SIEMENS

Actuating Terminal Equipment Controller (ATEC)

Base VAV

Start-up Procedures

140-1199
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Building Technologies

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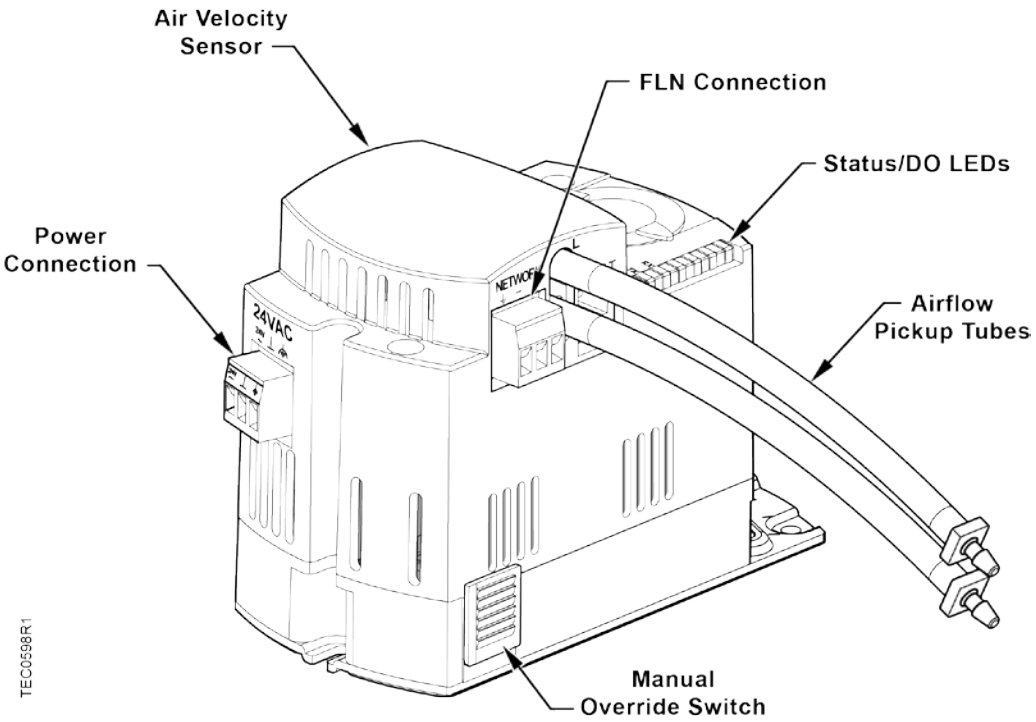
Before You Begin

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



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

Communication and DO Indicators

The Actuating Terminal Equipment Controller (ATEC) Base VAV has LEDs to indicate communication (yellow) and the DO (digital output) status BST (green).

Verifying Power to the Controller

Verify that the controller is powered up. Check that the BST LED on the controller is flashing. If the BST LED does not flash ON/OFF once per second, see the *iKnow Troubleshooting Tool* or contact Technical Support for troubleshooting information.

Setting the Application

Add the TEC to your job database and select one of the following applications.

Application Description	Application Number
VAV Cooling Only	2520
VAV Cooling or Heating	2521
VAV Slave Mode	2486

After you set the application, the controller goes through a shut-down/load sequence as it switches from slave mode to the application selected. After the application loads, the calibration cycle begins.

Enabling Actuators

⚠ CAUTION

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

The point(s) that determine actuator run times are:

- MTR 1 TIMING (damper actuator)

Your application may not have or use MTR2.

Use and/or to set run time(s) for the actuator(s) used by your application.

Damper Actuator Run Time		
Damper Actuator	Setting (seconds)	
	50 Hz	60 Hz
GDE131.1	125	90

Specifying Motor Setup

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

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

Motor Enable/Reverse Values for MTR SETUP.			
	Motor 1 Not Used	**Motor 1 Enabled**	**Motor 1 Enabled and Reversed**
Motor 2 Not Used	0	1	3
Motor 2 Enabled	4	5	7
Motor 2 Enabled and Reversed	12	13	15

Verifying Actuator Setup

1. Command all actuators closed. Verify that they close and remain closed. If not, adjust the setting for MTR SETUP according to Table *MTR SETUP Value for Most Common Configurations*.
2. If any of the actuators still do not close completely, then the actuators have been installed or set up incorrectly. See the Actuating Terminal Equipment Controller (ATEC) Base VAV Installation Instructions (540-1035), the iKnow Troubleshooting Tool, or contact Technical Support.

Selecting Automatic Calibration Option

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

NOTE:
The air velocity sensor should be calibrated at least once every 24 hours. Make sure that the sensor has been calibrated before balancing takes place, as this will affect the balancer's results.

CAL SETUP Options.	
CAL SETUP (value)	**Description**
0	Calibration occurs ONLY when the point CAL AIR is set to **YES**.
1	Calibration occurs when the field panel commands a Day/Night mode changeover. Actual calibration is subject to a time delay of 0, 1, 2, or 3 minutes. This delay is determined by the point CTLR ADDRESS divided by 4. The remainder is the time delay in minutes. **Example:** If CTLR ADDRESS = 11, then the controller will wait 3 minutes (11 ÷ 4 = 2 R3) after it receives the Day/Night mode changeover

CAL SETUP Options.	
CAL SETUP (value)	**Description**
	command before beginning the calibration routine.
2	Calibration occurs immediately after the override switch is pressed.
4 (factory default value)	Calibration occurs on the time interval set in the point CAL TIMER. **Example:** If CAL TIMER = 12, then the calibration period is 12 hours. Actual calibration is subject to a time delay based on the value of CTLR ADDRESS. See the example in Option 1 in this table.

