SIEMENS

BACnet Unit Vent Controller
Application Notes

Application 2577: Heating and DX Cooling, ASHRAE Cycles I and II

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Overview

In Application 2577, the Unit Vent Controller – 0 to 10V Output controls a unit ventilator equipped with a DX coil for cooling, and/or a heating coil, which may be hot water, steam, or electric, for ASHRAE Cycles I and II. A face-bypass damper can be controlled, replacing the modulating (0 to 10V) heating actuator, but will modulate only in heating mode. If a face-bypass damper is used, 2-position valves on the coils may be controlled. Cooling only units can also be controlled with this application by overriding HEAT.COOL to COOL.

Other features available in this application include morning warm-up/cool-down, night mode override, free-cooling, and auxiliary radiation in heating mode.

NOTE: Using a low temperature detection thermostat (LTDT) is strongly recommended for hot water and steam systems.

While in heating, this application controls room temperature by resetting the discharge air temperature. While in cooling, this application controls room temperature by cycling the DX unit. This application also controls an outdoor air damper according to the schedules as defined by ASHRAE Cycles I and II. The free-cooling/economizer function is turned on and off by the field panel using FREE CLG. If free cooling is not available, the outdoor air damper will be kept at minimum position; otherwise, the outdoor air damper will modulate open in sequence with the heating actuator or the DX. The unit ventilator fan is also controlled in this application.

Illustrations

Table 1 lists control drawings, control schedules, and wiring diagrams that can be used in this application. Use the table to find the illustrations for your particular hardware configuration.

Table 1. Application 2577 Illustration Cross Reference Table.

Hardware Configuration	Control Drawing	Control Schedule	Wiring Diagrams
DX coil, single step control	Figure 1, except: 1. No heating coil, heating valve actuator, or auxiliary radiation. 2. No LTDT.	Figure 4, except: 1. No heating mode.	Figure 7, except: 1. No heating valve actuator, or auxiliary radiation. 2. No LTDT.
Hot water and DX coils, valve and single step control	Figure 1, except: 1. LTDT recommended.	Figure 4	Figure 7, except: 1. LTDT recommended.
Hot water and DX coils, face-bypass damper controls and single step control	Figure 3, except: 1. LTDT recommended.	Figure 6	Figure 9, except: 1. LTDT recommended.
Steam and DX coils, valve and single step control	Figure 1, except: 1. Read steam coil instead of heating coil. 2. LTDT recommended.	Figure 4	Figure 7, except: 1. LTDT recommended.
Steam and DX coils, face-bypass damper control and single step control	Figure 3, except: 1. Read steam coil instead of heating coil. 2. LTDT recommended.	Figure 6	Figure 9, except: 1. LTDT recommended.
Electric and DX step control	Figure 2, except: 1. No LTDT.	Figure 5	Figure 8, except: 1. No LTDT.

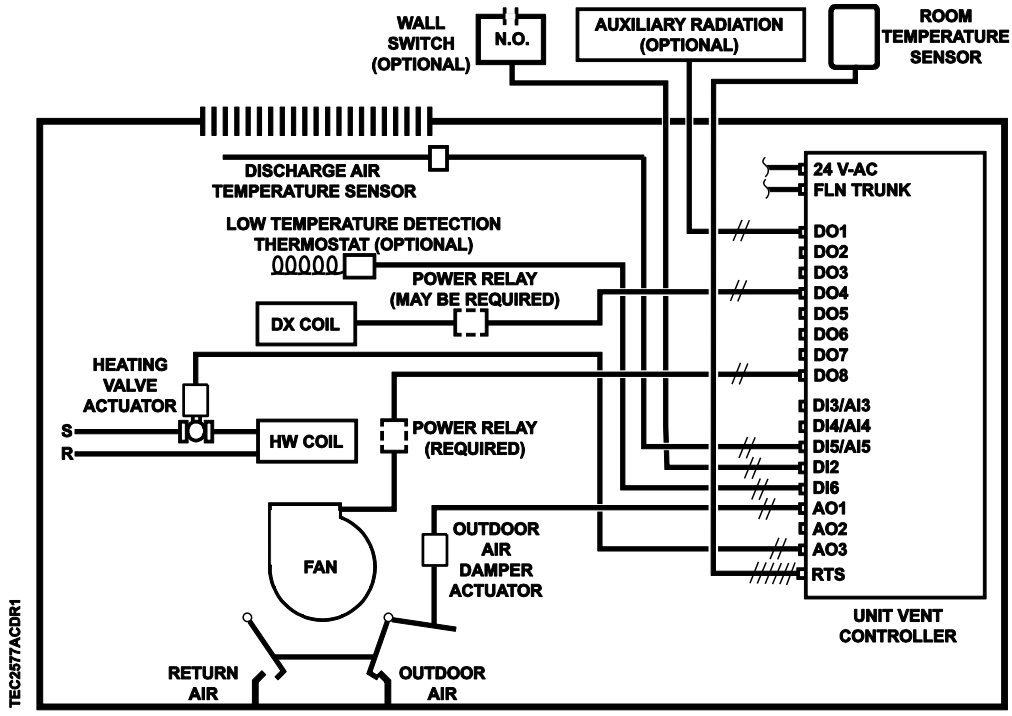

Figure 1. Application 2577 Control Drawing. See Table 1 for Application Configuration(s).

