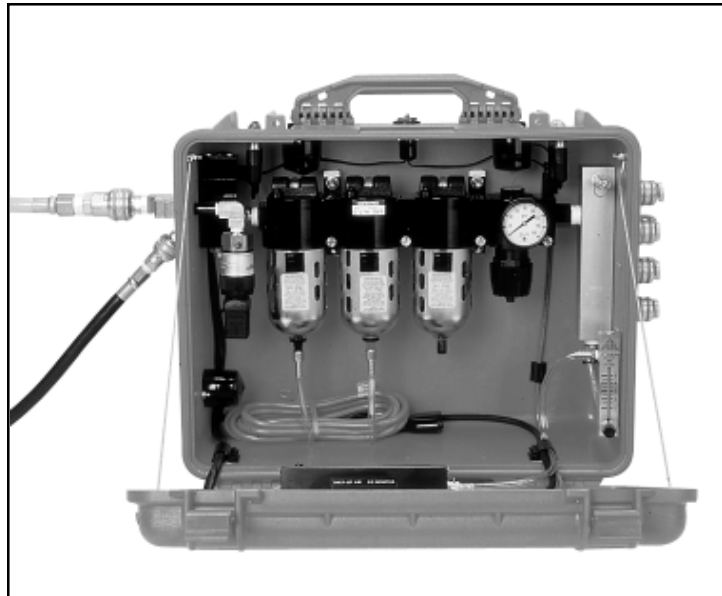


# Models BB50-COAA & BB100-COAA

Manual No. AABOX011  
(Rev 0 February 2001)



## Operating Manual



### AIR SYSTEMS INTERNATIONAL, INC.

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Air Systems International, Inc.  
Registered to ISO 9002  
Certificate No. A5033

## BREATHING AIR QUALITY POSITION STATEMENT

The responsibility for the quality of breathing air rests with the user. Compliance with federal, state, or local regulations are the responsibility of the user and this recommendation does not supersede any existing rules, regulations, or laws which may apply. Breathing air filtration products meet or exceed CGA Grade-D specifications for air quality as adopted by Federal OSHA. Compressor air quality standards meet or exceed OSHA 1910.134 requirements. When the components are used in accordance with the manufacturer's instructions and recommendations, the "system" meets or exceeds federal regulations presently in force. It is incumbent upon the user to comply with any changes in the regulations or law which may occur in future situations.

The air supply compressor should be located in a safe, clean ambient air environment. This "safe" location should be tested periodically using proper instruments to ensure clean ambient air quality on a consistent basis. Total system Grade-D air quality should be tested monthly. If the compressor is moved, retesting air quality is recommended. Should the location or environment significantly change, the air quality should be retested. The compressor filters and oil level should be checked daily and changed when contaminated or when the maximum number of "run" hours is achieved.

This series of air filtration units should be used according to the manufacturer's recommendations. The standard filtration package is not explosion-proof and should be located in a non-explosive environment. (An intrinsically safe model is available, please contact the factory for information.) The carbon monoxide monitor should be calibrated monthly or if the accuracy of the monitor is in question. System air quality should be tested for, but not limited to, the following Grade-D air components:

CO - Carbon Monoxide  
O<sub>2</sub> - Oxygen  
CO<sub>2</sub> - Carbon Dioxide  
H<sub>2</sub>O - Water (Moisture Content)  
Hydrocarbons (Oil Mist)  
Total Particulates

**The maximum allowable level of these air quality components varies depending on Grade-D or E requirements. Contact sales for a copy of the latest standards.**

***Our Breathing Air compressors and filtration systems meet all of the following federal specifications when used and serviced in accordance with our instructions.***

**Federal OSHA 29 CFR 1910.134  
"Compressor Operations for Breathing Air"  
Army Corps of Engineers EM385-1-1,  
paragraph 07b-11-4,  
"Compressed Breathing Air"**

## FILTRATION EFFICIENCY

1st Stage	Particulate/Bulk Liquid Separation	Auto Drain and Filter change indicator. Removes 95% bulk particulate and liquids @ 5 microns
2nd Stage	Oil Coalescing and Ultra Fine Particulate	Auto Drain and Filter change indicator. Removes oil and particulate to 99.9998% @ 0.01 microns
3rd Stage	Activated Charcoal	Manual Drain and Filter change indicator. Removes organic vapors, odors, and tastes. Less than 0.003 pp/wt remaining oil content

## AUTO-AIR BREATHER-BOX™ OVERVIEW

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These Grade-D filtration units have been designed for work in hazardous locations where the worker needs additional egress air to escape harmful environments. IDLH atmospheres require that the worker wear a pressure demand airline respirator with a minimum of five minutes of escape air, however, this five minutes of escape air may not be sufficient time to safely egress from the area. The Auto-Air Breather Box™ is attached to a secondary supply source of air. In the event of primary air loss, the Auto-Air system will automatically switch to reserve air. Audible and visual alarms sound to signal the worker that they are on the backup air system and that they should egress the hazardous work area. Any size reserve air cylinder can be attached to the Auto-Air Breather Box™, depending on the number of workers and length of time required to safely egress.

