Application 2065: Dual Duct Variable Air Volume – Two Inlet Damper Actuators with Optional Reheat

Overview

In Application 2065, the controller modulates two inlet actuators, one for the hot duct and one for the cold duct. In heating mode, the controller modulates the hot duct damper in order to maintain the room temperature setpoint while the cold duct damper is at minimum. In cooling mode, the flow loop controls the hot duct damper during light loads and the cold duct damper during heavy loads. See Figure 2065-1 and Figure 2065-2.

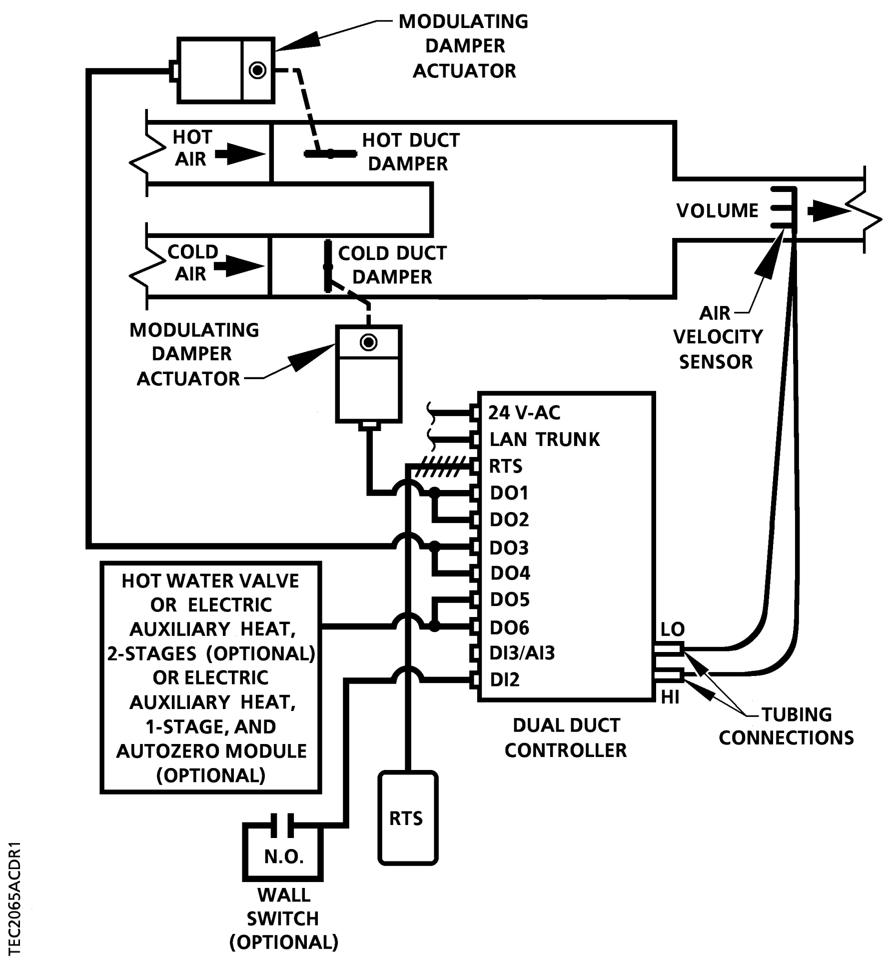
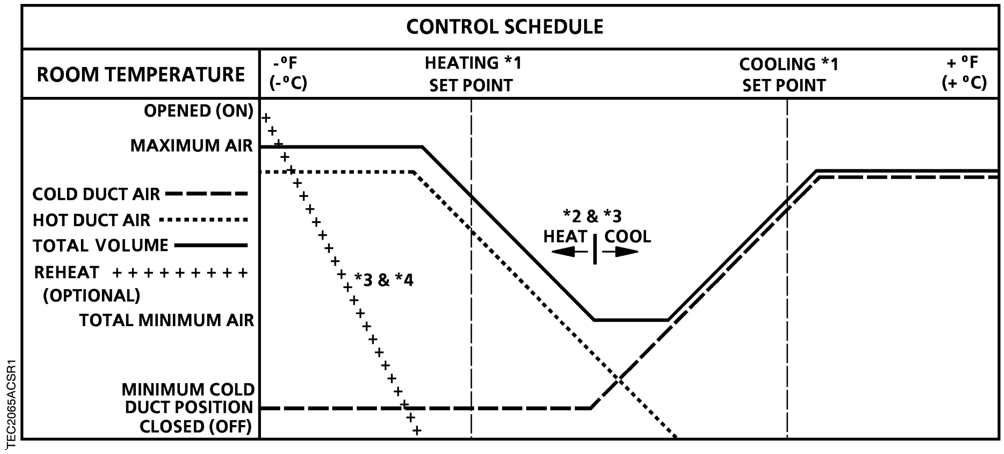


Figure 2065-1. Application 2065 Control Drawing.



1. See *Sequence of Operation, Control Temperature Setpoints*.
2. See *Sequence of Operation, Heating/Cooling Switchover*.
3. The reheat can be either a hot water valve or time modulated electric reheat. See *Sequence of Operation, Optional Auxiliary Heat*.
4. The reheat can be sequenced to operate either in series or parallel with the hot duct damper. It is shown is series. See *Sequence of Operation, Sequencing Logic*.

