



# Portable Instrument Selection Guide



## **MSA Mission Statement**

*That men and women may work in safety and that they, their families and their communities may live in health throughout the world.*

*Our vision is to be the leading innovator and provider of quality safety and instrument products, services and specialty chemicals that protect and improve people's health, safety and the environment.*

*To provide satisfaction of customer needs through the efforts of motivated, involved, highly trained employees dedicated to continuous improvement in quality, service, cost, value, technology and delivery.*



## **About MSA Instrument Division**

MSA's Instrument Division develops and manufactures portable and permanent gas-monitoring instruments for worker protection and environmental monitoring, using sensing technologies from catalytic and electrochemical to infrared. We provide a family of thermal imaging products to respond to a variety of needs, including increasing fire fighter safety by allowing workers to see through smoke. The Instrument Division also manufactures and supplies medical instrumentation to protect healthcare employees from hazards in the workplace and instruments for monitoring patients. We have been designing and manufacturing gas detection equipment for over 50 years and are dedicated to building the highest-quality gas monitoring and medical instrumentation and sensors for our customers. The Instrument Division is a full-range gas detection provider, engineering and producing our own sensors, pumps and other instrument components.

The Instrument Division meets the full ISO 9001 quality assurance requirements of the International Organization for Standardization. This standard represents our commitment to continuous improvement and quality from product design through production to service at your site. In addition, many of our products have been independently tested and have earned global approvals.

The Instrument Division complex consists of a two-story, 54,000-square-foot administration building and laboratory, attached to a one-story, 152,000-square-foot manufacturing facility dedicated to instrument and sensor assembly operations. Being a consolidated manufacturing facility allows us to communicate customer needs throughout the production process and to provide rapid responses to customer concerns.

## Advanced Technology

Advanced technology in research and development as well as manufacturing helps us to improve creativity, respond quickly to your changing needs, and combine traditional value with constant product enhancement. Our innovative New Product Development process focuses on designing and developing instruments based on customer input. By listening to the voice of the customer throughout the product development process, we are able to ensure MSA instruments meet user needs.

Our products are tested with state-of-the-art computer equipment at every manufacturing step, to ensure the highest quality possible. Although our facilities and equipment are new, we are still committed to the old-fashioned values of helping and supporting our customers. MSA field sales representatives and distributors are thoroughly trained in the use and application of our products. Our applications and inside sales departments are prepared to provide technical and customer service assistance. After the sale, we support our customers with the best repair and service organization in the industry. Building on our experience, we continue to fulfill our leadership role in the medical, instrumentation and control industries by developing high-quality products to solve our customers' monitoring needs.

FOR INFORMATION ON GAS DETECTION IN CONFINED SPACES, CONSULT MSA BULLETIN 5555-57, CLOSING IN ON CONFINED SPACES: A PRIMER ON HAZARDS AND EQUIPMENT.

## Purpose of Guide

This guide is designed to quickly and easily help you identify the portable gas detection solution to your specific needs. To assist in this process, it identifies some of the atmospheric hazards that are commonly found in various industries.

### WARNING

The information in this guide is not intended to be all-inclusive in scope or content and is not to be used as a substitute for a comprehensive hazards assessment. Contact MSA for more detailed information. Failure to follow this warning can result in serious personal injury or death.



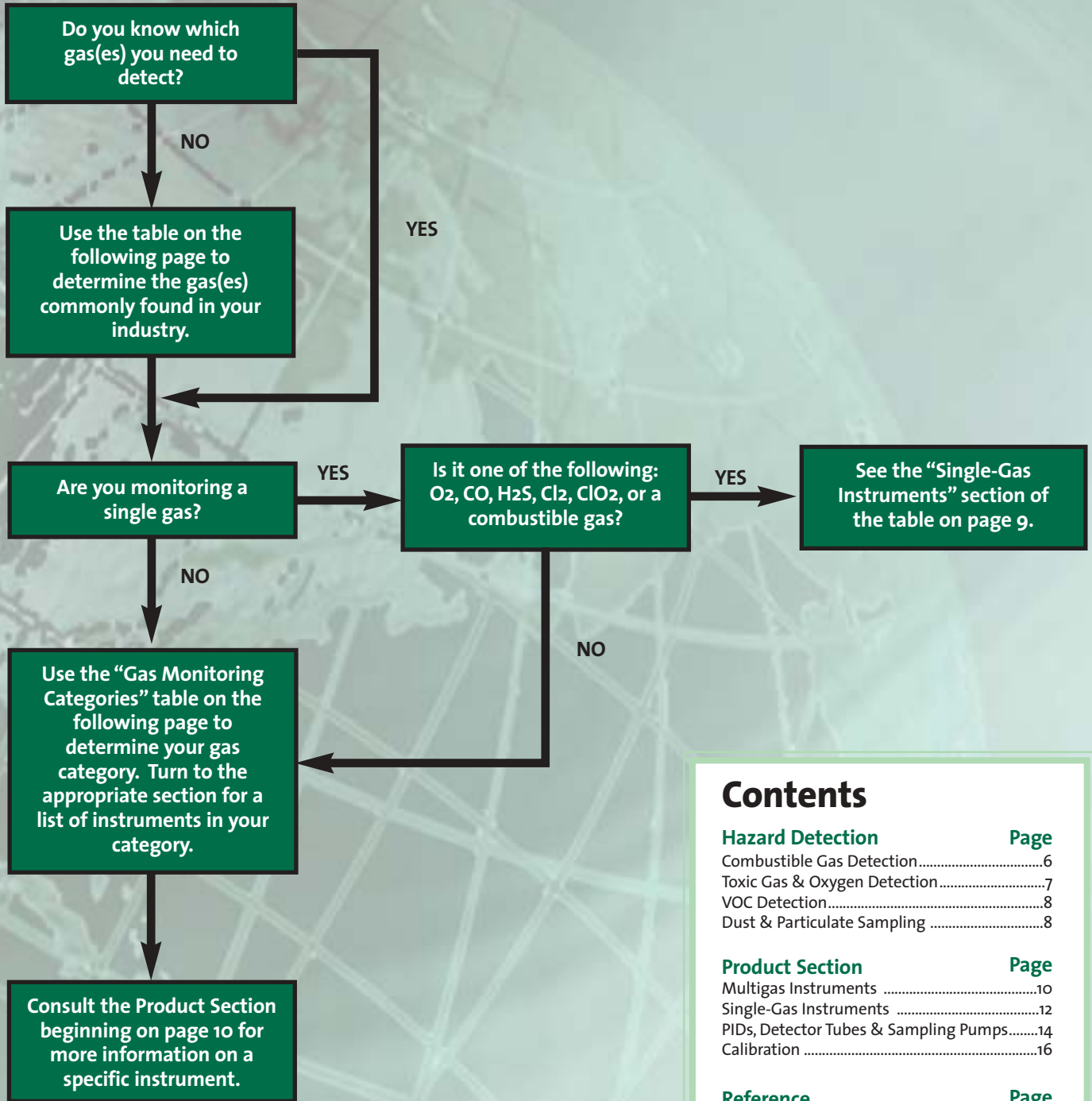
## Award-Winning Customer Service

Finding the right instrument for your needs doesn't have to be difficult if your first decision is to choose MSA. This selection guide was designed to simplify your gas detection decision-making process. It is just one example of MSA's commitment to providing superior customer service. With MSA, you also have access to the most dedicated and highly trained staff of portable detector selection experts. We encourage you to use them. If you have additional questions at any point in the selection process or need assistance with an application not listed in this guide, simply call our Customer Service Team at 1-800-MSA-2222 (for International Customer Service call 1-412-967-3354). In addition to technical expertise, they can also provide you with product data sheets or the number of your local MSA distributor.

