Siemens TEC Unit Vent 0-10V Output Controller

Control Applications
2281, 2283, 2284, 2286, 2287

Product Description
These instructions explain how to field install or replace a Siemens TEC Unit Vent Controller.

Product Numbers
Siemens TEC Unit Vent Controller 540-509N

Shipping carton includes a controller assembly, a mounting rail, and two self-tapping/drilling screws.

CAUTION
Keep the unit in its static-proof bag until installation.
Otherwise you run the risk of damage to the printed circuit board from electrostatic discharge.

Accessories
Low cost temporary temperature sensor, 10K thermistor with RJ11, that enables space control if the permanent room or duct sensor is not installed (pack of 25).

Duct Temperature Sensor, NTC 100K Q Type 2, 3" Probe for Commissioning Only 540-658P25 QAM1035.008P50

Warning/Caution Notation

⚠️ WARNING
Personal injury/loss of life may occur if you do not follow the procedures as specified.

⚠️ CAUTION
Equipment damage or loss of data may occur if you do not follow the procedures as specified.
Expected Installation Time

<table>
<thead>
<tr>
<th>Action</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>New controller installation</td>
<td>10 Min</td>
</tr>
<tr>
<td>Replacement (old controller has removable terminal blocks)</td>
<td>6 Min</td>
</tr>
<tr>
<td>Replacement (old controller does not have removable terminal blocks)</td>
<td>16 Min</td>
</tr>
</tbody>
</table>

NOTE: You may require additional time for database work at the field panel.

Required Tools and Materials
- Small flat-blade screwdriver (1/8-inch blade width)
- Cabling and connectors
- Cordless drill/driver set

Prerequisites
- Wiring conforms to NEC and local codes and regulations. For further information see the Wiring Guidelines Manual.
- Room temperature sensor installed (optional).
- 24 Vac Class 2 power available.
- Supply power to the unit is OFF.
- Any application specific hardware or devices installed.

NOTE: If the controller is being installed on a box with 1 or more stages of electric heat, the 550-809 MOV with pre-terminated spade connectors must be installed across the manufacturer-supplied airflow switch. MOVs can be installed at the time the controller is factory mounted; coordinate with the box manufacturer prior to order placement. For field installation, see Metal Oxide Varistor Kit Installation Instructions (540-986).

Installation Instructions

NOTE: All wiring must conform to national and local codes and regulations (NEC, CE, etc.).

1. Secure the mounting rail in the controller’s desired location.

2. Place the ESD wrist strap on your wrist and attach it to a good earth ground.

3. Remove the controller from the static proof bag and snap it into place on the mounting rail.

4. Connect the FLN.

5. Connect the point wiring (see Wiring Diagrams).

6. Plug the room temperature sensor cable into the RTS port.

7. Connect the power trunk. DO NOT apply power to the controller without first consulting the specialist.

NOTE: If 2-wire (1PR) cable is used, there will be no connection to the reference terminal.

Diagram:

- 3-WIRE FLN TRUNK
- REFERENCE GROUNDED AT SINGLE LOCATION TYPICALLY AT FIELD PANEL
- DO NOT CONNECT THE SHIELD WIRE TO THE REFERENCE TERMINAL

- POWER TRUNK
- EARTH (OPTIONAL CONNECTION)
- NOT REQUIRED FOR OPERATION
- 24 Vac PHASE (HOT)
- 24 Vac NEUTRAL (COMMON)
NOTE:
As a standard grounding procedure, ensure that a ground wire is connected directly from neutral of the 24Vac secondary (the side that connects to the "C" terminal of the TEC) to earth.

The installation is complete.

