Installation Guide

Alternate NOVAR DCV Kit

Used with Precedent™ Packaged Units with ReliaTel™ Controls

Model Number: NOVAR 3051with ReliaTel Controls

Unit must have a separate Ventilation Override kit installed.(Precedent - BAYNVOR001B)
Unit must be wired per CO_2 Installers Guide (Precedent - BAYCO2K001B, BAYCO2K003B)

⚠SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

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Introduction

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

⚠WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labeling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

⚠WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Trane personnel should always follow local regulations.**

Overview of Manual

This booklet describes proper installation, operation, and maintenance procedures for air cooled systems. By carefully reviewing the information within this manual and following the instructions, the risk of improper operation and/or component damage will be minimized. It is important that periodic maintenance be performed to help assure trouble free operation. Should equipment failure occur, contact a qualified service organization with qualified, experienced HVAC technicians to properly diagnose and repair this equipment.

General

An economizer must be installed and functional before attempting to install the NOVAR DCV Kit. CO_2 sensors detect and control the carbon dioxide level in the conditioned space by measuring CO_2 concentration, comparing it with a user-adjustable set point and sending a corresponding control signal to the economizer module. This causes the economizer damper to be positioned so that sufficient fresh air is introduced into the conditioned space to reduce and maintain the CO_2 concentration to a minimum level as selected by the user.

Inspection

1. Unpack all components of the NOVAR DCV kit.
2. Check carefully for any shipping damage. If any damage is found it must be reported immediately and a claim made against the transportation company.

Parts List

Precedent NOVAR 3051with ReliaTel Controls*

- 1 -Wire harness with imbedded 21KΩ resistor and instructions for mounting.

Note: *Unit must be wired per CO2 Installers Guide. (Precedent - BAYCO2K001B, BAYCO2K003B)*

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Installation

⚠ WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

1. Remove Compressor access panel, Return air/Filter access panel and Fan access panel.
2. Disconnect wire number "146A" from the MAS sensor. See Figure 3.
3. Connect the new wire from the NOVAR DCV kit "260A" to "146A". See Figure 4.

Note: *A female/female jumper may be necessary to accomplish Step 3.*

4. Reconnect the mass air sensor (MAS) to the kit wire "260B". See Figure 4.
5. Route the remainder of the wire in the kit harness through to the NOVAR control box.

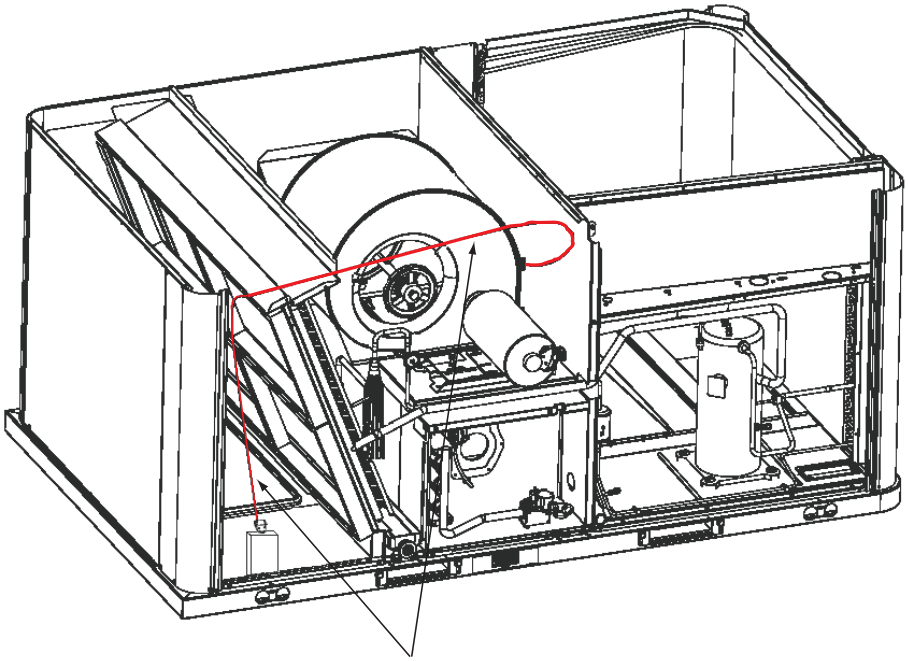
Note: *May require loosing the top panels to route the remainder of the wire to the NOVAR control box.*

6. Finish connecting the NOVAR DCV kit wire "238A " to the number "3" (normally closed) terminal on the "Damper" relay. See Figure 4.

