

Portable Instrument **Application Guide**

Choose the right Portable Gas Detector for your 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.



The numerous MSA XCell Sensors have a typical life of more than double the industry average. MSA XCell sensors are engineered using MSA's proprietary application-specific integrated circuit (ASIC) design. By miniaturizing the sensor controlling electronics and placing them inside the sensor itself, MSA XCell Sensors offer superior stability, accuracy and repeatability. MSA XCell Sensors are a breakthrough in chemical and mechanical sensor design, enabling faster response and span calibration times. The best and latest example of Advanced Technology is our XCell Pulse Sensor Technology, now available on select versions of the ALTAIR 2X gas detector, which enables the first stand-alone bump test and eliminates the need for bottled gas! With less time spent on calibration and bump tests, you save calibration gas, maintenance costs and in turn, save money.

But most importantly, in our industry, saving seconds on response time can also mean saving lives.

Durability

All MSA detectors are built for durability and designed to survive the work that is being done. All instruments are built to withstand extreme impact, dust and water ingress, RF interference and must pass rigorous drop and environmental testing. Most instruments and our highest use XCell sensors are backed with a 3 year warranty.

This combination of advanced technology and extreme product durability delivers you with very low cost of ownership in your gas detection programs.

We are focused on you

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 you 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.



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



Gases/Hazards & Industries	Gases/Hazards												
	Toxic Gases												VOCs
	Combustible gases	O ₂ Deficiency/Enrichment	Ammonia	Carbon Dioxide	Carbon Monoxide	Chlorine	Chlorine Dioxide	Hydrogen Cyanide	Hydrogen Sulfide	Nitric Oxide	Nitrogen Dioxide	Phosphine	
Industry													
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 (C₃H₆O) Hydrogen (H₂)
 Benzene (C₆H₆) Isobutane (C₄H₁₀)
 Butane (C₄H₁₀) Methane (CH₄)
 Ethylene (C₂H₄) Pentane (C₅H₁₂)
 Heptane (C₇H₁₆) Toluene (C₇H₈)
 Hexane (C₆H₁₄) Propane (C₃H₈)

TOXIC GASES

Ammonia (NH₃) Chlorine dioxide (ClO₂)
 Carbon dioxide (CO₂) Hydrogen cyanide (HCN)
 Carbon monoxide (CO) Hydrogen sulfide (H₂S)
 Chlorine (Cl₂) Nitric oxide (NO)

OXYGEN (O₂)

VOCs

Nitrogen dioxide (NO₂)
 Phosphine (PH₃)
 Sulfur dioxide (SO₂)

Instruments & Industries

			ALTAIR® Detector	ALTAIR Pro Detector	ALTAIR 2X Detector	ALTAIR 4X Detector	ALTAIR 5X/5X PID Detector with internal pump
			1	1	up to 2	up to 4	up to 6
Number of Detected Gases			1	1	up to 2	up to 4	up to 6
	Application/Task	Gas/Hazard					
AGRICULTURE	Chillers	NH ₃			●		■
	Silos/confined space	CO ₂					■
	Forklift operation	CO	■		■	■	■
	Fumigant	H ₂ S	■		■	■	■
	Silos/confined space	NO					■
		NO ₂			■	■	■
		O ₂ Deficiency/enrichment	■	■		■	■
		Combustible gases				■	■
		Insecticide for fumigation	PH ₃		■		■
AVIATION	Engine repair & maintenance	CO	■		■	■	■
		CO high concentration			■		■
		Combustible gases				■	■
	Confined space	O ₂ 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 ₂ Deficiency/enrichment	■	■		■	■
		CO	■		■	■	■
		CO high concentration			■		■
		CO w/presence of H ₂			●	●	●
		Cl ₂			■		■
		NH ₃			●		■
		H ₂ S	■		■	■	■
		ClO ₂		■			■
		NO					■
		NO ₂			■	■	■
		Combustible gases				■	■
		SO ₂			■	■	■
	Organic synthesis operations, liquid-solid separation, cleaning agents	VOCs					■

