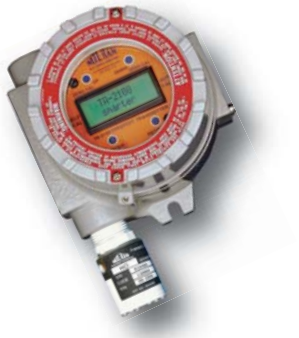
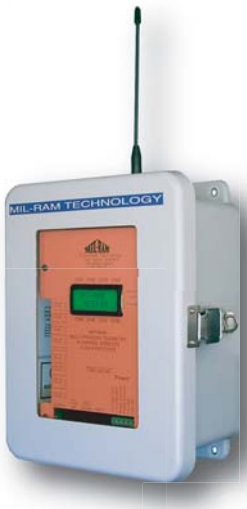
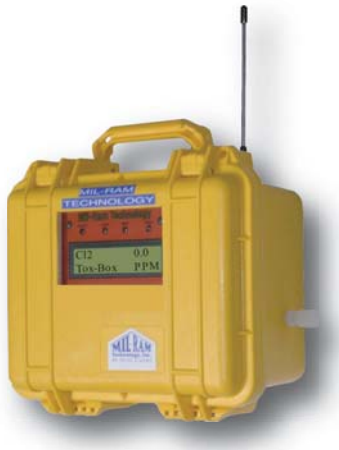
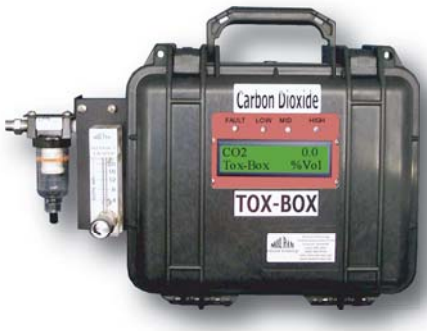
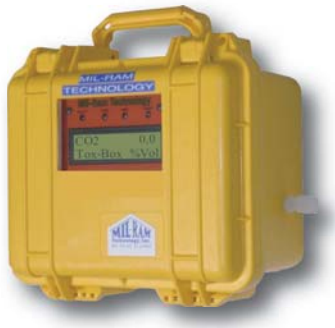
MIL-RAM TECHNOLOGY

Gas Detection for Industry
Patented Technology
no false alarms

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

MIL-RAM ISO 9001:2000 CERTIFIED Quality System Patented Technology

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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, CO_2, 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.

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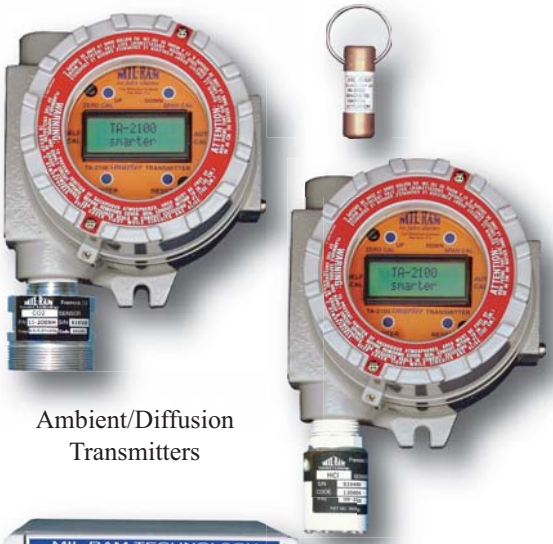
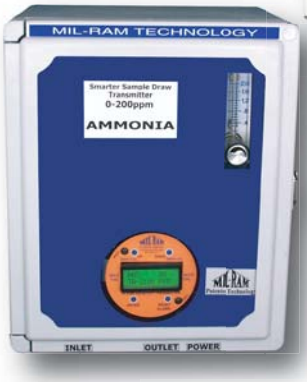
TA-2100 RS-485/4-20mA
3 or 4 - Wire *smarter* Transmitter



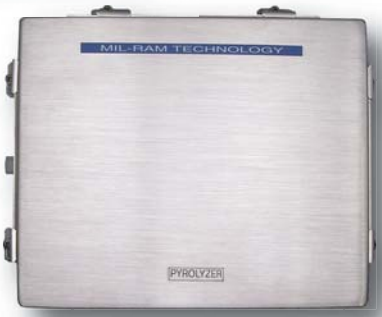
Ambient/Diffusion Transmitters



Sample Drawing Transmitters - Single Point, Multi-Point Sequential

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
- Cl 1 GR B,C,D Nema 4X or Nema 4X plastic enclosure
- Continuous Diagnostics



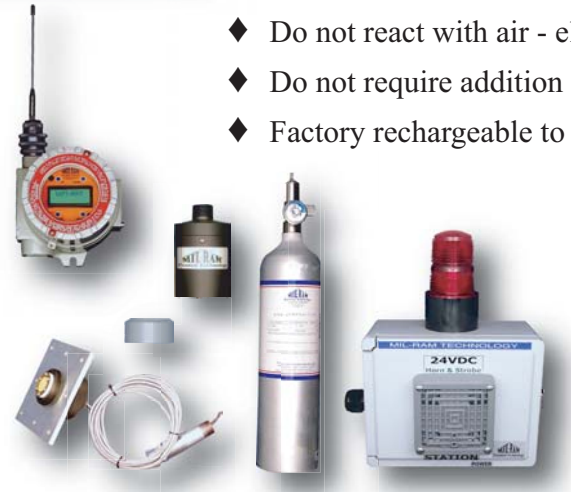
Pyrolyzer for detecting chlorinated/ fluorinated compounds e.g. Freons®

