SERIES 300N

CARBON DIOXIDE ANALYZER
OPERATIONS MANUAL

INDEX

APPENDIX

ABOUT NYAD CO2 ANALYZER

The Nyad CO_2 analyzer uses a very sensitive infrared absorption sensor. The sensor is factory calibrated with a certified sample of CO_2 gas mixed with inert nitrogen. The CO_2 concentration used for a span calibration is 400 ppmv.

It is ***NOT*** recommended to use air as a calibration source. Air is about 400 ppmv CO_2, but in most cases, air is contaminated with CO_2 from other sources eg. Human exhale.

Also note that when no sample is flowing through the sensor, air will permeate into the sensor, producing an indicated concentration of about 700 to 800 ppmv CO_2.

Accurate measurements are reliable ***ONLY*** there is a positive flow of sample through the sensor.

Sample flow is regulated by a .003" orifice installed in the inlet fitting. Maximum sample pressure should be limited to 100 psig.

1. PRINCIPAL OF OPERATION

Many gases, including CO_2, absorb energy in the infrared band. This absorption is selective and occurs at specific frequencies corresponding to the resonant frequencies of bond vibrations within the molecule. Measuring a characteristic absorption enables the gas to be detected and the strength of the absorption gives a measure of the gas concentration.

The CO_2 sensor optics consists of an infrared source, a sampling cell, an infrared filter, and a detector. In addition, the sensor includes electronics to drive the source and to process the signals from the detector.

The infrared source is a lamp emitting a broad band of radiation, which then passes through the gas in the sample cell then through a filter before reaching the detector. The filter selects out a very narrow bank of frequencies corresponding to a characteristic absorption band for CO_2. The level of energy reaching the detector falls as the concentration of CO_2 increases.

2. INTRODUCTION

The NYAD Series 300N Carbon Dioxide analyzers have the following features:

a) Units of measurement:

   1) Concentration parts per million by volume (ppm).

b) Two adjustable alarm points.

   1) Analog output (0-5VDC or 4-20mA) with adjustable zero and span.

3. INSTALLATION

Connect the sample line to the 1/8FNPT bulkhead fitting labeled “inlet”. The sample pressure should not exceed 100psig. An orifice is installed in the internal tubing to limit the pressure to the CO_2 sensor. If external alarms or recording devices are to be used, then these electrical connections will have to be made. Refer to the processor board diagram for the appropriate terminal connection.

4. STARTUP ROUTINE

After power is supplied, the instrument will proceed through its startup routine with the display and indicating LED’s stepping through the following sequence:

Note: Each step is displayed for about one second.

a) All display segments ON – all LED indicators on. This tests the display and LED’s to ensure all are working.
b) “NYAD” is displayed – all LED indicators OFF.

c) Operating System Version.

d) “EE 1” is displayed.

On completion of the startup routine, the measured CO_2 concentration is displayed as ppm. If any alarm condition exists, this will be indicated by one, or both, of the red LED’s (Al 1 or Al 2). The alarm condition will indicate six seconds after the measured value is displayed.

5. FRONT PANEL CONTROLS

The NYAD Model 300N CO_2 Analyzer has two front panel controls that allow the operator to interact with the instrument.

1) UP/UNITS-DOWN—This two-position momentary switch located to the left of the display has three functions:

   a) Changes the value of set point, outputs, and constants.
   b) Changes the calibration values.
   c) Changes toggle function “Hi and Lo”

2) MODE— Momentarily pressing and releasing this switch allows the operator to access, interrogate, and reset the other major functions incorporated into this analyzer, namely, Alarm 1, Alarm 2, Output, Toggle , and Calibration.

3) POWER— Press to power ON/OFF.

6. SETTING ALARM POINTS

This monitor has two adjustable alarm set points and relays as factory standard. When the measured value of CO_2 concentration exceeds the set point for a sustained period of about 6 seconds, the alarm condition is activated, the SPDT relay (Alarm 1) is energized as well as the red front-panel LED indicator, Al 1.

