SIEMENS

TEC Controller

Terminal Box Controller - Electronic Output (VAV)

Start-up Procedures

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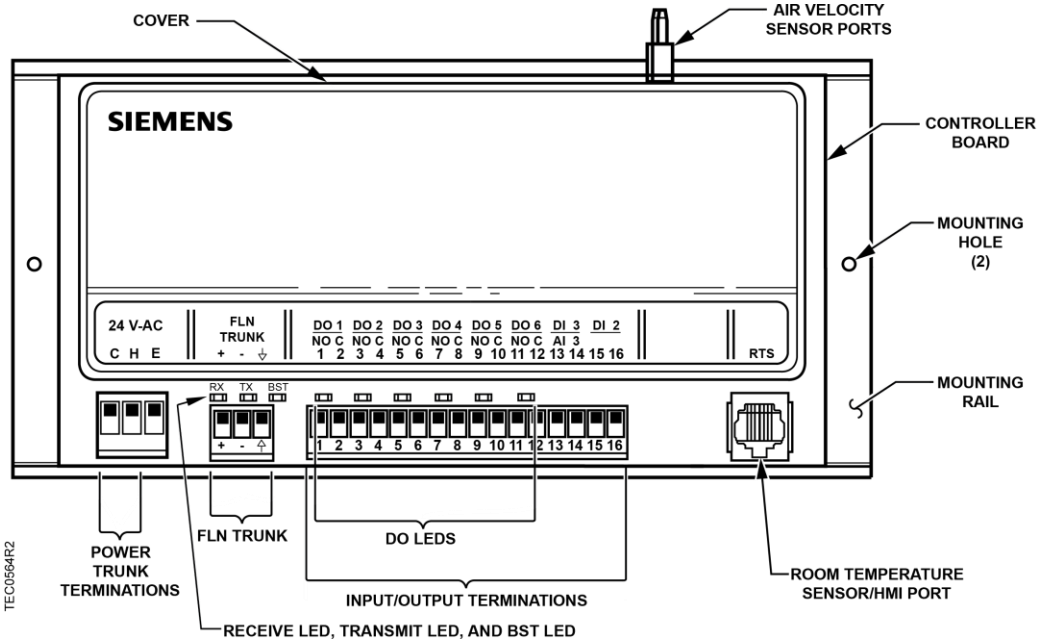
Before You Begin



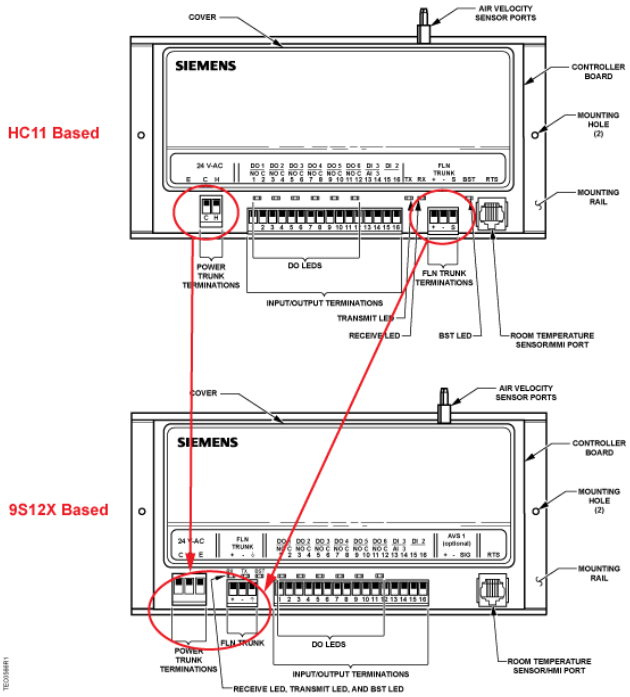
Generic Controller I/O Layout. See *Wiring Diagram* for application specific details.

Communication and DO Indicators

The Siemens TEC Terminal Box Controller has LEDs to indicate communication (yellow) and DO (digital output) status BST (green).

Retrofitting a Controller

1. Disconnect the FLN from the existing TEC(s).
2. Apply power to the new TEC(s), do not connect the FLN.
3. Using WCIS, change the application number and address.
4. Verify subpoints only have default values.
5. Connect FLN trunk to the TEC(s).
6. Verify, initial values downloaded from the field panel.
7. From the workstation, verify communication.



Terminal location changes (example).

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.

Enabling Actuators

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

The point that determines actuator run times are:

- MTR 1 TIMING
- MTR 2 TIMING

Your application may not have or use all these points.

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

Damper Actuator Run Time		
Damper Actuator	Setting (seconds)	
	50 Hz	60 Hz
GDE131.1	125	90
GLB131.1	150	125

Valve Actuator Run Time		
Valve Actuator	Setting (seconds)	
	50 Hz	60 Hz
SSB81U, floating control fail in place	180	150
SSC81U, floating control fail in place	150	125
SSC81.5U, floating control fail-safe	125	125
SQS85.53U, floating control spring return	35	30

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.

