RSN 5140

Remote Sensor Nodes for CBRN Monitoring

Multi-Functional CBRN Systems

The RSN 5140 is a mobile, man-portable CBRN monitoring system that uses multiple technologies to scan for the presence of toxic chemical and flammable gases, as well as biological, radiological, and nuclear threats. It integrates detection technologies from the world's leading detector suppliers to create a total CBRN monitoring solution. A modular design approach allows significant customizing of features for customers with differing needs.

The individual CBRN detectors are internally bound together with custom embedded software. The unit is designed primarily for temporary fixed and vehicle installations where the unit may need to be moved from place to place as threat demands change. Data can be stored internally or transmitted to a remote location in real-time by wire, wireless, or fiber optic link. At the remote location, RI's ASAP Sentry™ monitoring software can handle inputs from up to 62 remotely placed RSN 5140 devices.

The RSN 5140 CBRN system is a flexible design and can be configured to include user-preferred world-class detectors or a reduced detector set that addresses only those threats the customer wants to detect, for example, only chemical and biological, or only biological and radiological.

KEY FEATURES

- Configurable design
- Networkable

MONITORS & DETECTS

- Biological threats
- Chemical warfare
- Toxic industrial chemicals
- Flammable explosive gases
- Nuclear threats

APPLICATION AREAS

- Indoor or outdoor use
- Sports stadiums & arenas
- Subways
- Military bases
- Government buildings
- Airports

The RSN 5140 is ideal for episodic CBRN protection of facilities such as sports arenas, large buildings, and subways. It is designed to function over a wide range of environmental conditions, and can also be used to protect outdoor sports stadiums, military bases, airports, and other large-scale outdoor facilities.

RSN 5140 General Specifications[1]	
Component/Feature Options	**Description**
Air sampling rate	2.2 liters/minute, typ.
Chemical gas detector[2]	Chemical warfare agents and toxic industrial gases identified using ion mobility or mass spectrometry. Multiple optional modules. Data upon request.
Aerosol detector[2]	Detects and alarms when there is an unusual change in ambient aerosols. User adjustable alarm levels. Capable of identifying the presence of a biological aerosol at a concentration of 30 bio-particles per liter of air at a 90% confidence level. 0.5-15 micron particle size range. Tested by U.S. Department of Homeland Security at the U.S. Army's Edgewood Chemical and Biological Center. Report upon NDA signing.
Radiation monitoring	Gamma detection using a sensitive 1024 channel gamma ray spectrometer (CsI (Tl) scintillator) coupled with a GM tube. Detection down to 0.01uSv/hr. Maximum level = 1.0 Sv/Hr. Gamma photon range is 0.05-3.0 MeV.
GPS sensor	As required.
Aerosol sampler (optional)	Air Collection Rate: With Standard (bioaerosol) electret filter: User adjustable 50 LPM to 300 LPM. With HEPA-style (radiological) electret filter: User adjustable 10 LPM to 49 LPM.
Consumables	Electret filters, if configured with aerosol sampler.
Sensor data fusion	Embedded industrial process control computer collects and stores sensor data using RSN 5140 custom software package. ASAP Sentry™ software is available for remote PC-based monitoring and display of data from multiple units. Any software or firmware upgrades are provided at no additional charge.
Digital communication	RS-232, Ethernet, secure fiber optic serial data link.
Power	Custom to suit locally available power. Typical installation: 220VAC/0.5A .
Operating time	6 hours on rechargeable battery.
Physical dimensions	Natural convection unit: 86.4W x 67.6H x 22.9D cm
Weight	19 kg baseline.
Operating temperature range	-30 to 55°C. Operation to 60°C for up to 1,000 hours
Operating profile	Multi-year continuous operation
Maintenance	Inlet pre-filters require cleaning at approximately 3-6 month intervals, depending on environmental conditions. The chemical gas detector requires yearly filter and air pump replacement. The aerosol detector's light source requires replacement at 20,000-30,000 hours and the air pump at 30,000-40,000 hours.
Warranty	1 year parts and service. Other warranty and service options available.
Research International reserves the right to change specifications without prior notice.	