To determine the current setting for ALARM 1, press the MODE button. The display will show Al 1 and then default to the current value. If this value is acceptable, unit will momentarily in about 6 seconds flash “DISP” and return to the current measured CO_2 value.

If the current setting for ALARM 1 is not acceptable, proceed as follows:

a) Press the UP/DOWN button. You can cycle up or down through the numbers one digit at a time to the desired values or hold for several seconds and the rate will shift to fast.

To set ALARM 2, proceed exactly as described above after pressing the MODE button to display Al 2 and its current value.

If the measured value of CO_2 concentration is higher than the ALARM 1 or ALARM 2 setting, the corresponding LED will illuminate above the display and energize the alarm relay thus activating any warning devices connected to it.

The Nyad CO_2 analyzer is equipped with a toggle function (A1 1T and A2 2T). Set these for Hi when alarm is to detect increasingCO_2 and Lo when detecting decreasing CO_2.

To determine the current setting for A1 1T, press the MODE button until A1 1T is displayed (Hi or Lo). If this value is acceptable, unit will time out return to display.

To set A2 2T, proceed exactly as described above after pressing the MODE button to display A2 2T (Hi or Lo).

7. SETTING ANALOG OUTPUT ("OUT")

The NYAD Series 300N Analyzer features a 0-5 VDC and 4-20mA analog output as factory standard. This signal is linearly proportional to ppm CO_2. To change span values from those set at the factory, these values must first be displayed.

EXAMPLE:

As an example, assume we wish to set the output span to range as follows:

Output		**ppm** CO_2
(oPHi)	5 volts	1,000
(oPLo)	0 volts	0

a) Display the current settings by pressing the MODE switch and cycling through Al 1, Al 2, A1 1T, A2 2T to OUTPUT. The display will read "oPLo" and then show the current value of CO_2 concentration corresponding to the Lo end of the analog output when the MODE button is pushed.

b) If this displayed value is 0, you may accept it by pressing MODE switch. If you wish to change the setting, proceed as described in Section 6, SETTING ALARM POINTS. Set the desired value using the UP/DOWN switch to cycle the numbers.

c) Press the MODE switch. The display will now read "oPHi" and then show the concentration corresponding to the Hi end (5 VDC) of the analog output scale when the MODE is pushed. If the desired value reached, the unit will momentarily in 6 seconds return to display.

d) If you wish to change the setting, set the desired value by using the UP/DOWN switch as previously described.

8. DEFAULT VALUES

Series 300N CO_2 Analyzers are preset at the factory with the following standard values:

Function	ppmv
Al 1	300
Al 2	1,000
Output (oPHi)	1,000
Output (oPLo)	00

These setting have been shown by experience to be most used by our customers. However, any of them can be changed from the front panel of the analyzer to values most suitable for your application.

9. REFERENCE TABLE

REFERENCE TABLE

AL 1	Dry Relay Contact - Alarm 1
AL 2	Dry Relay Contact - Alarm 2
A1 1t	Toggle AL 1 “Hi or Lo”
A2 2t	Toggle AL 2 “Hi or Lo”
oPHi	Analog Output “Hi”
oPLo	Analog Output “Lo”
CAL	Calibration Function
No CO_2	Sensor not detecting CO_2
EroP	Operator Error

10. CALIBRATION

The CO_2 sensor and its digital signal processor are inherently stable and will maintain their calibration over extended period with minimal maintenance.

Zero (nitrogen) and Span calibration gases must be applied to the analyzer sample inlet to check its calibration. To supply gas from a pressurized bottle, a pressure regulator, needle valve, and flow meter will be needed.

a) The CO_2 concentration of the span gas should be between 400 ppm.

b) The inlet pressure should be 100 psig or less.

c) The sensor should be powered for 30 minutes before checking its calibration.

d) Next, attach the span gas to the inlet fitting and start the flow of span gas. After the reading is equilibrated, press the MODE button. The display will pass through the alarm and output screens and show CAL. The CAL light is now on. This value should be that observed in paragraph (a).

f) Press the MODE button. CAL will show, then the value of the CO_2 concentration in the span gas will be displayed.

g) Use the up/down switch to change the value to correspond to the value of the known cal gas.

