SIEMENS

TEC Custom Solutions Application 2455:

Unit Vent with Mixed Air Sequence, Hot and Chilled Water, Dehumidification, and Modulating Face & Bypass Damper

TEC-0577.08

This document contains the following sections:

Overview

In Application 2455, the Unit Vent Controller provides the following features:

- Morning warm-up/cool-down
- Night mode override
- Free cooling
- Dehumidification
- Auxiliary radiation in heating mode
- Modulating face and bypass damper
- Control of unit ventilator fan

Temperature control is accomplished using the following equipment:

- Modulating cooling valve
- 2-position heating valve
- Outside air damper
- Face and bypass damper

Application 2455 controls room temperature by setting the discharge setpoint and sending it to the heating and cooling PID loops which control the coil devices.

This application uses an outdoor air damper for mixed air control. A PID loop maintains the mixed air temperature. The free cooling/economizer function is turned on and off by the field panel using FREE CLG (Point 23). If free cooling is not available, the outdoor air damper is kept at minimum position; otherwise, it modulates to maintain the mixed air temperature setpoint.

For dehumidification, the outside air damper closes completely until the humidity drops to an acceptable level, after which normal control resumes.

Refer to Figures 2455-1 through 2455-8.

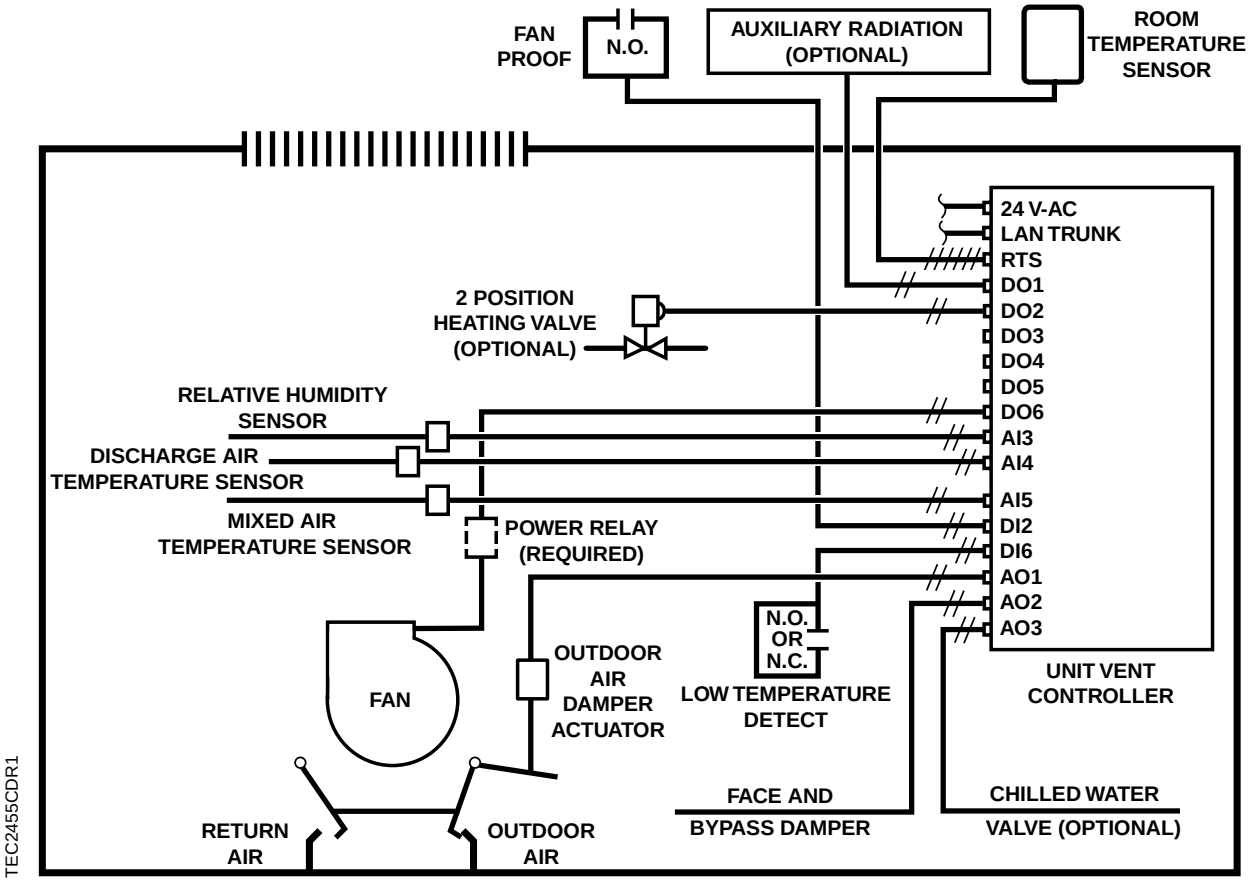
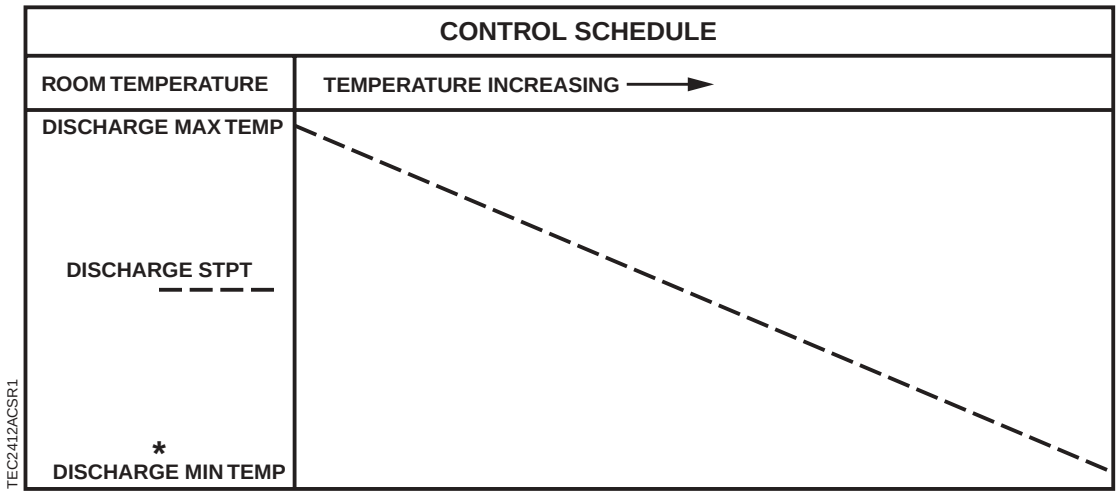


