



Carbon Dioxide Monitor

Model 2156 0.300% (3000 ppm)

Features:

- Complete self contained units
- **Non Dispersive InfraRed (NDIR)** technology
- **ECONO-CAL™** calibration kit available
- Fast warm-up
- Industrially robust: **0-5 V** and **4-20 mA** outputs
- **Dual** level detect set points and relays
- **Audio Alarm** beeps when **Low** level exceeded, **ON** continuous when **High** level exceeded
- Cost effective - High quality
- No moving parts - gas diffusion sampling
- Solid state throughout - **linear** outputs
- Humidity and moisture resistant
- Dust-tight water resistant fiberglass enclosure
- **Digital** readout with 0.56 inch **red LED** display

Model 2156 0.300% (3000 ppm) CO₂

Display of 0.040% is = 400 ppm (fresh air)

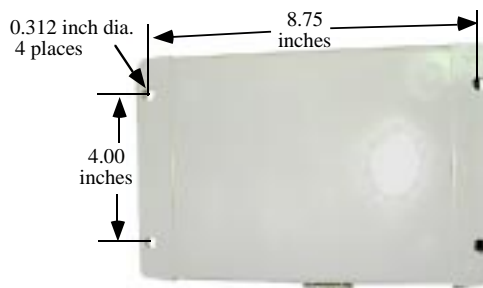
GREEN
Power ON
Indicator

YELLOW
Low Limit
Exceeded
Indicator

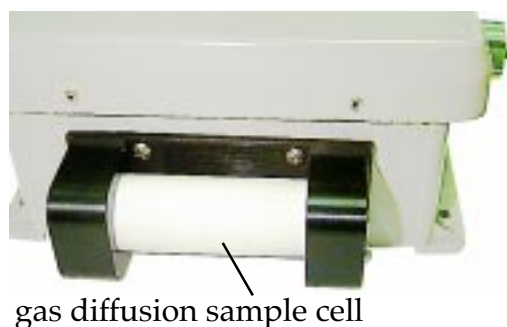
RED
High Limit
Exceeded
Indicator



Rear view:



Clearance: 5 x 8.5 x 10.5 inches



Cable grommet for signal wires and relay contact connections. AC power cable and plug. **Audio Alarm** beeps at low set point, on at high set point. Internal switch disables alarm

Application:

- Greenhouses
- Mushroom Farms
- Wineries
- Breweries
- Food Processing
- Ambient Air Quality

The **VALTRONICS** Model 2156 is a non-dispersive infrared (NDIR) carbon dioxide monitor for use as an outdoor air sensor. It produces a control signal proportional to carbon dioxide concentration. This control signal is then used to provide remote control of the outdoor air dampers; thereby controlling the fresh air intake or varying the ventilation rates while maintaining safe indoor air quality. Dual adjustable level detect circuits may be used for alarms.



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Description:

The Model 2156 is a non dispersive infrared gas monitor designed as a fully functioning stand-alone unit for the continuous monitoring of carbon dioxide. The optical system is not effected by humidity. The diffusion gas cell is not effected by variations in relative humidity from 0 to 95%. It has a 0.56 inch high digital readout and two adjustable level detect circuits with associated front panel indicators (yellow and red) and SPDT relay contacts.

This low power, water resistant system makes this an ideal remote sensor to interface with any central control unit. It has linear 0 to 5 volt and 4 to 20 mA current loop outputs. In either configuration, interfaced or stand-alone, this device is an excellent choice for any environment in which the level of carbon dioxide must be monitored or controlled.

