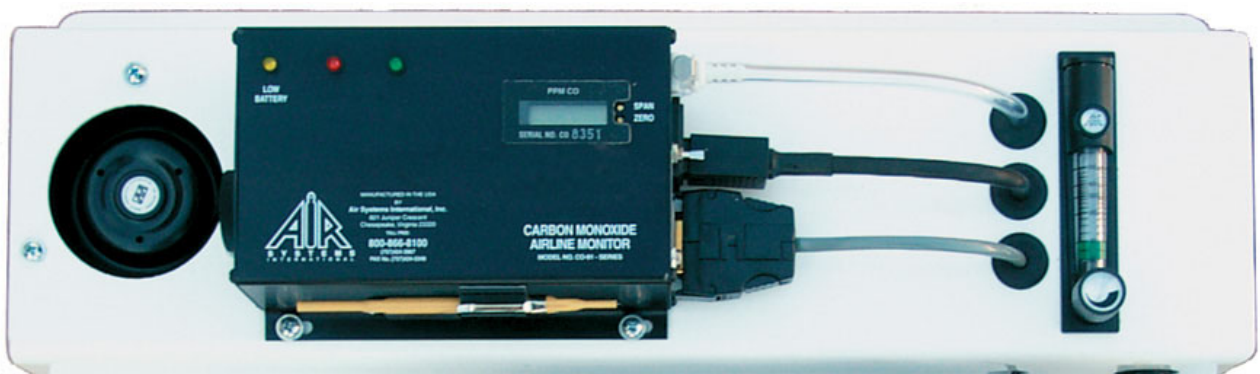


Model
CO-91PM



Operating Manual



AIRSYSTEMSINTERNATIONAL, INC.

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OVERVIEW

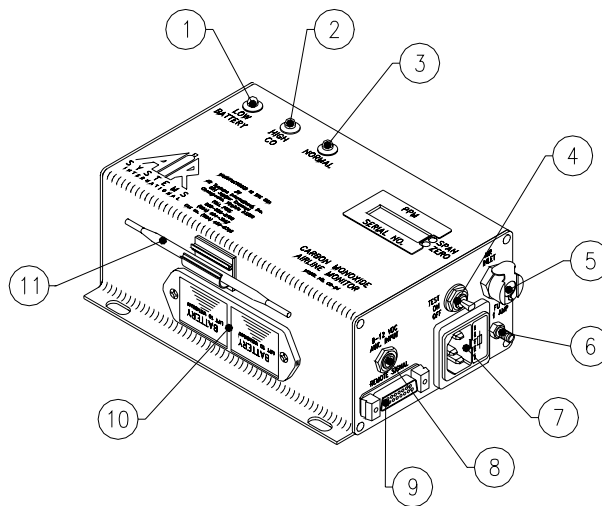
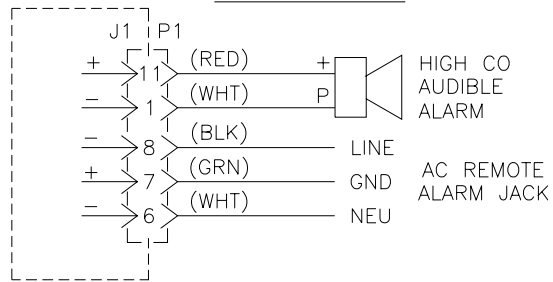
A carbon monoxide (CO) monitoring instrument is used in breathing air applications because CO can be ingested into compressor intakes by external exhaust emissions or from the combustion of hydrocarbons (Reference OSHA standard 1910.134). The CO-91 series monitors have been developed to continuously monitor CO concentrations in breathing air systems. When connected to an in-line sample stream, these instruments offer continuous, fast response, accurate (+/- 1% full scale) CO concentration levels displayed in parts-per-million (ppm). The instruments activate local and remote audible/visual alarms when CO concentrations are detected in the sample stream.