Figure 2455-1. Control Drawing for Application 2455.



* The discharge minimum temperature equals HTG DIS MIN (Point 74) in heating mode and CLG DIS MIN (Point 75) in cooling mode.

Figure 2455-2. Discharge Temperature Setpoint.

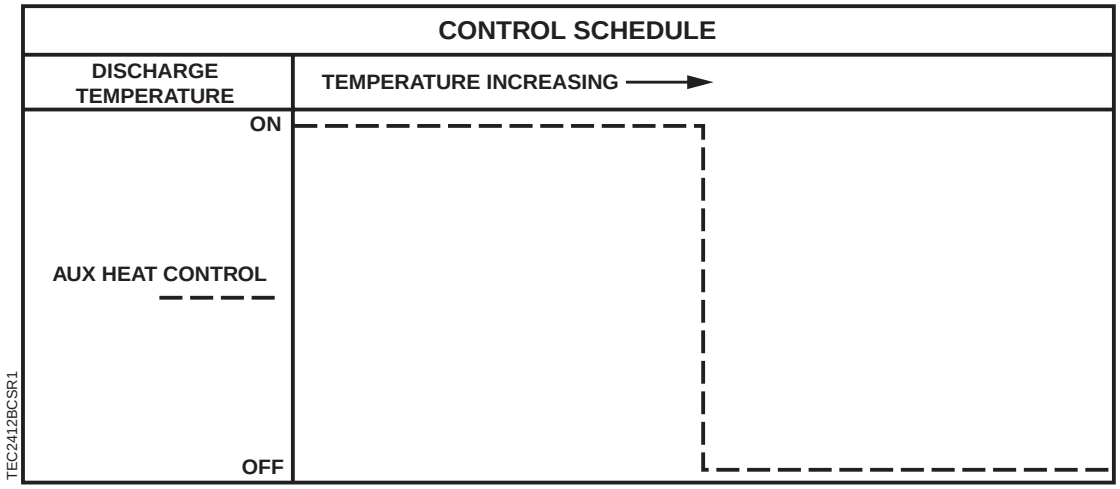
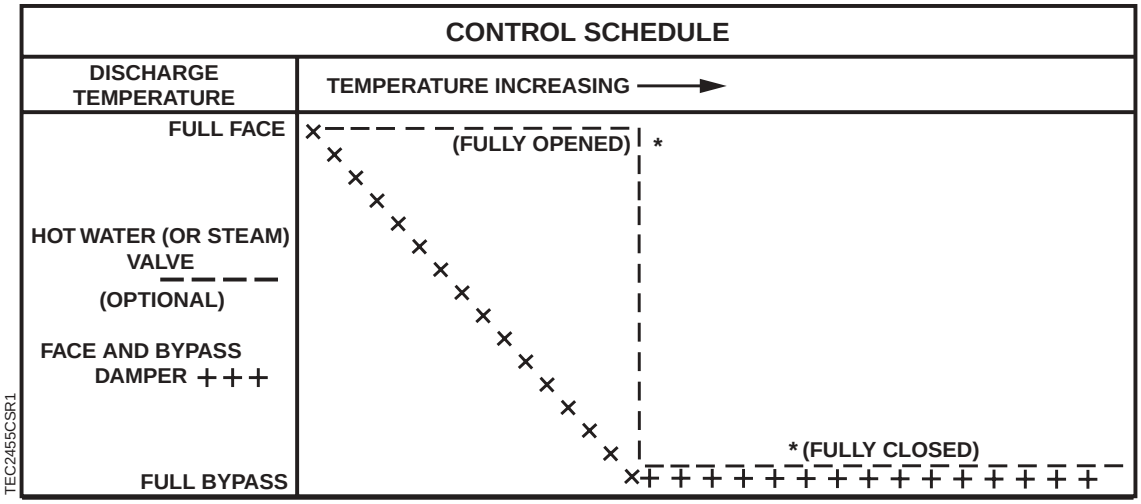


