



TELEDYNE GAS AND FLAME DETECTION
Everywhereyoulook™

Universal truths evaluating next generation

Designing, implementing and
maintaining a truly universal approach
to gas detection.

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Evaluating next generation gas detection



Universal Truths: Evaluating Next-Generation Gas Detection

Executive Summary

Protecting your people and your physical plant, while ensuring business continuity, are the most important functions of a fixed gas detection solution. Engineering a reliable, high-performance system that makes it easier and more cost effective to meet this challenge is the driving force behind a truly universal approach to gas detection.

This white paper is about the evolution and benefits of designing, implementing and maintaining a truly universal approach to gas detection. Our intention is to help you use this information, based on “universal truths,” to evaluate your current system and project the impact of next-generation gas detection on your organization’s safety and productivity in a global economy.

Introduction

In a global economy, the challenges to personal safety, productivity, and business continuity are magnified. Companies in a wide range of industries, where the presence of combustible and toxic gases are a way of life, must continue to evaluate their gas detection systems or pay the price on many levels. This evaluation must consider a number of factors that can enhance safety, while streamlining installation and minimizing maintenance – in the present and the future. That’s what constitutes a truly universal solution.

Fixed Gas Detection with Legacy Technology/Instruments

Before we look ahead and evaluate a truly universal approach, it’s important to take a look at how gas detection is done with legacy technology today...

- a single detector is paired and tested with a single sensor, detecting only a single combustible or toxic gas;
- adopting new, advanced digital communication protocols necessitates replacing existing systems with new detectors and/or new sensors;
- unique certification requirements for different devices and regions complicate the ability to engage in business as a company expands its operations globally;
- more points mean more maintenance and associated costs;
- a field technician’s toolbox is packed with multiple sensors, detector heads and accessories from multiple manufacturers, requiring major inventory investment;
- a large workforce with specialized knowledge is needed to address specific installation and service requirements; and multiple manuals, covering many different product lines, only complicate installation and impede productivity;

Engineering, Installation and Maintenance for a Universal World

Call it a paradigm shift in response to customer needs. Today, there is an increasing call for higher levels of safety, performance, standardization, economies of scale, ease of use, and overall accountability. Meeting these needs and adding value to the customer experience begins with re-thinking fixed gas detection engineering.

Engineering a universal gas detection system provides its own set of challenges. But these challenges are being met and needs are being fulfilled. As you position your company to leverage a truly universal gas detection solution, you must evaluate where you are and where you need to be. The following exploration of legacy systems used in the field today and truly universal characteristics of next-generation gas detection instruments should aid in your evaluation.

One to Many

Legacy System: A single detector is paired with—and tested with—a single sensor, accommodating only a small number of combustible or toxic gases.

Truly Universal System: A single gas detector accommodates multiple sensors, allowing you to detect multiple types of gases in one location. Working within the same device footprint the transmitter is designed to support different sensing technologies: combustible gas sensing with catalytic bead sensors and electrochemical and metal oxide semiconductor sensors for toxic gases. Using equally smart sensor technology allows the construction of sensors with multiple ranges in the same package which in turn enables range invariant calibration. One instrument that can provide the capabilities of multiple instruments, and one sensor that can support multiple gas ranges provides valuable flexibility not available in legacy gas detection devices.

Communication Protocols

Legacy System: Legacy systems have traditionally relied on analog signals for communication. This limits the transmission of advanced diagnostics data that ensures a safe plant environment. Adopting digital communication protocols necessitates installing new detectors and/or new sensors.

Truly Universal System: As needs change and new communications protocols are required, universal transmitters are engineered to accept new plug-and-play communication boards. This multiprotocol innovation – wired or wireless (when industry appropriate) – means protocols can be added without replacing the transmitter as a plant's communication requirements change. You'll want to make sure your transmitter accommodates a wide range of communication protocols, including Modbus and HART. This kind of flexibility is a key to a future-proof gas detection solution, and the transition from rigid, proprietary systems to standards-based, secure systems that accommodate growth and change.