Figure 2065-2. Application 2065 Control Schedule.

Hardware Inputs

Analog

- Air velocity sensor
- Room temperature sensor
- Room temperature setpoint dial (optional)

Digital

- Night mode override (optional)
- Wall switch (optional)

Hardware Outputs

Analog

- None

Digital

- Damper actuator (2 required)
- Stage 1 electric auxiliary heat (optional)
- Stage 2 electric auxiliary heat or Autozero Module (optional)
- Valve actuator (optional)

Ordering Notes

Dual Duct Controller – One Air Velocity Sensor – Electronic Output	540-106
Dual Duct Controller – One Air Velocity Sensor – Electronic Output with Autozero Module*	540-107*

*This controller is used in applications:

- Where it is not possible, due to operational restrictions, to calibrate the air velocity transducer by fully closing the damper (for example, clean rooms, laboratories),
- When a minimum position damper stop is used.

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

Autozero Module (optional)
Damper actuator (two required)
Terminal Equipment Controller room temperature sensor
Valve actuator (optional)

Point Database

Table 2065-1 presents the point database information for Application 2065.

Sequence of Operation

The following paragraphs present the sequence of operation for Application 2065, “Dual Duct Variable Air Volume–Two Inlet Damper Actuators with Optional Reheat”.

Control Temperature Setpoints

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

Day Mode – CTL STPT holds the value of DAY HTG STPT (Point 7) in heating mode or DAY CLG STPT (Point 6) in cooling mode. However, if the room temperature sensor has a setpoint dial and STPT DIAL (Point 14) = YES, CTL STPT holds the value of RM STPT DIAL (Point 13).

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

Night Mode – CTL STPT holds the value of NGT HTG STPT (Point 9) in heating mode or NGT CLG STPT (Point 8) in cooling mode.

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

Day and Night Modes

The day/night status of the space is determined by the status of DAY.NGT (Point 29). 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 2065-1, Figure 2065-4, and Figure 2065-5) and WALL SWITCH (Point 18) = YES, the controller monitors the status of DI 2. When the status of DI 2 (Point 24) 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, connected to a field panel), the field panel can send an operator or program 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* (125-1895) 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 (Point 20), 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 (Point 21) 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 temperature sensor will have any effect on the controller.

Hot/Cold Duct Damper Operation

This application has two types of cooling modes; a light cooling mode and a heavy cooling load. This is determined by HOT.COLD (Point 3).

When HOT.COLD = HOT, the application is in light cooling mode. Here, HOT means that the flow loop is controlling the hot duct damper. This is considered light cooling because the cooling load is so light that the amount of cold air needed to satisfy the cooling load is not enough to satisfy the minimum amount needed for ventilation (TOT FLOW MIN (Point 33). The flow loop will then control the hot duct damper to supply any make-up air needed to make sure that the airflow out of the terminal box is equal to TOT FLOW MIN.

When HOT.COLD = COLD, the application is in heavy cooling mode. Here, COLD means that the flow loop is controlling the cold duct damper. This is considered heavy cooling because the cooling load is so heavy that the amount of cold air needed to satisfy the cooling load is more than enough to satisfy the minimum amount needed for ventilation (TOT FLOW MIN). The flow loop will control the cold duct damper to make sure that the airflow out of the terminal box never exceeds CLG FLOW MAX (Point 32), while the hot duct damper will be completely shut.

NOTE: Do not override HOT.COLD. It must be able to change freely or the application will not work properly.

Light Cooling Load Operation – When the cooling load is light and HOT.COLD = HOT, the active flow loop controls the hot duct damper. Whenever the flow loop is controlling the hot duct damper, the flow loop uses the heating flow gain points, HTGFLO PGAIN (Point 26), HTGFLO IGAIN (Point 27), and HTGFLO DGAIN (Point 28). The flow loop also sets CTL FLOW MIN (Point 76) to 0 CFM and CTL FLOW MAX (Point 77) equal to HTG FLOW MAX (Point 34).

In night mode, when the cooling load is light, CLG DMP CMD (Point 48) = CLG LOOPOUT (Point 79) which causes the cold duct damper to be controlled directly by the cooling loop. Day mode operation is similar, except CLG DMP CMD will not be commanded below CLG DMP MIN (Point 60).

When the cooling load is light, FLOW STPT (Point 93) is set equal to the percentage corresponding to TOT FLOW MIN. This causes the flow loop to modulate the HTG DMP CMD (Point 52) to provide an airflow that is at least equal to the value of TOT FLOW MIN. If the cooling loop opens the cold duct damper far enough to supply an airflow that is greater than the value of TOT FLOW MIN, the hot duct damper closes completely. If after closing the hot duct damper, the cooling loop continues opening the cold duct damper, the controller switches to heavy cooling load operation (HOT.COLD is changed to COLD).

NOTE: Switching to heavy cooling load operation does not occur right away. The controller has a flow deadband to prevent it from oscillating between light and heavy cooling load operation.