Plant or mobile compressors provide the primary air supply to the system. Continuous carbon monoxide monitoring is provided to meet federal, state, and local regulations. The Auto-Air Breather Box™ series will supply Grade-D breathing air, provided the unit is used according to this instruction manual. The carbon monoxide monitor (CO-91AA) continuously receives 50-100cc of filtered air, and monitors for the presence of carbon monoxide.

The outgoing pressure regulator(s) is adjustable to conform to the specific respirator in use. To determine the correct pressure, refer to the NIOSH data sheet found with each respirator in use.

***Note: Always adjust the outgoing pressure with the complete respirator(s) and desired hose length(s) in place.***

***Note: Always operate the Auto-Air Breather Box™ in the upright position. Failure to comply may result in one or all of the following:***

- Auto drains will not function properly. This may result in the contamination of the CO monitor and cause water to be passed through respirator hose and into the worker's mask.
- Auto drains may become clogged, clean or replace auto drains (See Maintenance Instructions.)
- Filters may accumulate moisture and/or contamination; replace if necessary.

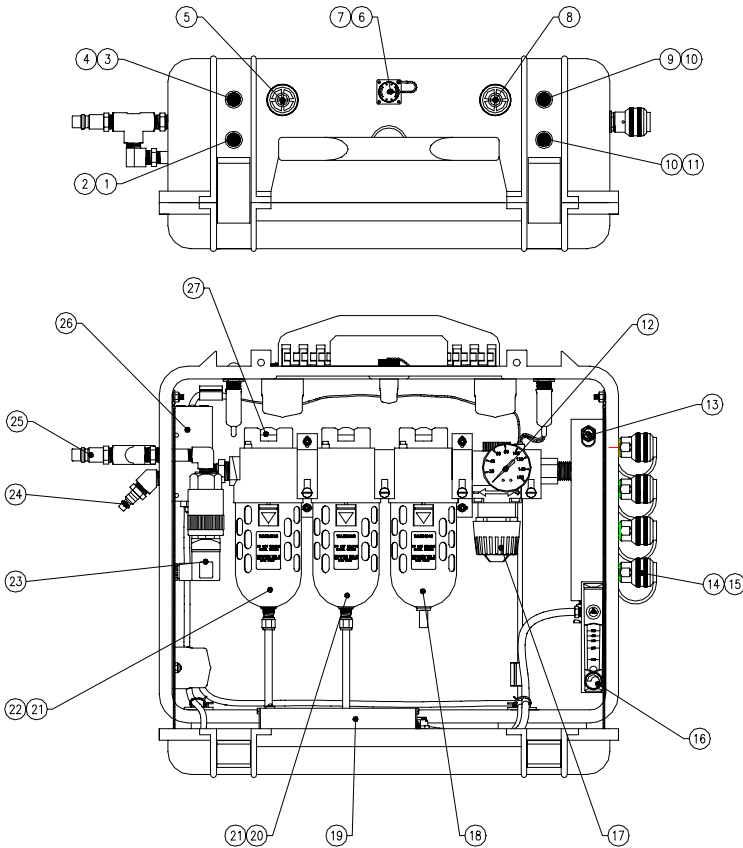
## MONITOR OVERVIEW

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 for 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 CO-91AA will switch to back-up (Auto-Air) service if 115 VAC service has been interrupted, or with a loss of primary air pressure. The instruments activate local and remote audible/visual alarms when CO concentrations are detected in the sample stream, or if the back-up (Auto-Air) service has been activated.

