

MIL-RAM TECHNOLOGY

Gas Detection for Industry Patented Technology

no false alarms



MIL-RAM
Patented Technology
no false alarms
Gas Detection Systems
ISO 9001:2000 Certified

Tel: 510-656-2001 • Toll Free: 1-888-4MILRAM (1-888-464-5726)
Fax: 510-656-2004 • Email: sls@mil-ram.com • Web: www.mil-ram.com

no false alarms Patented Sensor Technology

Industrial Gas Sensors: Mil-Ram is a leading innovator in the area of gas sensor development, manufacture and integration. Mil-Ram's unique *patented* electrochemical sensor technology specifically eliminates *zero drift* and associated *false* alarms. The Mil-Ram sensors provide enhanced chemical selectivity to further ensure the elimination of nuisance alarms related to common coexisting gases (CO, CO₂, LEL, etc.). A primary objective of sensor design is lower cost of ownership through elimination of *false* alarms and reduced maintenance. All Mil-Ram sensors are rigorously tested and characterized to ensure conformance to strict operational and performance standards. Many of the Mil-Ram electrochemical sensors are factory rechargeable to restore original sensitivity and performance. The Mil-Ram sensors have been field proven over the years in a wide variety of industrial environments, often under demanding and hostile conditions. As a sensor developer and manufacturer, Mil-Ram has a unique perspective on the application of various sensor technologies to solve the varying needs of industrial gas monitoring. Mil-Ram remains fully committed to ongoing sensor research and development to ensure the future needs of industry are met with efficient and cost effective monitoring solutions.

Electrochemical Sensors: Electrochemical sensing devices basically consist of electrodes surrounded by an electrolyte solution enclosed behind a gas permeable, hydrophobic membrane. Gas molecules diffuse across the membrane to enter the electrode/electrolyte interface where chemical and electrochemical reactions occur to generate measurable electrical current flow. Current flow is directly related to gas concentration over the specified detection range. In the absence of target gas, negligible electrical current flows and consequently, a definite *zero* is achieved and maintained (no *zero drift*). A combination of electrodes and electrolyte chemistry largely determines the type of gas detected and provides inherent chemical selectivity. Elimination of *zero drift* and corresponding *false* alarms are critical elements of the Mil-Ram *patented* electrochemical detection method.



Infrared Sensors (NDIR): Infrared detectors are based on the principle of infrared absorption by gas molecules at specific wavelengths in the infrared region. The Mil-Ram sensor utilizes an infrared lamp source and dual detectors; active and reference. The active detector is covered by an optical filter that allows transmission of infrared radiation at a specified wavelength where the target gas is known to absorb. The reference element is covered by a filter that transmits wavelengths outside the absorption band. This arrangement provides compensation for normal changes in lamp intensity over time. The infrared detector can be supplied for hydrocarbon (LEL) or carbon dioxide measurement. Unlike catalytic sensors for hydrocarbon detection, the infrared sensor is unaffected by catalytic inhibitors and poisons.



Catalytic Sensors: Catalytic bead combustible gas sensors basically consist of hot filaments (active and reference elements) enclosed behind a sintered stainless steel flame arrestor. The active element is treated with a catalyst to effectively burn or oxidize the gas while the reference element is nonreactive and provides compensation for ambient conditions; temperature and humidity. The two elements are configured in a Wheatstone bridge whereby exposure to combustible gas imbalances the bridge and generates an electrical output directly related to gas concentration. The catalytic gas sensor is not selective and detects numerous combustible gases and vapors. The Mil-Ram catalytic sensor achieves exceptional *zero* stability by providing excellent gas response at comparatively low operating temperatures. The lower operating temperature provides for long term stability and extended service life.



Photo-Ionization Detectors (PIDs): Photo-Ionization detectors are based on the principle of ultraviolet (UV) light absorption by a gas sample to produce electrically charged particles (positively charged molecular ions and negatively charged electrons). These charged particles generate measurable electrical current at the sensor electrodes. PID detectors provide low range detection of many different gas and vapor species including highly toxic volatile organic compounds (VOCs). Selectivity is based on UV source energy and ionization energy of the target gas.



TA-2100 RS-485/4-20mA 3 or 4 - Wire *smarter* Transmitter



Ambient/Diffusion Transmitters



Sample Drawing Transmitters - Single Point, Multi-Point Sequential



Pyrolyzer for detecting chlorinated/fluorinated compounds e.g. Freons®

Options

- Splash Guard
- Dust Guard
- Duct Mount Adapter Kit
- Sensor Extender Cable
- Relay Module
- RS-485 Modbus RTU
- Power Supply
- Wireless Telemetry
- Network Hubs
- Calibration Kits
- Custom Configurations