### Cross-Sensitivity:

Since sensor output is driven by chemical reactions, there are circumstances where gases other than those being monitored will cause a reading on the instrument display. This is known as "cross-sensitivity". Users should be aware of this potential when selecting an instrument. For more information consult the instrument technical manual or MSA's Customer Service Center.

# HOW TO USE THIS GUIDE



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# GASES/HAZARDS & INDUSTRIES

	Gases/Hazards															
	Combustible Gases	O <sub>2</sub> Deficiency/Enrichment	Ammonia	Carbon Dioxide	Carbon Monoxide	Chlorine	Chlorine Dioxide	Formaldehyde	Hydrogen Sulfide	Nitric Oxide	Nitrogen Dioxide	Ozone	Phosphine	Sulfur Dioxide	Dust & Particulate	VOCs
Agriculture		•		•	•				•	•	•		•			
Asbestos Abatement															•	
Aviation	•	•			•											•
Chemical	•	•	•		•	•			•	•	•			•	•	•
Construction	•	•			•				•	•	•				•	•
Fire Service	•	•		•	•	•			•						•	
Food & Beverage Processing		•	•	•	•				•				•			
Foundries	•	•			•				•	•	•			•	•	
HazMat	•	•	•		•	•		•	•				•	•		•
Heavy Manufacturing	•				•											•
Iron & Steel	•	•			•				•	•	•			•	•	•
Mining	•	•		•	•				•	•	•				•	
Nuclear	•	•			•											
Oil & Gas/Petrochemical	•	•	•		•				•						•	•
Paper & Pulp						•	•		•					•	•	•
Pharmaceutical	•	•	•			•		•	•					•	•	•
Sand Blasting															•	
Sanding & Grinding															•	
Semiconductor			•			•				•	•		•			•
Shipyard/Marine	•	•		•	•				•						•	
Spray Painting	•							•							•	•
Utilities	•	•			•				•	•	•			•		
Water & Wastewater Treatment	•	•	•		•	•			•					•		
Welding	•	•			•					•	•	•			•	

## GAS MONITORING CATEGORIES

### COMBUSTIBLE GASES

- Acetone (C<sub>3</sub>H<sub>6</sub>O)
- Benzene (C<sub>6</sub>H<sub>6</sub>)
- Butane (C<sub>4</sub>H<sub>10</sub>)
- Ethylene (C<sub>2</sub>H<sub>4</sub>)
- Heptane (C<sub>7</sub>H<sub>16</sub>)
- Hydrogen (H<sub>2</sub>)
- Isobutane (C<sub>4</sub>H<sub>10</sub>)
- Methane (CH<sub>4</sub>)
- Pentane (C<sub>5</sub>H<sub>12</sub>)
- Toluene (C<sub>7</sub>H<sub>8</sub>)

### TOXIC GASES

- Ammonia (NH<sub>3</sub>)
- Carbon Dioxide (CO<sub>2</sub>)
- Carbon Monoxide (CO)
- Chlorine (Cl<sub>2</sub>)
- Chlorine Dioxide (ClO<sub>2</sub>)
- Hydrogen Sulfide (H<sub>2</sub>S)
- Nitric Oxide (NO)
- Nitrogen Dioxide (NO<sub>2</sub>)
- Phosphine (PH<sub>3</sub>)
- Sulfur Dioxide (SO<sub>2</sub>)

# COMBUSTIBLE GAS DETECTION INSTRUMENTS FEATURES

Sensor Options

Features

Unique to Orion and FiveStar

	PORTABLE INSTRUMENTS				MicroGard® Portable Alarm	Combustible Gases, O <sub>2</sub> & Toxic Gases				
	Titan™ Combustible Gas Detector	Gascope® Combustible Gas Indicator	Tankscope® Combustible Gas Indicator	Explosimeter® Combustible Gas Indicator		FiveStar® Alarm	Passport® Personal Alarm	Watchman® Multigas Monitor	Orion® Multigas Detector	Orion C Multigas & Leak Detector
Number of Gases Detected	1	1	1	1	2	5	5	5	4	4
Number of Sensors Available	1	1	1	1	2	11	9	7	4	4
Combustible Gases	●	●	●	●	●	●	●	●	●	●
High-Range Methane Detection		●								●
Oxygen					●	●	●	●	●	●
Ammonia						And up to three of the following:			And up to two of the following:	
Carbon Monoxide						●	●	●	●	●
Chlorine						●	●			
Chlorine Dioxide						●				
Hydrogen Sulfide						●	●	●	●	●
Nitric Oxide						●	●	●		
Nitrogen Dioxide						●	●	●		
Phosphine						●				
Sulfur Dioxide						●	●	●		
Analog Display		●	●	●						
Digital Display	●				●	●	●	●	●	●
Alarms (Audible & Visual)	●				●	●	●	●	●	●
Vibrating Alarm	●									
Hand Held		●		●		●	●		●	●
Pocket Sized	●				●					
Hands-Free Operation						●	●		●	●
Memory Storage/Datalogging & Data Downloading						●	●	●	●	●
Datatagging						●	●	●		
High RF Protection						●		●	●	
Multilingual Display						●	●	●		
Remote Alarm					●		●	●		
Lockalarm™ Circuit					●	●	●	●	●	
Autocalibration						●			●	●
Smart Sensors						●				
Pressure Compensated O <sub>2</sub>						●			●	●

