

FUNCTIONAL SAFETY MANUAL

**GASSONIC SURVEYOR AND GASSONIC OBSERVER
ULTRASONIC GAS LEAK DETECTORS**



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This manual describes the functional safety related information for the installation, operation, configuration, and maintenance of the Gassonic Surveyor and Gassonic Observer ultrasonic gas leak detectors. This manual does not describe installation requirements in hazardous locations.

For complete information regarding performance, installation, operation, maintenance, and specifications of the Gassonic Surveyor or Gassonic Observer, please refer to the associated product manual.

Gassonic is today part of the General Monitors family of companies. It is Gassonic and General Monitors' mission to benefit society by providing safety solutions through industry-leading products, services, and systems that save lives and protect capital resources from the dangers of hazardous flames, gases, and vapors.

The safety product you have purchased should be handled carefully, and installed and maintained in accordance with the associated product instruction manual. Remember, this product is for your safety.

WARNING: TOXIC, COMBUSTIBLE, AND FLAMMABLE GASES AND VAPORS ARE VERY DANGEROUS. USE EXTREME CAUTION WHEN THESE HAZARDS ARE PRESENT.

INTRODUCTION

General Description

The Gassonic Surveyor and Gassonic Observer are microphone based ultrasonic gas leak detector that detects gas leaks by sensing the airborne ultrasound emitted from leaking gas at high pressure and responds with a 4-20 mA analog output. Both detectors are regarded as Type B field devices per IEC 61508.

The safety function of the Gassonic Observer does not include:

- RS-485 digital communication

RS-485 digital communication is typically used for field device setup, diagnostics, and troubleshooting. Carefully observe requirements for interfacing in hazardous locations. RS-485 digital communication is a non-interfering function and does not interrupt the safety critical function of the detector.

INSTALLATION

NOTE: Power should remain disconnected until all other wiring connections are made.

For complete information on the installation of the Gassonic Surveyor and Gassonic Observer acoustic detectors refer to the associated product instruction manual.

Installation and maintenance must be carried out by suitably skilled and competent personnel only. Before opening and working on the Gassonic Surveyor or Gassonic Observer in hazardous locations, be sure that power is off.

Install and maintain all hazardous area equipment in accordance with the relevant regulations and practices of the country concerned.

Detector Location Considerations

The Gassonic Surveyor and Gassonic Observer acoustic detectors do not have to be in contact with the leaking gas itself. It will detect the gas leak instantly even if the gas is carried away by wind or diluted in the air. However, factors that should be considered when locating a Gassonic acoustic detector include the following:

- Background noise levels
- Correct mounting
- Physical obstructions

Additionally, the unit should be mounted free from shock and vibration and convenient for visual inspection and cleaning. Though the detectors are Radio Frequency Interference (RFI) resistant, they should not be located near radio transmitters, high magnetic or electrical fields, or in areas with similar interference.

No special or additional detector mounting, wiring, power, or tool requirements exist beyond the standard installation practices documented in the product instruction manuals for the Gassonic Surveyor and Gassonic Observer.

WARNING: The inner three screws in the Gassonic Surveyor or inner six screws for the Gassonic Observer should not be unscrewed and the bottom compartments should not be opened. The warranty will be void if the bottom compartment is opened.

OPERATION AND MAINTENANCE

For complete operation, configuration, and maintenance information for the Gassonic Surveyor and Gassonic Observer detectors refer to the respective product instruction manual.

Before connecting a unit, check to make sure power is turned off. Before power up check all wiring connections.

The Gassonic Surveyor and Gassonic Observer detectors perform internal diagnostics on critical faults every second and will respond with 0 mA for an internal fault.

The Gassonic Observer performs an acoustic self-test every 15 minutes and outputs 1 mA for 5 seconds once the detector determines an acoustic fault. After the 5 second pulse the unit returns to normal detection mode and is able to detect gas. However, the detection capability may be reduced due to the acoustic fault. Refer to the product instruction manual for suggestions on clearing the fault.

