



Certificate / Certificat Zertifikat / 合格証

RK 1310015 C001

exida hereby confirms that the:

**SD-1RI Infrared Gas Detector,
SD-1EC Electrochemical method Gas Detector,
SD-10X Galvanic cell method Gas Detector**

**RIKEN KEIKI Co., Ltd.
Itabashi-ku, Tokyo - Japan**

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 1_H

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

Safety Function:

The SD-1RI/EC/OX are a three-wire / four wire, 4-20 mA smart device which detects combustible gas hazards. It contains self-diagnostics and is programmed to send its output to a specified failure state upon internal detection of a failure.

Application Restrictions:

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

The manufacturer
may use the mark:



Revision 4.4 August 13, 2025
Surveillance Audit Due
August 31, 2027



Kiyoshi Takai
Evaluating Assessor

[Signature]
Certifying Assessor

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SD-1RI
Infrared Gas Detector,
SD-1EC
Electrochemical
method Gas Detector,
SD-1OX
Galvanic cell method
Gas Detector

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 FIT*

Device	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}	SFF
SD-1RI	-	119	787	42	95.6%
SD-1EC	-	112	3,130	122	96.4%
SD-1OX	-	170	3,016	191	94.3%

* FIT = 1 failure / 10⁹ hours

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: : SD-1RI: RK 13-10-015 R001 V5 R4 (or later)
SD-1EC: RK 15-06-015 R003 V5 R4 (or later)
SD-1OX: RK 15-06-015 R004 V4 R4 (or later)

Safety Manual: : SD-1RI : No. PT2E-218 Rev.19 (or later)
SD-1EC: No. PT2E-238 Rev.12 (or later)
SD-1OX: No. PT2E-239 Rev.11 (or later)



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