SIEMENS

BACnet Unit Vent Controller
Application Notes

Application 2576 — Heating and/or Chilled Water Cooling, ASHRAE Cycle III (0 to 10V Output)

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Overview

In Application 2576, the Unit Vent Controller – 0 to 10V Output controls a unit ventilator equipped with a chilled water coil for cooling, and/or a heating coil, which may be hot water, steam, or electric, for ASHRAE Cycle III. A face-bypass damper can be controlled, replacing both the modulating (0 to 10V) heating and cooling actuators. If a face-bypass damper is used, 2-position valves on the coils may be controlled. Heating only and cooling only units can also be controlled with this application by overriding HEAT.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: The use of a low temperature detection thermostat (LTDT) is strongly recommended for hot water and steam systems.

This application controls room temperature by directly modulating the coil control devices. This application also controls an outdoor air damper according to the schedule as defined by ASHRAE Cycle III, to maintain a given mixed air temperature setpoint. 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 to maintain the mixed air temperature setpoint. 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 2576 Illustration Cross Reference Table.

Hardware Configuration	Control Drawing	Control Schedule	Wiring Diagram
Chilled water coil, valve control	Figure 1, except: 1. No heating coil, heating valve actuator, or auxiliary radiation.	Figure 6, except: 1. No heating mode.	Figure 9, except: 1. No heating valve actuator or auxiliary radiation.
Chilled water coil, face-bypass damper control	Figure 3, except: 1. No heating coil, heating valve actuator, or auxiliary radiation.	Figure 8, except: 1. No heating mode.	Figure 11, except: 1. No 2-position heating valve actuator or auxiliary radiation.
Hot water coil, valve control	Figure 4, except: 1. LTDT recommended.	Figure 6, except: 1. No cooling mode.	Figure 9, except: 1. No cooling valve actuator. 2. LTDT recommended.
Hot water coil, face-bypass damper control	Figure 3, except: 1. No cooling coil or cooling valve actuator. 2. LTDT recommended if 2-position valve is used.	Figure 8, except: 1. No cooling mode.	Figure 11, except: 1. No 2-position cooling valve actuator.
Steam coil, valve control	Figure 4, except: 1. Read steam coil instead of heating coil. 2. LTDT recommended.	Figure 6, except: 1. No cooling mode.	Figure 9, except: 1. No cooling valve actuator. 2. LTDT recommended.
Steam coil, face-bypass damper control	Figure 3, except: 1. No cooling coil or cooling valve actuator. 2. Read steam coil instead of heating coil. 3. LTDT recommended if 2-position valve is used.	Figure 8, except: 1. No cooling mode.	Figure 11, except: 1. No 2-position cooling valve actuator.
Electric coil only	Figure 2, except: 1. No cooling coil or cooling valve actuator. 2. No LTDT.	Figure 7, except: 1. No cooling mode.	Figure 10, except: 1. No cooling valve actuator. 2. No LTDT.

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Table 1. Application 2576 Illustration Cross Reference Table.

Hardware Configuration	Control Drawing	Control Schedule	Wiring Diagram
2-pipe, hot water/chilled water coil, valve control	Figure 1, except: 1. No heating coil or heating valve actuator. 2. Read heating/cooling coil instead of cooling coil. 3. Read heating/cooling valve actuator instead of cooling valve actuator. Terminate heating/cooling valve actuator at AO2. 4. LTDT recommended.	Figure 6, except: 1. Read coil valve instead of HW/STM valve and CHW valve.	Figure 9, except: 1. No heating valve actuator. 2. Read heating/cooling valve actuator instead of cooling valve actuator. Terminate heating/cooling valve actuator at AO2. 3. LTDT recommended.
2-pipe, hot water/chilled water coil, face-bypass damper control	Figure 5, except: 1. LTDT recommended if 2-position valve is used.	Figure 8	Figure 12, except: 1. LTDT recommended if 2-position valve is used.
4-pipe, hot water and chilled water coils, valve control	Figure 1, except: 1. LTDT recommended.	Figure 6	Figure 9, except: 1. LTDT recommended.
4-pipe, hot water and chilled water coils, face-bypass damper control	Figure 3, except: 1. 2-position valves required if automatic heat/cool switchover is required. 2. LTDT recommended if 2-position valve is used.	Figure 5	Figure 11, except: 1. 2-position valves required if automatic heat/cool switchover is required. 2. LTDT recommended if 2-position valve is used.
4-pipe, steam and chilled water coils, valve control	Figure 1, except: 1. Read steam coil instead of heating coil. 2. LTDT recommended.	Figure 6	Figure 9, except: 1. LTDT recommended.
4-pipe, steam and chilled water coils, face-bypass damper control	Figure 3, except: 1. Read steam coil instead of heating coil. 2. 2-position valves required if automatic heat/cool switchover is required. 3. LTDT recommended if 2-position valve is used.	Figure 8	Figure 11, except: 1. 2-position valves required if automatic heat/cool switchover is required. 2. LTDT recommended if 2-position valve is used.
Electric coil, step control, and chilled water coil, valve control	Figure 2	Figure 7	Figure 10