# SPECIFICATIONS AND PARTS IDENTIFICATION

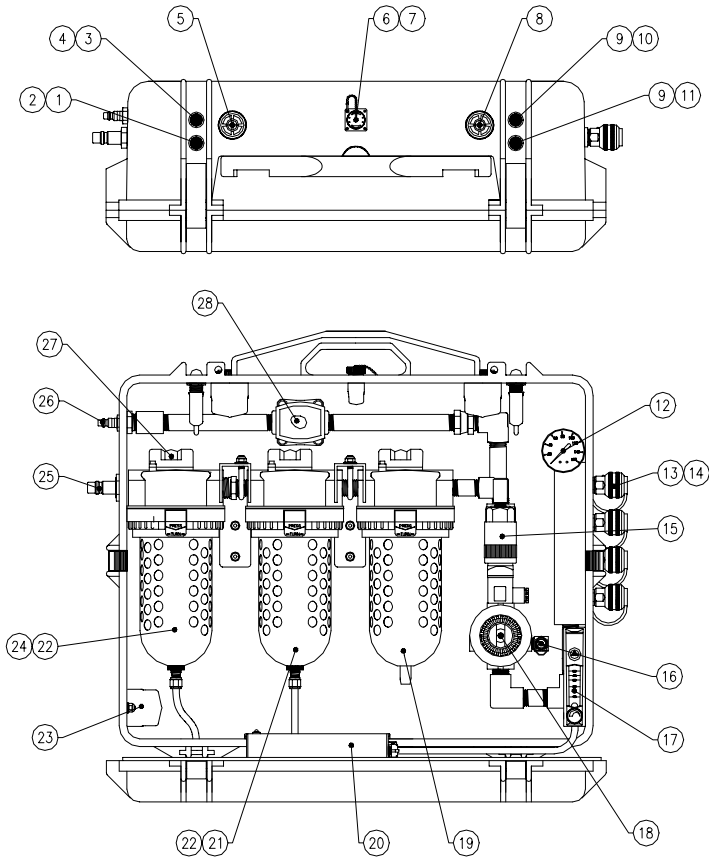
MODEL #	BB50-COAA	BB100-COAA
SIZE:	26.5"Lx21"Hx9"D (67cmx53cmx23cm)	26.5"Lx21"Hx9"D (37cmx53cmx23cm)
# OF OUTLETS:	4	4
WEIGHT:	38.8 lbs (17.6kg)	38.8 lbs (17.6kg)
MAXIMUM AIR FLOW (CFM):	50scfm @ 110psi 1415 LPM @ 7.5 bar	100scfm @ 110psi 2831 LPM @ 7.5 bar
MAXIMUM INLET PRESSURE:	150psi (10.3 bar)	150psi (10.3 bar)
MAXIMUM OUTLET PRESSURE:	125psi (8.6 bar)	125psi (8.6 bar)
RELIEF VALVE:	125psi (8.6 bar)	125psi (8.6 bar)
MONITORING:	Inline continuous monitoring of Carbon Monoxide	Inline continuous monitoring of Carbon Monoxide
VOLTAGE:	115 VAC 50/60Hz	115 VAC 50/60Hz

## MODEL BB50-COAA



ITEM #	DESCRIPTION	PART #
1	12 VDC BULB	ELDS001
2	RED LENS	ELDS005
3	120 VAC BULB	ELDS003
4	GREEN LENS	ELDS006
5	AUDIBLE ALARM, BACK-UP AIR	ELLS004
6	REMOTE ALARM JACK	ELJP004
7	REMOTE ALARM JACK COVER	ELJP005
8	AUDIBLE ALARM, HIGH CO	ELLS004
9	GREEN LED, NORMAL	MONC005
10	CLEAR LENS	ELDS013
11	RED LED, HIGH CO	MONC004
12	PRESSURE GAUGE, 0-160 PSI	GA20160B
13	RELIEF VALVE, 125 PSI	VR4125BR
14	QUICK DISCONNECT, HANSEN SERIES	QDH3SL6M
14A	QUICK DISCONNECT, SCHRADER SERIES	QDSSL6M
15	DUST CAP, HANSEN SERIES	QDH3DCAP
15A	DUST CAP, SCHRADER SERIES	QDSDCAP
16	FLOWMETER	WL033NS
17	PRESSURE REGULATOR	WL014
18	"D" FILTER ELEMENT	BB50-D
19	CO MONITOR FOR AUTO-AIR BREATHING BOX	CO-91AA
20	"C" FILTER ELEMENT	BB50-C
21	AUTO-DRAIN ASSEMBLY	WL024
22	"A" FILTER ELEMENT	BB50-A
23	PRESSURE SWITCH	PSVLV005
24	BACK-UP AIR INLET FITTING	QDH3PL6M
25	PRIMARY AIR INLET FITTING	QDH5PL6M
26	3 WAY VALVE	PSVLV009
27	FILTER CHANGE INDICATOR	WL056

