

Engineer's Notebook

What is confined space?

NIOSH (National Institute for Occupational Safety and Health) defines confined space as "a space which by design has limited openings for entry and exit; unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy."

What are the dangers associated with confined space entry?

Confined space entry can become a very dangerous and costly experience if one is not thoroughly trained on the associated hazards of this responsibility. Common concerns are: elevated noise levels, heat and cold stress, mechanical and electrical hazards, dust, engulfment potential, and of primary concern—atmospheric conditions. Generally, these locations have limited entry and egress and are not conducive to prolonged human occupancy without the use of proper procedures and safety equipment.

What are the most common atmospheric conditions I should be concerned about?

Gases typically monitored in confined spaces reside in three categories: oxygen, combustibles, and toxic gases. Alarm levels are 19.5% for oxygen deficiency, 23.5% for oxygen enrichment, and 10% LEL for combustible gases. The normal volume of oxygen in ambient air is 20.9%. The two most commonly monitored toxic gases are carbon monoxide and hydrogen sulfide. Carbon monoxide is a by-product of inefficient combustion, and hydrogen sulfide is naturally generated from the decomposition of organic materials like grass, wood, and dead animal carcasses.

Who should determine which gases to monitor in a confined space?

Determination of which gases to monitor in a confined space is typically the responsibility of a Safety Specialist or a Certified Industrial Hygienist.

Look out for confined spaces — they're not all easy to identify!

Manholes, sewers, boilers, silos, vessels, vats, pipelines, tunnels, storage tanks, chip compartments, and underground vaults are identifiable and non-identifiable areas and can be classified as confined spaces. Open-topped water and degreaser tanks, open pits, and enclosures with bottom access are also confined spaces. All prohibit natural ventilation, are a potential source of gas generation, and can keep gases from escaping, causing a potentially hazardous atmosphere. These areas should be properly labeled and treated with caution. Confined space gas monitors can be hand-held, portable, or attached to clothing as personal monitoring devices.

The Atmospheric Hazards of Confined Space...

Key Gas Detection Definitions:

Attendant: An individual stationed outside a permit space that monitors entrants and performs all attendants' duties.

Authorized Entrant: An employee authorized by the employer to enter a permit space.

Entry Permit: A document established by the employer that authorizes an employee to enter a permit space. The entry permit defines the conditions under which the permit space may be entered; states the reasons for entering; lists the anticipated hazard of entry; and establishes the length of time that the permit remains valid. For entries where the individual is authorized, the entry does not assume direct charge of the entry, the entry permit lists the eligible attendants, entrants, and the individual who may be in charge.

Hot Work Permit: An employer's written authorization to perform operations which could provide a source of ignition.

IDLH: Immediately Dangerous to Life or Health—The maximum concentration of gas in PPM (parts per million) from which a worker could escape within 30 minutes without experiencing any escape-impairing or irreversible health effects.

LEL/LFL: Lower Explosive Limit/Lower Flammable Limit—The lowest concentration (air-fuel mixture) at which a gas can ignite. Concentrations below this limit are too lean to burn.

UEL/UFL: Upper Explosive Limit/Upper Flammable Limit—The highest concentration that can be ignited. Above that concentration, the mixture is too rich to burn.

A gas is only combustible between its LEL and UEL, but any concentration of combustible gas should be a concern. Lean mixtures can collect in an area and reach a combustible level, or rich mixtures can be diluted with air to become combustible.

Oxygen-Deficient Atmosphere—An atmosphere containing less than 19.5% oxygen by volume.

Oxygen-Enriched Atmosphere—An atmosphere that contains more than 23.5% oxygen by volume.

PPM: Part Per Million—Volume measurement for toxic gases.

TLV: Threshold Limit Value—Term used to signify limits in toxic gas exposure.

TLV-STEL: Short Term Exposure Limit—A 15 minute excursion at a toxic-specific pre-determined level never to exceed the TWA of the substance.

STELs shall not be more than 4 per day and should be separated by at least 60 minutes between successive exposures.

TLV/TWA: Time Weighted Average—The concentration for a conventional 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

The above information, definitions, and practices are guidelines. Always consult applicable federal (29 CFR 1910.146), state, and local codes and regulations prior to application.

Bacharach Gas Detectors

- Designed Specifically for Gas Utility Personnel
- Measures Carbon Monoxide and Propane

The 21008G is a battery-powered portable instrument designed for locating gas leaks and testing gas line installations. This unit features a backlit display that changes from % LEL to % Gas automatically. All units are CSA approved and rated intrinsically safe in Class 1; Division 1; A, B, C & D.