SPECIFICATIONS

Size:	2.75"H x 7.0"L x 5.1"W (6.9cm x 17.7cm x 12.9 cm)
Weight:	1.81 lbs. (0.121kg)
Case:	Extruded aluminum Anodized black
Voltage:	115 VAC and/or 9 - 15 VDC
Shielding:	Internal RFI/EMI filters
Fuse:	115 VAC 1 amp fast acting
Operating Temperature:	4 to 113 degrees F (-20 to 45 degrees C)
Humidity Range:	10% to 90% RH
Flow Requirement:	50 - 100 cc
Display:	3 digit LCD
Output Signals:	CO-91ACRL (AC/DC) CO-91ACRLA (AC only)
Test Circuit:	Manually activated
Sensor Type:	Sealed electrochemical sensor Carbon Monoxide specific
Accuracy:	+/- 1% full scale
Response:	90% in 10 seconds
Detectable Range:	0 - 200ppm CO
Calibration:	Manual zero and span adjustments
Alarm Setting:	10ppm CO (5ppm Canadian)
Warning:	*Normal operation - Green light *High CO - Red Light and Audible Alarm Low Battery - Amber Light
Warranty:	2 years from original date of purchase for unit and sensor

*These indicators/alarms may be
installed/located on the monitor
or in a remote location.

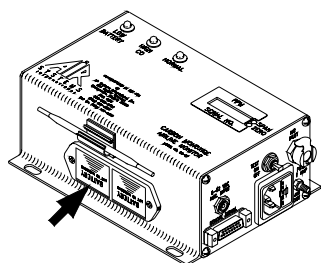
WIRING SCHEMATIC



- 1 LOW BATTERY INDICATOR
- 2 HIGH CO INDICATOR
- 3 NORMAL
- 4 ON/OFF/TEST SWITCH
- 5 AIR SAMPLE INLET
- 6 AIR DISCHARGE PORT (DO NOT BLOCK)
- 7 120 VAC RECESS PLUG WITH FUSE HOLDER (1 AMP FAST ACTING)
- 8 AUXILIARY DC POWER JACK
- 9 REMOTE SIGNAL CONNECTOR
- 10 BATTERY HOLDER
- 11 CALIBRATION TOOL

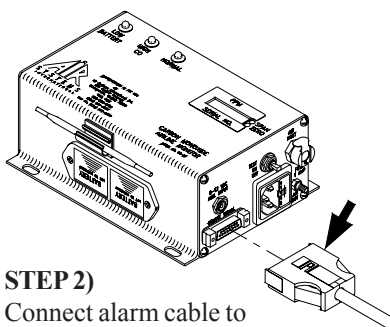
Note: #8 requires a 5.5mm jack

SETUP



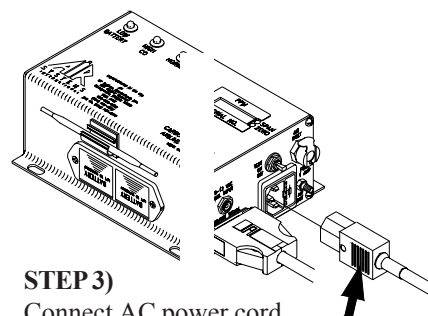
STEP 1)

Install new 9-volt batteries. These batteries continuously provide a required bias voltage to the CO sensor and power the monitor in the event of AC power loss. If AC and DC power are removed for a period of 2 hours or more, a 1 hour restabilization period is required.



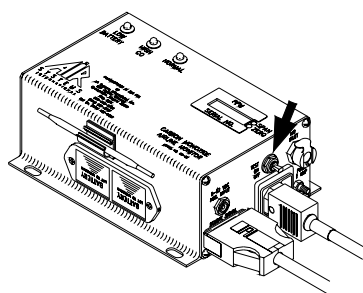
STEP 2)

Connect alarm cable to the remote signal jack.