## MODEL BB100-COAA



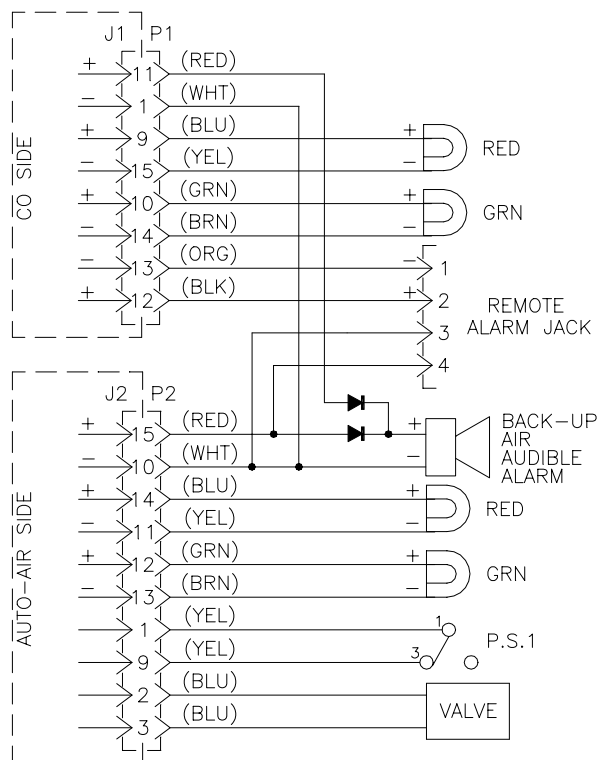
ITEM #	DESCRIPTION	PART #
1	RED LENS	ELDS005
2	12 VDC BULB	ELDS001
3	GREEN LENS	ELDS006
4	120 VAC BULB	ELDS003
5	AUDIBLE ALARM - BACK-UP AIR	ELLS004
6	REMOTE ALARM JACK	ELJP004
7	REMOTE ALARM JACK COVER	ELJP005
8	AUDIBLE ALARM - HIGH CO	ELLS004
9	CLEAR LENS	ELDS013
10	GREEN LED	MONC005
11	RED LED	MONC004
12	PRESSURE GAUGE, 0-160 PSI	GA20160B
13	QUICK DISCONNECT, HANSEN SERIES	QDH3SL6M
13A	QUICK DISCONNECT, SCHRADER SERIES	QDSSL6M
14	DUST CAP, HANSEN SERIES	QDH3DCAP
14A	DUST CAP, SCHRADER SERIES	QDSDCAP
15	PRESSURE SWITCH	PSVLV005
16	RELIEF VALVE, 125 PSI	VR4125BR
17	FLOWMETER	WL033NS
18	PRESSURE REGULATOR	WL015
19	"D" FILTER ELEMENT	BB100-D
20	CARBON MONOXIDE MONITOR	CO-91AA
21	"C" FILTER ELEMENT	BB100-C
22	AUTO-DRAIN ASSEMBLY	WL024
23	120 VAC RECESS PLUG	ELJP006
24	"A" FILTER ELEMENT	BB100-A
25	PRIMARY AIR INLET FITTING	QDH5PL12M
26	BACK-UP AIR INLET FITTING	QDH3PL6M
27	FILTER CHANGE INDICATOR	WL056
28	2 WAY VALVE	PSVLV079

## MONITOR SPECIFICATIONS

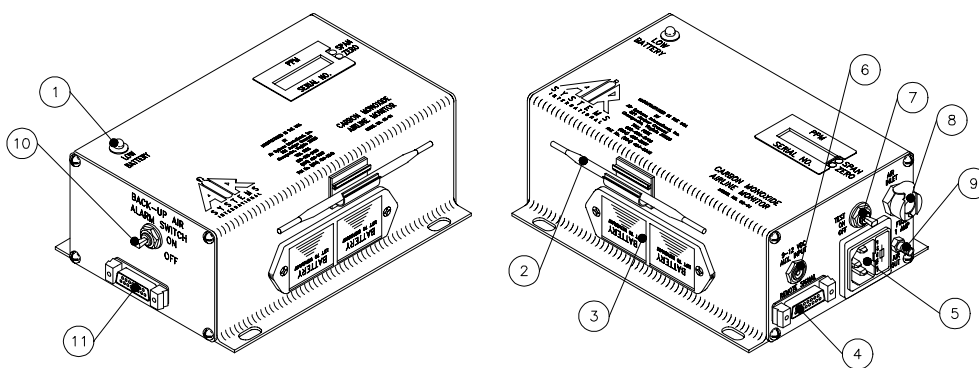
<b>SIZE:</b>	2.75"H x 7.1"L x 5.1"W (6.9cm x 17.7cm x 12.9cm)
<b>WEIGHT:</b>	2.85 lbs. (1.29 kg)
<b>CASE:</b>	Extruded aluminum Anodized black
<b>VOLTAGE:</b>	115 VAC/ 9-15 VDC
<b>SHIELDING:</b>	Internal RFI/EMI filters
<b>FUSE:</b>	115 VAC 1 amp fast acting
<b>OPERATING TEMPERATURE:</b>	4 to 113 degrees F (-20 to 45 degrees C)
<b>HUMIDITY RANGE:</b>	10% to 90% RH
<b>FLOW REQUIREMENTS:</b>	50-100cc
<b>DISPLAY:</b>	3 digit LCD

<b>OUTPUT SIGNALS:</b>	CO-91AA (DC) via 15 pin D-subminiature connector
<b>TEST CIRCUIT:</b>	Manually activated
<b>SENSOR TYPE:</b>	Sealed electrochemical sensor, Carbon Monoxide specific
<b>ACCURACY:</b>	+/- 1% full scale
<b>RESPONSE:</b>	90% in 10-15 seconds
<b>DETECTABLE RANGE:</b>	0-200ppm CO
<b>CALIBRATION:</b>	Manual zero and span adjustments
<b>ALARM SETTING:</b>	10ppm CO (5ppm Canadian)
<b>WARNING:</b>	*Normal Operation--Green Light *High CO--Red Light & Audible Alarm *Back-up Air--Red Light & Audible Alarm *Low Battery--Amber Light
<b>WARRANTY:</b>	2 years from original date of purchase

