Five Features to Look For in Your Next Gas Monitor

When purchasing a gas monitor, you should think of it like buying a family car. You want the model that comes standard with premium safety features and functionalities that will keep your family or frontline workers safest when they enter the open road or jungle of hazardous gases. But how do you identify the right gas monitor for you and your workers that will promote safety and save you time and money, in an increasingly crowded marketplace filled with ever-evolving option? Developing a baseline understanding of the most essential features and functionalities that will provide workers the greatest sense of security will put you on track to identifying a potential lifesaver—not a lemon.

The following are five of the most important aspects to assess when purchasing your first, or next, gas monitor.

1. ACCURACY.
It says it’s “accurate,” but what does that really mean? If a product tells you it’s accurate, your assumption is that it offers the greatest precision and that results will not be skewed in a way that can impact safety. However, when it comes to gas monitors, accuracy is open to each manufacturer’s interpretation. Officially, accuracy is a statement expressed as a percentage of the closeness of the reading on the gas monitor to the actual concentration; many manufacturers use this as an umbrella term representative of much more, including resolution and sensitivity. It is also at the manufacturer’s discretion as to whether “accuracy” encompasses a specific portion of the reading, the full scale, or something else entirely.

To acquire the most comprehensive insight into how the device will perform when used on your work site, it is important to review the following separately:

- **Accuracy**: Typically listed with a plus or minus 5 percent, it is associated with a confidence interval of 95 percent. This means in 95 out of 100 results, the readings should be within plus or minus 5 percent of the actual gas concentration. It is important to understand the device’s measuring range to determine whether or not the reading could be close to an actual concentration or completely off the mark.

- **Resolution**: This refers to the reading in the display of the monitor. Typically, sensors should have a resolution finer than the accepted occupational exposure limit for the target gas so as to assure the user that readings fall reliably within accuracy specifications.

- **Sensitivity**: Indicates to the lowest detectable reading that can be reliably measured and displayed. It is an absolute quantity of the gas that can be detected.

Why should you review these elements separately? Because they all are different and have varying implications on how the device will perform within your...
work site conditions. By reviewing each of these individual metrics, you will be in a stronger position to select a gas monitor that will help you optimize on-site safety.

2. UNDERSTANDING CROSS-SENSITIVITIES. In order to fully accept your gas monitor’s reading as accurate, it’s important to be aware of, and to take into account, which work site hazards may produce “off gases” or unforeseen consequences that could potentially affect the performance of your selected gas monitor. Manufacturers attempt to design sensors for a specific gas or vapor, however, quite often the target gas is not the only gas detected by the sensor as a result of cross-sensitivity (a sensor’s reaction to an interfering gas). Cross-sensitivity can result in either positively or negatively skewed results. For example, positively skewed results can lead to the belief that there is too much of the target gas present, which will result in the implementation of preventative measures such as increasing ventilation or removing the gas hazard. While these additional precautions are not harmful to workers, they are unnecessary exercises that decrease worker productivity and increase operating costs due to the extra time and equipment required to obtain a true reading. Negative effects produced by cross-sensitivities may cause workers to believe the instrument has malfunctioned or, in a worst-case scenario, cancel out the reading of the target gas. The negative effect created by the unintentionally detected gas lessens the amount of information provided to workers, thus potentially creating an even more dangerous situation that can be life threatening.

To assess how your selected device will react to cross-sensitivity, review the list of known cross-sensitive agents included in the gas monitor’s instructions for use. While doing so, it is important to keep in mind that not every potential interfering gas may be included; so when in doubt, always ask the manufacturer about the how the monitor may respond to interfering gases found within your work site. Filters are also another solution to preventing or reducing the effects of cross-sensitivity. For example, many SO₂ filters are cross-sensitive to H₂S, so a multi-gas monitor with an H₂S and SO₂ sensor will give erroneous readings for SO₂ due to H₂S interference. The solution is the addition of an H₂S selective filter to the SO₂ sensor. Ultimately, the best way to prevent interference from outlying gases is to be aware of all agents associated with each test site and their effects on readings when detected. This will aid in purchasing a gas detector suitable for your intended use and environment, as well as in identifying which additional filters are necessary to prevent falsely enhanced readings.