The instrument is powered by a rechargeable NiCd battery.

Specifications

Gases and Detected Ranges	
Oxygen:	0–25%
Combustible Gas-Methane:	0–99% LEL; 5–99% Gas
Carbon Monoxide:	0–2000 ppm
Combustible Gas-Propane:	Explosive range 11–100%
Size/Weight:	
	8.09 x 3.70 x 2.20" HWD (20.5 x 9.4 x 5.6 cm)/2.0 lbs (0.9 kg)

Each Unit Includes: Flex probe (51-2849), adjustment tool (06-9453), sensors, NiCd battery, and instructions.

Ordering Information

Order #	Description	Price
MQ21008G-5	Propane Gas Detector and CO with Alarm	

21008G ▼



Bacharach Oxygen Gas Detector

- Measure O₂
- Impact Resistant Case that withstands Fuels and other Corrosives, High-Temperature (to 1000°F) Stainless Steel Probe
- Accuracy ±0.8% of Reading

Each Unit Includes: Probe with 4' hose assembly, calibration tool, water filter, and instructions.

NOTE: Four C cell alkaline batteries are required for use. Batteries are NOT included.

Ordering Information

Order #	Mfg #	Description	Price
MQ4550A	19-8005	O ₂ Analyzer, 0–25.5%	
MQ4555A	19-3040	Custom Carrying Case	
MQ4540A	24-7070	O ₂ Replacement Sensor	

Oxor II ▶



Bacharach Gas Detectors

- Senses Over 20 Toxic and Combustible Gases
- Audible and Visual Alarms
- Long Probe for Easy Reach
- Intrinsically Safe

The 21014G was designed to pinpoint even the smallest gas leak source quickly and easily. The instrument uses a long-life (five year typical) solid state sensor that can detect more than 20 combustible and toxic gas leaks as small as

50 ppm. This unit is UL approved as intrinsically safe in hazardous locations (Class 1; Division 1; A, B, C & D).

Each Unit Includes: Plastic case, probe (19-0403), and instructions.

NOTE: Unit requires five C alkaline batteries for use. Batteries are NOT included.

19-7051 ▶



Specifications

Sensitivity:	50 ppm (parts per million)
Response Time:	Instantaneous
Size/Weight:	8.5 x 2.25 x 1.75" HWD (21.6 x 5.7 x 4.4 cm)/1.1 lbs (449g)

Ordering Information

Order #	Mfg #	Description	Price
MQ21014G	19-7051	Combustible and Toxic Leak Detector	
MQ21014G-1	19-0398	Replacement Sensor and Match Resistor	



NEW IST-AIM Alien Single Gas Detector

- More Than 10 “Smart” Plug and Play Sensors Options
- Industry Standard Peaks, TWA and STEL Readings
- Upgradeable-Take Advantage of Data Logging and Vibrator Features Later
- Long-Lasting Lithium Battery
- Data Logging 60K Storage Capacity
- Auto Calibration for Zero and Span Adjustments
- Rubberized, Plastic Molding with Belt Clip
- Glow-in-the-Dark Faceplate
- Water-Resistant; Watertight
- IR Port for Communications
- User Adjustable Settings with Optional Know Your Air™ Software
- Lifetime Warranty on Electronics



◀ Alien 470

Specifications

Models:	470 (base) 475 (base w/ vibrator) 480 (base w/ data logging); 485 (base w/ data logging & vibrator)		
Standard Readings	Peak, STEL, TWA, Low and High Alarm Levels		
Standard Accessories	Cal hood and tubing, hex screwdriver, three sensor filter replacements, and manual		
Operating Time	Disposable Lithium battery: 24 months		
Operating Temp	-40F to 158°F (-40C to 70C)		
Humidity Range	0% to 99% RH (non-condensing)		
PC Communications	Infrared		
Safety Approval	CSA Approved		
Water Resistant	IP 54		
Data logging Capacity	60K		
Size/Weight	3.75" x 2.75" x 1.25"/5 oz. (140 g.)		
Warranty	Lifetime warranty on electronics; 2-year warranty on CO, HS, OX sensors; 1-year warranty on toxic sensors		
Sensor Options (partial list)	Range	Set Point	Resolution
Carbon Monoxide:	0-500 ppm	35 ppm	1 ppm
Hydrogen Sulfide:	0-100 ppm	10 ppm	1 ppm
Oxygen: Alarm	0-25%	19.5% or 23%	0.1%
Ammonia:	0-100 ppm	25 ppm	1 ppm
Sulfur Dioxide:	0-20 ppm	2 ppm	0.1 ppm
Other sensors available: Chlorine, Hydrogen Cyanide, Nitrogen Dioxide, Hydrogen, Chlorine Dioxide, Nitric Oxide, Phosphine			