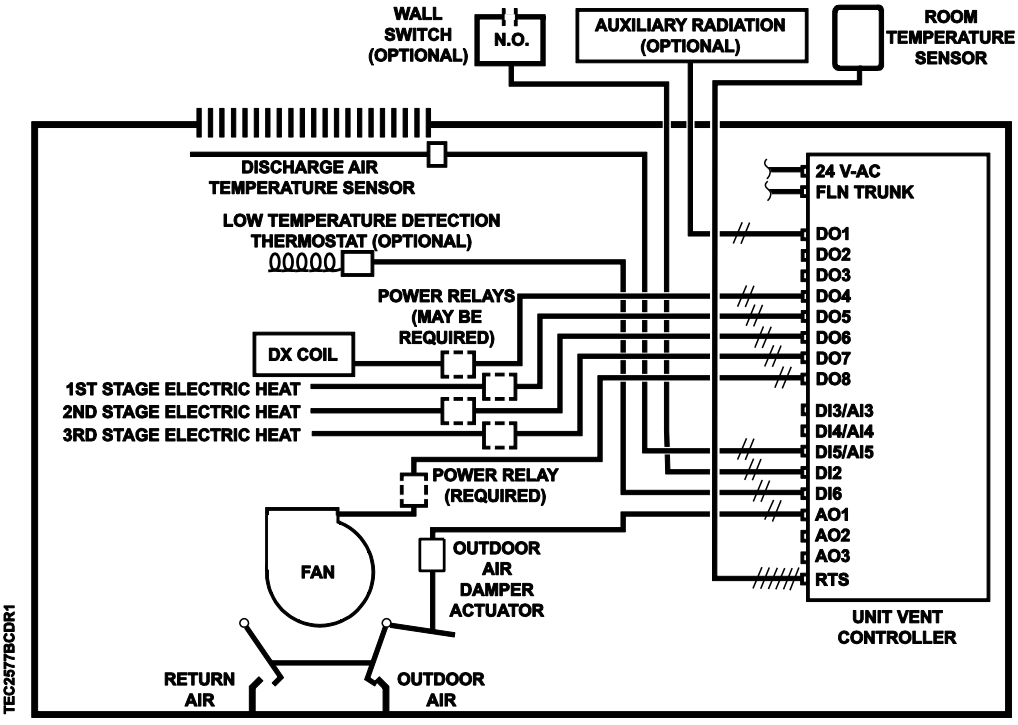

Figure 2. Application 2577 Control Drawing. See Table 1 for Application Configuration(s).

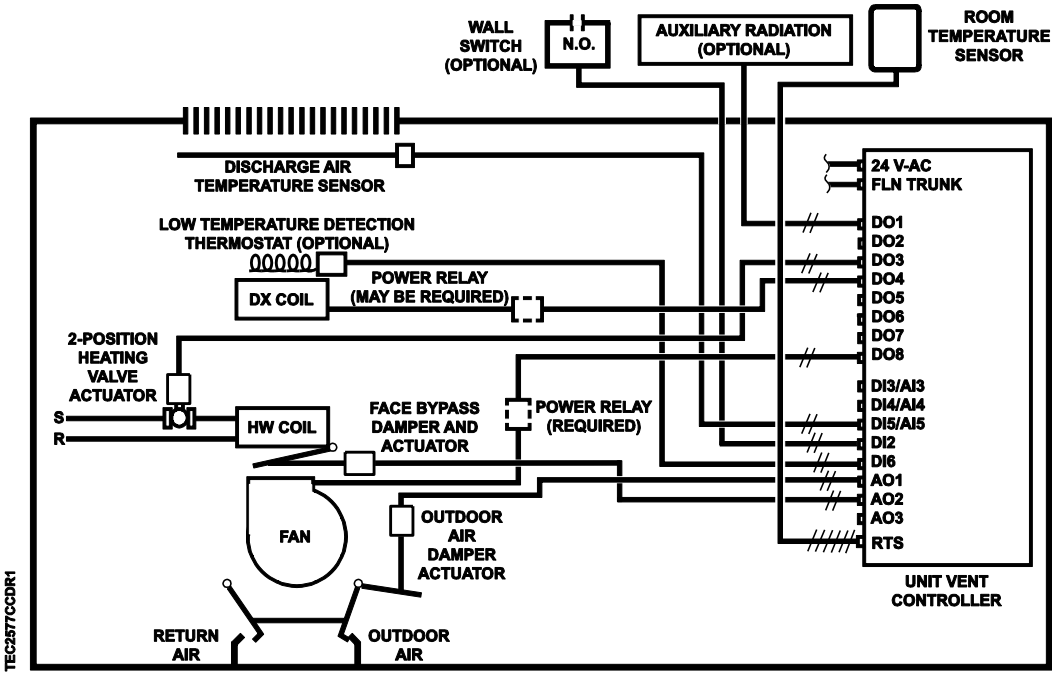

Figure 3. Application 2577 Control Drawing. See Table 1 for Application Configuration(s).

NOTE: The auxiliary radiation is an independent loop and is not sequenced with the other control loops. The graphical representation in the figures is an example of what may occur in your system.

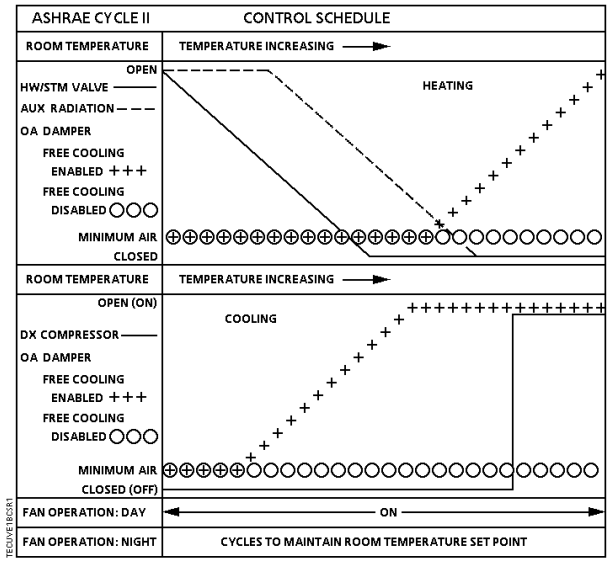

Figure 4. Application 2577 Control Schedule.

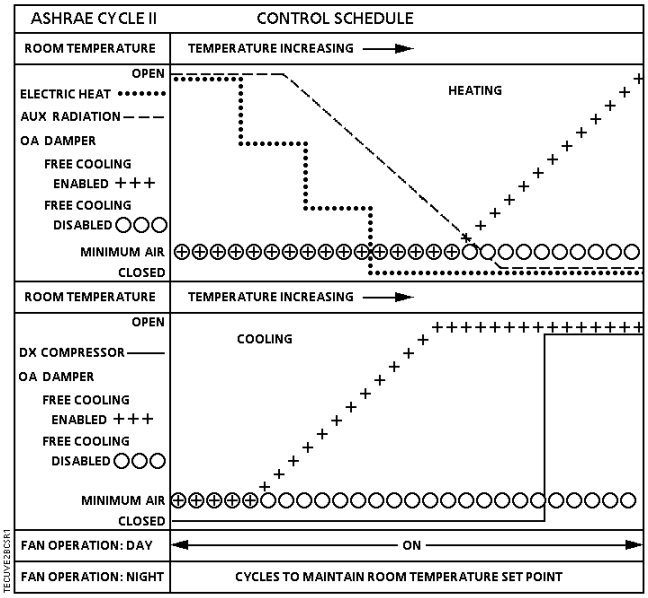

Figure 5. Application 2577 Control Schedule.

NOTE: The auxiliary radiation is an independent loop and is not sequenced with the other control loops. The graphical representation in the figures is an example of what may occur in your system.

