

Application 2353 Unit Vent Controller with Mixed Air Sequence and Dehumidification

Overview

In Application 2353, the Unit Vent Controller controls a unit ventilator with morning warm-up/cool-down, night mode override, free cooling, dehumidification and auxiliary radiation in heating mode. Temperature control is done with a modulating heating valve and DX cooling.

When the heating PID loop is used in this application, the room temperature is indirectly controlled by setting the discharge setpoint. This setpoint is sent to the heating PID loop, which controls the heating valve. When the cooling loop is used in this application it controls the room temperature directly.

This application also controls an outdoor air damper using mixed air control. This includes a PID loop to maintain the mixed air temperature. The free-cooling/economizer function is turned on and off by the field panel using the point FREE CLG (number 23). If free cooling is not available, then the outdoor air damper will be kept at minimum position; otherwise, the outdoor air damper will modulate to maintain the mixed air temperature set point.

This application performs dehumidification by turning on the DX cooling stages. Temperature control is then maintained by modulating the heating valve.

The unit ventilator fan is also controlled in this application.

Refer to Figures 2353-1 through 2353-3.

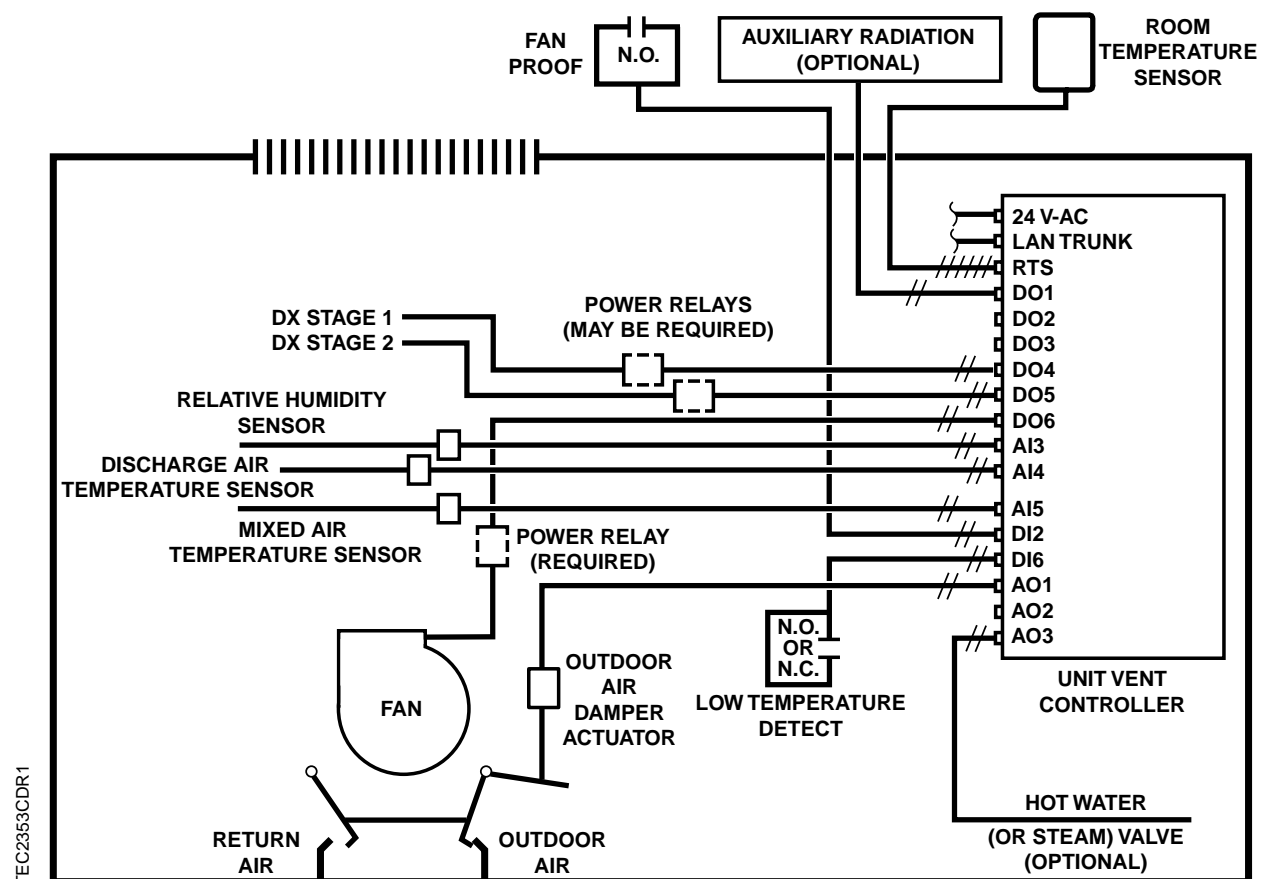
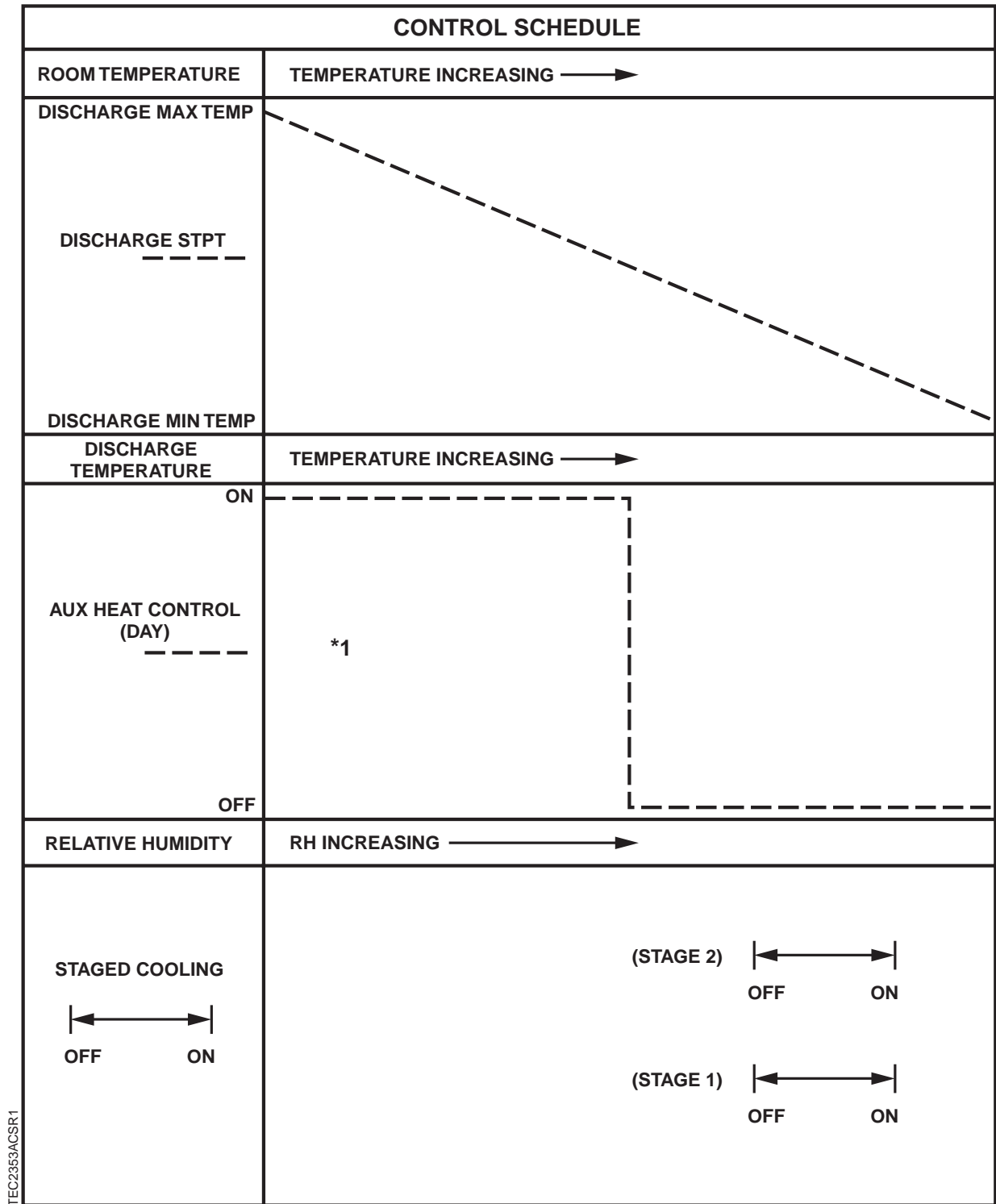
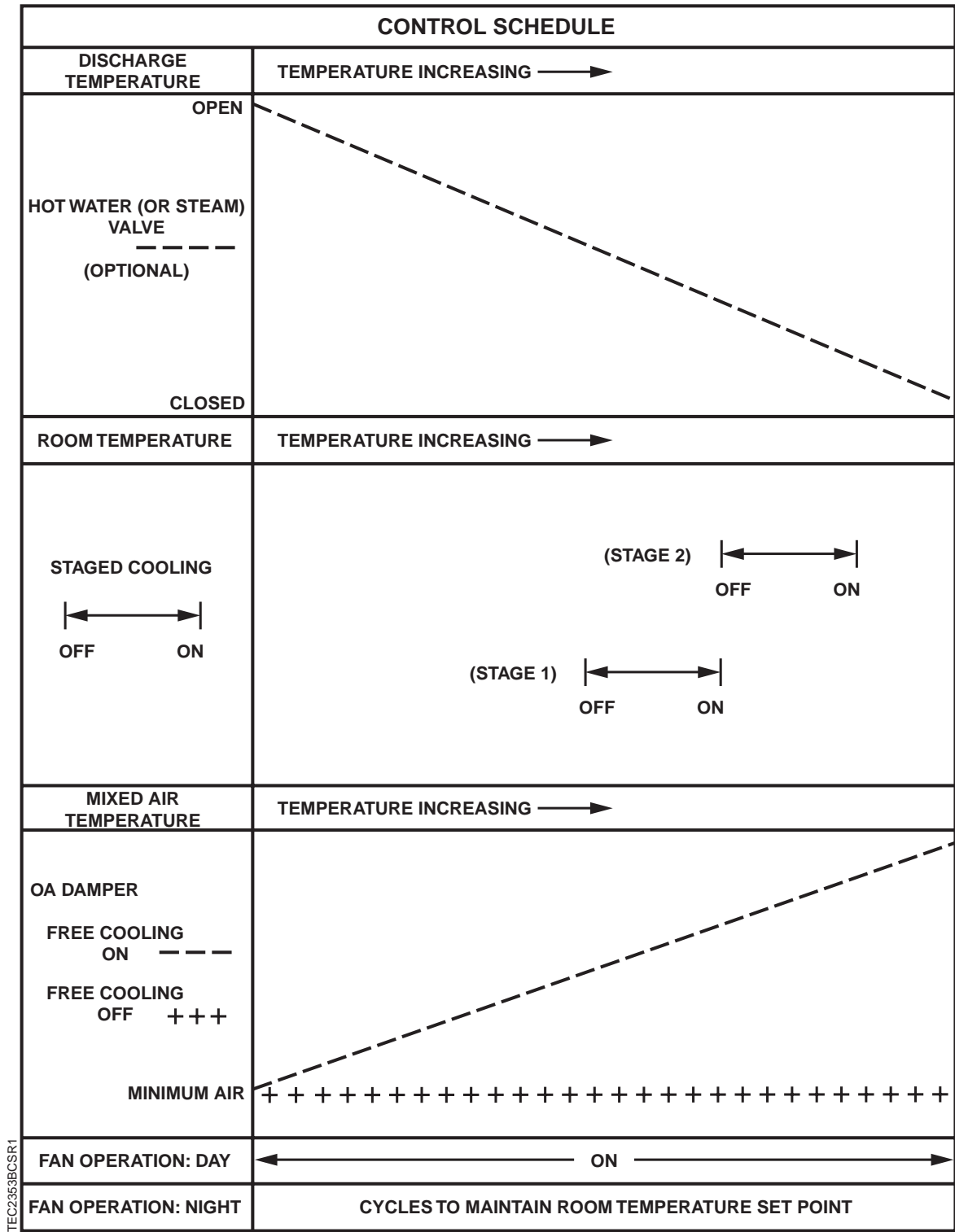


Figure 2353-1. Application 2353 Control Drawing.