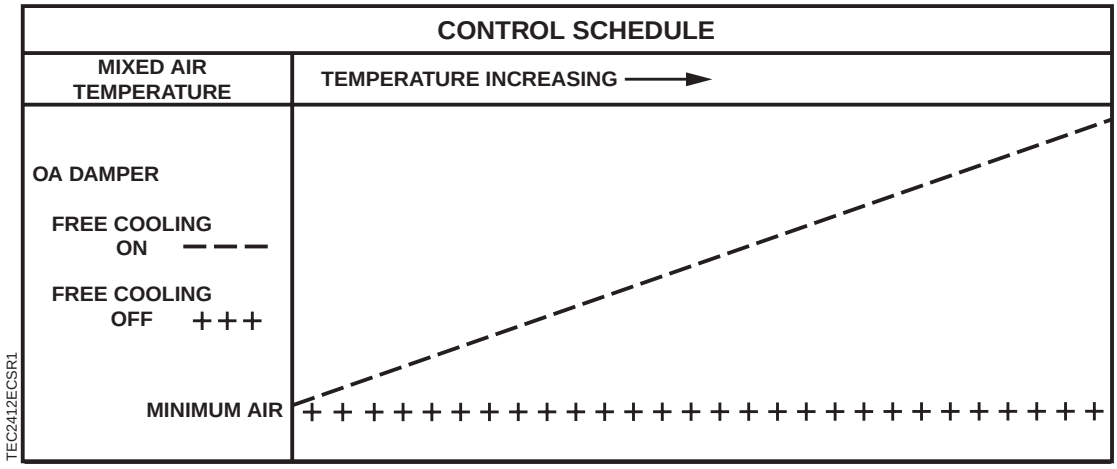
Figure 2455-3. Auxiliary Radiation.



NOTE: The fan is ON throughout the day.

* The face and bypass damper must remain in the full bypass position for longer than HTG TIME (Point 73) before the heating valve will shut. Likewise, the face and bypass damper position must be greater than (more toward the face position) full bypass for longer than HTG TIME before the heating valve will open.

Figure 2455-4. Day Heating Mode.



NOTE: When humidity is too high, the outside air damper is closed.

Figure 2455-5. Day Control of Outside Air Damper.

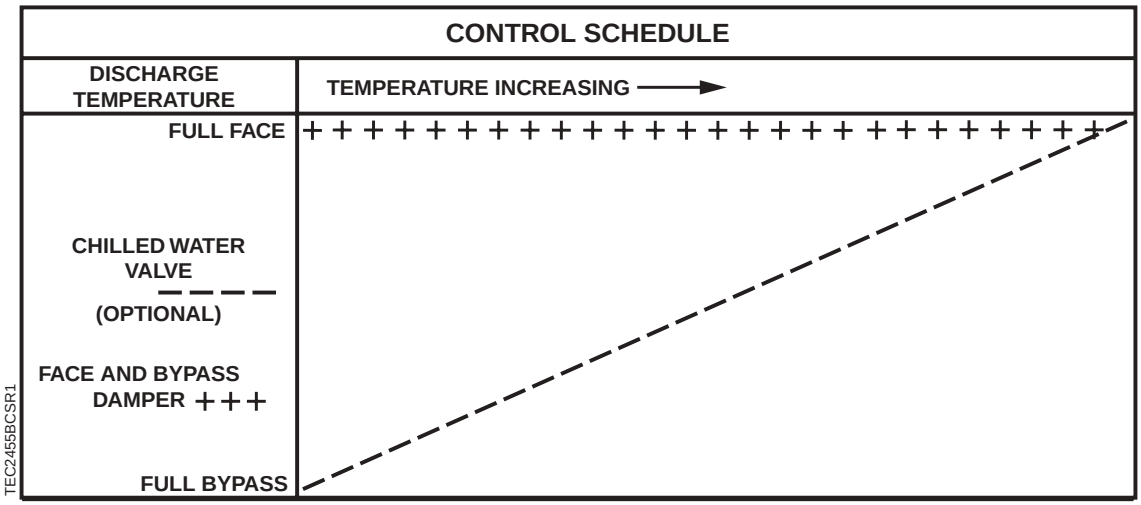


Figure 2455-6. Cooling Valve and Face & Bypass Damper Interaction in Day Cooling Mode.

