mode, the operation of the flow loop is flexible. As described in Sequencing Logic (page 3-46), it can be set up to do one of the following:

- Constantly maintain an airflow out of the terminal box equal to HTG FLOW MIN (Point 33).
- Operate in sequence with the electric reheat.
- Operate parallel with the electric reheat.
- Have its operation overlap with the operation of the electric reheat.

If the first option described above is chosen, HTG LOOPOUT (Point 80) controls the electric reheat in order to maintain the room temperature. If any one of the last three options is chosen, HTG LOOPOUT controls both the flow loop setpoint (FLOW STPT) and the electric reheat in order to maintain the room temperature. See Sequencing Logic for more information.

HTG LOOPOUT adjusts the value of FLOW STPT differently depending on which flow loop setup is chosen. However, in all cases FLOW STPT is between HTG FLOW MIN (Point 33) and HTG FLOW MAX (Point 34).

Flow Loop—The flow loop maintains the airflow between CTL FLOW MIN (Point 76) and CTL FLOW MAX (Point 77) by modulating DMPR COMD (Point 48).

Hot Water Reheat

CAUTION:

Do not set HTG FLOW MIN (Point 33) to 0 cfm (0 lps). A minimum airflow should be provided across the heating coils, for ventilation and for dispersing heat.

When the controller is in heating mode, HTG LOOPOUT controls the value of VLV COMD (Point 52). As HTG LOOPOUT traverses the range between REHEAT START and REHEAT END, the value of VLV COMD ranges from 0 to 100% open.

When the controller is in cooling mode, the heating valve is closed.
Sequencing Logic (Optional)

The settings of FLOW START (Point 16), FLOW END (Point 17), REHEAT START (Point 22), and REHEAT END (Point 23) determine how the damper and reheat modulation are sequenced while in heating mode. These points represent the values of HTG LOOPOUT (Point 80) at which modulation of the damper and reheat begin and end.

The damper moves from minimum position to fully open as HTG LOOPOUT increases from FLOW START to FLOW END. If FLOW START and FLOW END are both set to 0% (default value), the damper stays at minimum position while in heating mode.

The heating valve moves from fully closed to fully open as HTG LOOPOUT increases from REHEAT START to REHEAT END. Default values for these points are 0% and 100% respectively. See Hot Water Reheat (page 3-45) for more information.

By varying the values of these start and end points, the damper and the reheat can be sequenced in series, parallel, or overlapping, as shown in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Series</th>
<th>Parallel</th>
<th>Overlapping</th>
<th>Minimum Flow (Default Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLOW START</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>FLOW END</td>
<td>50%</td>
<td>100%</td>
<td>75%</td>
<td>0%</td>
</tr>
<tr>
<td>REHEAT START</td>
<td>50%</td>
<td>0%</td>
<td>25%</td>
<td>0%</td>
</tr>
<tr>
<td>REHEAT END</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Calibration

Air Velocity Sensor—Calibration of the controller’s internal air velocity sensor is periodically required to maintain accurate air velocity readings. CAL SETUP (Point 95) is set with the desired calibration option during controller startup. Depending on the value of CAL SETUP, calibration may be set to take place automatically or manually. If CAL AIR (Point 94) is set to YES, calibration is in progress. The damper is commanded closed to get a zero airflow reading during calibration.

Hot Water Valve—Calibration of a hot water valve is done by commanding the valve to closed.

At the end of a calibration sequence, CAL AIR automatically returns to NO. A setting of NO indicates that the controller is not in a calibration sequence.

Fail-Safe Operation

If the air velocity sensor fails, the controller uses pressure-dependent control. The temperature loop controls the operation of the damper.

If the room temperature sensor fails, the controller operates using the last known temperature value.
Automated Checkout

The ATEC has a built-in checkout procedure that can be manually initiated at any time after the controller has been installed. The procedure tests all of the necessary I/O and ensures the controller has the ability to operate within the set airflow range, between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

To perform the checkout procedure, set CHK OUT (Point 10) to YES. When the procedure is completed, CHK OUT returns to NO and the results are displayed in CHK STATUS (Point 3). See Table 3-7.

Table 3-7. Possible Failure Value and Description.

<table>
<thead>
<tr>
<th>CHK STATUS Values (Point 3)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>Checkout procedure has not been run since last controller initialization.</td>
</tr>
<tr>
<td>0</td>
<td>No errors found.</td>
</tr>
<tr>
<td>1</td>
<td>Room temperature sensor failed.</td>
</tr>
<tr>
<td>2</td>
<td>Room setpoint dial failed [If STPT DIAL (Point 14) is set to YES].</td>
</tr>
<tr>
<td>4</td>
<td>Air velocity sensor failed.</td>
</tr>
<tr>
<td>8</td>
<td>Controller could not reach CLG FLOW MIN or below.</td>
</tr>
<tr>
<td>16</td>
<td>Controller could not reach CLG FLOW MAX or above.</td>
</tr>
</tbody>
</table>

NOTE: Multiple failures are added together and displayed as one value. For example, if the room temperature sensor failed (1) and the controller could not reach CLG FLOW MAX (16), CHK STATUS displays 17.

Application Notes

1. If temperature swings in the room are excessive or there is trouble maintaining the setpoint, the cooling loop, the heating loop, or both need to be tuned. If FLOW (Point 75) is oscillating while FLOW STPT (Point 93) is constant, the flow loop requires tuning. Contact your local Siemens Building Technologies representative for more information.

2. In order for the heating loopout to work, MTR2 must be enabled by setting MTR SETUP (Point 58). Contact your local Siemens Building Technologies representative for more information.

3. The ATEC, as shipped from the factory, keeps all associated equipment off. The controller and its equipment are released to application control during start-up.
Wiring Diagram

The point wiring for Application 2523 is shown in Figure 3-15.

**CAUTION:**

The controller’s DOs control 24 Vac loads only. The maximum rating is 12 VA for each DO. Use an interposing relay for any of the following:

- VA requirements higher than the maximum
- 110 or 220 Vac requirements
- DC power requirements
- Separate transformers used to power the load

![Figure 3-15. Application 2523 Wiring Diagram.](image-url)
### Point Database

**Table 3-8. Point Database for Application 2523.**

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>CTLR ADDRESS</td>
<td>99</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>02</td>
<td>APPLICATION</td>
<td>2473</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(03)</td>
<td>CHK STATUS</td>
<td>-1</td>
<td>–</td>
<td>1</td>
<td>-1</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(04)</td>
<td>ROOM TEMP</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(05)</td>
<td>HEAT.COOL</td>
<td>COOL</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>HEAT</td>
<td>COOL</td>
</tr>
<tr>
<td>06</td>
<td>DAY CLG STPT</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>07</td>
<td>DAY HTG STPT</td>
<td>70.0 (21.20888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>08</td>
<td>NGT CLG STPT</td>
<td>82.0 (27.92888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>09</td>
<td>NGT HTG STPT</td>
<td>65.0 (18.40888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(10)</td>
<td>CHK OUT</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>11</td>
<td>RM STPT MIN</td>
<td>55.0 (12.80888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>12</td>
<td>RM STPT MAX</td>
<td>90.0 (32.40888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(13)</td>
<td>RM STPT DIAL</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>14</td>
<td>STPT DIAL</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>(15)</td>
<td>AI 3</td>
<td>74.0 (23.495556)</td>
<td>DEG F (DEG C)</td>
<td>0.5</td>
<td>37.5 (3.055556)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>16</td>
<td>FLOW START</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
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<tr>
<td>17</td>
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<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
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<td>18</td>
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<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>(19)</td>
<td>DI OVRD SW</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>20</td>
<td>OVRD TIME</td>
<td>0</td>
<td>HRS</td>
<td>1</td>
<td>0</td>
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<td>–</td>
</tr>
<tr>
<td>(21)</td>
<td>NGT OVRD</td>
<td>NIGHT</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
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3. Point numbers that appear in brackets {} may be unbundled at the field panel.

*Continued on next page...*
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<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>REHEAT START</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
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<tr>
<td>23</td>
<td>REHEAT END</td>
<td>100.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(24)</td>
<td>DI 4</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(25)</td>
<td>DI 3</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
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<tr>
<td>(29)</td>
<td>DAY.NGT</td>
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<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
<tr>
<td>31</td>
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<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
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<td>–</td>
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<tr>
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<td>CLG FLOW MAX</td>
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<td>CFM (LPS)</td>
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<td>–</td>
<td>–</td>
</tr>
<tr>
<td>33</td>
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<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
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<td>–</td>
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<tr>
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<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
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<td>–</td>
<td>–</td>
</tr>
<tr>
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<td>AIR VOLUME</td>
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<tr>
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<td>FLOW COEFF</td>
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<td>0.01</td>
<td>0.0</td>
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<td>–</td>
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<td>(40)</td>
<td>AI 4</td>
<td>74.0 (23.495556)</td>
<td>DEG F (DEG C)</td>
<td>0.5 (0.28)</td>
<td>37.5 (3.055556)</td>
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<td>DO 1</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(42)</td>
<td>DO 2</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(43)</td>
<td>DO 3</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(44)</td>
<td>DO 4</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(48)</td>
<td>DMPR COMD</td>
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<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
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<tr>
<td>(49)</td>
<td>DMPR POS</td>
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<td>PCT</td>
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<td>0.0</td>
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<td>–</td>
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<tr>
<td>51</td>
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<td>95</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
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<tr>
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<td>VLV COMD</td>
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<td>PCT</td>
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<td>VLV POS</td>
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<td>55</td>
<td>MTR2 TIMING</td>
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<td>SEC</td>
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<td>0</td>
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<td>–</td>
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<tr>
<td>56</td>
<td>DMPR ROT ANG</td>
<td>90</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>58</td>
<td>MTR SETUP</td>
<td>1</td>
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<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>59</td>
<td>DO DIR. REV</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>63</td>
<td>CLG P GAIN</td>
<td>20.0 (36.0)</td>
<td>–</td>
<td>0.25 (0.45)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets { } may be unbundled at the field panel.

*Continued on next page...*
Table 3-8. Point Database for Application 2523.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>CLG I GAIN</td>
<td>0.01 (0.018)</td>
<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>65</td>
<td>CLG D GAIN</td>
<td>0 (0.0)</td>
<td>–</td>
<td>2 (3.6)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>66</td>
<td>CLG BIAS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>67</td>
<td>HTG P GAIN</td>
<td>10.0 (18.0)</td>
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<td>0.25 (0.45)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>68</td>
<td>HTG I GAIN</td>
<td>0.01 (0.018)</td>
<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
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<td>69</td>
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<td>2 (3.6)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>70</td>
<td>HTG BIAS</td>
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<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
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<td>71</td>
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<td>0.05</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>72</td>
<td>FLOW I GAIN</td>
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<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
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<td>–</td>
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<td>73</td>
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<td>–</td>
</tr>
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<td>FLOW BIAS</td>
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<td>PCT</td>
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<td>75</td>
<td>FLOW</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>76</td>
<td>CTL FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>77</td>
<td>CTL FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>78</td>
<td>CTL TEMP</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
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<td>–</td>
</tr>
<tr>
<td>79</td>
<td>CLG LOOPOUT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
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<td>80</td>
<td>HTG LOOPOUT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>85</td>
<td>SWITCH LIMIT</td>
<td>5.2</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>86</td>
<td>SWITCH TIME</td>
<td>10</td>
<td>MIN</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>90</td>
<td>SWITCH DBAND</td>
<td>1.0 (0.56)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
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<tr>
<td>92</td>
<td>CTL STPT</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>93</td>
<td>FLOW STPT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>94</td>
<td>CAL AIR</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>95</td>
<td>CAL SETUP</td>
<td>4</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>96</td>
<td>CAL TIMER</td>
<td>12</td>
<td>HRS</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application.
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3. Point numbers that appear in brackets { } may be unbundled at the field panel.

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<thead>
<tr>
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<th>Descriptor</th>
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<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>97</td>
<td>DUCT AREA</td>
<td>1.0 (0.09292)</td>
<td>SQ. FT (SQ M)</td>
<td>0.025 (0.002323)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>98</td>
<td>LOOP TIME</td>
<td>5 SEC</td>
<td></td>
<td></td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(99)</td>
<td>ERROR STATUS</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets {} may be unbundled at the field panel.
Application 2524: VAV Series Fan Powered with One Stage of Electric Reheat

Overview

In Application 2524, the controller modulates the supply air damper of the terminal box for cooling and controls one stage of electric reheat for heating. When in heating, the terminal box either maintains minimum airflow or modulates the supply air damper. The terminal box also has a series fan for air circulation. In order for the terminal box to work properly, the central air-handling unit must provide supply air. See Figure 3-16 through Figure 3-18.

1. Heat must be on the outlet.

Figure 3-16. Application 2524 Control Drawing.
### Chapter 3—Applications for ATEC—VAV with Reheat

#### CONTROL SCHEDULE

<table>
<thead>
<tr>
<th>ROOM TEMPERATURE</th>
<th>COLDER</th>
<th>HEATING *1 SET POINT</th>
<th>COOLING *1 SET POINT</th>
<th>WARMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEAT ON 100% OF TIME</td>
<td></td>
<td></td>
<td></td>
<td>CLG FLOW MAX</td>
</tr>
<tr>
<td>HTG FLOW MAX=</td>
<td></td>
<td>*2 HEAT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTG FLOW MIN=</td>
<td></td>
<td></td>
<td>*3</td>
<td></td>
</tr>
<tr>
<td>CLG FLOW MIN=</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAN OPERATION - DAY</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAN OPERATION - NIGHT</td>
<td>ON</td>
<td></td>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>

1. See Sequence of Operation, Control Temperature Setpoints.
3. When temperature is near the setpoint, heat is cycled on and off according to the size of the demand. This allows it to be controlled proportionally rather than with deadbands.
4. The airflow is shown operating parallel with the electric reheat. The airflow can operate at minimum flow throughout the entire heating mode (default setting). The airflow can be controlled proportionally rather than with deadbands. See Sequencing Logic.

Figure 3-17. Application 2524 Control Schedule with Minimum Airflow during Heating (default).

### CONTROL SCHEDULE

<table>
<thead>
<tr>
<th>ROOM TEMPERATURE</th>
<th>COLDER</th>
<th>HEATING *1 SET POINT</th>
<th>COOLING *1 SET POINT</th>
<th>WARMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEAT ON 100% OF TIME</td>
<td></td>
<td></td>
<td></td>
<td>CLG FLOW MAX</td>
</tr>
<tr>
<td>HTG FLOW MAX=</td>
<td></td>
<td>*2 HEAT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTG FLOW MIN=</td>
<td></td>
<td></td>
<td>*3</td>
<td></td>
</tr>
<tr>
<td>CLG FLOW MIN=</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAN OPERATION - DAY</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAN OPERATION - NIGHT</td>
<td>ON</td>
<td></td>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>

1. See Sequence of Operation, Control Temperature Setpoints.
3. When temperature is near the setpoint, heat is cycled on and off according to the size of the demand. This allows it to be controlled proportionally rather than with deadbands.
4. The airflow is shown operating parallel with the electric reheat. The airflow can operate at minimum flow throughout the entire heating mode (Figure 3-17) or sequenced or overlapping with the heat. See Sequencing Logic.

Figure 3-18. Application 2524 Control Schedule with Damper Modulated during Heating.
Hardware Inputs

Analog
- Air velocity sensor
- Room temperature sensor
- Room temperature setpoint dial (optional)

Digital
- Night mode override (optional)
- Wall switch (optional)

Hardware Outputs

Analog
- None

Digital
- Damper actuator (wired internally)
- Series fan
- Stage 1 electric reheat

Ordering Notes

Actuating Terminal Equipment Controller with Reheat—Electronic Output
- Single unit 550-405
- 10-pack 550-405P10

Contact your local Siemens Building Technologies representative for additional product numbers.

Temperature sensor (select one)
- Terminal Equipment Controller room temperature sensor
- Duct temperature sensor, 10K Ω, TEC (return-duct sensor)
  - 4-inch (10.2 cm) 540-128
  - 18-inch (46 cm) 540-739
Sequence of Operation

Control Temperature Setpoints

Depending on the controller’s current operational mode (day or night), CTL STPT (Point 92) holds the value of one of the following setpoints:

**Day Mode**—CTL STPT holds the value of DAY CLG STPT (Point 6) or DAY HTG STPT (Point 7). If the room temperature sensor has a setpoint dial and STPT DIAL (Point 14) is set to YES, CTL STPT holds the value of RM STPT DIAL (Point 13).

If the setpoint dial is used and the value of RM STPT DIAL is less than the value of RM STPT MIN (Point 11), CTL STPT holds the value of RM STPT MIN. If the value of RM STPT DIAL is greater than the value of RM STPT MAX (Point 12), CTL STPT holds the value of RM STPT MAX.