**Find Ultrasonic
Leak Detectors**
on pages H76-H77

Ordering Information

Order #	Mfg #	Description	Price
MP954-470-100	Alien 470	Model with Oxygen	
MP954-470-101	Alien 470	Model with Carbon Monoxide	
MP954-470-102	Alien 470	Model with Hydrogen Sulfide	
MP954-475-101	Alien 475	Model with Carbon Monoxide & Vibrator	
MP954-475-102	Alien 475	Model with Hydrogen Sulfide & Vibrator	
MP954-480-104	Alien 480	Model with Ammonia & Data Logging*	
MP954-480-105	Alien 480	Model with Sulfur Dioxide & Data Logging*	
MP954-485-104	Alien 485	Model with Ammonia, Data Logging* & Vibrator	
MP954-485-105	Alien 485	Model with Sulfur Dioxide, Data Logging* & Vibrator	

*Note: To download data logging sessions, purchase one copy of Know Your Air™ software per customer order of one or more

Accessories

Order #	Description	Price
MP936-030-00A	Alien Know Your Air™ PC Kit (includes software & infrared adapter)	
MP671-034-000	Infrared PC adapter	
MP930-020-003	Hand Aspirator Assembly	

Replacement Sensors

Order #	Description	Price
MP931-030-100A	Oxygen smart sensor	
MP931-030-101A	Carbon Monoxide smart sensor	
MP931-030-102A	Hydrogen Sulfide smart sensor	
MP931-030-104A	Ammonia smart sensor	
MP931-030-105A	Sulfur Dioxide smart sensor	

Scott Instruments Personal Single-Gas Monitors

- Compact and Lightweight
- Detects Toxic or Flammable Gases
- Highly Visible and Audible Alarms
- Intrinsically Safe for Use in Hazardous Areas
- Front Panel Calibration/Zero Controls
- Water and Dust Resistant to IP66 Standard
- One Year Dry Cell Life for Toxic and Oxygen Models
- Comprehensive PC Interface

Specifications

Weight:	210 g (7.5 Ounces), Including Batteries
Dimensions:	130 H x 60 W x 30 D mm (5.1 H x 2.4 W x 1.2 D inches)
Typical response time:	Methane - 20 Seconds, Typical Toxic Gas - 20 Seconds
Expected sensor life:	Flammable - 5 years, Toxic - 3 years
Audible alarms:	85 dBA at 1 m, Selectable Tones
Visible indications:	Ultra Bright Flashing LED Pair
Display:	7 Segment High Contrast LCD, Backlight
Datalogging:	Adjustable Sample Rate 30-3000 hours @ 1 min Sample Rate
Battery life:	Toxic Gas Models 3000 hrs (3 AA alkaline)
Flammable gas models:	(Nickel Metal Hydride Rechargeable)
Operating Temp:	-20°C to +50°C (-4°F to +122°F)
Humidity:	0-95% RH non Condensing
Approval codes:	Eex ia (d) IIC T3/4 , Class 1 Division 1, Groups A, B, C, D
Standards:	Europe: EN50014, EN50018, EN50020, USA and Canada: UL913



093-0160 ▶

Ordering Information

Order #	Gas Type	Range	Price
MP093-0205	O2, Oxygen	0-25%	
MP093-0160	LEL, Methane	0-100%	
MP093-0206	CO, Carbon Monoxide	0-500 ppm	
MP093-0161	SO2, Sulfur Dioxide	0-10 ppm	
MP093-0162	CL2, Chlorine	0-5 ppm	
MP093-0163	NO2, Nitrogen Dioxide	0-10 ppm	
MP093-0165	H2, Hydrogen	0-99 ppm	
MP093-0166	NH2, Ammonia	0-50 ppm	
MP093-0167	HCN, Hydrogen Cyanide	0-25 ppm	
Accessories			
MP093-0178	Shoulder Strap		
MP093-0179	Waist Belt		
MP093-0181	Calibration Adapter/Aspirator		
MP093-0180	Leather Carrying Case		
MP093-0185	Communication Package w/ Charger and software		
MP093-0176	Single Unit Charger/Interface, 110 VAC		