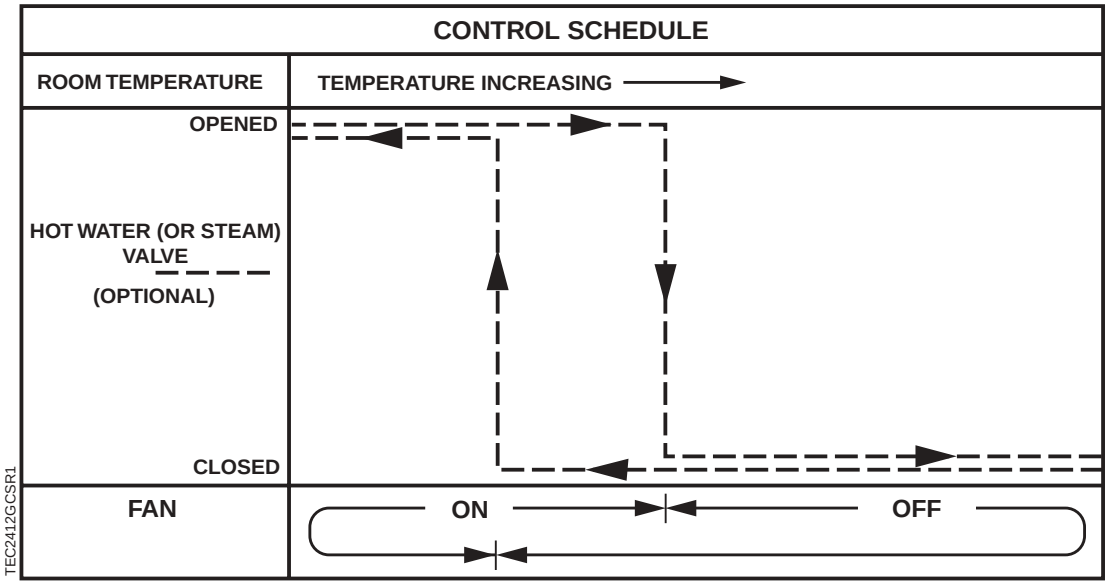
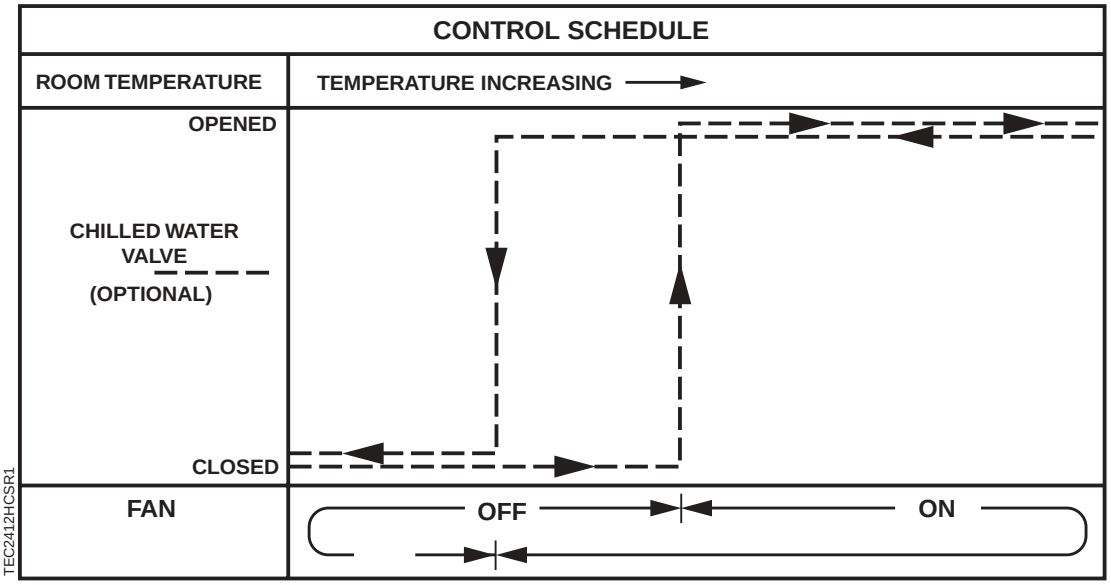


Figure 2455-7. Night Heating Mode with NGT HW HTG (Point 53) equal to NO. (If NGT HW HTG = YES, the Hot Water Valve is completely opened throughout Night Heating Mode.)



The Heating Valve is not shown. When NGT HW HTG (Point 53) equals NO, the hot water valve is shut throughout the night cooling mode. When NGT HW HTG equals YES, the hot water valve is completely opened throughout the night cooling mode.