Specifications: 2156 0.300% (3000 ppm) CO₂

- Method: **N.D. I. R.** (Non-dispersive Infra-red) Gas diffusion type gas cell
- Gas: Carbon dioxide (CO₂)
- Range: 0-**0.300%** (3000 ppm) CO₂
- Accuracy: ±0.08% CO₂ from 0 to 0.150% CO₂ & ± 5% of reading from 0.15% to 0.3% CO₂
- Repeatability: ± 1% of full scale (challenge with same gas sample and assure zero)
- External Power Source: 115/220 VAC , 50/60 Hz
- Power Consumption: less than 8 watts @ 115 VAC
- Adjustable Set Points: Dual set points adjustable from 400 ppm CO₂ to full scale (audio alarms below)
..... Low SET Point adjusted to 0.1% and High SET Point to 0.2% unless specified on PO
- SET POINT Relay Contact Rating: ... SPDT contacts: non-latching N.C., N.O. 3 amp max. at 250 VAC or 30 VDC
- Display: 0.56 inch high **RED** digital Light Emitting Diode (**LED**) readout
- Output Signals:
 - Voltage: **0 to 5 volt** = 0 to **0.300%** CO₂ (linear scale data attached)
 - Current Loop: **4 to 20 mA** = 0 to **0.300%** CO₂ (linear scale data attached) 0 to 550Ω load
 - Audio Alarms: Beeps once a second when Low SET Point is exceeded, continuous when High exceeded
 - Set Point Indicators: Yellow flashes when Low SET Point is exceeded, RED on continuous when High exceeded
- Zero Drift at Constant Temperature: Less than 2% of full scale per month (random not cumulative)
- Zero Noise at Constant Temperature: Less than 50 mV peak to peak measured during any 20 second period
..... measured on voltage output (equals less than 1% of full scale)
- Zero Drift due to Ambient Temperature: Less than 0.5% of full scale per degree Centigrade
- Operating Temperature Range: .. 0 to 50°C (32° to 122°F) see **Application Note A12**
- Storage Temperature Range: -40 to +70°C (-40 to +158°F)
- Operating Humidity Range: 0 to 95% RH (non-condensing) in gas cell see **Application Note A30**
- Weight: Less than 6 pounds (< 2.72 kilograms)
- External Clearance Dimensions: . 5 inches high, 8.5 inches wide, 10.5 inches long
- Mounting, four 0.312 inch dia holes ... Mounting centers 4.0 inch x 8.75 inch: see diagram



Terminal block TB1 has a linear 0 to 5 volt output signal on pin number 9 with respect to pin number 8 which is signal common. Pin number 7 has a linear 4 to 20 mA current loop signal referenced again to pin number 8. See the wiring diagram on page 4.

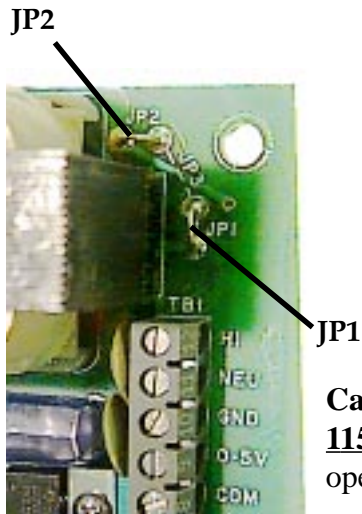
The table below shows both the linear 0 to 5 volt and the 4 to 20 mA current loop responses to 0 to 0.3% carbon dioxide diffusing through the gas cell. The wires from TB1 go through the strain relief cable grommet shown on page 4. The resulting wire bundle must be between 0.090 and 0.25 inch diameter to be properly strain relieved.