Wiring Diagram Crossreference Tables

<table>
<thead>
<tr>
<th>Heating and Chilled Water Cooling</th>
<th>ASHRAE Cycles I and II</th>
<th>ASHRAE Cycle III</th>
<th>Exceptions</th>
</tr>
</thead>
</table>
### Application 2281 (ASHRAE Cycles I and II) and Application 2283 (ASHRAE Cycle III)

<table>
<thead>
<tr>
<th>Heating and Chilled Water Cooling</th>
<th>ASHRAE Cycles I and II</th>
<th>ASHRAE Cycle III</th>
<th>Exceptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-pipe, HW and CHW coils, FBP damper control</td>
<td>Wiring Diagram 3 [\rightarrow 7]</td>
<td>Wiring Diagram 3 [\rightarrow 9]</td>
<td>1. 2-position valves required if automatic heat/cool switchover is required. 2. LTDT recommended if 2-position valve is used.</td>
</tr>
<tr>
<td>4-pipe, steam and CHW coils, valve control</td>
<td>Wiring Diagram 1 [\rightarrow 6]</td>
<td>Wiring Diagram 1 [\rightarrow 8]</td>
<td>LTDT recommended.</td>
</tr>
<tr>
<td>4-pipe, steam and CHW, FBP damper control</td>
<td>Wiring Diagram 3 [\rightarrow 7]</td>
<td>Wiring Diagram 3 [\rightarrow 9]</td>
<td>1. 2-position valves required if automatic heat/cool switchover is required. 2. LTDT recommended if 2-position valve is used.</td>
</tr>
<tr>
<td>Electric coil, step control, and CHW coil, valve control</td>
<td>Wiring Diagram 2 [\rightarrow 7]</td>
<td>Wiring Diagram 2 [\rightarrow 9]</td>
<td>None.</td>
</tr>
</tbody>
</table>

### Application 2284 (ASHRAE Cycles I and II) and Application 2286 (ASHRAE Cycle III)

<table>
<thead>
<tr>
<th>Heating and DX Cooling</th>
<th>ASHRAE Cycles I and II</th>
<th>ASHRAE Cycle III</th>
<th>Exceptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX coil, single step control</td>
<td>Wiring Diagram 1 [\rightarrow 10]</td>
<td>Wiring Diagram 1 [\rightarrow 12]</td>
<td>1. No heating coil, heating valve actuator, or auxiliary radiation. 2. No LTDT.</td>
</tr>
<tr>
<td>Hot water and DX coils, valve and single step control</td>
<td>Wiring Diagram 1 [\rightarrow 10]</td>
<td>Wiring Diagram 1 [\rightarrow 12]</td>
<td>LTDT recommended.</td>
</tr>
<tr>
<td>Hot water and DX coils, FBP damper control and single step control</td>
<td>Wiring Diagram 3 [\rightarrow 11]</td>
<td>Wiring Diagram 3 [\rightarrow 13]</td>
<td>LTDT recommended if 2-position valve is used.</td>
</tr>
<tr>
<td>Steam and DX coils, valve and single step control</td>
<td>Wiring Diagram 1 [\rightarrow 10]</td>
<td>Wiring Diagram 1 [\rightarrow 12]</td>
<td>LTDT recommended.</td>
</tr>
<tr>
<td>Steam and DX coils, FBP damper control and single step control</td>
<td>Wiring Diagram 3 [\rightarrow 11]</td>
<td>Wiring Diagram 3 [\rightarrow 13]</td>
<td>LTDT recommended if 2-position valve is used.</td>
</tr>
<tr>
<td>Electric and DX step control</td>
<td>Wiring Diagram 2 [\rightarrow 11]</td>
<td>Wiring Diagram 2 [\rightarrow 12]</td>
<td>None.</td>
</tr>
</tbody>
</table>
### Application 2287 (Nesbitt Cycle W).

<table>
<thead>
<tr>
<th>Nesbitt Cycle W</th>
<th>Wiring Diagram</th>
<th>Exceptions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2. LTDT recommended.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. LTDT recommended.</td>
</tr>
<tr>
<td>4-pipe, HW and CHW coils, valve control</td>
<td>Wiring Diagram 1 [↩️ 13]</td>
<td>LTDT recommended.</td>
</tr>
<tr>
<td>4-pipe, steam and CHW coils, valve control</td>
<td>Wiring Diagram 1 [↩️ 13]</td>
<td>LTDT recommended.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. LTDT recommended.</td>
</tr>
</tbody>
</table>
The controller’s DOs control 24 Vac loads only. The maximum rating is 12 VA for each DO. An external interposing relay is required 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.