# TOXIC GAS & OXYGEN DETECTION INSTRUMENTS FEATURES

Sensor Options

Features

Unique to Orion and FiveStar

	Toxic Gases				Toxic Gases & VOCs	Toxic Gases VOCs & O <sub>2</sub>	Combustible Gases, O <sub>2</sub> & Toxic Gases					
	PORTABLE INSTRUMENTS	Responder® Alarms	PULSAR™ Single-Gas Detector	PULSAR+™ Single-Gas Detector	Detector Tubes	Passport® PID II Organic Vapor Monitor	Passport® VOC 2000 Monitor	FiveStar® Alarm	Passport® Personal Alarm	Watchman® Multigas Monitor	Orion® Multigas Detector	Orion C Multigas & Leak Detector
Number of Gases Detected		1	1	1	1	**	**	5	5	5	4	4
Number of Sensors Available		5	3	3	*	**	**	11	9	7	4	4
Toxic—IDLH		•	•	•	•	•	•	•	•	•	•	•
Toxic—Non-IDLH		•	•	•	•	•	•					
Volatile Organic Compounds (VOCs)					•	•	•					
Combustible Gases								•	•	•	•	•
Oxygen		•	•	•			•	•	•	•	•	•
								And any three of the following:			And up to two of the following:	
Ammonia								•	•			
Carbon Dioxide												
Carbon Monoxide		•	•	•	•			•	•	•	•	•
Chlorine		•			•	•		•	•			
Chlorine Dioxide		•			•	•		•	•			
Hydrogen Sulfide		•	•	•	•	•		•	•	•	•	•
Nitric Oxide								•	•	•		
Nitrogen Dioxide					•			•	•	•		
Phosphine					•	•		•				
Sulfur Dioxide					•			•	•	•		
Digital Display		•		•		•		•	•	•	•	•
Alarms (Audible & Visual)		•	•	•	•	•		•	•	•	•	•
Vibrating Alarm		•	•	•								
Hand Held					•	•		•	•		•	•
Pocket Sized		•	•	•	•							
Hands-Free Operation								•	•		•	•
Memory Storage/Datalogging & Data Downloading					•	•		•	•	•	•	•
Datatagging								•	•	•		
High RF Protection		•	•	•				•		•	•	•
Multilingual Display								•	•	•		
Remote Alarm									•	•		
Lockalarm™ Circuit								•	•	•	•	
Patented Button™ Sensors			•	•				•			•	
Autocalibration								•			•	•
Smart Sensors								•			•	•
Pressure Compensated O <sub>2</sub>								•			•	•

\* Detector tubes are available for the detection of over 170 gases. Contact MSA's Customer Service Center for a complete list.  
 \*\* Instrument is pre-programmed for direct readings of 69 VOCs. Over 400 VOCs are potentially detectable. For a complete list, contact MSA's Customer Service Center.

## VOC DETECTION INSTRUMENTS FEATURES

### Gases Detected

### Features

	VOCs & Toxic Gases		VOCs, Toxic Gases & O <sub>2</sub>
	PORTABLE INSTRUMENTS		
	Passport® PID II Organic Vapor Monitor	Passport® VOC 2000 Organic Vapor & Oxygen Monitor	
Number of Gases Detected	*	*	
Toxic—IDLH	●	●	
Toxic—Non-IDLH	●	●	
Oxygen		●	
Chlorine	●	●	
Chlorine Dioxide	●	●	
Hydrogen Sulfide	●	●	
Phosphine	●	●	
Acetone	●	●	
Benzene	●	●	
Chlorobenzene	●	●	
Cyclohexane	●	●	
Heptane	●	●	
Hexane	●	●	
Methyl Isobutyl Ketone (MIBK)	●	●	
Methyl Tetrabutyl Ether (MTBE)	●	●	
Octane	●	●	
Propylene	●	●	
Toluene	●	●	
Trichloroethane	●	●	
Many Other VOCs *	●	●	
Digital Display	●	●	
Alarms (Audible & Visual)	●	●	
Hand Held	●	●	
Memory Storage/Datalogging & Data Downloading	●	●	

\* Instrument is pre-programmed for direct readings of 69 VOCs. Over 400 VOCs are potentially detectable. For a complete list, contact MSA's Customer Service Center.  
 Note: Detector tubes and sorbent tubes can also be used to identify specific VOCs.

## DUST & PARTICULATE SAMPLING PUMPS FEATURES

### Features

### Sampling Cassettes

	PORTABLE INSTRUMENTS	
	Escort® ELF® Sampling Pump	Escort® LC Sampling Pump
Internal Secondary Calibration Standard	●	
Timer	●	
Coal Dust Sampling	●	●
Silica General Purpose	●	●
Asbestos	●	●

# GASES & PORTABLE INSTRUMENTS

Gases

	Single-Gas Instruments							Multigas Instruments							Personal Sampling Pumps		Calibration Gas & Accessories			
	Explosimeter® Combustible Gas Indicator	Gascope® Combustible Gas Indicator	PULSAR™ Single-Gas Detector	PULSAR+ Single-Gas Detector	Responder® Alarms	Tankscope®, Model 62T Combustible Gas Indicator	Titan™ Combustible Gas Detector	FiveStar® Alarm	MicroGard® Portable Alarms	Orion® Multigas Detector	Orion G Multigas & Leak Detector	Passport® Personal Alarm	Passport® PID II Organic Vapor Monitor	Passport® VOC 2000 Organic Vapor & Oxygen Monitor	Watchman® Multigas Monitor	Detector Tubes	Escort ELF® Sampling Pump	Escort® LC Sampling Pump	PumpCalibration Check Gas	Calibration Check Kits
Combustible Gases	●	●				●	●	●	●	●	●				●			●	●	●
O <sub>2</sub> (Deficiency/Enrichment)			●	●	●			●	●	●	●		●					●	●	●
Ammonia—NH <sub>3</sub>							●				●				●			●	●	●
Carbon Dioxide—CO <sub>2</sub>															●			●	●	●
Carbon Monoxide—CO			●	●	●		●		●	●	●				●			●	●	●
Chlorine—Cl <sub>2</sub>					●		●				●	●	●	●	●			●	●	●
Chlorine Dioxide—ClO <sub>2</sub>					●		●					●	●	●	●			●	●	●
Formaldehyde—CH <sub>2</sub> O												●	●		●			●	●	●
Hydrogen Sulfide—H <sub>2</sub> S			●	●	●		●		●	●	●	●	●	●	●			●	●	●
Nitric Oxide—NO							●				●				●			●	●	●
Nitrogen Dioxide—NO <sub>2</sub>							●				●				●			●	●	●
Ozone															●			●	●	●
Phosphine—PH <sub>3</sub>							●					●	●		●			●	●	●
Sulfur Dioxide—SO <sub>2</sub>							●				●				●			●	●	●
Volatile Organic Compounds												●	●		●	●	●			

\* For sensor availability, call MSA's Customer Service Center at 1-800-MSA-2222.