The monitor is now calibrated and ready to be placed into service. A monthly calibration cycle is recommended. To abort the procedure, press MODE.

NOTE: The calibration menu items have a time out interval which returns them to the display mode after about 6 seconds.

Specifications

Model Numbers	CO2A-320N (OEM), CO2A-330N (Rack Mount), CO2A-340N (Panel Mount), CO2A-350N (Nema 4), and CO2A-370N (Nema 7X)
Units	PPM (Parts Per Million)

Standard

Display	4 Digit LCD, 0.5” High
Alarm	Dual Dry Relay Contacts (SPDT 1A@120V)
Analog Output	0-5VDC or 4-20mA (Adjustable zero and span)
Power	120/220VAC 50/60 Hz, 1W Max
Memory	Non-Volatile Data Memory
Inlet	1/8” FNPT
Calibration	Auto Calibration

Options

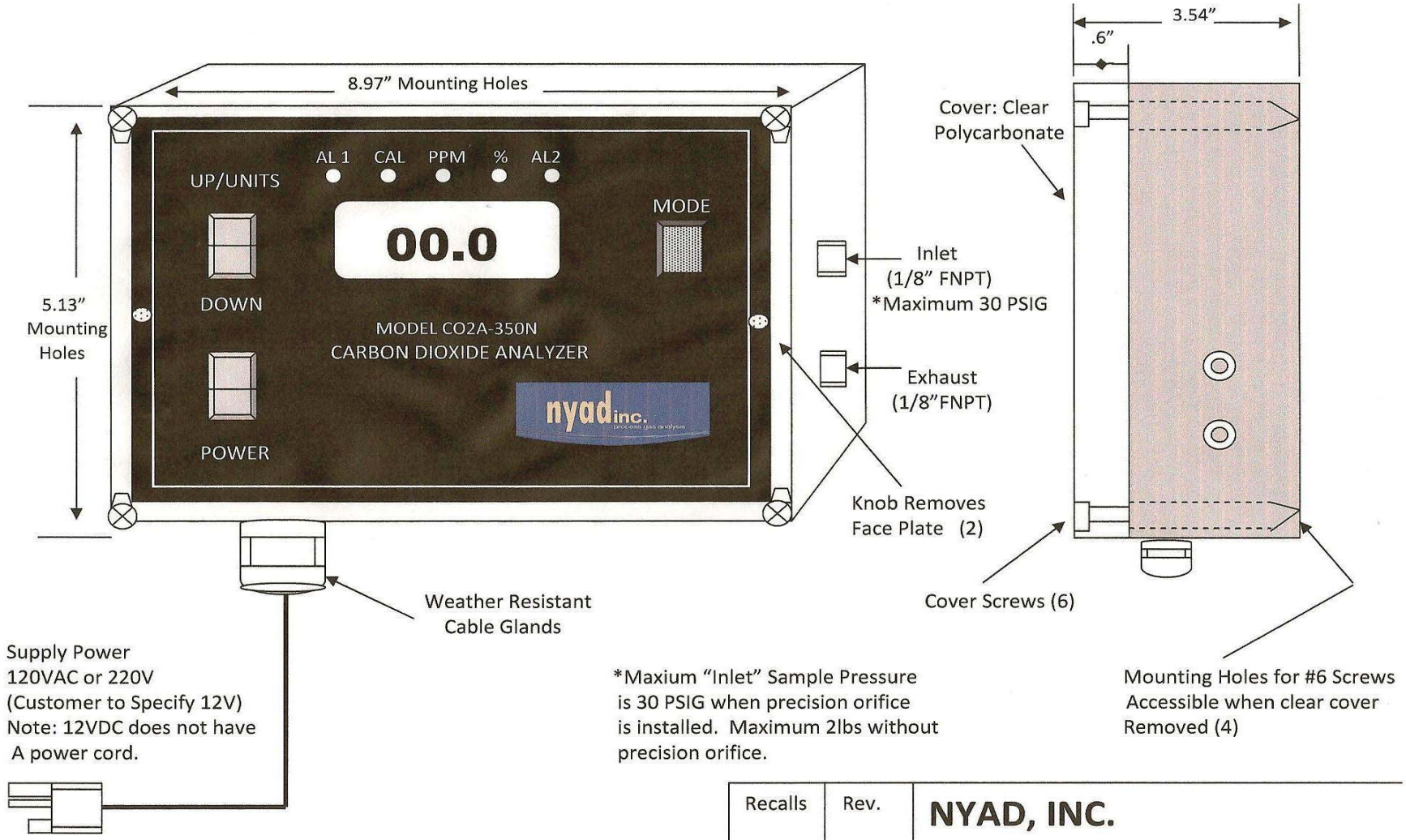
Audible Alarm	
Digital Output	RS232, RS485
Power	12V