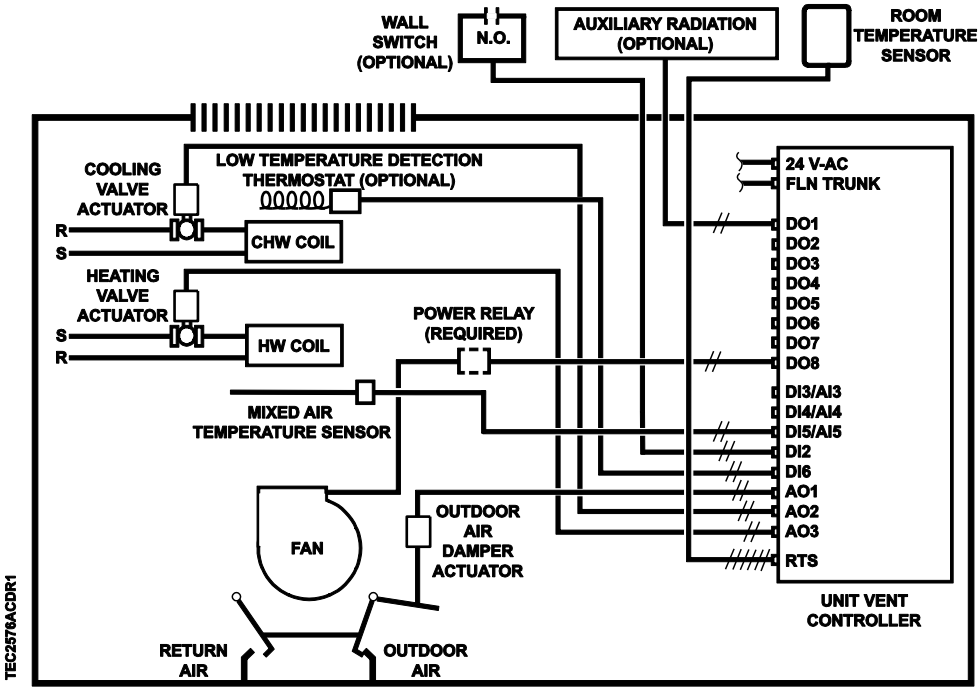

Figure 1. Application 2576 Control Drawing. See Table 1 for Application Configuration(s).

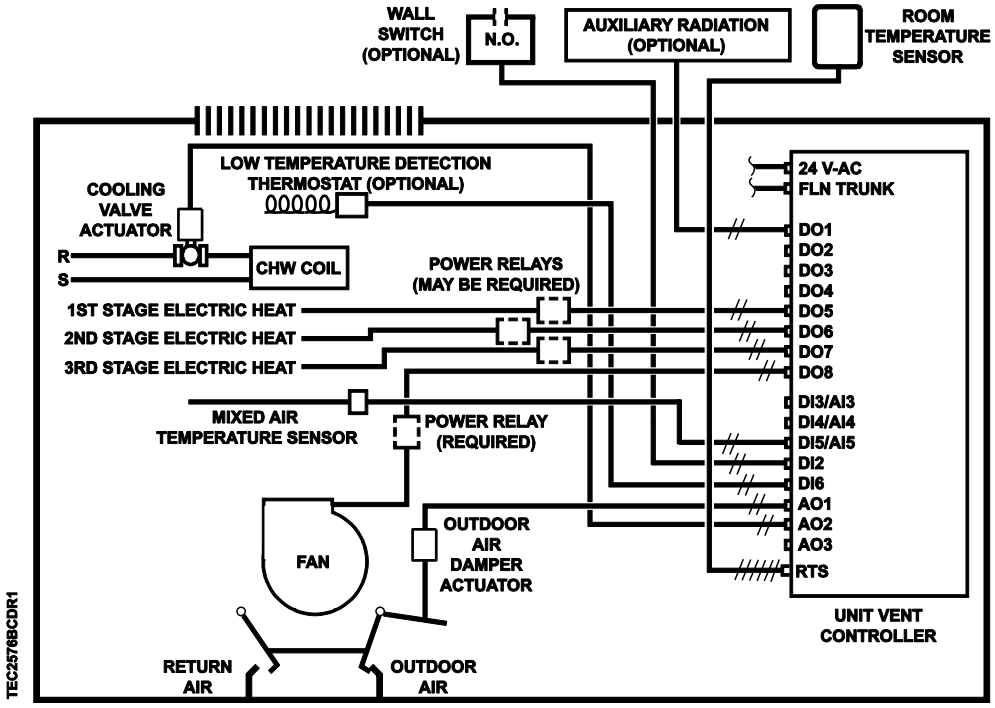

Figure 2. Application 2576 Control Drawing. See Table 1 for Application Configuration(s).

