



“How to Assess Air Quality
with a Confined Space
Monitor”

“How to Assess Air Quality with a Confined Space Monitor”

- Introduction
- First Two Methods of Gas Detection
- Understanding Monitor Display
- Determine Type of Gases / AG Industry
- Discuss Operation Requirement
- Calibration: Importance of Maintenance
- Demonstrate Monitor Operation and Sample



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First Two Methods of Gas Detection

1.?

2.?

1. Use the New Guy

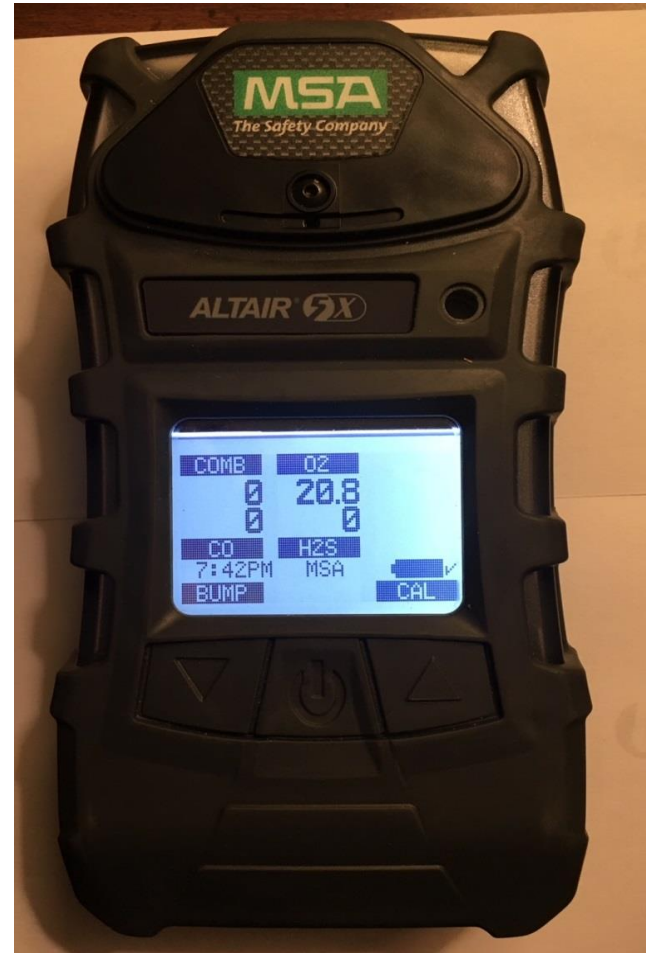


2. Canaries



Gas Monitor used today

MSA Altair 5X – Electrochem & Cat.



Understanding Monitor Display

- A monitor will display a measurement on the monitor screen, known as concentration level.
- It is measured and displayed, 3 ways.
 - 1) ppm – parts per million (CO, H₂S, PH₃)
 - 2) % LEL- lower explosion level
(Comb, EX, LEL)
 - 3) % BY VOLUME – (O₂ or Oxygen)

Determine Type of Gases Possibly Present in the AG Industry

Electrochemical Sensors – readings displayed in PPM

O₂ – A1 - 19.5 PPM

O₂ – A2 – 23 PPM

CO – A1 – 25 PPM

CO – A2 – 100 PPM

H₂S – A1 – 10 PPM

H₂S – A2 – 25 PPM

Catalytic Bead Sensor – reading displayed in COMB (LEL)

COMB – COMBUSTIBLES or LEL

COMB - A1 – 10% LEL

COMB - A2 – 20% LEL

PH₃ - A1 - .3 PPM

PH₃ – A2 - .4 PPM

Determine Type of Gases Possibly Present in the AG Industry

Monitor Sensors / Hazards

- **O₂ – Oxygen**
- 19.5 oxygen deficiency
- Symptoms: fatigue, difficulty with complex task, decreased motor control, fainting
- **LEL – Lower Explosion Limit**
- 10% LEL
- Combustibles

Monitor Sensors / Hazards

- **CO – Carbon Monoxide**
- OSHA TWA 50 PPM
- Burning of a hydrocarbon
- Colorless & Tasteless
- Symptoms: Fatigue, headache, difficulty breathing

Determine Type of Gases Possibly Present in the AG Industry

Monitor Sensors / Hazards

- H₂S – Hydrogen Sulfide
- OSHA TWA 10 PPM
- Rotten Egg Smell
- Lower levels smell, higher levels unable to smell
- Symptoms: Irritation to eyes, nose and throat.
- Headache, dizziness, nausea, difficulty breathing, etc

Monitor Sensors / Hazards

- PH₃ = PHOSPHINE
- OSHA TWA 0.3 PPM
- Colorless
- Odor: Rotten Fish or Garlic
- Symptoms: headache, dizziness, nausea, vomiting, diarrhea, drowsiness, cough, and chest tightness.