**Night Mode**—CTL STPT holds the value of NGT CLG STPT (Point 8) or NGT HTG STPT (Point 9).

**NOTE:** The value of CTL TEMP (Point 78) is the same as ROOM TEMP (Point 4), unless CTL TEMP is overridden.

Day and Night Modes

The day/night status of the space is determined by the status of DAY.NGT (Point 29). The control of this point differs depending on whether the controller is monitoring the status of a wall switch or is connected to a field panel.

When a wall switch is physically connected to the controller at the AI/DI port labeled “AI 4” (Figure 3-16 on page 3-53 and Figure 3-19 on page 3-62), and WALL SWITCH (Point 18) is set to YES, the controller monitors the status of DI 4 (Point 24). When DI 4 is ON (the switch is closed), DAY.NGT is set to DAY indicating that the controller is in day mode. When DI 4 is OFF (the switch is open), DAY.NGT is set to NIGHT indicating that the controller is in night mode.

When WALL SWITCH is set to NO, the controller does not monitor the status of the wall switch, even if one is connected to it. In this case, if the controller is operating stand-alone, it stays in day mode all the time. If the controller is operating with centralized control (that is, connected to a field panel), the field panel can send an operator or PPCL command to override the status of DAY.NGT. See the *Powers Process Control Language (PPCL) User’s Manual* (125-1896) and *Field Panel User’s Manual* (125-1895) for more information.
Night Mode Override Switch

If an override switch is present on the room temperature sensor and a value (in hours) other than zero has been entered into OVRD TIME (Point 20), pressing the override switch resets the controller to day operational mode for the amount of time set in OVRD TIME. The status of NGT OVRD (Point 21) changes to DAY. After the override time elapses, the controller returns to night mode and NGT OVRD changes back to NIGHT.

It is only when the controller is in night mode that the override switch on the room sensor has any effect on the controller.

Heating/Cooling Switchover

**Based on Room Temperature (Internal Logic)**

The heating/cooling switchover determines whether the controller is in heating or cooling mode by monitoring the room temperature and the demand for heating and cooling (as determined by the temperature control loops).

If the following conditions are met for the length of time set in SWITCH TIME (Point 86), the controller switches from heating to cooling mode by setting HEAT.COOL (Point 5) to COOL:

- HTG LOOPOUT (Point 80) < SWITCH LIMIT (Point 85).
- CTL TEMP (Point 78) > CTL STPT (Point 92) by at least the value set in SWITCH DBAND (Point 90).
- CTL TEMP > the appropriate cooling setpoint minus SWITCH DBAND.

If the following conditions are met for the length of time set in SWITCH TIME, the controller switches from cooling to heating mode by setting HEAT.COOL to HEAT:

- CLG LOOPOUT (Point 79) < SWITCH LIMIT.
- CTL TEMP < CTL STPT by at least the value set in SWITCH DBAND.
- CTL TEMP < the appropriate heating setpoint plus SWITCH DBAND.

**Based on Supply Air Temperature (External Control)**

**CAUTION:**

The ATEC’s internal heating/cooling switchover mechanism is not affected by the air temperature in the supply duct.

To change the value of HEAT.COOL (Point 5) based on the supply air temperature, HEAT.COOL must be commanded through PPCL. This is required when the supply duct delivers warm air for heat and cool air for cooling. In this case, the room-temperature-based switchover must be disabled by commanding HEAT.COOL, and the heat/cool mode must be based on the supply air temperature. When the supply air temperature is warm, the room is in the heating mode. When it is cold, the room is in the cooling mode.
Control Loops

The terminal box is controlled by three Proportional, Integral, and Derivative (PID) control loops: two temperature loops and a flow loop.

The two temperature loops are a cooling loop and a heating loop. The active temperature loop maintains room temperature at the value in CTL STPT (Point 92). See Control Temperature Set Points (page 3-56).

Cooling Loop—The cooling loop uses the values of CTL STPT and CTL TEMP (Point 78) to generate the cooling loopout, which is then used to generate FLOW STPT (Point 93). FLOW STPT is calculated between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

Heating Loop—if the controller is in heating mode, the operation of the flow loop is flexible. As described in Sequencing Logic (page 3-59), it can be set up to do one of the following:

- Constantly maintain an airflow out of the terminal box equal to HTG FLOW MIN (Point 33).
- Operate in sequence with the electric reheat.
- Operate parallel with the electric reheat.
- Have its operation overlap with the operation of the electric reheat.

If the first option described above is chosen, HTG LOOPOUT (Point 80) controls the electric reheat in order to maintain the room temperature. If any one of the last three options is chosen, HTG LOOPOUT controls both the flow loop setpoint (FLOW STPT) and the electric reheat in order to maintain the room temperature. See Sequencing Logic for more information.

HTG LOOPOUT adjusts the value of FLOW STPT differently depending on which flow loop setup is chosen. However, in all cases FLOW STPT is between HTG FLOW MIN (Point 33) and HTG FLOW MAX (Point 34).

Flow Loop—the flow loop maintains the airflow between CTL FLOW MIN (Point 76) and CTL FLOW MAX (Point 77) by modulating DMPR COMD (Point 48).

Electric Reheat

**CAUTION:**

Verify that the equipment is supplied with safeties by others to ensure that there is airflow across the heating coils when they are to be energized.

The heating loop controls one stage of electric reheat to warm up the room. The electric reheat is time modulated using a duty cycle as shown in the following example. When the controller is in cooling mode, the electric heat is off at all times.
Example

Assume the duty cycle (STAGE TIME, Point 89) is 10 minutes, REHEAT START (Point 22) is 0%, and REHEAT END (Point 23) is 100%. The following table shows the intervals during which heat is on and off for various levels of demand from the heating loopout (HTG LOOPOUT, Point 80).

<table>
<thead>
<tr>
<th>HTG LOOPOUT</th>
<th>Minutes ON</th>
<th>Minutes OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>40%</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>60%</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>100%</td>
<td>10</td>
<td>0</td>
</tr>
</tbody>
</table>

Sequencing Logic (Optional)

The settings of FLOW START (Point 16), FLOW END (Point 17), REHEAT START (Point 22), and REHEAT END (Point 23) determine how the damper and reheat modulation are sequenced while in heating mode. These points represent the values of HTG LOOPOUT (Point 80) at which modulation of the damper and reheat begin and end.

The damper moves from minimum position to fully open as HTG LOOPOUT increases from FLOW START to FLOW END. If FLOW START and FLOW END are both set to 0% (default value), the damper stays at minimum position while in heating mode.

The cycle for the reheat ranges from always off to always on as HTG LOOPOUT increases from REHEAT START to REHEAT END. Default values for these points are 0% and 100% respectively. See Electric Reheat (page 3-58) for more information.

By varying the values of these start and end points, the damper and the reheat can be sequenced in series, parallel, or overlapping, as shown in the following table:

<table>
<thead>
<tr>
<th>Series</th>
<th>Parallel</th>
<th>Overlapping</th>
<th>Minimum Flow (Default Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLOW START</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>FLOW END</td>
<td>50%</td>
<td>100%</td>
<td>75%</td>
</tr>
<tr>
<td>REHEAT START</td>
<td>50%</td>
<td>0%</td>
<td>25%</td>
</tr>
<tr>
<td>REHEAT END</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Calibration of Air Velocity Sensor

Calibration of the controller’s internal air velocity sensor is periodically required to maintain accurate air velocity readings. CAL SETUP (Point 95) is set with the desired calibration option during controller startup. Depending on the value of CAL SETUP, calibration may be set to take place automatically or manually. If CAL AIR (Point 94) is set to YES, calibration is in progress. The damper is commanded closed to get a zero airflow reading during calibration.

At the end of a calibration sequence, CAL AIR automatically returns to NO. A setting of NO indicates that the controller is not in a calibration sequence.
Fan Operation

**CAUTION:**

On a terminal box with a series fan, the terminal box fan must be controlled/interlocked to start either before or at the same time as the central air handler. Failure to do so may cause the terminal box fan to rotate backwards and cause consequent damage at start up.

**Day Mode**—FAN (Point 44) is ON all of the time.

**Night Mode**—The fan is controlled as follows:

The fan turns on when at least one of the following two conditions has been met:

- The electric heat, HEAT STAGE 1 (Point 43), turns on.
- The airflow out of the supply duct, FLOW (Point 75), is greater than the setting for SERIES ON (Point 26).

The fan turns off only when the following two conditions have been met:

- The first stage of electric heat has been off for at least one full duty cycle. (HEAT STAGE 1 has been OFF longer than STAGE TIME, Point 89).
- The airflow out of the supply duct, FLOW, is less than the setting for SERIES OFF (Point 27).

If the conditions have not been satisfied to turn the fan on or off, the state of the fan remains unchanged. (That is, if the fan is on, it remains on, while if the fan is off, it remains off.)

**Fail-safe Operation**

If the air velocity sensor fails, the controller uses pressure-dependent control. The temperature loop controls the operation of the damper.

If the room temperature sensor fails, the controller operates using the last known temperature value.

**Automated Checkout**

The ATEC has a built-in checkout procedure that can be manually initiated at any time after the controller has been installed. The procedure tests all of the necessary I/O and ensures the controller has the ability to operate within the set airflow range, between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).
To perform the checkout procedure, set CHK OUT (Point 10) to **YES**. When the procedure is completed, CHK OUT returns to NO and the results are displayed in CHK STATUS (Point 3). See Table 3-9.

**Table 3-9. Possible Failure Value and Description.**

<table>
<thead>
<tr>
<th>CHK STATUS Values (Point 3)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>Checkout procedure has not been run since last controller initialization.</td>
</tr>
<tr>
<td>0</td>
<td>No errors found.</td>
</tr>
<tr>
<td>1</td>
<td>Room temperature sensor failed.</td>
</tr>
<tr>
<td>2</td>
<td>Room setpoint dial failed [If STPT DIAL (Point 14) is set to YES].</td>
</tr>
<tr>
<td>4</td>
<td>Air velocity sensor failed.</td>
</tr>
<tr>
<td>8</td>
<td>Controller could not reach CLG FLOW MIN or below.</td>
</tr>
<tr>
<td>16</td>
<td>Controller could not reach CLG FLOW MAX or above.</td>
</tr>
</tbody>
</table>

**NOTE:** Multiple failures are added together and displayed as one value. For example, if the room temperature sensor failed (1) and the controller could not reach CLG FLOW MAX (16), CHK STATUS displays 17.

**Application Notes**

1. If temperature swings in the room are excessive or there is trouble maintaining the setpoint, the cooling loop, the heating loop, or both need to be tuned. If FLOW (Point 75) is oscillating while FLOW STPT (Point 93) is constant, the flow loop requires tuning. Contact your local Siemens Building Technologies representative for more information.

2. The ATEC, as shipped from the factory, keeps all associated equipment off. The controller and its equipment are released to application control during start-up.
Wiring Diagram

Figure 3-19 shows the point wiring for Application 2524.

**CAUTION:**

The controller’s DOs control 24 Vac loads only. The maximum rating is 12 VA for each DO. Use an interposing relay for any of the following:

- VA requirements higher than the maximum
- 110 or 220 Vac requirements
- DC power requirements
- Separate transformers used to power the load

![Wiring Diagram](image)

Figure 3-19. Application 2524 Wiring Diagram.
# Point Database

Table 3-10. Point Database for Application 2524

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>CTLR ADDRESS</td>
<td>99</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>02</td>
<td>APPLICATION</td>
<td>2473</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{03}</td>
<td>CHK STATUS</td>
<td>-1</td>
<td>–</td>
<td>1</td>
<td>-1</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{04}</td>
<td>ROOM TEMP</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{05}</td>
<td>HEAT.COOL</td>
<td>COOL</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>HEAT</td>
<td>COOL</td>
</tr>
<tr>
<td>06</td>
<td>DAY CLG STPT</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>07</td>
<td>DAY HTG STPT</td>
<td>70.0 (21.20888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>08</td>
<td>NGT CLG STPT</td>
<td>82.0 (27.92888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>09</td>
<td>NGT HTG STPT</td>
<td>65.0 (18.40888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{10}</td>
<td>CHK OUT</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>11</td>
<td>RM STPT MIN</td>
<td>55.0 (12.80888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>12</td>
<td>RM STPT MAX</td>
<td>90.0 (32.40888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{13}</td>
<td>RM STPT DIAL</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>14</td>
<td>STPT DIAL</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>{15}</td>
<td>AI 3</td>
<td>74.0 (23.495556)</td>
<td>DEG F (DEG C)</td>
<td>0.5</td>
<td>37.5 (3.055556)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>16</td>
<td>FLOW START</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>17</td>
<td>FLOW END</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>18</td>
<td>WALL SWITCH</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>{19}</td>
<td>DI OVRD SW</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>20</td>
<td>OVRD TIME</td>
<td>0</td>
<td>HRS</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{21}</td>
<td>NGT OVRD</td>
<td>NIGHT</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
<tr>
<td>22</td>
<td>REHEAT START</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets {} may be unbundled at the field panel.

Continued on next page...
Table 3-10. Point Database for Application 2524

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>REHEAT END</td>
<td>100.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{24}</td>
<td>DI 4</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>{25}</td>
<td>DI 3</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>26</td>
<td>SERIES ON</td>
<td>20.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>27</td>
<td>SERIES OFF</td>
<td>10.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>28</td>
<td>PARALLEL ON</td>
<td>20.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{29}</td>
<td>DAY.NGT</td>
<td>DAY</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
<tr>
<td>30</td>
<td>PARALLEL OFF</td>
<td>30.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>31</td>
<td>CLG FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>32</td>
<td>CLG FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>33</td>
<td>HTG FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>34</td>
<td>HTG FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{35}</td>
<td>AIR VOLUME</td>
<td>0 (0.0)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>36</td>
<td>FLOW COEFF</td>
<td>1.0</td>
<td>–</td>
<td>0.01</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{40}</td>
<td>AI 4</td>
<td>74.0 (23.495556)</td>
<td>DEG F (DEG C)</td>
<td>0.5 (0.28)</td>
<td>37.5 (3.055556)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{41}</td>
<td>DO 1</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>{42}</td>
<td>DO 2</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>{43}</td>
<td>HEAT STAGE 1</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>{44}</td>
<td>FAN</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>{48}</td>
<td>DMPR COMD</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{49}</td>
<td>DMPR POS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>51</td>
<td>MTR1 TIMING</td>
<td>95</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>56</td>
<td>DMPR ROT ANG</td>
<td>90</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>58</td>
<td>MTR SETUP</td>
<td>1</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>59</td>
<td>DO DIR. REV</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>63</td>
<td>CLG P GAIN</td>
<td>20.0 (36.0)</td>
<td>–</td>
<td>0.25 (0.45)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets {} may be unbundled at the field panel.

Continued on next page...
Table 3-10. Point Database for Application 2524

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>CLG I GAIN</td>
<td>0.01 (0.018)</td>
<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>65</td>
<td>CLG D GAIN</td>
<td>0 (0.0)</td>
<td>–</td>
<td>2 (3.6)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>66</td>
<td>CLG BIAS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>67</td>
<td>HTG P GAIN</td>
<td>10.0 (18.0)</td>
<td>–</td>
<td>0.25 (0.45)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>68</td>
<td>HTG I GAIN</td>
<td>0.01 (0.018)</td>
<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>69</td>
<td>HTG D GAIN</td>
<td>0 (0.0)</td>
<td>–</td>
<td>2 (3.6)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>70</td>
<td>HTG BIAS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>71</td>
<td>FLOW P GAIN</td>
<td>0.0</td>
<td>–</td>
<td>0.05</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>72</td>
<td>FLOW I GAIN</td>
<td>0.01 (0.018)</td>
<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>73</td>
<td>FLOW D GAIN</td>
<td>0</td>
<td>–</td>
<td>2</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>74</td>
<td>FLOW BIAS</td>
<td>50.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>75</td>
<td>FLOW</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>76</td>
<td>CTL FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>77</td>
<td>CTL FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>78</td>
<td>CTL TEMP</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>79</td>
<td>CLG LOOPOUT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>80</td>
<td>HTG LOOPOUT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>81</td>
<td>AVG HEAT OUT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>82</td>
<td>STAGE MAX</td>
<td>90.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>83</td>
<td>STAGE MIN</td>
<td>10.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>85</td>
<td>SWITCH LIMIT</td>
<td>5.2</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>86</td>
<td>SWITCH TIME</td>
<td>10</td>
<td>MIN</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>88</td>
<td>STAGE COUNT</td>
<td>1</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>89</td>
<td>STAGE TIME</td>
<td>10</td>
<td>MIN</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>90</td>
<td>SWITCH DBAND</td>
<td>1.0 (0.56)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets {} may be unbundled at the field panel.