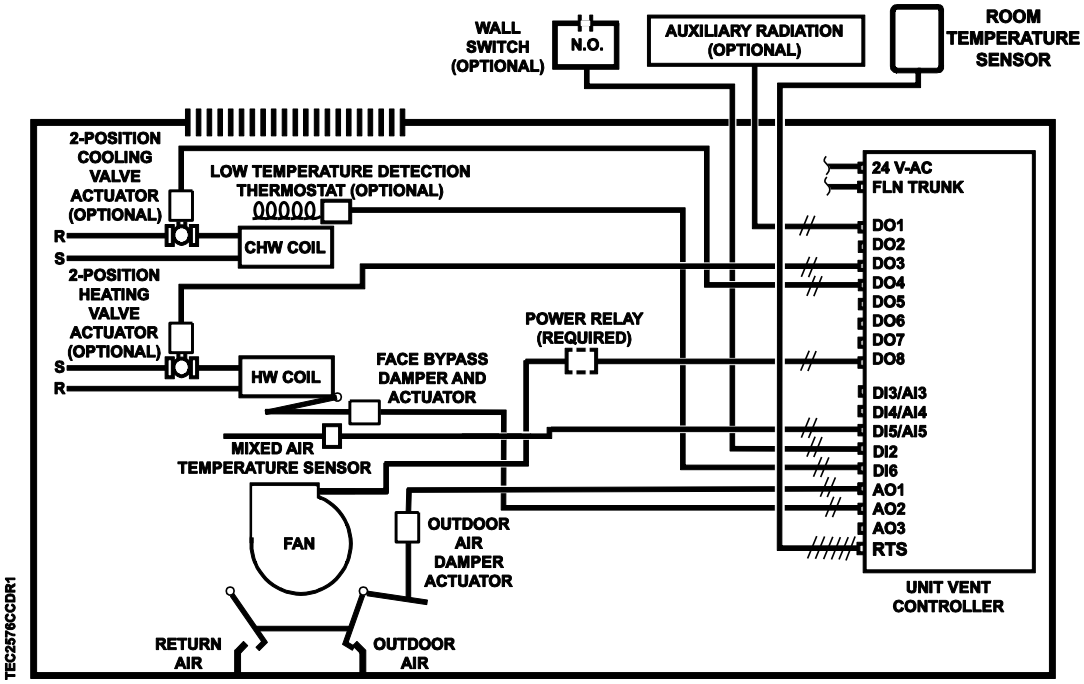

Figure 3. Application 2576 Control Drawing. See Table 1 for Application Configuration(s).

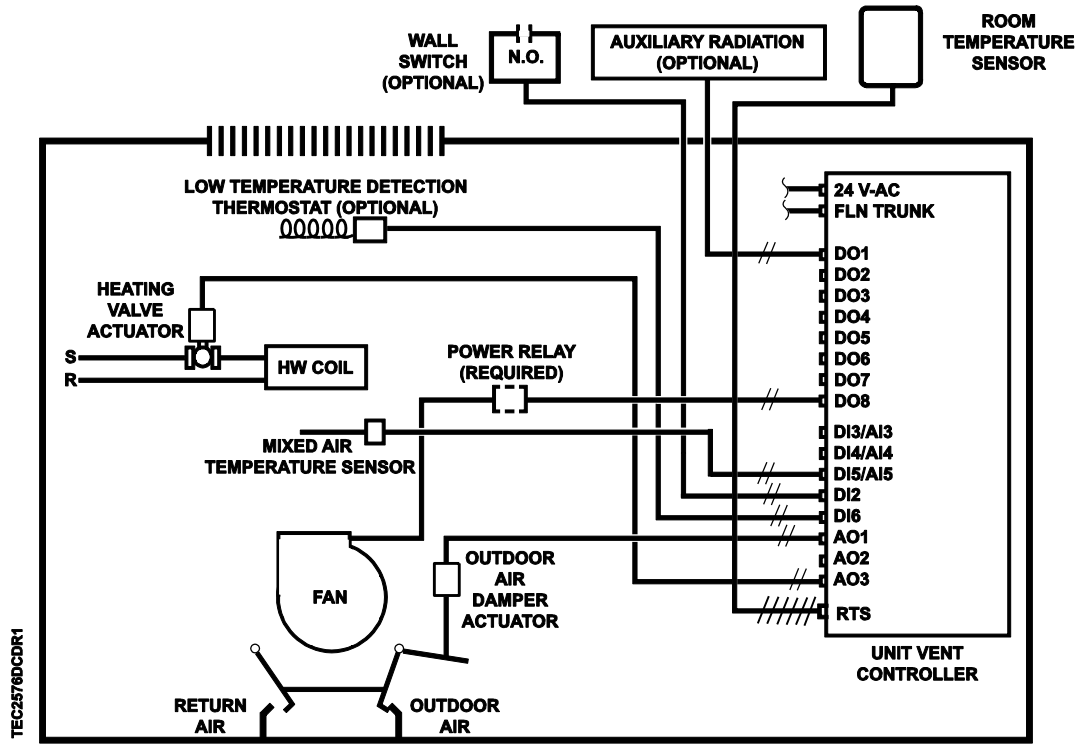

Figure 4. Application 2576 Control Drawing. See Table 1 for Application Configuration(s).

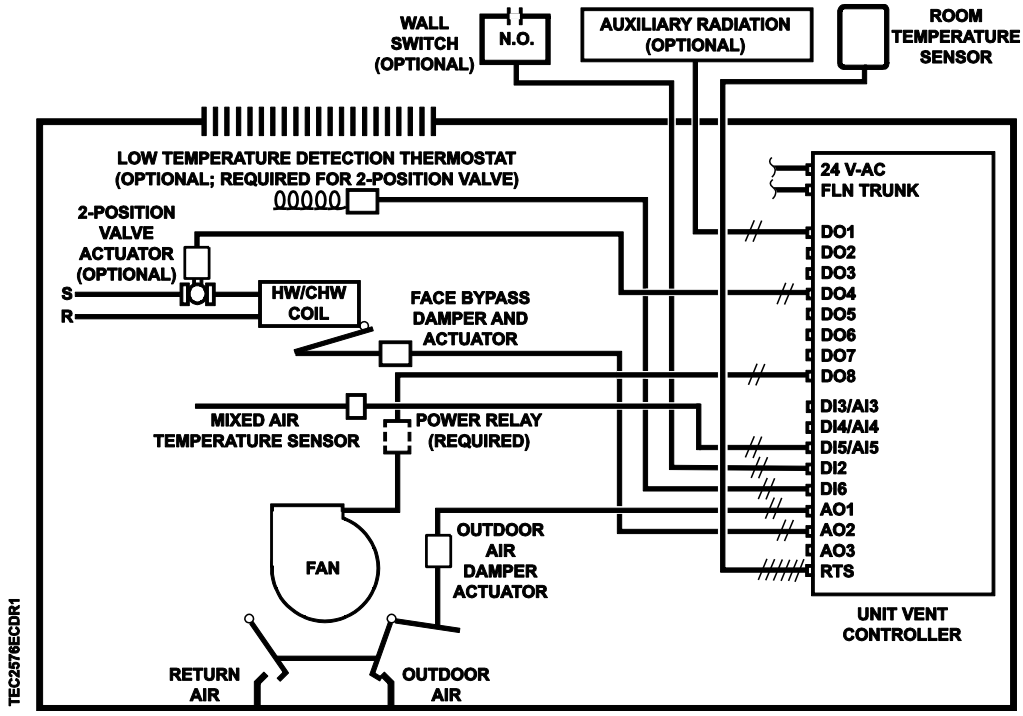

Figure 5. Application 2576 Control Drawing. See Table 1 for Application Configuration(s).

