

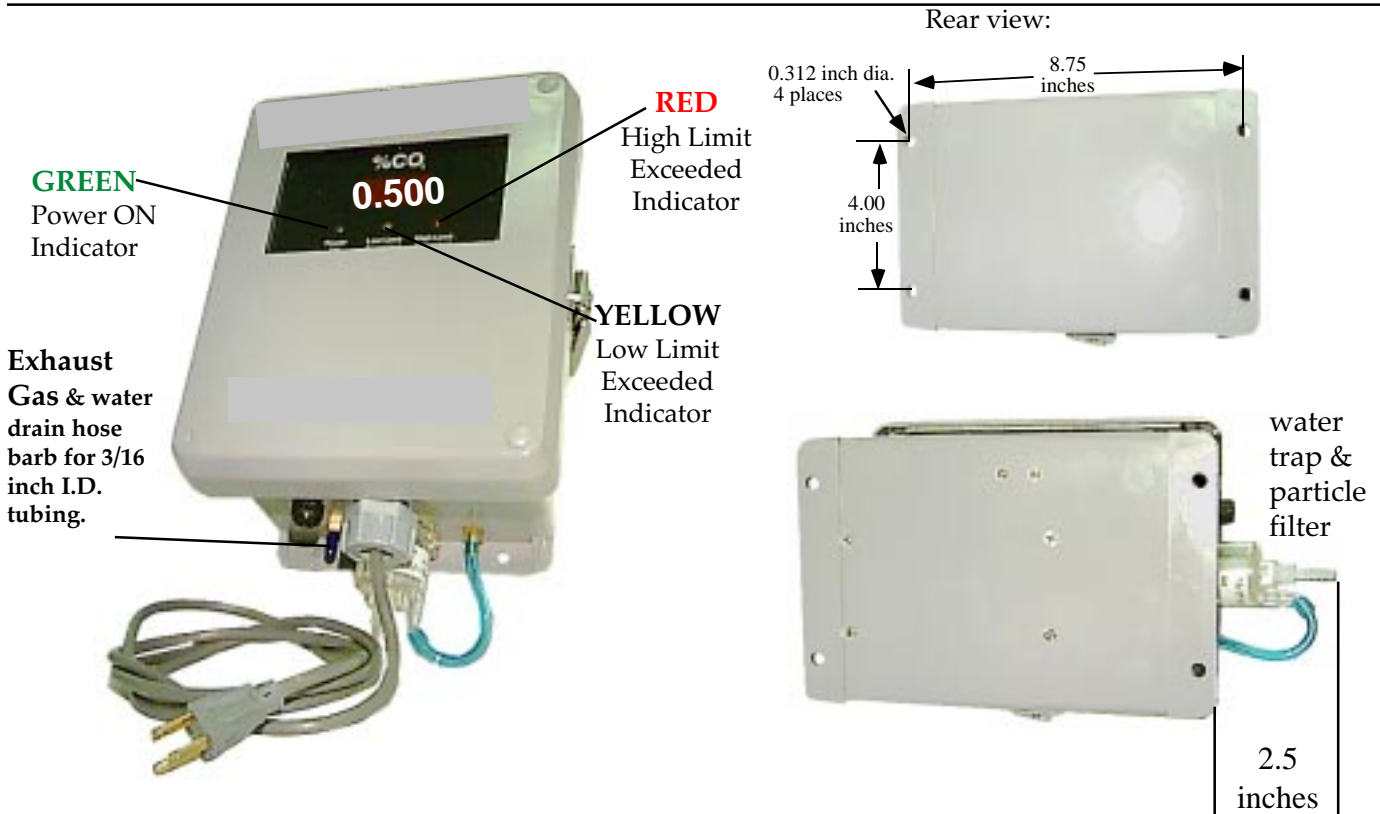
Carbon Dioxide Monitor

Model 2166 0.5% CO₂

Features:

- Complete self contained units
- Non dispersive infrared (NDIR) technology
- Precision gas calibration kit available
- Fast warm-up
- Industrially robust: 0-5 V and 4-20 mA outputs
- Dual level detect set points and relays
- Cost effective - High quality
- Sample draw system with pump switch for calib.
- 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 2166 0.500% (5000 ppm) CO₂



Fresh air is about 0.04% or 400 ppm CO₂

Overall Clearance: 5 x 7.5 x 13 inches

Application:

- Greenhouses
- Mushroom Farms
- Wineries
- Breweries
- Food Processing
- **Outside Air Monitor**

The VALTRONICS Model 2166 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.