smarter Transmitter Features

- ◆ *no false alarms* Mil-Ram *patented* sensor technology
- ◆ Self calibration adjusts span monthly based on sensor life curve - reduces calibration frequency and cost
- ◆ Auto gas calibration, non-intrusive, hands-free, magnetic switches
- ◆ Relay Module option in same enclosure - low, mid, high and fault relays - gas alarm relays can be programmed latching/non-latching, energized/non-energized and time delays
- ◆ RS-485 Modbus RTU option - provides multi-drop installations with serial communications to centralized control system (PLC, DCS, etc.)
- ◆ Wireless Telemetry option - transmit 4-20mA signals via wireless connectivity - greatly reduces installation costs
- ◆ Backlit 12 characters x 2 lines LCD display - provides user interface with magnetic switches - no dip switches
- ◆ Offsite sensor calibration to replace sensors in the field w/o recalibration
- ◆ Peak Value, 15-min. TWA, Temperature
- ◆ Remaining sensor life and Replace sensor indication
- ◆ Operating Voltage - 12 or 15-30 VDC
- ◆ CI 1 GR B,C,D Nema 4X or Nema 4X plastic enclosure
- ◆ Continuous Diagnostics

Sensors *patented* by Mil-Ram

- ◆ No *zero drift* with changes in temperature/humidity/pressure
- ◆ No LEL, methane, hydrocarbons, CO, CO₂, VOCs gas interference
- ◆ Do not saturate with occasional exposure to high gas levels
- ◆ Do not *go to sleep* after long periods in gas-free air
- ◆ Chemically selective based on unique electrolyte chemistry
- ◆ Do not react with air - eliminates *zero drift*
- ◆ Do not require addition of electrolyte for 3-5 year normal life
- ◆ Factory rechargeable to restore original performance

Sensor Technologies Available

- *Electrochemical: Toxics, Oxygen*
- *Catalytic: LEL Combustible Gases*
- *Infrared: LEL Combustible Gases*
- *Infrared: Carbon Dioxide, CO₂*
- *PID: Toxics, VOCs*



TA-2102 4-20mA 2 - Wire Loop Powered *smarter* Transmitter



Hundreds of Toxic Gas Sensors Available
Intrinsically Safe Version Available

Ambient/Diffusion Transmitters



Sample Drawing Transmitters - Single Point, Multi-Point Sequential

Pyrolyzer for detecting chlorinated/fluorinated compounds e.g. Freons®



smarter Transmitter Features

- ◆ *no false alarms* Mil-Ram *patented* sensor technology
- ◆ Self calibration adjusts span monthly based on sensor life curve - reduces calibration frequency and cost
- ◆ Auto gas calibration, non-intrusive, hands-free, magnetic switches
- ◆ Wireless Telemetry option - transmit 4-20mA signals via wireless connectivity - greatly reduces installation costs
- ◆ LCD display - 12 characters x 2 lines - provides user interface with magnetic switches - no dip switches
- ◆ Offsite sensor calibration to replace sensors in the field w/o recalibration
- ◆ Peak Value, 15-min. TWA, Temperature
- ◆ Remaining sensor life and Replace sensor indication
- ◆ Operating Voltage - 10-30 VDC
- ◆ CI 1 GR B,C,D Nema 4X or Nema 4X plastic enclosure
- ◆ Continuous Diagnostics

Sensors *patented* by Mil-Ram

- ◆ No *zero drift* with changes in temperature/humidity/pressure
- ◆ No LEL, methane, hydrocarbons, CO, CO₂, VOCs gas interference
- ◆ Do not saturate with occasional exposure to high gas levels
- ◆ Do not *go to sleep* after long periods in gas-free air
- ◆ Chemically selective based on unique electrolyte chemistry
- ◆ Do not react with air - eliminates *zero drift*
- ◆ Do not require addition of electrolyte for 3-5 year normal life
- ◆ Factory rechargeable to restore original performance

Options

Splash Guard
Dust Guard
Duct Mount Adapter Kit
Sensor Extender Cable
Power Supply
Wireless Telemetry
Network Hubs
Calibration Kits
Custom Configurations



Sensor Technology Available

- *Electrochemical: Toxics and Oxygen*

NOTE: due to power limitations naturally imposed on any 2-wire loop powered device, some sensor technologies are not supported by the Model TA-2102. This would include catalytic, infrared and PID type sensors.



Control Systems

Single and Multi-Channel Controllers



Options

- ◆ Computerized Data Acquisition
- ◆ Modbus RTU serial communications
- ◆ Auxiliary Alarm Station
- ◆ Strobes/Horns (ordinary or XP)
- ◆ Back-Up Battery
- ◆ Turn-Key Solutions

Single and Multi-Channel Controllers

- ◆ Universal Input - accepts any 2, 3 or 4-wire type 4-20mA transmitter
- ◆ Direct-Connect Sensor option - transmitter not required, remote sensor hundreds of feet
- ◆ Power Source Friendly - operates on 85-265 VAC (47-440 Hz) or 15-30 VDC
- ◆ Back-Up battery option
- ◆ Operator Interface includes LCD backlit display(s) and push button switches to provide simple configuration of all parameters - no dip switches
- ◆ Alarm Relays - low, mid, high and fault relays fully programmable; non-latching/latching, non-energized/energized, trigger on increasing/decreasing meter reading and time delays
- ◆ Local Alarms - integral buzzer and LED indicators
- ◆ Regenerated 4-20mA output per channel
- ◆ Modbus RTU option
- ◆ Calibration Mode
- ◆ Alarm Disable Mode
- ◆ Alarm Test/Output Test
- ◆ Continuous Diagnostics
- ◆ Nema 4X plastic or Cl 1 GR B,C,D enclosures
- ◆ Custom Configurations