1. Shown: aux heat control schedule for day heating mode only; in night heating mode, aux heat cycles with the fan.

Figure 2353-2. Application 2353 Control Schedules.



TEC2353BCSR1

Figure 2353-3. Application 2353 Control Schedules (continued).

Hardware inputs

Analog

- Discharge air temperature sensor
- Mixed air temperature sensor
- Room temperature sensor
- Room temperature set point dial (optional)
- Relative humidity sensor

Digital

- Night mode override (optional)
- Fan proof (optional)
- Low temperature detector (optional)

Hardware outputs

The following devices can be used by this application depending on your hardware configuration.

Analog (0-10V)

- Outdoor air damper actuator
- Heating valve
- Cooling valve

Digital

- Auxiliary radiation
- Unit fan

Sequence of Operation

The following paragraphs present the sequence of operation for Application 2353, "Unit Vent Controller with Mixed Air Sequence and Dehumidification."

Control temperature set points

Depending on the controller's current operational mode (day or night), the control temperature set point, CTL STPT (number 92) holds the value of one of the following set points:

Day Mode – In day mode, CTL STPT holds the value of the point DAY CLG STPT (number 6) or the point DAY HTG STPT (number 7). If the room temperature sensor has a set point dial and the point STPT DIAL (number 14) is set to YES, then CTL STPT holds the value of the point RM STPT DIAL (number 13).

If the set point dial is used and the value of RM STPT DIAL is less than the value of the point RM STPT MIN (number 11), then CTL STPT holds the value of RM STPT MIN. If the value of RM STPT DIAL is greater than the value of the point RM STPT MAX (number 12), then CTL STPT holds the value of RM STPT MAX.

Night Mode – In night mode, CTL STPT holds the value of the point NGT CLG STPT (number 8) or the point NGT HTG STPT (number 9).

NOTE: The value of the point CTL TEMP (number 78) is the same as the value of the point ROOM TEMP (number 4), unless CTL TEMP is overridden.

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 the point OVRD TIME (number 20), then by pressing the override switch a room occupant can reset the controller to day operational mode for the amount of time that is set in OVRD TIME. The status of the point NGT OVRD (number 21) changes to DAY and remains there until the override time elapses, at which time 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.

Mixed air control

This feature performs mixed air control by adjusting either the MA STPT or the outside air damper position, depending on the circumstances.

At night, the outside air damper is closed.

The OA damper is also closed during warm-up or cool-down.

During the day when FREE CLG (number 23) is NO, the OA damper is set to OADPR MINPOS (number 10).

During the day when FREE CLG (number 23) is YES, mixed air control depends on a number of things:

- Whether the MA CONTROL (number 58) point is enabled or disabled
- The status of the MA TEMP point
- The value off the HEAT.COOL point.

Cases 1 through 6 explain this in more detail.

CASE 1

MA CONTROL equals ENABLE, the MA TEMP point is NORMAL and the HEAT.COOL point is in the Cooling Mode.

If the application is in the day cooling mode and free cooling is available, the control will be as follows:

As CLG LOOPOUT (number 79) goes from 0 to 50%, the MA STPT (number 3) is adjusted from MAX MA STPT (number 81) down to MIN MA STPT (number 82). (MA STPT will equal MIN MA STPT when CLG LOOPOUT is 50% or greater.) If MA LOOPOUT (number 18) is greater than OADPR MINPOS (number 10), then the mixed air damper is under normal control of the mixed air PID loop. If MA LOOPOUT is less than or equal to OADPR MINPOS, then the mixed air damper is set equal to OA MINPOS.

CASE 2

MA CONTROL equals ENABLE, the MA TEMP point is NORMAL and the HEAT.COOL point is in the Heating Mode.

If the application is in the day heating mode and free cooling is available, the control will be as follows:

As HTG LOOPOUT (number 80) goes from 0 to 50%, the MA STPT is adjusted from MIN MA STPT up to MAX MA STPT. (MA STPT will equal MAX MA STPT when HTG LOOPOUT is 50% or greater.) If the mixed air override (MA OVERRIDE, number 91) is ON, then the mixed air damper will be adjusted from OADPR MINPOS down to 0% opened when the MA TEMP goes from 50°F down to 40°F. If MA OVERRIDE is OFF and MA LOOPOUT is greater than OADR MINPOS, then the outside air damper is under normal control of the mixed air PID loop. If MA OVERRIDE is OFF and MA LOOPOUT is less than or equal to OADPR MINPOS, then the mixed air damper is set equal to OADPR MINPOS.

CASE 3

MA CONTROL equals ENABLE, the MA TEMP point is FAILED and the HEAT.COOL point is in the Cooling Mode.

The mixed air damper will remain at OADPR MINPOS.

CASE 4

MA CONTROL equals DISABL and the HEAT.COOL point is in the Cooling Mode.

The mixed air damper goes from 0% OA to 100% OA as CLG LOOPOUT goes from 0% to 50%. The mixed air damper will not be set less than OADPR MINPOS, even if the CLG LOOPOUT is trying to set the mixed air damper to less than OADPR MINPOS.

CASE 5

MA CONTROL equals DISABL and the HEAT.COOL point is in the Heating Mode.

The mixed air damper goes from 100% OA to 0% OA as HTG LOOPOUT goes from 0% to 50%. The mixed air damper will not be set less than OADPR MINPOS, even if the HTG LOOPOUT is trying to set the mixed air damper to less than OADPR MINPOS.