## REMOTE SIGNAL CABLE CONNECTIONS FOR CO-91AA



## MONITOR IDENTIFICATION

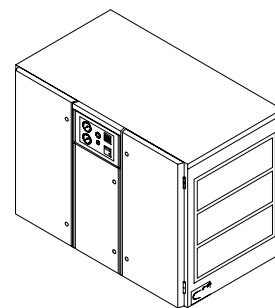


ITEM #	DESCRIPTION
1	LOW BATTERY INDICATOR
2	CALIBRATION TOOL
3	BATTERY HOLDER
4	REMOTE SIGNAL CONNECTOR
5	RECESS PLUG WITH FUSE HOLDER
6	AUXILIARY DC POWER JACK
7	ON/OFF/TEST SWITCH
8	AIR SAMPLE INLET
9	AIR DISCHARGE PORT (DO NOT BLOCK)
10	AUTO-AIR ALARM ON/OFF SWITCH
11	AUTO-AIR CABLE CONNECTION

# AUTO-AIR BREATHER BOX™ SETUP AND OPERATION

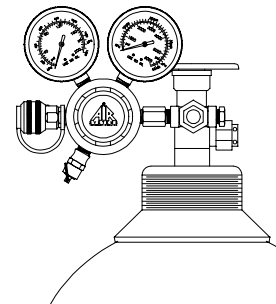
## STEP 1)

Secure a primary air source of sufficient air flow and discharge pressure. The number and type of respirators being used determines the flow rate and pressure required.



## STEP 2)

Secure a reserve (backup) air supply of sufficient capacity to achieve the desired time for all workers to egress from the hazardous area. The reserve air supply should be able to produce a sufficient flow rate and output pressure based on the flow rate and pressure required by the number and type of respirators being used for a specific duration. Adjust the reserve air supply to the proper discharge pressure for the respirators in use.



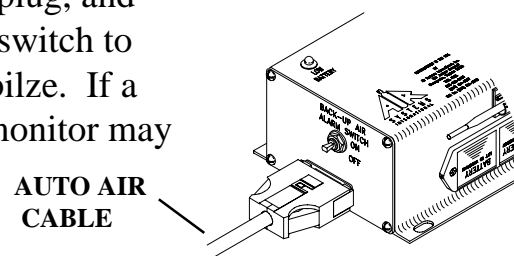
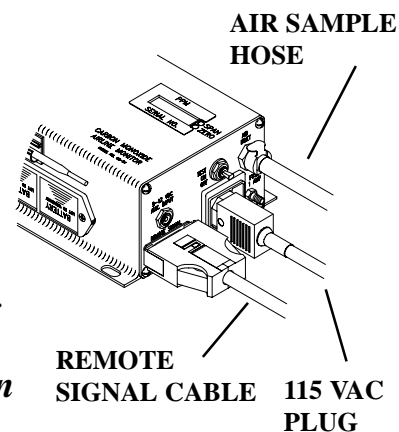
**Note: Reserve air must be at least Grade-D breathing air, and must be set at a minimum of 50psi, but not to exceed 125psi.**

## STEP 3)

Check air line monitor for fresh 9-volt batteries and turn the unit on.

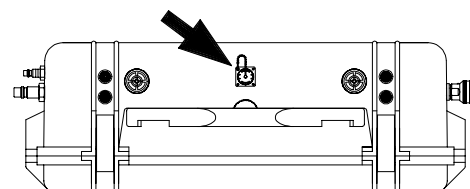
**Note: The 9-volt battery located in the left compartment supplies power to the back-up air alarm system. The 9-volt battery located in the right compartment supplies a bias voltage to the CO sensor to eliminate warm up times.**

Connect the remote signal cable, Auto-Air Cable, 115 VAC plug, and air sample hose to the monitor. 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 pages 13-14.



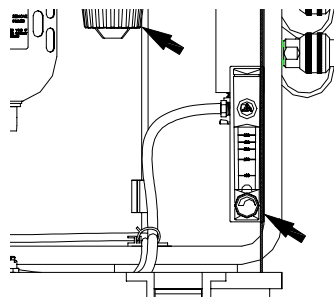
## STEP 4)

Connect the optional remote alarm (if used) into the remote alarm jack..



### STEP 5)

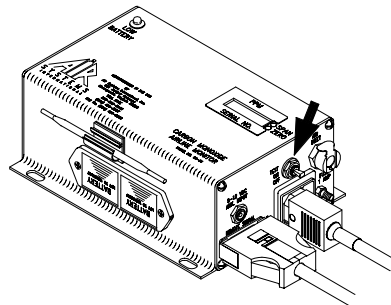
Close the flowmeter by turning the control knob fully clockwise.



### STEP 6)

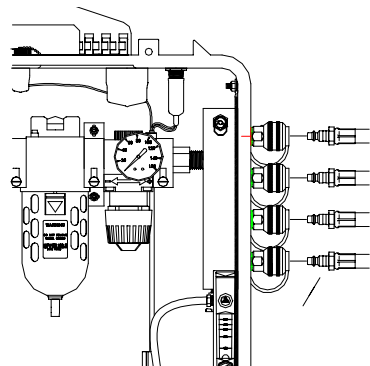
Hold the “ON/OFF/TEST” switch to the “TEST POSITION”. All local and remote audible/visual indicators will activate. If indicators do not activate, check all electrical connections, then call factory repair department.