Figure 2455-8. Night Cooling Mode. (Heating Valve not shown)

Hardware Inputs

Analog

- Discharge air temperature sensor
- Mixed air temperature sensor
- Room temperature sensor
- Room temperature setpoint 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
- Cooling valve
- Face and Bypass Damper

Digital

- Auxiliary radiation
- Unit fan
- 2-Position heating valve

Ordering Notes

Part Number 540-863S

You can also order the Unit Vent Controller as Custom Solution #283.

Sequence of Operation

The following paragraphs present the sequence of operation for Application 2455, *Unit Vent with Mixed Air Sequence, Dehumidification, Hot and Chilled Water, and Modulating Face and Bypass Damper*.

Control Temperature Setpoints

Depending on the controller's current operational mode (day or night), the control temperature setpoint, CTL STPT (Point 92) holds the value of one of the following setpoints:

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

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

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

NOTE: The value of CTL TEMP (Point 78) is the same as the value of ROOM TEMP (Point 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 OVRD TIME (Point 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 NGT OVRD (Point 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.

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

Mixed Air Control

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

Whenever the Space Relative Humidity is too high (DEHUMIDIFY (Point 28) is ON), the outside air damper is closed. When the Space Relative Humidity is at an acceptable level (DEHUMIDIFY is OFF), the outside air damper is controlled as follows:

- 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 (Point 23) is NO, the OA damper is set to OADPR MINPOS (Point 10).
- During the day when FREE CLG (Point 23) is YES, mixed air control depends on a number of things:
  - Whether the MA CONTROL (Point 58) point is enabled or disabled.
  - The status of the MA TEMP point.
  - The value of 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 (Point 79) goes from 0 to 50%, the MA STPT (Point 3) is adjusted from MAX MA STPT (Point 81) down to MIN MA STPT (Point 82). (MA STPT will equal MIN MA STPT when CLG LOOPOUT is 50% or greater.) If MA LOOPOUT (Point 18) is greater than OADPR MINPOS (Point 10), then the outside 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 outside 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 (Point 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 (Point 91) is ON, then the outside 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 outside 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 outside air damper will remain at OADPR MINPOS.

Case 4

MA CONTROL equals DISABL and the Application is in the Cooling Mode.

When 2* CLG LOOPOUT is less than OADPR MIN POS, the Outside air damper will be at OADPR MINPOS. As 2* CLG LOOPOUT goes from OADPR MIN POS to 100%, the outside air damper goes from OADPR MIN POS to 100 % OA. This means that the outside air damper will be 100% open to outside air when CLG LOOPOUT is 50%.

Case 5

MA CONTROL equals DISABL and the Application is in the Heating Mode.

When 2* (50 - HTG LOOPOUT) is less than OADPR MIN POS, the outside air damper will be at OADPR MINPOS. As 2* (50 - HTG LOOPOUT) goes from OADPR MIN POS to 100%, the outside air damper goes from OADPR MIN POS to 100 % OA. This means that the outside air damper will be 100% open to outside air when HTG LOOPOUT is 0%.

CASE 6

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

The outside air damper control in this case is identical to the outside 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 (Point 97). It will come out of override when MA TEMP remains greater than the value stored in MA HI LIMIT (Point 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 dehumidification is needed by looking at the value of DEHUMIDIFY (Point 28). This section explains how the value of DEHUMIDIFY is determined.

- 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. (That is, both DAY.NGT (Point 29) is NIGHT and NGT OVRD (Point 21) is NIGHT.)
- DEHUMIDIFY will be OFF if the space's relative humidity is low enough. (RH AI 3 (Point 15) is less than RH LO LIMIT (Point 17).)

DEHUMIDIFY will be commanded ON only if **all** of the following events occur:

- RH AI 3 is NORMAL.
- WARMUP.COOLDN is OFF.
- It is the day mode. (That is, either DAY.NGT is DAY or NGT OVRD is DAY.)

- RH AI 3 is greater than RH HI LIMIT (Point 16).
  (If RH AI 3 is greater than RH LO LIMIT but less than RH HI LIMIT, the value of DEHUMIDIFY remains unchanged.)

Dehumidification Operation

When DEHUMIDIFY (Point 28) equals ON, the fan will be on and the outside air damper will be completely closed. The other equipment is not affected by the dehumidification mode and is controlled normally. That is, if the application goes into the dehumidification mode during day cooling operation, the fan will be on and the outside air damper will be shut as is needed for the dehumidification mode. The rest of the equipment will be controlled as in the normal day cooling mode.

When dehumidification is no longer needed (DEHUMIDIFY equals OFF), the fan and outside air damper resume normal control. For instance, if the application is in day heating when the dehumidification mode ends, the fan and the outside damper are controlled as they normally are during day heating mode.