Heavy Cooling Load Operation – When the cooling load is heavy and HOT.COLD = COLD, the active flow loop controls the cold duct damper. Whenever the flow loop is controlling the cold duct damper, the flow loop uses the cooling flow gain points, CLGFLO PGAIN (Point 71), CLGFLO IGAIN (Point 72), and CLGFLO DGAIN (Point 73). The flow loop also sets CTL FLOW MIN to 0 CFM. and CTL FLOW MAX equal to CLG FLOW MAX.

When the cooling load is heavy, the hot duct damper is completely closed and HTG DMP CMD (Point 52) = 0% open.

In night mode, when the cooling load is heavy, FLOW STPT is set equal to CLG LOOPOUT. This causes the flow loop to modulate CLG DMP CMD (Point 48) to provide an airflow that is enough to maintain the space temperature setpoint as long as this airflow is less than the value of CLG FLOW MAX. If the cooling temperature PID loop closes the cold duct damper so far that the controller provides an airflow less than the value of TOT FLOW MIN, the controller switches to light cooling load operation (HOT.COLD is changed to HOT). In day mode, the cooling damper will not be closed below CLG DMP POS (Point 49).

Heating Operation – In day heating mode, the cooling damper is set to CLG DMP MIN (HEAT.COOL (Point 5) = HEAT). In night heating mode, the cooling damper is completely shut.

The flow loop controls the hot duct damper the entire time that the controller is in heating mode. HOT.COLD = HOT and the controller uses the heating flow gains. In heating mode, the value of FLOW STPT depends on the output of the heating loop, HTG LOOPOUT (Point 80). (See *Sequencing Logic*.) The flow loop maintains FLOW STPT by modulating HTG DMP CMD. The flow loop maintains the airflow between the values of TOT FLOW MIN and HTG FLOW MAX.

Heating/Cooling Switchover

The heating/cooling switchover determines whether the controller is in heating or cooling mode by monitoring the room temperature and the demand for heating and cooling (as determined by the temperature control loops).

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

- HTG LOOPOUT (Point 80) < 5.2%.
- CTL TEMP (Point 78) > CTL STPT (Point 92) by at least the value set in SWITCH DBAND (Point 90).
- CTL TEMP > 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 (Point 79) < 5.2%.
- CTL TEMP < CTL STPT by at least the value set SWITCH DBAND.
- CTL TEMP < the appropriate heating setpoint plus SWITCH DBAND.

Control Loops

The dual duct is controlled by four Proportional, Integral, and Derivative (PID) control loops; two temperature loops (one for heating and one for cooling), and two flow loops.

Temperature Loops – The two temperature loops are a cooling loop and a heating loop. The active temperature loop maintains room temperature at the value in CTL STPT (Point 92). See *Sequence of Operation, Control Temperature Setpoints*.

The cooling temperature loop generates cooling loopout which is then used to generate FLOW STPT (Point 93). During heavy cooling, HOT.COLD (Point 3) = COLD and FLOW STPT = CLG LOOPOUT (Point 79). The flow loop will control the cold duct damper. During light cooling, HOT.COLD = HOT and FLOW STPT = (TOT FLOW MIN ÷ HTG FLOW MAX) × 100% flow. The flow loop will then control the hot duct damper to maintain TOT FLOW MIN (Point 33), while the cooling loop will control the cold duct damper directly.

The heating temperature loop generates heating loopout which is then used to generate FLOW STPT. FLOW STPT is the result of scaling the heating loopout to the appropriate range of values determined by TOT FLOW MIN and HTG FLOW MAX (Point 34). In order to scale it, the loopout is multiplied by the range (MAX – MIN) and then added to the minimum setpoint.

When TOT FLOW MIN does not equal 0 CFM, FLOW STPT does not equal HTG LOOPOUT (Point 80). The minimum flow setpoint = (TOT FLOW MIN ÷ HTG FLOW MAX) × 100% flow. And FLOW STPT = [HTG LOOPOUT × (100% – minimum setpoint)] + minimum setpoint.

Example

If TOT FLOW MIN = 100 CFM, HTG FLOW MAX = 1000 CFM,
FLOW START = 0% and FLOW END = 100%

The minimum flow setpoint is (100 CFM ÷ 1000 CFM) × 100% flow = 10%

When HTG LOOPOUT = 0%, FLOW STPT = 10% flow.
[0% × (100% – 10%)] + 10% = 10%
This ensures that the airflow out of the terminal box is no less than TOT FLOW MIN.

When HTG LOOPOUT = 50%, FLOW STPT = 55% flow.
[50% × (100% – 10%)] + 10% = 55%

When HTG LOOPOUT = 100%, FLOW STPT = 100% flow.
[100% × (100% – 10%)] + 10% = 100%

Flow Loops – The controller uses two flow loops. However, since both flow loops share the same flow sensor, only one loop is active at a time.

The active flow loop maintains FLOW STPT by modulating either the hot duct damper point, HTG DMP CMD (Point 52) or the cold duct damper point, CLG DMP CMD (Point 48). The flow loop maintains the airflow between CTL FLOW MIN (Point 76) and CTL FLOW MAX (Point 77).

FLOW (Point 75) is the input value for the flow loop. It is calculated as a percentage based on where AIR VOLUME (Point 35) is between 0 CFM and CTL FLOW MAX. In the following text, this percentage is referred to as % flow.

