Tox-Array 2001/2002
Single or Two Channel Controller
Toxic or Combustible Gases

Features

- **no false alarms** Mil-Ram patented sensor technology
- Universal Input: Accepts any 2, 3 or 4-Wire type 4-20mA Transmitter
- Direct-Connect Sensor (Optional): Transmitter not required, remote sensor hundreds of feet
- Power Source Friendly: Operates on 85-265VAC (47-440Hz) or 15-30VDC
- Back-Up Battery Operation
- Operator Interface: Includes backlit LCD display (16 character x 2 line) 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, 0-255 sec. time delay and trigger with increasing/decreasing meter reading
- Local Alarms: integral buzzer, low, mid, high and fault LED indicators, LCD alarm messages
- Regenerated 4-20mA Output
- Modbus RTU Serial Interface (Optional)
- Analog Output Test
- Alarm Test
- Calibration Mode
- Buzzer Silence Mode
- Alarm Disable Mode
- Fault Condition
- Digital Filter
- Advanced Set-Up Mode
- Continuous Diagnostics
- Flash Programming
- Explosion-Proof Enclosure (Optional)

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<th>Gases Detected</th>
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<th>HCl</th>
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The Model **TOX-ARRAY 2001** Single Channel Controller and Model **TOX-ARRAY 2002** Two Channel Controller provide high resolution measurement (16-bit analog-to-digital conversion) of any 4-20mA transmitter with corresponding meter indication (16 character x 2 line LCD display) and local/external alarm function. Either controller accepts 2, 3 or 4-wire type transmitters. Optionally, use Mil-Ram’s direct-connect sensors; transmitter not required. The instrument is easily configured through the operator interface consisting of front panel push button switches and a large backlit LCD display (no dip switches). Low, mid, high and fault relays can be used to activate external alarms and/or switch equipment on/off. The alarm relays are easily configured for non-latching/latching, non-energized/energized and 0-255 sec. time delay. The alarm relays can be configured to trigger with increasing or decreasing meter readings. Software filtering can be enabled at various levels to offer increased stability in particularly noisy environments. A regenerated 4-20mA signal and/or optional Modbus serial interface provides reliable connection to a centralized control system (PLC, DCS, host computer, etc.) for data acquisition and processing. Continuous diagnostics further ensures system integrity and long-term stable operation and performance.
# Specifications

<table>
<thead>
<tr>
<th>Instrument Type</th>
<th>Single or Two Channel Controller</th>
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<tbody>
<tr>
<td>Part No.</td>
<td>Single Channel 01-2001; Two Channel 01-2002</td>
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<tr>
<td>Input</td>
<td>Any 4-20mA transmitter including 2, 3 or 4-Wire type (16-bit analog-to-digital conversion)</td>
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<tr>
<td>Power Source</td>
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<tr>
<td>Single Channel</td>
<td>85-265VAC (47-440Hz) @ 2.1W</td>
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<td>Two Channel</td>
<td>85-265VAC (47-440Hz) @ 4.2W</td>
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<td>Battery</td>
<td>Back-Up Battery (12 or 24VDC) optional</td>
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<td>Sensors</td>
<td>More than 400: Toxic, LEL and Oxygen</td>
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<tr>
<td>Operator</td>
<td>Back-lit LCD display (16 character x 2 lines)</td>
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<td>Interface (per channel)</td>
<td>4 push button switches (no dip switches)</td>
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<tr>
<td>Alarm Levels (per channel)</td>
<td>All parameters front panel programmable</td>
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<td>Local Alarms (per channel)</td>
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<tr>
<td>Low Alarm: buzzers, green LED</td>
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<td>Mid Alarm: buzzers faster, yellow</td>
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<td>High Alarm: buzzers continuous, red</td>
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<td>Fault Alarm: buzzers continuous, red LED</td>
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<td>All alarm conditions accompanied by LCD messages</td>
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<td>Alarm Relays (per channel)</td>
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<td>Low, mid, high and fault</td>
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<td>SPST, 10A @ 28VDC, resistive</td>
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<td>12A @ 120VAC, resistive</td>
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**NOTE:** Specifications subject to change without notice.