Continued on next page...
Table 3-10. Point Database for Application 2524

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>{92}</td>
<td>CTL STPT</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{93}</td>
<td>FLOW STPT</td>
<td>0.0 (0)</td>
<td>PCT</td>
<td>0.25 (0.14)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{94}</td>
<td>CAL AIR</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>95</td>
<td>CAL SETUP</td>
<td>4 (–)</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>96</td>
<td>CAL TIMER</td>
<td>12 (HRS)</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>97</td>
<td>DUCT AREA</td>
<td>1.0 (0.09292)</td>
<td>SQ. FT (SQ M)</td>
<td>0.025 (0.002323)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>98</td>
<td>LOOP TIME</td>
<td>5 (SEC)</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{99}</td>
<td>ERROR STATUS</td>
<td>0 (–)</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets {} may be unbundled at the field panel.
Application 2526: VAV Parallel Fan Powered with One Stage of Electric Reheat

Overview

In Application 2526, the controller modulates the supply air damper of the terminal box for cooling and controls one stage of electric reheat for heating. When in heating, the terminal box either maintains minimum airflow or modulates the supply air damper. The terminal box also has a parallel fan that recirculates the room air. In order for the terminal box to work properly, the central air-handling unit must provide supply air. See Figure 3-20 through Figure 3-22.

1. Heat must be on the outlet.

Figure 3-20. Application 2526 Control Drawing.
### Chapter 3—Applications for ATEC—VAV with Reheat

**Figure 3-21. Application 2526 Control Schedule with Minimum Airflow during Heating (default).**

#### CONTROL SCHEDULE

<table>
<thead>
<tr>
<th>ROOM TEMPERATURE</th>
<th>COLDER</th>
<th>HEATING *1 SET POINT</th>
<th>COOLING *1 SET POINT</th>
<th>WARMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEAT ON 100% OF TIME</td>
<td></td>
<td></td>
<td></td>
<td>CLG FLOW MAX</td>
</tr>
<tr>
<td>HTG FLOW MAX=</td>
<td>*4</td>
<td></td>
<td></td>
<td>HEAT OFF</td>
</tr>
<tr>
<td>HTG FLOW MIN= CLG FLOW MIN=</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAN OPERATION - DAY</td>
<td>ON</td>
<td></td>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>FAN OPERATION - NIGHT</td>
<td>ON</td>
<td></td>
<td></td>
<td>OFF</td>
</tr>
</tbody>
</table>

1. See Sequence of Operation, Control Temperature Setpoints.
3. When temperature is near the setpoint, heat is cycled on and off according to the size of the demand. This allows it to be controlled proportionally rather than with deadbands.
4. The airflow is shown at minimum flow throughout the entire heating mode (default setting). The airflow can optionally operate parallel (Figure 3-21), sequenced, or overlapping with the heat. See Sequencing Logic.

**Figure 3-22. Application 2526 Control Schedule with Damper Modulated during Heating.**

#### CONTROL SCHEDULE

<table>
<thead>
<tr>
<th>ROOM TEMPERATURE</th>
<th>COLDER</th>
<th>HEATING *1 SET POINT</th>
<th>COOLING *1 SET POINT</th>
<th>WARMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEAT ON 100% OF TIME</td>
<td></td>
<td></td>
<td></td>
<td>CLG FLOW MAX</td>
</tr>
<tr>
<td>HTG FLOW MAX=</td>
<td>*4</td>
<td></td>
<td></td>
<td>HEAT OFF</td>
</tr>
<tr>
<td>HTG FLOW MIN=</td>
<td>*3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAN OPERATION - DAY</td>
<td>ON</td>
<td></td>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>FAN OPERATION - NIGHT</td>
<td>ON</td>
<td></td>
<td></td>
<td>OFF</td>
</tr>
</tbody>
</table>

1. See Sequence of Operation, Control Temperature Setpoints.
3. When temperature is near the setpoint, heat is cycled on and off according to the size of the demand. This allows it to be controlled proportionally rather than with deadbands.
4. The airflow is shown operating parallel with the electric reheat. The airflow can operate at minimum flow throughout the entire heating mode (Figure 3-21) or sequenced or overlapping with the heat. See Sequencing Logic.
Hardware Inputs

Analog
- Air velocity sensor
- Room temperature sensor
- Room temperature setpoint dial (optional)

Digital
- Night mode override (optional)
- Wall switch (optional)

Hardware Outputs

Analog
- None

Digital
- Damper actuator (wired internally)
- Parallel fan
- Stage 1 electric reheat

Ordering Notes

Actuating Terminal Equipment Controller with Reheat—Electronic Output
Single unit 550-405
10-pack 550-405P10

Contact your local Siemens Building Technologies representative for additional product numbers.

Temperature sensor (select one)
- Terminal Equipment Controller room temperature sensor
- Duct temperature sensor, 10K Ω, TEC (return-duct sensor)
  4-inch (10.2 cm) 540-128
  18-inch (46 cm) 540-739
Sequence of Operation

Control Temperature Setpoints

Depending on the controller’s current operational mode (day or night), CTL STPT (Point 92) holds the value of one of the following setpoints:

**Day Mode**—CTL STPT holds the value of DAY CLG STPT (Point 6) or DAY HTG STPT (Point 7). If the room temperature sensor has a setpoint dial and STPT DIAL (Point 14) is set to YES, CTL STPT holds the value of RM STPT DIAL (Point 13).

If the setpoint dial is used and the value of RM STPT DIAL is less than the value of RM STPT MIN (Point 11), CTL STPT holds the value of RM STPT MIN. If the value of RM STPT DIAL is greater than the value of RM STPT MAX (Point 12), CTL STPT holds the value of RM STPT MAX.

**Night Mode**—CTL STPT holds the value of NGT CLG STPT (Point 8) or NGT HTG STPT (Point 9).

**NOTE:** The value of CTL TEMP (Point 78) is the same as ROOM TEMP (Point 4), unless CTL TEMP is overridden.

Day and Night Modes

The day/night status of the space is determined by the status of DAY.NGT (Point 29). The control of this point differs depending on whether the controller is monitoring the status of a wall switch or is connected to a field panel.

When a wall switch is physically connected to the controller at the AI/DI port labeled “AI 4” (Figure 3-20 on page 3-67 and Figure 3-23 on page 3-76), and WALL SWITCH (Point 18) is set to YES, the controller monitors the status of DI 4 (Point 24). When DI 4 is ON (the switch is closed), DAY.NGT is set to DAY indicating that the controller is in day mode. When DI 4 is OFF (the switch is open), DAY.NGT is set to NIGHT indicating that the controller is in night mode.

When WALL SWITCH is set to NO, the controller does not monitor the status of the wall switch, even if one is connected to it. In this case, if the controller is operating stand-alone, it stays in day mode all the time. If the controller is operating with centralized control (that is, connected to a field panel), the field panel can send an operator or PPCL command to override the status of DAY.NGT. See the Powers Process Control Language (PPCL) User’s Manual (125-1896) and Field Panel User’s Manual (125-1895) for more information.
Night Mode Override Switch

If an override switch is present on the room temperature sensor and a value (in hours) other than zero is entered into OVRD TIME (Point 20), pressing the override switch resets the controller to day operational mode of the time period that is set in OVRD TIME. The status of NGT OVRD (Point 21) changes to DAY. After the override time elapses, the controller returns to night mode and NGT OVRD changes back to NIGHT.

It is only when the controller is in night mode that the override switch on the room sensor has any effect on the controller.

Heating/Cooling Switchover

Based on Room Temperature (Internal Logic)

The heating/cooling switchover determines whether the controller is in heating or cooling mode by monitoring the room temperature and the demand for heating and cooling (as determined by the temperature control loops).

If the following conditions are met for the length of time set in SWITCH TIME (Point 86), the controller switches from heating to cooling mode by setting HEAT.COOL (Point 5) to COOL:

- HTG LOOPOUT (Point 80) < SWITCH LIMIT (Point 85).
- CTL TEMP (Point 78) > CTL STPT (Point 92) by at least the value set in SWITCH DBAND (Point 90).
- CTL TEMP > the appropriate cooling setpoint minus SWITCH DBAND.

If the following conditions are met for the length of time set in SWITCH TIME, the controller switches from cooling to heating mode by setting HEAT.COOL to HEAT:

- CLG LOOPOUT (Point 79) < SWITCH LIMIT.
- CTL TEMP < CTL STPT by at least the value set in SWITCH DBAND.
- CTL TEMP < the appropriate heating setpoint plus SWITCH DBAND.

Based on Supply Air Temperature (External Control)

CAUTION:

The ATEC’s internal heating/cooling switchover mechanism is not affected by the air temperature in the supply duct.

To change the value of HEAT.COOL (Point 5) based on the supply air temperature, HEAT.COOL must be commanded through PPCL. This is required when the supply duct delivers warm air for heat and cool air for cooling. In this case, the room-temperature-based switchover must be disabled by commanding HEAT.COOL, and the heat/cool mode must be based on the supply air temperature. When the supply air temperature is warm, the room is in the heating mode. When it is cold, the room is in the cooling mode.
Control Loops

The terminal box is controlled by three Proportional, Integral, and Derivative (PID) control loops: two temperature loops and a flow loop.

The two temperature loops are a cooling loop and a heating loop. The active temperature loop maintains room temperature at the value in CTL STPT (Point 92). See Control Temperature Setpoints (page 3-70).

**Cooling Loop**—The cooling loop uses the values of CTL STPT and CTL TEMP (Point 78) to generate the cooling loopout, which is then used to generate FLOW STPT (Point 93). FLOW STPT is calculated between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

**Heating Loop**—If the controller is in heating mode, the operation of the flow loop is flexible. As described in Sequencing Logic (page 3-73), it can be set up to do one of the following:

- Constantly maintain an airflow out of the terminal box equal to HTG FLOW MIN (Point 33).
- Operate in sequence with the electric reheat.
- Operate parallel with the electric reheat.
- Have its operation overlap with the operation of the electric reheat.

If the first option described above is chosen, HTG LOOPOUT (Point 80) controls the electric reheat in order to maintain the room temperature. If any one of the last three options is chosen, HTG LOOPOUT controls both the flow loop setpoint (FLOW STPT) and the electric reheat in order to maintain the room temperature. See Sequencing Logic for more information.

HTG LOOPOUT adjusts the value of FLOW STPT differently depending on which flow loop setup is chosen. However, in all cases FLOW STPT is between HTG FLOW MIN (Point 33) and HTG FLOW MAX (Point 34).

**Flow Loop**—The flow loop maintains the airflow between CTL FLOW MIN (Point 76) and CTL FLOW MAX (Point 77) by modulating DMPR COMD (Point 48).
Electric Reheat

**CAUTION:**

Verify that the equipment is supplied with safeties by others to ensure that there is airflow across the heating coils when they are to be energized.

**CAUTION:**

Do not set HTG FLOW MIN (Point 33) to 0 cfm (0 lps). A minimum airflow should be provided across the heating coils, for ventilation and for dispersing heat.

The heating loop controls one stage of electric reheat to warm up the room. The electric reheat is time-modulated using a duty cycle as shown in the following example. When the controller is in cooling mode, the electric heat is off at all times.

**Example**

Assume the duty cycle (STAGE TIME, Point 89) is 10 minutes, REHEAT START (Point 22) is 0%, and REHEAT END (Point 23) is 100%. The following table shows the intervals during which heat is on and off for various levels of demand from the heating loopout (HTG LOOPOUT, Point 80).

<table>
<thead>
<tr>
<th>HTG LOOPOUT</th>
<th>Minutes ON</th>
<th>Minutes OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>40%</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>60%</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>100%</td>
<td>10</td>
<td>0</td>
</tr>
</tbody>
</table>

**Sequencing Logic (Optional)**

The settings of FLOW START (Point 16), FLOW END (Point 17), REHEAT START (Point 22), and REHEAT END (Point 23) determine how the damper and reheat modulation are sequenced while in heating mode. These points represent the values of HTG LOOPOUT (Point 80) at which modulation of the damper and reheat begin and end.

The damper moves from minimum position to fully open as HTG LOOPOUT increases from FLOW START to FLOW END. If FLOW START and FLOW END are both set to 0% (default value), the damper stays at minimum position while in heating mode.

The cycle for the reheat ranges from always off to always on as HTG LOOPOUT increases from REHEAT START to REHEAT END. Default values for these points are 0% and 100% respectively. See *Electric Reheat* (page 3-73) for more information.
By varying the values of these start and end points, the damper and the reheat can be sequenced in series, parallel, or overlapping, as shown in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Series</th>
<th>Parallel</th>
<th>Overlapping</th>
<th>Minimum Flow (Default Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLOW START</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>FLOW END</td>
<td>50%</td>
<td>100%</td>
<td>75%</td>
<td>0%</td>
</tr>
<tr>
<td>REHEAT START</td>
<td>50%</td>
<td>0%</td>
<td>25%</td>
<td>0%</td>
</tr>
<tr>
<td>REHEAT END</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Calibration of Air Velocity Sensor

Calibration of the controller’s internal air velocity sensor is periodically required to maintain accurate air velocity readings. CAL SETUP (Point 95) is set with the desired calibration option during controller startup. Depending upon the value of CAL SETUP, calibration may be set to take place automatically or manually. If CAL AIR (Point 94) is set to YES, calibration is in progress. The damper is commanded closed to get a zero airflow reading during calibration.

At the end of a calibration sequence, CAL AIR automatically returns to NO. A setting of NO indicates that the controller is not in a calibration sequence.

Fan Operation

The fan is controlled as follows:

FAN (Point 44) turns on only when the following two conditions have been met:

- The electric heat, HEAT STAGE 1 (Point 43), turns on.
- The airflow out of the supply duct, FLOW (Point 75), is less than the setting for PARALLEL ON (Point 28). (This means that there is not enough airflow out of the supply duct to allow for safe operation of the electric heat.)

The fan turns off when at least one of the following two conditions has been met:

- The electric heat has been off for at least one full duty cycle. (HEAT STAGE 1 has been OFF longer than STAGE TIME, Point 89.)
- The airflow out of the supply duct, FLOW, is greater than the setting for PARALLEL OFF (Point 30). (This means that there is enough airflow out of the supply duct to allow for safe operation of the electric heat.)

If the conditions have not been satisfied to turn the fan on or off, the state of the fan remains unchanged. (That is, if the fan is on, it remains on, while if the fan is off, it remains off.)
Fail-safe Operation

If the air velocity sensor fails, the controller uses pressure-dependent control. The temperature loop controls the operation of the damper.

If the room temperature sensor fails, the controller operates using the last known temperature value.

Automated Checkout

The ATEC has a built-in checkout procedure that can be manually initiated at any time after the controller has been installed. The procedure tests all of the necessary I/O and ensures the controller has the ability to operate within the set airflow range, between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

To perform the checkout procedure, set CHK OUT (Point 10) to YES. When the procedure is completed, CHK OUT returns to NO and the results are displayed in CHK STATUS (Point 3). See Table 3-11.

<table>
<thead>
<tr>
<th>CHK STATUS Values (Point 3)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>Checkout procedure has not been run since last controller initialization.</td>
</tr>
<tr>
<td>0</td>
<td>No errors found.</td>
</tr>
<tr>
<td>1</td>
<td>Room temperature sensor failed.</td>
</tr>
<tr>
<td>2</td>
<td>Room setpoint dial failed [If STPT DIAL (Point 14) is set to YES].</td>
</tr>
<tr>
<td>4</td>
<td>Air velocity sensor failed.</td>
</tr>
<tr>
<td>8</td>
<td>Controller could not reach CLG FLOW MIN or below.</td>
</tr>
<tr>
<td>16</td>
<td>Controller could not reach CLG FLOW MAX or above.</td>
</tr>
</tbody>
</table>

**NOTE:** Multiple failures are added together and displayed as one value. For example, if the room temperature sensor failed (1) and the controller could not reach CLG FLOW MAX (16), CHK STATUS displays 17.

Application Notes

1. If temperature swings in the room are excessive or there is trouble maintaining the setpoint, the cooling loop, the heating loop, or both need to be tuned. If FLOW (Point 75) is oscillating while FLOW STPT (Point 93) is constant, the flow loop requires tuning. Contact your local Siemens Building Technologies representative for more information.

2. The ATEC, as shipped from the factory, keeps all associated equipment off. The controller and its equipment are released to application control during start-up.
Wiring Diagram

Figure 3-23 shows the point wiring for Application 2526.

