

Symbio 800 Demand Controlled Ventilation (DCV) with Traq and Minimum Position Control

Demand Control Ventilation (DCV)

Demand control ventilation reduces energy consumption by reducing the outdoor air damper below minimum ventilation based on space CO2. Decreasing CO2 levels will decrease damper position to DCV minimum damper position setpoint. Increasing CO2 level will increase damper position to design minimum setpoint. DCV requires a valid space CO2 value.

Demand control ventilation setpoints used in all methods.

- Space CO2 high limit
- Space CO2 low limit

DCV when enabled with outdoor airflow control (Traq), DCV resets the outdoor air minimum flow setpoint based on space CO2. DCV enabled with Outdoor Air Flow Compensation, DCV resets the outdoor air damper minimum position based space CO2 and supply fan speed. DCV enabled with Outdoor Air Minimum Position Control resets the outdoor air damper minimum position based on space CO2.

Table 1 summarizes the settings used for each Minimum Damper Position Control and Demand Control Ventilation.

Table 1 Outdoor air damper minimum ventilation control

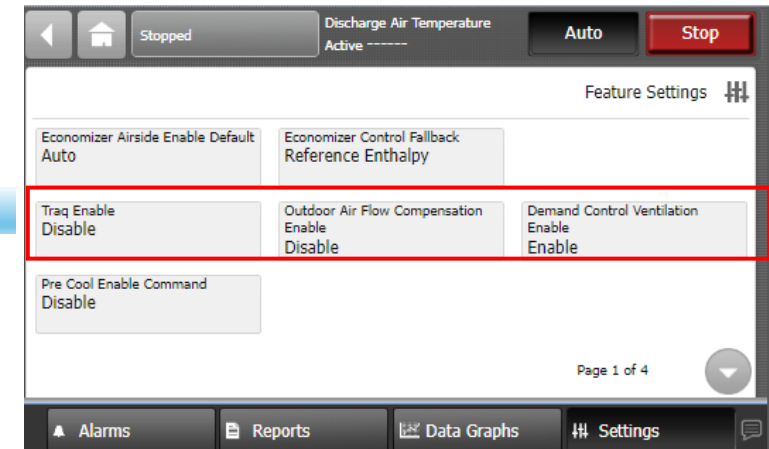
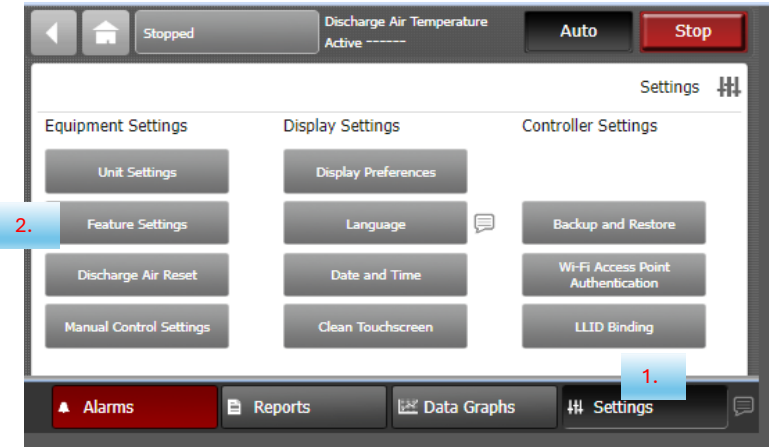
Traq	Outdoor Air Flow Compensation	Demand Control Ventilation	Description	Outdoor Air Damper Controlling Setpoints
Enabled/Active	Disabled	Disabled	Damper controls to outdoor air minimum flow setpoint	Setpoint: Outdoor Air Minimum Flow Setpoint Active Outdoor Air Minimum Flow Setpoint Status
Enabled/Active	Disabled	Enabled/Active	Outdoor Air Flow setpoint is reset based on space CO ₂ .	Setpoint: Outdoor Air Minimum Flow Setpoint Status Settings: Design Min Outdoor Air Flow Setpoint DCV Min Outdoor Air Flow Setpoint
Disabled	Enabled/Active	Disabled	Outdoor Air Damper Minimum Position is reset based on supply fan speed.	Setpoint: Economizer Minimum Position Setpoint Active Settings: Design Min OA Damper Pos Setpoint Max Fan Design Min OA Damper Pos Setpoint Mid Fan Design Min OA Damper Pos Setpoint Min Fan
Disabled	Enabled/Active	Enabled/Active	Outdoor Air Damper Minimum Position is reset based on supply fan speed and space CO ₂ .	Setpoint: Economizer Minimum Position Setpoint Active Settings: Design Min OA Damper Pos Setpoint Max Fan Design Min OA Damper Pos Setpoint Mid Fan Design Min OA Damper Pos Setpoint Min Fan DCV Min Outdoor Air Dampr Pos at Max Fan DCV Min Outdoor Air Dampr Pos at Min Fan
Disabled	Disabled	Enabled/Active	Outdoor Air Damper Minimum Position is reset based on space CO ₂ .	Setpoint: Economizer Minimum Position Setpoint Active Settings: Design Min OA Damper Position DCV Min Outdoor Air Damper Pos Setpoint
Disabled	Disabled	Disabled	Outdoor air damper position is control by	Setpoint: Economizer Minimum Position Setpoint Active