Day Heating Operation

In day heating operation, the controller maintains the room temperature at the value stored in CTL STPT (Point 92) by doing the following:

- The Room PID controller adjusts the DISCH STPT (Point 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 face and bypass damper. When HTG LOOPOUT (Point 80) is 50% or less, the face and bypass damper will be in full bypass position. When HTG LOOPOUT is 100%, the face and bypass damper will be in full face position. When HTG LOOPOUT is between 50% and 100%, the face and bypass damper modulates between full face and full bypass.
- The 2-position heating valve on DO 2 (HTG VLV, Point 42) will be completely opened when HTG LOOPOUT remains above 50% for longer than HTG TIME (Point 73). Waiting until HTG LOOPOUT stays above 50% for longer than HTG TIME before opening the heating valve saves wear and tear on the heating valve by preventing it from repeatedly turning on and off whenever HTG LOOPOUT is hovering about 50%.
- The 2-position heating valve on DO 2 will be shut when HTG LOOPOUT remains below 50% for longer than HTG TIME. Waiting until HTG LOOPOUT stays below 50% for longer than HTG TIME before closing the heating valve saves wear and tear on the heating valve by preventing it from repeatedly turning on and off whenever HTG LOOPOUT is hovering about 50%.
- Auxiliary radiation, if provided, is controlled using dead band control. AUX RAD (Point 41) will be on if HTG LOOPOUT (Point 80) is above AUX ON (Point 83) and off if HTG LOOPOUT is below AUX OFF (Point 84). When HTG LOOPOUT is between AUX ON and AUX OFF, AUX RAD remains in its last commanded state.
  (HTG LOOPOUT is the output of the Heating PID loop.)

During day heating, the cooling valve is shut.

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

In day cooling operation, the controller maintains the room temperature at the value stored in CTL STPT (Point 92) by doing the following:

- The room PID controller adjusts the DISCH STPT (Point 93) which is used in the cooling PID loop. (The cooling PID loop controls the supply air temperature in the cooling mode.)
- The cooling PID loop modulates the cooling valve, while the face and bypass damper remains in the full face position. (The face and bypass damper remains in full face position throughout day cooling mode.)
- During day cooling, the heating valve is shut and the auxiliary radiation is off.

Refer to the *Mixed Air Control* section to find out how the outside air damper is controlled in day cooling mode.

Night Heating Operation

In night heating mode, the controller maintains the room temperature at the value of CTL STPT (Point 92) by doing the following:

- If CTL TEMP (Point 78) drops below the value of NGT HTG STPT (Point 9) minus the value of NGT DBAND (Point 88), then:

– The fan turns ON.
– The heating valve is fully opened once the fan has been on longer than HTG TIME (Point 73).
– The auxiliary radiation is turned ON.
– The face and bypass damper is in full face position.

- If CTL TEMP rises above NGT HTG STPT, then:

– The fan turns OFF.
– The auxiliary radiation is turned OFF.
– If NGT HW HTG (Point 53) is NO, the heating valve will fully shut after the fan has been off longer than HTG TIME. If NGT HW HTG is YES, the heating valve remains fully opened.
– The face and bypass damper is in the full bypass position provided that NGT HW HTG is set to NO. Otherwise, the face and bypass damper remains in the full face position.

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 NGT CLG MODE (Point 54) is set to YES.
- Heating only is provided when NGT CLG MODE is set to NO.

Night Cooling Operation

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

In the night cooling mode the controller maintains the room temperature at the value stored in CTL STPT (Point 92) by doing the following:

- If CTL TEMP (Point 78) rises above the sum of NGT CLG STPT (Point 8) and NGT DBAND (Point 88), then:
  - The fan turns ON.
  - The cooling valve is fully opened.
- If CTL TEMP drops below NGT CLG STPT, then:
  - The fan turns OFF.
  - The cooling valve is fully shut.

If NGT HW HTG (Point 53) is set to NO, the heating valve stays closed throughout night cooling. If NGT HW HTG is set to YES, the hot water (steam) valve stays opened throughout night cooling.

The face and bypass damper is in full face position throughout night cooling, and the outside air damper is shut.

Heating/Cooling Switchover

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

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

- CLG LOOPOUT (Point 79) is below 50% if free cooling is not available (FREE CLG (Point 23) is set to NO), or below SWITCH LIMIT (Point 85) if free cooling is available.
- 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 (Point 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 room loop uses the value of CTL STPT (Point 92) and CTL TEMP (Point 78) to modulate the value of DISCH STPT (Point 93). The discharge setpoint will not be adjusted above DSH MAX TEMP (Point 95) or below DSH MIN TEMP (Point 94). In the heating mode, DSH MIN TEMP will be set equal to HTG DIS MIN (Point 74). In the cooling mode, DSH MIN TEMP will be set equal to CLG DIS MIN (Point 75).

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

Cooling Loop – The cooling loop uses the value of DISCH STPT and DISCH TEMP to modulate the value of CLG LOOPOUT (Point 79).

Mixed Air Loop – The mixed air loop uses the values of MA STPT (Point 03) and MA TEMP (Point 48) to modulate the value of MA LOOPOUT (Point 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 CTL STPT (Point 92) plus or minus the value of MORN DBAND (Point 89).

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

This module controls the auxiliary radiation on DO 1 (DO 1 is called AUX RAD, Point 41).