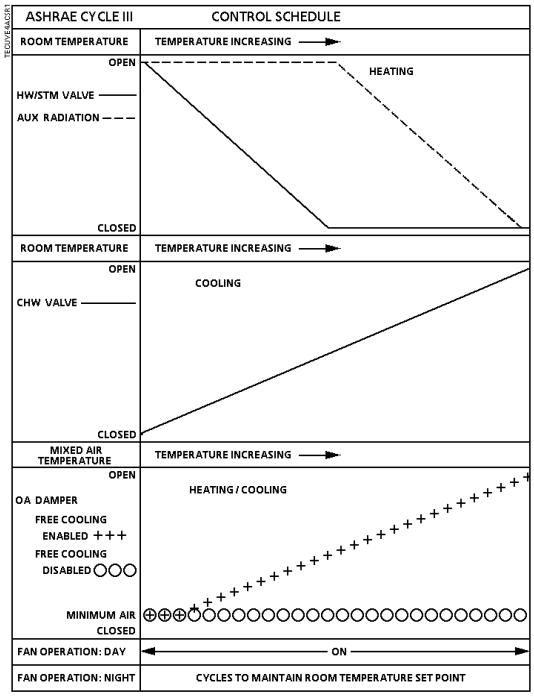

Figure 6. Application 2576 Control Schedule.

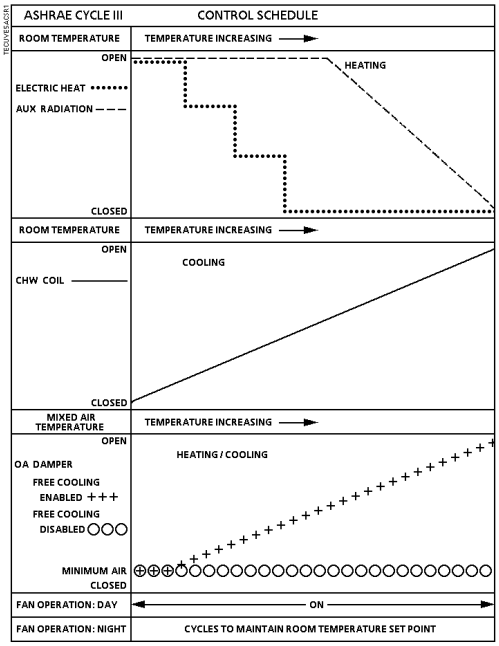

Figure 7. Application 2576 Control Schedule.

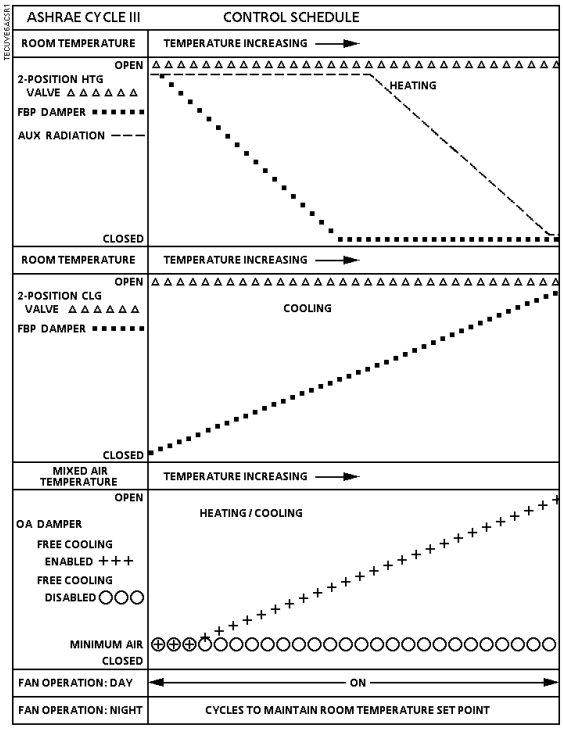

Figure 8. Application 2576 Control Schedule.

BACnet

The Fan Coil BACnet ASC 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 B	Data Sharing-Read Property-
	DS-RPM-B –B	Data Sharing-Read Property Multiple
	DS-WP-B	Data Sharing-Write Property-B
	DM-DDB-	Device Management-Dynamic Device Bind B ing-B
	DM-DOB-B	Device Management-Dynamic Object Binding-B
	DM-DDC-B B	Device Management-Device Communication Control-

Hardware Inputs

Analog

- Averaging air temperature sensor
- Room temperature sensor
- Room temperature setpoint dial (optional)

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 (0-10V)

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

Digital

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

Ordering Notes

Unit Vent Controller – 0-10V Output (550-493)

See *APOGEE Automation Configuration and Sizing Guidelines* on InfoLink for product numbers.

