

Gas Detectors for Firefighters and Hazmat Teams

Technical Note 5

Emergency Response Teams

Fully 85% of fire departments in the U.S. consist of all or mostly volunteer personnel. Firefighters and hazmat teams face numerous threats to life and health, some of which demand use of gas detectors to prevent over-exposure, particularly the so-called Toxic Twins: carbon monoxide and hydrogen cyanide. But volunteer fire departments have limited budgets for maintenance and training for these detectors. WatchGas instruments are particularly suited for such departments because of their simple operation and ease of maintenance in lowcost instruments that cover multiple gas detection needs.



WatchGas UNI Single Gas Detectors

Fire Engine Teams

During overhaul when not wearing SCBA, firefighters are subject to poisoning by carbon monoxide (CO) hydrogen cyanide (HCN) (from plastics) and lack of oxygen (O₂). UNI singlegas monitors detect oxygen deficiency or toxic CO or HCN levels and tell the responders when it is necessary to don SCBA gear. In some instances firefighters are responding to a fire from combustible chemicals such as a leaking gas pipeline, propane tank, or liquid fuel source, or they need to enter a confined space. In such cases, POLI 4-gas confined space entry monitors are called for, which have sensors for CO/H₂S/O₂/LEL. Options for HCN and select other toxic gas sensors are available on these meters.

Arson Investigation

Fire accelerants such as gasoline that are used to purposefully start a flame can often become trapped underneath tiles, into walls or absorb into masonry and remain unburned after the fire is put out. Arson investigators use ppb-level PIDs such as the NEO PPB to search for such residual fuels. Samples are then taken back to a laboratory for chemical analysis to identify the fuel type and possible source, to aid in identifying the perpetrator.

Hazmat Teams

Hazardous Materials Response Teams need a variety of gas detectors in order to be able to handle a broad range of toxic chemical releases. PIDs like the NEO are useful in this regard because they are broad-band detectors that sense thousands of VOCs including paint thinners, fuels, alcohols, industrial solvents, dry cleaning fluids, etc. A limitation of PIDs is that they are not chemically-specific – that is, a response shows that something is there, but it does not identify what it is.



WatchGas NEO
Photo-ionization
detector Benzene
specific

PIDs also do not respond to some inorganic toxic compounds like chlorine (Cl₂), sulfur dioxide (SO₂), hydrogen cyanide (HCN) and hydrochloric acid (HCl). For such compounds the UNI and POLI series instruments provide chemically-specific sensors for over 20 different toxic compounds, the largest selection in the gas detection industry. These sensors include carbon monoxide (CO), hydrogen sulfide (H₂S), ammonia (NH₃), chlorine (Cl₂), chlorine dioxide (ClO₂), ozone (O₃), hydrogen cyanide (HCN), hydrogen chloride (HCl), hydrogen fluoride (HF), nitric oxide (NO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), phosphine (PH₃), arsine (AsH₃), methyl mercaptan, and ethylene oxide (ETO). The ETO sensor is particularly useful in measuring some VOCs that a PID cannot detect, such as methanol. Thus, a

combination of PID for VOCs and range of electrochemical sensors for specific toxics covers most hazmat detection needs. A POLI multi-gas meter handles all these measurement options in a single instrument, including PID.

POLI 5-Gas Options

The POLI has 4 sensor slots, but can measure 5 gases by using combination sensors, including CO/H₂S and H₂S/SO₂ combination sensor often used at refineries. and optionally PID. LEL sensors detect flammable gases and vapors as they approach combustible concentrations, while PIDs measure many of the same combustible gases at much lower concentrations, thus giving an early warning of possible explosion.

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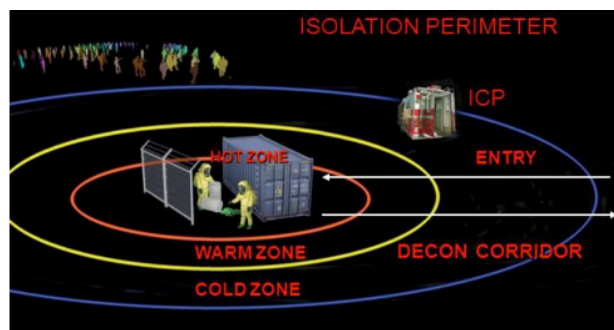
POLI Allows Quick Sensor Change-Out

Because Hazmat teams may not know which chemicals they need to detect until they arrive at the scene, they often must change out sensors on-site. The POLI uses smart sensors that retain calibration information. Therefore one can switch by simply opening the instrument cover and inserting a different sensor, without needing to re-calibrate or carry along calibration gases and regulators. In addition, the POLI recognizes the sensor type so there is no confusion about (or need for training on) proper sensor location. And the display automatically adjusts the sensor ID without the need for the user to re-program the instrument.

A few gas sensors including HCl and ethylene oxide take several hours to equilibrate before use, because these sensors use a bias voltage. Such sensors should be installed in an instrument during storage to be sure they are ready for rapid deployment, and can be changed out if not needed.

Continuous Monitors for Hot Zone Delineation

Another purpose of continuous monitors in outdoor hazmat response is perimeter delineation. For example, if a tanker truck is overturned, a PID or a single-gas toxic monitor can be used to determine how close workers can come to the spill location before requiring a facemask or full personal protective equipment.



EMTs/Confined Space Entry

Emergency Medical Technicians are often present in gas-related emergencies. A common example is CO poisoning from poorly-maintained indoor heating devices, which becomes more frequent during the winter months. Having a CO sensor on hand for real-time measurements can help locate the toxic gas source to eliminate it. Another example is when a worker is found unconscious after entering a vat or tank without suspecting low oxygen or toxic vapors. It is not uncommon to find that a second worker attempts to rescue the fallen co-worker and is also overcome. A confined space entry monitor should be lowered into the vessel before any rescue workers enter.

Wireless Systems

WatchGas also offers wireless systems suitable for venue protection or hazmat spill scenarios. The WatchGasPlatoon rapidly deployable (minutes) set of POLI multi-gas monitors that communicate wirelessly in real time to a central command station (IRLink and computer) with full mapping and alarm software. Simpler versions include the WatchGasSquad Pro, without mapping software, and WatchGasSquad without IRLink. Please see the wireless system datasheet for more details