

# Portable Instrument **Application Guide**

Which Portable Gas Detector for which Industry/Application

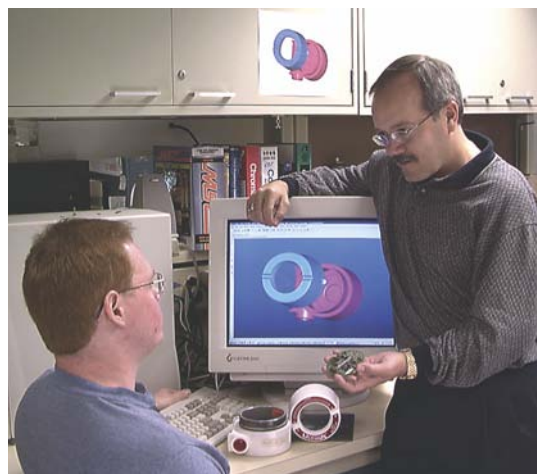


*Because every life has a **purpose...***

## Advanced Technology

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

Our products are tested at every manufacturing step to ensure the highest quality possible. MSA field sales representatives and distributors are thoroughly trained in product use and applications. Our applications and inside sales departments provide technical and customer service assistance. After the sale, we support our customers with the best repair and service organization in the industry and unmatched product warranties.



## Purpose of Guide

This guide will quickly and easily help you to identify portable gas detection solutions for your specific needs. To assist in this process, this guide identifies some atmospheric hazards that are commonly found within many 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.

## 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 and services that protect and improve people's health, safety and the environment.

We strive to achieve this vision by satisfying customer needs through the efforts of motivated, involved, highly-trained employees dedicated to continuous improvement in quality, service, cost, value, technology, and delivery.

*Refer to the ALTAIR Family leaflet or the product leaflets for more information*



Gases/Hazards & Industries	Gases/Hazards													
	Toxic Gases													
Industry	Combustible gases	O <sub>2</sub> Deficiency/Enrichment	Ammonia	Carbon Dioxide	Carbon Monoxide	Chlorine	Chlorine Dioxide	Hydrogen Cyanide	Hydrogen Sulfide	Nitric Oxide	Nitrogen Dioxide	Phosphine	Sulfur Dioxide	VOCs
AGRICULTURE	■	■	■	■	■				■	■	■	■		
AVIATION	■	■			■									■
CHEMICAL	■	■	■		■	■		■	■				■	■
CONSTRUCTION	■	■			■				■					■
FIRE SERVICE	■	■		■	■	■		■	■					■
FOOD & BEVERAGE PROCESSING		■	■	■	■				■			■		
FOUNDRIES	■	■			■				■				■	
HEAVY MANUFACTURING	■				■									■
IRON & STEEL	■	■			■			■	■	■	■		■	■
MINING	■	■		■	■			■	■	■	■			
OIL & GAS/PETROCHEMICAL	■	■	■		■				■					■
PAPER & PULP						■	■		■				■	■
PHARMACEUTICAL	■	■	■			■			■				■	■
SEMICONDUCTOR			■			■				■	■	■		■
SHIPYARD/MARINE	■	■		■	■				■					
UTILITIES	■	■		■	■				■	■	■		■	
WATER & WASTEWATER TREATMENT	■	■	■		■	■			■				■	
WELDING	■	■			■					■	■			

## 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>)  
 Hexane (C<sub>6</sub>H<sub>14</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>)  
 Propane (C<sub>3</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 cyanide (HCN)  
 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>)