Test Instruments — Miscellaneous

NEW AEMC Carbon Monoxide Meter

- Easy One-Hand Operation
- 2000-count LCD Display
- Two Measurement Modes: "Normal" for Detection of CO Source and "Average" for Precise Measurement
- "Beeper" Indication of Possible Risk
- MAX and Hold Functions
- Backlight
- Lightweight and Compact
- Includes Protective Safety Holster

Specifications and Ordering Information

Mfg#	CA895
Measurements — Air	
Measurement Range	0 to 1000 ppm
Display Resolution	1 ppm
Sensor	Electromechanical
Accuracy	±5% of Reading ±5 ppm
Response Time	<70 sec to 90% of the measurement
Dimensions	9.33 x 2.38 x 1.57" (237 x 60.5 x 38 mm)
Weight	Approx. 6.2 oz (190g) including battery

Ordering Information

Order #	Mfg #	Description	Price
MP2121.35	CA895	Carbon Monoxide Meter	



CA895 ▶



Bacharach Indoor Air Quality Analyzers CO₂ or CO/CO₂

- Measure CO₂, Barometric Pressure, Temperature and Humidity
- Store up to 200 Readings
- User Zero Function for All Gasses
- Scroll to Review Readings or Display Peak Reading
- NiMH Battery Operates 10 Hours on One Charge

Model 200 Also:
Measures CO
Features an Internal Sampling Pump

Each Unit Includes:
110-220V Charger and Instructions



19-8049

Specifications

	Range	Resolution
CO ₂	0 to 10,000 ppm	10 ppm
CO (Model 200 ONLY)	0 to 500 ppm	1 ppm
Temperature	0 to 104°F	0.1°F
Relative Humidity	0 to 99.9%	1%
Barometric Pressure	21 to 36 "Hg	
Size	5.5 x 2.5 x 1.4" (HWD)	

Ordering Information

Order #	Description	Price
MP19-8048	Comfort Chek 100 IAQ Analyzer with CO ₂	
MP19-8049	Comfort Chek 200 IAQ Analyzer with CO and CO ₂	
MP19-3302	Car Charger 12V	
MP19-3310	Extended Probe Assembly with 6' Tubing	
MP19-3254	Bach-Com Software with IrDA link for Data Downloading	
MP1150-C	Hard Carrying Case	

Bacharach CO₂ Analyzers

- Measure CO₂, Barometric Pressure, Temperature and RH
 - Model 2825 Measures CO₂ (High Range), O₂, Pressure
 - Model 2830 Measures CO₂ (High Range), O₂, Pressure and Temperature
 - Model 2835 Measures CO₂ (Low Range), O₂, Pressure, Temperature and RH
- Ideal for Incubators, Beverage, Food Packing and Storage
- Store up to 200 Readings
- User Zero Function for All Gasses
- Scroll to Review Readings or Display Peak Reading
- NiMH Battery Operates 10 Hours on One Charge

Each Unit Includes:
110-220V Charger and Instructions



19-8055

Specifications

	Range	Resolution
CO ₂ (Low)	0 to 10,000 ppm	10 ppm
CO ₂ (High)	0 to 60%	0.01%
O ₂	0 to 30%	1%
Temperature	0 to 104°F	0.1°F
Relative Humidity	0 to 99.9%	1%
Barometric Pressure	21 to 36 "Hg	
Size	5.5 x 2.5 x 1.4" (HWD)	

Ordering Information

Order #	Description	Price
MP19-8053	Model 2825 CO ₂ , O ₂ and Pressure	
MP19-8054	Model 2830 CO ₂ , O ₂ , Pressure and Temperature	
MP19-8055	Model 2835 CO ₂ , O ₂ , Pressure, Temperature and RH	
MP19-3302	Car Charger 12V	
MP19-3310	Extended Probe Assembly with 6' Tubing	
MP19-8027	Calibration Kit (Less Calibration Gas)	
MP24-1125*	CO ₂ Calibration Gas 340 ppm (for 2835)	
MP24-1130*	CO ₂ Calibration Gas 5% (for 2825 and 2830)	
MP23-4003*	N ₂ Calibration Gas 100% (for 2825 and 2830)	
MP19-3254	Bach-Com Software with IrDA link for Data Downloading	
MP1150-C	Hard Carrying Case	