Unit Close up

1. Wire tie new wire(s) to existing wiring harness.
2. Replace the access panels that were removed in step 1 of installation instructions.

Figure 1. Precedent Wire Routing (A through D cabinets)



Precedent Wire Routing for NOVAR DCV Kit

Figure 2. Precedent Wire Routing (E cabinet)

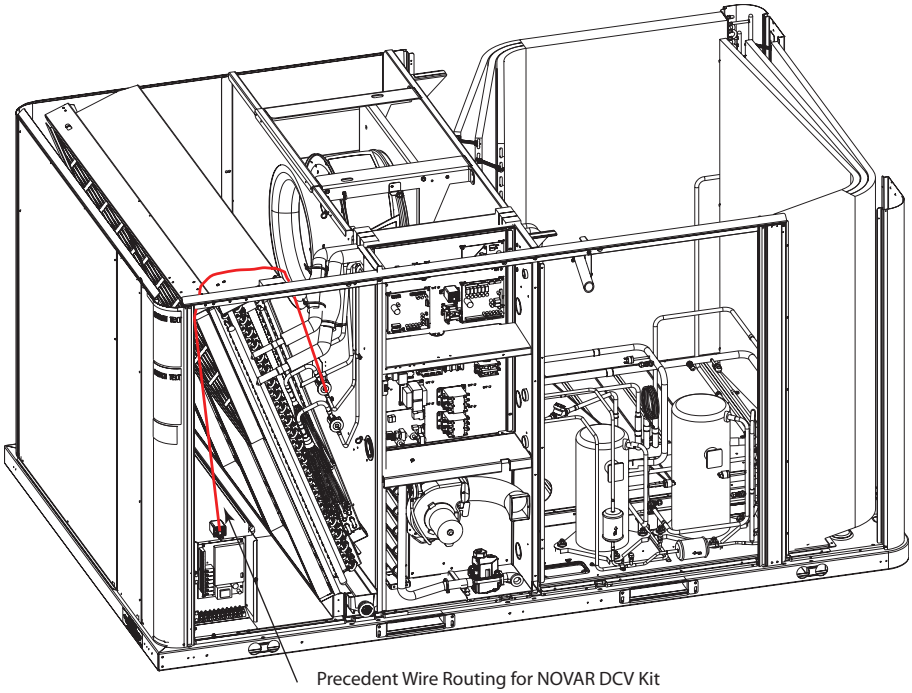


Figure 3. Current Precedent wiring

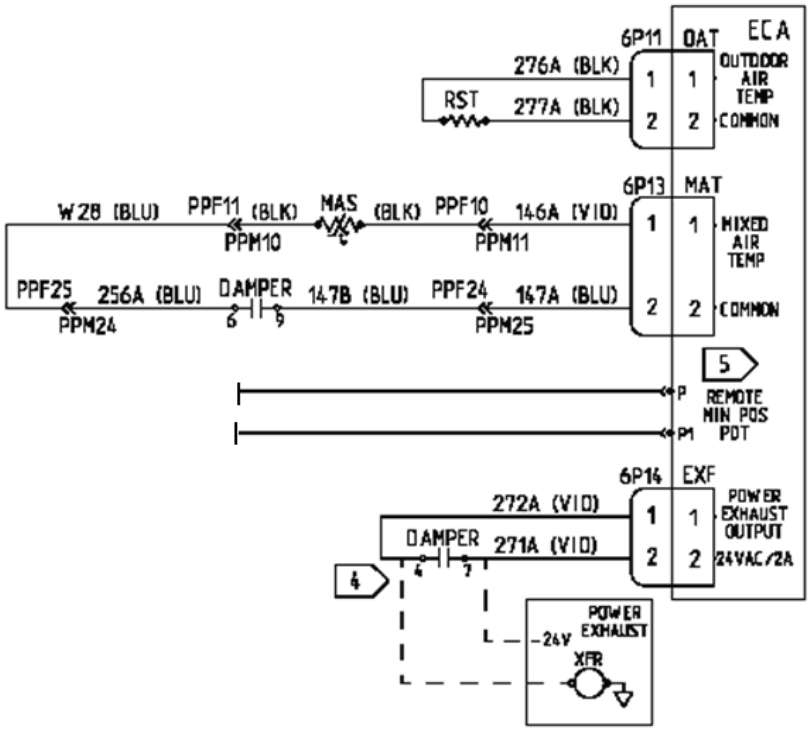
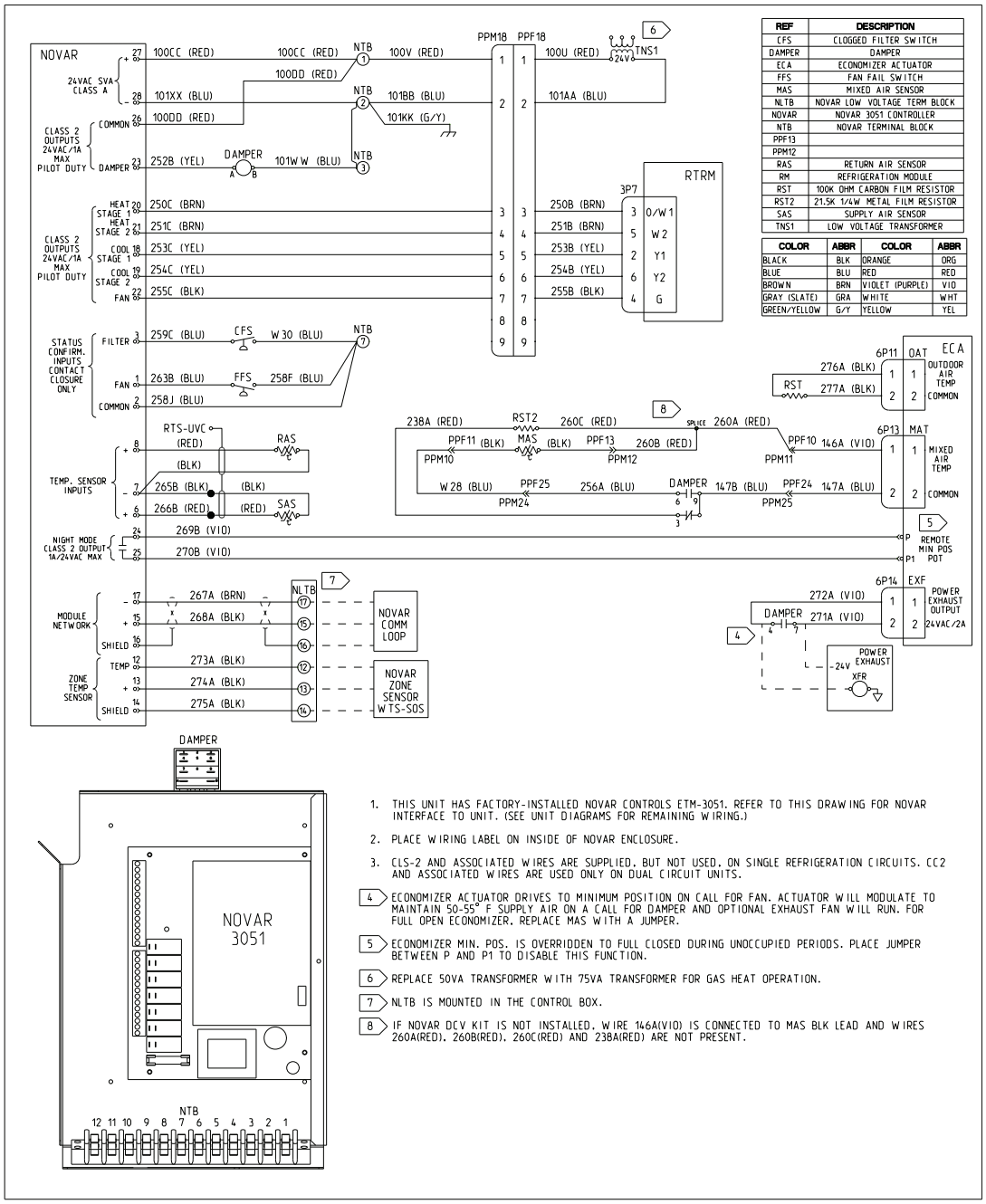