### OXYGEN (O<sub>2</sub>)

Instruments & Industries			ALTAIR® Detector	ALTAIR Pro Detector	ALTAIR 2X Detector	ALTAIR 4X Detector	ALTAIR 5X Detector with internal pump	SIRIUS® Detector
Number of Detected Gases			1	1	up to 2	up to 4	up to 6	up to 5
	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					■	
		NO <sub>2</sub>			■	■	■	
		O <sub>2</sub> Deficiency/enrichment	■	■		■	■	■
		Combustible gases				■	■	■
	Insecticide for fumigation	PH <sub>3</sub>		■			■	
AVIATION	Engine repair & maintenance	CO	■		■	■	■	■
		CO high concentration			●		●	
		Combustible gases				■	■	■
	Confined space	O <sub>2</sub> Deficiency/enrichment	■	■		■	■	■
	Jet fuel vapors, solvents	VOCs						■
CHEMICAL PLANT	Production process, general leak detection, confined space, liquid nitrogen carriers/storage, reactor work, tank maintenance, inspection tunnels	O <sub>2</sub> Deficiency/enrichment	■	■		■	■	■
		CO	■		■	■	■	■
		CO high concentration			●		●	
		CO w/presence of H <sub>2</sub>			●	●	●	
		Cl <sub>2</sub>			■		■	
		NH <sub>3</sub>			●		■	
		H <sub>2</sub> S	■		■	■	■	■
		ClO <sub>2</sub>		■			■	
		NO					■	
		NO <sub>2</sub>			■	■	■	
		Combustible gases				■	■	■
		SO <sub>2</sub>			■	■	■	
	Organic synthesis operations, liquid-solid separation, cleaning agents	VOCs						■

**Legend**

● XCell CO H<sub>2</sub>-RES sensor    ● Contact MSA for availability

Instruments & Industries			ALTAIR® Detector	ALTAIR Pro Detector	ALTAIR 2X Detector	ALTAIR 4X Detector	ALTAIR 5X Detector with internal pump	SIRIUS® Detector
Number of Detected Gases			1	1	up to 2	up to 4	up to 6	up to 5
	Application/Task	Gas/Hazard						
CONSTRUCTION	Vehicle emissions (diesel exhaust), generators, digging operations, trenching	CO	■		■	■	■	■
		CO high concentration			●		●	
	Trenching, underground construction	Combustible gases				■	■	■
	Digging operations, underground construction	H <sub>2</sub> S	■		■	■	■	■
	Diesel exhaust	NO					■	
		NO <sub>2</sub>			■	■	■	
	Confined spaces, trenching, underground construction	O <sub>2</sub> Deficiency/enrichment	■	■		■	■	■
		CO <sub>2</sub>					■	
FIRE BRIGADES	Confined space entry (rescue), underground construction	O <sub>2</sub> Deficiency/enrichment	■	■		■	■	■
		CO <sub>2</sub>					■	
	Overhaul, home calls (boilers, leaks), trenching	CO	■		■	■	■	■
	Underground construction, trenching	Combustible gases				■	■	■
		H <sub>2</sub> S	■		■	■	■	■
	HazMat	NH <sub>3</sub>			●		■	
		Cl <sub>2</sub>			■		■	
		Combustible gases				■	■	■
		H <sub>2</sub> S	■		■	■	■	■
		PH <sub>3</sub>		■			■	
		SO <sub>2</sub>			■	■	■	
		VOCs						■
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	■		■	■	■	■
		CO high concentration			●		●	
		H <sub>2</sub> S	■		■	■	■	■
	Confined space, packaging or gassing foods	O <sub>2</sub> Deficiency/enrichment	■	■		■	■	■
		PH <sub>3</sub>		■			■	
	Production process	Cl <sub>2</sub>			■		■	
		SO <sub>2</sub>			■	■	■	
	Silos	Combustible gases				■	■	■