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

During night heating, aux radiation is ON when the FAN (Point 46) is ON and OFF when the FAN is OFF.

DAY HEATING MODE:
Auxiliary radiation is turned ON when HTG LOOPOUT rises above the value of AUX ON (Point 83). Aux radiation is turned OFF when HTG LOOPOUT drops below the value of AUX OFF (Point 84). When HTG LOOPOUT is between AUX ON and AUX OFF, the aux radiation DO remains in its last commanded state. If ON, it remains ON; if OFF, it remains OFF.

Aux radiation is ON whenever WRMUP.COOLDN = ON during heating mode.

Fan Operation

In day mode, FAN (Point 46) is always ON.

When dehumidification is needed (DEHUMIDIFY (Point 28) is ON), FAN is always ON. This is true regardless of the status of DAY.NGT (Point 29).

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

In night heating, the fan turns ON when the temperature drops below the value of CTL STPT (Point 92) minus NGT DBAND (Point 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.

Fan Alarm

If PROOF USED (Point 51) is set to NO, FAN ALARM (Point 77) is not used.

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

NOTE: FAN ALARM must be turned OFF manually. You should fix the problem that caused FAN ALARM to turn ON before manually commanding FAN ALARM to OFF. After manually commanding FAN ALARM OFF, you must release FAN ALARM to NONE priority so that the TEC can regain control of this point.

When the fan is ON and DI 2 is ON, FAN ALARM can not be commanded. Also, when the fan is OFF, FAN ALARM can not be commanded.

Fail-Safe Operation

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

A low temperature detection thermostat LOW TEMP DET (Point 52) connected to DI 6 (Point 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, LTDT CONTACT should be set to NOPEN to prevent the LTDT failure mode.

See Table 1 for what happens during the different failure modes.

Table 1. Fail-Safe Sequences.

Safety/Failure	APP 2455 Safety Sequence
LTDT = ON	**"Shutdown"** * Close OA DMPR * Heating Valve fully opened * Cooling Valve fully shut * Fan OFF * Aux OFF * Face and Bypass Damper is set to Full Face Position
FAN ALARM = ON	**"Shutdown"** * Close OA DMPR * Heating Valve fully opened * Cooling Valve fully shut * Fan OFF * Aux OFF * Face and Bypass Damper is set to Full Face Position
Discharge sensor fails	If last valid value was greater than 150 degrees: * Close OA DMPR * Heating Valve fully closed * Cooling Valve fully shut * Fan ON * Aux OFF * Face and Bypass Damper is set to Full Bypass Position 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, normal control resumes.

If at least one of the safeties in Table 1 occurs, SAFETY MODE (Point 66) turns ON. If all of the safeties in the above table are cleared, SAFETY MODE turns OFF. Therefore, by checking the value of SAFETY MODE, you can tell whether or not a safety is occurring.

In fail-safe mode, analog and digital outputs are not commanded, but failed points can be overridden which will allow the controller to return from fail-safe mode. If the controller returns from fail-safe mode by having failed points overridden, room temperature control is not possible.

Application Notes

1. If the unit ventilator cycles excessively, or the temperature swings in the room are excessive, or there is trouble in maintaining the setpoint, then either the cooling loop, the heating loop or both need to be tuned. Refer to the *APOGEE Automation Service Procedures* on InfoLink 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.

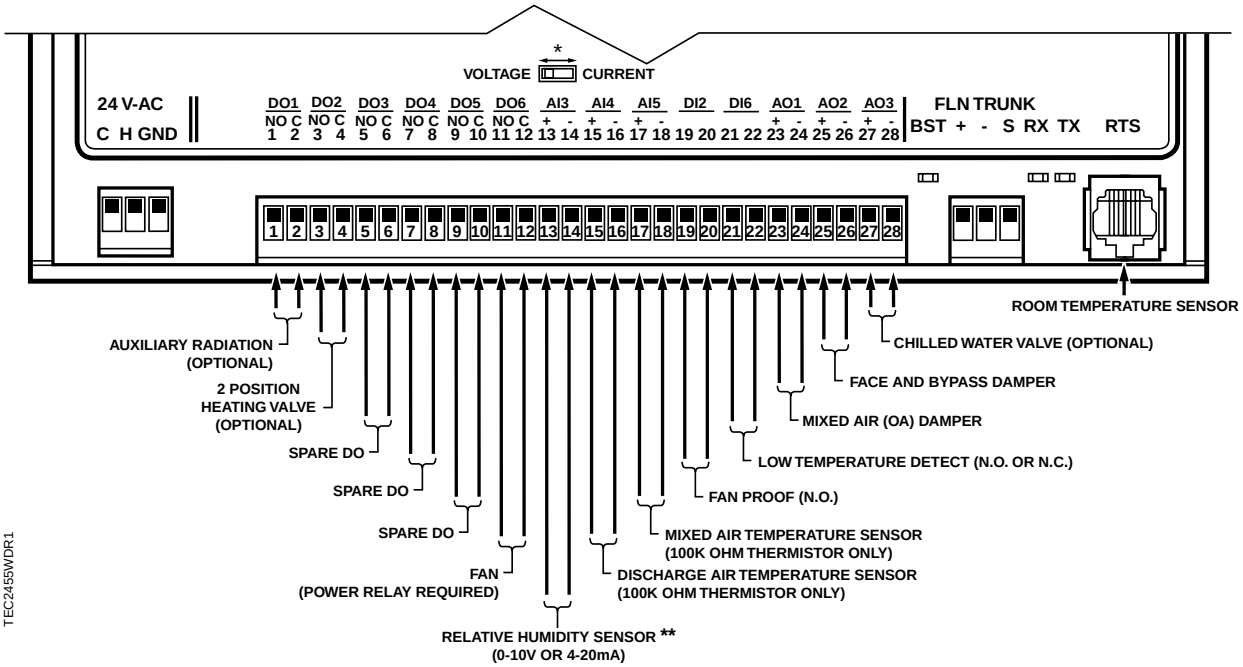
3. When the fan is manually switched OFF at the unit fan speed switch, the actuators should be wired so they return to their normal state.