Calibration and Maintenance

Legacy System: Because of engineering constraints, sensor calibration must be performed in the field, where conditions are less than ideal and both safety and performance may be compromised.

- Accurate calibration is critical to satisfying both safety and performance requirements. It also impacts productivity when false alarms, due to inaccurate calibration, slow down – or even shut down – production. Imagine the consequences of an electrochemical sensor triggering an alarm that releases a blanket of foam. The cleanup costs alone can be staggering!

Next-generation gas detection enables a calibration-in-the-lab scenario, providing a more controlled and safe environment for establishing gas sensor parameters. This is a significant innovation, especially with legacy cat bead sensors which required proper voltage adjustments at the point of detection. Additionally, the flexibility to calibrate an electrochemical sensor to a particular gas level and then make simple adjustments to the range later—without recalibrating the sensor to the new range—can offer significant efficiencies in sensor maintenance.

Through advanced engineering, a transmitter's microprocessor can remember the type of sensor installed, as well as all calibration values. This built-in system of checks and balances virtually eliminates duplication of effort and the possibility of installing the wrong sensor.

Global Standards

Legacy System: Global certification, especially when deploying a variety of detectors, can complicate and delay the ability to engage in business as your company expands its operations.

Truly Universal System: Expanding the certification of a gas detector for global acceptance (including CSA, ATEX, IECEx, INMETRO and SIL 2 certified by a third party agency*), plays a critical role in facilitating quick global adoption. The process of seeking global certifications can be further streamlined when a single gas detector is flexible enough to accommodate a wide range of toxic and combustible gases.

*SIL2 renewal pending.

Cost of Ownership

Legacy System: The presence of more points (i.e., detectors) means higher maintenance, more complexity and incremental costs associated with added cabling, junction boxes and wiring.

Truly Universal System: Less is more – and better – when you can reduce the number of points in a gas detection system. One device consolidating three points has a positive ripple effect in terms of installation and maintenance. For instance, at a site with 45 points, accepted practice would include point-to-point wiring, using a Modbus communication protocol wired back to a central location or controller. But with a multi-head scenario, handling three points each, the number of detectors is reduced to 15 devices. This approach represents significant cost savings. In fact, using a single detector that consolidates three points, with a single relay board to control three alarms, totally eliminates a costly controller. Multiply this configuration times three for every three-head detector/multiple sensor configuration, and your cost of ownership is further reduced.

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Workforce Knowledge Base

Legacy System: Multiple manuals or the knowledge of many different product lines can slow the installation process and impede productivity.

Truly Universal System: In today's climate, it is becoming increasingly important to do more with a smaller, less specialized workforce. Truly universal engineering produces solutions that are simple to use with consistency in design making products intuitive, easy to learn and easy to use. This reduces installation time and increases productivity.

Toolbox

Legacy System: Large inventories of sensors, detector heads and accessories demand a significant inventory investment.

Truly Universal System: A field technician looks in his toolbox and sees fewer sensors, detectors and calibration adapters, as well as fewer accessories (like deluge guards and flow cells). Universal mounting kits simplify the process in new installations, while retrofits to existing installations are significantly more manageable. This simplification also minimizes lapses in safety due to human error.

Conclusion

Exploring a series of "universal truths" about next-generation fixed gas detection is a critical first step in evaluating how you protect your people and maintain the highest levels of productivity. Truly universal gas detection begins with a singularly flexible system, engineered to ensure accurate performance in a wide range of environments; considers current and future manufacturing plant environments; and plays a significant role in keeping costs under control in the face of global certification requirements and a changing workforce. How you use this insight will impact where, and how successfully you conduct business.

For more information about best practices in gas detection or to learn more about Teledyne Gas and Flame Detection Meridian Universal Gas Detector and Meridian Sensors, please call +1-626-934-1672 or email us at gasandflamedetection@teledyne.com. We also invite you to visit www.teledynegasandflamedetection.com.

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