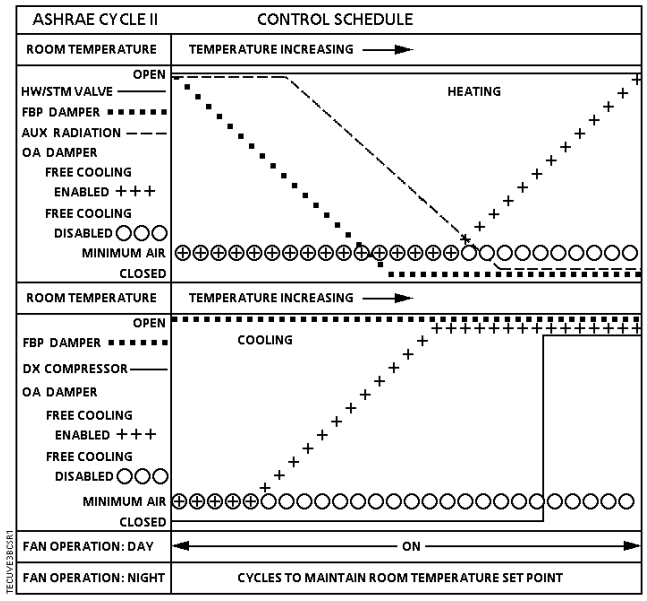

Figure 6. Application 2577 Control Schedule.

BACnet

The BACnet Unit Vent Controller communicates using BACnet MS/TP protocol for open communications on BACnet MS/TP networks.

Table 2. Supported BIBBS.

Product	Supported BIBBs	BIBB Name
BTEC	DS-RP-B	Data Sharing-ReadProperty-B
	DS-RPM-B	Data Sharing-ReadPropertyMultiple-B
	DS-WP-B	Data Sharing-WriteProperty-B
	DM-DDB-B	Device Management-DynamicDeviceBinding-B
	DM-DOB-B	Device Management-DynamicObjectBinding-B
	DM-DDC-B	Device Management-DeviceCommunicationControl-B

Hardware Inputs

Analog

- Averaging air temperature sensor (10K thermistor)
- Room temperature sensor
- Room temperature setpoint dial (optional)
- Spare AI4 10K thermistor
- Spare AI3 switch selectable 0-10V or 4-20 mA

Digital

- Low Temperature Detection Thermostat (LTDT)
- Night mode override (optional)
- Wall switch (optional)

Hardware Outputs

The following is a list of devices that can be used by this application depending on your hardware configuration. See Table 1.

Analog (0 to 10V)

- Face-bypass damper actuator
- Heating valve actuator
- Outdoor air damper actuator

Digital

- Auxiliary radiation electric coil contact; or, auxiliary radiation 2-position valve actuator
- DX coil
- Unit fan
- 1st stage electric heat
- 2nd stage electric heat
- 3rd stage electric heat
- 2-position heating valve actuator

Ordering Notes

BACnet Unit Vent Controller (550-493)

Averaging Air Temperature Sensor (10K)

Terminal Equipment Controller Room Temperature Sensor

Point Database

Table 3 presents the point database information for Application 2577.

Sequence of Operation

This section presents the sequence of operation for Application 2577, *Heating and DX Cooling, ASHRAE Cycles I and II*.

Control Temperature Setpoints

Depending on the controller's current operational mode (day or night), the control temperature setpoint, CTL STPT holds the value of one of the following setpoints:

Day Mode – In day mode, CTL STPT holds the value of DAY CLG STPT or DAY HTG STPT. If the room temperature sensor has a setpoint dial and STPT DIAL is set to YES, CTL STPT holds the value of RM STPT DIAL.

If the setpoint dial is used and the value of RM STPT DIAL is less than the value of RM STPT MIN, 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, CTL STPT holds the value of RM STPT MAX.

Night Mode – In night mode, CTL STPT holds the value of NGT CLG STPT or NGT HTG STPT.

NOTE: The value of CTL TEMP is the same as the value of ROOM TEMP, unless CTL TEMP is overridden.

Room Temperature Offset

NOTE: The Room Temperature Offset feature is optional.

TEMP OFFSET (Point 3) is a user-adjustable offset that will compensate for deviations between the value of ROOM TEMP (Point 4) and the actual room temperature. This corrected value is displayed in CTL TEMP (Point 78).

CTL TEMP (Point 78) = ROOM TEMP (Point 4) + TEMP OFFSET (Point 3)

EXAMPLE: If the actual room temperature is 72.0°F, and the value of ROOM TEMP is 73.0°F, then the value entered into TEMP OFFSET is –1.0. In this case, the value of ROOM TEMP would read 73.0°F, but the value of CTL TEMP would read 72.0°F.

Day and Night Modes

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

When a wall switch is physically connected to the termination strip on the controller at DI 2 (Figure 1 through Figure 3, and Figure 7 through Figure 9), and WALL SWITCH = YES, the controller monitors the status of DI 2. When the status of DI 2 is ON (the switch is closed), DAY.NGT will be set to DAY indicating that the controller is in day mode. When the status of DI 2 is OFF (the switch is open), DAY.NGT will be set to NIGHT indicating that the controller is in night mode.

When WALL SWITCH = 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 (connected to a field panel), then the field panel can send an operator or PPCL command to override the status of DAY.NGT. See the *PPCL User's Manual* or *Field Panel User's Manual* 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, pressing the override switch will reset the controller to day operational mode for the time period that is set in OVRD TIME. The status of NGT OVRD changes to DAY. After the override time elapses, the controller returns to night mode and the status of NGT OVRD changes back to NIGHT.

Only when the controller is in night mode does the override switch on the room sensor have any effect on the controller.

Day Heating Operation

In day heating operation, the controller maintains the room temperature at the value stored in CTL STPT by doing the following:

- Resetting the unit ventilator's discharge temperature setpoint, DISCH STPT, based on the difference between CTL TEMP and CTL STPT. If CTL TEMP goes below CTL STPT, the discharge temperature setpoint increases. If the reverse occurs, the setpoint decreases. DISCH STPT must not drop below the value of DSH MIN TEMP, or rise above DSH MAX TEMP.

- Modulating the available coil control device based on the difference between the discharge temperature point, DISCH TEMP, and DISCH STPT. If DISCH TEMP goes below DISCH STPT, the heating valve actuator opens, the face-bypass damper opens, or the stages of electric heat energize. If DISCH TEMP goes above DISCH STPT, the reverse occurs.

- Controlling auxiliary radiation (if provided) using a pulse-width modulation algorithm. The auxiliary radiation will be on for a percentage of the time held in AUX HTG TIME. The on-time is based on the difference between DISCH STPT and AUX DSH STPT. If DISCH STPT goes below AUX DSH STPT, the on-time of the auxiliary radiation valve decreases. If the reverse occurs, the on-time increases.