| Relay Function | Front-Panel programmable for non-latching/latching, non-energized/energized, 0-255 sec. time delay and alarm on increasing/decreasing reading. Fault relay factory set: non-latching, normally energized and 0 sec. time delay |
| Digital Filter | Selectable levels of digital filtering for increased stability in noisy electrical environments |
| Analog Output (per channel) | Regenerated 4-20mA output (16-bit resolution) for connection to DCS, PLC, host computer, etc. |
| Serial Interface (option) | Modbus RTU, connect multiple controllers to a Master device (e.g. PLC) on a single cable |
| Operating Temp. | -20°C to +50°C |
| Rel. Humidity | 0-95%, non-condensing |
| Enclosure Type | Nema 4x plastic, wall mount |
| Other enclosures available including stainless steel and explosion-proof |
| Model TA-2002 11 1/4 in. W x 9 1/4 in. H x 6 in. D |
| Options | Direct-connect sensor (transmitter not required) |
| Sensor extender cable to remote sensor |
| Back-up Battery with trickle charger |
| Integral strobe/horn |
| Auxiliary Alarm Station |

---

**MIL-RAM TECHNOLOGY, INC.**

*Patented Technology no false alarms*

Gas Detection Systems
Wireless Telemetry Systems

**TOLL FREE:** 888-4MILRAM • 1-888-464-5726

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Tel: 510-656-2001 • Fax: 510-656-2004
sles@mil-ram.com • www.mil-ram.com
www.wirelessmil-ram.com
Acrylonitrile (ACN) \( \text{C}_3\text{H}_3\text{N} \)
Ammonia \( \text{NH}_3 \)
Arsenic Pentfluoride \( \text{AsF}_5 \)
Arsine \( \text{AsH}_3 \)
Boron Trichloride \( \text{BCl}_3 \)
Boron Trifluoride \( \text{BF}_3 \)
Bromine \( \text{Br}_2 \)
Carbon Dioxide \( \text{CO}_2 \)
Carbon Monoxide \( \text{CO} \)
Chlorine \( \text{Cl}_2 \)
Chlorine Dioxide \( \text{ClO}_2 \)
Chlorobenzene \( \text{C}_6\text{H}_5\text{Cl} \)
Chlorine \( \text{Cl}_2 \)
Combustible Gas L.E.L. 
Diborane \( \text{B}_2\text{H}_6 \)
Dichloroethane \( \text{C}_2\text{H}_4\text{Cl}_2 \)
Dichlorosilane \( \text{SiH}_2\text{Cl}_2 \)
Difluoromethane \( \text{CH}_2\text{F}_2 \)
Difluorosilane \( \text{SiF}_2\text{H}_2 \)
Fluorine \( \text{F}_2 \)
Freon Gases, R-123, 134a, 11, 12, others \( \text{ALL} \)
Germaine \( \text{GeH}_4 \)
Hydrazine \( \text{N}_2\text{H}_4 \)
Hydrogen \( \text{H}_2 \)
Hydrogen Bromide \( \text{HBr} \)
Hydrogen Chloride \( \text{HCl} \)
Hydrogen Cyanide \( \text{HCN} \)
Hydrogen Fluoride \( \text{HF} \)
Hydrogen Iodide \( \text{HI} \)
Hydrogen Peroxide \( \text{H}_2\text{O}_2 \)
Hydrogen Sulfide \( \text{H}_2\text{S} \)
Iodine \( \text{I}_2 \)
Methyl Bromide \( \text{CH}_3\text{Br} \)
Methyl Chloride \( \text{CH}_3\text{Cl} \)
Methyl Iodide \( \text{CH}_3\text{I} \)
Methylene Chloride \( \text{CH}_2\text{Cl}_2 \)
Nitric Acid Vapors \( \text{HNO}_3 \)
Nitric Oxide \( \text{NO} \)
Nitrogen Dioxide \( \text{NO}_2 \)
Nitrogen Trifluoride \( \text{NF}_3 \)
Oxygen \( \text{O}_2 \)
Ozone \( \text{O}_3 \)
Phosgene \( \text{COCl}_2 \)
Phosphine \( \text{PH}_3 \)
Phosphorus Oxysulfide \( \text{POC}_3 \)
Silane \( \text{SiH}_4 \)
Sulfur Dioxide \( \text{SO}_2 \)
Sulfuric Acid Vapors \( \text{H}_2\text{SO}_4 \)
Tetrachloroethylene \( \text{C}_2\text{Cl}_4 \)
Trichloroethylene \( \text{C}_2\text{HCl}_3 \)
And More (Call Factory)

remaining sensor life indicator, and replace sensor indicator, four 12-15 Amp relays option, diagnostics, backlight LCD display, peak value, loop test and rapid warm-up. Also available with the 2-wire loop powered smarter transmitter. MIL-RAM’s patented TOX-ARRAY sensors are based on time proven electrochemical technology. A unique and innovative approach to sensor design eliminates false alarms and is not affected by changes in temperature, humidity or pressure and does not react with air; this eliminates zero drift. Interferences typically encountered on other detectors are avoided with the TOX-ARRAY sensors. The result is fast, accurate and reliable response with outstanding sensitivity and selectivity. The TOX-ARRAY sensors are extremely stable with a service life of greater than 3 years and are factory rechargeable. No additional electrolyte is required during the 3+ years of life of the sensor charge.

