



RAEGuard PID Configuration & Applications

RAEGuard Continuous PID Module

The RAEGuard (FGM-1000 series) is a fixed-mounted Photoionization Detector (PID) designed to measure volatile organic compounds (VOCs) on a continuous basis. PIDs provide safety and hygiene professionals with reliable, affordable, accurate and instantaneous means of *directly* measuring VOCs at low ppm levels to protect employees. The RAEGuard can also be used in process control applications to increase productivity and efficiency. The RAEGuard comes in three concentration ranges: 0.01 to 20 ppm, 0.1 to 100 ppm, and 1 to 1000 ppm and two flow configurations: standard and flow-through. The flow-through versions allow sample gas to be drawn from 100 feet (30 meters) or more using the integrated sampling pump. Refer to Technical Note TN-106 for a list of chemicals that can be measured, and Technical Note TN-140 for sample tubing considerations.

The RAEGuard is best suited for operation with the 10.6 eV lamp; because of the continuous operation, we generally do not recommend using the 11.7 eV lamps. 9.8 eV lamps can be used but may require more frequent replacement than 10.6 eV lamps. In-line external filters are recommended to extend the calibration interval.

Controllers and Data Output

The RAEGuard is designed to be used with a controller that provides 9-36 VDC power (typically 24 V). The unit is small enough that it can often be mounted in existing electrical panels or other weatherproof cabinets. The RAEGuard gives 4-20 mA and RS485 outputs, which connect to the user's datalogger, programmable logic controller and/or personal computer. Two dry contacts are provided for low and high concentration alarms. The RAEGuard itself has a concentration display and LEDs indicating alarms and operation status. Industrial-type sirens are available, for example, from Federal Warning Systems (www.federalwarningsystems.com 800-548-7229).

Printing Processes

Printing and silkscreening processes use solvents like toluene to dissolve and apply inks. These solvents are then emitted to the atmosphere during drying. RAEGuards have been successfully installed in effluent ducting to determine the drying process' completion.

Degreasing Operations

Vapor degreasers employ large amounts of solvents such as perchloroethylene (PCE) to remove cutting oils and greases used in machining and assembling metal parts. Major applications include automobile and aviation industries.

Air Treatment System Performance

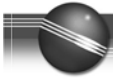
Many RAEGuards have been successfully installed to monitor air treatment system performance. Contaminated air streams arise from manufacturing operations and environmental clean-up activities, such as soil vapor extraction. Common treatment systems include activated carbon adsorption systems, catalytic oxidizers, and liquid scrubbers. In some cases, a RAEGuard is placed both before and after the treatment system to determine treatment effectiveness. RAEGuards can also be used to measure VOC emissions from incinerators, if the gases are allowed to cool below 60° C (140° F) before entering the unit.

Paint Booths

Paints may contain a variety of solvents including methyl ethyl ketone (MEK) toluene, and simple hydrocarbons, which are easily detected with a PID. During spray painting and paint drying, these solvents are emitted to the air. Large operations such as in the automobile and aviation industries may require one monitor for each booth.

Benzene in Refinery Analyzer Shelters

Refinery analyzer shelters house on-line process analyzers such as gas chromatographs (GCs) and electrochemical detectors. Liquid and gaseous process samples, which may contain high levels of butadiene or benzene, flow continuously to the analyzers. The 0.01 to 20 ppm RAEGuards fitted with 9.8 eV lamps have been employed to protect workers from possible leaks in the tubing or valves in the shelters. Although the 9.8 eV lamp is not completely specific for benzene, response to enough hydrocarbon interferences is removed to allow setting the alarm limit to 1 ppm, the OSHA permissible exposure limit for benzene. The cost of the RAEGuard is much less than an on-line gas chromatograph and it provides continuous protection. Typically, one RAEGuard is installed per 9' x 15' (3 m x 5 m) shelter, or two for larger shelters.



Other Benzene Monitoring

Other benzene monitoring applications include styrene production, leather manufacturing, and steel mills. Leather production processes use benzene and other solvents to treat the leather. Steel mill coking gas consists of 55 to 60% H₂, 5 to 8% CO, 23 to 28% CH₄, 2 to 4% hydrocarbons and 0.5% to 1% benzene. A PID is preferred as more selective than other methods, which often have interference by the high concentrations of gases. For example, a flame ionization detector responds to methane, while a PID does not.

Carbon Disulfide Monitoring

Carbon disulfide (CS₂) is used in the manufacture of pesticides and other chemical processes. It is highly toxic, with its ACGIH TWA of 10 ppm soon to be reduced to 1 ppm. A 0.01 to 20 ppm range RAEGuard with 10.6 eV lamp is recommended for this application. In cases where H₂S is present also, a 9.8 eV lamp can be used to measure CS₂ selectively. However, the ACGIH TWA for H₂S is

also soon to be reduced from 10 ppm to 1 ppm, in which case it may be desirable to use a 10.6 eV lamp to measure both compounds. CS₂ is highly flammable and some regulatory agencies require Intrinsically Safe certification instead of Explosion Proof monitoring equipment, as is the RAEGuard. In this case, the requirement can be met by continuously purging the RAEGuard housing with a slight positive pressure of nitrogen to ensure a non-combustible atmosphere.

Indoor Air Quality Monitoring

RAEGuards can be used for continuous indoor air quality (IAQ) monitoring, including non-manufacturing facilities. VOC sources include those from newly installed carpets or painted surfaces or where air intakes are located near potential outside sources. One example is an airport in which the incoming air is potentially contaminated with jet fuels. In some cases, the RAEGuard is packaged with other IAQ sensors by OEM distributors to provide complete IAQ monitoring systems.