- Positioning the outdoor air damper as follows:
  - For ASHRAE Cycle I, OADPR MINPOS is set to 100%.
  - For ASHRAE Cycle II, OADPR MINPOS is set to a value less than 100% to satisfy the minimum outdoor air requirements.
  - When the coil is providing heat, the damper is positioned at its minimum setting. When the coil is not providing heat and FREE CLG is set to ENABLE, the damper is positioned from minimum to maximum open to provide ventilation cooling. If FREE CLG is set to DISABL, the damper is kept at minimum at all times.

Day Cooling Operation

In day cooling operation, the controller maintains the room temperature at the value stored in CTL STPT by doing the following:

- Verifying that the face-bypass damper (if present) is at full face all the time.
- Cycling the DX coil based on the difference between the control temperature point, CTL TEMP, and CTL STPT.
- Positioning the outdoor air damper as follows:
  - For ASHRAE Cycle I, OADPR MINPOS is set to 100%.
  - For ASHRAE Cycle II, OADPR MINPOS is set to a value less than 100% to satisfy the minimum outdoor air requirements.
  - When the coil is providing cooling and FREE CLG is set to ENABLE, the damper is kept open. When the coil is not providing cooling and FREE CLG is set to ENABLE, the damper is modulated between minimum and maximum. If FREE CLG is set to DISABL, the damper is kept at minimum at all times.

Night Heating Operation

The controller maintains the room temperature at the value stored in CTL STPT by doing the following:

- If CTL TEMP drops below the sum of NGT HTG STPT minus NGT DBAND:
  - The fan turns ON
  - Heating turns ON
- If CTL TEMP rises above NGT HTG STPT:
  - The fan turns OFF
  - Heating turns OFF

When the fan turns ON, the heating actuators and auxiliary radiation are opened. When the fan turns OFF, all heating and auxiliary radiation are closed. If electric heat is being controlled, the fan remains ON for 30 seconds after the last stage of electric heat is turned OFF. If NGT HW HTG is set to YES, (for hot water coils), the heating actuator is kept open at all times during the night.

In night heating operation, the controller operates as follows:

- For units with hot water coils, NGT HW HTG must be set to YES, so that the valve will be positioned to full open.
- For units with steam or electric coils, NGT HW HTG must be set to NO, so that the coils can be cycled.
- The face-bypass damper is at full face when the fan is ON and full bypass when the fan is OFF and the 2-position heating valve actuator is open.
- The controller may switch to cooling mode when appropriate if NGT CLG MODE is set to YES.
- Heating only is provided when NGT CLG MODE is set to NO.

Night Cooling Operation

In night cooling operation, the controller maintains the room temperature at the value stored in CTL STPT by doing the following:

- If CTL TEMP rises above the sum of NGT CLG STPT and NGT DBAND:
  - The fan turns ON
  - DX cooling turns ON
- If CTL TEMP drops below NGT CLG STPT:
  - The fan turns OFF
  - DX cooling turns OFF
- When NGT CLG MODE is set to NO, the unit will operate in night heating mode only.

In night cooling operation, the controller operates as follows:

- For units with hot water coils, NGT HW HTG must be set to YES, so that the valve will be positioned to full open.
- For units with steam or electric coils, NGT HW HTG must be set to NO, so that the heating coils can be kept OFF.
- The face-bypass damper is at full face when the fan is ON and at full bypass when the fan is OFF and the 2-position cooling valve actuator is open.

Heating/Cooling Switchover

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

- HTG LOOPOUT is below 50% if free cooling is disabled, or below SWITCH LIMIT if free cooling is enabled.
- CTL TEMP is greater than the sum of CTL STPT plus SWITCH DBAND.
- CTL TEMP is greater than the sum of 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 is below 50% if free cooling is disabled, or below SWITCH LIMIT if free cooling is enabled.
- CTL TEMP is less than the sum of CTL STPT minus SWITCH DBAND.
- CTL TEMP is less than the sum of the appropriate heating setpoint plus SWITCH DBAND.

If night cooling is not available, as indicated by NGT CLG MODE, the controller remains in heating mode during the night.

Control Loops

The unit ventilator is controlled by four Proportional, Integral, and Derivative (PID) control loops; a room loop, a heating loop, a DX loop, and an auxiliary loop.

Room Loop – The room loop uses the values of CTL STPT and CTL TEMP to set the discharge setpoint, DISCH STPT, between the values of DSH MIN TEMP and DSH MAX TEMP.

Heating Loop – The heating loop uses the values of DISCH STPT and DISCH TEMP to modulate the value of HTG LOOPOUT.

DX Loop – The DX loop uses the values of CTL STPT and CTL TEMP to modulate the value of CLG LOOPOUT.

Auxiliary Loop – The auxiliary loop uses the values of AUX DSH STPT and DISCH STPT to modulate the value of AUX LOOPOUT.

Morning Warm-up/Cool-down

Morning warm-up or cool-down occurs after the controller switches from night mode to day mode, upon power-up, or if the controller is reset. During morning warm-up or cool-down, the controller provides maximum heating or cooling with the outdoor air damper closed until the temperature of the space reaches the sum of CTL STPT plus or minus MORN DBAND. In morning cool-down, if FREE CLG is set to ENABLE, the outdoor air damper is opened.

In heating mode, normal day heating operation begins when the temperature of the room reaches the sum of CTL STPT minus MORN DBAND.

In cooling mode, normal day cooling operation begins when the temperature of the room reaches the sum of CTL STPT plus MORN DBAND.

For example, in day heating mode, if CTL STPT is 72°F (22.2°C) and MORN DBAND is 3°F (1.6°C), normal day heating operation begins when the temperature of the room reaches 69°F (20.6°C).

ON/OFF Coil Valve Control

When a face-bypass configuration is used, the heating coil may be turned ON and OFF with a 2-position valve using a DO. There are two conditions when this might occur:

1. In the case where a hot water/steam coil and a DX coil are used with a face-bypass damper, the DX coil will be shut while in heating, and the heating valve actuator will be shut while in cooling. In this configuration, a 2-position heating valve must be used to prevent both coils from being ON at the same time.

   NOTE: In night heating or cooling, if NGT HW HTG is set to YES, the heating coil is kept open.

2. When in heating, if the face-bypass damper is all the way closed (bypass) for more than two minutes, the heating coil can be closed to conserve energy. This is an option which is performed when FBP.2PSVCTL is set to ENABLE. Otherwise, the heating valve is kept open when the damper is closed.

   NOTE: In night heating or cooling, if NGT HW HTG is set to YES, the heating coil is kept open.

DX Cooling Operation

DX cooling is controlled as follows:

- If CLG OUTPUT is greater than 75%, the DX turns ON.
- If CLG OUTPUT is less than 75%, the DX turns OFF.
- The DX may not turn ON or OFF until the number of minutes held in CMP MIN ON or CMP MIN OFF have expired.