Wireless Telemetry Systems 902-928 MHz • 2.4 GHz



Single and Multi-Channel Wireless Telemetry Systems

- ◆ Eliminates costly hard wiring between field installed transmitters and control system
- ◆ 902-928 MHz (or 2.4 GHz) frequency hopping spread spectrum technology - user FCC license not required - virtually immune to interference
- ◆ Multi-Process - transmit/receive data from any 4-20mA transmitter including gas detection, temperature, humidity, flow, pressure, pH, conductivity, level, weather stations and more
- ◆ Simple addressing provides a unique identity for each transmitter
- ◆ Advanced data recognition to ensure data reliability and integrity

Gases Detected

Toxic, Combustible, Oxygen, VOCs, Freons®

Acetic Acid	Chlorofluorocarbons	Hydrogen Chloride	Nitrogen	Tetraethylorthosilicate
Acetone	Chloroform	Hydrogen Cyanide	Nitrogen Dioxide	Tin Tetrachloride
Acrylonitrile	Combustibles, LEL	Hydrogen Fluoride	Nitrogen Tetraoxide	Titanium Fluoride
Alcohol	Diborane	Hydrogen Iodide	Nitrogen Trifluoride	Titanium Tetrachloride
Ammonia	Dibromotetrafluoroethylene	Hydrogen Peroxide	Oxygen	Trichloroethylene
Antimony Pentachloride	Dichloroethane	Hydrogen Selenide	Ozone	Trichlorosilane
Arsenic Pentachloride	Dichlorosilane	Hydrogen Sulfide	Pentane	Tungsten Hexachloride
Arsenic Pentafluoride	Difluoromethane	Iodine	Perchloroethylene	Tungsten Hexafluoride
Arsenic Trichloride	Disilane	Isobutane	Phosgene	Vinyl Chloride
Arsenic Trifluoride	Ethane	Isopropyl Alcohol	Phosphine	VCM
Arsine	Ethanol	LNG	Phosphorous Oxychloride	Xylene
Benzene	Ethylene	LPG	Phosphorous Pentachloride	Many More Gases
Boron Trichloride	Fluorine	Methane	Phosphorous Pentafluoride	
Boron Trifluoride	Fluorosulfonic Acid	Methyl Bromide	Phosphorous Trichloride	VOCs including:
Bromine	Freons®	Methyl Chloride	Phosphorous Trifluoride	Alcohols
Butane	Germane	Methyl Chloroform	Propane	Aldehydes
Carbon Dioxide	Germanium Tetrachloride	Methyl Iodide	Silane	Aromatics
Carbon Monoxide	Germanium Trichloride	Methylene Chloride	Silicon Tetrachloride	Amides
Carbon Tetrachloride	HCFCs (Freons®)	Molybdenum Fluoride	Silicon Tetrafluoride	Amines
Carbonyl Difluoride	Heptane	Molybdenum Hexafluoride	Sulfur Dioxide	Chlorinated Hydrocarbons
Chlorine	Hexane	Molybdenum Pentachloride	Sulfur Tetrafluoride	Hydrocarbons
Chlorine Dioxide	Hydrazine	Natural Gas	Sulfuric Acid Vapors	Ketones
Chlorine Trifluoride	Hydrogen	Nitric Acid Vapors	Tantalum Fluoride	Sulfur Compounds
Chlorobenzene	Hydrogen Bromide	Nitric Oxide	Tetrachloroethylene	Many More Gases

Tox-Box Single Gas Portable Gas Detection System



Sample Drawing Analyzers and Monitors

Wireless Option



CO₂ Analyzer for Natural Gas Pipelines



Single Gas Portable Monitors and Analyzers

- ◆ Available with any Mil-Ram **Toxic/LEL/VOC/Oxygen** sensor - **Electrochemical/Catalytic/Infrared/PID**
- ◆ On board sample pump or positive pressure input
- ◆ Rechargeable 12 VDC sealed lead-acid battery
- ◆ Alarm Relays - low, mid, high and fault - fully programmable (no dip switches)
- ◆ Operator Interface - auto-backlit 16 characters x 2 lines LCD display and push button switches
- ◆ Regenerated 4-20mA output - Modbus RTU option
- ◆ Continuous Diagnostics including Remaining sensor life

Tel: 510-656-2001 • Toll Free: 1-888-4MILRAM (1-888-464-5726)
 Fax: 510-656-2004 • Email: sls@mil-ram.com • Web: www.mil-ram.com