

# MACURCO GAS DETECTORS

## ND-2

### INSTALLATION & OPERATING INSTRUCTIONS

[WWW.MACURCO.COM](http://WWW.MACURCO.COM)

#### GENERAL INFORMATION

The ND-2 is a microcomputer-controlled electronic sensor and controller for Nitrogen Dioxide (NO<sub>2</sub>), and includes a NO<sub>2</sub> sensor (electrochemical), digital display, status lights, 4-to-20 mA current loop and auxilliary relay outputs. The unit is intended for use with building automation computers or controllers that control exhaust fans to maintain a safe environment within OSHA or building code specifications. The ND-2 may be used as a standalone unit. The ND-2 sources power to the computer or controller, which must have a resistor at its input. The ND-2 current loop output is isolated, allowing the use of one power supply to power many detectors. See the front of the ND-2 data sheet for a chart of NO<sub>2</sub> level versus mA output for controller programming. The relay has "dry" contacts.

#### LOCATION

The unit, on average, can cover about 5000 sq. ft. (465 sq. meters). The coverage depends on air movement within the room or facility. Extra detectors may be needed near any areas where people work, or the air is stagnant. Normally, the unit mounts 5 feet (1.5 meters) above the floor in a central area where air movement is generally good. See the ND-2 data sheet for more information on location.

#### INSTALLATION

The ND-2 is housed in an electrical box that has mounting holes on the back. Conduit can be connected to the bottom three knock-out holes. **DO NOT** remove the four black vents in the case. The vents are necessary for adequate air flow into the unit. Remove the two small screws toward the **bottom** of the inside cover. The inside cover then swings up for access to internal circuitry.

Once the cover is open, you should notice a seven-screw terminal block. The first two screws, at the far left, are for power, and are marked "**POWER 12-24 V ac/dc**". There is no polarity associated with the power terminals, due to the internal circuitry. The three middle terminals are for the auxilliary SPDT relay. They are marked from left to right "**N.O.**" (normally-open), "**COM**" (common), and "**N.C.**" (normally-closed). The relay contacts are rated for 5 amps, **MAXIMUM**, and may be used to control a fan or other equipment. The two terminals at the far right are for the 4-to-20 mA current loop, and are marked "+" and "-". See the ND-2 data sheet for a detailed wiring diagram and other technical information.

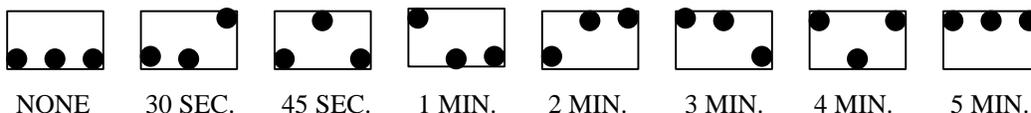
#### OPERATION

When power is first applied to the detector, it will go through a warm-up period of 30 seconds. The digital display will count down from 30 to 0 during the warm-up period, and the relay will also actuate.

The ND-2 is now operational. Set the relay actuation threshold with the **PPM NO<sub>2</sub>** level adjustment as needed for the job requirements. The current OSHA and ACGIH values for NO<sub>2</sub> are TWA of 3 ppm (parts per million) and STEL of 5 ppm. The suggested setting to meet these limits is a setting of 3 ppm.

The relay turn-on delay can be set from 0 to 5 minutes by setting the 3-position "**FAN DELAY**" switch, inside the unit, near the digital display. When the turn-on delay has been actuated by a NO<sub>2</sub> level exceeding the threshold settings, the amber light will flash. When the turn-on delay is over the amber light will come on solid and the relay will actuate.

#### *RELAY DELAY SWITCH CHART*



#### TESTING

Testing the unit is done by pressing the "**TEST**" switch located near the buzzer on the printed circuit board. This will initiate the test cycle. The display will read "88.8," the relay will actuate, and the amber Fan light will be on solid. The test cycle will last approximately 30 seconds, and the unit will return to normal operation. Test failure

is indicated by an error display. The digital display will indicate an error code, "E0n" where "n" indicates the error code number.

### **RESET**

MACURCO ND-2 (con't)

The reset feature is activated by pressing the switch labeled "RESET". The switch is mounted on the printed circuit board near the terminal block. Pressing the switch will initiate the warm-up cycle as mentioned above in "OPERATION".

### **STABILIZATION TIME**

Although it will be operational within a few minutes of being first powered, the gas sensor in the ND-2 requires at least one hour to reach its final operating point. The ND-2 is intended to be continuously powered.

### **SENSOR ZERO ALIGNMENT**

If you are certain that the air is clean and the ND-2 indicates a small reading, the sensor "ZERO" adjustment (just above the gas sensor, labeled "ZERO") may be adjusted. Turn the screw about a quarter of a turn CCW at a time, while waiting 30 seconds between turns. This adjustment is a 25-turn potentiometer.

### **ALARMS DUE TO OTHER GASES**

Although the ND-2 is specifically calibrated with NO<sub>2</sub>, the electro-chemical sensor will detect a variety of gases such as Hydrogen Sulfide, Sulfur Dioxide, Chlorine, and Hydrogen Chloride. These gases may cause a reading and relay actuation.

### **REPLACING THE SENSOR AND RECALIBRATING THE ND-2**

Macurco offers a replacement sensor and a Field Calibration Kit for the ND-2. We recommend that the sensor be replaced, and the unit be recalibrated at least once every two years. The Field Calibration Kit may be used to calibrate several units. The number of units that may be calibrated is determined by the gas quantity in the cylinder, and will vary due to calibration kit useage and gas flow rate. The gas mixture has a useful life of no more than one year. As an alternative, Macurco offers factory sensor replacement and recalibration; contact Macurco Technical Support at (303) 781-4062, for further details.

### **SERVICING OF UNIT**

The ND-2 does not require regular maintenance. The unit uses a self-purging electro-chemical sensor that has a two year life expectancy. This sensor acts somewhat like a battery since its output will be reduced with time. The manufacturer of the sensor (City Technology Limited) indicates the sensor can be expected to have a reduced output of up to 2% per month, but not to normally exceed 5% per year.

All maintenance and repair of products manufactured by Macurco are to be performed at the Macurco manufacturing facility. Macurco does not sanction any third-party repair facilities. Any attempted repair of a Macurco product will void the products limited warranty.

### **RETURN INSTRUCTIONS**

Call (303) 781-4062 for a Return Authorization number. Then, carefully pack the gas detector with a written description of the nature of the return. Send the unit to the following address:

**Macurco Inc.**  
**3946 South Mariposa Street**  
**Englewood, Colorado 80110**  
**WWW.MACURCO.COM**

### **LIMITED WARRANTY**

The ND-2 gas detectors are warranted to be free from defective material and workmanship for a period of one (1) year from the date of manufacture. If any component becomes defective during the warranty period, it will be replaced or repaired free of charge, if the unit is returned in accordance with the instructions below. This warranty does not apply to units that have been altered or had repair attempted, or that have been subjected to abuse, accidental or otherwise. The above warranty is in lieu of all other express warranties, obligations or liabilities. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE ARE LIMITED TO A PERIOD OF ONE (1) YEAR FROM THE PURCHASE DATE. Macurco shall not be liable for any incidental or consequential damages for breach of this or any other warranty express or implied arising out of or related to the use of said gas detector. Manufacturer or its agents liability shall be limited to replacement or repair as set forth above. Buyer's sole and exclusive remedies are return of the goods and repayment of the price, or repair and replacement of non-conforming goods or parts. (The Uniform Commercial Code applicable in the State of Colorado shall govern.)