CASE 6

MA CONTROL equals ENABLE, the MA TEMP point is FAILED and the HEAT.COOL point is in the Heating Mode.

The mixed air damper control in this case is identical to the mixed air damper control in case 5.

MA OVERRIDE

The mixed air control will go into override when MA TEMP drops below the value stored in MA LO LIMIT (number 97). It will come out of override when MA TEMP remains greater than the value stored in MA HI LIMIT (number 96) for longer than MA TIME. When MA TEMP is between MA LO LIMIT and MA HI LIMIT, the mixed air control's override status will remain in its last commanded state.

Dehumidification determination

This application determines whether or not dehumidification is needed by looking at the value of the DEHUMIDIFY point (number 28). This section explains how the DEHUMIDIFY point is set.

- DEHUMIDIFY will be OFF if the RH point has FAILED.
- DEHUMIDIFY will be OFF during warm-up or cool-down. (WRMUP.COOLDN is ON.)
- DEHUMIDIFY will be OFF at night if night dehumidification is not desired. (NITE DEHUMID (number 25) is NO.)
- DEHUMIDIFY will be OFF if the space's relative humidity is low enough. (RH AI 3 (number 15) is less than RH LO LIMIT (number 17).)

- DEHUMIDIFY will be commanded ON only if **all** of the following events occur:
 - The RH AI 3 point is NORMAL.
 - WARMUP.COOLDN is OFF.
 - It is either the night mode with NITE DEHUMID set to YES, **OR**, it is the day mode.
 - RH AI 3 is greater than RH HI LIMIT (number 16).
(If RH AI 3 is greater than RH LO LIMIT but less than RH HI LIMIT, then the value of DEHUMIDIFY will remain unchanged.)

DX cooling control

When the cooling load increases, this module will turn ON DX stage 1 before turning ON DX stage 2.

If DX 1 (number 44) is OFF and the cooling load increases, DX 1 will turn ON only if **all** of the following conditions have been met:

- DX 2 (number 45) is OFF.
- DX 1 has been OFF longer than CMP MIN OFF (number 75) has.
- CLG LOOPOUT (number 79) is greater than 66%.

Upon a further increase in cooling load, DX 2 will turn ON only if **all** of the following conditions have been met:

- DX 1 is ON.
- DX 2 has been OFF longer than CMP MIN OFF (number 75) has.
- CLG LOOPOUT is greater than 83%.

When the cooling load decreases, this module will turn OFF DX stage 2 before turning OFF DX stage 1.

If DX 2 is ON and the cooling load decreases, DX 2 will turn OFF only if **all** of the following conditions have been met:

- DX 1 is ON.
- DX 2 has been OFF longer than CMP MIN ON (number 76) has.
- CLG LOOPOUT is less than 83%.

Upon a further decrease in cooling load, DX 1 will turn OFF only if **all** of the following conditions have been met:

- DX 2 is OFF.
- DX 1 has been ON longer than CMP MIN ON.
- CLG LOOPOUT is less than 66%.

Day heating operation

In day heating operation, regardless of whether the room needs to be dehumidified, the controller maintains the room temperature at the value stored in the point CTL STPT (number 92) by doing the following:

- The room PID controller adjusts the DISCH STPT (number 93) which is used in the heating PID loop. (The heating PID loop controls the supply air temperature in the heating mode.)
- The heating PID loop modulates the heating valve.
- Auxiliary radiation, if provided, is controlled using dead band control. The auxiliary radiation will be on if HTG LOOPOUT (number 80) is above AUX ON (number 83) and off if HTG LOOPOUT is below AUX OFF (number 84). If HTG LOOPOUT is between the values of AUX OFF and AUX ON, then AUX RAD (number 41) will remain in its last commanded state. (HTG LOOPOUT is the output of the heating PID loop.)

When dehumidification is needed in the day heating mode, both stages of DX cooling will be ON. When dehumidification is not needed in the day heating mode, both stages of DX cooling will be off.

Refer to the *Mixed air control* section of this document to find out how the outside air damper is controlled in day heating mode.

Day cooling operation

When dehumidification is not needed during day cooling operation, the controller maintains the room temperature at the value stored in the point CTL STPT (number 92) by doing the following:

- The DX PID controller adjusts the CLG LOOPOUT (number 79) to control the DX cooling.
- The DX cooling stages are cycled in such a manner that CTL TEMP will equal CTL STPT. (Refer to the *DX cooling control* section of this document for more information on DX cooling control.)

When dehumidification is needed in day cooling operation, the following occurs:

- Both DX stages turn ON.
- The DX PID loop modulates the **heating** valve for temperature control. (As the COOLING LOOPOUT goes from 100% to 50%, the heating valve will modulate from fully closed to fully opened.)

Refer to the *Mixed air control* section of this document to find out how the outside air damper is controlled in the day cooling mode.

Night heating operation

When dehumidification is not needed in the night heating mode, the controller maintains the room temperature at the value stored in the point CTL STPT (number 92) by doing the following:

- If the point CTL TEMP (number 78) drops below the value of the point NGT HTG STPT (number 9) minus the value of the point NGT DBAND (number 88), then:
 - The fan turns ON.
 - The heating valve is fully opened.
 - The auxiliary radiation is turned on.
- If CTL TEMP rises above NGT HTG STPT, then:
 - The fan turns OFF.
 - The auxiliary radiation is turned off.
 - If NGT HW HTG (number 53) is NO, then the heating valve is fully shut. If NGT HW HTG is YES, then the heating valve remains fully opened.

When dehumidification is needed in the night heating mode, the following happens:

- The fan turns ON.
- The auxiliary radiation is turned on.
- The heating PID loop modulates the heating valve in order to maintain the room temperature at the value stored in CTL STPT.
- Both DX stages are turned on.

Other points to keep in mind during the night heating mode:

- The outside air damper is shut.
- For units with steam, NGT HW HTG must be set to NO so that the coils can be cycled.
- The controller may switch to cooling mode when appropriate if the point NGT CLG MODE (number 54) is set to YES.
- Heating only is provided when NGT CLG MODE is set to NO.