Wiring Diagrams

CAUTION:

The controller's digital outputs (DOs) control 24 Vac loads only. The maximum rating is 12 VA for each DO. Use an interposing 220 V 4-relay module (550-054) for any of the following:

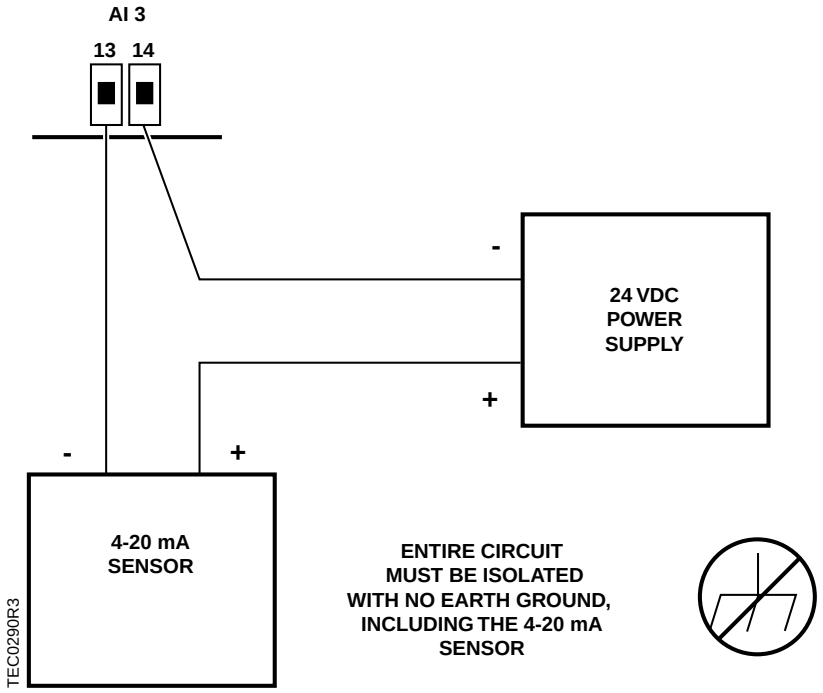
- VA requirements higher than the maximum
- 110 or 220 Vac requirements
- DC power requirements
- Separate transformers used to power the load



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

****** A 4-20 mA relative humidity sensor, if used, requires special wiring (see Figure 2455-10).

Figure 2455-9. Application 2455 Wiring Diagram.



NOTE: You can NOT use the same transformer to power the controller and a 4-20 mA sensor. The 4-20 mA sensor requires a SEPARATE dedicated power supply.

Figure 2455-10. Special Wiring Requirements for 4-20 mA Sensor at AI3.

CAUTION:

Equipment damage or loss of data will occur if the user does not follow procedure as specified.

Point Database

Table 2. Point Database for Application 2455.

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
{26}	DI 6	OFF	--	--	--	ON	OFF
{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	--	--

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35	AOV3 SPAN	10.0	VOLTS	0.01	0.0	--	--
36	AOV3 START	0.0	VOLTS	0.01	0.0	--	--

Table 2. Point Database for Application 2455.

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}	HTG VALVE	OFF	--	--	--	ON	OFF
{43}	DO 3	OFF	--	--	--	ON	OFF
{44}	DO 4	OFF	--	--	--	ON	OFF
{45}	DO 5	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	--	--

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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	--	--

Table 2. Point Database for Application 2455.

Point Number	Descriptor	Factory Default (SI Units)	Engr Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
73	HTG TIME	30	SEC	1	0	--	--
74	HTG DIS MIN	60.0 (15.656)	DEG F (DEG C)	0.5 (0.28)	37.5(3.056)	--	--
75	CLG DIS MIN	55.0 (12.856)	DEG F (DEG C)	0.5 (0.28)	37.5(3.056)	--	--
{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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