CAUTION:

The controller’s DOs control 24 Vac loads only. The maximum rating is 12 VA for each DO. Use an interposing relay for any of the following:

- VA requirements higher than the maximum
- 110 or 220 Vac requirements
- DC power requirements
- Separate transformers used to power the load

![Wiring Diagram](image)

Figure 3-23. Application 2526 Wiring Diagram.
## Point Database

### Table 3-12. Point Database for Application 2526.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>CTLR ADDRESS</td>
<td>99</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>02</td>
<td>APPLICATION</td>
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<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(03)</td>
<td>CHK STATUS</td>
<td>-1</td>
<td>–</td>
<td>1</td>
<td>-1</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(04)</td>
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<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(05)</td>
<td>HEAT.COOK</td>
<td>COOL</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(06)</td>
<td>DAY CLG STPT</td>
<td>74.0 (23.46888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
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<td>DAY HTG STPT</td>
<td>70.0 (21.20888)</td>
<td>DEG F (DEG C)</td>
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<td>48.0 (8.88888)</td>
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<td>–</td>
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<td>48.0 (8.88888)</td>
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<td>–</td>
</tr>
<tr>
<td>(10)</td>
<td>CHK OUT</td>
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<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>(11)</td>
<td>RM STPT MIN</td>
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<td>DEG F (DEG C)</td>
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<td>–</td>
</tr>
<tr>
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<td>DEG F (DEG C)</td>
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<td>48.0 (8.88888)</td>
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<td>–</td>
</tr>
<tr>
<td>(13)</td>
<td>RM STPT DIAL</td>
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<td>DEG F (DEG C)</td>
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<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
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<td>NO</td>
</tr>
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<td>0.0</td>
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<td>–</td>
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<td>FLOW END</td>
<td>0.0 (0.00000)</td>
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<td>–</td>
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<td>WALL SWITCH</td>
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<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>(19)</td>
<td>DI OVRD SW</td>
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<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(20)</td>
<td>OVRD TIME</td>
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<td>–</td>
</tr>
<tr>
<td>(21)</td>
<td>NGT OVRD</td>
<td>NIGHT</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(22)</td>
<td>REHEAT START</td>
<td>0.0 (0.00000)</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets { } may be unbundled at the field panel.

*Continued on next page...*
### Table 3-12. Point Database for Application 2526.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
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<tr>
<td>23</td>
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<td>–</td>
</tr>
<tr>
<td>(24)</td>
<td>DI 4</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(25)</td>
<td>DI 3</td>
<td>OFF</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>26</td>
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<td>PCT</td>
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<td>–</td>
<td>–</td>
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<tr>
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<td>SERIES OFF</td>
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<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
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<tr>
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<td>PARALLEL ON</td>
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<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
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<td>DAY.NGT</td>
<td>DAY</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
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<tr>
<td>30</td>
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<td>PCT</td>
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<tr>
<td>31</td>
<td>CLG FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>32</td>
<td>CLG FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>33</td>
<td>HTG FLOW MIN</td>
<td>220 (103.818)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
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<tr>
<td>34</td>
<td>HTG FLOW MAX</td>
<td>2200 (1038.18)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(35)</td>
<td>AIR VOLUME</td>
<td>0 (0.0)</td>
<td>CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>36</td>
<td>FLOW COEFF</td>
<td>1.0</td>
<td>–</td>
<td>0.01</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(40)</td>
<td>AI 4</td>
<td>74.0 (23.49556)</td>
<td>DEG F (DEG C)</td>
<td>0.5 (0.28)</td>
<td>37.5 (3.05556)</td>
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<tr>
<td>(41)</td>
<td>DO 1</td>
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<td>–</td>
<td>–</td>
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<td>OFF</td>
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<tr>
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<td>DO 2</td>
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<td>–</td>
<td>–</td>
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<td>OFF</td>
</tr>
<tr>
<td>(43)</td>
<td>HEAT STAGE 1</td>
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<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(44)</td>
<td>FAN</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>(48)</td>
<td>DMPR COMD</td>
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<td>–</td>
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<td>(49)</td>
<td>DMPR POS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
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<td>–</td>
</tr>
<tr>
<td>51</td>
<td>MTR1 TIMING</td>
<td>95</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>56</td>
<td>DMPR ROT ANG</td>
<td>90</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>58</td>
<td>MTR SETUP</td>
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<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>59</td>
<td>DO DIR. REV</td>
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<td>–</td>
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<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>63</td>
<td>CLG P GAIN</td>
<td>20.0 (36.0)</td>
<td>0.25 (0.45)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application.
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets ( ) may be unbundled at the field panel.

Continued on next page...
Table 3-12. Point Database for Application 2526.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>CLG I GAIN</td>
<td>0.01 (0.018)</td>
<td>–</td>
<td>0.001 (0.0018)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
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<tr>
<td>65</td>
<td>CLG D GAIN</td>
<td>0 (0.0)</td>
<td>–</td>
<td>2 (3.6)</td>
<td>0</td>
<td>–</td>
<td>–</td>
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<tr>
<td>66</td>
<td>CLG BIAS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
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<tr>
<td>67</td>
<td>HTG P GAIN</td>
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<tr>
<td>68</td>
<td>HTG I GAIN</td>
<td>0.01 (0.018)</td>
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<td>0.001 (0.0018)</td>
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<td>HTG D GAIN</td>
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<td>–</td>
<td>2 (3.6)</td>
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<tr>
<td>82</td>
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<td>0.0</td>
<td>–</td>
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<td>83</td>
<td>STAGE MIN</td>
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<td>PCT</td>
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<td>86</td>
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<td>0</td>
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<td>STAGE COUNT</td>
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<td>89</td>
<td>STAGE TIME</td>
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<td>MIN</td>
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<td>–</td>
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<tr>
<td>90</td>
<td>SWITCH DBAND</td>
<td>1.0 (0.56)</td>
<td>DEG F (DEG C)</td>
<td>0.25 (0.14)</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets () may be unbundled at the field panel.

Continued on next page...
Table 3-12. Point Database for Application 2526.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>(92)</td>
<td>CTL STPT</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(93)</td>
<td>FLOW STPT</td>
<td>0.0</td>
<td>PCT</td>
<td>0.25</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(94)</td>
<td>CAL AIR</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>95</td>
<td>CAL SETUP</td>
<td>4</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>96</td>
<td>CAL TIMER</td>
<td>12</td>
<td>HRS</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>97</td>
<td>DUCT AREA</td>
<td>1.0 (0.09292)</td>
<td>SQ. FT (SQ M)</td>
<td>0.025</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>98</td>
<td>LOOP TIME</td>
<td>5</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(99)</td>
<td>ERROR STATUS</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application.
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets { } may be unbundled at the field panel.
Application 2473: Slave Mode

Overview

Application 2473 is the slave mode application for the ATEC with Reheat (P/N 550-405). Slave mode is the default application that comes up when power is first applied to the controller. Slave mode provides no control. Its purpose is to allow the operator to perform equipment checkout before a control application is put into effect and to set some basic controller parameters (CTRLR ADDRESS, APPLICATION, etc.). A controller in slave mode can also be used as a point extension device by commanding spare I/O points from the field panel.

Using Auxiliary Points

It is possible to have extra points available on an ATEC in addition to the ones used by the current application that is running in the controller. If these extra points are to be controlled by a field panel, then they must be unbundled at the field panel. See Table 3-14 (page 3-82) for point database information.

Using the Controller as a Point Extension Device

If the controller is only used as a point extension device, with no control application in effect, its application must be set to slave mode and points must be unbundled at the field panel. All points must be controlled from the field panel in order to be used.

DO 3 and DO 4 may be used as separate DOs or as a pair to control a motor as shown in the example.

NOTE: DO 1 and DO 2 are wired internally. They can only be used to rotate a shaft that fits into the ATEC through 90° (or less).

NOTE: If using either a motor or DOs as auxiliary points, be sure to set MTR SETUP (Point 58) to the correct value. See Table 3-13. If using a pair of DOs to control a motor, then the DOs cannot be unbundled. Only MTR1 COMD (Point 48) and MTR2 COMD (Point 52) can be unbundled to control the motors.

Table 3-13. Motor Enable/Reverse Values for MTR SETUP (Point 58).

<table>
<thead>
<tr>
<th>Motor 2</th>
<th>Motor 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Used</td>
<td>Not Used</td>
</tr>
<tr>
<td>Enabled</td>
<td>4</td>
</tr>
<tr>
<td>Enabled and Reversed</td>
<td>12</td>
</tr>
</tbody>
</table>
Example

If using DO 3 and DO 4 as the physical terminations for a motor, follow these steps:

1. Set MTR SETUP as per Table 3-13 to enable both Motor 1 (the damper) and Motor 2.
2. Unbundle MTR2 COMD at the field panel to command the motor from the field panel.

For other combinations of DOs and motors, contact your local Siemens Building Technologies representative for complete motor enable/reverse procedures.

Point Database

Table 3-14. Point Database for Application 2473.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>CTRLR ADDRESS</td>
<td>99</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>02</td>
<td>APPLICATION</td>
<td>–</td>
<td>2473</td>
<td>–</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>03</td>
<td>CHK STATUS</td>
<td>–</td>
<td>1</td>
<td>–</td>
<td>1</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>04</td>
<td>ROOM TEMP</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>10</td>
<td>CHK OUT</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>13</td>
<td>RM STPT DIAL</td>
<td>74.0 (23.44888)</td>
<td>DEG F (DEG C)</td>
<td>0.25</td>
<td>48.0 (8.88888)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>15</td>
<td>AI 3</td>
<td>74.0 (23.495556)</td>
<td>DEG F (DEG C)</td>
<td>0.5</td>
<td>37.5 (3.055556)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>18</td>
<td>WALL SWITCH</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>19</td>
<td>DI OVRD SW</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>24</td>
<td>DI 4</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>25</td>
<td>DI 3</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>29</td>
<td>DAY.NGT</td>
<td>DAY</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>NIGHT</td>
<td>DAY</td>
</tr>
<tr>
<td>35</td>
<td>AIR VOLUME</td>
<td>0 (0.0) CFM (LPS)</td>
<td>4 (1.8876)</td>
<td>0</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>36</td>
<td>FLOW COEFF</td>
<td>1.0</td>
<td>–</td>
<td>0.01</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>40</td>
<td>AI 4</td>
<td>74.0 (23.495556)</td>
<td>DEG F (DEG C)</td>
<td>0.5</td>
<td>37.5 (3.055556)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>41</td>
<td>DO 1</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>42</td>
<td>DO 2</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application.
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets { } may be unbundled at the field panel.

Continued on next page...
Table 3-14. Point Database for Application 2473.

<table>
<thead>
<tr>
<th>Point Number</th>
<th>Descriptor</th>
<th>Factory Default (SI Units)</th>
<th>Eng. Units (SI Units)</th>
<th>Slope (SI Units)</th>
<th>Intercept (SI Units)</th>
<th>On Text</th>
<th>Off Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>{43}</td>
<td>DO 3</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>{44}</td>
<td>DO 4</td>
<td>OFF</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>{48}</td>
<td>MTR1 COMD</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{49}</td>
<td>MTR1 POS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>51</td>
<td>MTR1 TIMING</td>
<td>95</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{52}</td>
<td>MTR2 COMD</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{53}</td>
<td>MTR2 POS</td>
<td>0.0</td>
<td>PCT</td>
<td>0.4</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>55</td>
<td>MTR2 TIMING</td>
<td>130</td>
<td>SEC</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>56</td>
<td>DPR1 ROT ANG</td>
<td>90</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>57</td>
<td>DPR2 ROT ANG</td>
<td>90</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>58</td>
<td>MTR SETUP</td>
<td>1</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>59</td>
<td>DO DIR. REV</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>87</td>
<td>CAL MODULE</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>{94}</td>
<td>CAL AIR</td>
<td>NO</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>95</td>
<td>CAL SETUP</td>
<td>4</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>96</td>
<td>CAL TIMER</td>
<td>12</td>
<td>HRS</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>97</td>
<td>DUCT AREA</td>
<td>1.0</td>
<td>(0.09292)</td>
<td>0.025</td>
<td>0.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>{99}</td>
<td>ERROR STATUS</td>
<td>0</td>
<td>–</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. Points not listed are not used in this application.
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets { } may be unbundled at the field panel.
Chapter 4—Point Database

Overview

Chapter 4 presents a description of the ATEC point database, including point descriptors, point addresses, and a listing of applications in which each point is found. Applications in parentheses are slave modes.

Description of Points

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Address</th>
<th>Application</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTLR ADDRESS</td>
<td>01</td>
<td>All</td>
<td>Identifies the controller on the FLN trunk. Addresses 0 to 98 are valid; 0 to 31 are typically used.</td>
</tr>
<tr>
<td>APPLICATION</td>
<td>02</td>
<td>All</td>
<td>Identification number of the program running in the controller.</td>
</tr>
<tr>
<td>CHK STATUS</td>
<td>03</td>
<td>All</td>
<td>Results from the automated checkout procedure that runs when CHK OUT (Point 10) is commanded to YES. See Chapter 2 and Chapter 3—Applications for details.</td>
</tr>
<tr>
<td>ROOM TEMP</td>
<td>04</td>
<td>All</td>
<td>Actual reading from the room temperature sensor.</td>
</tr>
<tr>
<td>HEAT.COOL</td>
<td>05</td>
<td>2501, 2521, 2522, 2523, 2524, 2526</td>
<td>Current mode of operation for applications that can be in either a heating mode or a cooling mode.</td>
</tr>
<tr>
<td>DAY CLG STPT</td>
<td>06</td>
<td>All except slave modes</td>
<td>The temperature setpoint in degrees that the controller maintains during day periods in cooling mode if a room temperature sensor setpoint dial is not present or is not used. See STPT DIAL (Point 14).</td>
</tr>
<tr>
<td>DAY HTG STPT</td>
<td>07</td>
<td>2501, 2521, 2522, 2523, 2524, 2526</td>
<td>The temperature setpoint in degrees that the controller maintains during day periods in heating mode if a room temperature sensor setpoint dial is not present or is not used. See STPT DIAL (Point 14).</td>
</tr>
<tr>
<td>NGT CLG STPT</td>
<td>08</td>
<td>All except slave modes</td>
<td>The temperature setpoint in degrees that the controller maintains during the night periods in cooling mode.</td>
</tr>
<tr>
<td>NGT HTG STPT</td>
<td>09</td>
<td>2501, 2521, 2522, 2523, 2524, 2526</td>
<td>The temperature setpoint in degrees that the controller maintains during the night periods in heating mode.</td>
</tr>
<tr>
<td>CHK OUT</td>
<td>10</td>
<td>All</td>
<td>When this point is commanded to YES, the controller runs the automated checkout procedure. The results appear in CHK STATUS (Point 3).</td>
</tr>
<tr>
<td>RM STPT MIN</td>
<td>11</td>
<td>All except slave modes</td>
<td>The minimum temperature setpoint in degrees that the controller can use from the setpoint dial. This overrides any temperature setpoint from the setpoint dial that falls below this minimum.</td>
</tr>
</tbody>
</table>
### Chapter 4—Point Database