Night cooling operation

In night cooling mode, the point NGT CLG MODE (number 54) must be set to yes. (If NGT CLG MODE is set to NO, the unit will operate in night heating mode only.)

When dehumidification is not needed in the night cooling mode, the controller maintains the room temperature at the value stored in the point CTL STPT (number 92) by doing the following:

- If the point CTL TEMP (number 78) rises above the sum of the points NGT CLG STPT (number 8) and NGT DBAND (number 88), then:
 - The fan turns ON.
 - Both DX cooling stages turn ON.

- If CTL TEMP drops below NGT CLG STPT, then:
 - Both stages of DX cooling shut off.
 - The fan shuts OFF 30 seconds after both DX cooling stages shut OFF.

During the night cooling mode, keep in mind that for modulated hot water or steam, NGT HW HTG must be set to NO so that the heating coils can be kept shut when dehumidification is not required.

When dehumidification is needed in the night cooling mode:

- The fan turns ON.
- Both Stages of DX Cooling turn ON (for dehumidification).
- The DX PID loop modulates the **heating** valve in order to maintain the room temperature at the value stored in CTL STPT. As CLG LOOPOUT goes from 100% to 0%, the heating valve will go from fully closed to fully opened.

During night cooling, the outside air damper is shut.

Heating/cooling switchover

If **all** of the following conditions are met for the length of time set in the point SWITCH TIME (number 86), then the controller switches from heating to cooling mode by setting the point HEAT.COOL (number 5) to COOL:

- The point HTG LOOPOUT (number 80) is below 50% if free cooling is not available (the point FREE CLG (number 23) is set to NO), or below SWITCH LIMIT (number 85) if free cooling is available.
- The point CTL TEMP (number 78) is greater than the sum of the points CTL STPT (number 92) plus SWITCH DBAND (number 90).
- CTL TEMP is greater than the appropriate cooling set point minus SWITCH DBAND.

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

- The point CLG LOOPOUT (number 79) is below 50% if free cooling is not available (the point FREE CLG (number 23) is set to NO), or below SWITCH LIMIT (number 85) if free cooling is available.
- CTL TEMP is less than CTL STPT minus SWITCH DBAND.
- CTL TEMP is less than the appropriate heating set point plus SWITCH DBAND.

If night cooling is not available, as indicated by the point NGT CLG MODE (number 54), then 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 cooling loop, and a mixed air loop.

Room Loop – The heating loop uses the value of the point CTL STPT (number 92) and the point CTL TEMP (number 78) to modulate the value of the point DISCH STPT (number 93). The discharge setpoint will not be adjusted above DSH MAX TEMP (number 95) or below DSH MIN TEMP (number 94).

Heating Loop – The heating loop uses the value of the point DISCH STPT (number 93) and the point DISCH TEMP (number 47) to modulate the value of the point HTG LOOPOUT (number 80).

DX Loop – The cooling loop uses the value of CTL STPT and CTL TEMP to modulate the value of the point CLG LOOPOUT (number 79).

Mixed Air Loop – The mixed air loop uses the values of the points MA STPT (number 03) and MA TEMP (number 48) to modulate the value of the point MA LOOPOUT (number 18).

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 the point CTL STPT (number 92) plus or minus the value of the point MORN DBAND (number 89). If the point FREE CLG (number 23) is set to ENABLE during morning cool-down, then 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. For example, if CTL STPT is 72°F (22.2°C) and MORN DBAND is 3°F (1.6°C), then normal day heating operation begins when the temperature of the room reaches 69°F (20.6°C).

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

Auxiliary radiation control

This module controls the auxiliary radiation on DO 1 (DO 1 is called AUX RAD. It is point number 41.)

If the point AUX.NOAUX (point 50) equals NOAUX or if the controller is in cooling mode, then the aux radiation DO 1 is OFF.

If the controller is in night heating mode, the aux radiation is ON when the FAN (number 46) is ON and OFF when the FAN is OFF.

DAY HEATING MODE:

The aux radiation (on DO 1) will be turned ON when the HTG LOOPOUT rises above the value stored in the point AUX ON (number 83). The aux radiation (on DO 1) will be turned OFF when the HTG LOOPOUT drops below the value stored in the point AUX OFF (number 84). When HTG LOOPOUT is between the values AUX ON and AUX OFF, the aux radiation DO will remain in its last commanded state. If it is already ON, it will remain ON. If it is already OFF, it will remain OFF.

If WRMUP.COOLDN = ON in heating mode, then the aux radiation will be turned fully ON.

Fan operation

In day mode, the point FAN (number 46) is ON all of the time.

In night mode, when dehumidification is not needed (DEHUMIDIFY is OFF), the fan only operates when required for heating or cooling.

When dehumidification is needed (DEHUMIDIFY (number 28) is ON), the fan is on all of the time. This is true regardless of whether or not it is DAY or NIGHT.

In night heating, the fan turns on when the temperature drops below the value of the point CTL STPT (number 92) minus the point NGT DBAND (number 88). When the temperature rises above CTL STPT, the fan turns 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.

NOTE: Both DX Stage must be OFF for at least 30 seconds before the fan will be allowed to turn off.

Fan alarm

If PROOF USED (number 51) is set to NO, then this feature is not used.

If PROOF USED is set to YES, and the fan is on, then the FAN ALARM (number 77) will be turned ON if DI 2 remains OFF for longer than the PROOF TIME (number 22). When the fan is on and DI 2 is ON, FAN ALARM will be OFF.

When the fan is off, FAN ALARM will be 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 LOW TEMP DET (number 52) connected to DI 6 (number 26) can be used to signal the controller when the temperature, sensed by the LTDT, is below the low temperature limit. This LTDT can be either normally opened or normally closed, depending on the value of LTDT CONTACT (point 87).

NOTE: If an LTDT is not wired to DI 6, then LTDT CONTACT should be set to NOPEN in order to prevent the LTDT failure mode.