High readings of ultrasonic sound level may indicate an explosive concentration of gas at the sensor. A subsequent fall in the ultrasonic sound level does not imply that safe working conditions have been restored.

The Gassonic acoustic detectors are tested and calibrated as part of the manufacturing process. However, prior to use, it is good practice to establish and follow a regular maintenance schedule. This can be done using the Gassonic 1701 test and calibration unit. Carefully follow test and calibration procedures described in the product instruction manuals for the Gassonic Surveyor and Gassonic Observer.

Refer to the Troubleshooting Section in the product instruction manuals in the event of a fault condition. In addition, spare parts should be on-hand to maintain the four hour repair time². Refer to the Spare Parts Section of the corresponding instruction manual for more information.

² From Confidential Report: Reliability and Risk Assessment by Technis, November 2007

SPECIFICATIONS

Table 1 and Table 2 list specifications for the Gassonic Surveyor and Gassonic Observer. For a complete list of specifications refer to the Gassonic Surveyor and Gassonic Observer instruction manuals.

Table 1 – Environmental/Electrical Specifications

	Gassonic Surveyor	Gassonic Observer
Instruction Manual P/N	BB6019	BB6017
Operating Temp Range:	-40°C to 75°C	-40°C to 60°C
Humidity Range:	0 to 100% RH	0 to 100% RH
Input Power:	9 VDC – 30 VDC	15 VDC – 30 VDC
Vibration sensitivity:	0.13 m/s ² perpendicular to the membrane will trigger the unit in the most sensitive range (44dB SPL)	

Table 2 – Analog Output Specifications

Analog Output Level	Gassonic Surveyor	Gassonic Observer
0 mA	No power/Low supply voltage	No power/Low supply voltage
1 mA (5 second pulse)	(not applicable)	Acoustic Error
3 mA	Unit inhibit	Unit inhibit
4 - 20 mA	44 - 104 dB	58 - 104 dB
> 20 mA	Over range	Over range

CERTIFICATIONS AND FAILURE RATE DATA

The Gassonic Surveyor and Gassonic Observer have gone through rigorous reliability and functional safety assessments, which have resulted in the acoustic detectors being certified to IEC 61508 Parts 1, 2, and 3, by FM Approvals. The reliability assessment is a failure rate prediction that assumes an average temperature of 40°C and an environment factor equivalent to Ground Fixed. It is assumed that the detectors will be installed in a Safety Instrumented System (SIS) operating in a Low Demand environment per IEC 61508. Table 3 lists the Safety Integrity Level (SIL) parameters for both the Gassonic Surveyor and Gassonic Observer.

Table 3 – SIL Parameters for Gassonic Surveyor and Gassonic Observer

Parameter	Gassonic Surveyor	Gassonic Observer
FM Certificate	3034949-Surveyor	3034949-Observer
Product Life (Years)	22	17
λ_{DD} (Fails per hour)	1.64E-7	4.40E-7
λ_{DU} (Fails per hour)	1.44E-7	3.41E-8
Safe Failure Fraction (SFF)	71%	94%
Safety Integrity Level (SIL*)	1**	2***
Diagnostic Test Interval	1 second (critical faults)	2 seconds (critical faults) 15 minutes (acoustic self-test)
Typical Response Time	<1 second****	
Average Probability of Failure on Demand (PFD _{avg1001*****})	6.4E-4	1.3E-4

* Hardware Fault Tolerance (HFT) = 0

** The Gassonic Surveyor is suitable for use in SIL 2 in voted applications with ‘m+1’ redundancy

*** The Gassonic Observer is suitable for use in SIL 3 in voted applications with ‘m+1’ redundancy

**** Does not include user-selectable delays

***** PFD_{avg1001} assumes a 4 hour repair time and 1 year proof test interval.

Agency Approvals

The Gassonic Surveyor has the following approvals: ATEX, IECEx, and IEC 61508 (per FM Approvals). The Gassonic Observer has the following approvals: ATEX, UL/ULC, IECEx, GGTN K, GOST R (pending), and IEC 61508 (per FM Approvals).

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