Electric Heat

If electric heat is used, it is controlled as follows:

HTG OUTPUT	Stage 1	Stage 2	Stage 3
0% to 33%	ON	OFF	OFF
34% to 66%	ON	ON	OFF
67% to 100%	ON	ON	ON

In addition, no stage may turn ON or OFF until the number of seconds held in EHT STG DELY have elapsed since the last time any stage turned ON or OFF. Stage one will always be the first stage to turn ON and the last stage to turn OFF.

Fan Operation

In day mode, FAN, is ON all of the time.

In night mode, the fan only operates when required for heating or cooling.

In night heating, the fan turns ON when the temperature drops below the value of CTL STPT minus NGT DBAND. When the temperature rises above CTL STPT, the fan turns OFF. If any stage of electric heat is ON, the fan will be ON. The fan will remain ON for 30 seconds after the last stage of electric heat is turned OFF.

In night cooling, the fan turns ON when the temperature rises above the value of CTL STPT plus NGT DBAND. When the temperature drops below CTL STPT, the fan turns OFF. If the DX coil is ON, the fan will be ON. The fan will remain ON for 30 seconds after the DX coil is turned OFF.

Fail-safe Operation

The Unit Vent Controller has a fail-safe operation that can be triggered by several occurrences.

A low temperature detection thermostat (LTDT) can be used to signal the controller when the temperature sensed by the LTDT is below the low temperature limit.

If the room temperature sensor input to the Unit Vent Controller fails or the LTDT equals ON, the controller goes through the following shutdown sequence:

- Outdoor air damper is closed.
- Heating is full ON (except electric which is OFF).
- DX cooling is full OFF.
- Face-bypass damper is open to face.
- Fan is OFF.
- Auxiliary radiation is OFF.
- 2-position heating valve actuator is open.

NOTE: While DO 2 is not commanded by the fail-safe mode, all other DOs can be affected.

If the discharge air temperature sensor fails, the following conditions occur:

- If the last valid value is greater than 150 degrees, the heat is turned OFF, the outdoor air damper is closed, and the fan is turned ON.
- If the sensor does not come back within 10 minutes or if the last valid value is less than 150 degrees, the controller shuts down as described above.

- In the failed state, temperature control is not possible.

If a failed sensor returns or if the LTDT turns OFF, then normal control resumes.

This BACnet controller supports BACnet command priorities in which each command is issued with a priority level from 1-16; 1 is the highest priority and 16 is the lowest priority. Operator commands have a priority level 8 and therefore are given precedence over normal application control which is at priority level 16. The fail-safe commands described above are issued with a BACnet priority of 5 (Critical Equipment Control). Since 5 is a higher priority than 8, a normal operator command can not override outputs when they are in their safe mode. For an emergency override of the outputs, a command at a priority higher than 5 is needed, or alternatively, the failed input point can be overridden back to its normal state which releases the fail-safe mode allowing commands to be accepted.

Application Notes

1. If the unit ventilator cycles excessively, if the temperature swings in the room are excessive or if there is trouble in maintaining the setpoint, then either the cooling loop, the heating loop, or both need to be tuned.

2. The Unit Vent Controller as shipped from the factory keeps all associated equipment OFF. See the *Start-up* document for how to release the controller and its equipment to application control.

3. When the fan is manually switched OFF at the unit fan speed switch, the actuators should be wired so they return to their normal state.

Wiring Diagrams

The point wiring for Application 2577 is shown in Figure 7 through Figure 9.

CAUTION:

The controller's DOs control 24 Vac loads only. The maximum rating is 12 VA for each DO. Use an interposing 220V 4-relay module 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

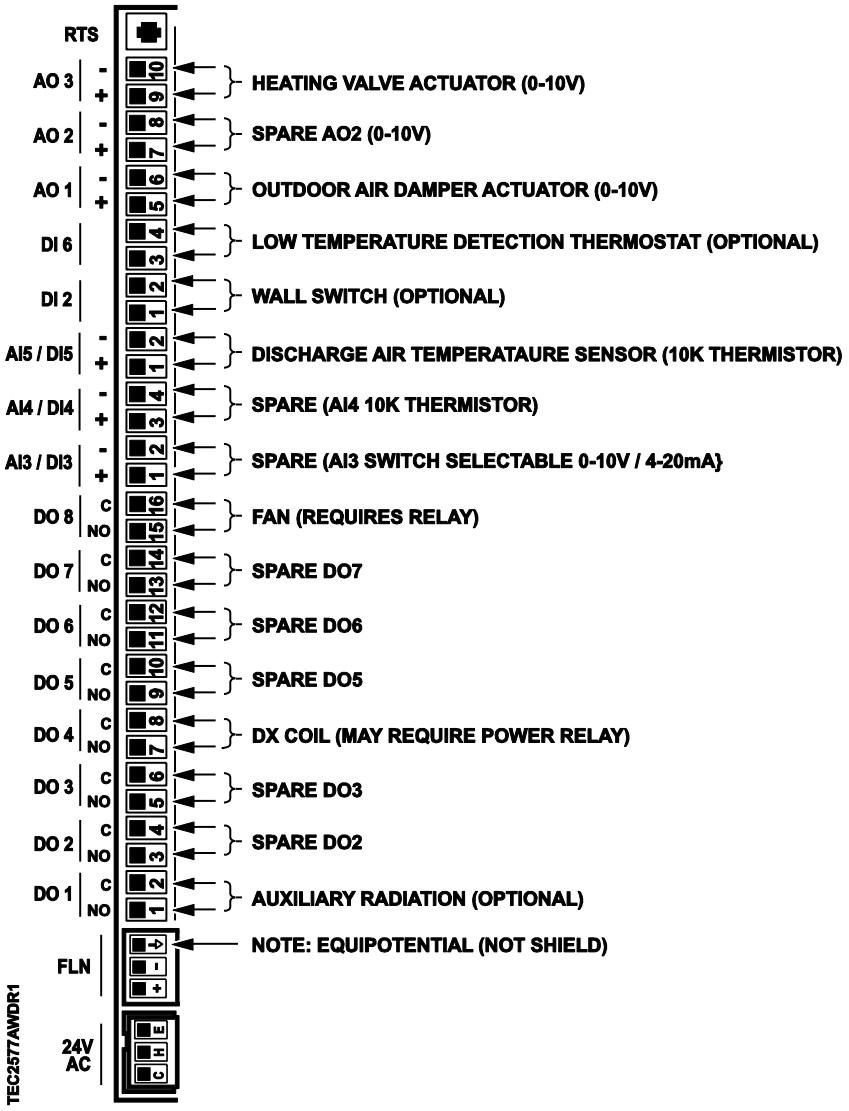

Figure 7. Application 2577 Wiring Diagram. See Table 1 for Application Configuration(s).