DCV Setup w/ Symbio 800 Controls

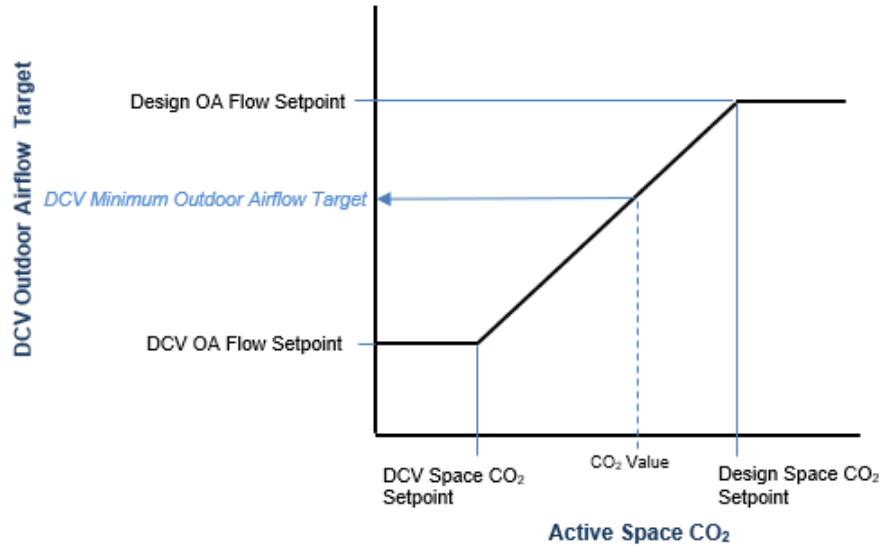
Not all points are available through BAS to setup DCV controls with Symbio 800 units. For this reason, DCV is setup through the unit's touchscreen display (TD7). BAS points pertaining to Outside Damper control available are listed below.

Object Identifier	Object Name	Description	Units	When Exists	Valid Range	Notes
AV-10175	Space CO2 High Limit	Normally provided by the BAS to define the CO2 high limit, for ventilation purposes	Parts Per Million	Economizer with TRAQ or Demand Control Ventilation	0 to 2000 ppm	Same as changing Design CO2 Setpoint at TD7
AV-10176	Space CO2 Low Limit	Normally provided by the BAS to define the CO2 low limit	Parts Per Million	Economizer with TRAQ or Demand Control Ventilation	0 to 2000 ppm	Same as changing DCV CO2 Setpoint at TD7
AV-10144	Economizer Minimum Position Setpoint BAS	Normally provided by the BAS to request the economizer minimum position setpoint	Percent	Economizer Present	0.0 to 100.0 %	Ignored when Demand Control Ventilation is Enabled
AV-10118	Space CO2 Concentration BAS	The value is normally provided by the BAS to send the space CO2 concentration value. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes.	Parts Per Million	Economizer with TRAQ or Demand Control Ventilation	50 to 5000 PPM	Space CO2 concentration can be sent through BAS or provided with field installed CO2 sensor (0-10 VDC, 0 -2000 ppm).
AV-10115	Outdoor Air Flow BAS	The value is normally provided by the BAS to send the outdoor air flow value. The value is subject to arbitration logic in the controller, in which case it may or may not be used for control purposes.	Cubic Feet per Minute	TRAQ Present	0 to 65,000 CFM	Ignored when Demand Control Ventilation is Enabled
BV-10124	Supply Fan Compensation	Enables the outdoor air damper position to compensate for changes in supply fan speed	Default 0 Disable	Economizer Present	0 = Disable 1 = Enable	Same as changing Outdoor Air Flow Compensation at TD7