***NOTE:** Calibration gasses are hazardous, hazardous freight charges will apply and these items will be drop shipped.

Bacharach Refrigerant and Combustible Leak Detectors

- Dual Unit Model-Two Functions
- Sequential Flashing Probe Tip, Dual LED Displays and Loud Tick Rate Indicate Relative Concentration Level
- Detect All Halogens and Combustible Hydrocarbons
- Swappable Sensor Tips
- Hydrophobic Filter Prevents Moisture Contamination
- Automatic Sensitivity Adjustment
- Sensors are Industry's Most Responsive 0.2 Seconds
- Adjustable Probe Length 3 to 20"
- One Year Warranty Including Sensors

Specifications

Refrigerants Detected	All CFC, HCFC, and HFC Including R-12, R-22, R-123, R-134a and Blends R-404A, R-408A, R-409A and R-410A (Any refrigerant containing Chlorine, Fluorine or Bromine)
Combustible Gases Detected	All Combustible Gases and Vapors
Alarm Sensitivity	Refrigerant: 0.25 oz/yr of R-134a (hardest to detect refrigerant) Combustibles: Minimum 50 ppm (methane)
Power	Four (4) AA Alkaline Batteries (4-5 Hours Typical Operation)
Size (HWD)/Weight	1.75x9.62x2.25" (4.44x 4.435.72 cm)/0.86 Lbs. (0.39 kg)
Agency Approvals	Refrigerant: UL Listed in Accordance with SAE J1627 Combustibles: MET Lab Certified to UL 913 Intrinsically Safe for Use in Class I, Div I, Group D

Each Basic Kit Includes: Detector unit and sensor(s), color coded tip(s), 4 AA batteries, 5 filters, soft carrying case and instructions.

Each Deluxe Kit Also Includes: 2 additional AA batteries, protective rubber boot, MagLite®, and a hard carrying case.



19-8042

Ordering Information

Order #	Description	Price
MP19-8042	Dual Refrigerant/Combustible Informant 2 Detector Kit	
MP19-8045	DELUXE Dual Refrigerant/Combustible Informant 2 Detector Kit	
MP19-8040	Refrigerant ONLY Informant 2 Detector Kit	
MP19-8043	DELUXE Refrigerant ONLY Informant 2 Detector Kit	
MP19-8041	Combustible Gas ONLY Informant 2 Detector Kit	
MP19-8044	DELUXE Combustible Gas ONLY Informant 2 Detector Kit	
MP19-8047	Combustible Gas Upgrade Kit (Upgrades Refrigerant to Dual)	
MP19-8046	Refrigerant Upgrade Kit (Upgrades Combustible Gas to Dual)	
MP19-0499	Replacement Combustible Sensor	
MP19-0510	Replacement Refrigerant Sensor	
MP19-0509	Replacement Filters (Pk/5)	
MP19-0497	Protective Rubber Boot	

NEW Bacharach Refrigerant Leak Detector

- Quickly and Accurately Mark any Leak Spot
- Detects all CFC, HFC, and HCFC Refrigerants
- Patented Heated Diode Sensor Technology Allows Instant Response
- Instantaneous Response Time
- Innovative Sensor Replacement Design
- Long-life, DC Brushless Fan
- High and Low-Sensitivity Modes
- Automatic Zero and Background Compensation
- Audible & Visual Leak Indication
- No User Calibration Required

Specifications

Sensing Elements	
Type:	Patented Heated Diode, Plug-in
Life Expectancy:	Typically 150 hours or 1 year of normal use
Refrigerants	All CFC, HCFC and HFC refrigerants, including R-12, R-22, R-123, R-134a and blends R-404A, R-408A, R-409A, and R-410A
Alarm Sensitivity of R-134a	(Hardest to detect refrigerant) 0.5 oz / year (14g / year) per SAE J1627 0.1 oz / year (3g / year) when probe is held over leak source for at least 5 secs
Alarm Types	Variable-intensity audible and visual alarms
Power Source	Two 'D' Alkaline Batteries (15 hours minimum)
Warm-up Time	10 seconds
Response Time	Instantaneous
Probe	14" (356mm) flexible
Size (WLH) (Excluding Probe)	2.12 x 9.5 x 2.4" (53.8 x 241.3 x 61.0 mm)
Weight	1.16 lb. (0.53 kg) w/ batteries
Agency Approvals	UL certified to SAE J1627 CE Mark
Warranty	One year