(for example part number 540-147, Terminal Equipment Controller Relay Module)

### Wiring Requirements for 4–20 mA Sensors.

- Each 4-20mA sensor requires a **SEPARATE** dedicated power limited 24 VDC power supply. DO NOT use the same transformer to power both the sensor and controller.

### NOTE:
If the voltage/current switch is set to current and a 4 to 20mA sensor is connected to an AI, then special wiring requirements must be followed.
Application 2281 Wiring Diagram 2.

Application 2281 Wiring Diagram 3.
Wiring Diagram 4

Application 2281 Wiring Diagram 4.

Wiring Diagram 1

Application 2283 Wiring Diagram 1.
Wiring Diagram 2

Application 2283 Wiring Diagram 2.

Wiring Diagram 3

Application 2283 Wiring Diagram 3.
Wiring Diagram 4

Application 2283 Wiring Diagram 4.

Wiring Diagram 1

Application 2284 Wiring Diagram 1.
Wiring Diagram 2

ROOM TEMPERATURE SENSOR

AO 3

SPARE AO3 (0-10V)

AO 2

SPARE AO2 (0-10V)

AO 1

OUTDOOR AIR DAMPER ACTUATOR (0-10V)

DI 4

LOW TEMPERATURE DETECTION THERMOSTAT (OPTIONAL)

DI 2

WALL SWITCH (OPTIONAL)

A5/G5:

DISCHARGE AIR TEMPERATURE SENSOR (100K Ω THERMISTOR)

DO 1

FAN (REQUIRES RELAY)

DO 7

3RD STAGE ELECTRIC HEAT (MAY REQUIRE POWER RELAY)

DO 5

2ND STAGE ELECTRIC HEAT (MAY REQUIRE POWER RELAY)

DO 4

1ST STAGE ELECTRIC HEAT (MAY REQUIRE POWER RELAY)

DO 4

DX COIL (MAY REQUIRE POWER RELAY)

DO 1

SPARE DO1

DO 2

SPARE DO2

DG 1

AUXILIARY RADIATION (OPTIONAL)

FLA

COMMUNICATION COMMON

24V AC

Application 2284 Wiring Diagram 2.

Wiring Diagram 3

ROOM TEMPERATURE SENSOR

AO 3

SPARE AO3 (0-10V)

AO 2

FACE BYPASS DAMPER ACTUATOR (0-10V)

AO 1

OUTDOOR AIR DAMPER ACTUATOR (0-10V)

DI 4

LOW TEMPERATURE DETECTION THERMOSTAT (OPTIONAL)

DI 2

WALL SWITCH (OPTIONAL)

A5/G5:

DISCHARGE AIR TEMPERATURE SENSOR (100K Ω THERMISTOR)

DG 1

FAN (REQUIRES RELAY)

DG 7

SPARE DG7

DG 5

SPARE DG6

DG 4

SPARE DG5

DG 4

DX COIL (MAY REQUIRE POWER RELAY)

DG 3

2-POSITION HEATING VALVE ACTUATOR

DG 2

SPARE DG2

DG 1

AUXILIARY RADIATION (OPTIONAL)

FLA

COMMUNICATION COMMON

24V AC

Application 2284 Wiring Diagram 3.
Wiring Diagram 1

Wiring Diagram 2

Application 2286 Wiring Diagram 1.

Application 2286 Wiring Diagram 2.
Application 2286 Wiring Diagram 3.

Application 2287 Wiring Diagram 1.

* AUXILIARY RADIATION IS CONTROLLED IN PARALLEL WITH THE HEATING COIL.
Wiring Diagram 2

Application 2287 Wiring Diagram 2.

* AUXILIARY RADIAIION IS CONTROLLED IN PARALLEL WITH THE HEATING COIL.