



## Young Regulator Co.

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Submit DA-CO2-xx

### Demand-Air™ CO<sub>2</sub> DA-CO2-XX Round Modulating Damper and Sensor for Demand Response Ventilation

#### Application and Design

The Demand-Air™ Kit (DA-CO2-XX) is the simple answer to Demand Response Ventilation. The Carbon Dioxide Sensor monitors concentrations in the space and causes the damper motor to modulate open or closed as required to maintain a healthful indoor environment while reducing operating cost. The Damper is available in any round size you need. The kit features a high-quality Belimo brushless DC motor. To preclude over-ventilation, the damper begins to open at 800ppm and is full open by 1200ppm. 24VAC Transformer included.

#### 5 Year Parts Warranty



Standard Construction	
Shell	Galvanized Steel
One end straight one crimped	4" to 9" 24 ga. Shell Length 8" 10" to 20" 20 ga.
Blade	Stamped 20 ga. Galvanized Steel
Shaft	1/2" Plated Steel
Bushings	Oil Impregnated Bronze
Low-Leak Seals	EPDM Rubber
Sensor Data	
Supply Power	24VAC ± 20%
Power Consumption	< 1 Watt (average)
Output Signal	0-10 VDC
Sensor Dimensions	5.12"(h) x 3.35"(w) x 1.18"(d)
Sensor Coverage Area	7,500 sq. ft. (max)
Calibration Life cycle	15 years
Sensor Technology	Single Beam Infrared (NDIR)

Belimo LMB24- SR Actuator	
24V, 2-10 VDC Control w/ Position Feedback	
Volts / Watts /VA	24VAC / 1.5W / 3VA
Noise	< 35dB(A)
Timing	95 Seconds Constant
Torque	45 in-lbs
Reflective Position Indicator	
Options	
2 POSITION DAMPER MOTOR Damper fully opens when CO <sub>2</sub> PPM exceed desired level. Damper will drive closed when below.	
AUXILIARY SWITCH Adjustable Auxiliary Switch contact made to engage another device such as a fan to assist with ventilation.	
Stainless Steel Available	
Duct Mount Sensor Available	



Quantity	Diameter	Notes
<b>Project</b>	<b>Location</b>	
<b>Contractor</b>	<b>Design Specifier</b>	

## Demand Response Ventilation

ASHRAE Standards 62.1 (commercial spaces) and 62.2 (low-rise residential) prescribe ventilation rates/air changes to ensure buildings are healthy, productive places for people to live and work. Bringing in fresh outside air is great but expensive because it must be dried and heated or cooled. Demand Response Ventilation is simply introducing only the fresh air required based on Actual Demand.

**Why Carbon Dioxide?** People breath at a relatively constant rate, carbon dioxide is a good measure of how many people are using a particular space and how much fresh-air they require. ASHRAE has set 1000 ppm as a high normal CO<sub>2</sub> concentration. Above that point people may start to feel stuffy or notice unpleasant levels of bioeffluence.

## Case Study

To illustrate how 62.1 works, consider a simplified branch bank building. Table 1 outlines how the interior space is configured and the airflow requirements for each zone.

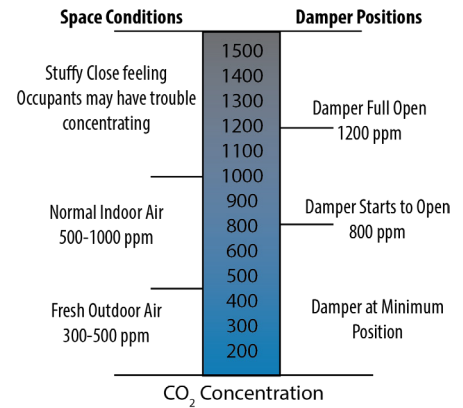


There are Requirements for each square foot depending on its usage and for each person in a particular space.

Table 2 Compares three scenarios

1. Uncontrolled Intake of 62.1 required air all the time.
2. Uncontrolled intake of required air only when the bank is open.
3. Each space being fully occupied only half the time.

Savings comes from closing the intake when CO<sub>2</sub> is low because occupancy is less than the planned maximum.



Zone	Floor Space	CFM / Sqft	Area Req.	People	CFM / Person	People Req.
Lobby	1200	.06	72	10	7.5	75
Offices	1000	.06	60	7	5	35
Vault	250	.06	15	1	5	5
Break Room	150	.12	18	1	5	5
Storage	100	.06	6	0	5	0
Corridors	300	.06	18	0	5	0
<b>Totals</b>	3000	Fresh Air Req	189	19	Fresh Air Req	120
			<b>Total Fresh Air Requirement</b>		<b>309 CFM</b>	

Scenario	Min/Yr	62.1 Mandate	CFM/Yr	Cost to Operate	Savings
Uncontrolled 24/7	525,600	309 CFM	262,800,000	\$ 618.00	Baseline
Uncontrolled 12 hr workday	183,600	309 CFM	56,732,400	\$ 257.88	<b>\$ 402.12</b>
Half Occupancy 12 hr Workday	183,600	150 CFM	27,540,400	\$ 104.80	<b>\$ 513.20</b>

\* Cost estimates taken from Paul Raymer's Article, "The Cost of Ventilation", published in Ventilation News and Views blog August 2013.

Boston MA 3299 55 degree days  
Gas @ \$1.28/therm  
Electric @ \$0.18/kWh

## Demand-Air™ CO<sub>2</sub> Specification

The Demand-Air CO<sub>2</sub> is a controlled fresh-air intake system that can be used either as a standalone product or as part of a building management system. Damper action will be modulating and proportional to carbon dioxide concentration in the space. Blade must be at least 20 gage galvanized steel and feature EPDM Low-Leak seals. Shell must be at least 24 gage for sizes 4 inches through 10 inches and 20 gage for dampers 12 inches through 20 inches. Shaft shall be ½ inch plated steel and turn inside an oil-impregnated bronze bearing. The damper will be driven by an electronic, direct coupled, brushless DC motor. The motor must accept either a 2 to 10 vdc or a 4 to 20 mA input from the CO<sub>2</sub> sensor.

The motor must also output that signal as feedback to a building management system. It will have a reflective position indicator and adjustable position stops. The motor must be able to deliver 45 inch pounds of torque and have a 95 second timing interval. The motor shall not produce sound at more than 35dB{A}. The sensor must feature Single Beam Non-Dispersive Infrared Technology and Automatic Background Calibration. It should be able to sense Carbon Dioxide from 0 to 2,000 parts per million and display the same on an attractive led display. It should have a calibration interval of not less than 15 years. The sensor must have factory configurable scaling. Total system draw should not exceed 4 Watts. The system must carry a 5 year parts warranty