The TOX-ARRAY 2000 offers tremendous microprocessor-based capability, the simplified design eliminates the complexity encountered in setting up other microprocessor-based systems. It was clearly designed with the end user in mind.

Each channel features a three-digit LED display. High, low and trouble LEDs provide alarm status, while a buzzer provides audible alarms at the controller.

Programmable relays offer added flexibility in area monitoring and reduced installation cost. Discrete relays for each alarm level are standard in the same 9-1/4"W x 11-1/4"H x 6"D enclosure.

An easy-to-read, backlight LCD prompts you for easy setup of each channel. Push button switches enable the user to address various setup parameters on the LCD and easily program each channel. Alarm set points, relay assignment and function (latching or non-latching) are easily installed for each channel.

The Model TOX-ARRAY 2000 is designed to operate from field selectable 115/230 volts AC, 50/60Hz, 12-24 volts DC. An optional battery backup with trickle charge circuit is available as well as RS-485.

DESCRIPTION

The Model TOX-ARRAY 2000 wall-mount system, front panel programmable, provides in any combination, up to 6 channels of toxic, combustible and oxygen monitoring in a 9-1/4"W x 11-1/4"H x 6"D Nema 4X fiberglass enclosure.

Any combination of toxic, combustible and oxygen sensors can be used on the TOX-ARRAY 2000. Each channel can have the RS-485/4-20mA 3 or 4-wire smarter transmitter, that features labor free auto self-calibration, which adjusts span monthly based on life curve, non-intrusive hands free auto gas calibration in 2 minutes, off-site sensor calibration to replace sensors in the field without recalibration,
SENSOR FEATURES

- **no false alarms** - does not react with changes in temperature, humidity, or pressure
- Does not drift - no autozeroing or adjustments required
- Not affected by humidity - 5% to 95% relative humidity
- Not affected by temperature - -40°C to +50°C is not temperature compensated; inherent design makes it stable
- Maintains calibration for over six months - good practice dictates calibration be checked monthly
- Maintenance free - no replenishment of electrolyte or water during 3+ years of normal life of each charge
- Long life - over three years and is factory rechargeable at reasonable cost
- Fast response - 90% of reading in less than 45 seconds
- Fast recovery - 90% recovery in less than 30 seconds
- Not saturated by occasional high concentrations of gas in the work environment (continuous gas exposure reduces service life)
- Stays awake - does not go to sleep when it has not been exposed to gas for long periods of time
- Chemically selective
- Does not react with air
- No L.E.L., methane, hydrocarbons, CO, CO₂ gas interference
- No sensor warm-up time
- Zero and Span are not interactive
- Simple push-button setup of each channel
- Large backlit LCD “walks” the user through channel setup
- User programmable relays, two per channel, with common trouble relay
- One-man calibration
- LED indicators for alarm status
- 4-20mA transmitters for toxic, combustibles and oxygen monitoring. Available without display and with 2, 3 or 4-wire **smarter** transmitters
- 4-20mA, 0-1V, 0-100mV outputs
- Standard power: 115/230VAC/12-24VDC
- Three-digit 7 segment LED display for each channel
- Accommodates any combination of toxic, combustible and oxygen transmitters
- System is easily expanded in a space efficient manner
- Custom engineered systems available, sample-draw, RFI protected, pyrolyzer, data acquisition, others

SENSOR FEATURES

- **Temperature Range** - -40°C to +50°C
- **Humidity Range** - 5% to 95% RH, noncondensing - continuous
- **Pressure Range** - Atmospheric ± 15%
- **Zero Drift** - <0.1 ppm
- **Position Sensitivity** - Install vertically
- **Storage Life** - >18 months in container
- **Life Expectancy** - >3 years in clean air - factory rechargeable many times
- **Approvals** - UL, CSA

NOTE: Specifications subject to change without notice

**CONTROLLER SPECIFICATIONS**

**Power**
115/230 VAC, 50-60 Hz, 12-24 VDC, battery backup available with trickle charger
Sample-Draw Option: 115 VAC pump voltage

**Outputs**
4-20 mA, 0-1 volt, 0-100 mV, RS-485 (optional), RS-232 (optional)

**Relays**
Two DPDT relays per channel, latching or non-latching (user programmable); common DPDT trouble relay - relays rated 15 Amps @ 120 VAC