Powers Averaging Air Temperature Sensor

Terminal Equipment Controller Room Temperature Sensor

Point Database

Table 2 presents the point database information for Application 2576.

Sequence of Operation

The following paragraphs present the sequence of operation for Application 2576, "Heating and/or Chilled Water Cooling, ASHRAE Cycle III".

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.

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 5 and Figure 9 through Figure 12), 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, the controller stays in day mode all the time. If the controller is operating with centralized control (that is, it is connected to a field panel), the field panel can send an operator or PPCL command to override the status of DAY.NGT. See *Powers Process Control Language (PPCL) User's Manual* (125-1896) and *Field Panel User's Manual* (125-3000) 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.

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

Valve Configuration

Definition of “2-pipe heat/cool”:

- If the unit has one valve, controlling a coil that may have hot water or chilled water, depending on the season, 1 VLV HTGCLG is set to YES. This configuration is often referred to as “2-pipe heat/cool”.
- If the unit has any other setup, 1 VLV HTGCLG is set to NO. This includes units which are heating or cooling only, units with a heating and a cooling coil (often referred to as “4-pipe”), units with electric heating, etc.

Day Heating Operation

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

- Modulating the available coil control device based on the difference between the control temperature point, CTL TEMP, and CTL STPT. If CTL TEMP goes below CTL STPT, the heating valve actuator opens, the face-bypass damper opens, or the stages of electric heat energize. If CTL TEMP goes above CTL 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 modulated in sequence with the coil control device. Auxiliary radiation is first ON and last OFF.
- Positioning the outdoor air damper as follows:
  - For ASHRAE Cycle III, when FREE CLG is enabled, the position of the outdoor air damper is based on the difference between the mixed air temperature point, MA TEMP, and the mixed air temperature setpoint, MA STPT. If the value of MA TEMP is below the value of MA STPT, the damper closes. The damper cannot close beyond the value of OADPR MINPOS. When FREE CLG is disabled, the damper is held at the value of OADPR MINPOS.

Day Cooling Operation

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

- Modulating the available coil control device based on the difference between the control temperature point, CTL TEMP, and CTL STPT. If CTL TEMP goes above CTL STPT, the cooling valve actuator opens or the face-bypass damper opens. If CTL TEMP goes below CTL STPT, the reverse occurs.
- Positioning the outdoor air damper as follows:
  - For ASHRAE Cycle III, when FREE CLG is enabled, the position of the outdoor air damper is based on the difference between the mixed air temperature point, MA TEMP, and the mixed air temperature setpoint, MA STPT. If the value of MA TEMP is below the value of MA STPT, the damper closes. The damper cannot close beyond the value of OADPR MINPOS. When FREE CLG is disabled, the damper is held at the value of OADPR MINPOS.

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 value of NGT HTG STPT minus the value of 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 will remain 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:

- 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.

In night cooling operation, the controller operates as follows:

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

Heating/Cooling Switchover

For 2-pipe heating/cooling units (1 VLV HTGCLG is set to YES), the switchover between heating and cooling must be controlled by the field panel which commands HEAT.COOL.

For all other units (1 VLV HTGCLG is set to NO), the heating/cooling switchover is determined as follows:

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 auxiliary radiation is not available, (AUX.NOAUX is set to NOAUX), or below SWITCH LIMIT if auxiliary radiation is available.
- CTL TEMP is greater than the sum of CTL STPT plus SWITCH DBAND.
- 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 is below SWITCH LIMIT.
- CTL TEMP is less than CTL STPT minus SWITCH DBAND.
- CTL TEMP is less than 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 three Proportional, Integral, and Derivative (PID) control loops: a heating loop, a cooling loop, and a mixed air loop.

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

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

Mixed Air Loop – The mixed air loop uses the values of MA STPT and MA TEMP to modulate the value of MA 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 value of CTL STPT plus or minus the value of 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 value of CTL STPT minus MORN DBAND.

In cooling mode, normal day cooling operation begins when the temperature of the room reaches the value 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 coils may be turned ON and OFF with 2-position valves using DOs. There are two conditions when this might occur:

1. In the case where a 4-pipe configuration is used with a face-bypass damper, the cooling valve actuator will be shut while in heating, and the heating valve actuator will be shut while in cooling. In this configuration, 2-position valves must be used to prevent both coils from being ON at the same time.

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

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

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

   When a 2-pipe heat/cool configuration is used (1 VLV HTGCLG is set to YES), with or without a face-bypass damper, NGT HW HTG should be set to YES. The 2-pipe heat/cool coil will then stay open during both night heating and night cooling.

Electric Heat

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

HTG OUTPUT	Stage 1	Stage 2	Stage 3
0% - 33%	ON	OFF	OFF
34% - 66%	ON	ON	OFF
67% - 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.

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).
- 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.
- 2-position cooling valve actuator is closed.

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

If the mixed air temperature sensor fails, the outdoor air damper is closed and the heating and cooling loops continue to control room temperature.

- 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, either the cooling loop, the heating loop or both need to be tuned. See *APOGEE Automation Service Procedures* on InfoLink for more information.

2. The Unit Vent Controller – 0 to 10V Output, as shipped from the factory, keeps all associated equipment OFF. See the "Equipment Controllers" tab in *APOGEE Automation Start-up Procedures* on InfoLink for information on 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

Figure 9 through Figure 12 present the point wiring for Application 2576.