## MSA PORTABLE INSTRUMENT APPROVALS

Instrument	MET	MSHA	PADEP	UL	Canada	Europe (CE)	Australia	ETL
Escort ELF® Sampling Pump		●	●	●		●		
Escort® LC Sampling Pump				●				
Explosimeter® Combustible Gas Indicator				●				
FiveStar® Alarm	●	●	●		●	ATEX	●	
Gascope® Combustible Gas Indicator	●							
MicroGard® Portable Alarms		●	●	●	●	●		
Orion® Multigas Detector				●	cUL	ATEX	●	
Orion G Multigas & Leak Detector				●	cUL	ATEX		
Passport® Personal Alarm	●	●	●		●	●	●	
Passport® PID II Organic Vapor Monitor	●							
PULSAR™ Single-Gas Detector				●	cUL	ATEX	●	
PULSAR+ Single-Gas Detector				●	●	●		
Responder® Alarms					●			●
Tankscope® Combustible Gas Indicator	●							
Titan™ Combustible Gas Detector		*		●	cUL*	ATEX		
VOC 2000 Organic Vapor & O <sub>2</sub> Monitor	●				●			
Watchman® Multigas Monitor	●							

\* Approvals pending

# MULTIGAS INSTRUMENTS

Multigas detectors are used primarily to monitor immediate hazards. They can be used for both continuous and intermittent gas detection.

MSA offers a full line of multigas instrument accessories, including batteries, chargers, pumps, sample lines and probes.

## Features

MSA's multigas detectors come equipped with the following features:

- Audible & visual alarms
- Push-button calibration\*
- Peak readings
- STEL & TWA
- Lockalarm™ feature (instrument automatically locks in the alarm mode when the gas exposure level exceeds 100% LEL)
- Continuous pumped operation (as an add-on for some instruments)
- Rechargeable or alkaline battery pack option\*\*

\*except MicroGard® Alarm

\*\*except Watchman® Multigas Monitor

## Orion® Multigas Detector

[The standard for reliability, ease of use and durability]

- Detects up to 4 gases including O<sub>2</sub>, CO, H<sub>2</sub>S, and combustible gas
- Simple, intuitive 2-button operation
- Rugged construction
- Large display with great contrast
- Internal pump
- 16-hr run time in pumped mode
- NiMH or alkaline batteries
- TIM System-compatible
- IP54-rated
- Sensors are easy to change

(For more complete information, see Data Sheet o8-16-27.)



## FiveStar® Alarm

[Rugged, reliable 5-gas detection at your fingertips]

- Sensors available: O<sub>2</sub>, CO, Cl<sub>2</sub>, ClO<sub>2</sub>, H<sub>2</sub>S, NO, NO<sub>2</sub>, PH<sub>3</sub>, SO<sub>2</sub>, NH<sub>3</sub> and combustible gas
- Autocalibration
- "Smart sensors"
- Pressure-compensated oxygen
- High levels of RFI protection
- Multilingual display
- Weather-resistant
- World's leading poison-tolerant combustible sensor
- Battery gas gauge
- Fast charger option
- Up to 20 hours of use with optional NiMH battery
- 2-year sensor warranty for most sensors

(For more complete information, see Bulletin o816-o6.)





## Watchman® Multigas Monitor

[ Designed to withstand the most demanding environments ]

- Monitors up to 4 gases including O<sub>2</sub>, CO, H<sub>2</sub>S, NO, NO<sub>2</sub>, SO<sub>2</sub> and combustible gas
- Extremely durable
- High RFI protection
- 14-hour battery run time as standard feature
- Remote alarm

(For more complete information, see Data Sheet 08-04-27-MC.)

## Passport® Personal Alarm

[ Known world-wide for its reliability and long service life ]

- Detects up to five gases including NH<sub>3</sub>, O<sub>2</sub>, CO, Cl<sub>2</sub>, H<sub>2</sub>S, NO, NO<sub>2</sub>, SO<sub>2</sub> and combustible gas
- Remote alarm
- Over 50,000 sold

(For more complete information, see Data Sheet 08-00-39.)



(For more complete information, see Data Sheet 08-04-27-MC.)

## MicroGard® Portable Alarms

[ Economical 2-gas instrument for detecting oxygen deficiency and combustible gas ]

- Detects O<sub>2</sub> and combustible gas
- Pocket-sized
- Economical
- Lightweight



## Orion® G Multigas & Leak Detector

[ Detects gas leaks at appliances, flues and underground pipes ]

- Multi-functional flexibility; indoor, outdoor and underground
- Measures low-level leaks, 0-100% LEL, 0-100% by volume, O<sub>2</sub>, CO and H<sub>2</sub>S (any combination)
- Fast response, intrinsically safe leak sensor
- Ergonomic design that fits snugly in hand
- Long-life NiMH or alkaline batteries (interchangeable)
- Large display, with great contrast for quick, easy readings
- Bar-hole probe filter trap designed to keep out water and dust



# SINGLE-GAS INSTRUMENTS

Single gas detectors are an economical way to monitor a specific single gas. MSA toxic gas indicators can be used for continuous monitoring of CO, O<sub>2</sub>, or H<sub>2</sub>S. MSA combustible gas indicators can be used to measure methane, pentane, and many other combustible gases.



## PULSAR™ Single-Gas Detector

[Everything you want in a portable, maintenance-free instrument]

- Units detect CO, O<sub>2</sub> or H<sub>2</sub>S
- Maintenance-free, two-year service life
- No need to calibrate instrument
- Long-life lithium battery, 33% longer than competition
- Large, easy-to-read, numeric end-of-service-life indicator, characters 4x larger than other displays
- Distinctive audio, visual and optional vibrating alarms
- Durable, passes 6-ft. drop test
- Water and dust resistant, passes IP54 rating
- MSA's patented Button™ Sensors

*(For more complete information, see Data Sheet o802-18.)*

## PULSAR+ Single-Gas Detector

[Industry-leading performance with a gas-concentration display]

- Units available to detect O<sub>2</sub>, CO or H<sub>2</sub>S
- MSA's patented Button™ Sensors
- Autocalibration with no accessories needed
- Long-life, replaceable lithium battery
- Excellent water and dust resistance, IP54 rating
- Piercing audio, ultra-bright visual and optional vibrating alarms
- Lifetime warranty



## Responder® Series

[ Compact, lightweight and easy-to-operate single gas detector with display ]

- Units available to detect O<sub>2</sub>, CO, H<sub>2</sub>S, Cl<sub>2</sub> or ClO<sub>2</sub>
- Digital display
- Pocket-sized
- Audible, visual & vibrating alarms (audible & visual alarms for MiniOx)
- Adjustable alarm levels
- Peak readings
- MiniOx Remote Responder available for remote sampling of confined spaces

*(For more complete information, see Bulletin o802-16.)*



## Titan™ Combustible Gas Detector

[ High-performance combustible gas detector with innovative design and small size ]

- Detects and measures combustible gas or vapor concentrations
- Reads % LEL or % by volume
- Simple, intuitive, one-button operation
- Large, easy-to-read display
- Audible and visual alarm with optional vibrating alarm
- Optional NiMH battery pack
- Full battery charge with MSA Fast Charger
- Strong construction, with excellent resistance to water and dust penetration—IP54 rating
- Features MSA Series 20L Sensor for expanded sensor life
- Sensor is very easy to replace

(For more complete information, see Bulletin 0802-20.)