3. BUYING “RELIABLE” SAVES MONEY AND LIVES. As mentioned in the family car scenario, it only makes sense to invest in a product that will protect your family time and time again. The same goes for gas monitors, and while it may be more challenging to discern this less tangible trait, it is usually associated with companies that have long-standing industry reputations for manufacturing devices able to withstand the rigors of the job and the environment for years at a time.

Also useful in further establishing that an instrument will reliably perform within your work site is the examination of ambient conditions. Ambient conditions typically refer to the operational specifications, in particular temperature, pressure, and relative humidity. These are typically designated by each manufacturer depending on specifications for the unit. Common specifications for operation of a gas monitor are: temperature between 32-104 degrees Fahrenheit, pressure at 700-1300 hPa (or mm Hg), and relative humidity (RH) ranging from 10-90 percent.

Beyond assessing ambient conditions to determine which gas monitor is a match for your work site, you also should consider its test repeatability. By revealing how often a device achieves the same results under the same ambient conditions, it
demonstrates how the monitor can be expected to act during identical conditions, test after test.

4. A FAST RESPONSE CAN PREVENT ACCIDENTS.
Speed saves in the oil and gas industry, especially when it comes to sensor response time because it allows workers to be alerted to unseen hazards as quickly as possible. "t90" refers to the time it takes for the monitor to display 90 percent of the actual concentration. This is a critical consideration in selecting a gas monitor that will help you make safety a work site priority.

Vividly illustrating the importance of rapid sensor speed is the following scenario showcasing the difference between a sensor with a t90 of 15 seconds and a sensor with a t90 of 25-40 seconds during an H2S event: As H2S gas is simultaneously introduced to the two monitors, neither monitor will react initially. It is only after a few seconds that the instrument with a t90 of 15 seconds will begin to register a gas amount, while the device with longer t90 time remains blank, despite being exposed to the same concentration of gas for the same duration of time. The worker wearing this device will start to suffer from a decreased level of oxygen in the blood and decreased level of muscle activity. The worker will experience these effects for a total of 10 seconds without the alarm sounding to warn of the dangerous H2S level.

After one minute and 35 seconds of gas exposure, the device with the 15-second t90 time will measure 15 ppm and go into an A2 alarm, alerting the worker of the dangerous conditions and allowing evacuation of the contaminated area. An additional 42 seconds will pass before the monitor with a t90 of 25-40 seconds will alert the wearer to dangerous gas levels, during which time symptoms such as eye irritation, headache, dizziness, nausea, throat and eye irritation, coughing, and breathing difficulty may develop. Additionally, by the end of these 42 seconds, the actual level of exposure will have risen to nearly 20 ppm. At this level of exposure, all of the previous symptoms will continue to worsen, and memory loss may occur.

By selecting devices with fast response times for your gas detection toolkit, you contribute to the prevention of fatalities and a stronger safety culture.

5. USER-FRIENDLY DEVICES KEEP SAFETY SIMPLE.
Simple, effective equipment will always result in greater compliance and more frequent use. When workers struggle with equipment because of its design and/or operation, they tend to view it more as a hindrance and less as a helpful asset that can save their lives. That's why it is of the utmost importance to choose the gas monitor that seamlessly integrates into workers' every-day routines.
Characteristics to look for in a gas monitor include:
- Lightweight and unobtrusive solutions equipped with proper attachment features so they are comfortable for the user to wear in the breathing zone on the chest pocket, collar, or hard hat
- Durable, shock-proof devices with a chemical-resistant coating that will withstand the rigors of the work site
- Universal-part gas detectors, meaning they accept parts from multiple manufacturers as to not lock you into a specific company's equipment
- Intelligent monitors capable of recording large amounts of data, as well as transmitting the data wirelessly to a central command station for analysis to further enhance the safety of your operations
- Automatic bump and calibration tests as soon as the lid on the device is closed to foster daily use
- Flexible and portable devices that don’t require electricity, allowing for complete freedom in test site location

Ultimately, the addition of the most undemanding equipment will promote use and save lives.

MAKING SENSE OF IT ALL TO MAXIMIZE SAFETY

Manufacturers are in constant competition to create and develop equipment that can do it all while still protecting frontline workers and company assets. It’s during this revolving door of new idea creation that the market can become cluttered and end users confused on what is the right gas detector for their team and work site. To navigate your next purchase effectively, it is essential to that those in the oil and gas industry develop a stronger understanding of these important features that foster greater security. After all, by getting to know your gas monitor, you lead the way to a safer working environment for you and your colleagues.

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