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

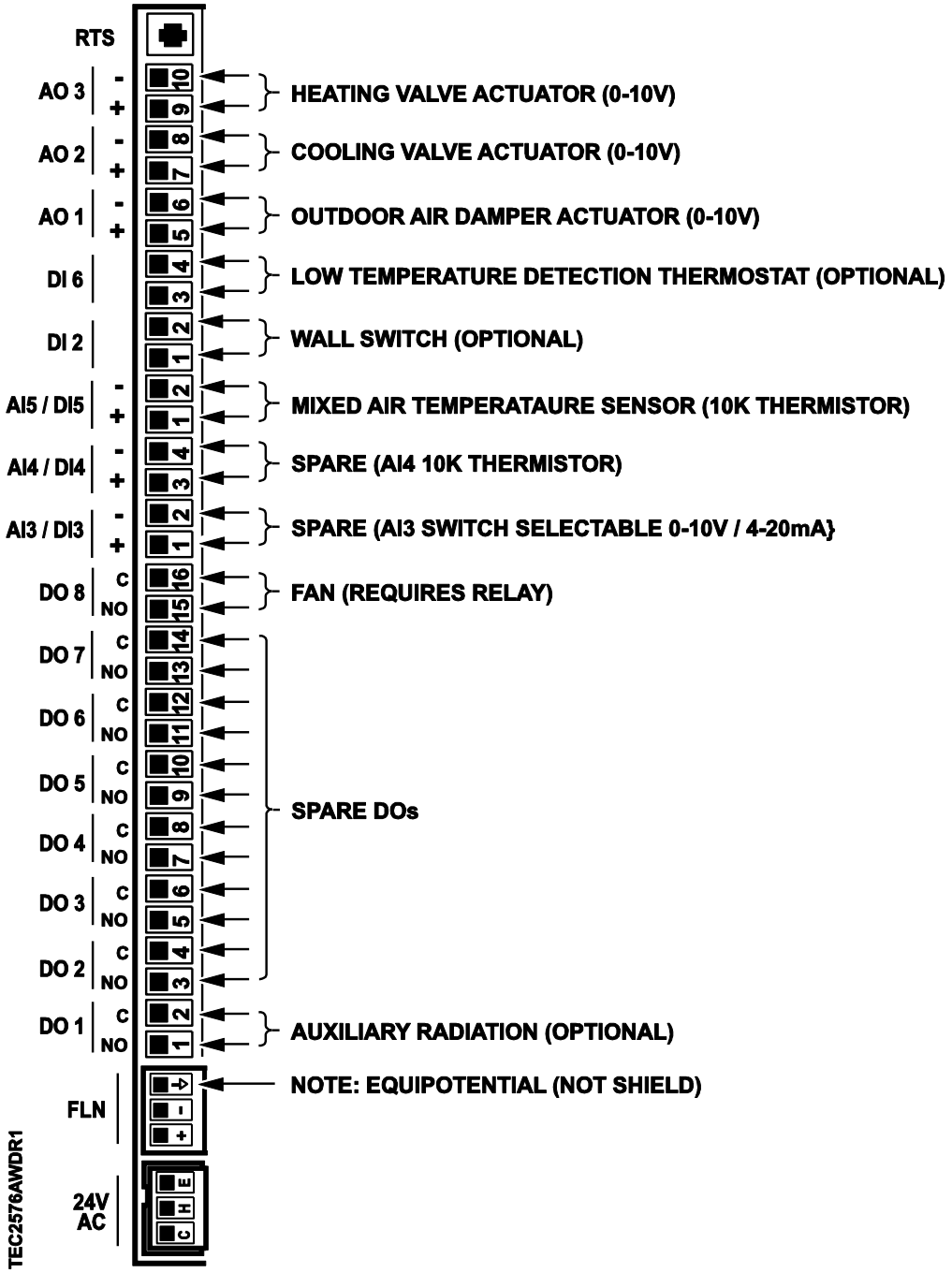

Figure 9. Application 2576 Wiring Diagram. See Table 1 for Application Configuration(s).