The following table lists what happens when certain failure modes display:

Safety/Failure	APP 2353 Safety Sequence
LTDT = ON	"Shutdown" * Close OA DMPR * Heating Valve fully opened * The DX Stages are Off * Fan OFF * Aux OFF
FAN ALARM = ON	"Shutdown" * Close OA DMPR * Heating Valve fully opened * The DX Stages are Off. * Fan OFF * Aux OFF
Disch/MA sensor fails	If last valid value was greater than 150 degrees: Turn off heat and close OA DMPR. If sensor does not come back within 10 minutes, "Shutdown." If last valid value was less than 150 degrees, "Shutdown."
Room Temp. sensor fails	"Shutdown"
Any Combination of the above	"Shutdown"

If the failures clear, then normal control resumes.

If at least one of the safeties in the above table occurs, then SAFETY MODE (number 66) turns ON. If all of the safeties in the above table are cleared, then SAFETY MODE turns OFF. Therefore, by checking the value of this point, you can tell whether or not a safety is occurring.

Analog and digital outputs cannot be commanded when the controller is in fail-safe mode; however, failed points may be overridden, allowing the controller to return from fail-safe mode. In this instance, room temperature control is not possible.

Application Notes

1. If the unit ventilator cycles excessively, or if the temperature swings in the room are excessive, or if there is trouble in maintaining the set point, then either the cooling loop, the heating loop or both need to be tuned. Refer to the *APOGEE Automation Service Procedures Manual* (125-3013) for more information.
2. The Unit Vent Controller, as shipped from the factory, keeps all associated equipment OFF. Refer to the *Start-up* document for this controller 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.

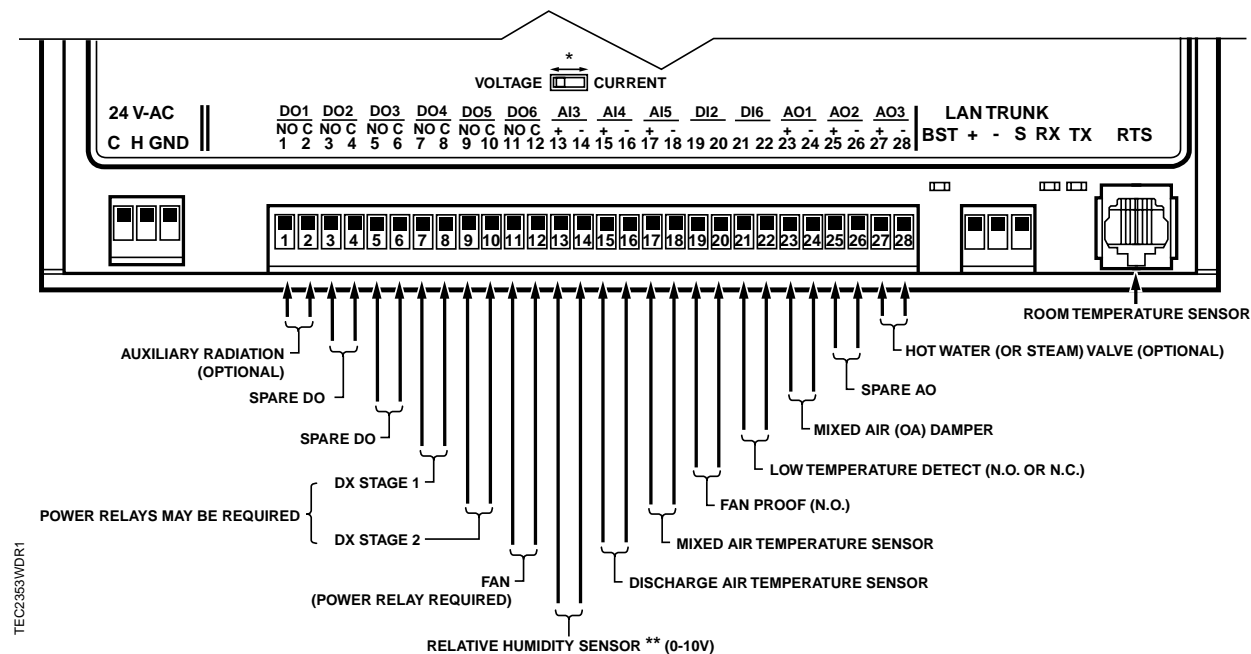
Wiring diagrams

The point wiring for Application 2353 is shown in Figure 2353-4.



CAUTION:

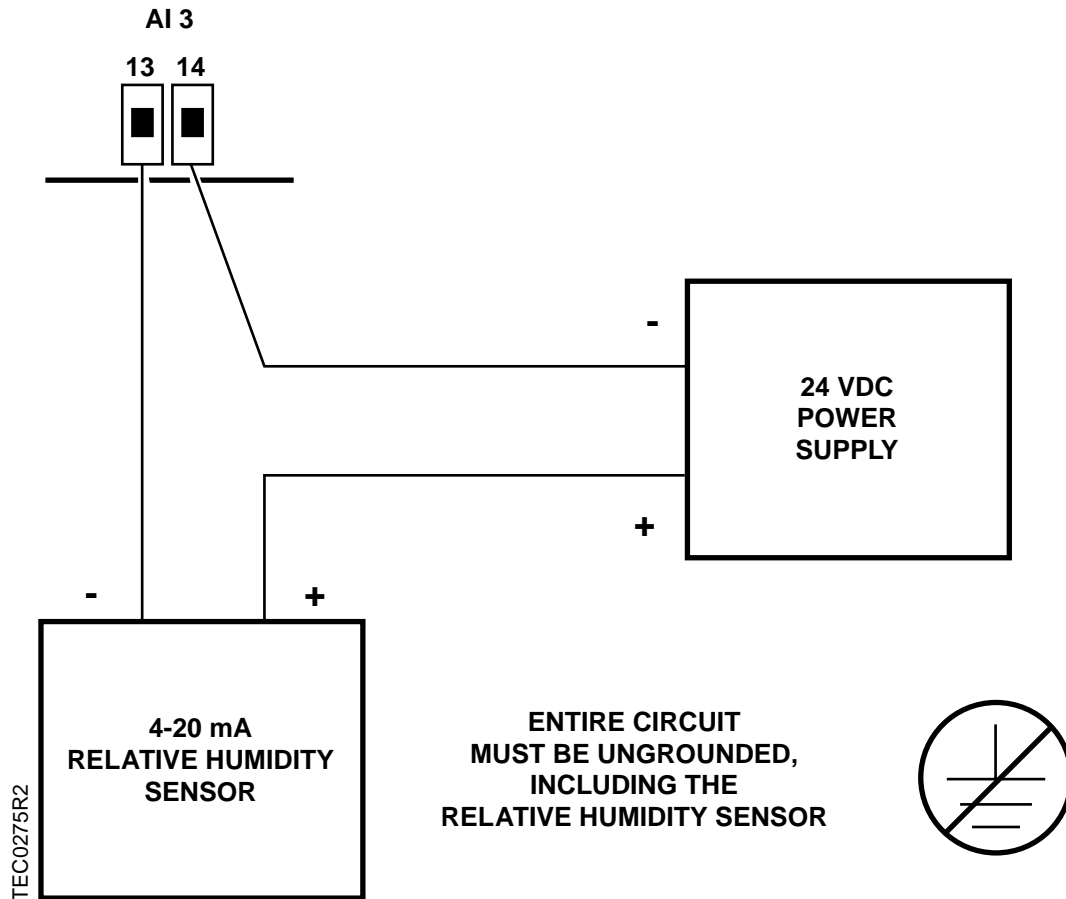
The Unit Vent Controller's Digital Outputs (DOs) control 24 Vac loads only. The maximum rating is 12 VA for each DO. For higher VA requirements, 110 or 220 Vac requirements, separate requirements used to power the load, or DC power requirements, use an interposing 220 V 4-relay module.



* If AI 3 monitors a 0-10 volt sensor, then dip-switch located behind AI 3 on controller's circuit board (under controller assembly's cover) must be set to the left (voltage position). If AI 3 monitors a 4-20 mA sensor, this dip-switch must be set to right (current position).

** A 4-20 mA relative humidity sensor, if used, requires special wiring requirements. Refer to Figure 2353-5.

Figure 2353-4. Application 2353 Wiring Diagram.



NOTE: Each 4-20 mA sensor requires a dedicated 24V DC power supply.

Figure 2353-5. Point Wiring for AI 3 if 4-20 mA sensor is Used.

Table 2353-1. Point Database for Application 2353.

Point Number	Descriptor	Factory Default (SI Units)	Engr Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
01	CTLR ADDRESS	99	--	1	0	--	--
02	APPLICATION	2384	--	1	0	--	--
{03}	MA STPT	55.0 (12.856)	DEG F (DEG C)	0.5 (0.28)	37.5(3.056)	--	--
{04}	ROOM TEMP	74.0 (23.45)	DEG F (DEG C)	0.25 (0.14)	48.0(8.89)	--	--
{05}	HEAT.COOL	COOL	--	--	--	HEAT	COOL
06	DAY CLG STPT	74.0 (23.45)	DEG F (DEG C)	0.25 (0.14)	48.0(8.89)	--	--
07	DAY HTG STPT	70.0 (21.21)	DEG F (DEG C)	0.25 (0.14)	48.0(8.89)	--	--
08	NGT CLG STPT	82.0 (27.93)	DEG F (DEG C)	0.25 (0.14)	48.0(8.89)	--	--
09	NGT HTG STPT	65.0 (18.41)	DEG F (DEG C)	0.25 (0.14)	48.0(8.89)	--	--
10	OADPR MINPOS	14.8	PCT	0.4	0.0	--	--
11	RM STPT MIN	55.0 (12.81)	DEG F (DEG C)	0.25 (0.14)	48.0(8.89)	--	--
12	RM STPT MAX	90.0 (32.41)	DEG F (DEG C)	0.25 (0.14)	48.0(8.89)	--	--
{13}	RM STPT DIAL	74.0 (23.45)	DEG F (DEG C)	0.25 (0.14)	48.0(8.89)	--	--
14	STPT DIAL	NO	--	--	--	YES	NO
{15}	RH AI 3	0.0	PCT	0.4	0.0	--	--
16	RH HI LIMIT	70.0	PCT	0.4	0.0	--	--
17	RH LO LIMIT	40.0	PCT	0.4	0.0	--	--
{18}	MA LOOPOUT	0.0	PCT	0.4	0.0	--	--
{19}	DI OVRD SW	OFF	--	--	--	ON	OFF
20	OVRD TIME	1	HRS	1	0	--	--
{21}	NGT OVRD	DAY	--	--	--	NIGHT	DAY
22	PROOF TIME	30	SEC	1	0	--	--
{23}	FREE CLG	DISABL	--	--	--	ENABLE	DISABL
{24}	DI 2	OFF	--	--	--	ON	OFF
25	NITE DEHUMID	NO	--	--	--	YES	NO
{26}	DI 6	OFF	--	--	--	ON	OFF
27	DX STG DELAY	30	SEC	1	0	--	--
{28}	DEHUMIDIFY	OFF	--	--	--	ON	OFF
{29}	DAY.NGT	DAY	--	--	--	NIGHT	DAY
{30}	WRMUP.COOLDN	ON	--	--	--	ON	OFF
31	AOV1 SPAN	10.0	VOLTS	0.01	0.0	--	--
32	AOV1 START	0.0	VOLTS	0.01	0.0	--	--
33	AOV2 SPAN	10.0	VOLTS	0.01	0.0	--	--
34	AOV2 START	0.0	VOLTS	0.01	0.0	--	--
35	AOV3 SPAN	10.0	VOLTS	0.01	0.0	--	--
36	AOV3 START	0.0	VOLTS	0.01	0.0	--	--

1. Points not listed are not used in this application.
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets {} may be unbundled at the field panel.

Table 2353-1. Point Database for Application 2353.