Legend

- XCell CO H₂-RES sensor
- Contact MSA for availability

Instruments & Industries			ALTAIR® Detector	ALTAIR Pro Detector	ALTAIR 2X Detector	ALTAIR 4X Detector	ALTAIR 5X/5X PID Detector with internal pump
			1	1	up to 2	up to 4	up to 6
Number of Detected Gases			1	1	up to 2	up to 4	up to 6
	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 ₂ S	■		■	■	■
	Diesel exhaust	NO					■
		NO ₂			■	■	■
	Confined spaces, trenching, underground construction	O ₂ Deficiency/enrichment	■	■		■	■
		CO ₂					■
Use of paints, caulks, sealants, coatings, paints, varnishes, stains, wall coverings	VOCs					■	
FIRE BRIGADES	Confined space entry (rescue), underground construction	O ₂ Deficiency/enrichment	■	■		■	■
		CO ₂					■
	Overhaul, home calls (boilers, leaks), trenching	CO	■		■	■	■
	Underground construction, trenching	Combustible gases				■	■
	HazMat	H ₂ S	■		■	■	■
		NH ₃			●		■
		Cl ₂			■		■
		Combustible gases				■	■
		H ₂ S	■		■	■	■
		PH ₃		■			■
	SO ₂			■	■	■	
	VOCs					■	
FOOD & BEVERAGE PROCESSING	Refrigeration facilities & cold storage	NH ₃			●		■
	Breweries & wineries, carbonated beverage bottling, fermentation tanks, refrigeration facilities, baking facilities	CO ₂					■
		CO high concentration					■
	Forklifts	CO	■		■	■	■
		H ₂ S	■		■	■	■
	Confined space, packaging or gassing foods	O ₂ Deficiency/enrichment	■	■		■	■
		PH ₃		■			■
	Production process	Cl ₂			■		■
		SO ₂			■	■	■
		VOCs					■
Silos	Combustible gases				■	■	

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

*Not M1/M2 approved

Legend

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

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Number of Detected Gases			1	1	up to 2	up to 4	up to 6
	Application/Task	Gas/Hazard					
SHIPYARD/MARINE	Combustion	CO	■		■	■	■
		CO high concentration			■		■
	Battery room	CO	■		■	■	■
		CO high concentration			■		■
		CO w/presence of H ₂			●	●	●
	Oil trans-shipment (combustible gas sampling within inert environments)	Combustible gases				■	■
	Tank emissions	H ₂ S	■		■	■	■
	Diesel motors, fuel boilers	NO ₂			■	■	■
	Confined space, storage tanks, cargo holds	O ₂ Deficiency/enrichment	■	■		■	■
		VOCs					■
Confined space	CO ₂					■	
UTILITIES	Confined space throughout processes	O ₂ Deficiency/enrichment	■	■		■	■
		Boiler leaks	CO	■		■	■
		CO high concentration			■		■
	Gas service safety survey and leak detection, throughout processes	Combustible gases (CH ₄)				■	■
	Throughout processes	H ₂ S	■		■	■	■
	Fossil fuel power plants	Combustible gases				■	■
		CO	■		■	■	■
		CO high concentration			■		■
		CO w/presence of H ₂			●	●	●
		CO ₂					■
		NO					■
		NO ₂			■	■	■
		SO ₂			■	■	■
	VOCs					■	
	Nuclear power plants	Combustible gases				■	■
CO		■		■	■	■	
CO high concentration				■		■	
CO w/presence of H ₂				●	●	●	
VOCs						■	

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Instruments & Industries			ALTAIR® Detector	ALTAIR Pro Detector	ALTAIR 2X Detector	ALTAIR 4X Detector	ALTAIR 5X/5X PID Detector with internal pump
Number of Detected Gases			1	1	up to 2	up to 4	up to 6
	Application/Task	Gas/Hazard					
WATER & WASTEWATER TREATMENT	Processing	NH ₃			●		■
		CO	■		■	■	■
		CO high concentration			■		■
		Cl ₂			■		■
	Digester process, sewer work	CO ₂					■
	Incinerators, stagnant gas in urban sewer system	CO	■		■	■	■
		CO high concentration			■		■
	Processing						
	Digester process, throughout process	Combustible gases (CH ₄)				■	■
	Sewer work, throughout process	H ₂ S	■		■	■	■
	Sewer treatment/maintenance, confined space, throughout process	O ₂	■	■		■	■
		VOCs					■
Dechlorination process	SO ₂			■	■	■	
WELDING	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 ₂			■	■	■
	Confined space welding, electron beam welding	O ₂ Deficiency/enrichment	■	■		■	■

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