**Standard Enclosure**
9-1/4"W x 11-1/4"H x 6"D Nema 4X, fiberglass, 1 to 6 channels

**Other**
Explosion-proof, UL approved or any other

**Enclosures**
Nema enclosure, 1 to 6 channels or more

**Optional**
RS-485/4-20mA 3 or 4-wire **smarter** Transmitter
Data Acquisition Software

**SENSE TECHNOLOGY (Typical)**

**Detection Principle**
Electrochemical

**Detection Method**
Diffusion (Sample-Draw Available, Nema 4X)

**Detection Range**
0.00-1.00 ppm to 0-5000 ppm

**Output Signal**
Linear

**Resolution**
0.01/0.1/1 ppm

**Response Time**
<45 sec. to 90% of final reading

**Recovery Time**
<30 sec. to 90% recovery

**Temperature Range**
-40°C to +50°C
-40°F to +122°F

**Humidity Range**
5% to 95% RH, noncondensing - continuous
0% to 99% RH, noncondensing - intermittent

**Pressure Range**
Atmospheric ± 15%

**Zero Drift**
<0.1 ppm

**Position Sensitivity**
Install vertically

**Storage Life**
>18 months in container

**Life Expectancy**
>3 years in clean air - factory rechargeable many times

**Approvals**
UL, CSA

**NOTE: Specifications subject to change without notice**

**MIL-RAM TECHNOLOGY, INC.**
Patented Technology
Gas Detection Systems
ISO 9001:2000 Certified

**MIL-RAM TECHNOLOGY, INC.**
Patented Technology
Gas Detection Systems
Wireless Telemetry Systems
TOLL FREE: 888-4MILRAM • 1-888-464-5726
4135 Business Center Drive • Fremont, CA 94538
Tel: 510-656-2001 • Fax: 510-656-2004
sls@mil-ram.com • www.mil-ram.com
www.wirelessmil-ram.com
Gas Detection Controller
Digital Modbus RTU smarter Transmitter Network

TA-2048MB Controller Features
♦ 48-Channel system consists of three (3) separate 16-channel Modbus Networks. Local or remote power supply options.
♦ Multi-drop smarter Transmitter (Sensor) Networks. Eliminates separate (costly) wiring to each Transmitter.
♦ RS-485 digital Modbus RTU; half or full-duplex configuration.
♦ Four relays (SPDT), 10 Amp. common to all channels on each Network. Select energized/non-energized, latching/non-latching function. Low, Mid, High and Fault relays. LED alarm indicators. Audible buzzer alarm and external alarm stations optional.
♦ Optional: Remote Relay Modules, Modbus enabled, can be installed at any point on RS-485 network. Up to 16 modules per network. Up to 48 different zones. Conveniently install relays at point of use. Eliminates long wiring runs between relays and field installed alarms.
♦ Optional: Remote Analog Output Module. Provides discrete analog 4-20mA output (16 bit resolution) per channel.
♦ Optional: Remote Digital Output Module. Provides RS-485 Modbus RTU interface to Centralized System (e.g. PLC)
♦ Backlit 16 characters x 2 lines LCD display. Auto-scrolls to provide channel data and fault conditions. Indicates alarm status.
♦ Simple front panel, push button channel setup. Auto-Configuration wizard provides rapid channel setup without special knowledge.
♦ Rack mount or wall mount enclosures. Explosion proof available.
♦ Continuous Diagnostics. Wireless Options (consult factory).

Sensors patented by Mil-Ram
♦ no false alarms Mil-Ram electrochemical sensor technology
♦ 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
♦ Long life: >3 years typical under normal operating conditions
Gas Detection Controller
Digital Modbus RTU smarter Transmitter Network

TA-2016MB-WM Controller Features

♦ 16-Channel system utilizing RS-485 Modbus RTU Network.
♦ Multi-drop Network eliminates separate wiring to each Transmitter.
♦ Four relays (SPDT), 10 Amp. common to all channels. Select latching or non-latching function. Low, Mid, High and Fault relays. LED alarm indicators. Audible buzzer alarm. External alarm stations optional.
♦ Optional: Remote Relay Modules, Modbus enabled, can be installed at any point on RS-485 network. Up to 16 modules per network. Up to 16 different zones. Conveniently install relays at point of use. Eliminates long wiring runs between relays and field installed alarms.
♦ Optional: Remote Analog Output Module. Provides discrete analog 4-20mA output (16 bit resolution) per channel.
♦ Optional: Remote Digital Output Module. Provides RS-485 Modbus RTU interface to Centralized System (e.g. PLC)
♦ Optional: Analog Input Module to connect standard 4-20mA Transmitters where traditional analog installation is preferred.
♦ Backlit 16 characters x 2 lines LCD display. Auto-scrolls to provide channel data and fault conditions. Indicates alarm status.
♦ Simple front panel, push button channel setup. Auto-Configuration wizard provides rapid channel setup without special knowledge.
♦ Nema 4x weather-proof polycarbonate enclosure (XP available)
♦ Continuous Diagnostics. Wireless Options (consult factory).