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Address</th>
<th>Application</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM STPT MAX</td>
<td>12</td>
<td>All except slave modes</td>
<td>The maximum temperature setpoint in degrees that the controller can use from the setpoint dial. This overrides any temperature setpoint from the setpoint dial that falls above this maximum.</td>
</tr>
<tr>
<td>RM STPT DIAL</td>
<td>13</td>
<td>All</td>
<td>The temperature setpoint in degrees from the room temperature sensor (not available on all temperature sensor models). This setpoint will be used for control in day mode (heating or cooling) when enabled by STPT DIAL (Point 14).</td>
</tr>
<tr>
<td>STPT DIAL</td>
<td>14</td>
<td>All except slave modes</td>
<td>YES indicates that there is a room setpoint dial on the room temperature sensor and it should be used as the temperature setpoint for control in day/occupied mode. NO indicates that the appropriate preset setpoint (Point 6, 7, 8, 9, or 10) will be used as the temperature setpoint for control in day/occupied heating or cooling mode. Valid input: YES or NO.</td>
</tr>
<tr>
<td>AI 3</td>
<td>15</td>
<td>2473, 2500, 2522, 2523, 2524, 2526</td>
<td>Actual reading from a 100K Ω thermistor connected to the controller’s AI 3 input. When a thermistor is connected at AI 3, DI 3 is not available. See DI 3 (Point 25).</td>
</tr>
<tr>
<td>SUPPLY TEMP</td>
<td>15</td>
<td>2501</td>
<td>Actual reading from a 100K Ω thermistor connected to the controller’s AI 3 input. The controller uses this value to determine whether it is in heating or cooling mode.</td>
</tr>
<tr>
<td>FLOW START</td>
<td>16</td>
<td>2522, 2523, 2524, 2526</td>
<td>Determines how the damper modulation will be sequenced while in heating mode. When HTG LOOPOUT (Point 80) is above this value, then FLOW STPT (Point 93) starts to increase.</td>
</tr>
<tr>
<td>FLOW END</td>
<td>17</td>
<td>2522, 2523, 2524, 2526</td>
<td>Determines how the damper modulation will be sequenced while in heating mode. When HTG LOOPOUT (Point 80) is below this value, then FLOW STPT (Point 93) starts to decrease.</td>
</tr>
<tr>
<td>WALL SWITCH</td>
<td>18</td>
<td>2500, 2501, 2522, 2523, 2524, 2526, (2473)</td>
<td>YES indicates that the controller is to monitor the status of a wall switch that is connected to AI 4/DI 4. NO indicates that the controller will not monitor the status of a wall switch, even if one is connected. When a switch is connected at DI 4, AI 4 is not available. See AI 4 (Point 40). Valid input: YES or NO.</td>
</tr>
<tr>
<td>DI OVRD SW</td>
<td>19</td>
<td>All</td>
<td>Actual indication of the status of the override switch (not physically available on all temperature sensor models) at the room temperature sensor. ON indicates that the switch is being pressed. OFF indicates that the switch is released. Valid input: ON or OFF.</td>
</tr>
<tr>
<td>OVRD TIME</td>
<td>20</td>
<td>All except slave modes</td>
<td>The amount of time in hours that the controller will operate in day/occupied mode when the override switch is pressed while the controller is in night/unoccupied mode.</td>
</tr>
<tr>
<td>Descriptor</td>
<td>Address</td>
<td>Application</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>----------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>NGT OVRD</td>
<td>21</td>
<td>All except slave modes</td>
<td>Indicates the mode that the controller is operating in with respect to the override switch. NIGHT indicates that the switch has not been pressed and the override timer is not active. DAY indicates that the switch has been pressed and the override timer is active. The controller then uses a day mode temperature setpoint. This point is only in effect when DAY.NGT (Point 29) indicates night mode.</td>
</tr>
<tr>
<td>REHEAT START</td>
<td>22</td>
<td>2522, 2523, 2524, 2526</td>
<td>Determines how the reheat modulation will be sequenced while in heating mode. When HTG LOOPOUT (Point 80) is above this value, then the reheat cycles on and off (or remains on) according to the size of the demand.</td>
</tr>
<tr>
<td>REHEAT END</td>
<td>23</td>
<td>2522, 2523, 2524, 2526</td>
<td>Determines how the reheat modulation will be sequenced while in heating mode. When HTG LOOPOUT (Point 80) is at or above this value, reheat is on 100% of the time. When HTG LOOPOUT is below this value, then the reheat cycles on and off according to the size of the demand.</td>
</tr>
<tr>
<td>DI 4</td>
<td>24</td>
<td>2500, 2501, 2522, 2523, 2524, 2526, (2473)</td>
<td>Actual status of a contact connected to the controller at DI 4. ON indicates that the contact is closed; OFF indicates that the contact is open. If a wall switch is used, it is connected to DI 4. See WALL SWITCH (Point 18) and SUPPLY TEMP (Point 15 for Application 2501).</td>
</tr>
<tr>
<td>DI 3</td>
<td>25</td>
<td>2500, 2501, 2522, 2523, 2524, 2526, (2473)</td>
<td>Actual status of a contact connected to the controller at AI 3/DI 3. ON indicates that the contact is closed; OFF indicates that the contact is open. When a contact is connected at DI 3, AI 3 is not available. See AI 3/SUPPLY TEMP (Point 15).</td>
</tr>
<tr>
<td>SERIES ON</td>
<td>26</td>
<td>2524</td>
<td>When flow rises above this value, the series fan turns ON. This point is present, but not used in this application.</td>
</tr>
<tr>
<td>SERIES OFF</td>
<td>27</td>
<td>2524</td>
<td>When flow drops below this value and reheat has been OFF for at least one full duty cycle, the series fan turns OFF. This point is present, but not used in this application.</td>
</tr>
<tr>
<td>PARALLEL ON</td>
<td>28</td>
<td>2524</td>
<td>This point is present, but not used in this application. When flow drops below this value and reheat is ON, the parallel fan turns ON.</td>
</tr>
<tr>
<td>DAY.NGT</td>
<td>29</td>
<td>All</td>
<td>Indicates the mode in which the controller is operating. Day temperature setpoints will be used in day mode. Night temperature setpoints will be used in night mode. This point is normally set by the field panel.</td>
</tr>
<tr>
<td>PARALLEL OFF</td>
<td>30</td>
<td>2524</td>
<td>This point is present, but not used in this application. When flow rises above this value, the parallel fan turns OFF.</td>
</tr>
<tr>
<td>CLG FLOW MIN</td>
<td>31</td>
<td>All except slave modes</td>
<td>The minimum amount of air in cfm (lps) to be supplied to the space in cooling mode.</td>
</tr>
<tr>
<td>CLG FLOW MAX</td>
<td>32</td>
<td>All except slave modes</td>
<td>The maximum amount of air in cfm (lps) to be supplied to the space in cooling mode.</td>
</tr>
</tbody>
</table>
### Chapter 4—Point Database

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Address</th>
<th>Application</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTG FLOW MIN</td>
<td>33</td>
<td>2501, 2521, 2522, 2523, 2524, 2526</td>
<td>The minimum amount of air in cfm (lps) to be supplied to the space in heating mode.</td>
</tr>
<tr>
<td>HTG FLOW MAX</td>
<td>34</td>
<td>2501, 2521, 2522, 2523, 2524, 2526</td>
<td>The maximum amount of air in cfm (lps) to be supplied to the space in heating mode.</td>
</tr>
<tr>
<td>AIR VOLUME</td>
<td>35</td>
<td>All</td>
<td>Actual amount of air in cfm (lps) currently passing through the air velocity sensor.</td>
</tr>
<tr>
<td>FLOW COEFF</td>
<td>36</td>
<td>All</td>
<td>Calibration factor for the airflow sensor.</td>
</tr>
<tr>
<td>AI 4</td>
<td>40</td>
<td>2500, 2501, 2522, 2523, 2524, 2526</td>
<td>Actual reading from a 100K Ω thermistor connected to the controller's AI 4 input. When a thermistor is connected at AI 4, DI 4 is not available. See DI 4 (Point 24).</td>
</tr>
<tr>
<td>SUPPLY TEMP</td>
<td>40</td>
<td>2521</td>
<td>The controller compares the value of this point to COOL TEMP (Point 61) and HEAT TEMP (Point 62) and sets HEAT.COOL (Point 5) accordingly. The field panel sets the value of this point by commanding it.</td>
</tr>
<tr>
<td>DO 1</td>
<td>41</td>
<td>All</td>
<td>Digital output 1 controls a 24 Vac load with an ON or OFF status. DO 1 is coupled with DO 2 to control the damper.</td>
</tr>
<tr>
<td>DO 2</td>
<td>42</td>
<td>All</td>
<td>Digital output 2 controls a 24 Vac load with an ON or OFF status. DO 2 is coupled with DO 1 to control the damper.</td>
</tr>
<tr>
<td>DO 3</td>
<td>43</td>
<td>2500, 2501, 2522, 2523, 2524, 2473</td>
<td>Digital output 3 controls a 24 Vac load with an ON or OFF status. If Motor 2 is enabled, DO 3 is coupled with DO 4 to control an actuator such as the hot-water valve in Application 2523.</td>
</tr>
<tr>
<td>HEAT STAGE 1</td>
<td>43</td>
<td>2522, 2524, 2526</td>
<td>This point is DO 3 in applications with electric reheat or baseboard radiation. This digital output controls the contact for the first stage of heating and has a status of ON or OFF.</td>
</tr>
<tr>
<td>DO 4</td>
<td>44</td>
<td>2500, 2501, 2522, 2523, 2473</td>
<td>Digital output 4 controls a 24 Vac load with an ON or OFF status. If the Autozero Module is enabled, DO 4 controls it. If Motor 2 is enabled, DO 4 is coupled with DO 3 to control an actuator such as the hot-water valve in Application 2523.</td>
</tr>
<tr>
<td>HEAT STAGE 2</td>
<td>44</td>
<td>2522</td>
<td>This point is DO 4 in Application 2522. This digital output controls the contact for the second stage of heating, the Autozero Module, or another 24 Vac load and has a status of ON or OFF.</td>
</tr>
<tr>
<td>FAN</td>
<td>44</td>
<td>2524, 2526</td>
<td>This point is DO 4 in applications with a fan. This digital output controls the contact for the fan and has a status of ON or OFF.</td>
</tr>
<tr>
<td>DMPR COMD</td>
<td>48</td>
<td>All except slave modes</td>
<td>The value to which the damper motor is commanded in percent of full travel.</td>
</tr>
<tr>
<td>MTR1 COMD</td>
<td>48</td>
<td>(2473), (2486)</td>
<td>The value to which the Motor 1 actuator is commanded in percent of full travel.</td>
</tr>
</tbody>
</table>
### Description of Points

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Address</th>
<th>Application</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DMPR POS</strong></td>
<td>49</td>
<td>All except slave modes</td>
<td>The current position of the damper motor in percent of full travel. This value is calculated based on motor run time. See <em>MTR1 TIMING (Point 51)</em>.</td>
</tr>
<tr>
<td><strong>MTR1 POS</strong></td>
<td>49</td>
<td>(2473), (2486)</td>
<td>The current position of Motor 1 in percent of full travel. This value is calculated based on motor run time. See <em>MTR1 TIMING (Point 51)</em>.</td>
</tr>
<tr>
<td><strong>MTR1 TIMING</strong></td>
<td>51</td>
<td>All</td>
<td>The time required for the Motor 1 (damper) actuator to travel from full closed to the full open position.</td>
</tr>
<tr>
<td><strong>MTR2 COMD</strong></td>
<td>52</td>
<td>2500, 2501, (2473)</td>
<td>The value to which the Motor 2 actuator is commanded in percent of full travel (for use as an auxiliary slave point).</td>
</tr>
<tr>
<td><strong>VLV COMD</strong></td>
<td>52</td>
<td>2523</td>
<td>The value to which the hot-water valve actuator is commanded in percent of full travel.</td>
</tr>
<tr>
<td><strong>MTR2 POS</strong></td>
<td>53</td>
<td>2500, 2501, (2473)</td>
<td>The current position of the Motor 2 actuator in percent of full travel (for use as an auxiliary slave point).</td>
</tr>
<tr>
<td><strong>VLV POS</strong></td>
<td>53</td>
<td>2523</td>
<td>The current position of the hot-water valve in percent of full travel. This value is calculated based on motor run time. See <em>MTR2 TIMING (Point 55)</em>.</td>
</tr>
<tr>
<td><strong>MTR2 TIMING</strong></td>
<td>55</td>
<td>2500, 2501, 2523, (2473)</td>
<td>The time required for the Motor 2 actuator to travel from full closed to the full open position.</td>
</tr>
<tr>
<td><strong>DMPR ROT ANG</strong></td>
<td>56</td>
<td>All except slave modes</td>
<td>The number of degrees the damper is free to travel.</td>
</tr>
<tr>
<td><strong>DPR1 ROT ANG</strong></td>
<td>56</td>
<td>(2473), (2486)</td>
<td>The number of degrees Damper 1 is free to travel.</td>
</tr>
<tr>
<td><strong>DPR2 ROT ANG</strong></td>
<td>57</td>
<td>(2473)</td>
<td>The number of degrees Damper 2 is free to travel.</td>
</tr>
<tr>
<td><strong>MTR SETUP</strong></td>
<td>58</td>
<td>All</td>
<td>The configuration setup code for Motors 1 and 2. This enables the motors individually and sets each motor to be either direct or reverse acting.</td>
</tr>
<tr>
<td><strong>DO DIR.REV</strong></td>
<td>59</td>
<td>All</td>
<td>The configuration setup code for DOs. Allows the DOs to be direct or reverse acting (enabled equals energized or enabled equals de-energized).</td>
</tr>
<tr>
<td><strong>EHEAT FLOW</strong></td>
<td>60</td>
<td>2522</td>
<td>The flow required before the electric heat will be enabled.</td>
</tr>
<tr>
<td><strong>COOL TEMP</strong></td>
<td>61</td>
<td>2501, 2521</td>
<td>The discharge air temperature where the controller will switch from heating to cooling mode. Used only in applications with SUPPLY TEMP (Point 15 or Point 40).</td>
</tr>
<tr>
<td><strong>HEAT TEMP</strong></td>
<td>62</td>
<td>2501, 2521</td>
<td>The discharge air temperature where the controller will switch from cooling to heating mode. Used only in applications with SUPPLY TEMP (Point 15 or Point 40).</td>
</tr>
<tr>
<td><strong>CLG P GAIN</strong></td>
<td>63</td>
<td>All except slave modes</td>
<td>The proportional gain value for the cooling temperature control loop.</td>
</tr>
<tr>
<td><strong>CLG I GAIN</strong></td>
<td>64</td>
<td>All except slave modes</td>
<td>The integral gain value for the cooling temperature control loop.</td>
</tr>
</tbody>
</table>

*Note:* When a motor is enabled, its associated DOs are enabled.
<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Address</th>
<th>Application</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLG D GAIN</td>
<td>65</td>
<td>All except slave modes</td>
<td>The derivative gain value for the cooling temperature control loop.</td>
</tr>
<tr>
<td>CLG BIAS</td>
<td>66</td>
<td>All except slave modes</td>
<td>The biasing of the cooling temperature control loop. See CLG LOOPOUT (Point 79).</td>
</tr>
<tr>
<td>HTG P GAIN</td>
<td>67</td>
<td>2501, 2521, 2522, 2523, 2524, 2526</td>
<td>The proportional gain value for the heating temperature control loop.</td>
</tr>
<tr>
<td>HTG I GAIN</td>
<td>68</td>
<td>2501, 2521, 2522, 2523, 2524, 2526</td>
<td>The integral gain value for the heating temperature control loop.</td>
</tr>
<tr>
<td>HTG D GAIN</td>
<td>69</td>
<td>2501, 2521, 2522, 2523, 2524, 2526</td>
<td>The derivative gain value for the heating temperature control loop.</td>
</tr>
<tr>
<td>HTG BIAS</td>
<td>70</td>
<td>2501, 2521, 2522, 2523, 2524, 2526</td>
<td>The biasing of the heating temperature control loop. See HTG LOOPOUT (Point 80).</td>
</tr>
<tr>
<td>FLOW P GAIN</td>
<td>71</td>
<td>All except slave modes</td>
<td>The proportional gain value for the flow control loop.</td>
</tr>
<tr>
<td>FLOW I GAIN</td>
<td>72</td>
<td>All except slave modes</td>
<td>The integral gain value for the flow control loop.</td>
</tr>
<tr>
<td>FLOW D GAIN</td>
<td>73</td>
<td>All except slave modes</td>
<td>The derivative gain value for the flow control loop.</td>
</tr>
<tr>
<td>FLOW BIAS</td>
<td>74</td>
<td>All except slave modes</td>
<td>The biasing of the flow control loop.</td>
</tr>
<tr>
<td>FLOW</td>
<td>75</td>
<td>All except slave modes</td>
<td>Indicates the actual amount of air currently passing the air velocity sensor. The value is calculated as a percentage based on where the value of AIR VOLUME (Point 35) is in the range between 0 and CTL FLOW MAX (Point 77).</td>
</tr>
<tr>
<td>CTL FLOW MIN</td>
<td>76</td>
<td>All except slave modes</td>
<td>The active minimum flow used as a limit for the flow control loop. This value is the same as CLG FLOW MIN (Point 31) if the controller is in cooling mode, or is the same as HTG FLOW MIN (Point 33) if the controller is in heating mode, unless it is overridden.</td>
</tr>
<tr>
<td>CTL FLOW MAX</td>
<td>77</td>
<td>All except slave modes</td>
<td>The active maximum flow used as a limit for the flow control loop. This value is the same as CLG FLOW MAX (Point 32) if the controller is in cooling mode, or is the same as HTG FLOW MAX (Point 34) if the controller is in heating mode, unless it is overridden.</td>
</tr>
<tr>
<td>CTL TEMP</td>
<td>78</td>
<td>All except slave modes</td>
<td>The temperature used as input for the temperature control loops. This value is the same as the value in ROOM TEMP (Point 4) unless it is overridden.</td>
</tr>
<tr>
<td>CLG LOOPOUT</td>
<td>79</td>
<td>All except slave modes</td>
<td>The cooling temperature control loop output value in percent.</td>
</tr>
<tr>
<td>HTG LOOPOUT</td>
<td>80</td>
<td>2501, 2521, 2522, 2523, 2524, 2526</td>
<td>The heating temperature control loop output value in percent.</td>
</tr>
<tr>
<td>Descriptor</td>
<td>Address</td>
<td>Application</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
<td>-------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>AVG HEAT OUT</td>
<td>81</td>
<td>2522, 2524, 2526</td>
<td>This point is used to determine what stages of electric heat are used for a given loop output value. The ranges for the value are determined by the number of stages used: 0 to 100 for 1 stage of electric heat, and 0 to 200 for 2 stages of electric heat. For example, a value of 150 indicates that Stage 1 is on 100% of the time and Stage 2 is on 50% of the time.</td>
</tr>
<tr>
<td>STAGE MAX</td>
<td>82</td>
<td>2022, 2024, 2026</td>
<td>The value, in percent, which the heating loop must exceed for the electric heat to be ON for the full duty cycle (STAGE TIME, Point 89).</td>
</tr>
<tr>
<td>STAGE MIN</td>
<td>83</td>
<td>2522, 2524, 2526</td>
<td>The value, in percent, which the heating loop must go below for the electric heat to be OFF for the full duty cycle (STAGE TIME, Point 89).</td>
</tr>
<tr>
<td>DMPR STATUS</td>
<td>84</td>
<td>2500, 2501, 2522</td>
<td>This point is used only when CAL MODULE (Point 87) is set to YES. It readjusts the damper position if the command value is not equal to the actual position of the damper. CAL indicates that the damper is operating normally. RECAL indicates that the damper position was adjusted (recalibrated) by 25% because the desired airflow was not obtainable under its current status.</td>
</tr>
<tr>
<td>SWITCH LIMIT</td>
<td>85</td>
<td>2522, 2523, 2524, 2526</td>
<td>The active temperature control loop output must be less than this value to switch between cooling mode and heating mode. Actual switchover depends on SWITCH DBAND (Point 90) being exceeded and is subject to SWITCH TIME (Point 86) being expired.</td>
</tr>
<tr>
<td>SWITCH TIME</td>
<td>86</td>
<td>2522, 2523, 2524, 2526</td>
<td>The time, in minutes, before the heat/cool mode can change over when the other parameters are appropriate.</td>
</tr>
<tr>
<td>CAL MODULE</td>
<td>87</td>
<td>2500, 2501, 2522, (2473)</td>
<td>YES indicates that the Autozero Module is enabled to calibrate the air velocity transducer. The damper will not be used for calibration. NO indicates that Autozero Module is disabled and that the air velocity transducer will be calibrated by closing the damper. Valid input: YES or NO.</td>
</tr>
<tr>
<td>STAGE COUNT</td>
<td>88</td>
<td>2522, 2524, 2526</td>
<td>The number of electric heating stages used by the application. DOs associated with unused stages may be used as spare DOs.</td>
</tr>
<tr>
<td>STAGE TIME</td>
<td>89</td>
<td>2522, 2524, 2526</td>
<td>The cycle time in minutes for the electric reheat stages. For example, if (a) there are two stages of electric heat (that is, STAGE COUNT, Point 88, is set to 2), (b) STAGE TIME = 10 minutes, and (c) AVG HEAT OUT (Point 81) = 150%, then Stage 1 is ON for 10 minutes (100% of the time), and Stage 2 is ON for 5 minutes (50% of 10 minutes) and OFF for 5 minutes.</td>
</tr>
</tbody>
</table>
### Chapter 4—Point Database