Steps: See Table 1 for best control method based on Unit options selected and/or application



DCV setup with Traq option Enabled (All units)

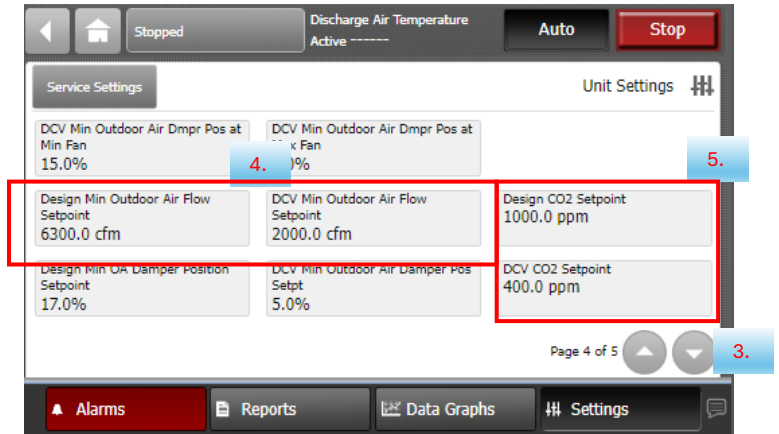
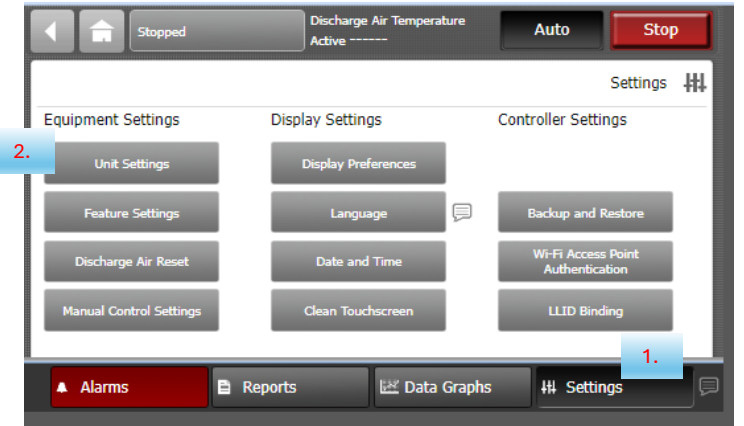


Sequence of Operation:

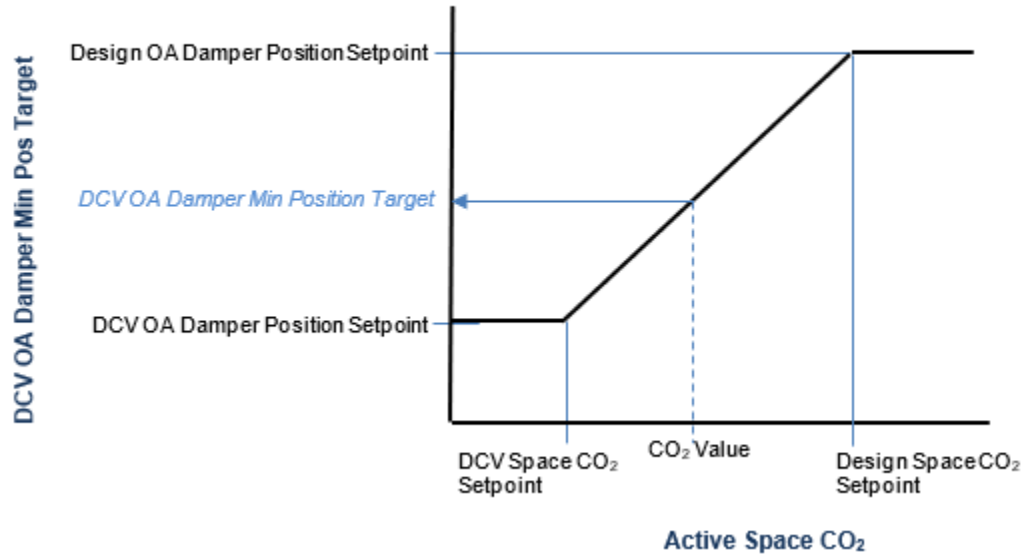
When unit is NOT actively economizing the outside air damper will control to the Outside Air Min Flow Setpoint depending on the space CO2 concentration reading.