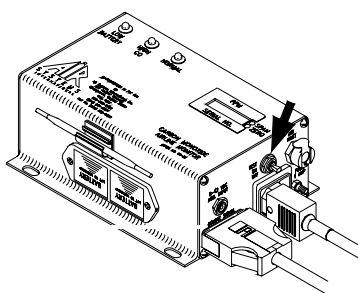
STEP 3)

Connect AC power cord to the 115 VAC jack.



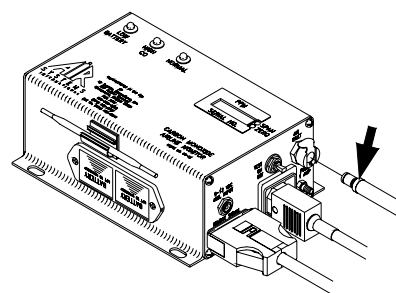
STEP 4)

Place the “ON/OFF/TEST” switch to the “ON” position. Allow 30 seconds for the readout to stabilize. If a reading other than “ZERO” is displayed, calibration of the monitor may be necessary. See calibration procedure.



STEP 5)

Hold the “ON/OFF/TEST” switch in the “TEST” position. All local and remote audible/visual indicators will activate. If all indicators do not activate see troubleshooting guide.



STEP 6)

Connect air sample tube from filtration system to the monitor’s air sample inlet connect port. Assure that the sample air flow rate is within the 50 - 100cc (green bar area). The monitor is now operational.

OPERATION

- 1) The instrument will analyze the air sample and display the CO concentration in parts-per-million (ppm). The system’s green “NORMAL” operation light will illuminate and the red “HIGH CO” light will flicker faintly approximately every second when the CO level is below 10ppm (5ppm Canadian).
- 2) When the CO concentration level exceeds the alarm set point, the green “NORMAL” light will turn off, the red “HIGH CO” light will illuminate, the audible alarm will sound (CO-91ACRLA only) and the remote alarm connections will energize.
- 3) When CO concentration levels drop below the alarm set point, all alarm indicators will deactivate and return to “NORMAL” operation.
- 4) An alarm function test can be performed at any time by lifting the “ON/OFF/TEST” switch to the “TEST” position.

SHUTDOWN

- 1) Turn monitor “OFF” at the “ON/OFF/TEST” switch after all workers have disconnected from the breathing air system.
- 2) DO NOT remove 9-volt batteries from the monitor, they are used to maintain bias voltage to the sensor; this keeps the sensor continuously ready for immediate future use.

MAINTENANCE

1) Calibrate the monitor monthly or whenever the reading may be questionable. A calibration sticker should be affixed for future reference. We recommend the use of Air Systems' calibration kits to obtain an accurate calibration.

Note: *If monitor can not be calibrated, sensor replacement may be necessary. Contact factory for further information.*

2) Replacement sensors are shipped with a metal spring installed between the electrodes. Do not remove the clip until the sensor is to be installed into the monitor. (See Diagram below)

3) Replace 9-volt batteries when the amber "LOW BATTERY" light illuminates. If the monitor is not used for 90 days, check the 9-volt battery condition and replace if necessary.

ORDERING INFORMATION

CO-91NS - "New" replacement sensor

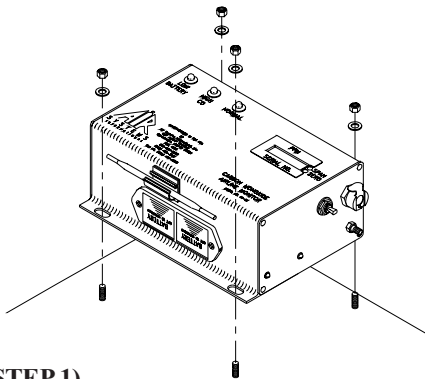
BBK-20 - Small Calibration Kit for CO monitor; includes 20ppm CO gas, zero air, preset regulator, tubing and case - 17 liter cylinders

BBK-20103 - Large Calibration Kit for CO monitor; includes 20ppm CO gas, zero air, preset regulator, tubing and case - 103 liter cylinders