Sensors patented by Mil-Ram

♦ no false alarms Mil-Ram electrochemical sensor technology
♦ 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
♦ Long life: >3 years typical under normal operating conditions

Gases & Instrumentation 2010 Golden Gas Award

Digital Modbus
16-Channel Control System
(8 Channel Model Available)

Model TA-2016MB-WM
Auto-Configuration
110 VAC or 24 VDC
16 Channel System
Modbus RTU Network
-up to 16 Gas Detectors
-up to 16 Relay Modules
-up to 16 Alarm Zones

RS-485 Modbus RTU Network

Relay Module

Gas
Detectors

Model TA-2100MB smarter Transmitters
(LEL, Toxic, VOC, Infrared, MOS, more)

Gas Detection Controller Gases & Instrumentation

MIL-RAM TECHNOLOGY, INC. REGISTERED TO ISO 9001:2008 FILE NUMBER 10000574 QM08

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
Model TA-2102 **smarter** Fixed Gas Detectors

Sample Draw Configuration
Toxic Gases & Oxygen
Hundreds of Gases & Vapors

**Features**

**no false alarms** utilizing Mil-Ram’s ultra-stable Electrochemical Sensors

Self-Calibration adjusts monthly based on sensor life curve

Auto-Gas Calibration, non-intrusive, hands-free, magnetic switches

Not affected by temperature/humidity over specified range - stable by design

LCD display - 12 characters x 2 lines - provides user interface with magnetic switches - no dip switches - diagnostic messages

Offsite sensor calibration with memory chip embedded in sensor

Peak Value, 15-min. TWA, Remaining Sensor Life, Replace Sensor indication and number of days since last gas calibration

Loop Powered - Intrinsically Safe option

Optional Enclosures - 316 stainless steel, Nema 4x polycarbonate

Heavy-duty, chemically resistant pump - Advanced diagnostics

---

**Specifications** - Typical (see specific data sheet)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection Principle</td>
<td>Electrochemical Sensor Technology - ultra stable</td>
</tr>
<tr>
<td>Detection Method</td>
<td>Sample Drawing with Integral Pump</td>
</tr>
<tr>
<td>Detection Range</td>
<td>Low ppm to % volume (depends on gas type - see specific data sheet)</td>
</tr>
<tr>
<td>Calibration Method</td>
<td>Non-intrusive, magnetic tool</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>24 VDC nominal</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>1 W @ 24 VDC (see specific data sheet)</td>
</tr>
<tr>
<td>Electrical Connections</td>
<td>Power (24 VDC) and Signal (4-20mA)</td>
</tr>
<tr>
<td>Cable Requirements</td>
<td>2-wires, shielded (gas detector); 2-wires (sample pump)</td>
</tr>
<tr>
<td>Connection Type</td>
<td>2-wire, loop powered gas detector</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.01 ppm/0.1 ppm/1 ppm/0.1% volume (depends on gas type)</td>
</tr>
<tr>
<td>Zero Drift</td>
<td>less than 1% of full-scale typical</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-25°C to +50°C (depends on gas type - see specific data sheet)</td>
</tr>
<tr>
<td>Humidity Range</td>
<td>0 - 95% RH, non-condensing (see specific data sheet)</td>
</tr>
<tr>
<td>Response Time</td>
<td>&lt;30 sec. to 90% of final reading (see specific data sheet)</td>
</tr>
<tr>
<td>Recovery Time</td>
<td>&lt;30 sec. to 90% recovery (see specific data sheet)</td>
</tr>
<tr>
<td>Sensor Service Life</td>
<td>&gt; 2 years typical, depends on sensor type and conditions</td>
</tr>
<tr>
<td>Electronic Enclosure</td>
<td>Ex-Proof, alum. or 316 SS, Nema 4x</td>
</tr>
<tr>
<td>Enclosure Certifications</td>
<td>UL/CSA Class I, Groups B, C, D</td>
</tr>
</tbody>
</table>

Specifications subject to change without notice due to continuing program of product innovation. See specific data sheets for more information.
Model TA-2100 *smarter* Fixed Gas Detectors

Sample Drawing Configuration
Toxics, Combustibles, VOCs, Oxygen
Hundreds of Gases & Vapors