- If CO2 concentration active \leq DCV CO2 setpoint, the Outside Airflow Setpoint Active will be equal to DCV Min Outdoor Air Flow Setpoint
- If CO2 concentration active \geq Design CO2 setpoint, the Outside Airflow Setpoint Active will be equal to Design Min Outdoor Air Flow Setpoint
- If DCV CO2 setpoint \leq CO2 concentration active \leq Design CO2 setpoint, the Outside Airflow Setpoint Active will equal a linear value between the DCV Min Outdoor Air Flow Setpoint and Design Min Outdoor Air Flow Setpoint

Steps:



DCV setup with Minimum Position Control (Outdoor Airflow Flow Compensation Disabled)

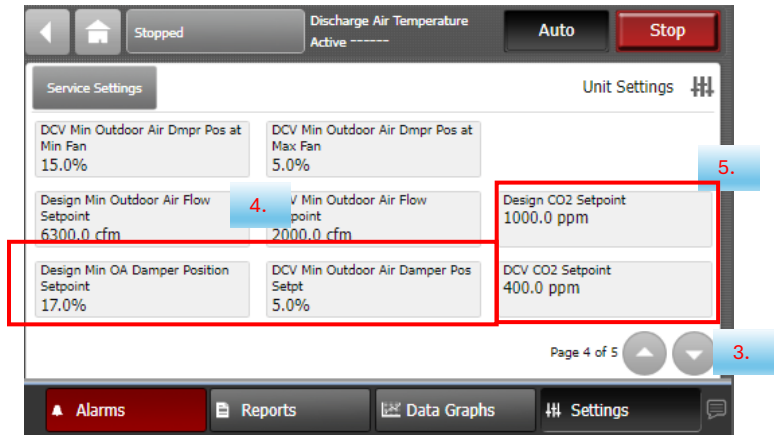
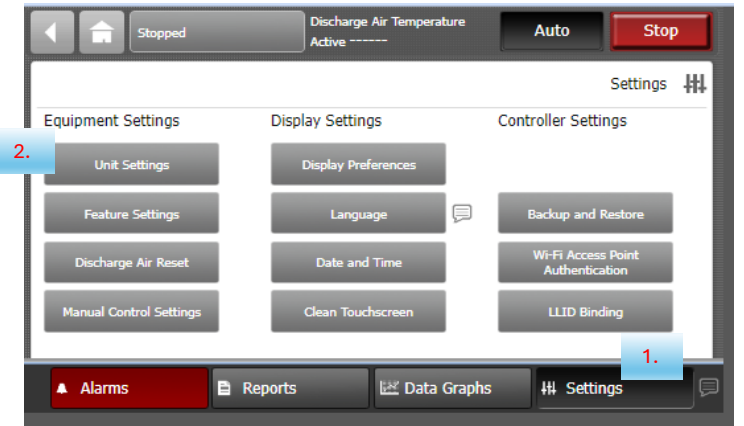


Sequence of Operation:

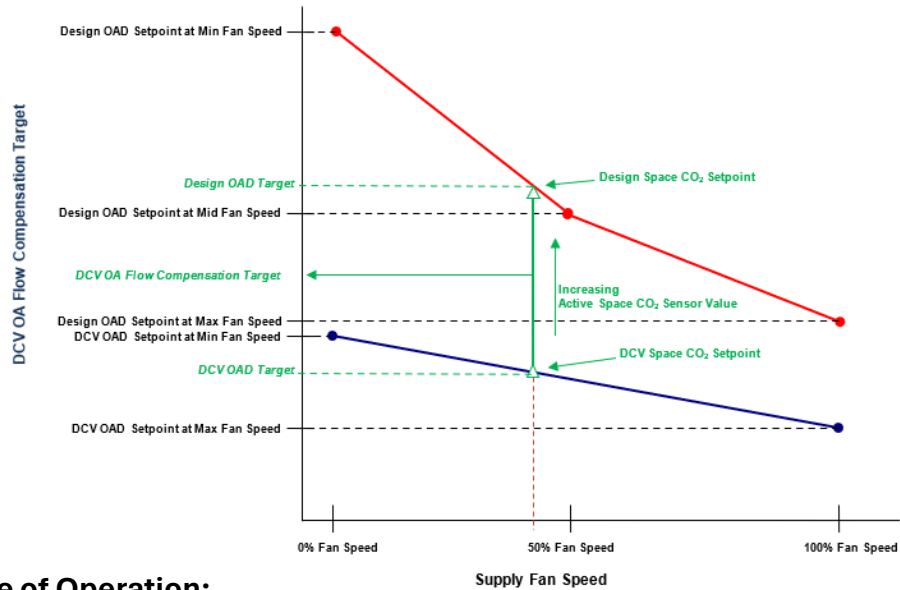
When unit is NOT actively economizing the outside air damper will control to the Economizer Min Position Setpoint Active depending on the space CO2 concentration reading.

- If CO2 concentration active \leq DCV CO2 setpoint, the Economizer Min Position Setpoint Active will be equal to DCV Min Outdoor Pos Setpoint
- If CO2 concentration active \geq Design CO2 setpoint, the Economizer Min Position Setpoint Active will be equal to Design Min OA Position Setpoint
- If DCV CO2 setpoint \leq CO2 concentration active \leq Design CO2 setpoint, the Economizer Min Position Setpoint Active will equal a linear value between the DCV Min Outdoor Pos Setpoint and Design Min OA Damper Position Setpoint

Steps:



DCV setup with Minimum Position Control (Outdoor Airflow Flow Compensation Enabled)



Sequence of Operation:

When unit is NOT actively economizing the outside air damper will control to the Economizer Min Position Setpoint Active depending on the space CO2 concentration reading and supply fan speed status.

- If CO2 concentration active \leq DCV CO2 setpoint, the Economizer Min Position Setpoint Active will be equal to DCV Min Outdoor Pos Setpoint but is dependent on supply fan speed (blue line). This value will be linear between the DCV Min and Max Fan setpoints.

- If CO2 concentration active \geq Design CO2 setpoint, the Economizer Min Position Setpoint Active will be equal to Design Min OA Position Setpoint but is dependent on supply fan speed (red line). This value will be linear between the Design Min OA Damper Position Setpoint @ Min and Med Fan or Med and Max Fan setpoints.

- If DCV CO2 setpoint \leq CO2 concentration active \leq Design CO2 setpoint, the Economizer Min Position Setpoint Active will equal a linear value between the DCV Min Outdoor Pos Setpoint and Design Min OA Damper Position Setpoint (green vertical line).

Steps:

1. **Settings**

Equipment Settings | Display Settings | Controller Settings

- Unit Settings
- Display Preferences
- Feature Settings
- Language
- Discharge Air Reset
- Date and Time
- Manual Control Settings
- Clean Touchscreen
- Backup and Restore
- Wi-Fi Access Point Authentication
- LLID Binding

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2. **Service Settings**

Economizer Dry Bulb Enable Offset: 5.0 °F

Outdoor Air Min Flow Setpoint Default: 6300.0 cfm

Relief Enable Position Setpoint: 20.0%

Space Static Pressure Setpoint Default: 0.03 IWC

4. **Design Min OA Damper Pos Setpoint**

- Design Min OA Damper Pos Setpoint Min Fan: 25.0%
- Design Min OA Damper Pos Setpoint Mid Fan: 20.0%
- Design Min OA Damper Pos Setpoint Max Fan: 16.0%

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5. **Unit Settings**

6. **DCV Min Outdoor Air Dmpr Pos at Min Fan: 15.0%**

DCV Min Outdoor Air Dmpr Pos at Max Fan: 5.0%

Design Min Outdoor Air Flow Setpoint: 6300.0 cfm

DCV Min Outdoor Air Flow Setpoint: 2000.0 cfm

Design CO2 Setpoint: 1000.0 ppm

Design Min OA Damper Position Setpoint: 17.0%

DCV Min Outdoor Air Damper Pos Setpoint: 5.0%

DCV CO2 Setpoint: 400.0 ppm

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