BBK-10 - Small Calibration Kit for Canadian CO monitor settings; includes 10ppm CO gas, zero air preset regulator, tubing and case - 17 liter cylinders

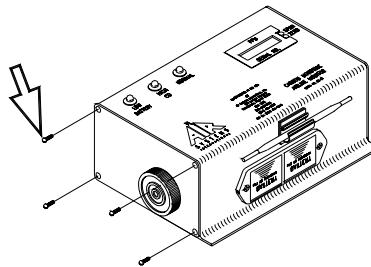
Note: *Individual cylinders are available. Consult factory for part numbers and pricing.*

SENSOR REPLACEMENT



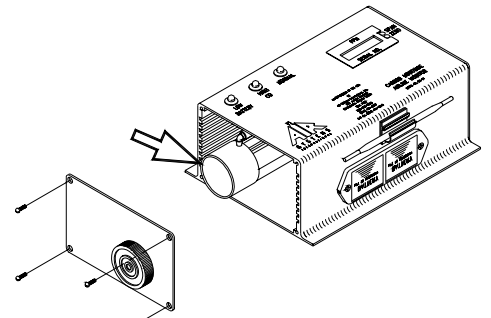
STEP 1)

Disconnect all external connections.
Remove CO monitor from system.



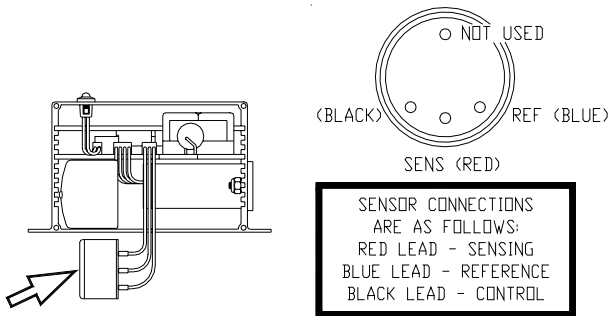
STEP 2)

Remove the four screws from
the monitor's left end plate.



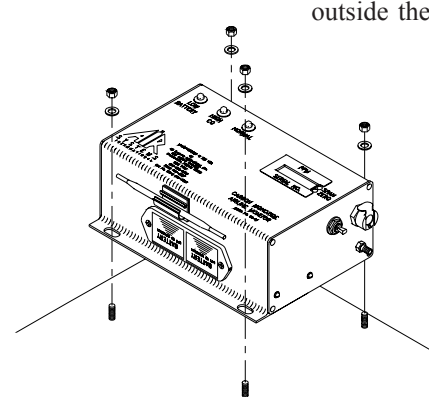
STEP 3)

Remove end plate to gain access
to the sensor cup from
outside the housing.



STEP 4)

Remove sensor from sensor cup and remove leads. Take the new sensor and remove the metal spring. Reattach leads to the proper terminals on the new sensor. Install new sensor into sensor cup.



STEP 5)

Reassemble monitor and install back into system. Connect all external connections. Allow monitor to stabilize 30 minutes to 1 hour and recalibrate.

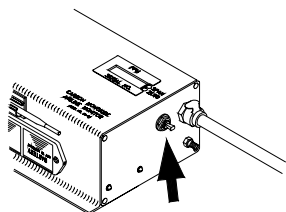
CALIBRATION PROCEDURE

Do not use inert gases to zero the monitor. This will cause premature failure of the sensor.

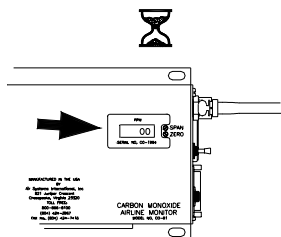
CO Zero Adjustment

To zero the instrument, follow the steps below. Zero calibration gas should be used to properly “zero” the instrument and assure that a valid calibration is achieved. If zero adjustment cannot be made as indicated, sensor replacement may be necessary. ***After each monitor adjustment outlined in the following steps, allow time for the changes to stabilize.***

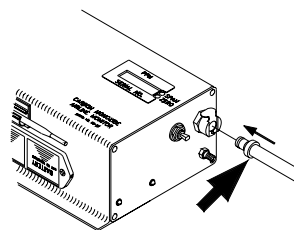
1. Place the “on/off/test” switch to the “on” position.