**Features**

- *no false alarms* utilizing stable and reliable sensor technologies
- Self-Calibration adjusts monthly based on sensor life curve
- Auto-Gas Calibration, non-intrusive, hands-free, magnetic switches
- Not affected by temperature/humidity over specified range - stable by design
- LCD display - 12 characters x 2 lines - provides user interface with magnetic switches - no dip switches - LED alarm indicators
- Offsite sensor calibration with memory chip embedded in sensor
- Peak Value, 15-min. TWA, Remaining Sensor Life, Replace Sensor indication and number of days since last gas calibration
- Optional Relay Module; low, mid, high and fault conditions
- Optional RS-485 Modbus RTU Network interface
- Heavy-duty, chemically resistant pump - Advanced diagnostics

**Specifications - Typical (see specific data sheet)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection Principle:</td>
<td>PID, Catalytic, Electrochemical, Infrared, Solid-State MOS</td>
</tr>
<tr>
<td>Detection Method:</td>
<td>Sample Drawing with Integral Pump</td>
</tr>
<tr>
<td>Detection Range:</td>
<td>Low ppm to % volume (depends on gas type - see specific data sheet)</td>
</tr>
<tr>
<td>Calibration Method:</td>
<td>Non-intrusive, magnetic tool</td>
</tr>
<tr>
<td>Operating Voltage:</td>
<td>24 VDC nominal</td>
</tr>
<tr>
<td>Power Requirements:</td>
<td>1.08 - 1.82 W @ 24 VDC (see specific data sheet)</td>
</tr>
<tr>
<td>Electrical Connections:</td>
<td>Power (24 VDC) and Signal (4-20mA)</td>
</tr>
<tr>
<td>Cable Requirements:</td>
<td>3 or 4 wires, shielded (gas detector and pump)</td>
</tr>
<tr>
<td>Optional Connections:</td>
<td>RS-485 Half-duplex (Modbus RTU)</td>
</tr>
<tr>
<td>Resolution:</td>
<td>0.01 ppm/0.1 ppm/1 ppm/0.1% volume/1% LEL (depends on gas type)</td>
</tr>
<tr>
<td>Zero Drift:</td>
<td>less than 1% of full-scale typical</td>
</tr>
<tr>
<td>Temperature Range:</td>
<td>-25°C to +50°C (depends on gas type - see specific data sheet)</td>
</tr>
<tr>
<td>Humidity Range:</td>
<td>0 - 95% RH, non-condensing (see specific data sheet)</td>
</tr>
<tr>
<td>Response Time:</td>
<td>&lt;30 sec. to 90% of final reading (see specific data sheet)</td>
</tr>
<tr>
<td>Recovery Time:</td>
<td>&lt;30 sec. to 90% recovery (see specific data sheet)</td>
</tr>
<tr>
<td>Sensor Service Life:</td>
<td>&gt; 2 years typical, depends on sensor type and conditions</td>
</tr>
<tr>
<td>Electronic Enclosure:</td>
<td>Ex-Proof, alum. or 316 SS, Nema 4x</td>
</tr>
<tr>
<td>Enclosure Certifications:</td>
<td>UL/CSA, Class I, Groups B, C, D</td>
</tr>
</tbody>
</table>

Specifications subject to change without notice due to continuing program of product innovation. See specific data sheets for more information.
Single Channel Gas Alarm

Gas Alarm Features

♦ no false alarms Mil-Ram patented sensor technology
♦ Toxic/VOC/Oxygen: hundreds of different gases and vapors
♦ 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 provides low, mid, high and fault relays, rated 10A
♦ Integrated audible horn and visible strobe
♦ LCD display - backlit - 12 characters x 2 lines - provides user interface with magnetic switches - no dip switches - Graphical LCD Option
♦ Offsite sensor calibration to replace sensors in the field w/o recalibration
♦ Peak Value, 15-min. TWA, Number days since last gas calibration
♦ Remaining sensor life and Replace sensor indication
♦ Standard Output: 4-20mA, linear
♦ RS-485 Modbus RTU option - provides multi-drop installations with serial communications to centralized control system (PLC, DCS, etc.)
♦ Operating Voltage - 110 VAC (24 VDC available)
♦ Nema 4X polycarbonate enclosure - Stainless Steel Option
♦ Continuous Diagnostics - Non-hazardous areas

Sensor Technologies

♦ Electrochemical ♦ Infrared
♦ Solid State MOS
♦ Thermal Conductivity ♦ PID

Sensors patented by Mil-Ram

♦ no false alarms Mil-Ram electrochemical sensor technology
♦ 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
♦ Long life: >3 years typical under normal operating conditions

