

Application Note: Detecting Combustible Gas Leaks in Compressor Stations

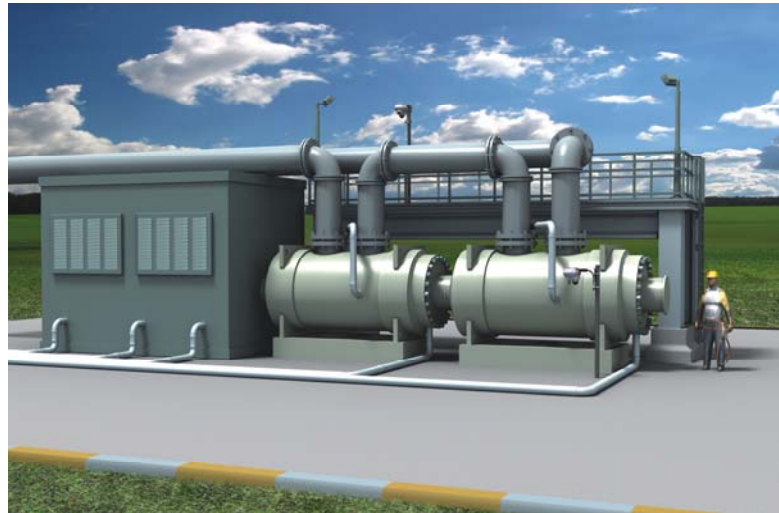
In gas compressor stations, there is a high risk of fire and explosion due to a combination of intense heat, pressure and vibration. General Monitors offers several highly reliable gas detection solutions that help maintain safety in gas compressor stations. Ultrasonic, Infrared and Catalytic Bead gas detectors can be used alone or in integrated systems to help stabilize hazardous environments.

The Compressor Station Environment

At a compressor or booster station two main processes typically take place:

- 1) Gas compression is performed in order to ensure the natural gas flowing through a pipeline remains pressurized and
- 2) gas chilling/cooling, which reduces the gas temperature.

Both processes subject gas compressor equipment to high stresses. Vibration and heat from nearby machinery, for example, can produce cracks on seals and flanges. Hydrogen sulfide, liquids, and undesirable particles in the natural gas stream can corrode pipelines and degrade components. Over time, prolonged exposure to these elements invariably leads to component failure and possibly to leaks of combustible material. Early detection of dangerous compressor gas leaks is critical to help mitigate the risk of fire in volatile locations.



Ultrasonic Gas Detectors

The Gassonic Observer-H is a non-concentration based ultrasonic gas leak detector used to detect leaks from high-pressure systems. The Gassonic Observer-H responds to the airborne ultrasound generated from gas releases in open, well ventilated areas. Since the Gassonic Observer-H responds to the source of a gas release rather than the dispersed gas, it is unaffected by changing wind directions, gas dilution and the direction of the gas leak. With its maximum coverage radius of 20 meters, it can supervise a relatively large area with a single device.



The Gassonic Observer-H is immune to many false signals and can be configured to filter short timescale ultrasonic noise that can produce nuisance alarms. Frequencies below 25 kHz are removed by a high pass filter, effectively eliminating interference from audible and low frequency ultrasonic noise. At the same time, setting the alarm trigger level above the ultrasonic background noise ensures immunity to other noise sources. The result is a reliable method of detection, able to monitor environments with high levels of ultrasound such as compressor stations.

Infrared Gas Detectors

The IR4000 Infrared Combustible Gas Detection System is a scalable plant safety solution with voting suitable for gas compressor station applications. The system's IR4000M Multi-Point Monitor can connect up to eight IR400 Point IR Gas Detectors and read their status with one command, one detector at a time. The IR4000M can also calibrate, gas check and zero each IR400 sensor for ease of maintenance.



The IR4000M is highly versatile. The monitor incorporates a display, relay module and a data concentrator in an explosion-proof enclosure and magnetic interface, which permits installation and calibration in hazardous locations. Optional 8-Amp relays expand system functions, reducing the need for integration with other controllers. HART and Modbus permit the device to convey device IDs, concentration readings, and time-stamped diagnostic, maintenance, and warning and alarm records to the control room.

Catalytic Bead Gas Detectors

The Model S4000CH Intelligent Sensor is a microprocessor-based transmitter designed for use with General Monitors' catalytic bead sensors. The unit features one person calibration and can virtually self-calibrate by simply activating a magnetic switch and applying gas. It is designed to monitor combustible gases and vapors within the lower explosive limit (LEL) and provide status indication and alarm outputs.



All of the S4000CH electronics are contained within an explosion-proof housing so that sensor information can be processed at the sensor site. The detector uses a 4-20 mA analog output signal that is proportional to 0 to 100% LEL gas concentration at the sensor. In addition, the S4000CH includes warning, alarm and fault relay contacts that can be used to indicate an alarm or fault condition and dual redundant Modbus or HART communication. Configurations with relays, Modbus and HART are available to meet many needs.

Integrating Multiple Gas Detection Technologies

The ability of detection technologies to work together, thereby mitigating the limitations of single technologies, is one of the benefits of a new outlook in fixed gas detection systems. Ultrasonic gas leak detectors alarm as they "hear" the ultrasonic sound from a gas leak, whereas other methods rely on "smelling"; trace amounts of a toxic or combustible vapor imaging or "seeing" a gas cloud. Experience has shown that a combination of gas detection sensor technologies provides a greater level of safety. Taken together, these detectors enhance the protection of the area as a whole.

Conclusion

It is extremely important to take precautions in order to prevent gas compressor explosions and fires. Early gas leak detection is critical in this environment, and General Monitors offers several gas detection technologies that are ideal for use with gas compressors. Ultrasonic, infrared and catalytic bead gas detectors can be used individually or in conjunction with one another to ensure that gas compressors remain safe and explosion-free.