- If AIR VOLUME = 0 CFM, FLOW is 0% flow.
- If AIR VOLUME = CTL FLOW MAX, FLOW is 100% flow.

The low limit of FLOW STPT will be the percentage that corresponds to the volume given in CTL FLOW MIN. This percentage can be calculated as:
(CTL FLOW MIN ÷ CTL FLOW MAX) × 100% flow.
The flow loop ensures that the supply air will not be less than CTL FLOW MIN.

Example

If CTL FLOW MIN = 250 CFM, and CTL FLOW MAX = 1000 CFM:

The low limit of FLOW STPT
= (250 CFM ÷1000 CFM) × 100% flow
= 0.25 × 100% flow
= 25% flow

Since 25% of 1000 CFM = 250 CFM, the minimum airflow out of the terminal box will be 250 CFM.

Optional Auxiliary Heat

If AUX HTG USED (Point 82) = YES, this application also controls auxiliary heat. The value of AUX HTG TYPE (Point 83) indicates the type of auxiliary heat control. If AUX HTG USED = NO, no auxiliary heat is used.

CAUTION:

If using electric heat, the verify that the equipment is supplied with safeties by others to ensure that there is airflow across the heating coils when they are to be energized or equipment damage may result.

Do not set minimum airflows to zero.

Hot Water Auxiliary Heat – If AUX HTG TYPE = HW, the application controls auxiliary hot water heat. The heating loop modulates the heating valve point, VALVE COMD (Point 37) in order to warm the space. When the controller is in cooling mode, the heating valve is closed.

Electric Auxiliary Heat – If AUX HTG TYPE = ELEC, the heating loop controls up to two stages of electric reheat to warm up the room. The electric reheat is time modulated using a duty cycle as shown in the following example. When the controller is in cooling mode, the electric heat is OFF at all times.

Example

If the duty cycle is 10 minutes (point STAGE TIME (Point 89) = 10 minutes) and the heating loop is calling for 60% of heating (point HTG LOOPOUT (Point 80) = 60%), for every 10-minute period, the stages of electric auxiliary heat cycle as follows:

	Stage 1: minutes		Stage 2: minutes	
	ON	**OFF**	**ON**	**OFF**
With 1 stage of electric heat:	6	4	–	–
With 2 stages of electric heat:	10	0	2	8

Sequencing Logic(optional)

In heating mode, this application includes logic that allows the flow loop to operate either in sequence, parallel, or overlapping with the hot water valve(s). This algorithm is very similar to the spring range sequencing of valves and dampers. Portions of the output of the heating loop, HTG LOOPOUT (Point 80), will drive both the flow loop and the auxiliary heat (if used) from 0 to 100%. See the following three examples.

The ladder diagrams in Figure 2065-3 show sequenced, parallel, and overlapping flow loop operations with auxiliary reheat. The vertical bars show the output of heating loopout from 0 to 100%. The horizontal bars (reheat start, flow start, etc.) show the action that occurs when the loop output rises above the horizontal bar. The relative positions shown on the graphs are for illustration purposes only and may differ from the examples.

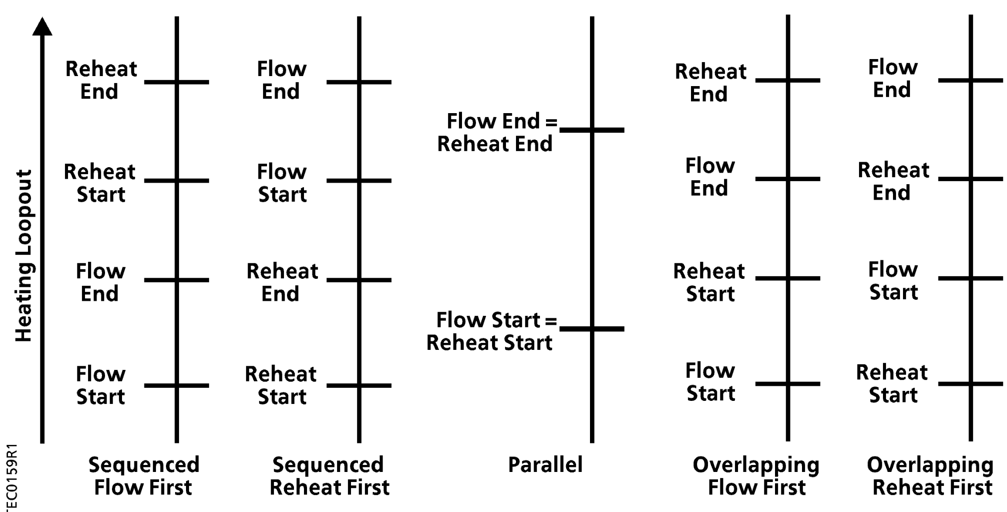


Figure 2065-3. Sequenced, Parallel, and Overlapping Flow Loop Operations with Reheat.

For simplicity, assume that in these examples:

- TOT FLOW MIN (Point 33) = 0 CFM
- AUX HTG USED (Point 82) = YES
- AUX HTG TYPE (Point 83) = HW
- There is a hot water valve for auxiliary heat. (When this is done, FLOW STPT (Point 93) will equal 0 when HTG LOOPOUT = 0).