2. Allow 30 seconds for the readout to stabilize.
The green indicator light will illuminate.

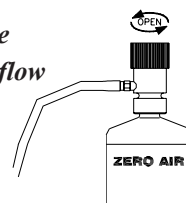


6. Attach the clear tubing with male plug to the monitor air sample inlet.



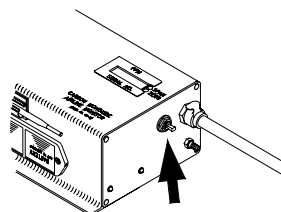
7. Open gas regulator fully by turning the knob at least two (2) turns counterclockwise.

Note: A controlled orifice in the regulator will allow the gas to flow at approximately 300 cc/min.



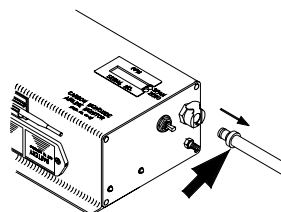
3. Hold the “on/off/test” switch in the “test” position. The following will occur:

- Audible alarm will sound
- Green indicator LED will flash
- Amber low battery indicator LED will illuminate
- Red lamp on

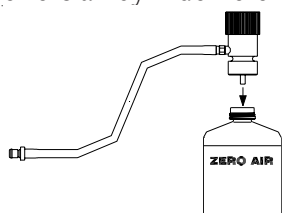


This test ensures the circuitry is operable and the continuity to the sensor is proper. Release the switch.

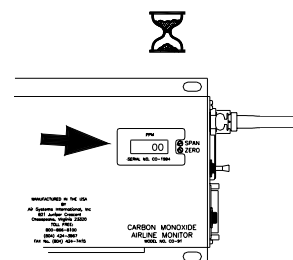
4. Remove air sample inlet tube.



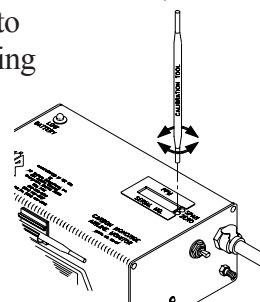
5. Install regulator on the zero air cylinder reference gas.



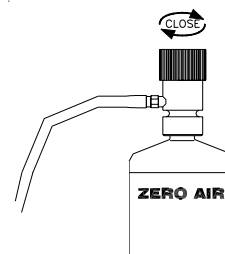
8. Allow digital readout to stabilize approximately 15 - 30 seconds.



9. Adjust "zero" pot adjustment screw (clockwise to increase, counterclockwise to decrease) until a "00" reading is obtained.



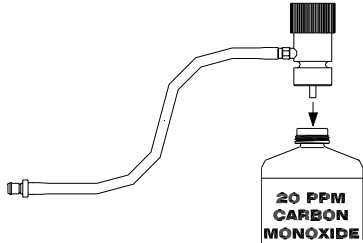
10. Turn off the regulator and disconnect the tubing from the zero air regulator.



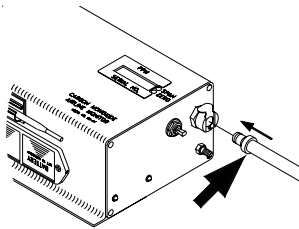
CO SPAN ADJUSTMENT

Use only 10 - 20 ppm CO gas for calibration. Using a higher concentration may decrease accuracy at lower scale readings. Note: 10ppm gas must be used to satisfy Canadian calibration requirements.

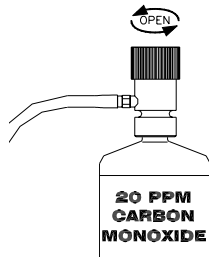
1. Install regulator to the CO calibration gas cylinder.