## Explosimeter® Combustible Gas Indicator

[ Combustible detection with simple analog operation ]

- Detects and measures concentrations of combustible gases or vapors in the air
- Can be used in the immediate environment or for remote sampling of confined spaces
- Easy-to-read analog display
- Hand-held

(For more complete information, see Data Sheet 08-00-03.)



## Gascope® Combustible Gas Indicator

[ Dual-range combustible gas detector ]

- Detects, measures, and pinpoints leaks of combustible gases and vapors
- Wide detection range allows for readings above the UEL
- Dual-detection range gives readings in both % LEL and % by volume
- Easy-to-read analog display

(For more complete information, see Data Sheet 08-01-04.)



## Tankscope® Combustible Gas Indicator, Model 62T

[ For combustible gas detection in inerted environments ]

- Specifically designed to detect combustible gas levels in inerted shipboard oil holds
- Easy-to-read analog display
- Very simple to use

(For more complete information, see Bulletin 0804-29-MC.)



# PIDs, DETECTOR TUBES & SAMPLING PUMPS

Photoionization detectors (PIDs) are primarily used for detecting VOCs or very low concentrations of toxic gases. They are suitable for immediate as well as chronic hazard monitoring. Detector tubes are an inexpensive way to perform a quick atmospheric check. Sampling pumps and cassettes are particularly suited for monitoring chronic hazards related to dust, fibers and particulate.

## Passport® PID II Organic Vapor Monitor

[ A convenient, portable instrument for detecting low concentrations of VOCs ]

- Compact design
- Built-in pump
- 0.1 – 10,000 ppm operating range
- Graphic & numeric displays
- Datalogging & data downloading
- Easy to use & operate

*(For more complete information, see Data Sheet 08-01-39.)*



## Passport® VOC 2000 Organic Vapor and Oxygen Monitor

[ Detects VOCs and oxygen levels in a variety of monitoring applications ]

- Integrated O<sub>2</sub> sensor
- Compact design
- Built-in pump
- 0.1 – 10,000 ppm operating range
- Graphic & numeric displays
- Datalogging & data downloading
- Easy to use & operate

*(For more complete information, see Bulletin 0816-19-MC.)*



## Detector Tubes

- Available for the detection of over 170 gases and vapors

The MSA Kwik-Ref™ Detector Tube CD-ROM Database lists all tubes available, along with facts on chemical reaction and color changes, interferences, cross-sensitivities, and more.

*(For more complete information, see Data Sheet 08-00-02-MC.)*



## Detector Tube Pumps

MSA offers both manual and automatic detector tube pumps.

## Escort ELF® Sampling Pump

[ State-of-the-art electronic laminar flow sensor provides constant flow control in a compact, lightweight sampling pump ]

- State-of-the-art electronic laminar flow sensor
- For personal and area sampling
- Compact & lightweight
- Timer
- Engineered for use in “hostile” environments
- Can be used with many types of sample collection media, including filter discs, charcoal tubes & other sorbent tubes.

*(For more complete information, see Bulletin 0810-38-MC.)*



## Escort® LC Sampling Pump

[ A durable and economical sampling pump providing regulated flow for many types of sample collection media ]

- For personal and area sampling
- Compact & lightweight
- Timer
- Engineered for use in “hostile” environments
- Can be used with many types of sample collection media, including filter discs, charcoal tubes & other sorbent tubes.

*(For more complete information, see Data Sheet 08-04-01.)*



## Sampling Pump Accessories

MSA sampling pump accessories include filter media, a cyclone assembly, preweighed filter cassettes, filter holder assemblies, impingers, the Gemini® Twin-Port Sampler, sorbent tubes, and calibrators.

*(For more complete information, see Data Sheet 08-09-01.)*



# COMPUTERIZED CALIBRATION AND RECORD KEEPING WITH THE TIM<sup>®</sup> SYSTEM

Calibration checks help to ensure the accuracy of gas monitoring and detection equipment. To assist you in this essential process, MSA offers the TIM Total Instrument Manager System and a complete line of calibration accessories.

The MSA TIM System is a computer-controlled, automatic calibration system. The TIM System's data software includes a user-friendly archive—with both view and print capability—of all calibrations of all instruments that were bump-tested or calibrated on the TIM System. The TIM System is compatible with the MSA Orion Multigas Detector, FiveStar Alarm, Passport Personal Alarm, Gasport Gas Detector and Watchman Multigas Monitor.

Additional features include:

- Can be configured to calibrate four instruments simultaneously & provide immediate results
- Auto-recognition of instrument sensor configuration
- Computer-based test program
- Calibration to factory recommendations
- Permanent calibration history records
- Record of sensor response after calibration
- Print capability for all instrument test records
- Immediate computer-generated test receipt

*(For more complete information, see Bulletin 0818-02.)*



## Calibration Accessories

### Regulators

MSA offers a complete line of regulators to accurately match gas delivery to instrument flow requirements. Three types of regulators are available: fixed flow, matched flow and demand.



## Calibration Kits

A complete line of calibration kits is available for instrument calibration. Kits include all necessary tubing and adapters, regulators and calibration instructions. Calibration kits are housed in a heavy-duty plastic case, complete with a molded insert to house all accessories, regulators and calibration cylinders.



## Test Kits

Squirt® Gas Bump Test Kits are available for testing the operation of an instrument before each use. Kits are equipped with all necessary tubing, adapters and squirt gas cylinder in a handy carrying case.



## Calibration Cylinders

MSA offers a complete line of calibration gas to support all of your instrument calibration needs. Calibration gas is supplied in six cylinder sizes, ranging from 11-liter squirt gas for bump testing to 552-liter cylinders for large-volume users.

Each cylinder is shipped with an individual copy of an MSDS and a Certificate of Analysis, ensuring an exact calibration for both MSA and non-MSA instruments. For your convenience, reactive gases have an expiration date listed on each cylinder.



MSA calibration cylinders are recyclable. Contact the Customer Service Center for additional details.