*Note: An alarm function test can be performed at any time by lifting the “ON/OFF/TEST” switch to the “TEST” position.*



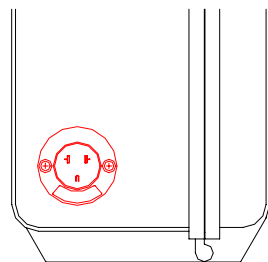
### STEP 7)

Attach the desired respirators and lengths of hose to the quick connect outlet couplings.



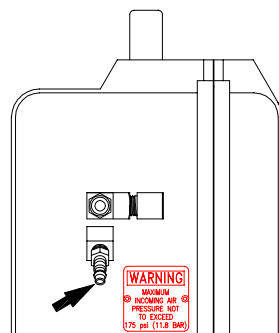
### STEP 8)

Connect 120 VAC to the recess plug by way of the supplied extension cord. AC power is required for system to stay in primary air mode. **If NO AC power is connected, unit will default into backup air mode.**



### STEP 9)

Connect reserve air to the unit at the inlet quick connect plug (1/4” Industrial Interchange).

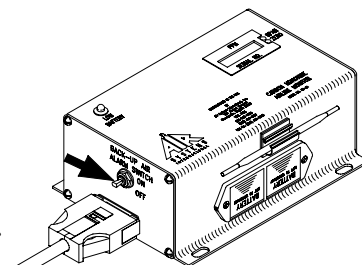




### STEP 10)

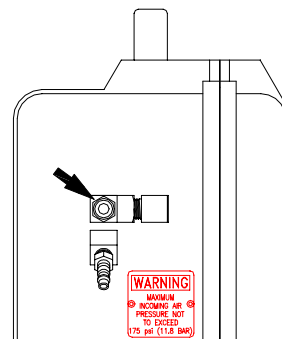
Turn “BACK-UP AIR ALARM” switch to the “ON” position. The red backup light and audible alarm (constant tone) should be on at this time.

***Note: The “BACK-UP AIR ALARM” switch provides an audible alarm and visual indicator. In the event of a power failure/interruption or a loss of primary air pressure, the alarms will sound and the red back-up indicator will illuminate.***



### STEP 11)

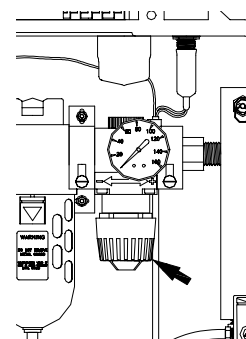
Connect primary air to unit at the inlet quick connect plug (1/2” Industrial Interchange).



### STEP 12)

Adjust primary pressure regulator to the proper discharge pressure for the respirators in use by turning the regulator knob clockwise to increase pressure, counterclockwise to decrease pressure..

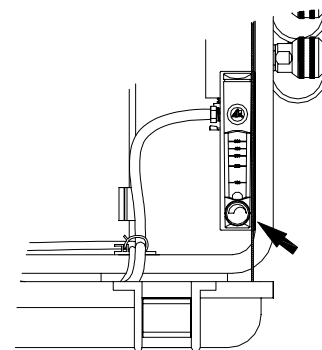
The presence of sufficient primary air pressure (50psi or greater) will cause the valve to shift out of reserve air position and all audible and visual alarms will deactivate. The green “PRIMARY AIR” indicator will illuminate.



### STEP 13)

Adjust CO monitor air sample flow rate by turning the flowmeter control knob counterclockwise until the float hovers in the green bar area (approximately 50-100cc/min). The unit is now ready for operation.

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).



When the CO concentration level exceeds the alarm set point, the green “NORMAL” light will turn off, the red “HIGH CO” light illuminates, the audible alarm will sound, and the remote alarm connections will energize.

When CO concentrations drop below the alarm set point, all alarm indicators will deactivate, and return to “NORMAL” operation.

## SHUTDOWN

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1. Make sure all personnel have egressed from the work area.
2. Close reserve air cylinders.
3. Despressurize both the main and reserve air supply lines.
4. Bleed system pressure by pulling the ring out on the relief valve, or relieve pressure through the manual drain located at the base of the filter.
5. Turn monitor “OFF” at the “ON/OFF/TEST” switch. Turn “OFF” the “BACK-UP AIR ALARM” switch. Do not remove 9-volt batteries. These are used to maintain a bias voltage to the sensors; this keeps the sensor ready for immediate future use.
6. Disconnect airline hoses.
7. Install dust caps if applicable.

## SYSTEM MAINTENANCE



**CAUTION:** *Always depressurize the system before performing service.*

**Filter Housing/Bowls:** Periodic cleaning of the polycarbonate bowls may become necessary. Simply remove the auto drains. Clean the bowls with a mild soapy solution. Reinstall into the filter housing.

**Auto Drains:** The automatic drains are designed to remove bulk liquid contaminants. The drains (1st and 2nd stages only) will automatically drain the liquids after the level has reached over 1/3 of the bowl capacity. For periodic cleaning, use a mild soapy solution.

**Filter Change:** The filtration system consists of a filter change indicator which will gradually change from green to orange when filter life is spent.