Example 1

Assume that your system has a hot water valve that is to operate in *sequence* with the flow loop. If,

- FLOW START (Point 16) = 0%
- FLOW END (Point 17) = 50%
- REHEAT START (Point 22) = 50%
- REHEAT END (Point 23) = 100%

then,

- When HTG LOOPOUT = 0%, FLOW STPT will equal 0% flow.
- When HTG LOOPOUT = 25%, FLOW STPT will equal 50% flow.
- When HTG LOOPOUT ≥ 50%, FLOW STPT will equal 100% flow.
- When HTG LOOPOUT ≤ 50%, VALVE COMD (Point 37) will equal 0% open.
- When HTG LOOPOUT = 75%, VALVE COMD will equal 50% open.
- When HTG LOOPOUT = 100%, VALVE COMD will equal 100% open.

Example 2

Assume that your system has a hot water valve that is to operate in *parallel* with the flow loop. If,

- FLOW START (Point 16) = 0%
- FLOW END (Point 17) = 100%
- REHEAT START (Point 22) = 0%
- REHEAT END (Point 23) = 100%

then,

- when HTG LOOPOUT = 0%, FLOW STPT will equal 0% flow.
- when HTG LOOPOUT = 50%, FLOW STPT will equal 50% flow.
- when HTG LOOPOUT = 100%, FLOW STPT will equal 100% flow.
- when HTG LOOPOUT = 0%, VALVE COMD will equal 0% open.
- when HTG LOOPOUT = 50%, VALVE COMD will equal 50% open.
- when HTG LOOPOUT = 100%, VALVE COMD will equal 100% open.

Example 3

Assume that your system has a hot water valve that is to operate *overlapping* with the flow loop. If,

- FLOW START (Point 16) = 0%
- FLOW END (Point 17) = 75%
- REHEAT START (Point 22) = 25%
- REHEAT END (Point 23) = 100%

then,

- When HTG LOOPOUT = 0%, FLOW STPT will equal 0% flow.
- When HTG LOOPOUT = 37.5%, FLOW STPT will equal 50% flow.
- When HTG LOOPOUT ≥ 75%, FLOW STPT will equal 100% flow.
- When HTG LOOPOUT ≤ 25%, VALVE COMD will equal 0% open.
- When HTG LOOPOUT = 62.5%, VALVE COMD will equal 50% open.
- When HTG LOOPOUT = 100%, VALVE COMD will equal 100% open.

Another option that the sequencing logic provides is to have the flow loop provide an airflow equal to TOT FLOW MIN throughout the heating mode with all of the temperature control being done by the hot water valve(s). The airflow minimum will be maintained by setting the FLOW START and FLOW END to 0% which will cause FLOW STPT to hold the value corresponding to minimum flow throughout the entire heating mode, regardless of the value of HTG LOOPOUT.

Calibration

Air Velocity Transducer – Calibration of the controller's internal air velocity transducer is periodically required to maintain accurate air velocity readings. CAL SETUP (Point 95) is set with the desired calibration option during controller start-up. Depending on the value of CAL SETUP, calibration may be set to take place automatically, by the operator command, or manually when the override switch on the room temperature sensor is pressed. If CAL AIR (Point 94) = YES, calibration is in progress.

- For a controller used without an Autozero Module, (CAL MODULE (Point 87) = NO), the dampers are commanded closed simultaneously to get zero airflow readings during calibration.
- For a controller used with an Autozero Module (CAL MODULE = YES), calibration occurs without closing the dampers.

NOTE: The first time after start-up or initialization, the controller will calibrate the dampers as if not using an Autozero Module, although the Autozero Module will be activated. All subsequent calibrations will use the Autozero Module only.

Damper Status Operation

Under normal operation DMPR STATUS (Point 84) reads CAL. However, when using an Autozero Module, it is possible after a period of operation for the calculated damper position points, CLG DMP POS (Point 49) and HTG DMP POS (Point 53), to differ from the actual (physical) damper position.

If this occurs, the controller will *automatically* compensate for any difference by setting DMPR STATUS to RECAL which readjusts the value of DMPR POS. DMPR STATUS will be set to RECAL if all of the following conditions are true:

- CLG DMP POS and HTG DMP POS = 100%
- Air velocity (AIR VOLUME (Point 35) ÷ DUCT AREA (Point 97)) > 200 FPM
- FLOW (Point 75) < FLOW STPT (Point 93)

- or -

- CLG DMP POS and HTG DMP POS = 0%
- Air velocity (AIR VOLUME ÷ DUCT AREA) > 200 FPM
- FLOW > FLOW STPT

If DMPR STATUS has been changed to RECAL in response to the conditions described above, do one of the following:

1. If flow is currently being properly controlled, set DMPR STATUS to CAL and release it.
2. If flow is not being properly controlled (that is, the conditions described above are still present) or if it is important that the damper position be accurate, initialize the controller.

If these steps do not fix the problem of maintaining flow, a mechanical problem might exist.

Fail-safe Operation

If AIR VOLUME (Point 35) is failed, damper control depends on the status of HEAT.COOL (Point 5).

- If HEAT.COOL reads HEAT, the following occurs:
  - HTG DMP CMD (Point 52) is set equal to the flow setpoint, FLOW STPT (Point 93).
  - CLG DMP CMD (Point 48) is set equal to 100% minus FLOW STPT.