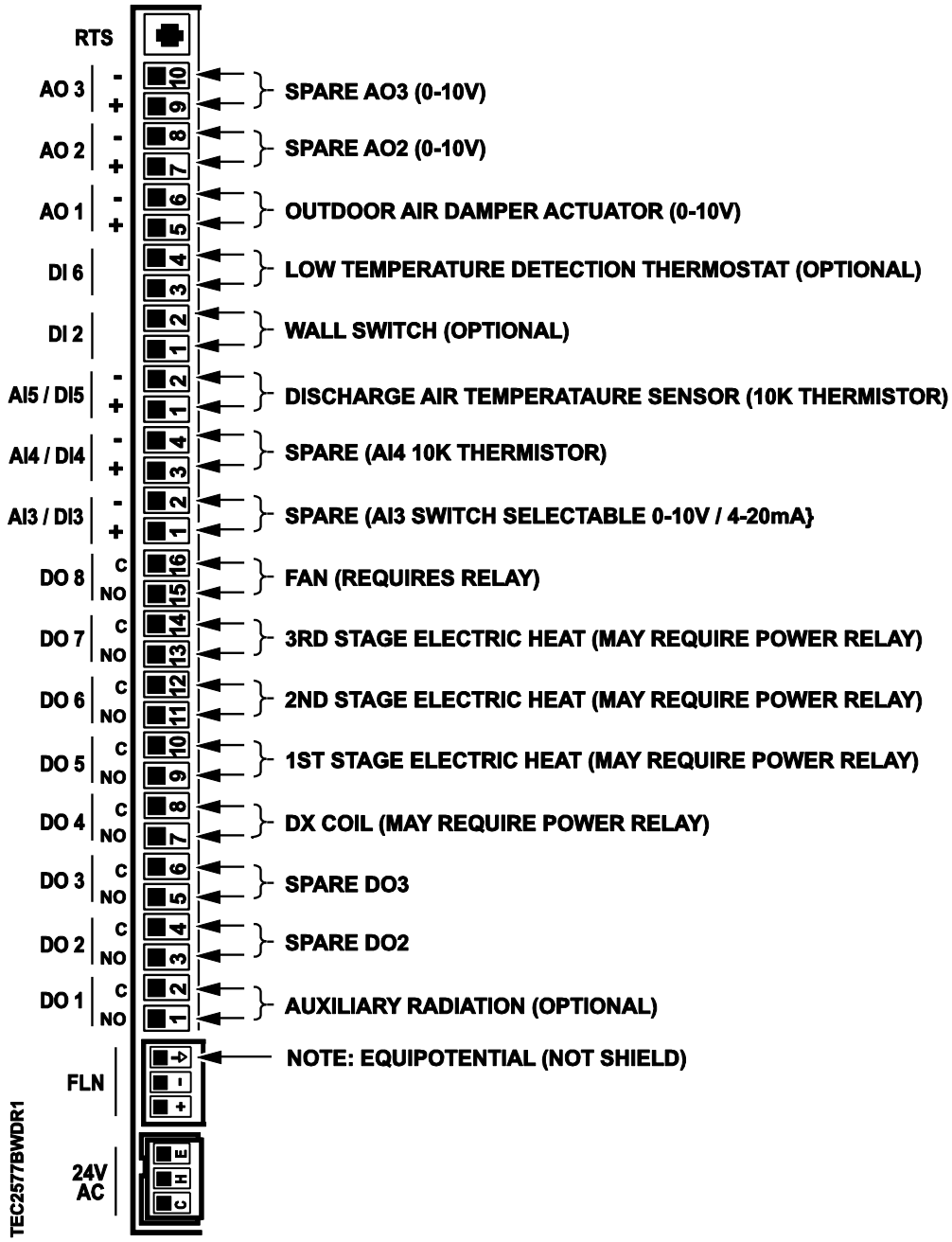

Figure 8. Application 2577 Wiring Diagram. See Table 1 for Application Configuration(s).