**Note:** *Air must be flowing through the filtration unit before filter change indicators will function.*

**Drain Lines:** Make sure the auto drain tubes are placed in the holes at the bottom of the box to allow the liquids to drain outside of the box.

**Calibration:** Monitor calibration should be done monthly to ensure accuracy. A calibration date sticker should be affixed for future reference. To obtain an accurate calibration, we recommend the use of Air Systems' calibration kits.

**Part Number:**

- BBK-20** Calibration Kit for CO monitor; 20ppm CO gas, zero air, regulator and case - 17 liter size.
- BBK-10** Calibration kit for Canadian CO monitor settings; includes 10ppm CO gas, zero air, regulator and case-17 liter size.
- BBK-20103** Calibration Kit for CO monitor; 20ppm CO gas, zero air, regulator and case - 103liter size.

To assure sensor accuracy, calibration of the monitor is required. If you cannot obtain an accurate calibration sensor replacement may be necessary. ***Consult Repair Service Department before ordering.***

**Part Number:**

- CO-91NS** New Replacement Sensor

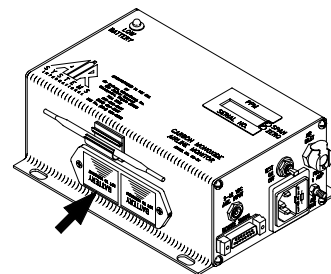
**Battery Replacement:** Replace 9-volt batteries when the amber "LOW BATTERY" light illuminates. If the monitor is not used for 90 days, check the 9-volt battery condition and replace if necessary.

## 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.

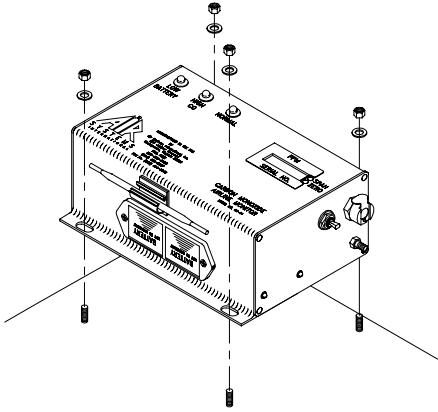
**Batteries approved for use are:**

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



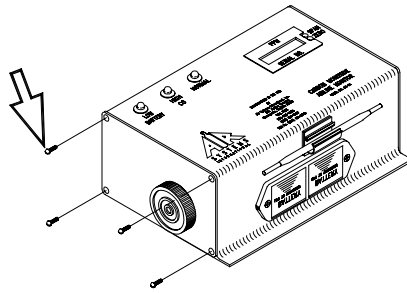
## SENSOR REPLACEMENT

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.



### STEP 1)

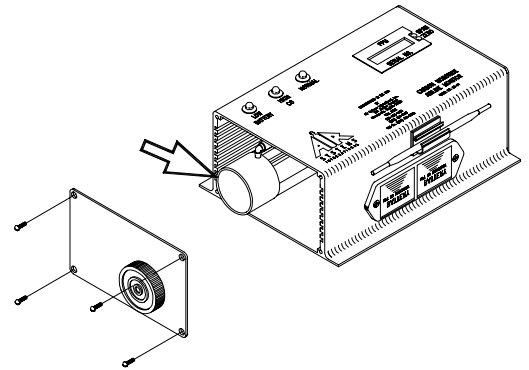
Disconnect all external connections.  
Remove CO monitor from the unit.



### STEP 2)

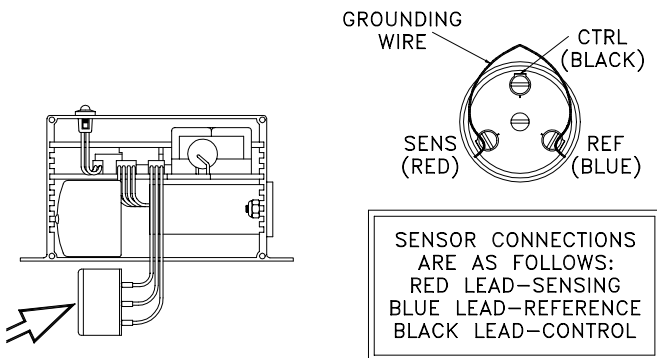
Remove the four screws from the monitor's left end plate.

*Note: Alarm location may vary.*



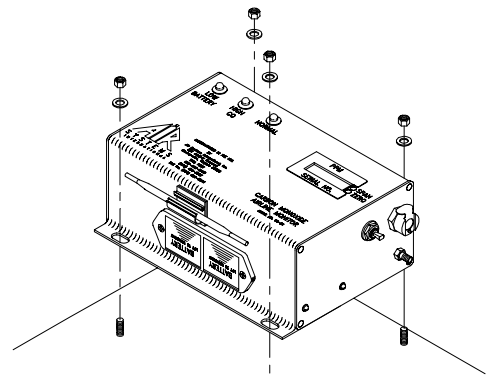
### STEP 3)

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 colored 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 and recalibrate.