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

Verifying Actuator Setup

1. Command all actuators closed. Verify that they close and remain closed. If not, adjust the setting for MTR SETUP according to Table *MTR SETUP Values*.
2. If any of the actuators still do not close completely, then the actuators have been installed or set up incorrectly. See the Siemens TEC Terminal Box Controller Installation Instructions (540-1025), the iKnow Troubleshooting Tool, or contact Field Support.

Setting the Application

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

Application Description	Application Number
VAV Cooling Only	20
VAV Cooling or Heating	21
VAV Series Fan Powered with Hot Water Reheat	25
VAV Parallel Fan Powered with Electric Reheat	26
VAV Parallel Fan Powered with Hot Water Reheat	27
VAV Slave Mode	91

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

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

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

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

Setting Number of Heat Stages

Depending on the application, STAGE COUNT, HTG STG CNT, VALVE COUNT, or VLV CNT (if present) refers to electric heat stages or valves used (enabled), some point names may vary.

- For electric heat applications, check the hardware to verify the number of electric heat stages wired to the controller (1 to 3) and set STAGE COUNT or HTG STG CNT to this value.

⚠ CAUTION

For installations using electric heat coils and without terminal fans, never set min airflow settings to 0.

Equipment damage can occur if electric heat is on without airflow.

Selecting Automatic Calibration Option

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

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

CAL SETUP Options.	
CAL SETUP (value)	**Description**
0	Calibration occurs ONLY when the point CAL AIR is set to **YES**.
1	Calibration occurs when the field panel commands a day/night mode changeover. Actual calibration is subject to a time delay of 0, 1, 2, or 3 minutes. This delay is determined by the point CTLR ADDRESS divided by 4. The remainder is the time delay in minutes. **Example:** If CTLR ADDRESS = 11, then the controller will wait 3 minutes (11 ÷ 4 = 2 R3) after it receives the day/night mode changeover command before beginning the calibration routine.
2	Calibration occurs immediately after the override switch is pressed.
4 (factory default value)	Calibration occurs on the time interval set in the point CAL TIMER. **Example:** If CAL TIMER = 12, then the calibration period is 12 hours. Actual calibration is subject to a time delay based on the value of CTLR ADDRESS. See the example in Option 1.

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

Setting Room Temperature Setpoints

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

1. If the room temperature sensor has a setpoint dial that will be used, set STPT DIAL to **YES**. Otherwise, set STPT DIAL to **NO**.
   - Set RM STPT MIN and RM STPT MAX for the minimum and maximum allowable room temperature setpoint values, respectively. Valid values range from 55° to 95°F (13° to 35°C). Default values are 55°F (13°C) for RM STPT MIN and 90°F (32°C) for RM STPT MAX.
2. Setpoint dial configured with a heating/cooling deadband (default).
   - To allow the controller to operate with a heating/cooling deadband (functioning the same as provided when the setpoint dial is not present), 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 the setpoint that will be used.
   - As described below, the setpoint(s) for heating/cooling will be 1/2 of the deadband above or below the setpoint dial value.

   ⇨ When HEAT.COOL equals HEAT, then:
   ⇨ CTL STPT will equal RM STPT DIAL – 0.5 * (DAY CLG STPT – DAY HTG STPT) and will be limited by RM STPT MIN and RM STPT MAX.
   ⇨ When HEAT.COOL equals COOL, then:
   ⇨ CTL STPT will equal RM STPT DIAL + 0.5 * (DAY CLG STPT – DAY HTG STPT) and will be limited by RM STPT MIN and RM STPT MAX.

   NOTE: A space where the deadband is used can be more energy efficient than a space where the deadband is not being used.
3. Setpoint dial configured for zero heating/cooling deadband.
   - When the job specification requires a common heating and cooling temperature setpoint, use the following configuration:
   - Set DAY HTG STPT equal to DAY CLG STPT. This will configure the setpoint deadband equal to zero.
   - If a setpoint deadband equals zero, then:
     CTL STPT will equal RM STPT DIAL, and will be limited by RM STPT MIN and RM STPT MAX.
     NOTE: A space where the heating/cooling deadband is zero may be more comfortable than a space where the deadband is being used, but may use more energy.
4. Set the room temperature setpoints to the desired values. Heating setpoints are not present in cooling only applications.

Setting Override Time

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

Setting Duct Area

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

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

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

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 the procedure until it is within 5%.

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

Box Manufacturer Flow Coefficients		
Manufacturer	**Sensor Type**	**Value**
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.

1. Set CLG FLOW MIN to the desired minimum airflow setpoint in cooling mode.
2. Set HTG FLOW MIN to the desired minimum airflow setpoint in heating mode. (Typically set equal to CLG FLOW MIN).
3. Set CLG FLOW MAX to the desired maximum cooling airflow setpoint.
4. Set HTG FLOW MAX to the desired maximum heating airflow setpoint.

⚠ CAUTION

If using electric reheat, do not set HTG FLOW MIN to 0 cfm (0 lps).
Equipment damage may occur at 0 cfm (0 lps) with electric heat ON.

Setting Controller Address

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

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

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