NOTE:
Since these are additive values, options can be combined by summing their numbers. For example, to calibrate in Options 1 and 2, set CAL SETUP to **3**.

Setting Room Temperature Setpoints

- Day (or OCC) cooling setpoint: DAY CLG STPT or OCC CLG STPT
- Day (or OCC) heating setpoint: DAY HTG STPT or OCC HTG STPT
- Night (or UOC) cooling setpoint: NGT CLG STPT or UOC CLG STPT
- Night (or UOC) heating setpoint: NGT HTG STPT or UOC HTG STPT

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

- When the job specification requires a common heating and cooling temperature setpoint, use the following configuration:
- Set DAY HTG STPT equal to DAY CLG STPT. This configures the setpoint deadband equal to zero.
- If a setpoint deadband equals zero, then:
  CTL STPT equals RM STPT DIAL, and is limited by RM STPT MIN and RM STPT MAX.
  NOTE: A space where the heating/cooling deadband is zero may be more comfortable than a space where the deadband is being used; however, may use more energy.

4. Set the room temperature setpoints to the desired values. Heating setpoints are not present in cooling only applications.

Setting Override Time

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

Setting Duct Area

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

Area =	Round Duct	Rectangular Duct
Area in Sq. Ft.	(π x R^2)/144 (*Where:* π = 3.14 and R = radius of duct in inches)	Width x Height/144 (in inches)
Area in Sq. M	(π x R^2)/10,000 (*Where:* π = 3.14 and R = radius of duct in centimeters)	Width x Height/10,000 (in centimeters)

Setting Flow Coefficient

1. Set FLOW COEFF to the appropriate value found in the following table. This value is a starting point for the air balancer.
2. To fine tune the flow coefficient use the following formula:

   ⇨ **New Flow Coefficient = (Actual Volume ÷ Controller Volume) × Old Flow Coefficient**
   The actual volume is the actual value obtained from the balancer's measurements. The controller volume is the value obtained from AIR VOLUME.

3. If the controller volume is not within 5% of the actual volume, repeat Steps 1 and 2 until it is within 5%.

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

Setting MIN and MAX Airflow Setpoints

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

Application 2520 and 2521:

1. Set CLG FLOW MIN to the desired minimum cooling airflow setpoint.
2. Set CLG FLOW MAX to the desired maximum cooling airflow setpoint.

Application 2521:

1. Set HTG FLOW MIN to the desired minimum heating airflow setpoint.
2. Set HTG FLOW MAX to the desired maximum heating airflow setpoint.

⚠ CAUTION

Terminal units with electric heat must have sufficient air flow across the coil to prevent equipment damage.

This can be provided by a terminal fan, when present, or by sufficient supply airflow, HTG FLOW MIN, per manufacturer’s recommendation or contract specifications.

Setting Controller Address

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

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

Performing the Automated Fault Detection and Diagnostics

VAV ATEC controllers have a built-in checkout procedure that performs a basic fault detection and diagnostic routine. It 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 can operate within the set airflow range, between CLG FLOW MIN and CLG FLOW MAX.

To perform the checkout procedure, set CHK OUT to **YES**. When the procedure has completed, CHK OUT returns to NO and the results display in CHK STATUS, Table *Possible Failure Value and Description*.

Possible Failure Value and Description	
CHK STATUS Values	**Description**
-1	Checkout procedure has not been run since last controller initialization.
0	No errors found.
1	RTS failed.
2	Room Setpoint dial failed (If STPT DIAL = YES).
4	AVS failed.
8	Controller could not reach CLG FLOW MIN or below.
16	Controller could not reach CLG FLOW MAX or above.
32	Controller did not read low (zero) flow when damper closed.

NOTE:
Multiple failures are added together and displayed as one value. For example, if the RTS 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 = 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 VAV Actuator 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 Industry representative.

Room setpoint dial failed—CHK STATUS = 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 from **YES** to **NO**.
3. Connect directly to the controller through the room temperature sensor connection on the VAV Actuator 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 Industry representative.

Air velocity sensor failed—CHK STATUS = 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. Re-pipe if HI and LO connections are incorrect.
3. The sensor or the VAV Actuator may be faulty.

Controller could not reach CLG FLOW MIN or below—CHK STATUS = 8

1. The actuator may be loose on the shaft. Check that the set screw 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. Re-pipe 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
   - FLOW COEFF
   - CLG FLOW MIN
   - CLG FLOW MAX
5. Motor setup information may be incorrect. Check the values of the following points and correct as needed:
   - MTR SETUP
   - MTR1 TIMING
   - DMPR ROT ANG

6. The box may not have been balanced correctly. Contact your local Siemens Industry representative.
7. The air velocity sensor may need calibration. Set CAL AIR 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 = 16

1. Check for the problems described immediately above for CLG FLOW MIN.
2. The box may be starved for air, because either the central air-handling unit is off or there is low duct static.

Controller did not read low (zero) flow when damper closed—CHK STATUS = 32

1. Check for the problems described above for CLG FLOW MIN.
2. The damper shaft may not be secured correctly to the actuator so that when the actuator is fully closed, the damper does not completely shut off airflow.
3. Airflow calibration (at zero) may need to be performed ensuring the damper is fully closed and/or the air handling unit is off.

Issued by
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