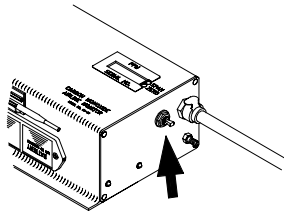
## CALIBRATION PROCEDURE

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

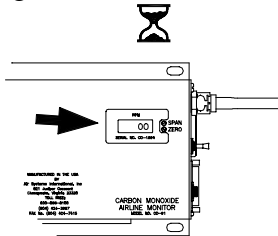
### CO Zero Adjustment

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.***

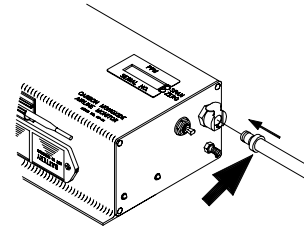
1. Place the “on/off/test” switch to the “on” position.



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

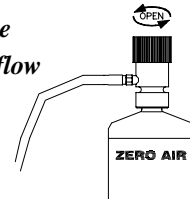


6. Attach the clear tubing with male plug to the monitor air sample inlet.



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

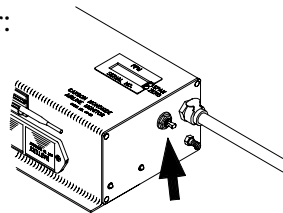
***Note: A controlled orifice in the regulator will allow the gas to flow at approximately 300 cc/min.***



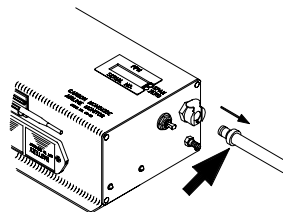
3. Hold the “on/off/test” switch in the “test” position. The following will occur:

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

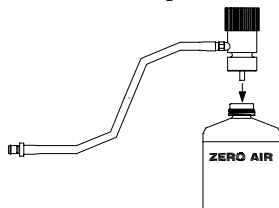
This test ensures the circuitry is operable and the continuity to the sensor is proper. Release the switch.



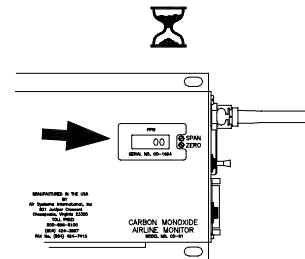
4. Remove air sample inlet tube.



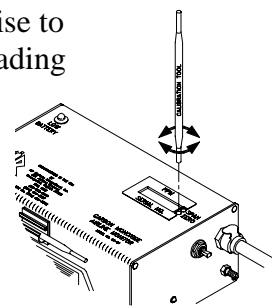
5. Install regulator on the zero air cylinder reference gas.



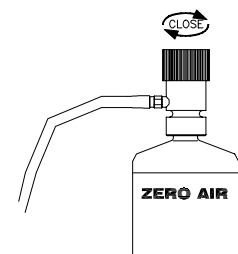
8. Allow digital readout to stabilize approximately 15 - 30 seconds.



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



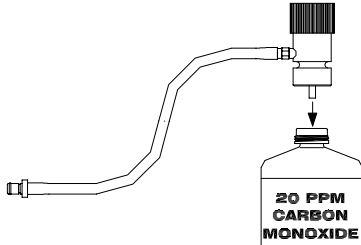
10. Turn off the regulator and disconnect the tubing from the zero air regulator.



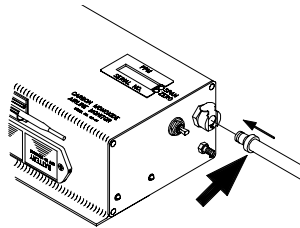
## CO SPAN ADJUSTMENT

*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.*

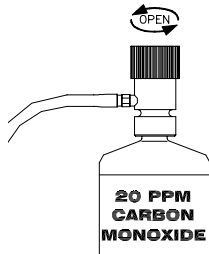
1. Install regulator to the CO calibration gas cylinder.



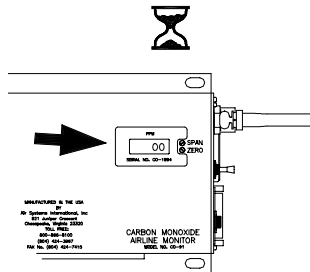
2. Connect the plug to the monitor.



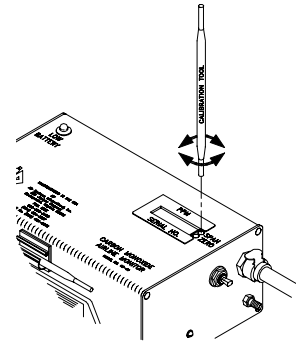
3. Open gas regulator fully by turning the knob at least two (2) turns counterclockwise.



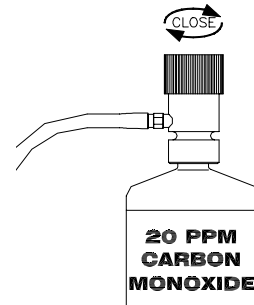
4. Allow digital display to stabilize approximately 15 - 30 seconds.



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.**

***Warranty Disclaimer***

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**Rev 2 12/98**