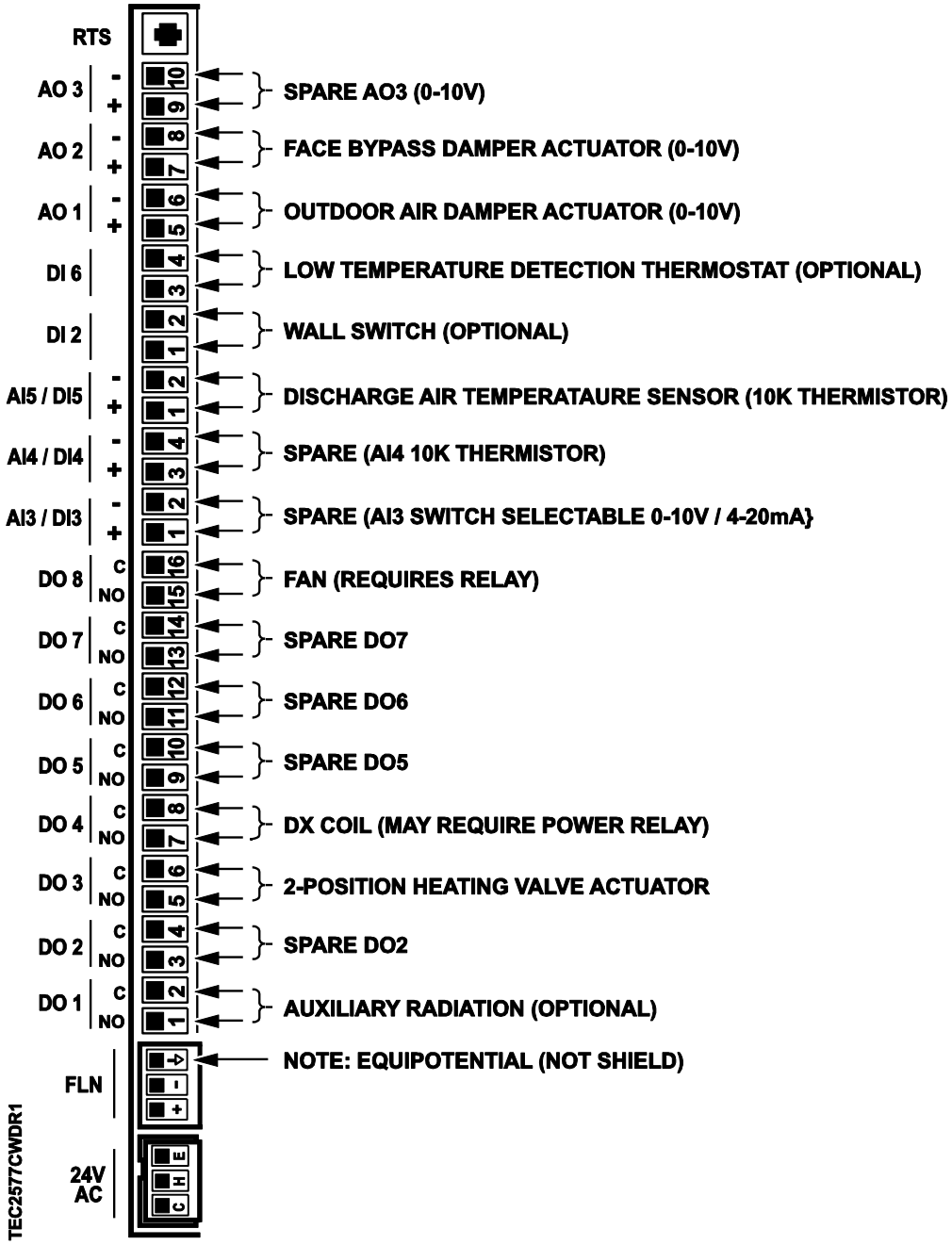

Figure 9. Application 2577 Wiring Diagram. See Table 1 for Application Configuration(s).

Table 3. Point Database for Application 2577. (See Table 4 for Slave Mode Point Database.)

Object Type[a]	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Engr Units (SI Units)[b]	Range	Active Text	Inactive Text
AO	01	CTLR ADDRESS	99	--	0-254	--	--
AO	02	APPLICATION	2595	--	--	--	--
AO	03	TEMP OFFSET	0.0 (0.0)	DEG F (DEG C)	-31.75-32	--	--
AI	{04}[c]	ROOM TEMP	74.0 (23.45)	DEG F (DEG C)	48-111.75	--	--
BO	{05}	HEAT.COOL	COOL	--	Binary	HEAT	COOL
AO	06	DAY CLG STPT	74.0 (23.45)	DEG F (DEG C)	48-111.75	--	--
AO	07	DAY HTG STPT	70.0 (21.21)	DEG F (DEG C)	48-111.75	--	--
AO	08	NGT CLG STPT	82.0 (27.93)	DEG F (DEG C)	48-111.75	--	--
AO	09	NGT HTG STPT	65.0 (18.41)	DEG F (DEG C)	48-111.75	--	--
AO	10	OADPR MINPOS	14.8	PCT	0-102	--	--
AO	11	RM STPT MIN	55.0 (12.81)	DEG F (DEG C)	48-111.75	--	--
AO	12	RM STPT MAX	90.0 (32.41)	DEG F (DEG C)	48-111.75	--	--
AI	{13}	RM STPT DIAL	74.0 (23.45)	DEG F (DEG C)	48-111.75	--	--
BO	14	STPT DIAL	NO	--	Binary	YES	NO
AI	{15}	DISCH TEMP	74.0 (23.496)	DEG F (DEG C)	37.5-165	--	--
BO	17	FBP.MODVALVE	VALVE	--	Binary	FBP	VALVE
BO	18	WALL SWITCH	NO	--	Binary	YES	NO
BI	{19}	DI OVRD SW	OFF	--	Binary	ON	OFF
AO	20	OVRD TIME	1	HRS	0-255	--	--
BO	{21}	NGT OVRD	NIGHT	--	Binary	NIGHT	DAY
BO	22	AUX.NOAUX	NOAUX	--	Binary	AUX	NOAUX
BO	{23}	FREE CLG	DISABL	--	Binary	ENABLE	DISABL
BI	{24}	DI 2	OFF	--	Binary	ON	OFF
BI	{25}	DI 5	OFF	--	Binary	ON	OFF
BI	{26}	LOW TEMP DET	ON	--	Binary	OFF	ON
BO	27	ELEC.NOELEC	NOELEC	--	Binary	ELEC	NOELEC

Object Type[a]	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Engr Units (SI Units)[b]	Range	Active Text	Inactive Text
BO	28	FBP.2PSVCTL	DISABL	--	Binary	ENABLE	DISABL
BO	{29}	DAY.NGT	DAY	--	Binary	NIGHT	DAY
BO	{30}	WRMUP.COOLDN	ON	--	Binary	ON	OFF
AO	31	AOV1 SPAN	10.0	VOLTS	0-10.23	--	--
AO	32	AOV1 START	0.0	VOLTS	0-10.23	--	--
AO	33	AOV2 SPAN	10.0	VOLTS	0-10.23	--	--
AO	34	AOV2 START	0.0	VOLTS	0-10.23	--	--
AO	35	AOV3 SPAN	10.0	VOLTS	0-10.23	--	--
AO	36	AOV3 START	0.0	VOLTS	0-10.23	--	--
AO	37	AO DIR.REV	0	--	0-255	--	--
AO	{38}	AOV1	0.0	VOLTS	0-10.23	--	--
AO	{39}	AOV2	0.0	VOLTS	0-10.23	--	--
AO	{40}	AOV3	0.0	VOLTS	0-10.23	--	--
BO	{41}	AUX RAD	OFF	--	Binary	ON	OFF
BO	{42}	DO 2	OFF	--	Binary	ON	OFF
BO	{43}	HTG 2POS VLV	OFF	--	Binary	ON	OFF
BO	{44}	DX	OFF	--	Binary	ON	OFF
BO	{45}	EHEAT 1	OFF	--	Binary	ON	OFF
BO	{46}	EHEAT 2	OFF	--	Binary	ON	OFF
BO	{47}	EHEAT 3	OFF	--	Binary	ON	OFF
AI	{48}	AI 3	0.0	PCT	0-102	--	--
AI	{49}	AI 4	74.0 (23.496)	DEG F (DEG C)	37.5-165	--	--
BO	{50}	FAN	OFF	--	Binary	ON	OFF
BI	{51}	DI 3	OFF	--	Binary	ON	OFF
BI	{52}	DI 4	OFF	--	Binary	ON	OFF
BO	53	NGT HW HTG	YES	--	Binary	YES	NO
BO	54	NGT CLG MODE	NO	--	Binary	YES	NO
AO	{55}	AUX OUTPUT	0.0	PCT	0-102	--	--
AO	57	AUX HTG TIME	10	MIN	0-255	--	--
AO	58	EHT STG DELY	30	SEC	0-255	--	--
AO	59	DO DIR.REV	0	--	0-255	--	--
AO	{60}	HTG OUTPUT	0.0	PCT	0-102	--	--