# INSTRUMENTS & INDUSTRIES

		Single-Gas Instruments							Multigas Instruments					PIDs, Sampling Pumps & Calibration Accessories					
		PORTABLE INSTRUMENTS																	
		Explosimeter® Combustible Gas Indicator	Gascope® Combustible Gas Indicator	PULSAR™ Single-Gas Detector	PULSAR+ Single-Gas Detector	Responder® Alarms	Tankscope® Model 62T Combustible Gas Indicator	Titan™ Combustible Gas Detector	FiveStar® Alarm	MicroGard® Portable Alarms	Orion® Multigas Detector	Orion G Multigas & Leak Detector	Passport® Personal Alarm	Watchman® Multigas Monitor	Calibration Check Kits	Detector Tubes	Passport® PID II Organic Vapor Monitor	Passport® VOC 2000 Organic Vapor & Oxygen Monitor	Sampling Pumps
Application/Task	Gas/Hazard																		
Agriculture	chillers	NH <sub>3</sub>							●					●	●				
	silos/confined space	CO <sub>2</sub>												●	●				
	forklift operation	CO			●	●	●		●		●		●	●	●				
	fumigant	H <sub>2</sub> S			●	●	●		●		●		●	●	●	●	●	●	
	silos/confined space	NO							●				●	●	●				
	silos/confined space	NO <sub>2</sub>							●				●	●	●				
	silos/confined space	O <sub>2</sub> <i>Deficiency/Enrichment</i>			●	●	●		●	●	●		●	●	●			●	
	insecticide for fumigation	PH <sub>3</sub>							●						●	●	●	●	
Asbestos Abatement	asbestos fibers & lead dust	Dust & Particulate																●	
Aviation	engine repair & maintenance	CO			●	●	●		●		●		●	●	●				
		Combustible Gases	●	●				●	●	●	●		●	●	●				
	confined space	O <sub>2</sub> <i>Deficiency/Enrichment</i>			●	●	●		●	●	●		●	●	●			●	
	jet fuel vapors, solvents	VOCs												●		●	●	●	
Chemical		NH <sub>3</sub>							●				●	●	●	●			
	general leak detection	CO			●	●	●		●		●		●	●	●				
		Cl <sub>2</sub>					●		●				●	●	●				
	drying, milling & blending operations	Dust & Particulate																●	
	general leak detection	H <sub>2</sub> S			●	●	●		●		●		●	●	●	●			
		NO							●				●	●	●				
		NO <sub>2</sub>							●				●	●	●	●			
	confined space, liquid nitrogen carriers/storage, reactor work, tank maintenance, inspection tunnels	O <sub>2</sub> <i>Deficiency/Enrichment</i>			●	●	●		●	●	●		●	●	●			●	
	SO <sub>2</sub>							●				●	●	●	●				
	organic synthesis operations, liquid-solid separation, cleaning agents	VOCs												●		●	●	●	
Construction	vehicle emissions (diesel exhaust), generators, digging operations, trenching	CO			●	●	●		●		●		●	●	●				
	trenching underground construction	Combustible Gases	●					●	●		●		●	●	●				
	underground construction, excavation, demolition, oil mist sampling	Dust & Particulate																●	
	digging operations underground construction	H <sub>2</sub> S			●	●	●		●		●		●	●	●	●	●	●	

# INSTRUMENTS & INDUSTRIES

		Single-Gas Instruments							Multigas Instruments				PIDs, Sampling Pumps & Calibration Accessories														
		PORTABLE INSTRUMENTS																									
		Explosimeter® Combustible Gas Indicator	Gascope® Combustible Gas Indicator	PULSAR™ Single-Gas Detector	PULSAR+™ Single-Gas Detector	Responder® Alarms	Tankscope®, Model 6z.T Combustible Gas Indicator	Titan™ Combustible Gas Detector	FiveStar® Alarm	MicroGard® Portable Alarms	Orion® Multigas Detector	Orion G Multigas & Leak Detector	Passport® Personal Alarm	Watchman® Multigas Monitor	Calibration Check Kits	Detector Tubes	Passport® PID II Organic Vapor Monitor	Passport® VOC 2000 Organic Vapor & Oxygen Monitor	Sampling Pumps								
	Application/Task	Gas/Hazard																									
Construction	diesel exhaust	NO																•		•	•						
	diesel exhaust	NO <sub>2</sub>																•			•	•					
	confined spaces, trenching, underground construction	O <sub>2</sub> Deficiency/Enrichment																•	•	•			•		•		
		VOCs																					•	•	•	•	
Fire Service	confined space entry (rescue)	CO <sub>2</sub>																		•	•			•	•		
	overhaul, home calls (furnace leaks), trenching	CO																		•	•	•		•	•		
	underground construction, trenching	Combustible Gases																•	•				•	•			
		Dust & Particulate																									•
		H <sub>2</sub> S																		•	•	•		•	•	•	•
		confined space entry (rescue), underground construction	O <sub>2</sub> Deficiency/Enrichment																•	•	•	•	•				
Food & Beverage Processing	refrigeration facilities & cold storage	NH <sub>3</sub>																•					•	•	•	•	
	breweries & wineries, carbonated beverage bottling, fermentation tanks, refrigeration facilities, baking facilities	CO <sub>2</sub>																					•	•			
	forklifts	CO																		•	•	•		•	•		
		H <sub>2</sub> S																		•	•			•	•		
	confined space, packaging or gassing foods	O <sub>2</sub> Deficiency/Enrichment																•	•	•			•	•		•	
		PH <sub>3</sub>																•					•	•	•	•	
Foundries	furnace operation, coremaking, metal preparation & pouring	CO																•	•				•	•			
		Combustible Gases																•	•				•	•			
	mold preparation, casting cleaning, furnace changing, cleaning & finishing process	Dust & Particulate																								•	
	coremaking	H <sub>2</sub> S																		•	•	•		•	•	•	•
		NO																		•	•			•	•		
		NO <sub>2</sub>																		•	•			•	•		
		SO <sub>2</sub>																		•	•			•	•		
		O <sub>2</sub>																•	•				•	•			
	confined space	O <sub>2</sub>																•	•				•	•			