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Address</th>
<th>Application</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWITCH DBAND</td>
<td>90</td>
<td>2522, 2523, 2524, 2526</td>
<td>The temperature range in degrees which is compared to the difference between CTL TEMP (Point 78) and CTL STPT (Point 92). The difference must exceed this value for temperature control mode to change over between heating and cooling. Changeover is also subject to the active temperature control loop output being below SWITCH LIMIT (Point 85) and SWITCH TIME (Point 86) being expired.</td>
</tr>
<tr>
<td>CTL STPT</td>
<td>92</td>
<td>All except slave modes</td>
<td>The actual setpoint value being used as input for the active temperature control loop.</td>
</tr>
<tr>
<td>FLOW STPT</td>
<td>93</td>
<td>All except slave modes</td>
<td>The currently active setpoint of the flow control loop.</td>
</tr>
<tr>
<td>CAL AIR</td>
<td>94</td>
<td>All</td>
<td>YES commands the controller to go through calibration sequence for the air velocity sensor. YES is also displayed when the calibration sequence is started automatically. CAL AIR automatically returns to NO after the calibration sequence is completed. Valid input: YES or NO.</td>
</tr>
<tr>
<td>CAL SETUP</td>
<td>95</td>
<td>All</td>
<td>The configuration setup code for the calibration sequence options. See Chapter 2 and Chapter 3—Applications for details.</td>
</tr>
<tr>
<td>CAL TIMER</td>
<td>96</td>
<td>All</td>
<td>Time interval, in hours, between the calibration sequence initiations if a timed calibration option is selected in CAL SETUP (Point 95).</td>
</tr>
<tr>
<td>DUCT AREA</td>
<td>97</td>
<td>All</td>
<td>Area, in square feet (square meters), of the duct where the air velocity sensor is located. This is a calculated value (calculated by the field panel or computer being used) that depends on duct shape and size. It is used in calculating all points in units of cfm, cf, fps and L. Valid input: 0.025 ft^2 (0.002 m^2) through 6.375 ft^2 (0.5923 m^2).</td>
</tr>
<tr>
<td>LOOP TIME</td>
<td>98</td>
<td>All except slave modes</td>
<td>The time, in seconds, between control loop calculations.</td>
</tr>
<tr>
<td>ERROR STATUS</td>
<td>99</td>
<td>All</td>
<td>The status code indicating any errors detected during controller power up. A status of 0 indicates there are no problems. See Chapter 5—Troubleshooting for details.</td>
</tr>
</tbody>
</table>
Chapter 5—Troubleshooting

Overview

Chapter 5 discusses the following topics:

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  - Preventive Maintenance ............................................................................................... 5-3
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Basics of Troubleshooting

Chapter 5 describes corrective measures you should take if you encounter a problem when using an ATEC.

You are not required to do any controller troubleshooting. You may wish to contact your local Siemens Building Technologies, Inc., Siemens representative if a problem occurs or you have any questions about the controller.

NOTE: When troubleshooting, record what the problem is and what actions were performed immediately before the problem occurred. Being able to describe the problem in detail is important should you need assistance from your local Siemens Building Technologies representative.

Datamate Software

Datamate is a customer software tool for all controller communications. There are two versions: Datamate Base, and Datamate Advanced. Datamate Base works on an IBM-compatible Personal Computer or a Handheld PC or Pocket PC™ running Windows CE. Datamate Advanced works only on an IBM-compatible Personal Computer. With Datamate, you can back up, restore, and edit any APOGEE database (but only Datamate Advanced allows you to edit points offline). Backing up and restoring a database can be accomplished while connected to any APOGEE field panel, or to the Building Level Network (BLN) or Floor Level Network (FLN) device in question. A modem and telephone lines can also be used. Databases can be saved to a hard or floppy disk and kept for permanent storage or used as backup.

For more information regarding Datamate software, see the appropriate user guide based on which version of Datamate you are using (Base or Advanced), or contact your local Siemens Building Technologies representative.

Basic Service Information

Always remove power from the controller when installing or replacing it. Since the controller does not have a power switch, the recommended method of removing power from a locally powered controller is to turn OFF the power to the 24 Vac transformer. The recommended method of removing power from a controller on a power cable (even to service a single controller) is to turn OFF the power at the transformer.

NOTE: When removing power from a controller to perform maintenance or service, make sure that the person in charge of the facility is aware of this and that appropriate steps are taken to keep the building in control.

Never remove the cover from the ATEC. There are no serviceable parts inside. If a problem is found with a controller, contact your local Siemens Building Technologies representative for replacement. An anti-static wrist strap is recommended when installing or replacing controllers.
NOTE: The ATEC has a built-in checkout procedure that can be manually initiated at any time after the controller has been installed. This procedure tests all of the necessary I/O and ensures the controller has the ability to operate within the set airflow range. (See page 5-6 for details.)

Preventive Maintenance

Most controller components, under normal circumstances, are designed so that they do not require preventive maintenance. Periodic inspections, voltage checks, and point checks are normally not required. The controller's rugged design makes most preventive maintenance unnecessary. However, devices that are exposed to dusty or dirty environments may require periodic cleaning to function properly.

Safety Features

The controller board stores the controller's address, applications, and point values. In the event of a power failure or a reset, these values are retrieved from the controller's permanent memory and are used by the controller unless overridden by a field panel. If one of the following conditions occurs, safety features present in the controller will activate its fail-safe mode.

- Sensor failure.
- Loss of power. Upon controller power loss, communication with the controller is also lost. The controller will appear as failed (\( ^*F* \)) at the field panel or portable operator's terminal.
Controller LED

To determine if the controller is powered up and working, verify that the Basic Sanity Test (BST)/Floor Level Network (FLN) Light Emitting Diode (LED) is flashing ON/OFF once per second or is steadily illuminated. The BST/FLN LED is near the upper right-hand corner of the controller’s front surface (Figure 5-1).

NOTE: A blinking LED indicates communication over the FLN. A steadily lit LED indicates stand-alone operation. The LED blinks for two minutes after power-up or loss of communication over the FLN. If there is still no communication after two minutes, the LED becomes steadily lit.

Figure 5-1. Location of LED and Connections on ATEC.

Basic Troubleshooting Flowchart

Use the Basic Troubleshooting Flowchart, Figure 5-2, as a quick guide for troubleshooting common controller problems. Use it to find the paragraphs and procedures in this section that describe the symptom and the corrective action you should take to solve a problem.
Basics of Troubleshooting

Start

Can communication be established with the controller via the room temp sensor? NO

YES

Are the proper address, application, and setpoints being displayed? NO

YES

Are software revisions correct? NO

YES

Does the automated checkout procedure pass w/o errors? NO

YES

Datamate - Refer to the appropriate user guide: Datamate Base or Datamate Advanced

Check the controller’s:
- BST LED
- cables/wiring
- voltages/power

If communication can not be established, contact your local Siemens Building Technologies, Inc. representative.

Contact your local Siemens Building Technologies, Inc. representative.

Change as required:
Release the setpoints in the field panel initial value block.

Datamate - Refer to the appropriate user guide: Datamate Base or Datamate Advanced

Verify the minimum software revision (contact your local Siemens Business Technologies, Inc. representative if necessary):
- Datamate Base or Datamate Advanced
- Verify latest software revision
- Insight for APOGEE is Rev. 3.1 or higher.
- APOGEE Field Panel Firmware is Rev. 2.0 or higher.

Check the FLN trunk connections. Refer to FLN Trunk Connections Check for more info.

Check the following:
- Digital Outputs
- Damper Actuator
- Valve Actuator
- Motor Setup

Check the following:
- Room temperature
- sensor/thermistor
- temperature input
- Digital inputs
- Analog inputs
- Relay Module

Refer to the Controller Troubleshooting, Temperature Sensor Troubleshooting, and the Relay Module Troubleshooting sections for more info.

Refer to Automated Checkout Procedure section

Are all points that have hardware connected reading properly, no failed points? NO

YES

Do all commandable devices move properly?

Finish

Is the controller problem solved? NO

YES

Is the FLN trunk communicating with the field panel? NO

YES

Does the automated checkout procedure pass w/o errors? NO

YES

Figure 5-2. Basic Troubleshooting Flowchart.
Automated Checkout

The ATEC has a built-in checkout procedure that can be manually initiated at any time after the controller has been installed. The procedure tests all of the necessary I/O and ensures the controller has the ability to operate within the set airflow range, between CLG FLOW MIN (Point 31) and CLG FLOW MAX (Point 32).

To perform the checkout procedure, set CHK OUT (Point 10) to YES. When the procedure is completed, CHK OUT returns to NO and the results are displayed in CHK STATUS (Point 3). See Table 5-1.

<table>
<thead>
<tr>
<th>CHK STATUS Values (Point 3)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>Checkout procedure has not been run since last controller initialization.</td>
</tr>
<tr>
<td>0</td>
<td>No errors found.</td>
</tr>
<tr>
<td>1</td>
<td>Room temperature sensor failed.</td>
</tr>
<tr>
<td>2</td>
<td>Room setpoint dial failed [If STPT DIAL (Point 14) is set to YES].</td>
</tr>
<tr>
<td>4</td>
<td>Air velocity sensor failed.</td>
</tr>
<tr>
<td>8</td>
<td>Controller could not reach CLG FLOW MIN or below.</td>
</tr>
<tr>
<td>16</td>
<td>Controller could not reach CLG FLOW MAX or above.</td>
</tr>
</tbody>
</table>

NOTE: Multiple failures are added together and displayed as one value. For example, if the room temperature sensor failed (1) and the controller could not reach CLG FLOW MAX (16), CHK STATUS displays 17.

Failure codes indicate the following possible problems.

Room temperature sensor failed—CHK STATUS (Point 3) = 1

1. The cable for the room temperature sensor may be unplugged or loose. Check both ends to ensure that the cable is securely seated.

2. Connect directly to the controller through the room temperature sensor connection on the ATEC and check whether communication is possible. If so, the problem lies in the room temperature sensor or its cable. If not, the problem is with the controller.

3. Contact your local Siemens Building Technologies representative.

Room setpoint dial failed—CHK STATUS (Point 3) = 2

1. The cable for the room temperature sensor may be unplugged or loose. Check both ends to ensure that the cable is securely seated.

2. The controller may be incorrectly set to use a setpoint dial with a sensor that does not have the dial. If the sensor has no dial, change STPT DIAL (Point 14) from YES to NO.
3. Connect directly to the controller through the room temperature sensor connection on the ATEC and check whether communication is possible. If so, the problem lies in the room temperature sensor or its cable. If not, the problem is with the controller.

4. Contact your local Siemens Building Technologies representative.

**Air velocity sensor failed**—CHK STATUS (Point 3) = 4

1. The sensor tubing may be blocked, leaking, or disconnected. Check for pinched, disconnected, or cracked sensor tubing. Correct as needed.

2. The tubing connections for the air velocity sensor may be reversed. Repipe if HI and LO connections are incorrect.

3. The sensor or the ATEC may be faulty. See “Air Velocity Sensor Troubleshooting” on page 5-15.

**Controller could not reach CLG FLOW MIN or below**—CHK STATUS (Point 3) = 8

1. The actuator may be loose on the shaft. Check that the setscrew is fully tightened against the damper shaft. Follow these torque guidelines:
   - 70 ± 5 inch pounds—solid metal
   - 37 ± 2 inch pounds—plastic, graphite, composite, or hollow metal (Hollow metal shafts require an insert to prevent shaft damage.)

2. The tubing for the air velocity sensor may be pinched, disconnected, or cracked. Check the tubing and correct as needed.

3. The tubing connections for the air velocity sensor may be reversed. Repipe if HI and LO connections are incorrect.

4. Box sizing information may be incorrect. Check the values of the following points and correct as needed:
   - DUCT AREA (Point 97)
   - FLOW COEFF (Point 36)
   - CLG FLOW MIN (Point 31)
   - CLG FLOW MAX (Point 32)

5. Motor setup information may be incorrect. Check the values of the following points and correct as needed:
   - MTR SETUP (Point 58; see Table 5-2 on page 5-17)
   - MTR1 TIMING (Point 51)
   - DMPR ROT ANG (Point 56)
6. The box may not have been balanced correctly. Contact your local Siemens Building Technologies Representative.

7. The air velocity sensor may need calibration. Set CAL AIR (Point 94) to **YES** to run the calibration sequence. When CAL AIR returns to **NO**, indicating that the sequence is finished, run the checkout procedure again to see whether the problem has been corrected.

**Controller could not reach CLG FLOW MAX or above**—CHK STATUS (Point 3) = 16

1. Check for the problems described immediately above for CLG FLOW MIN.

2. The box may be starved for air, either because the central air-handling unit is off or because of low duct static.

## Troubleshooting Procedures

### Controller Troubleshooting

The following information describes troubleshooting procedures you should use if you encounter a problem with the controller. Find the symptom that best describes the problem and perform the corrective action that follows. For any unresolved problem, contact your local Siemens Building Technologies representative.

**A. BST/FLN LED on controller is OFF.**

1. Check the incoming 24 Vac power to controller (19.2–27.6 Vac). See Figure 5-3. Correct as required.

2. Contact your local Siemens Building Technologies representative.

![Figure 5-3. ATEC Power Wiring.](image-url)
B. BST/FLN LED on controller does not flash but instead remains lit when connected to an FLN trunk. Communication with controller via Datamate is possible.

**NOTE:** The BST/FLN LED flashes for two minutes after power-up or disconnection from the FLN. If there is still no communication after two minutes, the LED turns on steadily. Thus, it is necessary to wait for two minutes to determine whether the LED will continue flashing or not.

1. See *FLN Trunk Connections Check* on page 5-22. Check the FLN trunk wiring for proper connection and polarity.

2. Check that a point exists in the field panel database for the FLN device. Correct as required.

3. Check that the address for the ATEC in the field panel shows the correct FLN trunk (1 to 3) and drop (addresses 0 to 98 are valid; 0 to 31 are typically used). Change if necessary.

4. Check that CTRL ADDRESS (Point 1) in the ATEC matches its drop number in the field panel. Change if necessary.

5. Contact your local Siemens Building Technologies representative.

C. Cannot communicate with the controller through the port on the room temperature sensor.

1. Check the incoming 24 Vac power to controller (19.2 to 27.6 Vac). See Figure 5-3. Correct as required.

2. The cable for the room temperature sensor may be unplugged or loose. Check both ends to ensure that the cable is securely seated.