Point Number	Descriptor	Factory Default (SI Units)	Engr Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
37	AO DIR.REV	0	--	1	0	--	--
{38}	AOV1	0.0	VOLTS	0.01	0.0	--	--
{39}	AOV2	0.0	VOLTS	0.01	0.0	--	--
{40}	AOV3	0.0	VOLTS	0.01	0.0	--	--
{41}	AUX RAD	OFF	--	--	--	ON	OFF
{42}	DO 2	OFF	--	--	--	ON	OFF
{43}	DO 3	OFF	--	--	--	ON	OFF
{44}	DX 1	OFF	--	--	--	ON	OFF
{45}	DX 2	OFF	--	--	--	ON	OFF
{46}	FAN	OFF	--	--	--	ON	OFF
{47}	DISCH TEMP	74.0 (23.496)	DEG F (DEG C)	0.5 (0.28)	37.5(3.056)	--	--
{48}	MA TEMP	74.0 (23.496)	DEG F (DEG C)	0.5 (0.28)	37.5(3.056)	--	--
49	MA TIME	300	SEC	1	0	--	--
50	AUX.NOAUX	NOAUX	--	--	--	AUX	NOAUX
51	PROOF USED	NO	--	--	--	YES	NO
{52}	LOW TEMP DET	OFF	--	--	--	ON	OFF
53	NGT HW HTG	YES	--	--	--	YES	NO
54	NGT CLG MODE	NO	--	--	--	YES	NO
55	MA P GAIN	5.0 (9.0)	--	0.25 (0.45)	0.0	--	--
56	MA I GAIN	0.02 (0.036)	--	0.001 (0.0018)	0.0	--	--
57	MA D GAIN	0 (0.0)	--	2 (3.6)	0	--	--
{58}	MA CONTROL	DISABL	--	--	--	ENABLE	DISABL
59	DO DIR.REV	0	--	1	0	--	--
{60}	HTG OUTPUT	0.0	PCT	0.4	0.0	--	--
{61}	CLG OUTPUT	0.0	PCT	0.4	0.0	--	--
{62}	OA DMPR POS	0.0	PCT	0.4	0.0	--	--
63	CLG P GAIN	1.6 (2.88)	--	0.2 (0.36)	0.0	--	--
64	CLG I GAIN	0.05 (0.09)	--	0.0005 (0.0009)	0.0	--	--
65	CLG D GAIN	10 (18.0)	--	2 (3.6)	0	--	--
{66}	SAFETY MODE	OFF	--	--	--	ON	OFF
67	HTG P GAIN	0.4 (0.72)	--	0.05 (0.09)	0.0	--	--
68	HTG I GAIN	0.015 (0.027)	--	0.0002 (0.00036)	0.0	--	--
69	HTG D GAIN	5 (9.0)	--	1 (1.8)	0	--	--
70	ROOM P GAIN	2.3 (4.14)	--	0.05 (0.09)	0.0	--	--
71	ROOM I GAIN	0.00504 (0.009072)	--	0.00009(0.000162)	0.0	--	--
72	ROOM D GAIN	76 (136.8)	--	2 (3.6)	0	--	--

1. Points not listed are not used in this application.
2. A single value in a column means that the value is the same in English units and in SI units.
3. Point numbers that appear in brackets {} may be unbundled at the field panel.

Table 2353-1. Point Database for Application 2353.

Point Number	Descriptor	Factory Default (SI Units)	Engr Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
73	CLG STG 1 ON	33.2	PCT	0.4	0.0	--	--
74	CLG STG 2 ON	66.8	PCT	0.4	0.0	--	--
75	CMP MIN OFF	5	MIN	1	0	--	--
76	CMP MIN ON	5	MIN	1	0	--	--
{77}	FAN ALARM	OFF	--	--	--	ON	OFF
{78}	CTL TEMP	74.0 (23.45)	DEG F (DEG C)	0.25 (0.14)	48.0(8.89)	--	--
{79}	CLG LOOPOUT	0.0	PCT	0.2	0.0	--	--
{80}	HTG LOOPOUT	0.0	PCT	0.2	0.0	--	--
81	MAX MA STPT	70.0 (21.256)	DEG F (DEG C)	0.5 (0.28)	37.5(3.056)	--	--
82	MIN MA STPT	55.0 (12.856)	DEG F (DEG C)	0.5 (0.28)	37.5(3.056)	--	--
83	AUX ON	70.0	PCT	0.4	0.0	--	--
84	AUX OFF	40.0	PCT	0.4	0.0	--	--
85	SWITCH LIMIT	4.8	PCT	0.4	0.0	--	--
86	SWITCH TIME	10	MIN	1	0	--	--
87	LTDT CONTACT	NCLOSE	--	--	--	NCLOSE	NOPEN
88	NGT DBAND	3.0 (1.68)	DEG F (DEG C)	0.25 (0.14)	0.0	--	--
89	MORN DBAND	2.0 (1.12)	DEG F (DEG C)	0.25 (0.14)	0.0	--	--
90	SWITCH DBAND	2.0 (1.12)	DEG F (DEG C)	0.25 (0.14)	0.0	--	--
{91}	MA OVERRIDE	OFF	--	--	--	ON	OFF
{92}	CTL STPT	74.0 (23.45)	DEG F (DEG C)	0.25 (0.14)	48.0(8.89)	--	--
{93}	DISCH STPT	74.0 (23.496)	DEG F (DEG C)	0.5 (0.28)	37.5(3.056)	--	--
94	DSH MIN TEMP	60.0 (15.656)	DEG F (DEG C)	0.5 (0.28)	37.5(3.056)	--	--
95	DSH MAX TEMP	110.0 (43.656)	DEG F (DEG C)	0.5 (0.28)	37.5(3.056)	--	--
{96}	MA HI LIMIT	52.0 (11.176)	DEG F (DEG C)	0.5 (0.28)	37.5(3.056)	--	--
{97}	MA LO LIMIT	50.0 (10.056)	DEG F (DEG C)	0.5 (0.28)	37.5(3.056)	--	--
98	LOOP TIME	5	SEC	1	0	--	--
{99}	ERROR STATUS	0	--	1	0	--	--

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