Object Type[a]	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Engr Units (SI Units)[b]	Range	Active Text	Inactive Text
AO	{61}	CLG OUTPUT	0.0	PCT	0-102	--	--
AO	{62}	OA DMPR POS	0.0	PCT	0-102	--	--
AO	63	CLG P GAIN	1.6 (2.88)	--	0-51	--	--
AO	64	CLG I GAIN	0.05 (0.09)	--	0-2.0475	--	--
AO	65	CLG D GAIN	10 (18.0)	--	0-2046	--	--
AO	66	CLG BIAS	50.0	PCT	0-102.2	--	--
AO	67	HTG P GAIN	0.4 (0.72)	--	0-12.75	--	--
AO	68	HTG I GAIN	0.015 (0.027)	--	0-0.819	--	--
AO	69	HTG D GAIN	5 (9.0)	--	0-1023	--	--
AO	70	HTG BIAS	50.0	PCT	0-102.2	--	--
AO	71	ROOM P GAIN	2.3 (4.14)	--	0-12.75	--	--
AO	72	ROOM I GAIN	0.00504 (0.009072)	--	0-0.36855	--	--
AO	73	ROOM D GAIN	76 (136.8)	--	0-510	--	--
AO	74	ROOM BIAS	72.0 (22.376)	DEG F (DEG C)	37.5-165	--	--
AO	75	CMP MIN OFF	5	MIN	0-255	--	--
AO	76	CMP MIN ON	5	MIN	0-255	--	--
AO	{77}	AUX LOOPOUT	0.0	PCT	0-102.2	--	--
AI	{78}	CTL TEMP	74.0 (23.45)	DEG F (DEG C)	48-111.75	--	--
AO	{79}	CLG LOOPOUT	0.0	PCT	0-102.2	--	--
AO	{80}	HTG LOOPOUT	0.0	PCT	0-102.2	--	--
AO	{81}	AUX P GAIN	0.2 (0.36)	--	0-5.1	--	--
AO	{82}	AUX I GAIN	0.00054 (0.000972)	--	0-0.36855	--	--
AO	{83}	AUX D GAIN	24 (43.2)	--	0-255	--	--
AO	{84}	AUX BIAS	0.0	PCT	0-102.2	--	--
AO	85	SWITCH LIMIT	4.8	PCT	0-102	--	--
AO	86	SWITCH TIME	10	MIN	0-255	--	--
AO	88	NGT DBAND	3.0 (1.68)	DEG F (DEG C)	0-63.75	--	--
AO	89	MORN DBAND	2.0 (1.12)	DEG F (DEG C)	0-63.75	--	--
AO	90	SWITCH DBAND	2.0 (1.12)	DEG F	0-63.75	--	--

Object Type[a]	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Engr Units (SI Units)[b]	Range	Active Text	Inactive Text
				(DEG C)			
AO	{91}	AUX DSH STPT	80.0 (26.856)	DEG F (DEG C)	37.5-165	--	--
AI	{92}	CTL STPT	74.0 (23.45)	DEG F (DEG C)	48-111.75	--	--
AO	{93}	DISCH STPT	74.0 (23.496)	DEG F (DEG C)	37.5-165	--	--
AO	94	DSH MIN TEMP	60.0 (15.656)	DEG F (DEG C)	37.5-165	--	--
AO	95	DSH MAX TEMP	110.0 (43.656)	DEG F (DEG C)	37.5-165	--	--
AO	98	LOOP TIME	5	SEC	0-255	--	--
AO	{99}	ERROR STATUS	0	--	0-255	--	--

a Object Types: Analog Input (AI), Analog Output (AO), Binary Input (BI) and Binary Output (BO).

b A single value in a column means that the value is the same in English units and in SI units.

c Point numbers that appear in brackets { } may be unbundled at the field panel.

Table 4. Slave Mode 2595 Point Database.

Object Type [a]	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Engr Units (SI Units) [b]	Range	Active Text	Inactive Text
AO	01	CTLR ADDRESS	99	--	0-254	--	--
AO	02	APPLICATION	2595	--	--	--	--
AO	03	TEMP OFFSET	0.0 (0.0)	DEG F (DEG C)	-31.75-32	--	--
AI	{04} [c]	ROOM TEMP	74.0 (23.45)	DEG F (DEG C)	48-111.75	--	--
AI	{13}	RM STPT DIAL	74.0 (23.45)	DEG F (DEG C)	48-111.75	--	--
AI	{15}	AUX TEMP	74.0 (23.496)	DEG F (DEG C)	37.5-165	--	--
BO	18	WALL SWITCH	NO	--	Binary	YES	NO
BI	{19}	DI OVRD SW	OFF	--	Binary	ON	OFF
BI	{24}	DI 2	OFF	--	Binary	ON	OFF
BI	{25}	DI 5	OFF	--	Binary	ON	OFF
BI	{26}	DI 6	OFF	--	Binary	ON	OFF
BO	{29}	DAY.NGT	DAY	--	Binary	NIGHT	DAY
AO	{38}	AOV1	0.0	VOLTS	0-10.23	--	--
AO	{39}	AOV2	0.0	VOLTS	0-10.23	--	--
AO	{40}	AOV3	0.0	VOLTS	0-10.23	--	--
BO	{41}	DO 1	OFF	--	Binary	ON	OFF
BO	{42}	DO 2	OFF	--	Binary	ON	OFF
BO	{43}	DO 3	OFF	--	Binary	ON	OFF
BO	{44}	DO 4	OFF	--	Binary	ON	OFF
BO	{45}	DO 5	OFF	--	Binary	ON	OFF
BO	{46}	DO 6	OFF	--	Binary	ON	OFF
BO	{47}	DO 7	OFF	--	Binary	ON	OFF
AI	{48}	AI 3	0.0	PCT	0-102	--	--
AI	{49}	AI 4	74.0 (23.496)	DEG F (DEG C)	37.5-165	--	--
BO	{50}	DO 8	OFF	--	Binary	ON	OFF
BI	{51}	DI 3	OFF	--	Binary	ON	OFF
BI	{52}	DI 4	OFF	--	Binary	ON	OFF
AO	59	DO DIR.REV	0	--	0-255	--	--
AI	{78}	CTL TEMP	74.0 (23.45)	DEG F (DEG C)	48-111.75	--	--

Object Type [a]	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Engr Units (SI Units) [b]	Range	Active Text	Inactive Text
AO	{99}	ERROR STATUS	0	--	0-255	--	--

a Object Types: Analog Input (AI), Analog Output (AO), Binary Input (BI) and Binary Output (BO).

b A single value in a column means that the value is the same in English units and in SI units.

c Point numbers that appear in brackets { } may be unbundled at the field panel.