Toxic - VOCs - Oxygen
Hundreds of Gases and Vapors

Typical Applications

♦ Pulp & Paper
♦ Chemicals & Plastics
♦ Water & Wastewater Treatment
♦ Semiconductor & Electronics
♦ Laboratories & Universities
♦ Food Processing & Refrigeration
♦ Pharmaceuticals
♦ Any Industrial Process that generates Toxic Gas
Fixed Gas Detectors without Display
Toxics, Combustibles and Oxygen
Gases & Vapors

**Features**

- **no false alarms** utilizing stable and reliable sensor technologies
- Highly selective for specified target gas
- No zero drift with changes in ambient conditions
- One-man calibration with adjustment of potentiometers
- Toxics: 2-wire, loop powered; Combustibles: 3-wire connection
- Encapsulated electronics offers maximum protection from severe environments
- Not affected by temperature -25 deg. C to +50 deg. C
- Sensor extender cables available to remote sensor from electronics
- Duct mounting kits available
- Sample drawing, extractive systems optional
- Power requirement: 12 - 30 VDC
- Output: standard 4-20mA
- Continuous diagnostics

**Specifications - Typical** (see specific data sheet)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection Principle</td>
<td>Electrochemical, Catalytic, Infrared</td>
</tr>
<tr>
<td>Detection Method</td>
<td>Diffusion, Remote Sensor or Sample Drawing with Integral Pump</td>
</tr>
<tr>
<td>Detection Range</td>
<td>Low ppm to % volume (depends on gas type)</td>
</tr>
<tr>
<td>Calibration Method</td>
<td>One-man calibration with adjustment of potentiometers</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>12 - 30 VDC, 24 VDC nominal</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>0.48 - 1.08 W @ 24 VDC (depends on gas type)</td>
</tr>
<tr>
<td>Electrical Connections</td>
<td>Power (24 VDC) and Signal (4-20mA)</td>
</tr>
<tr>
<td>Cable Requirements</td>
<td>Toxics: 2-wire loop powered; Combustibles: 3-wires connection</td>
</tr>
<tr>
<td>Signal Output</td>
<td>4-20 mA, linear</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.01 ppm/0.1 ppm/1 ppm/0.1% volume/1% LEL (depends on gas type)</td>
</tr>
<tr>
<td>Zero Drift</td>
<td>less than 1% of full-scale typical</td>
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<tr>
<td>Temperature Range</td>
<td>-25°C to +50°C (depends on gas type)</td>
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<tr>
<td>Humidity Range</td>
<td>0 - 95% RH, non-condensing (depends on gas type)</td>
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<tr>
<td>Response Time</td>
<td>&lt;30 sec. to 90% of final reading (depends on gas type)</td>
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<td>Recovery Time</td>
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<td>Sensor Service Life</td>
<td>&gt; 2 years typical, depends on sensor type and conditions</td>
</tr>
<tr>
<td>Electronic Enclosure</td>
<td>Ex-Proof, alum. or 316 SS, Nema 4x</td>
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<tr>
<td>Enclosure Certifications</td>
<td>UL/CSA, Class I, Groups B, C, D</td>
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</table>

Specifications subject to change without notice due to continuing program of product innovation. See specific data sheets for more information.
Model TA-2102 smarter Fixed Gas Detectors
Toxic Gases & Oxygen
Hundreds of Gases & Vapors

**Features**

- **no false alarms** utilizing Mil-Ram's ultra-stable Electrochemical Sensors
- Self-Calibration adjusts monthly based on sensor life curve
- Auto-Gas Calibration, non-intrusive, hands-free, magnetic switches
- Not affected by temperature/humidity over specified range - stable by design
- LCD display - 12 characters x 2 lines - provides user interface with magnetic switches - no dip switches - diagnostic messages
- Offsite sensor calibration with memory chip embedded in sensor
- Peak Value, 15-min. TWA, Remaining Sensor Life, Replace Sensor indication and number of days since last gas calibration
- Loop Powered - Intrinsically Safe option
- Optional Enclosures - 316 stainless steel, Nema 4x polycarbonate