# INSTRUMENTS & INDUSTRIES

		Single-Gas Instruments										Multigas Instruments				PIDs, Sampling Pumps & Calibration Accessories			
		PORTABLE INSTRUMENTS																	
		Explosimeter® Combustible Gas Indicator	Gascope® Combustible Gas Indicator	PULSAR™ Single-Gas Detector	PULSAR+™ Single-Gas Detector	Responder® Alarms	Tankscope®, Model 6zT Combustible Gas Indicator	Titan™ Combustible Gas Detector	FiveStar® Alarm	MicroGard® Portable Alarms	Orion® Multigas Detector	Orion G Multigas & Leak Detector	Passport® Personal Alarm	Watchman® Multigas Monitor	Calibration Check Kits	Detector Tubes	Passport® PID II Organic Vapor Monitor	Passport® VOC 2000 Organic Vapor & Oxygen Monitor	Sampling Pumps
Application/Task	Gas/Hazard																		
HazMat	HazMat response	NH3							●				●		●	●	●	●	
		CO			●	●	●		●		●		●	●	●	●			
		Cl2							●				●		●	●	●	●	
		Combustible Gases	●	●			●	●	●	●	●		●	●	●				
		Formaldehyde														●	●	●	
		H2S			●	●	●		●		●		●	●	●	●	●	●	●
		PH3							●						●	●	●	●	
		SO2							●					●	●	●			
		VOCs													●		●	●	●
	confined space, underground construction, trenching	O2 <i>Deficiency/Enrichment</i>			●	●	●		●	●	●		●	●					
Heavy Manufacturing	manufacturing process emissions, forklift & crane operations	various gases								●		●					●	●	
Iron & Steel	blast furnace operation & maintenance, coke oven & converter operation, furnace & gas pipeline leaks, coking operations	CO			●	●	●		●		●		●	●	●	●			
		Combustible Gases	●	●				●	●	●	●		●	●	●				
	handling of coal & ore, coke manufacturing, furnace maintenance	Dust & Particulate																	●
	coking operations	H2S			●	●	●		●		●		●	●	●	●	●	●	●
	welding	NO							●				●	●	●	●			
	welding	NO2							●				●	●	●	●			
	confined space	O2 <i>Deficiency/Enrichment</i>			●	●	●		●	●	●		●	●	●			●	
	coking operations	SO2							●				●	●	●	●		●	
	motor maintenance & cleaning, coke oven emissions	VOCs													●		●	●	
Mining	confined space	"Black Damp" <i>(O2 Deficiency)</i>			●	●	●		●	●		●		●					
	mechanized coal cutting	"Fire Damp" <i>(Combustible Gases)</i>							●	●		●		●		●			
	mining process	"Stink Damp" <i>(H2S)</i>			●	●	●		●				●		●	●			
	result of combustion (fire), diesel-powered machinery, confined space, blasting	"White Damp" <i>(CO)</i>			●	●	●		●				●		●	●			
		CO2													●	●			

# INSTRUMENTS & INDUSTRIES

		Single-Gas Instruments							Multigas Instruments				PIDs, Sampling Pumps & Calibration Accessories								
		PORTABLE INSTRUMENTS	Explosimeter® Combustible Gas Indicator	Gascope® Combustible Gas Indicator	PULSAR™ Single-Gas Detector	PULSAR™ Single-Gas Detector	Responder® Alarms	Tankscope®, Model 62T Combustible Gas Indicator	Titan™ Combustible Gas Detector	FiveStar® Alarm	MicroGuard® Portable Alarms	Orion® Multigas Detector	Orion G Multigas & Leak Detector	Passport® Personal Alarm	Watchman® Multigas Monitor	Calibration Check Kits	Detector Tubes	Passport® PID II Organic Vapor Monitor	Passport® VOC 2000 Organic Vapor & Oxygen Monitor	Sampling Pumps	
Application/Task		Gas/Hazard																			
Mining	drilling, blasting & cutting, coal transportation, mechanized mining	Dust & Particulate																			
	diesel exhaust	NO								●				●							
	diesel-powered machinery, blasting	NO <sub>2</sub>								●				●							
Nuclear	confined space	O <sub>2</sub> <i>Deficiency/Enrichment</i>				●	●	●			●	●	●		●	●	●				
Oil & Gas/Petrochemical	petroleum refining	NH <sub>3</sub>								●				●				●	●	●	●
	incomplete combustion, conversion, coking, general processing, leak detection	CO				●	●	●			●	●		●	●	●	●				
	conversion processes, isomerization, leak detection, catalytic reforming, treatment processes	Combustible Gases		●	●				●	●	●	●		●	●	●					
	heavy hydrocarbon processing (coking)	Dust & Particulate																			●
	refining process, general leak detection, treatment processes, crude separation, drilling rigs	H <sub>2</sub> S									●		●		●	●	●	●	●	●	●
	confined space, tank-cleaning operations, enclosed buildings or structures	O <sub>2</sub> <i>Deficiency/Enrichment</i>				●	●	●			●	●	●		●	●	●			●	
	refining process, process stream sample collection, general plant operations	VOCs																	●	●	●
Paper & Pulp	paper production (bleaching)	Cl <sub>2</sub>						●		●				●				●	●	●	●
	paper production (bleaching)	ClO <sub>2</sub>						●		●								●			
	wood preparation, pulping, wood dust sampling	Dust & Particulate																			●
	chemical pulping, Kraft pulping	H <sub>2</sub> S				●	●	●			●		●		●	●	●	●	●	●	●
	chemical pulping, Kraft pulping	SO <sub>2</sub>									●				●	●		●			
	paper production (coating & drying)	VOCs																	●	●	●
Pharmaceutical	manufacturing	NH <sub>3</sub>								●				●				●	●	●	●
	manufacturing	Cl <sub>2</sub>						●		●				●				●	●		
	manufacturing	Combustible Gases		●	●				●	●	●	●		●	●	●					
	drying, milling & blending operations	Dust & Particulate																			●
	manufacturing	Formaldehyde																	●	●	●

# INSTRUMENTS & INDUSTRIES

		Single-Gas Instruments							Multigas Instruments				PIDs, Sampling Pumps & Calibration Accessories						
		PORTABLE INSTRUMENTS																	
		Explosimeter® Combustible Gas Indicator	Gascope® Combustible Gas Indicator	PULSAR™ Single-Gas Detector	PULSAR+ Single-Gas Detector	Responder® Alarms	Tankscope® Model 62T Combustible Gas Indicator	Titan™ Combustible Gas Detector	FiveStar® Alarm	MicroGard® Portable Alarms	Orion® Multigas Detector	Orion G Multigas & Leak Detector	Passport® Personal Alarm	Watchman® Multigas Monitor	Calibration Check Kits	Detector Tubes	Passport® PID II Organic Vapor Monitor	Passport® VOC 2000 Organic Vapor & Oxygen Monitor	Sampling Pumps
Application/Task	Gas/Hazard																		
Pharmaceutical	manufacturing	H2S		●	●	●		●		●		●	●	●	●				
	chemical synthesis, tank-cleaning, enclosed buildings or structures	O2 <i>Deficiency/Enrichment</i>		●	●	●			●	●	●		●	●	●		●		
	manufacturing	SO2						●				●	●	●	●				
	organic synthesis, liquid-solid separation, compounding, granulating & tablet-coating operations, drying & packaging	VOCs													●		●	●	
Sand Blasting	general operations	Dust & Particulate																●	
Sanding & Grinding	grinding operations, manufacture of paints & glass, routine maintenance activities, construction, demolition	Dust & Particulate																●	
Semiconductor	manufacturing	NH3						●				●		●	●	●	●		
	manufacturing	Cl2				●			●			●		●	●				
	manufacturing	NO							●			●	●	●	●				
	manufacturing	NO2							●			●	●	●	●				
	as doping agent in manufacturing, diffusion and ion implementation, chemical vapor deposition	PH3						●							●	●	●	●	
	lithography, etching, oxidation, metallization, assembly & testing	VOCs													●		●	●	
Shipyard/Marine	confined space	CO2												●	●				
	combustion	CO		●	●	●		●		●		●	●	●	●				
	oil transshipment (combustible gas sampling in an inert environment)	Combustible Gases					●	●			●				●				
	construction & repair (abrasive blasting operations, cutting & grinding, burning, heating)	Dust & Particulate																●	
	tank emissions	H2S		●	●	●			●		●		●	●	●	●			
	confined space, storage tanks, cargo holds	O2 <i>Deficiency/Enrichment</i>		●	●	●			●	●	●		●		●		●		
Spray Painting	general operations	Dust & Particulate																●	
	use of water-based paint	Formaldehyde													●	●	●		
	use of solvent-based paint	VOCs													●		●	●	