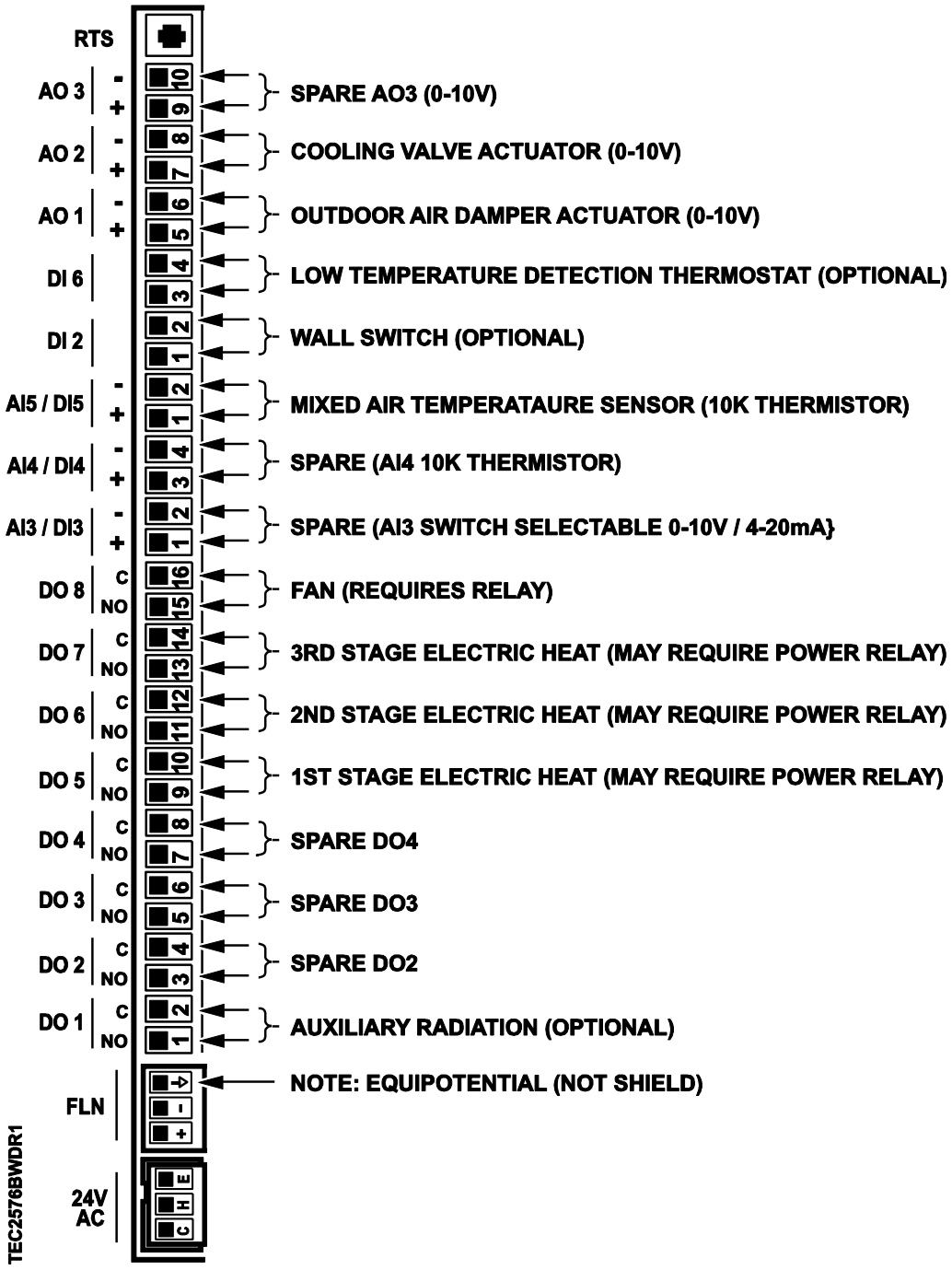

Figure 10. Application 2576 Wiring Diagram. See Table 1 for Application Configuration(s).

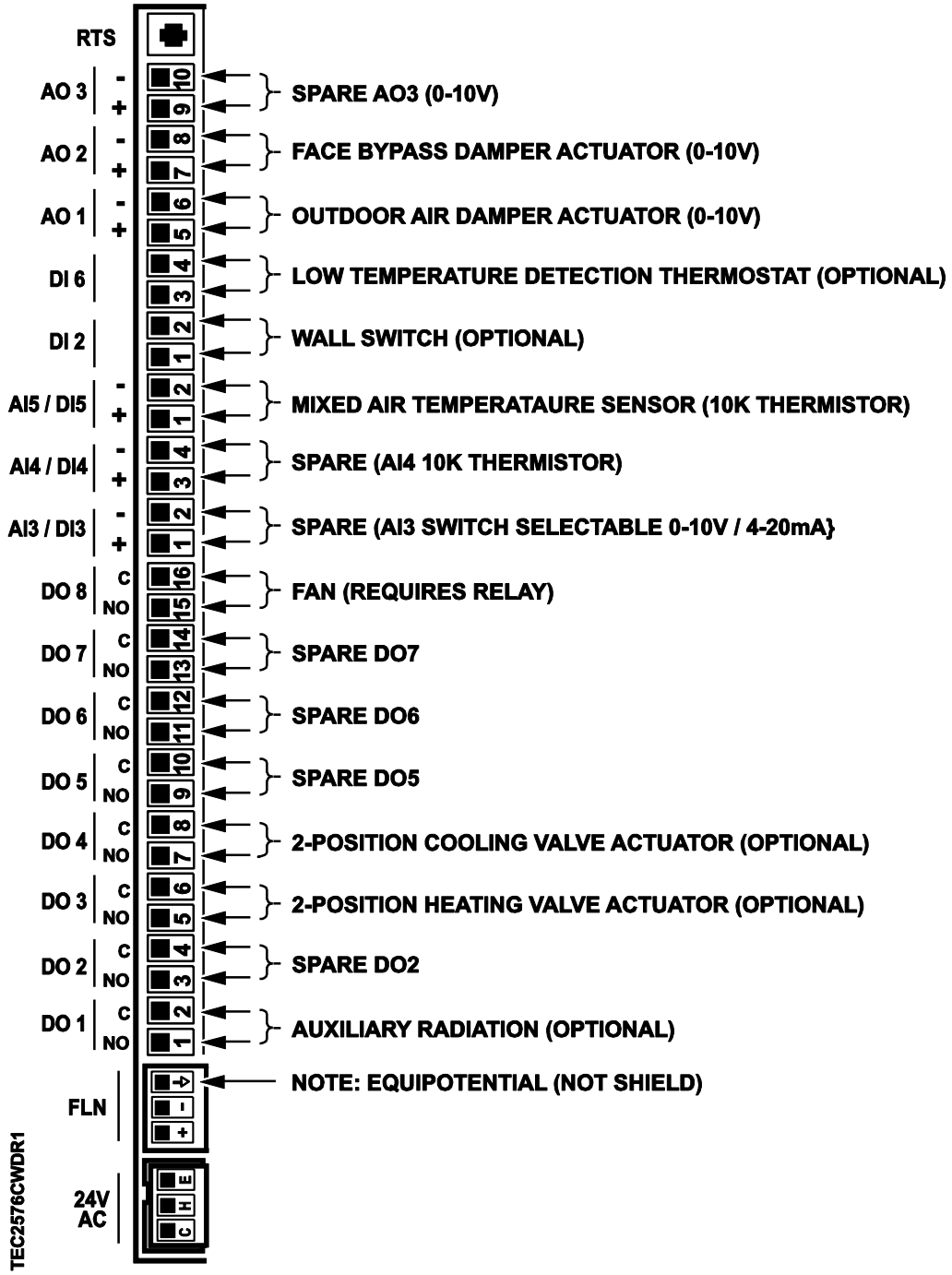

Figure 11. Application 2576 Wiring Diagram. See Table 1 for Application Configuration(s).