CO2 Sensor

Type	Infrared
Range	0 to 5,000 ppmv
Accuracy	+/- 0.5%
Response Time	20 seconds diffusion time
Operating Humidity	0 to 95% RH non-condensing
Inlet Pressure	100 psig Max
Operating Temperature	0 to 50 degrees C
Sensor Life in Air	15 years
Sensor Warranty	2 Years
Calibration Gas	CO_2 gas (400 ppmv)
Calibration Interval	Once a month

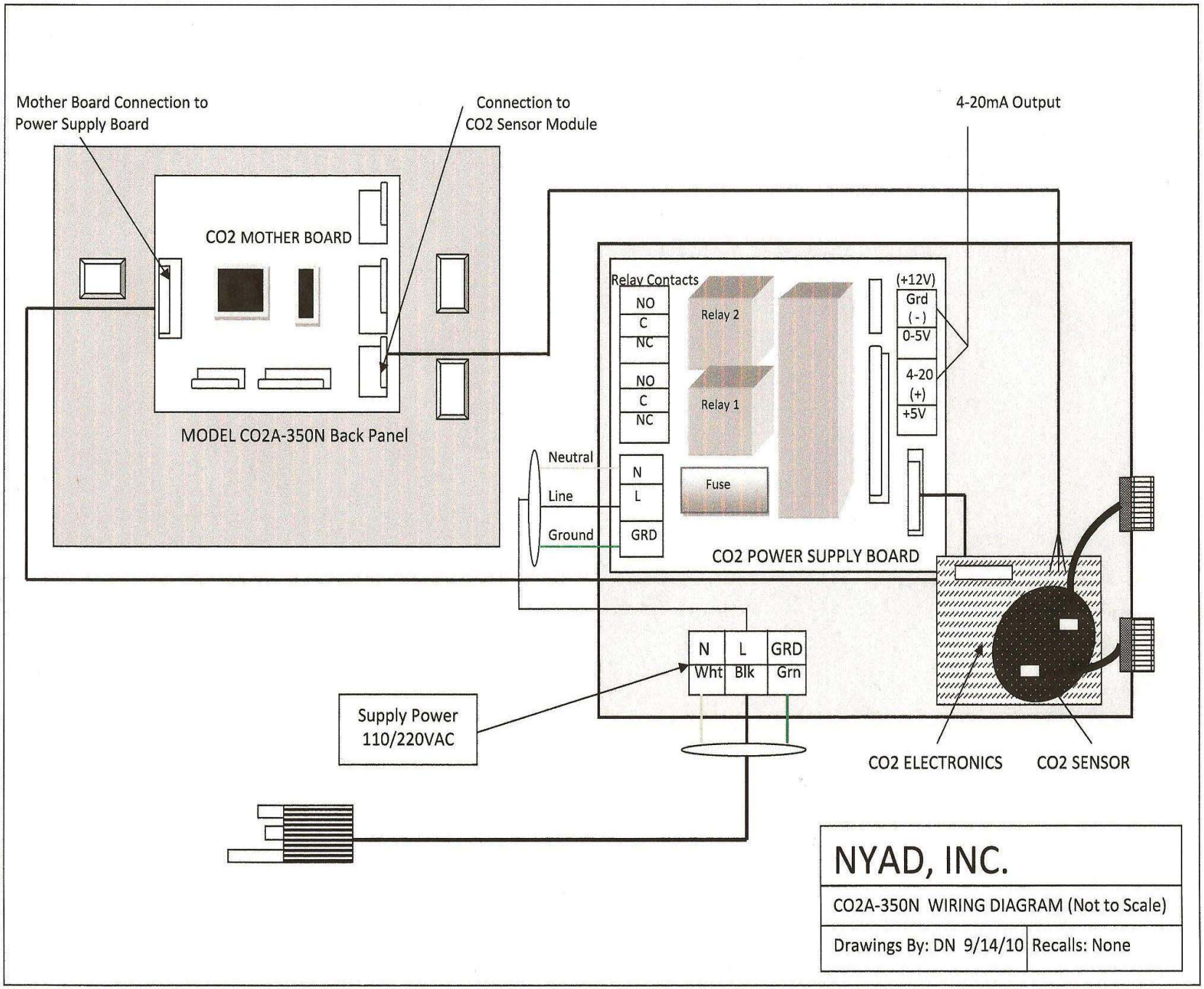
Enclosures

O.E.M.	**5.75”W x 7.25”H x2.4”D**
NEMA-4	**9.5”W x 6.25”H x 3.5”D**
PANEL MOUNT	**10”W x 5.25”H x 6”D**
RACK MOUNT	**19”W x 5.25”H x 6”D**



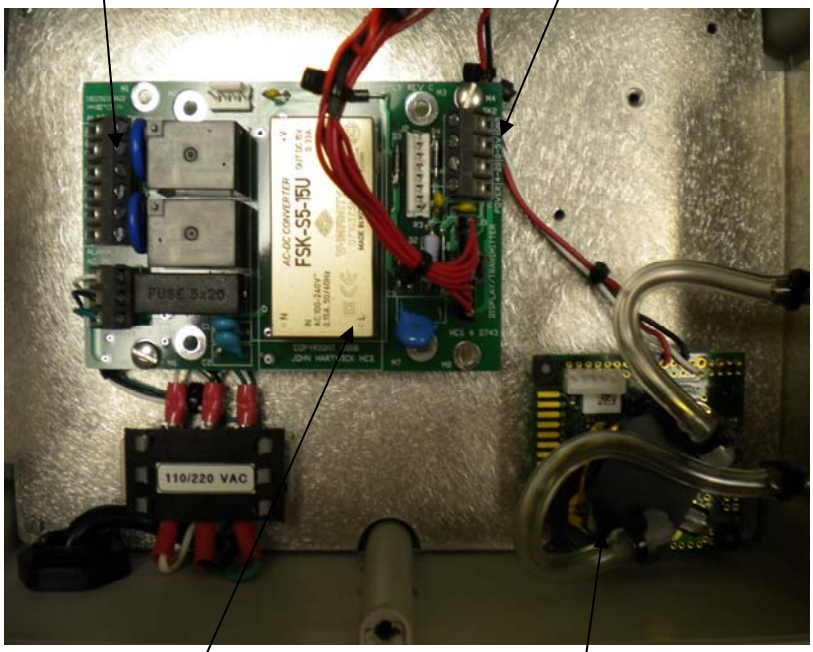
*Maxium "Inlet" Sample Pressure is 30 PSIG when precision orifice is installed. Maximum 2lbs without precision orifice.