VALTRONICS 0.3% & 5 volt full scale

Gas in %	Output in volts	±0.08% CO2		4-20 mA output	±0.08% CO2		Gas in %	Output in volts	±5% of Reading		4-20 mA output	±5% of Reading	
		Max.	Min.		Max.	Min.			Max.	Min.		Max.	Min.
0.000	0.000	0.125	-0.125	4.00	4.40	3.60	0.155	2.583	2.708	2.458	12.27	12.67	11.87
0.005	0.083	0.208	-0.042	4.27	4.67	3.87	0.160	2.667	2.792	2.542	12.53	12.93	12.13
0.010	0.167	0.292	0.042	4.53	4.93	4.13	0.165	2.750	2.875	2.625	12.80	13.20	12.40
0.015	0.250	0.375	0.125	4.80	5.20	4.40	0.170	2.833	2.958	2.708	13.07	13.47	12.67
0.020	0.333	0.458	0.208	5.07	5.47	4.67	0.175	2.917	3.042	2.792	13.33	13.73	12.93
0.025	0.417	0.542	0.292	5.33	5.73	4.93	0.180	3.000	3.125	2.875	13.60	14.00	13.20
0.030	0.500	0.625	0.375	5.60	6.00	5.20	0.185	3.083	3.208	2.958	13.87	14.27	13.47
0.035	0.583	0.708	0.458	5.87	6.27	5.47	0.190	3.167	3.292	3.042	14.13	14.53	13.73
0.040	0.667	0.792	0.542	6.13	6.53	5.73	0.195	3.250	3.375	3.125	14.40	14.80	14.00
0.045	0.750	0.875	0.625	6.40	6.80	6.00	0.200	3.333	3.458	3.208	14.67	15.07	14.27
0.050	0.833	0.958	0.708	6.67	7.07	6.27	0.205	3.417	3.542	3.292	14.93	15.33	14.53
0.055	0.917	1.042	0.792	6.93	7.33	6.53	0.210	3.500	3.625	3.375	15.20	15.60	14.80
0.060	1.000	1.125	0.875	7.20	7.60	6.80	0.215	3.583	3.708	3.458	15.47	15.87	15.07
0.065	1.083	1.208	0.958	7.47	7.87	7.07	0.220	3.667	3.792	3.542	15.73	16.13	15.33
0.070	1.167	1.292	1.042	7.73	8.13	7.33	0.225	3.750	3.875	3.625	16.00	16.40	15.60
0.075	1.250	1.375	1.125	8.00	8.40	7.60	0.230	3.833	4.025	3.642	16.27	16.88	15.65
0.080	1.333	1.400	1.267	8.27	8.48	8.05	0.235	3.917	4.113	3.721	16.53	17.16	15.91
0.085	1.417	1.488	1.346	8.53	8.76	8.31	0.240	4.000	4.200	3.800	16.80	17.44	16.16
0.090	1.500	1.575	1.425	8.80	9.04	8.56	0.245	4.083	4.288	3.879	17.07	17.72	16.41
0.095	1.583	1.663	1.504	9.07	9.32	8.81	0.250	4.167	4.375	3.958	17.33	18.00	16.67
0.100	1.667	1.750	1.583	9.33	9.60	9.07	0.255	4.250	4.463	4.038	17.60	18.28	16.92
0.105	1.750	1.838	1.663	9.60	9.88	9.32	0.260	4.333	4.550	4.117	17.87	18.56	17.17
0.110	1.833	1.925	1.742	9.87	10.16	9.57	0.265	4.417	4.638	4.196	18.13	18.84	17.43
0.115	1.917	2.013	1.821	10.13	10.44	9.83	0.270	4.500	4.725	4.275	18.40	19.12	17.68
0.120	2.000	2.100	1.900	10.40	10.72	10.08	0.275	4.583	4.813	4.354	18.67	19.40	17.93
0.125	2.083	2.188	1.979	10.67	11.00	10.33	0.280	4.667	4.900	4.433	18.93	19.68	18.19
0.130	2.167	2.275	2.058	10.93	11.28	10.59	0.285	4.750	4.988	4.513	19.20	19.96	18.44
0.135	2.250	2.363	2.138	11.20	11.56	10.84	0.290	4.833	5.075	4.592	19.47	20.24	18.69
0.140	2.333	2.450	2.217	11.47	11.84	11.09	0.295	4.917	5.163	4.671	19.73	20.52	18.95
0.145	2.417	2.538	2.296	11.73	12.12	11.35	0.300	5.000	5.250	4.750	20.00	20.80	19.20
0.150	2.500	2.625	2.375	12.00	12.40	11.60							

Accuracy = ±5% of reading from 0.15 to 0.3 % CO2 and ±0.08% CO2 from 0 to 0.15%

Chart revised on 10/13/97



Caution: Note jumper configuration for either **115 VAC** (JP1 & JP2) or **230 VAC** (JP3 only) operation.



#10-32 gas calibration hose barb may be screwed in place of the # 10-32 pan head screw.

Preventive Maintenance:

Gas calibration should be done every six months. At least calibration with zero gas (nitrogen) every six months and both zero and span (certified 0.1% CO₂) at least once a year. Span calibration using 0.1% CO₂ would give you better accuracy on the low end of the scale where most measurements may occur (see Application Note A11 for an example of typical Industrial Safety CO₂ measurements). A calibration log book where you record how much ZERO and SPAN had drifted before it was recalibrated will help you decide what the optimum duration between calibrations should be. See **Application Note A35** for detailed calibration instructions. The flow rate should be set to about 0.3 Liters per minute.