  This causes the hot duct and the cold duct dampers to be controlled as pressure dependent dampers by the heating temperature loop.
- If HEAT.COOL reads COOL, the following occurs:
  - CLG DMP CMD is set equal to the output of the cooling loop, CLG LOOPOUT (Point 79).
  - HTG DMP CMD is set equal to 100% minus CLG LOOPOUT.

  This causes the hot duct and the cold duct dampers to be controlled as pressure dependent dampers by the cooling temperature loop.

If the temperature sensor fails, the controller operates using the last known temperature value.

Application Notes

1. If temperature variations in the room are excessive or there is trouble maintaining the setpoint, the cooling loop, the heating loop, or both need to be tuned. If FLOW (Point 75) is oscillating while FLOW STPT (Point 93) is constant, the flow loop requires tuning.
2. The Dual Duct Controller – One Air Velocity Sensor – Electronic Output, as shipped from the factory, keeps all associated equipment OFF. See the *Equipment Controllers* section in the *APOGEE Automation Start-up Procedures* on InfoLink for information on how to release the controller and its equipment to application control.
3. Spare DOs can be used as auxiliary points that are controlled by the field panel after being defined in the field panel's database. DO 5 and DO 6 may be used as auxiliary motor points. If using a pair of spare DOs to control a motor, you must unbundle the corresponding motor command point.

Wiring Diagrams

The point wiring for Application 2065 is shown in Figure 2065-4 and Figure 2065-5.

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

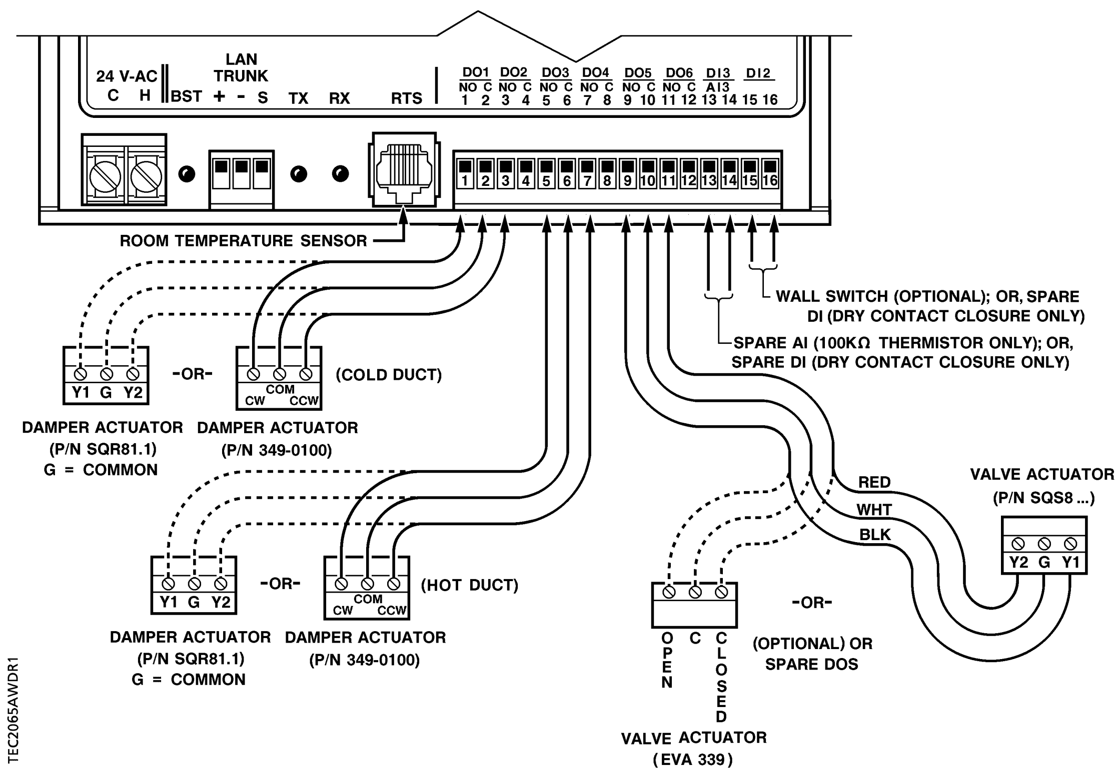


Figure 2065-4. Application 2065 Wiring Diagram with Hot Water Reheat.