Confined Space Standard

Before an employee enters the space, the internal atmosphere shall be tested with a calibrated direct-reading instrument, for oxygen content, for flammable gases and vapors and for potential toxic air contaminants.

Discuss Operation Requirements

Draeger

- Before each day's usage sensitivity must be tested on a known concentration of the gas to be detected equivalent to 25 to 50% of full scale concentration. Accuracy must be within 0 to +20% of the actual value. Accuracy may be corrected by calibration.

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- Perform a blocked flow test before each day's use. - It is recommended that a Bump Test is performed before each day's use, and adjust if necessary. - Perform a Bump Test more frequently if exposed to silicone, silicates, lead-containing compounds, hydrogen sulfide, or high contaminant levels. - Recheck calibration if unit is subjected to physical shock.

Discuss Operation Requirements



ISEA Statement on Validation of Operation For Direct Reading Portable Gas Monitors

The International Safety Equipment Association (ISEA) is the leading national organization of manufacturers of safety and health equipment including environmental monitoring instruments. ISEA is dedicated to protecting the health and safety of all workers through the development of workplace standards and the education of users on safe work practices and exposure prevention.

ISEA has developed this statement to ensure definition consistency in all documentation, and to emphasize the need to validate the operational capability of portable gas monitors. The statement reflects current instrumentation technologies and monitoring practices. Specifically, the statement intends to:

- a. Define and clarify the differences between bump test (function check), calibration check, and full calibration;
- b. Clarify when these validation methods are to be performed; and
- c. Reemphasize to users, regulatory agencies and standards writing bodies the importance of validating the operational capabilities of portable gas monitors used to examine the atmosphere in potentially hazardous locations.

1. Definitions

- a. **Bump Test (Function Check)** - A *qualitative* function check where a challenge gas is passed over the sensor(s) at a concentration and exposure time sufficient to activate all alarm indicators to present at least their lower alarm setting. The purpose of this check is to confirm that gas can get to the sensor(s) and that all the alarms present are functional. This is typically dependent on the response time of the sensor(s) or a minimum level of response achieved, such as 80% of gas concentration applied. Note this check is not intended to provide a measure of calibration accuracy.
- b. **Calibration Check** - A *quantitative* test utilizing a known traceable concentration of test gas to demonstrate that the sensor(s) and alarms respond to the gas within manufacturer's acceptable limits. This is typically $\pm 10\text{-}20\%$ of the test gas concentration applied unless otherwise specified by the manufacturer, internal company policy, or a regulatory agency.
- c. **Full calibration** - The *adjustment* of the sensor(s) response to match the desired value compared to a known traceable concentration of test gas. This should be done in accordance with the manufacturer's instructions.

2. Recommended Frequency

- a. A **bump test (function check)** or **calibration check** of portable gas monitors should be conducted before each day's use in accordance with the manufacturer's instructions.

Any portable gas monitor which fails a bump test (function check) or calibration check must be adjusted by means of a full calibration procedure before further use, or removed from service.
- b. A **full calibration** should be conducted at regular intervals in accordance with instructions specified by the instrument's manufacturer, internal company policy, or a regulatory agency.

Demonstrate Maintenance

- Bump Test or Calibrate Monitor
- Manual or Auto Calibrator

Demonstrate Operation

- Turn on Instrument
- Confined Space Entry Point – Vertical & Horizontal
- Sample Confined Space

Sampling with Pump

DRAEGER

- 2-3 seconds per foot of tubing is a good idea to ensure sample has reached monitor and sensor has enough time to read, stabilize and display the gas concentration.

MSA

- Instrument must be capable of sample draw from 50 feet within 9 seconds or from 80 feet (24, 38 m) within 15 seconds. (Should be 1'/second rule of thumb, will verify in testing. Tubing up to a certain length (TBD) will need to be 1/16" ID and then 1/8" ID for anything longer.) Standard version Altair 5X.

Calibration Gas

- Cylinder Gas Expiration Date
 - Multi Gas – 24 mths
 - PH3 GAS – 12 mths
- Cylinder Options
 - Disposable Cylinders
 - 34, 44, 58, 116 liter
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Thank You

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