## Legend

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Instruments & Industries			ALTAIR Detector	ALTAIR Pro Detector	ALTAIR 2X Detector	ALTAIR 4X Detector	ALTAIR 5X Detector with internal pump	SIRIUS® Detector
Number of Detected Gases			1	1	up to 2	up to 4	up to 6	up to 5
	Application/Task	Gas/Hazard						
FOUNDRIES	Furnace operation, coremaking, metal preparation & pouring	CO	■		■	■	■	■
		CO high concentration			●		●	
		CO w/presence of H <sub>2</sub>			●	●	●	
		Combustible gases				■	■	■
	Coremaking	H <sub>2</sub> S	■		■	■	■	■
		NO					■	
		NO <sub>2</sub>			●	■	■	
		SO <sub>2</sub>			■	■	■	
HEAVY MANUFACTURING	Manufacturing process emissions, forklift & crane operations	O <sub>2</sub> Deficiency/enrichment	■	■		■	■	■
		Various gases	■	■	■	■	■	■
IRON & STEEL	Blast furnace operation & maintenance, coke oven & converter operation, furnace & gas pipeline leaks, coking operations	CO	■		■	■	■	■
		CO high concentration			●		●	
		CO w/presence of H <sub>2</sub>			●	●	●	
		Combustible gases				■	■	■
	Coking operations	H <sub>2</sub> S	■		■	■	■	■
		SO <sub>2</sub>			■	■	■	
	Welding	NO					■	
		NO <sub>2</sub>			●	■	■	
MINING	Confined space	O <sub>2</sub>	■	■		■	■	■
	Motor maintenance & cleaning, coke oven emissions	VOCs						■
	Confined space	"Black damp" O <sub>2</sub> deficiency		■		■	■	
	Mechanized coal cutting	"Fire damp" (Combustible gases)				■	■	
	Mining process	"Stink damp" H <sub>2</sub> S	■*		■*	■	■	
	Result of combustion (fire), diesel-powered machinery, confined space, blasting	"White damp" CO			■	■	■	
		CO high concentration			●		●	
	Emergency rescue action	Combustible gases				■	■	
		CO <sub>2</sub>					■	
	Diesel exhaust	NO					■	
	Diesel-powered machinery, blasting	NO <sub>2</sub>			●	■	■	

\*Not M1/M2 approved

#### Legend

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Instruments & Industries			ALTAIR Detector	ALTAIR Pro Detector	ALTAIR 2X Detector	ALTAIR 4X Detector	ALTAIR 5X Detector with internal pump	SIRIUS Detector
Number of Detected Gases			1	1	up to 2	up to 4	up to 6	up to 5
	Application/Task	Gas/Hazard						
OIL, GAS & PETROLEUM	Petroleum refining	NH <sub>3</sub>			●		■	
	Incomplete combustion, conversion, coking, general processing, leak detection	CO	■		■	■	■	■
		CO high concentration			●		●	
		CO w/presence of H <sub>2</sub>			●	●	●	
	Conversion processes, isomerization, leak detection, catalytic reforming, treatment processes	Combustible gases				■	■	■
	Refining process, general leak detection, treatment processes, crude separation, drilling rigs	H <sub>2</sub> S	■		■	■	■	■
		SO <sub>2</sub>			■	■	■	
		CO <sub>2</sub>					■	
	Confined space, tank-cleaning operations, enclosed buildings or structures	O <sub>2</sub>	■	■		■	■	■
	Refining process, process stream sample collection, general plant operations	VOCs						■
PAPER & PULP	Paper production (bleaching)	Cl <sub>2</sub>			■		■	
		ClO <sub>2</sub>		■			■	
	Chemical pulping, Kraft pulping	H <sub>2</sub> S	■		■	■	■	■
		SO <sub>2</sub>			■	■	■	
	Paper production (coating & drying)	VOCs						■
PHARMACEUTICAL	Manufacturing	NH <sub>3</sub>			●		■	
		Cl <sub>2</sub>			■		■	
		Combustible gases				■	■	■
		H <sub>2</sub> S	■		■	■	■	■
		SO <sub>2</sub>			■	■	■	
	Chemical synthesis, tank-cleaning, enclosed buildings or structures	O <sub>2</sub> Deficiency/ enrichment	■	■		■	■	■
	Organic synthesis, liquid-solid separation, compounding, granulating & tablet-coating operations, drying & packaging	VOCs						■
SEMICONDUCTOR	Manufacturing	NH <sub>3</sub>			●		■	
		Cl <sub>2</sub>			■		■	
		NO					■	
		NO <sub>2</sub>			●	■	■	
	As doping agent in manufacturing, diffusion and ion implementation, chemical vapor deposition	PH <sub>3</sub>		■			■	
	Lithography, etching, oxidation, metallization, assembly & testing	VOCs						■