Carbon Dioxide Monitor

Model 2166 0.500%

Description:

The Model 2166 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 pumped gas sampling circuit has a self-draining water trap. This eliminates difficulties with water condensation in the sample lines. 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: 2166 0.500 % (5000 ppm) CO₂

Method: N.D. I. R. (Non-dispersive Infra-red) Gas sample pump (see **App note A67**)
Gas: Carbon dioxide (CO₂)
Range: **0-0.500%** (5000 ppm) CO₂
Accuracy: $\pm 0.013\%$ CO₂ from 0 -0.25% CO₂ and $\pm 5\%$ of reading from 0.25% to 0.5% CO₂
Repeatability: $\pm 1\%$ 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 0.05% CO₂ to full scale (audio alarms below)
..... Low SET Point adjusted to 0.3% and High SET Point to 0.5% 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 digital Light Emitting Diode (**RED** LED) readout
Output Signals:
Voltage: 0 to 5 volt = 0 to 0.500% CO₂ (linear scale data attached)
Current Loop: 4 to 20 mA = 0 to 0.500% CO₂ (linear scale data attached) 0 to 550 Ω 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: 5 to 95% RH (non-condensing) in gas cell See **App Note A30**
Weight: Less than 6 pounds (< 2.72 kilograms)
External Clearance Dimensions: . 5 inches high, 7.5 inches wide, 13 inches long (including 3.5" water trap)
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 0.5% carbon dioxide being drawn through the gas cell by the sample pump. 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 0.500 % (5000 ppm) & 1 volt full scale