Figure 4. Precedent wiring after the NOVAR DCV kit has been installed



REF	DESCRIPTION
CFS	CLOGGED FILTER SWITCH
DAMPER	DAMPER
ECA	ECONOMIZER ACTUATOR
FFS	FAN FAIL SWITCH
MAS	MIXED AIR SENSOR
NLTB	NOVAR LOW VOLTAGE TERM BLOCK
NOVAR	NOVAR 3051 CONTROLLER
NTB	NOVAR TERMINAL BLOCK
PPF13	
PPM12	
RAS	RETURN AIR SENSOR
RM	REFRIGERATION MODULE
RST	100K OHM CARBON FILM RESISTOR
RST2	21.5K 1/4W METAL FILM RESISTOR
SAS	SUPPLY AIR SENSOR
TNS1	LOW VOLTAGE TRANSFORMER

COLOR	ABBR	COLOR	ABBR
BLACK	BLK	ORANGE	ORG
BLUE	BLU	RED	RED
BROWN	BRN	VIOLET (PURPLE)	VIO
GRAY (SLATE)	GRA	WHITE	WHT
GREEN/YELLOW	G/Y	YELLOW	YEL

1. THIS UNIT HAS FACTORY-INSTALLED NOVAR CONTROLS ETM-3051. REFER TO THIS DRAWING FOR NOVAR INTERFACE TO UNIT. (SEE UNIT DIAGRAMS FOR REMAINING WIRING.)
2. PLACE WIRING LABEL ON INSIDE OF NOVAR ENCLOSURE.
3. CLS-2 AND ASSOCIATED WIRES ARE SUPPLIED, BUT NOT USED, ON SINGLE REFRIGERATION CIRCUITS. CC2 AND ASSOCIATED WIRES ARE USED ONLY ON DUAL CIRCUIT UNITS.
4. ECONOMIZER ACTUATOR DRIVES TO MINIMUM POSITION ON CALL FOR FAN. ACTUATOR WILL MODULATE TO MAINTAIN 50-55° F SUPPLY AIR ON A CALL FOR DAMPER AND OPTIONAL EXHAUST FAN WILL RUN. FOR FULL OPEN ECONOMIZER, REPLACE MAS WITH A JUMPER.
5. ECONOMIZER MIN. POS. IS OVERRIDDEN TO FULL CLOSED DURING UNOCCUPIED PERIODS. PLACE JUMPER BETWEEN P AND P1 TO DISABLE THIS FUNCTION.
6. REPLACE 50VA TRANSFORMER WITH 75VA TRANSFORMER FOR GAS HEAT OPERATION.
7. NLTB IS MOUNTED IN THE CONTROL BOX.
8. IF NOVAR DCV KIT IS NOT INSTALLED, WIRE 146A(VIO) IS CONNECTED TO MAS BLK LEAD AND WIRES 260A(RED), 260B(RED), 260C(RED) AND 238A(RED) ARE NOT PRESENT.

DCV Setup, Damper Position and CO2 Setpoint

Note: *Before you begin it would be helpful to turn the fan "ON" and conduct the Minimum Position Setpoint procedure used WITHOUT CO_2 to obtain and record visually the potentiometer setting and/or the corresponding DC voltage settings for the min and max required to meet ASHRAE standards.*

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

1. Power is to be turned off to unit for this procedure.
2. Connect CO_2 sensor to LTB terminals per installers guide and ensure CO_2 sensor is working correctly.

Note: *The unit/Economizer Control Actuator (ECA) module must see a working CO_2 sensor at start up in order to enable DCV. DCV will be disabled anytime there is an invalid CO_2reading.*

3. Set DCV Minimum Position to meet regulatory requirements using the "MIN POS, DCV MAX" potentiometer.

Note: *To adjust the position setting for the required ventilation air, turn the "MIN POS, DCV MAX" potentiometer clockwise 'OPEN' to increase the amount of ventilation, or counterclockwise 'CLOSE' to decrease the amount of ventilation. Full clockwise = 40%, Full counterclockwise = 0% (damper closed).*

4. Set Design Minimum position to meet code requirements using "MIN POS, Design" potentiometer.

Note: *To adjust the position setting for the required ventilation air, turn the MIN POS, Design potentiometer clockwise 'OPEN' to increase the amount of ventilation, or counterclockwise "CLOSE" to decrease the amount of ventilation. Full clockwise = 50%, Full counterclockwise = 10%.*