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

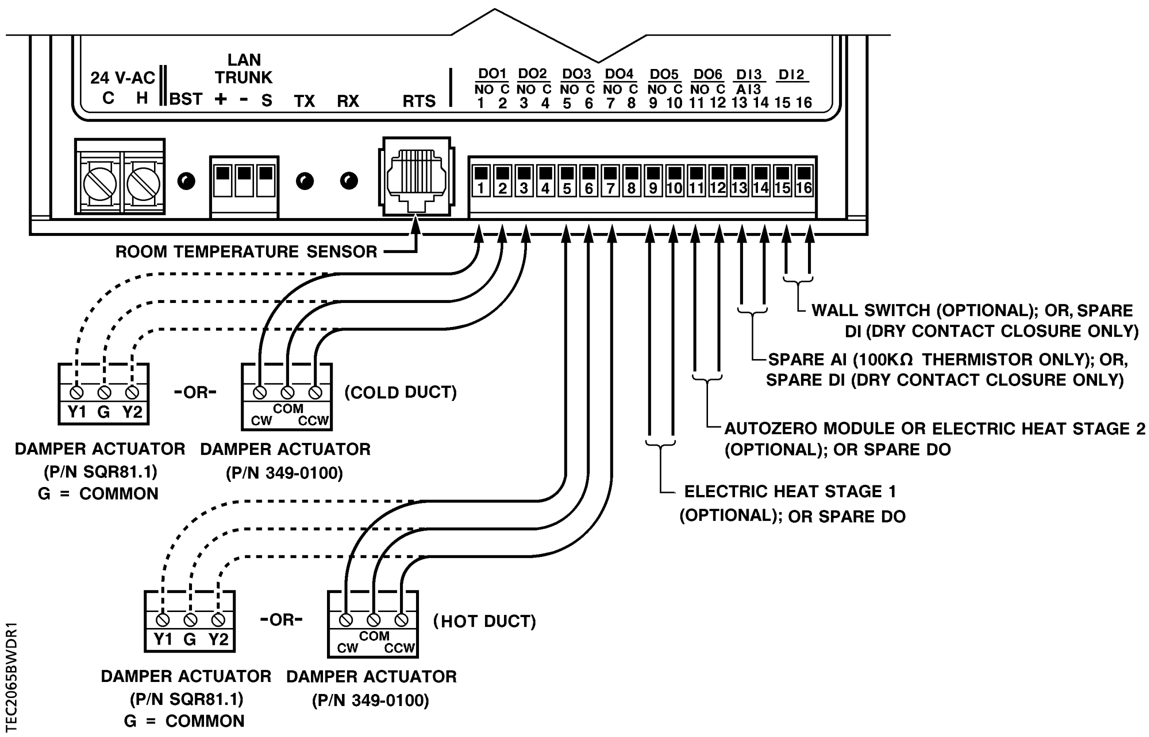


Figure 2065-5. Application 2065 Wiring Diagram with Electric Auxiliary Reheat.

Table 2065-1. Point Database for Application 2065.

Point Number	Descriptor	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
01	CTLR ADDRESS	99.000	–	1.000	0.000	–	–
02	APPLICATION	2092	–	1.000	0.000	–	–
{03}	HOT.COLD	HOT	–	–	–	HOT	COLD
{04}	ROOM TEMP	74.000 (23.449)	DEG F (DEG C)	0.250 (0.140)	48.000 (8.889)	–	–
{05}	HEAT.COOL	COOL	–	–	–	HEAT	COOL
06	DAY CLG STPT	74.000 (23.449)	DEG F (DEG C)	0.250 (0.140)	48.000 (8.889)	–	–
07	DAY HTG STPT	70.000 (21.209)	DEG F (DEG C)	0.250 (0.140)	48.000 (8.889)	–	–
08	NGT CLG STPT	82.000 (27.929)	DEG F (DEG C)	0.250 (0.140)	48.000 (8.889)	–	–
09	NGT HTG STPT	65.000 (18.409)	DEG F (DEG C)	0.250 (0.140)	48.000 (8.889)	–	–
11	RM STPT MIN	55.000 (12.809)	DEG F (DEG C)	0.250 (0.140)	48.000 (8.889)	–	–
12	RM STPT MAX	90.000 (32.409)	DEG F (DEG C)	0.250 (0.140)	48.000 (8.889)	–	–
{13}	RM STPT DIAL	74.000 (23.449)	DEG F (DEG C)	0.250 (0.140)	48.000 (8.889)	–	–
14	STPT DIAL	NO	–	–	–	YES	NO
{15}	AUX TEMP	74.000 (23.496)	DEG F (DEG C)	0.500 (0.280)	37.500 (3.056)	–	–
16	FLOW START	0.000	PCT	0.400	0.000	–	–
17	FLOW END	100.000	PCT	0.400	0.000	–	–
18	WALL SWITCH	NO	–	–	–	YES	NO
{19}	DI OVRD SW	OFF	–	–	–	ON	OFF
20	OVRD TIME	0.000	HRS	1.000	0.000	–	–
{21}	NGT OVRD	NIGHT	–	–	–	NIGHT	DAY
22	REHEAT START	50.000	PCT	0.400	0.000	–	–
23	REHEAT END	100.000	PCT	0.400	0.000	–	–
{24}	DI 2	OFF	–	–	–	ON	OFF
{25}	DI 3	OFF	–	–	–	ON	OFF

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.

Continued on the next page…

Table 2065-1. Point Database for Application 2065.