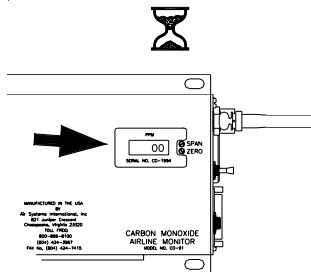
2. Connect the plug to the monitor.



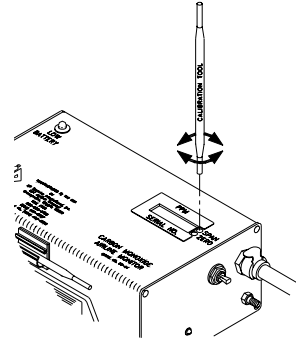
3. Open gas regulator fully by turning the knob at least two (2) turns counterclockwise.



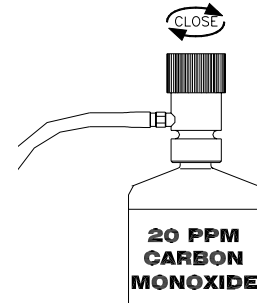
4. Allow digital display to stabilize approximately 15 - 30 seconds.



5. Adjust the "span" pot adjustment screw (clockwise to increase, counterclockwise to decrease) until the digital display reads the same concentration (ppm) as printed on the calibration gas cylinder.



6. Turn regulator off and repeat "zero" adjustment procedure above. Display should return to a "00" reading.



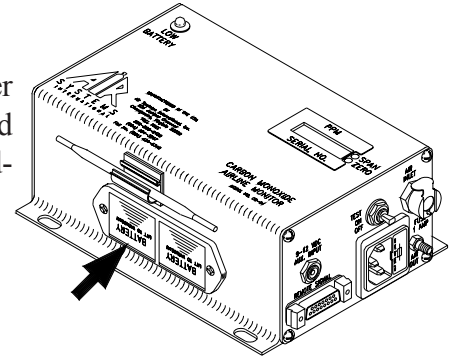
THE MONITOR IS NOW CALIBRATED AND SHOULD BE RECALIBRATED MONTHLY OR IF ACCURACY IS QUESTIONABLE. CHECK LOCAL REQUIREMENTS AND RECALIBRATE AS REQUIRED.

MONITOR BATTERY REPLACEMENT

These batteries continuously provide a required bias voltage to the CO sensor and power the monitor in the event of AC power loss. If AC and DC power are removed for a period of 2 hours or more, a 1 hour restabilization period is required on the sensor as erratic readings may occur.

Batteries approved for use are:

1. Panasonic Industrial Alkaline Battery - 9 VDC Model No. 6AM - 6PI 9V
2. Duracell Alkaline Battery - 9 VDC Model No. MN1604B2
3. Eveready Battery (Energizer) Alkaline 9VDC - Model No. 6LR61-6AM6-9V



Warranty Disclaimer

Air Systems' manufactured equipment is warranted to the original user against defects in workmanship or materials under normal use for one year after date of purchase. Any part which is determined by Air Systems to be defective in material or workmanship will be, as the exclusive remedy, repaired or replaced at Air Systems' option. This warranty does not apply to electrical systems or electronic components. Electrical parts are warranted, to the original user, for 90 days from the date of sale. During the warranty period, electrical components will be repaired or replaced at Air Systems' option. (Exception: Airline monitors and CO sensors are warranted 2 years from date of purchase. Oxygen sensors have a 1 year warranty.)

NO OTHER WARRANTY, EXPRESSED OR IMPLIED, AS TO DESCRIPTION, QUALITY, MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER MATTER IS GIVEN BY AIR SYSTEMS IN CONNECTION HEREWITH. UNDER NO CIRCUMSTANCES SHALL THE SELLER BE LIABLE FOR LOSS OF PROFITS, ANY OTHER DIRECT OR INDIRECT COSTS, EXPENSES, LOSSES OR DAMAGES ARISING OUT OF DEFECTS IN, OR FAILURE OF THE PRODUCT OR ANY PART THEREOF.

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