



The manufacturer
may use the mark:



Revision 1.3 August 31, 2022
Surveillance Audit Due
May 1, 2025



Certificate / Certificat Zertifikat / 合格証

MSA 21-03-041 C002

exida hereby confirms that the:

S5000 Fixed Gas Monitor

MSA- The Safety Company

Cranberry Township, PA USA

and

General Monitors

Irvine, CA USA

Has been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-3

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type B Element

SIL 2 @ HFT=0; SIL 3 @ HFT = 1; Route 2_H

**PFH/PFD_{avg} and Architecture Constraints
must be verified for each application**

Safety Function:

The S5000 Fixed Gas Monitor will measure combustible, toxic, or oxygen gas concentrations and communicate this level to a logic solver via an analog 4-20mA signal or alarm relays within the stated safety accuracy.

Application Restrictions:

The unit must be properly designed into a Safety Instrumented Function per the Safety Manual requirements.



Evaluating Assessor

Certifying Assessor

Systematic Capability: SC 3 (SIL 3 Capable)**Random Capability: Type B Element****SIL 2 @ HFT=0; SIL 3 @ HFT = 1; Route 2_H****PFH/PFD_{avg} and Architecture Constraints
must be verified for each application****S5000 Gas Monitor
and Transmitter****Systematic Capability:**

The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3. These are intended to achieve sufficient integrity against systematic errors of design by the manufacturer.

A Safety Instrumented Function (SIF) designed with this product must not be used at a SIL level higher than stated.

Random Capability:

The SIL limit imposed by the Architectural Constraints must be met for each element. This element meets *exida* criteria for Route 2_H.

IEC 61508 Failure Rates in FIT¹

Device Component	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}	#
Common	410	206	451	273	1120
XCell interface 1&2 ²	0	6	69	15	34
Passive Catalytic Bead	0	311	688	2118	23
IR400/700	54	10	69	36	47
MOS/NSS	0	70	155	77	54
mA Output #1	0	17	57	22	49
Relay Output	9	70	0	67	133
Digital Catalytic Bead	474	167	605	1978	49
Echem/XCell Toxic	384	385	423	1830	122
Echem/XCell Oxygen	385	1814	419	407	123
Life & Health	1679	155	2654	735	168
Diffusion Supervision	1106	866	2017	1453	218

¹FIT = 1 failure / 10⁹ hours

²DU for interface 1 & 2 includes 8 FITs for SensorBus failures

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFH/PFD_{avg} considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

The following documents are a mandatory part of certification:

Assessment Report: MSA 21-03-041 R003 V1 R3 (or later)

Safety Manual: MANS5000SAFETY / 01



80 N Main St
Sellersville, PA 18960