## Legend

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Instruments & Industries			ALTAIR Detector	ALTAIR Pro Detector	ALTAIR 2X Detector	ALTAIR 4X Detector	ALTAIR 5X Detector with internal pump	SIRIUS Detector
Number of Detected Gases			1	1	up to 2	up to 4	up to 6	up to 5
	Application/Task	Gas/Hazard						
SHIPYARD/MARINE	Combustion	CO	■		■	■	■	■
		CO high concentration			●		●	
	Battery room	CO	■		■	■	■	■
		CO high concentration			●		●	
		CO w/presence of H <sub>2</sub>			●	●	●	
	Oil trans-shipment (combustible gas sampling within inert environments)	Combustible gases				■	■	■
	Tank emissions	H <sub>2</sub> S	■		■	■	■	■
	Diesel motors, fuel boilers	NO <sub>2</sub>			■	■	■	
	Confined space, storage tanks, cargo holds	O <sub>2</sub> Deficiency/enrichment	■	■		■	■	■
UTILITIES	Confined space	CO <sub>2</sub>					■	
	Confined space throughout processes	O <sub>2</sub> Deficiency/enrichment	■	■		■	■	■
	Boiler leaks	CO	■		■	■	■	■
		CO high concentration			●		●	
	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	Combustible gases				■	■	■
		CO	■		■	■	■	■
		CO high concentration			●		●	
		CO w/presence of H <sub>2</sub>			●	●	●	
		CO <sub>2</sub>					■	
		NO					■	
		NO <sub>2</sub>			■	■	■	
		SO <sub>2</sub>			■	■	■	
	Nuclear power plants	Combustible gases				■	■	■
		CO	■		■	■	■	■
		CO high concentration			●		●	
		CO w/presence of H <sub>2</sub>			●	●	●	

**Legend**

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Instruments & Industries			ALTAIR® Detector	ALTAIR Pro Detector	ALTAIR 2X Detector	ALTAIR 4X Detector	ALTAIR 5X Detector	SIRIUS® Detector
Number of Detected Gases			1	1	up to 2	up to 4	up to 6	up to 5
	Application/Task	Gas/Hazard						
WATER & WASTEWATER TREATMENT	Processing	NH <sub>3</sub>			●		■	
		CO	■		■	■	■	■
		CO high concentration			●		●	
		Cl <sub>2</sub>			■		■	
	Digester process, sewer work	CO <sub>2</sub>					■	
	Incinerators, stagnant gas in urban sewer system	CO	■		■	■	■	■
		CO high concentration			●		●	
	Processing							
	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>	■	■		■	■	■
		VOCs						■
WELDING	Dechlorination process	SO <sub>2</sub>			■	■	■	
	Confined space welding, arc air cutting, digester process flux- & gas-shielded arc welding, metal cutting & flame gouging, gas pressure welding	CO	■		■	■	■	■
		CO high concentration			●		●	
	Thermite arc & stud welding, laser welding & chilling, arc air cutting, digester process electric resistance welding, gas pressure welding, metal cutting & flame gouging	Combustible gases				■	■	■
		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> Deficiency/enrichment	■	■		■	■	■

#### Legend

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**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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Subject to changes without notice

#### MSA – The Safety Company

1000 Cranberry Woods Drive  
Cranberry Township, PA 16066 USA  
Phone 724-776-8600

[www.MSAsafety.com](http://www.MSAsafety.com)

#### U.S. Customer Service Center

Phone 1-800-MSA-2222  
Fax 1-800-967-0398

#### Pacific Asia Region

##### MSA Singapore

MSA S.E Asia Pte Ltd  
35 Marsiling Industrial Estate Road 3,  
#04-01, Singapore 739257  
Phone: +65 6350 4500  
Fax: +65 6350 4505

##### MSA Australia

Phone: 1300 728 672 / +61 02 9688 0333  
Fax: +61 2 9896 1835

#### MSA Indonesia

Phone: +62 21 6409 000  
Fax: +62 21 641 2831

#### MSA Malaysia

Phone: +603 8724 8208/9208  
Fax: +603 8724 2208

#### MSA New Zealand

Customer Service  
Phone: 0800 441 335

#### MSA Philippines

Phone: +63 9209 742 191

#### MSA Thailand

Phone: +66 2617 8211  
Fax: +66 2617 8214

For sales enquiry, contact us [here](http://www.MSAsafety.com).

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