19-8106

Each Unit Includes: instruction manual, 2 Alkaline 'D' Batteries and hard carrying case

Ordering Information

Order #	Description	Price
MP19-8106	Tru-Pointe Refrigerant Leak Detector	

NEW Scott Instruments Scout Multi-Gas Personal Monitor

Confined Space Monitor

- Built-In Pump Permits User to Pre-Sample Confined Spaces

Triple Range Gas Leak Survey Instrument

- Combustible Gas Sensor Quickly Autoranges (PPM, %LEL, %Gas)

Combustion Efficiency and Carbon Monoxide Monitor

- Air-Free CO Feature Determines Safety and Efficiency of Combustion Appliances
- Simple, Intuitive Basic or Sophisticated Operations
- Configurable-Operates in Your Application Allowing Custom Settings
- Switch Between Free-Air (Ambient) Mode to Sample Draw Mode
- Sensor Life Indication Predicts Sensor Replacement
- Iris Manager Software Can Fully Configure and Datalog Records
- Monitor Employee Exposure Levels
- Data Automatically Uploaded Every Time Scout Docked into Cradle
- Retrieve Data In Standard Word Processing or Spread Sheet Programs
- Longest Runtime 50 Hours on Single Set of Batteries
- Standard "C" Sized Alkaline or Lithium-Ion



▲ **Scout**

Ordering Information

CODES: A B C D E F G H - Enter Codes In Blank Spaces in the Base Unit for Ordering # and ADD option prices to base unit. Price

MPSCT-_____XX	Base Unit	Price
Code A		
(01)	Alkaline Battery Pack	
(03)	Alkaline and Lithium Ion Battery w/ IRIS Charger & Communications Dock [3]	
(04)	Lithium Ion Battery w/ IRIS Charger & Communications Dock [3]	
(05)	Alkaline and Li-Ion Battery w/12V DC Charger Kit	
NOTE: IRIS Charger & Communications Dock provides inductive charging and is equipped with an integral IR transceiver.		
Code B		
(01)	Internal pump+10 ft tubing	
(02)	Internal pump + 10 ft. FEP tubing	
(03)	Internal pump+ probe + tubing	
NOTE: Use FEP (polyethylene) tubing for all applications where reactive gases will be sampled.		
Codes (C D E F)		Reorder #
(01)	O ₂ Sensor (Oxygen)	096-2522
(02)	CO Sensor (Carbon Monoxide)	096-2523
(03)	H ₂ S Sensor (Hydrogen Sulfide)	096-2524
(05)	NH ₃ Sensor (Ammonia)	096-2526
(06)	SO ₂ Sensor (Sulfur Dioxide)	096-2527
(07)	PH ₃ Sensor (Phosphine)	096-2529
(09)	HCN Sensor (Hydrogen Cyanide)	096-2531
(10)	NO ₂ Sensor (Nitrogen Dioxide)	096-2532
(11)	NO Sensor (Nitrogen Oxide)	096-2533
(12)	CO/H ₂ S Sensor (Value2 Dual-Toxic) (Position E ONLY)	096-2528
(13)	Combustible Sensor (Position F ONLY)	096-2534
(14)	Dual Range Combustible Sensor (%LEL/%Gas) (Position F ONLY)	096-2884
	Dummy Sensor Plug for all unused sensor locations	074-0407
Code G		
(01)	Rubber Boot	
(02)	Leather Boot w/Shoulder strap	
Code H		
(02)	Data Log Board + IRIS Software for PC with IR port (Alkaline units)	
(03)	Data log Board + IRIS Software+ PC-to-Charger Cable (Lithium-ion Units) Non-Iris Charger	
(04)	Data log Board + IrDA Transceiver for basic datalogging needs (Alkaline units)	
(05)	Data log Board +IRIS Software+ IrDA Transceiver (Alkaline Units)	
Accessories		
MP1520-C	Pelican Carrying Case	

NEW IST-AIM Commander Multi-Gas Detector

- Houses up to Five Interchangeable "Smart" Plug and Play Sensors
- Large LCD with Simultaneous, Real-Time Gas Detection Readings
- 103 dB @ 1 ft. Alarm
- Quick Change Alkaline or Rechargeable NiMH Battery Pack
- Simple 3-button Operation
- 13 Gas Sensor Options
- Peaks, TWA and STEL Industry Readings
- User Adjustable Detector Settings with Optional Know Your Air™ Software
- Pump or Diffusion Air Sampling Methods
- Ergonomic, Water Resistant, High Impact Case with Integral Rubber Boot
- Handy Glow-in-the-Dark Feature



▲ X100-MABCZ

Standard Accessories: Cal/pump hood, cal tubing, three sensor filter replacements, Quick Start Guide, Know Your Air™ PC software, comprehensive hardware and Know Your Air™ PC software manuals on CD, hydrophobic replacement filters and 16ft. tubing for pump models, one NiMH battery pack and charger adapter for (XP models), one alkaline battery pack with AA batteries for (X models).

