Certificate / Certificat

Zertifikat / 合格証

MSA 1202040 C001

exida hereby confirms that the:

Ultima XA, Ultima XE, and Ultima XIR Gas Monitors

Mine Safety Appliances
Pittsburgh, PA USA

Has been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-7

and meets requirements providing a level of integrity to:

Systematic Capability: SC 2 (SIL 2 Capable)
Random Capability: Type B Element

Oxygen, Catalytic Combustible, IR Gas Applications:
Random Integrity: SIL 2 @ HFT=0; Route 1_H

Toxic Gas Applications:
Random Integrity: SIL 1 @ HFT=0; Route 1_H
Random Integrity: SIL 2 @ HFT=1; Route 1_H

PFD_{AVG} and Architecture Constraints must be verified for each application

Safety Function:
The Ultima XA, Ultima XE, and Ultima XIR Gas Monitors measure hazardous gas concentrations and communicate this level to a logic solver via an analog 4-20mA signal or alarm relays.

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

John C Yozallinas
Evaluating Assessor

Griff Ironias
Certifying Assessor

The manufacturer may use the mark:

Valid until May 1, 2016
Revision 2.0 April 6, 2015

ANSI Accredited Program
PRODUCT CERTIFICATION
#1004

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Systematic Capability: SC 2 (SIL 2 Capable)

Random Capability: Type B Element

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Toxic Gas Applications:

Random Integrity: SIL 1 @ HFT=0; Route 1_H

Random Integrity: SIL 2 @ HFT=1; Route 1_H

Ultima XA, Ultima XE, and Ultima XIR Gas Monitors

Mine Safety Appliances

Pittsburgh, PA USA

Systematic Capability:

The Product has met manufacturer design process requirements of Safety Integrity Level (SIL) 2. 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.

IEC 61508 Failure Rates in FIT*

Device (with or without HART)	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}	SFF
Ultima XA Series Gas Monitors, Oxygen, 4-20mA output	0 FIT	47 FIT	4956 FIT	459 FIT	91.6%
Ultima XA Series Gas Monitors, Oxygen, relay output	0 FIT	73 FIT	4965 FIT	458 FIT	91.7%
Ultima XA Series Gas Monitors, Toxic, 4-20mA output	0 FIT	48 FIT	3337 FIT	2102 FIT	61.7%
Ultima XA Series Gas Monitors, Toxic, relay output	0 FIT	74 FIT	3346 FIT	2101 FIT	61.9%
Ultima XA Series Gas Monitors, Catalytic, 4-20mA output	0 FIT	68 FIT	5029 FIT	435 FIT	92.1%
Ultima XA Series Gas Monitors, Catalytic, relay output	0 FIT	75 FIT	5023 FIT	429 FIT	92.2%
Ultima XE Series Gas Monitors, Oxygen, 4-20mA output	0 FIT	47 FIT	4956 FIT	459 FIT	91.6%
Ultima XE Series Gas Monitors, Oxygen, relay output	0 FIT	73 FIT	4965 FIT	458 FIT	91.7%
Ultima XE Series Gas Monitors, Toxic, 4-20mA output	0 FIT	48 FIT	3337 FIT	2102 FIT	61.7%
Ultima XE Series Gas Monitors, Toxic, relay output	0 FIT	74 FIT	3346 FIT	2101 FIT	61.9%
Ultima XE Series Gas Monitors, Catalytic, 4-20mA output	0 FIT	68 FIT	5029 FIT	435 FIT	92.1%
Ultima XE Series Gas Monitors, Catalytic, relay output	0 FIT	75 FIT	5023 FIT	429 FIT	92.2%
Ultima XIR Infrared Gas Detector, 4-20mA output	0 FIT	91 FIT	862 FIT	98 FIT	90.7%
Ultima XIR Infrared Gas Detector, relay output	99 FIT	98 FIT	715 FIT	92 FIT	90.8%

* FIT = 1 failure / 10^9 hours

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of 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 12-02-040 R001 V2R1**

Safety Manual: **10100751, Rev 1 and higher**

64 N Main St
Sellersville, PA 18960