(1) Most of the detection/identification features and capabilities listed in this Table are optional. The features actually incorporated are determined through discussions with the customer.

(2) May be export controlled.

Bioaerosol Classifier Specifications	
Operating principle	Monitoring of 280nm UV-stimulated particle scattering and biofluorescence using photon counting electro-optics. Alarm decisions are based on algorithms that consider bioaerosol statistical behavior, biofluorescence intensity and particle size.
Particle size and type	1 to 15 microns in four size ranges. Respirable aerosolized bacteria, spores, viruses, and toxins. Biofluorescence intensity in each size range is monitored and reported.
Interferents	Interferent resistant to diesel smoke, pollen, cement and silica dust.
Detection limit	100 ACPLA in most natural environments, 20-30 ACPLA under laboratory test conditions.
Sampling rate	1.2 liter per min of ambient air nominal.
Consumables	None.
Time to alarm	15 second average, 30 seconds maximum. 15-minute trailing history is used in alarm protocols.
Serial data output	Data stream provides alarm status, particles per liter of air in each size bin; percentage of particles that are biological; relative biofluorescence compared to scattering intensity for each size bin.
Operating life	Air pump: 30,000 - 40,000 hours. UV light source: greater than 20,000 hours.
Operating temperature range	-40°C to 50°C. Operation to 60°C is permitted up to a total time of 1000 hours.
Humidity	Non-condensing.
Start-up time	1 minute.
Data storage	Removable SD-type data card. Stores more than 5 years of aerosol data.

Gamma Monitor Specifications	
Detectors	a) 23 cm^3CsI (Tl) scintillator plus b) Energy-compensated GM counter
EDR measurement range, µSv/hr	$0.01 – 10^6$
Detected energy range, MeV	0.05 – 3.0
Energy dependence of sensitivity relative to 0.662 MeV (^{137}Cs)	±25%
Tolerable basic relative error of EDR measurement	±15%
Count rate for ^{137}Cs at 1.0 µSv/hr	480 cps
Operating temperature range	-30°C to 55°C
Spectrometric isotope identification	Yes, optional

IMS Chemical Detector Specifications			
Chemical warfare agent	**Threshold Exposure Concentration (mg/m3)**	**Response time (secs)**	**Relative humidity range (%RH)**
VX & VXR	0.1	<= 10	0 to 100
GD, GF	0.1	<= 10	0 to 100
GA, GB	0.1	<= 10	0 to 100
HD	0.7	<= 10	0 to 100
L	2.0	<= 10	0 to 100
HN3	0.7	<= 10	0 to 100
AC	22	<= 10	0 to 100
CK	20	<= 10	0 to 100
CG	20	<= 10	0 to 100
Toxic Industrial Chemical	**Threshold Exposure Concentration (mg/m3)**	**Response time (secs)**	**Relative humidity range (%RH)**
Boron trichloride	73	<= 10	0 to 100
Formaldehyde	25	<= 10	0 to 100
Carbon disulphide	39	<= 10	0 to 100
Chlorine	15	<= 10	0 to 100
Diborane	9	<= 10	0 to 100
Fluorine	39	<= 10	0 to 100
Hydrogen chloride	15	<= 10	0 to 100
Hydrogen fluoride	25	<= 10	0 to 100
Hydrogen sulfide	10	<= 10	0 to 100
Methyl hydrazine	47	<= 10	0 to 100
Nitric acid	6	<= 10	0 to 100
Sulphur dioxide	40	<= 10	0 to 100
Hydrogen bromide	397	<= 10	0 to 100
Thionyl chloride	146	<= 10	0 to 100
Flammable gases			
Method	Non-Dispersive Infrared (NDIR)		
Sensitivity and range (methane reference)	0.002% resolution, 0% to explosive limit	18-30	

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