Test Instruments — Miscellaneous

H

Specifications

Standard Sensors	Range	Set Point	Resolution
Carbon Monoxide:	0-500 ppm	35 ppm	1 ppm
Hydrogen Sulfide:	0-100 ppm	10 ppm	1 ppm
Combustibles:	0-100%	10%	1% LEL
Oxygen:	0-25%	19.5 or 23%	0.1%
Operating Time	Alkaline (AA): 28-18 hrs / Rechargeable Nickel Metal Hydride: 22-12 hrs		
Operating Temp	-40°F to 122°F (-40°C to 50°C)		
Humidity Range	0% to 99% RH (intermittent) / 15% to 90% RH (continuous)		
PC Communications	Infrared		
Safety Approval	Intrinsically safe – Class 1, Division 1, Groups A, B, C and D; CSA Approved		
Data logging Capacity	800 hours at 1 minute intervals		
Warranty	2-year standard warranty on electronics; CO, HS, LEL, OX sensors; battery cartridges; pump (if applicable)		
Size/Weight	5.94" x 5.2" x 2.8"/650 grams (22.9 oz.) with pump		

Ordering Information

Order #	Description	Price
MPX100-MABCZ	Commander X: Alkaline battery, EX/OX/CO/HS sensors	
MPX101-MABCZ	Commander X: Pump, Alkaline battery, EX/OX/CO/HS sensors	
MPXP100-MABCZ	Commander XP: NiMH battery, EX/OX/CO/HS sensors	
MPXP101-MABZZ	Commander XP: Internal pump, NiMH battery, EX/OX/CO sensors	
MPXP101-MACZZ	Commander XP: Internal pump, NiMH battery, EX/OX/HS sensors	
MPXP101-MABCZ	Commander XP: Internal pump, NiMH battery, EX/OX/CO/HS sensors	
MPXP111-MABCZ	Commander XP: Data logger*, internal pump, NiMH battery, EX/OX/CO/HS sensors	
MPXP101-MABZZ-K3	Commander XP: Internal pump, NiMH battery, EX/OX/CO sensors packaged with 34L cylinder of 10% LEL Methane/35 PPM CO/18% VOL OX, regulator, case	
MPXP101-MACZZ-K3	Commander XP: Internal pump, NiMH battery, EX/OX/HS sensors packaged with 34L cylinder of 10% LEL Methane/10 PPM HS/18% VOL OX, regulator, case	
MPXP101-MABCZ-K4	Commander XP: Internal pump, NiMH battery, EX/OX/CO/HS sensors packaged with 34L cylinder of 10% LEL Methane/35PPM CO/10 PPM HS/18% VOL OX, regulator, case	
MPXP111-MABCZ-K4	Commander XP: Data logger*, internal pump, NiMH battery, EX/OX/CO/HS sensors packaged with 34L cylinder of 10% LEL Methane/35PPM CO/10 PPM HS/18% VOL OX, regulator, case	

*NOTE: Units packaged with Calibration Gas are DROP SHIP ONLY

*Need Infrared PC pod adapter to download data from Commander to PC.

PLEASE NOTE: Combustible sensor calibrated to Methane gas. Pentane calibration of EX sensor available on request.

Optional Accessories

Order #	Description	Price
MP671-034-000	Infrared PC pod adapter	
MP930-020-003	Sampling probe with rigid tubing – approximately 2.5 ft.	
MP936-000-004	Vehicle wiring kit	
Replacement Sensors		
MP931-020-990C	Blank smart sensor	
MP931-021-100C	Oxygen (OX) smart sensor	
MP931-021-101C	Carbon Monoxide (CO) smart sensor	
MP931-021-102C	Hydrogen Sulfide (HS) smart sensor	
MP931-020-100C	Combustible (EX) smart sensor	