3. Connect directly to the controller through the room temperature sensor connection on the ATEC and check whether communication is possible. If so, the problem lies in the room temperature sensor or its cable. If not, the problem is with the controller.

4. Contact your local Siemens Building Technologies representative.

D. Communication with controller possible while connected to the room temperature sensor, but unable to control setpoint via the dial.

1. Controller may be in night mode. Check the day/night wall switch for proper setting.

2. Check that the controller is set up to use the dial by ensuring that STPT DIAL (Point 14) is set to **YES**. Reset if necessary.

3. Check the settings for maximum and minimum values that the controller will accept from the setpoint dial (RM STPT MIN, Point 11, and RM STPT MAX, Point 12). Adjust as necessary.
4. Check priority of points to see if any are overridden. Release as appropriate.

5. The room temperature sensor or its cable may be faulty. Contact your local Siemens Building Technologies representative.

E. ROOM TEMP (Point 4) appears as failed, *F* (Figure 5-4).

1. The cable for the room temperature sensor may be unplugged or loose. Check both ends to ensure that the cable is securely seated.

2. The cable may be faulty, or the room temperature sensor may have failed. Contact your local Siemens Building Technologies representative.

![Figure 5-4. Room Temperature Sensor Displays *F* (Failed).]

F. Display at the field panel shows invalid points or no points.

1. Check that the address for the ATEC in the field panel shows the correct FLN trunk (1 to 3) and drop (addresses 0 to 98 are valid; 0 to 31 are typically used). Change if necessary.

2. Check that CTRL ADDRESS (Point 1) in the ATEC matches its drop number in the field panel. Change if necessary.

NOTE: Datamate allows you to communicate with an ATEC even if the address is incorrect. (The screen may display a message when connection is being established, but you are not prevented from communicating with the ATEC.)

3. Contact your local Siemens Building Technologies representative.

G. The controller status is failed at field panel. The screen may display a Device Failure message.

1. Check the incoming 24 Vac power to controller (19.2 to 27.6 Vac). See Figure 5-3 on page 5-8. Correct as required.

2. Check that CTRL ADDRESS (Point 1) is set to correct value (addresses 0 to 98 are valid; 0 to 31 are typically used).

3. See FLN Trunk Connections Check on page 5-22. Check the FLN trunk wiring for proper connection and polarity.
4. If all equipment controllers on the FLN trunk are failed, contact your local Siemens Building Technologies representative.

**H. A value entered into the controller using Datamate immediately changes back to its previous value.**

1. The field panel may be updating the controller through the execution of PPCL code. Evaluate the PPCL code to ensure proper operation. See *APOGEE PPCL User Manual* (125-1896) for more information.

2. Disconnect the controller from the FLN trunk and check for proper operation. If the value continues to revert to its previous value, the controller must be replaced.

3. Contact your local Siemens Building Technologies representative.

**I. Upon recovery from a power loss to the controller, or recovery from a communication loss with the field panel, a value entered into the controller using Datamate immediately changes back to its previous value.**

The field panel is updating the controller with the initial value block (Scuinitvals). Update the initial value block (Scuinitvals) at the field panel. See *APOGEE Field Panel User’s Manual* (125-3000) for more information.

**J. Room temperature is too cold or too hot.**

1. Adjust heating or cooling setpoint as appropriate.

2. If the controller is using a setpoint dial, ensure that STPT DIAL (Point 14) is set to YES. Also check the settings for maximum and minimum values that the controller will accept from the setpoint dial (RM STPT MIN, Point 11, and RM STPT MAX, Point 12). Adjust as necessary.

3. Check the operation of the valve and/or damper actuator (page 5-23), the damper, and the damper linkage. Repair or replace as necessary.

4. Check priority of points to see if any are overridden. Release as appropriate.

5. Contact your local Siemens Building Technologies representative.

**K. Analog input points displayed at the field panel are not reading as expected (pre-APOGEE firmware or manually unbundled points).**

1. Improper slope/intercept value for the point may be entered in the field panel database. Check the slope/intercept entries for the point and correct as needed. See the point database tables in *Chapter 2 or Chapter 3—Applications* for slope/intercept values.
2. Check sensor. Contact your local Siemens Building Technologies representative if sensor replacement is necessary.

L. Points cannot be commanded at the field panel.

1. Incorrect point addresses entered. Correct as needed using Datamate. See the point database tables in Chapter 2 or Chapter 3—Applications for addresses. Check whether points can now be commanded.

2. Check priority of points to see if they are overridden. Release as appropriate.

3. Contact your local Siemens Building Technologies representative.

Temperature Sensor Troubleshooting

The following information describes troubleshooting procedures you should use if you encounter a problem with a temperature sensor used with the controller. Find the symptom that best describes the problem and perform the corrective action that follows. If the problem persists, contact your local Siemens Building Technologies representative.

A. The following points read failed (*F*): ROOM TEMP (Point 4), RM STPT DIAL (Point 13), and DI OVRD SW (Point 19).

The room temperature sensor override switch is stuck. Adjust the cover on the room temperature sensor to free the override switch.

B. The following points read failed (*F*): ROOM TEMP (Point 4) and RM STPT DIAL (Point 13).

1. The cable for the room temperature sensor may be unplugged or loose. Check both ends to ensure that the cable is securely seated.

2. Contact your local Siemens Building Technologies representative.

C. Cannot communicate with the controller through the port on the room temperature sensor.

1. The cable for the room temperature sensor may be unplugged or loose. Check both ends to ensure that the cable is securely seated.

2. Connect directly to the controller through the room temperature sensor connection and check whether communication is possible. If so, the problem lies in the room temperature sensor or its cable. If not, the problem is with the controller.

3. Contact your local Siemens Building Technologies representative.
D. Measured temperature is not the actual room temperature, or the room temperature readings fluctuate.

1. The cable for the room temperature sensor may be unplugged or loose. Check both ends to ensure that the cable is securely seated.

2. Check that the sensor is not exposed to direct sunlight and that there are no drafts coming through the wall board, bricks, and so on. The sensor must not be located where temperature changes are frequent (that is, near a window, an outside door, or a diffuser) or near fluorescent light dimmers. Contact your local Siemens Building Technologies representative if sensor relocation is necessary.

3. ROOM TEMP (Point 4) may be overridden. Check the priority of ROOM TEMP. If the priority is displayed as OVRD, then release the point.

4. Contact your local Siemens Building Technologies representative if sensor or cable replacement is necessary.

E. Adjusting the sensor setpoint dial has no effect on the value of RM STPT DIAL (Point 13).

1. Check that the controller is set up to use the dial by ensuring that STPT DIAL (Point 14) is set to YES. Reset if necessary.

2. RM STPT DIAL (Point 13) may be overridden. Check the priority of RM STPT DIAL. If the priority is displayed as OVRD, then release the point.

3. Check the settings for maximum and minimum values that the controller will accept from the setpoint dial (RM STPT MIN, Point 11, and RM STPT MAX, Point 12). Adjust as necessary.

4. The cable for the room temperature sensor may be unplugged or loose. Check whether RM STPT DIAL (Point 13) appears as failed, (*F*). If so, check both ends of the cable to ensure that it is securely seated.

5. Contact your local Siemens Building Technologies representative if sensor or cable replacement is necessary.

F. AI 3 (Point 15) or SUPPLY TEMP (Point 15) appears as failed, (*F*).

1. Check cable from controller to supply-duct or auxiliary temperature sensor for proper connection to AI 3 (terminals 4 and 5).

2. Check temperature sensor and replace if necessary. Contact your local Siemens Building Technologies representative if sensor or cable replacement is necessary.
Digital and Analog Inputs Troubleshooting

The following information describes troubleshooting procedures you can use should you encounter a problem with the controller's digital and/or analog inputs. Find the symptom that best describes the problem and perform the corrective action that follows. If the problem persists, contact your local Siemens Building Technologies representative.

A. Analog input points displayed at field panel do not read as expected (pre-APOGEE firmware or manually unbundled points).

1. Check slope/intercept entries for the points in question and change as needed. See the point database tables in Chapter 2 or Chapter 3—Applications.

2. Check sensor and contact your local Siemens Building Technologies representative if replacement is necessary.

B. Points cannot be read or overridden from field panel.

Check points that are not functioning for proper addressing and correct as needed.

C. One or more inputs (digital or analog) do not appear to be functioning properly.

1. See Di 3 and Di 4 Check on page 5-22, and/or Ai 3 and Ai 4 Check on page 5-23. Inspect all wires and make sure they are making good contact with connector. Rewire any connections that are questionable.

2. Install wires into correct terminals. See the wiring diagram for your application in Chapter 2 or Chapter 3—Applications.

3. Contact your local Siemens Building Technologies representative.

D. Ai 3 (Point 15) or SUPPLY TEMP (Point 15) appears as failed, (°F*).

1. Check cable from controller to supply-duct or auxiliary temperature sensor for proper connection to Ai 3 (terminals 4 and 5).

2. Check temperature sensor and replace if necessary. Contact your local Siemens Building Technologies representative for sensor replacement.
Air Velocity Sensor Troubleshooting

The following information describes troubleshooting procedures you should use if you encounter a problem with an air velocity sensor or with the controller’s internal air velocity transducer (differential pressure transducer). Find the symptom that best describes the problem and perform the corrective action that follows. If the problem persists, contact your local Siemens Building Technologies representative.

**A. AIR VOLUME (Point 35) reads failed, (*F*).**

1. Clean or replace the air velocity sensor (located in the duct).

2. If velocity is greater than 4000 fpm (20.32 m/sec) (not 4000 cfm), take corrective action to decrease the velocity.

3. Check for pinched, disconnected, or cracked sensor tubing. Correct as needed.

4. Check the sensor connections. Repipe if HI and LO connections are reversed.

5. Verify that the correct value is entered for DUCT AREA (Point 97). If incorrect, enter the correct value.

6. Contact your local Siemens Building Technologies representative.

**B. AIR VOLUME (Point 35) reads a very high value.**

1. Check for pinched, disconnected, or cracked sensor tubing. Correct as needed.

2. Check the sensor connections. Repipe if HI and LO connections are reversed.

3. If using an Autozero Module, check that the HI and LO connections are correct and that the module is wired to DO 4 (terminals 2 and 3) on the ATEC. Repipe or rewire as needed.

4. Verify that the correct value is entered for DUCT AREA (Point 97). If incorrect, enter the correct value.

5. Recalibrate air velocity sensor by setting CAL AIR (Point 94) to YES. When calibration is finished, CAL AIR automatically returns to NO.

6. Verify that the flow coefficient, as supplied by the air balancer, is entered correctly for FLOW COEFF (Point 36). If the value is incorrect, enter the correct value.

7. Clean or replace the duct sensor and tubing.

8. Contact your local Siemens Building Technologies representative.
C. AIR VOLUME (Point 35) reads a very low value or zero.

1. Verify that the correct value is entered for DUCT AREA (Point 97). If the value is incorrect, enter the correct value.

2. Check the sensor connections. Repipe if HI and LO connections are reversed.

3. If using an Autozero Module, check that the HI and LO connections are correct and that the module is wired to DO 4 (terminals 2 and 3) on the ATEC. Repipe or rewire as needed.

4. Check for leakage near where the sensor tubing enters the duct. Block off any air leaks using tape or other approved material as required.

5. Verify that DMPR ROT ANG (Point 56) is correctly set. If the setting for this point is smaller than the damper’s actual rotation angle, then the air velocity sensor may have been calibrated with the damper open. If the value is incorrect, enter the correct value, then recalibrate the sensor by setting CAL AIR (Point 97) to YES. When calibration is finished, CAL AIR automatically returns to NO.

6. Check for pinched, disconnected, or cracked sensor tubing. Correct as needed.

7. Verify that the flow coefficient, as supplied by the air balancer, is entered correctly for FLOW COEFF (Point 36). If the value is incorrect, enter the correct value.

8. Clean or replace the air velocity sensor and tubing (located in the duct).

9. Contact your local Siemens Building Technologies representative.

D. AIR VOLUME (Point 35) in the application shows an incorrect value.

1. Check for pinched, disconnected, or cracked sensor tubing. Correct as needed.

2. Check to ensure that the sensor is upstream of the damper blade. If not, contact your local Siemens Building Technologies representative to relocate the sensor.

3. Check that damper seals properly and does not leak when closed.

4. Check for leakage near where the sensor tubing enters the duct. Block off any air leaks using tape or other approved material as required.

5. If using an Autozero Module, check that the HI and LO connections are correct and that the module is wired to DO 4 (terminals 2 and 3) on the ATEC. Repipe or rewire as needed.

6. Verify that the flow coefficient, as supplied by the air balancer, is entered correctly for FLOW COEFF (Point 36). If the value is incorrect, enter the correct value.

7. Clean or replace the air velocity sensor and tubing (located in the duct).

8. Contact your local Siemens Building Technologies representative.
Actuator and Valve Troubleshooting

The following information describes troubleshooting procedures you should use if you encounter a problem with a damper actuator or an electronic valve actuator. Find the symptom that best describes the problem and perform the corrective action that follows. If the problem persists, contact your local Siemens Building Technologies representative.

A. Actuator does not move at all.

1. Check the value of MTR SETUP (Point 58) to ensure that the actuator is enabled. See Table 5-2.

   **Table 5-2. Motor Setup (Point 58).**

<table>
<thead>
<tr>
<th>Motor 2</th>
<th>Motor 1 (Damper)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Used</td>
<td>Enabled</td>
</tr>
<tr>
<td></td>
<td>Enabled and Reversed</td>
</tr>
<tr>
<td>Enabled</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Enabled and Reversed</td>
</tr>
<tr>
<td>Enabled and Reversed</td>
<td>13</td>
</tr>
</tbody>
</table>

   **NOTE:** The damper actuator on the ATEC is factory-wired to DO 1 and DO 2. This wiring is not user-serviceable.

2. For an externally wired actuator (the valve in Application 2523 or an actuator used in slave mode for the ATEC with Reheat), see Actuator Check on page 5-23. Check that power is supplied to actuator.

3. For an externally wired actuator, verify actuator is correctly wired to the ATEC. The common wire should be terminated at screw terminal 2, and screw terminals 1 and 3 should each be the termination for a hot wire (extend, retract). Rewire if necessary.

4. For a valve actuator, check that the actuator is properly secured to the valve.

5. For a damper actuator, check that the setscrew is fully tightened against damper shaft. Follow these torque guidelines:
   - 70 ± 5 inch pounds—solid metal
   - 37 ± 2 inch pounds—plastic, graphite, composite, or hollow metal (Hollow metal shafts require an insert to prevent shaft damage.)

6. Check if the controller is calibrating the air velocity sensor. While calibration is underway, CAL AIR (Point 94) = YES. If so, verify that the actuator is functioning properly after calibration cycle is completed (CAL AIR has returned to NO).

7. Contact your local Siemens Building Technologies representative.
B. Actuator position displays as 100% open, but damper or valve is closed.

1. For an externally wired actuator (the valve in Application 2523 or an actuator used in slave mode for the ATEC with Reheat), verify proper wiring. See Table 5-3 and the installation wiring diagram.

2. Try changing MTR SETUP (Point 58) to reverse the action of the actuator. See Table 5-2. If this does not correct the problem, return MTR SETUP to its previous value.

3. Contact your local Siemens Building Technologies representative.

<table>
<thead>
<tr>
<th>Electronic Actuator</th>
<th>Terminal Code/Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>damper (GDE131.1U or GLB131.1P)</td>
<td>Violet (Y1) clockwise, Red (G) COM, Orange (Y2) counterclockwise</td>
</tr>
<tr>
<td>valve (SSB81U or SSC81U)</td>
<td>Y1 Extend, G COM, Y2 Retract</td>
</tr>
</tbody>
</table>

C. Valve or damper position displays as 0% open, but flow remains through the valve or damper.

1. For an externally wired actuator (the valve in Application 2523 or an actuator used in slave mode for the ATEC with Reheat), verify proper wiring. See Table 5-3 and the installation wiring diagram.

2. Try changing MTR SETUP (Point 58) to reverse the action of the actuator. See Table 5-2 on page 5-17. If this does not correct the problem, return MTR SETUP to its previous value.

3. For a damper, check for damper binding and correct as needed.

4. For a damper, confirm proper alignment of damper shaft in actuator bushing. Damper shaft must not be off-center or sized improperly. See Figure 5-5 on page 5-19.

**NOTE:** The damper actuator includes a 1/2-inch adapter insert ready to mount on 1/2-inch shafts. For 3/8-inch shafts, a 3/8-inch insert is shipped in the actuator box.

5. Contact your local Siemens Building Technologies representative.
D. Valve cannot be shut completely.

Contact your local Siemens Building Technologies representative.