Sensors *patented* by Mil-Ram

- No *zero drift* with changes in temperature/humidity/pressure
- No LEL, methane, hydrocarbons, CO, CO_2 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
Relay Module
RS-485 Modbus RTU
Power Supply
Wireless Telemetry
Network Hubs
Calibration Kits
Custom Configurations



Sensor Technologies Available

- ***Electrochemical: Toxics, Oxygen***
- ***Catalytic: LEL Combustible Gases***
- ***Infrared: LEL Combustible Gases***
- ***Infrared: Carbon Dioxide, CO_2***
- ***PID: Toxics, VOCs***

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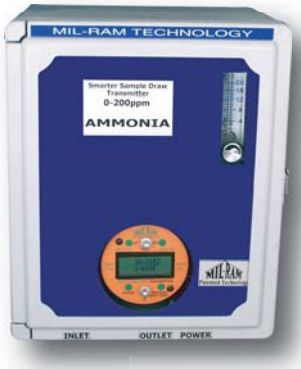
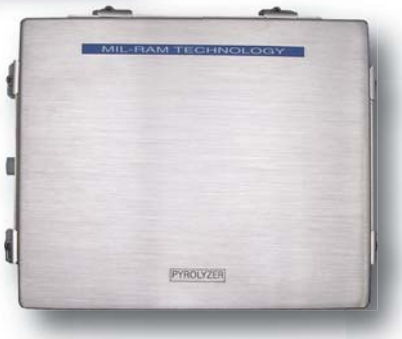
TA-2102 4-20mA
2 - Wire Loop Powered *smarter* Transmitter

Hundreds of Toxic Gas Sensors 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
- Cl 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, CO_2 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.

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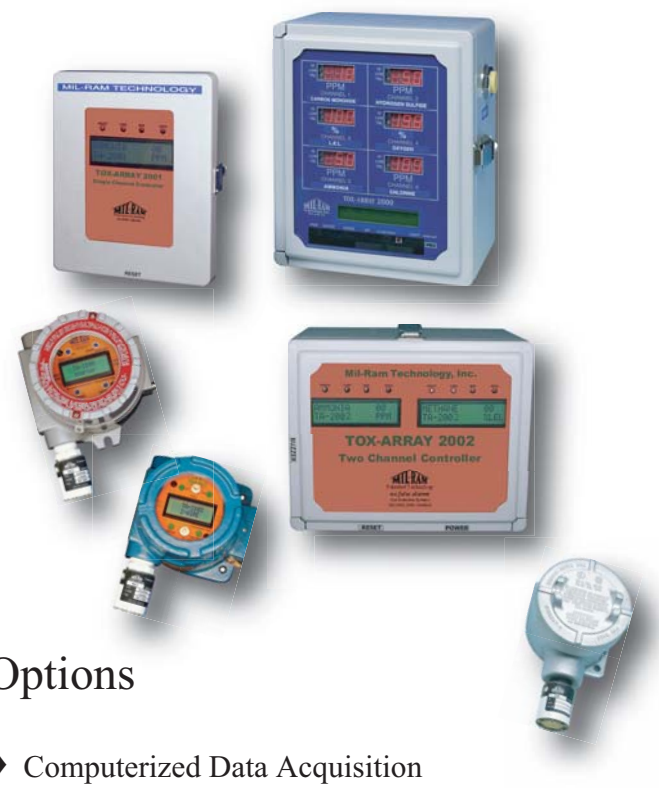
Control Systems
Single and Multi-Channel Controllers



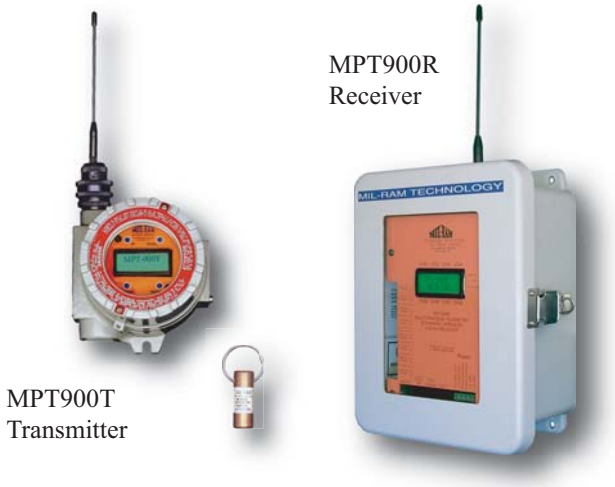
Options

- 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



MPT900R
Receiver

MPT900T
Transmitter

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

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Gases Detected
Toxic, Combustible, Oxygen, VOCs, Freons®

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

VOCs including:
Alcohols
Aldehydes
Aromatics
Amides
Amines
Chlorinated Hydrocarbons
Hydrocarbons
Ketones
Sulfur Compounds
Many More Gases

Tox-Box Single Gas Portable Gas Detection System

Sample Drawing
Analyzers and
Monitors

Wireless Option

CO_2 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

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