Chart rev on 5-6-98

Gas Concentration in %	Output in volts	±5% of Reading		4-20 mA output	±5% of Reading		4-20 mA output across 250Ω in volts
		Max.	Min.		Max.	Min.	
0.000	0.000	0.125	-0.125	4.00	4.40	3.60	1.00
0.010	0.100	0.225	-0.025	4.32	4.72	3.92	1.08
0.020	0.200	0.325	0.075	4.64	5.04	4.24	1.16
0.030	0.300	0.425	0.175	4.96	5.36	4.56	1.24
0.040	0.400	0.525	0.275	5.28	5.68	4.88	1.32
0.050	0.500	0.625	0.375	5.60	6.00	5.20	1.40
0.060	0.600	0.725	0.475	5.92	6.32	5.52	1.48
0.070	0.700	0.825	0.575	6.24	6.64	5.84	1.56
0.080	0.800	0.925	0.675	6.56	6.96	6.16	1.64
0.090	0.900	1.025	0.775	6.88	7.28	6.48	1.72
0.100	1.000	1.125	0.875	7.20	7.60	6.80	1.80
0.110	1.100	1.225	0.975	7.52	7.92	7.12	1.88
0.120	1.200	1.325	1.075	7.84	8.24	7.44	1.96
0.130	1.300	1.425	1.175	8.16	8.56	7.76	2.04
0.140	1.400	1.525	1.275	8.48	8.88	8.08	2.12
0.150	1.500	1.625	1.375	8.80	9.20	8.40	2.20
0.160	1.600	1.725	1.475	9.12	9.52	8.72	2.28
0.170	1.700	1.825	1.575	9.44	9.84	9.04	2.36
0.180	1.800	1.925	1.675	9.76	10.16	9.36	2.44
0.190	1.900	2.025	1.775	10.08	10.48	9.68	2.52
0.200	2.000	2.125	1.875	10.40	10.80	10.00	2.60
0.210	2.100	2.225	1.975	10.72	11.12	10.32	2.68
0.220	2.200	2.325	2.075	11.04	11.44	10.64	2.76
0.230	2.300	2.425	2.175	11.36	11.76	10.96	2.84
0.240	2.400	2.525	2.275	11.68	12.08	11.28	2.92
0.250	2.500	2.625	2.375	12.00	12.40	11.60	3.00
0.260	2.600	2.730	2.470	12.32	12.74	11.90	3.08
0.270	2.700	2.835	2.565	12.64	13.07	12.21	3.16
0.280	2.800	2.940	2.660	12.96	13.41	12.51	3.24
0.290	2.900	3.045	2.755	13.28	13.74	12.82	3.32
0.300	3.000	3.150	2.850	13.60	14.08	13.12	3.40
0.310	3.100	3.255	2.945	13.92	14.42	13.42	3.48
0.320	3.200	3.360	3.040	14.24	14.75	13.73	3.56
0.330	3.300	3.465	3.135	14.56	15.09	14.03	3.64
0.340	3.400	3.570	3.230	14.88	15.42	14.34	3.72
0.350	3.500	3.675	3.325	15.20	15.76	14.64	3.80
0.360	3.600	3.780	3.420	15.52	16.10	14.94	3.88
0.370	3.700	3.885	3.515	15.84	16.43	15.25	3.96
0.380	3.800	3.990	3.610	16.16	16.77	15.55	4.04
0.390	3.900	4.095	3.705	16.48	17.10	15.86	4.12
0.400	4.000	4.200	3.800	16.80	17.44	16.16	4.20
0.410	4.100	4.305	3.895	17.12	17.78	16.46	4.28
0.420	4.200	4.410	3.990	17.44	18.11	16.77	4.36
0.430	4.300	4.515	4.085	17.76	18.45	17.07	4.44
0.440	4.400	4.620	4.180	18.08	18.78	17.38	4.52
0.450	4.500	4.725	4.275	18.40	19.12	17.68	4.60
0.460	4.600	4.830	4.370	18.72	19.46	17.98	4.68
0.470	4.700	4.935	4.465	19.04	19.79	18.29	4.76
0.480	4.800	5.040	4.560	19.36	20.13	18.59	4.84
0.490	4.900	5.145	4.655	19.68	20.46	18.90	4.92
0.500	5.000	5.250	4.750	20.00	20.80	19.20	5.00

Accuracy = ±5% of reading from 0.25 to 0.50 % gas and ±0.013 % gas from 0 to 0.250 % gas





Cable grommet for signal wires
0.090 min / 0.25 max wire dia.

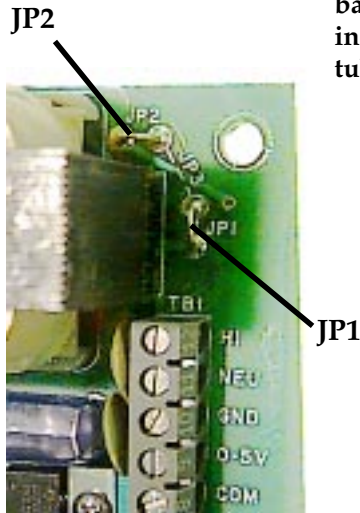
Cable grommet for
AC power cord

Audio
Alarm

Exhaust Gas
and water
drain hose
barb for 3/16
inch I.D.
tubing

Gas Inlet
hose barb
for 1/4 inch
I.D. tubing

Water Trap



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

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 2000 ppm or 3000 ppm CO₂) at least once a year. 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 A73** for detailed calibration instructions. The **pump switch should be turned OFF** during calibration and the flow rate set to about 1 to 2 Liter per minute or you can flow directly into the **inlet** side of the **hydrophobic filter** at about 0.3 to 0.5 liter per min. The filter in the water trap and the hydrophobic / particle filter inside should inspected and changed when necessary. The flow rate of the pump should be checked to see if it is still operating properly. It should be about 4 to 6 liters per minute if measured at the water trap input, Gas Inlet (both sides of the pump drawing). See **Application Note A67** for maintenance information.