E. Valve leaks.

Contact your local Siemens Building Technologies representative.

F. Actuator does not develop sufficient force to move damper.

1. Check for damper binding and correct as needed.

2. Confirm proper alignment of damper shaft in actuator bushing. Damper shaft must not be off-center or sized improperly. See Figure 5-5.

   **NOTE:** The damper actuator includes a 1/2-inch adapter insert ready to mount on 1/2-inch shafts. For 3/8-inch shafts, a 3/8-inch insert is shipped in the actuator box.

3. Make sure that the actuator setscrew is fully tightened against damper shaft. Follow these torque guidelines:
   - 70 ± 5 inch pounds—solid metal
   - 37 ± 2 inch pounds—plastic, graphite, composite, or hollow metal (Hollow metal shafts require an insert to prevent shaft damage.)

4. Contact your local Siemens Building Technologies representative.

G. Actuator position does not match its display value.

1. For a valve actuator, check that valve stem is screwed to actuator. If necessary, contact your local Siemens Building Technologies representative for replacement.

2. For a damper actuator, check for damper binding and correct as needed.
3. Confirm proper alignment of damper shaft in actuator bushing. Damper shaft must not be off-center or sized improperly. See Figure 5-5.

**NOTE:** The damper actuator includes a 1/2-inch adapter insert ready to mount on 1/2-inch shafts. For 3/8-inch shafts, a 3/8-inch insert is shipped in the actuator box.

4. Make sure that the actuator setscrew is fully tightened against damper shaft. Follow these torque guidelines:
   - 70 ± 5 inch pounds—solid metal
   - 37 ± 2 inch pounds—plastic, graphite, composite, or hollow metal (Hollow metal shafts require an insert to prevent shaft damage.)

5. Contact your local Siemens Building Technologies representative to set the actuator’s run-time to the correct value.

**Relay Module Troubleshooting**

Figure 5-6 shows the most common relay module from Siemens Building Technologies for use with the ATEC.

In the text that follows, find the symptom that best describes the problem you are experiencing and perform the corrective action. If the problem persists, contact your local Siemens Building Technologies representative.

**WARNING:**
A relay module is a high voltage device! Always remove power before attempting to service it.

**A. Relays cycle ON/OFF improperly or do not energize.**

1. Check wiring to and from relay module for correct placement and continuity. Correct wiring if necessary.

2. Check that the correct controller application is selected.

3. Check that wiring connects to proper DOs on the controller. See Table 5-4 and Figure 5-6.

4. If Powers Process Control Language (PPCL) is continuously commanding relays ON and then OFF, contact your local Siemens Building Technologies representative to have PPCL code corrected as necessary.

5. Replace relay module. Contact your local Siemens Building Technologies representative.
Table 5-4. Relay Module (540-147) Connections.

| Relay Module Input Terminal Pin | Relay Number | Relay Module Terminal Block | ATEC
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>–</td>
<td>COMMON</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>K1</td>
<td>COM1, NO1, NC1</td>
<td>DO 3 1</td>
</tr>
<tr>
<td>3</td>
<td>K2</td>
<td>COM2, NO2, NC2</td>
<td>DO 4 3</td>
</tr>
<tr>
<td>4</td>
<td>K3</td>
<td>COM3, NO3, NC3</td>
<td>–</td>
</tr>
<tr>
<td>5</td>
<td>K4</td>
<td>COM4, NO4, NC4</td>
<td>–</td>
</tr>
</tbody>
</table>

B. Load controlled by relay turns OFF when it should be ON, and ON when it should be OFF.

Rewire load being controlled to the proper relay module terminals. Use caution when wiring, or contact your Siemens Building Technologies representative for service.

C. Relay never de-energizes.

Check that the cabling connecting controller board to relay module is not shorted.

D. Load never turns OFF (low voltage loads only).

Contact your local Siemens Building Technologies representative for replacement of relay module.
Equipment Checks

FLN Trunk Connections Check

If the controller connects to a field panel via a Floor Level Network (FLN), make sure that the wiring is terminated properly at both the field panel and at the controller's FLN trunk terminal blocks. The wires should not be shorted or loosely connected. Maintain proper FLN trunk polarity: + to +; – to –. Verify that the shields are properly terminated. See Figure 5-7.

If the FLN Trunk wiring is reversed, then the controller's BST/FLN LED will remain illuminated steadily.

It is normal for the BST/FLN LED to be illuminated steadily if there is no FLN trunk connected to the controller.

![FLN Trunk Wiring Diagram](image)

**Figure 5-7. FLN Trunk Wiring.**

DI 3 and DI 4 Check

To check if DI 3 and DI 4 are functioning properly, use the following procedure.

**Equipment Required**

- Jumper wire (use a 3-inch (76-mm) piece of wire, stripped at both ends, or equivalent).
- Datamate (Base or Advanced) and IBM-compatible computer, or Handheld PC or Pocket PC™ with Windows CE, plus communications cable.

**Procedure**

1. Plug into the communication port on the room temperature sensor. Scroll so that the display shows DI 4 (Point 24) or DI 3 (Point 25).
2. Connect the jumper wire between the controller screw terminals 4 and 5 (labeled “AI 3”) for the DI 3 point, or screw terminals 5 and 6 (labeled “AI 4”) for the DI 4 point. See Figure 5-1 on page 5-4. Verify that the value of the point is ON, indicating a contact closure.

3. Remove the jumper wire from one of the terminals. Verify that the value of the point is OFF. If DI 3 and DI 4 do not toggle ON and OFF, then contact your local Siemens Building Technologies representative.

**Al 3 and Al 4 Check**

**Equipment Required**

- Accurate thermometer (digital or analog)
- Datamate (Base or Advanced) and IBM-compatible computer, or Handheld PC or Pocket PC™ with Windows CE, plus communications cable

**Procedure**

1. Plug into the communication port on the room temperature sensor.

2. Check the status of AI 3 or SUPPLY TEMP (Point 15), or AI 4 (Point 40).

3. If the point is failed (*F*), check the cable that connects the temperature sensor to the controller. Make sure that both ends are properly terminated. If a connection problem cannot be found, contact your local Siemens Building Technologies representative for possible sensor replacement.

4. If the point is not failed, use an accurate thermometer to measure the temperature. Compare this value with the value for Point 15 or Point 40. If the values differ by more than 5°F (2.8°C), contact your local Siemens Building Technologies representative for sensor replacement.

5. If, after replacing the sensor, the values still differ by more than 5°F (2.8°C) (or if Point 15 or Point 40 still shows failed), contact your local Siemens Building Technologies representative.

**Actuator Check**

The actuator receives power through the controller, which switches triacs at the actuator terminations DO 1 through DO 4. DO 1 and DO 2 are internally wired to the damper actuator, and the wiring is not user-serviceable. If the valve or damper wired to DO 3 and DO 4 is not moving to its commanded position when expected, check the following:

- Wiring from the actuator to the controller
- Wiring connected to correct DO
If the problem still exists after checking the wiring, troubleshoot the externally wired actuator by interchanging it with a known working actuator. Interchanging actuators can help determine whether there is a problem with the actuator, the cabling, or the controller. See Table 5-5.

Table 5-5. Actuator Terminal Block Codes.

<table>
<thead>
<tr>
<th>Electronic Actuator</th>
<th>Terminal Code/Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>damper (GDE131.1U or GLB131.1P)</td>
<td>Violet (Y1) clockwise Red (G) COM Orange (Y2) counterclockwise</td>
</tr>
<tr>
<td>valve (SSB81U or SSC81U)</td>
<td>Y1 extend G COM Y2 retract</td>
</tr>
</tbody>
</table>

**Equipment Required**

- Spare, working electronic actuator
- Datamate (Base or Advanced) and IBM-compatible computer, or Handheld PC or Pocket PC™ with Windows CE, plus communications cable

**Procedure**

1. Disconnect the existing actuator.
2. Connect a working actuator to the existing cabling in the same manner as the original actuator.
3. Plug into the communication port on the room temperature sensor.
4. Set the desired point from the list below to 0 and then verify that the actuator strokes fully closed (or fully opened if it is reverse acting). Next, set the same point to 100, and verify that the damper or valve strokes fully opened (or closed if it is reverse acting).
   - VLV COMD (Point 52) for the hot water valve in Application 2523.
   - MTR2 CMD (Point 53) for an externally controlled valve or auxiliary damper (if present) in slave mode for the ATEC with Reheat.
5. Release the point. Verify that the actuator returns to its normal position.
6. If the spare actuator does not work, then the cable is defective. Repair or replace.
   Contact your local Siemens Building Technologies representative.
ERROR STATUS Messages

Each application contains a point called “ERROR STATUS,” which appears as point number 99 on the display. ERROR STATUS gives a numerical indication of any internal errors detected during power-up of the controller. A status of zero indicates no problems. Other codes appear in Table 5-6.

If ERROR STATUS is a value other than one shown in Table 5-6, then a multiple error condition exists. The value of ERROR STATUS is the sum of any current error conditions. To evaluate multiple errors, subtract the greatest value possible (obtained from Table 5-6) from the value displayed in ERROR STATUS that will still yield a result equal to or greater than zero. If the result is greater than zero, continue subtracting (using the values listed in Table 5-6) until the result is zero. See the following example:

Example

The value for ERROR STATUS is 80.

1. Select the greatest value from the ERROR STATUS table (Table 5-6) that can be subtracted from 80 to get a number equal to or greater than zero. In this example, subtract 64 from 80. 80 – 64 = 16. Error condition 64 exists. A remainder of 16 indicates that another error condition is present.

2. To find the remaining error conditions, continue subtracting error codes from the remainder until the remainder is zero. In this example, 16 – 16 = 0. So, in addition to error condition 64, error condition 16 is also present.

Table 5-6. ERROR STATUS Descriptions.

<table>
<thead>
<tr>
<th>ERROR STATUS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Everything is operating properly.</td>
</tr>
<tr>
<td>128</td>
<td>The controller electronics interface for the room temperature sensor has failed. This may occur as a result of a defective room temperature sensor or invalid setpoint readings. Initializing the controller may clear this error condition. See Clearing an Error Condition for the procedure.</td>
</tr>
<tr>
<td>64</td>
<td>An analog-to-digital (A-to-D) converter failure has occurred. This condition may occur as a result of a defective room temperature sensor or invalid setpoint readings. The controller may correct this condition automatically. If not, initializing the controller may clear this error condition. See Clearing an Error Condition for the procedure.</td>
</tr>
<tr>
<td>16</td>
<td>The controller’s Electronically Erasable Programmable Read Only Memory (EEPROM) has failed a write test. Initializing the controller may clear this error condition. See Clearing an Error Condition for the procedure.</td>
</tr>
</tbody>
</table>
Clearing an Error Condition

To clear an error condition, you must initialize the controller. Attempt to correct any underlying problem(s) that could cause the error condition before beginning the procedure.

Procedure

1. Using Datamate (Base or Advanced), go to the All Points Report.
2. Select **Point 99** and right click.
3. Choose **Properties**.
4. Reset the value of Point 99 to **0**.
5. Release **Point 99**.

If an error condition reappears in the display, repeat the initialization procedure. If the error recurs after initializing the controller a second time, contact your local Siemens Building Technologies representative.
Glossary

Overview

The glossary contains terms and acronyms that are used in this manual. For definitions of point database descriptors, see *Chapter 4—Point Database* in this manual. For definitions of commonly used terms as well as acronyms and abbreviations associated with the APOGEE Automation System, see the *Technical Glossary of Building Controls Terminology and Acronyms* (125-2185). This book is available from your local Siemens Building Technologies, Inc., representative.

**AI**

Analog Input. Physical point that accepts a continuously variable signal. For example, flow rate sensors (water or air), temperature sensors (room or duct), pressure sensors (static or velocity), and humidity sensors (room, duct, or outdoor).

**algorithm**

Mathematical formula used to calculate an output value using varying inputs.

**Autozero Module**

Terminal Equipment Controller device used to calibrate the controller’s internal air velocity transducer without changing the volume of air being delivered to a space.

**AVS**

Air Velocity Sensor.

**BST**

Basic sanity test.

**centralized control**

Type of control offered by a controller that is connected, by means of a Floor Level Network (FLN), with a field panel.
control loop

PID algorithm that is used to control an output based on a setpoint and an input reading from a sensor.

Datamate

Customer software tool for all controller communications. There are two versions: Datamate Base and Datamate Advanced. Datamate Base works on an IBM-compatible personal computer, or a handheld PC or Pocket PC™ running Windows CE. Datamate Advanced works only on an IBM-compatible personal computer. With Datamate, you can back up, restore, and edit any APOGEE database (but only Datamate Advanced allows you to edit points offline).

day mode

Operational mode of a controller when it is using day temperature setpoints.

DDC

Direct Digital Control. (1) Industry-standard term for intelligent, microprocessor-based control units in various locations throughout a facility. It may incorporate P, PI, or PID control. (2) Electronic controller that that is programmed to provide the required control action. Differs from an analog controller in that the digital controller initially applies a numerical value to the incoming signal from a sensor (digitizes the input). This enables the signal to be processed by the controller program. A digital controller program thus follows the mathematical and logical thought process of the control program designer to arrive at the required control output signal.

DI

Digital Input. Physical input point that accepts a two-state signal (that is, ON/OFF, OPEN/CLOSED, YES/NO, etc.).

DO

Digital Output. Physical output point that generates a two-state signal (that is, ON/OFF, OPEN/CLOSED, YES/NO, etc.).

English units

Foot-pound-second system of units for weights and measurements.
equipment controller

FLN device that provides additional point capacity to a field panel or provides individual room or mechanical equipment control. The Actuating Terminal Equipment Controller—Electronic Output is an equipment controller.

field panel

Device containing a microprocessor for centralized control of system components and equipment controllers. A field panel samples and processes field data, initiates control actions, communicates with its operators, and generates reports, displays, and warnings.

FLN

Floor Level Network. Formerly Local Area Network (LAN). Data communications link that passes information from an FLN device to the building level network and from the building level network to an floor level network device. The floor level network is used for the exchange of data on all floor levels of a building. The network consists of TECs, unitary controllers, differential pressure monitors, etc.

intercept

Offset that converts analog values (used by the controller) to a form that the user can understand (engineering units). Point at which a line passes through the X axis of a coordinate system. Slope and intercept constants are determined by the type of field input/output represented by the physical or virtual point.

loopout

Output of the control loop expressed as a percentage.

night mode

Operational mode of the controller when it is using night temperature setpoints.

OFF text

Text indicating the de-energized state of a digital point (for example, OFF, CLOSED, NO).

ON text

Text indicating the energized state of a digital point (for example, ON, OPEN, YES).

override switch

Button on room temperature sensor that can be pressed by an occupant to change the status of a room from night mode to day mode for a predetermined time.
PID

Proportional plus Integral plus Derivative gain. Functionality used in state-of-the-art control systems to decrease the response time of the overall control process. The addition of the derivative gain function to PI control results in the controller providing a control output signal that is proportional to the rate by which the error is changing. Instead of the control output merely being proportional to the error (as with proportional only type control), the magnitude of the control output is significantly increased or decreased to reduce the time needed to attain the desired setpoint.

PPCL

Powers Process Control Language. Programming language used to write control programs for building control and energy management functions. PPCL consists of various types of statements, each performing a different task. These statements become ordered instructions called control programs that are executed at the field panel. These control programs instruct the field panel on how to perform calculations, evaluate control strategies, performed time based actions, and command points.

reheat coil

Hot water, steam, or electric coil located at a branch of a HVAC system that supplies air to an individual room or zone. Reheat coils are commonly used to allow each room or zone served by a primary air handling unit to add just as much heat as necessary to satisfy the individual zone's comfort or ambient temperature needs.

RTS

Room Temperature Sensor.

SI units

Système International d'Unités. The international metric system.

slave mode

Default application that comes up when power is first applied to a Terminal Equipment Controller.

slope

Factor that converts analog values (used by the controller) to a form that the user can understand (engineering units). Change in y value (engineering units) per unit change in x value (analog value). Slope and intercept constants are determined by the type of field input/output represented by the physical or virtual point.
stand-alone control
Type of control offered by a controller that is providing independent DDC control to a space.

Terminal Equipment Controller
Siemens Building Technologies, Inc., product family of equipment controllers (one is the Actuating Terminal Equipment Controller—Electronic Output) that house the applications software used to control terminal units, such as heat pumps, VAV terminal boxes, fan coil units, unit ventilators, etc.

unbundle
Term used to describe the entering of a point that resides in a controller's database into the field panel's database so that it can be monitored at and/or controlled from the field panel.

VAV
Variable air volume. Ventilation system that changes the amount of air supplied to and exhausted from the rooms served. The specific quantity of air supplied to various rooms is automatically adjusted to accommodate heating, cooling, or ventilation needs of the zone at a given point in time.
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