# INSTRUMENTS & INDUSTRIES

		Single-Gas Instruments							Multigas Instruments					PIDs, Sampling Pumps & Calibration Accessories							
		PORTABLE INSTRUMENTS	Explosimeter® Combustible Gas Indicator	Gascope® Combustible Gas Indicator	PULSAR™ Single-Gas Detector	PULSAR+™ Single-Gas Detector	Responder® Alarms	Tankscope® Model 62T Combustible Gas Indicator	Titan™ Combustible Gas Detector	FiveStar® Alarm	MicroGard® Portable Alarms	Orion® Multigas Detector	Orion G Multigas & Leak Detector	Passport® Personal Alarm	Watchman® Multigas Monitor	Calibration Check Kits	Detector Tubes	Passport® PID II Organic Vapor Monitor	Passport® VOC 2000 Organic Vapor & Oxygen Monitor	Sampling Pumps	
Application/Task	Gas/Hazard																				
Utilities	home furnace leaks	CO			●	●	●			●		●	●	●	●	●	●				
	gas service safety survey and leak detection, throughout processes	Combustible Gases (CH <sub>4</sub> )	●	●				●	●	●	●	●	●	●	●	●	●				
	throughout processes	H <sub>2</sub> S			●	●	●			●		●	●	●	●	●	●	●	●		
	fossil fuel power plants	NO								●				●	●	●	●				
	fossil fuel power plants	NO <sub>2</sub>								●				●	●	●	●				
	confined space throughout processes	O <sub>2</sub> <i>Deficiency/Enrichment</i>			●	●	●			●	●	●	●	●	●	●	●				
	fossil fuel power plants	SO <sub>2</sub>								●				●	●	●	●				
Water & Wastewater Treatment	processing	NH <sub>3</sub>								●						●	●	●	●		
	processing	CO			●	●	●			●		●	●	●	●	●	●				
	digester process	CO <sub>2</sub>						●				●									
	incinerators, stagnant gas in urban sewer system	CO			●	●	●			●				●	●	●	●				
	processing	Cl <sub>2</sub>					●			●						●	●	●	●		
	digester process, throughout process	Combustible Gases (CH <sub>4</sub> )	●	●				●	●	●	●	●	●	●	●	●	●				
	sewer work, throughout process	H <sub>2</sub> S			●	●	●			●		●	●	●	●	●	●	●	●		
	sewer treatment/maintenance, confined space, throughout process	O <sub>2</sub> <i>Deficiency/Enrichment</i>			●	●	●			●	●	●		●	●	●	●				
	dechlorination process	SO <sub>2</sub>								●				●	●	●	●				
	Welding	confined space welding, arc air cutting, digester process flux- & gas-shielded arc welding, metal cutting & flame gouging, gas pressure welding	CO			●	●	●			●		●	●	●	●	●	●			
thermite arc & studwelding, laser welding & chilling, arc air cutting, digester process electric resistance welding, gas pressure welding, metal cutting & flame gouging		Combustible Gases	●	●				●	●	●	●	●	●	●	●	●	●				
		Dust & Particulate																		●	
		NO								●				●	●	●	●				
arc welding & cutting, stud welding, arc air cutting, gas pressure welding, metal cutting & flame gouging		NO <sub>2</sub>								●				●	●	●	●				
confined space welding, electron beam welding		O <sub>2</sub> <i>Deficiency/Enrichment</i>			●	●	●			●	●	●		●	●	●	●				
arc welding & cutting, stud welding, arc air cutting, electric resistance welding		Ozone														●	●				



## Exposure Limits Terms and Abbreviations

**IDLH (Immediately Dangerous to Life and Health)\*** – The maximum concentration level of a substance (gas) from which a worker could escape within 30 minutes without developing immediate, severe or irreversible health effects, or other escape-impairing symptoms. IDLH levels are measured in ppm (parts per million). \* As defined by NIOSH (National Institute for Occupational Safety and Health).

**PEL (Permissible Exposure Limit)** – An airborne concentration of contaminant that most workers can be exposed to repeatedly in a normal 8-hour day, in a 40-hour week, without adverse health effect. PEL levels are measured in ppm (parts per million) and are established by OSHA.

**PPM (Parts Per Million)** – The most common unit of measurement for toxic gases. “10,000 parts per million” gas concentration equals 1% by volume.

**TLV (Threshold Limit Value)\*** – Refers to the airborne concentration of substances to which most workers can be repeatedly exposed over a working lifetime without adverse effects.

\* As defined by ACGIH (American Conference of Governmental Industrial Hygienists).

There are three categories of TLVs:

**TLV – TWA (Time Weighted Average)** – This is the average amount of gas that a worker can be repeatedly exposed to in a normal 8-hour day, in a 40-hour week, without adverse health effects.

**TLV – STEL (Short Term Exposure Limit)** – The gas concentration that most workers can be continuously exposed to for a 15-minute time period without suffering adverse health effects that would impair self-rescue or worker safety. This limit should not be repeated more than 4 times per day and there should be at least 60 minutes between individual STEL exposure periods.

**TLV – C (Ceiling)** – The highest gas concentration to which workers may be exposed. Ceiling TLVs should never be exceeded and they take precedence over all TWAs and STELs.

**LEL (Lower Explosive Limit)** – The lowest concentration of a gas or vapor that will ignite and sustain combustion. “% LEL” is a common unit of measurement in combustible gas detection.

**UEL (Upper Explosive Limit)** – The maximum concentration at which a gas will sustain combustion.

**Oxygen Deficient Atmosphere** – An atmosphere containing less than 19.5% oxygen by volume. (Possesses a risk of insufficient oxygen for breathing.)

**Oxygen Enriched Atmosphere** – An atmosphere containing more than 25% oxygen by volume. (Possesses an increased risk of explosion.)

**Note:** This Bulletin contains only a general description of the products shown. While uses and performance capabilities are described, under no circumstances shall the products be used by untrained or unqualified individuals and not until the product instructions including any warnings or cautions provided have been thoroughly read and understood. Only they contain the complete and detailed information concerning proper use and care of these products.



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