Point Number	Descriptor	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
26	HTGFLO PGAIN	0.000	–	0.250	0.000	–	–
27	HTGFLO IGAIN	0.018	–	0.006	0.000	–	–
28	HTGFLO DGAIN	0.000	–	2.000	0.000	–	–
{29}	DAY.NGT	DAY	–	–	–	NIGHT	DAY
32	CLG FLOW MAX	2200.000 (1038.180)	CFM (LPS)	4.000 (1.888)	0.000	–	–
33	TOT FLOW MIN	220.000 (103.818)	CFM (LPS)	4.000 (1.888)	0.000	–	–
34	HTG FLOW MAX	2200.000 (1038.180)	CFM (LPS)	4.000 (1.888)	0.000	–	–
{35}	AIR VOLUME	0.000	CFM (LPS)	4.000 (1.888)	0.000	–	–
36	FLOW COEFF	1.000	–	0.010	0.000	–	–
{37}	VALVE COMD	0.000	PCT	0.400	0.000	–	–
{38}	VALVE POS	0.000	PCT	0.400	0.000	–	–
39	MTR3 TIMING	130.000	SEC	1.000	0.000	–	–
{41}	DO 1	OFF	–	–	–	ON	OFF
{42}	DO 2	OFF	–	–	–	ON	OFF
{43}	DO 3	OFF	–	–	–	ON	OFF
{44}	DO 4	OFF	–	–	–	ON	OFF
{45}	DO 5	OFF	–	–	–	ON	OFF
{46}	DO 6	OFF	–	–	–	ON	OFF
{48}	CLG DMP CMD	0.000	PCT	0.400	0.000	–	–
{49}	CLG DMP POS	0.000	PCT	0.400	0.000	–	–
51	MTR1 TIMING	95.000	SEC	1.000	0.000	–	–
{52}	HTG DMP CMD	0.000	PCT	0.400	0.000	–	–
{53}	HTG DMP POS	0.000	PCT	0.400	0.000	–	–
55	MTR2 TIMING	95.000	SEC	1.000	0.000	–	–
56	DPR1 ROT ANG	90.000	–	1.000	0.000	–	–
57	DPR2 ROT ANG	90.000	–	1.000	0.000	–	–
58	MTR SETUP	0.000	–	1.000	0.000	–	–

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.

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Table 2065-1. Point Database for Application 2065.

Point Number	Descriptor	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
59	DO DIR. REV	0.000	–	1.000	0.000	–	–
60	CLG DMP MIN	0.000	PCT	0.400	0.000	–	–
63	CLG P GAIN	20.000 (36.000)	–	0.250 (0.450)	0.000	–	–
64	CLG I GAIN	0.012 (0.022)	–	0.006 (0.011)	0.000	–	–
65	CLG D GAIN	0.000	–	2.000 (3.600)	0.000	–	–
66	CLG BIAS	50.000	PCT	0.400	0.000	–	–
67	HTG P GAIN	10.000 (18.000)	–	0.250 (0.450)	0.000	–	–
68	HTG I GAIN	0.012 (0.022)	–	0.006 (0.011)	0.000	–	–
69	HTG D GAIN	0.000	–	2.000 (3.600)	0.000	–	–
70	HTG BIAS	50.000	PCT	0.400	0.000	–	–
71	CLGFLO PGAIN	0.000	–	0.250	0.000	–	–
72	CLGFLO IGAIN	0.018	–	0.006	0.000	–	–
73	CLGFLO DGAIN	0.000	–	2.000	0.000	–	–
{75}	FLOW	0.000	PCT	1.000	0.000	–	–
{76}	CTL FLOW MIN	220.000 (103.818)	CFM (LPS)	4.000 (1.888)	0.000	–	–
{77}	CTL FLOW MAX	2200.000 (1038.180)	CFM (LPS)	4.000 (1.888)	0.000	–	–
{78}	CTL TEMP	74.000 (23.449)	DEG F (DEG C)	0.250 (0.140)	48.000 (8.889)	–	–
{79}	CLG LOOPOUT	50.000	PCT	0.400	0.000	–	–
{80}	HTG LOOPOUT	0.000	PCT	0.400	0.000	–	–
{81}	AVG HEAT OUT	0.000	–	2.000	0.000	–	–
82	AUX HTG USED	NO	–	–	–	YES	NO
83	AUX HTG TYPE	HW	–	–	–	ELEC	HW
{84}	DMPR STATUS	CAL	–	–	–	RECAL	CAL
86	SWITCH TIME	10.000	MIN	1.000	0.000	–	–

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

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Table 2065-1. Point Database for Application 2065.

Point Number	Descriptor	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
87	CAL MODULE	NO	–	–	–	YES	NO
88	STAGE COUNT	1.000	–	1.000	0.000	–	–
89	STAGE TIME	10.000	MIN	1.000	0.000	–	–
90	SWITCH DBAND	1.000 (0.560)	DEG F (DEG C)	0.250 (0.140)	0.000	–	–
{92}	CTL STPT	74.000 (23.449)	DEG F (DEG C)	0.250 (0.140)	48.000 (8.889)	–	–
{93}	FLOW STPT	0.000	PCT	1.000	0.000	–	–
{94}	CAL AIR	NO	–	–	–	YES	NO
95	CAL SETUP	4.000	–	1.000	0.000	–	–
96	CAL TIMER	12.000	HRS	1.000	0.000	–	–
97	DUCT AREA	1.000 (0.093)	SQ. FT (SQ M)	0.025 (0.002)	0.000	–	–
98	LOOP TIME	5.000	SEC	1.000	0.000	–	–
{99}	ERROR STATUS	0.000	–	1.000	0.000	–	–

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