Recalls	Rev.	**NYAD, INC.**	
None	None	**CO2A-350N Carbon DIOXIDE (NOT TO SCALE)** **TYPE: NEMA-4 WEATHERPROOF**	
		Drawings By: DN	Date: 9/14/10


Mother Board Connection to
Power Supply Board
Connection to
CO2 Sensor Module
4-20mA Output
CO2 MOTHER BOARD
MODEL CO2A-350N Back Panel
Relay Contacts
NO
C
NC
NO
C
NC
Relay 2
Relay 1
Fuse
(+12V)
Grd
(-)
0-5V
4-20
(+)
+5V
Neutral
Line
Ground
N
L
GRD
CO2 POWER SUPPLY BOARD
N
L
GRD
Wht
Blk
Grn
Supply Power
110/220VAC
CO2 ELECTRONICS
CO2 SENSOR
NYAD, INC.
CO2A-350N WIRING DIAGRAM (Not to Scale)
Drawings By: DN 9/14/10
Recalls: None

RELAY CONTACT
(AL 1 and AL2)

OUTPUT
(0-5VDC or 4-20mA)



CO2 POWER
SUPPLY BOARD

CO2 SENSOR
AND ELECTRONICS

WARRANTY

WARRANTY TERMS

Nyad, Inc. warrants to the original consumer purchaser that all parts used in the construction or fabrication of the Nyad Equipment will be free from defects in materials and factory workmanship, under normal use and service for ***five years*** from the date of delivery.

Warranty coverage provides the necessary repairs or parts replacement found by Nyad, Inc. to be defective due to bad workmanship or faulty materials.

LIMITATIONS OF WARRANTY

The Nyad Equipment is restricted to inspection (FOB the Factory) before warranty is determined, unless other arrangements have been made by Nyad and the original consumer purchaser.

This warranty does not apply to routine service/maintenance, calibrations, repairs and replacement of the carbon monoxide sensor every twenty-four (24) months in accordance with manufacturer's recommendation, or replacements made necessary by fire or water damage, or accident to or improper installation by others, alteration, misuse or abuse to the Nyad Equipment.

This warranty does not cover labor charges or cost incurred for time and expense by other service agencies or personnel involved in maintaining the Nyad Equipment.

Application of this Warranty is further conditioned upon the following:

Installation. The Nyad Equipment must be properly installed in accordance with Nyad's installation procedures and instructions.

Proper Maintenance and Operation. The Nyad Equipment must be properly maintained and operated in accordance with Nyad's maintenance and operating procedures. All service parts must be acquired from Nyad or its authorized representative.

No Alteration. The Nyad Equipment must not have been modified or altered from its original conditions at the date of delivery or installation.

Failure to comply with any of these conditions will void this Warranty.

TECHNICAL SUPPORT

Nyad, Inc. will offer Technical Support via telephone or email. All technical support shall be related to the Nyad Equipment only. Any other technical issues involving other products and services to the Nyad Equipment will not be the responsibility of Nyad, Inc.; however, our technical support team will offer their best knowledge and support involved in the Nyad Equipment.

Warranty/Technical Support:

Ph (925) 270-3971 xt 4
Contact: Dorothy Natividad
Email: Dorothy@nyad.com
www.nyad.com

RETURN POLICY

Before returning any items (except for recalibration service and repairs) you must call (925) 270-3971 8:00 a.m. – 5:00 p.m. PST. Monday through Friday for approval.

Product may be returned for a full refund/credit within 30 days from the date that Nyad originally shipped and must be returned in their original new condition. Exceptions for special order. Returns for special orders will have 30% restocking fee and must be approved.

Items returned in damaged or altered conditions which cannot be resold as new will have a 30% restocking fee.

All returned items are subject to inspection for use and damage before credit is issued. Returns may incur additional charges if product is returned in damaged conditions.

Manufacture Warranty/Defective Claims - You may return product to us for rework, exchange and/or request a full refund/credit. Request must be made from the original purchaser. Upon receipt of a returned item, Nyad will evaluate and determine the warranty claim.

Damaged Items – It is your responsibility to inspect your packages for damages/defect on delivery. If product is damaged in transit to you, we must be notified immediately (within 24 hours) so that we can submit a claim the our freight carrier.

Lost Packages – Lost Packages must be reported within 30 days of shipment date and verification from the freight carrier that product has not been delivered.

Please contact or email us for further important instructions on filing a lost or damaged package claim.