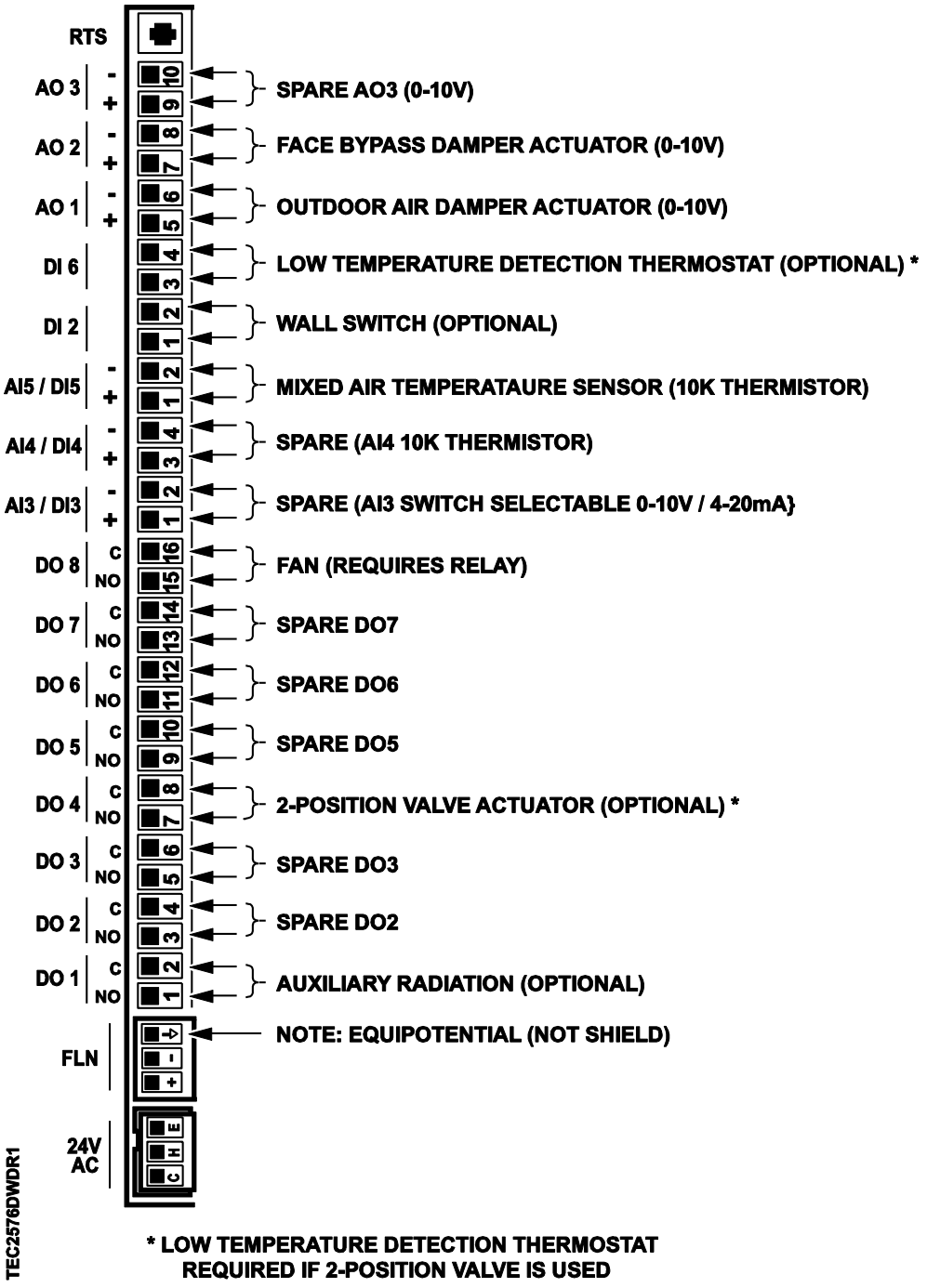

Figure 12. Application 2576 Wiring Diagram. See Table 1 for Application Configuration(s).

Table 3. Point Database for Application 2576.

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	--	0-255	--	--
AO	02	APPLICATION	2595	--	0-32767	--	--
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}	MA TEMP	74.0 (23.496)	DEG F (DEG C)	37.5-165	--	--
BO	16	1 VLV HTGCLG	NO	--	Binary	YES	NO
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

Object Type [a]	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units)	Engr Units (SI Units) [b]	Range	Active Text	Inactive Text
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
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}	CLG 2POS VLV	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

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	{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	--	--
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	{77}	MA 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}	MA P GAIN	0.2 (0.36)	--	0-5.1	--	--
AO	{82}	MA I GAIN	0.00054 (0.000972)	--	0-0.36855	--	--
AO	{83}	MA D GAIN	24 (43.2)	--	0-255	--	--
AO	{84}	MA 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 (DEG C)	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
AI	{92}	CTL STPT	74.0 (23.45)	DEG F (DEG C)	48-111.75	--	--
AO	{93}	MA STPT	74.0 (23.496)	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.