Available suitable for use in SIL 2 environments / Advanced diagnostics

### Specifications - Typical (see specific data sheet)

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<thead>
<tr>
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<th>Details</th>
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<td>Electrochemical Sensor Technology - ultra stable</td>
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<td>Detection Method</td>
<td>Diffusion, Remote Sensor or Sample Drawing with Integral Pump</td>
</tr>
<tr>
<td>Detection Range</td>
<td>Low ppm to % volume (depends on gas type - see specific data sheet)</td>
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<tr>
<td>Calibration Method</td>
<td>Non-intrusive, magnetic tool</td>
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<tr>
<td>Operating Voltage</td>
<td>12 - 30 VDC, 24 VDC nominal</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>0.48 W @ 24 VDC (see specific data sheet)</td>
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<tr>
<td>Electrical Connections</td>
<td>Power (24 VDC) and Signal (4-20mA)</td>
</tr>
<tr>
<td>Cable Requirements</td>
<td>2-wires, shielded</td>
</tr>
<tr>
<td>Connection Type</td>
<td>2-wire, loop powered</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.01 ppm/0.1 ppm/1 ppm/0.1% volume (depends on gas type)</td>
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<td>Zero Drift</td>
<td>less than 1% of full-scale typical</td>
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<tr>
<td>Temperature Range</td>
<td>-40°C to +55°C (depends on gas type - see specific data sheet)</td>
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<td>Humidity Range</td>
<td>0 - 95% RH, non-condensing (see specific data sheet)</td>
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<td>Response Time</td>
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<td>Electronic Enclosure</td>
<td>Ex-Proof, alum. or 316 SS, Nema 4x</td>
</tr>
<tr>
<td>Certifications</td>
<td>UL Class I, Division 1, GR B,C,D pending</td>
</tr>
</tbody>
</table>

Specifications subject to change without notice due to continuing program of product innovation. See specific data sheets for more information.
Model TA-2100 **smarter** Fixed Gas Detectors
Toxics, Combustibles, VOCs, Oxygen
Hundreds of Gases & Vapors

**Features**

- **no false alarms** utilizing stable and reliable sensor technologies
- Self-Calibration adjusts monthly based on sensor life curve
- Auto-Gas Calibration, non-intrusive, hands-free, magnetic switches
- Not affected by temperature/humidity over specified range - stable by design
- LCD display - 12 characters x 2 lines - provides user interface with magnetic switches - no dip switches - LED alarm indicators
- Offsite sensor calibration with memory chip embedded in sensor
- Peak Value, 15-min. TWA, Remaining Sensor Life, Replace Sensor indication and number of days since last gas calibration
- Optional Relay Module; low, mid, high and fault conditions
- Optional RS-485 Modbus RTU Network interface
- Advanced diagnostics - continuous on-board systems monitoring

<table>
<thead>
<tr>
<th><strong>Specifications</strong> - Typical (see specific data sheet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection Principle: PID, Catalytic, Electrochemical, Infrared, Solid-State MOS</td>
</tr>
<tr>
<td>Detection Method: Diffusion, Remote Sensor or Sample Drawing with Integral Pump</td>
</tr>
<tr>
<td>Detection Range: Low ppm to % volume (depends on gas type - see specific data sheet)</td>
</tr>
<tr>
<td>Calibration Method: Non-intrusive, magnetic tool</td>
</tr>
<tr>
<td>Operating Voltage: 12 - 30 VDC, 24 VDC nominal</td>
</tr>
<tr>
<td>Power Requirements: 1.08 - 1.82 W @ 24 VDC (see specific data sheet)</td>
</tr>
<tr>
<td>Electrical Connections: Power (24 VDC) and Signal (4-20mA)</td>
</tr>
<tr>
<td>Cable Requirements: 3 or 4 wires, shielded</td>
</tr>
<tr>
<td>Optional Connections: RS-485 Half-duplex (Modbus RTU)</td>
</tr>
<tr>
<td>Resolution: 0.01 ppm/0.1 ppm/1 ppm/0.1% volume/1% LEL (depends on gas type)</td>
</tr>
<tr>
<td>Zero Drift: less than 1% of full-scale typical</td>
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<tr>
<td>Temperature Range: -40°C to +55°C (depends on gas type - see specific data sheet)</td>
</tr>
<tr>
<td>Humidity Range: 0 - 95% RH, non-condensing (see specific data sheet)</td>
</tr>
<tr>
<td>Response Time: &lt;30 sec. to 90% of final reading (see specific data sheet)</td>
</tr>
<tr>
<td>Recovery Time: &lt;30 sec. to 90% recovery (see specific data sheet)</td>
</tr>
<tr>
<td>Sensor Service Life: &gt; 2 years typical, depends on sensor type and conditions</td>
</tr>
<tr>
<td>Electronic Enclosure: Ex-Proof, alum. or 316 SS, Nema 4x</td>
</tr>
<tr>
<td>Certifications: UL/CSA, Class I, Division 1, GR B,C,D (see specific data sheet)</td>
</tr>
</tbody>
</table>

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