5. Set DCV Minimum CO2 Setpoint to desired value using " DCV SETPOINT, LL" potentiometer.

Note: *To adjust the potentiometer, turn clockwise to increase ppm, counterclockwise to decrease ppm. Range is 300 - 1900 ppm.*

6. Set Building CO2 Setpoint to desired value using "DCV SETPOINT, UL" potentiometer.

Note: *To adjust the potentiometer, turn clockwise to increase ppm, counterclockwise to decrease ppm. Range is 1000 - 2000 ppm.*

7. DCV Damper and CO_2 settings are now complete.

Note: *With no fan operation there will be no damper movement. Because of this adjustments will be approximate. Better accuracy can be obtained by connecting a DC voltmeter to the "2-10 VDC Damper Position" terminals on the ECA module to check/verify the adjustments that have been made. Refer to the table below for help approximating the damper blade position.*

Table 1. Voltage' to 'Percent Open' Reference Table

Approx. DC Voltage	Percent Open
2	0%
3	12.5%
3.8	25%
4.7	37.5%
5.8	50%

Single Setpoint for CO_2-Based DCV*

Outdoor intake flow (V_{ot}) is adjusted to maintain the indoor CO_2 concentration at $C_{s\text{-}min}$ as population changes. If the OA damper reaches Vot-min and the population in the zone continues to drop, the OA damper remains at Vot-min. This over ventilates the zone, so that the indoor CO_2 concentration drifts downward. Conversely, if the OA damper reaches Vot-design and the population in the zone continues to increase, the OA damper remains at the code-required Vot-design.

Note: *Unit must have a separate Ventilation Override kit installed (BAYNVOR001B).*

1. Calculate the "Design Minimum" OA damper position by determining the design outdoor intake airflow ($V_{ot\text{-}design}$) for the zone.

   $V_{ot\text{-}design} = (R_p \times P_z) + (R_a \times A_z)$

   where,

   R_p = required outdoor airflow rate per person, cfm/person

   P_z = design zone population, number of people

   R_a = required outdoor airflow rate per unit area, cfm/ft^2

   A_z = zone floor area, ft^2

   Example calculation for a retail sales floor:

   R_p = 7.5 cfm/person *

   R_a = 0.12 cfm/ft^2 *

   A_z = 1,000 ft^2

   P_z = 15 people

   * For a retail sales floor, per Table 6-1 of ASHRAE Standard 62.1-2004

   $V_{ot\text{-}design}$ = (7.5 x 15) + (0.12 x 1000) = 233 cfm ("Design Minimum" OA damper position)

2. Calculate the "DCV Minimum" OA damper position by determining the outdoor intake airflow ($V_{ot\text{-}min}$) at an assumed minimum (non-zero) population.

   $V_{ot\text{-}min} = (R_p \times P_{z\text{-}min}) + (R_a \times A_z)$

   where,

   $P_{z\text{-}min}$ = reasonable value (other than zero) to represent a typical minimum zone population, number of people

   Example calculation for a retail sales floor:

   $P_{z\text{-}min}$ = 5 people (1/3 of design population, for example)

   $V_{ot\text{-}min}$ = (7.5 x 5) + (0.12 x 1000) = 158 cfm ("DCV Minimum" OA damper position)

3. Calculate the "DCV Setpoint" by determining the indoor CO2 concentration (Cs) that corresponds to the "DCV Minimum" OA damper position.

   $$C_s = C_o + \frac{N}{(V_{ot\text{-}min} / P_{z\text{-}min})}$$

   where,

   Co = CO_2 concentration in the outdoor air, ppm

   N = CO_2 generation rate, cfm/person

Single Setpoint for CO_2-Based DCV*

Example calculation for a retail sales floor:

C_o = typically varies little for a given building location, so it is considered constant = 400 ppm, for example

N = 0.015 cfm/person (for an activity level between walking and seated, light work)

$$C_{s\text{-}min} = 400 \text{ ppm} + \left[\frac{0.015 \text{ cfm/person}}{(158 \text{ cfm} / 5 \text{ people})} \right] \times 1{,}000{,}000 = 875 \text{ ppm} \quad \text{("DCV Setpoint")}$$

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