Certificate / Certificat
Zertifikat / 合格証

ROT 1101097 C002

exida hereby confirms that the:

Rotex Solenoid & Air Operated Valves Type 52S

Rotex Automation Limited Vadodara, Gujarat - INDIA

Have 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 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

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

Safety Function:
The Solenoid Valve will move to the designed safe position when De-energized / Energized within the specified safety time.

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

Jack Gao
Evaluating Assessor

Gregory Scott
Certifying Assessor

The manufacturer may use the mark:

Valid until November 1, 2018
Revision 2.0 October 26, 2015

ANSI Accredited Program
PRODUCT CERTIFICATION
#1004

Rotex Solenoid & Air Operated Valves – Type 52S

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Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

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

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 device meets *exida* criteria for Route 2_H.

52S Solenoid Valve Series Assessed[1]

Valve Group	Valve Type Series	Description and Application
Type 52S-A	51440, 51441, 51442, 51445, 51450, I 5005, I 5005EP, M5003, M5004, P5003, & P5011	5/2 Single Solenoid Internal Pilot, De-energize To Trip (DTT) or Energize To Trip (ETT), ≤8 W Coils
Type 52S-B	57440, 57441, 57442, 57445, 57450, I 5006, I 5006EP, P5006, & P5012	5/2 Double Solenoid Internal Pilot, Energize To Trip (ETT) only, ≤8 W Coils
Type 52S-C	53440 & 53445	5/2 Single Air Operated, De-energize To Trip (DTT) or Energize To Trip (ETT)
Type 52S-D	58440 & 58445	5/2 Double Air Operated, Energize To Trip (ETT) only

IEC 61508 Failure Rates in FIT[2]

Valve Group and Application	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
52S-A Valve Types; DTT	0	240	0	411
52S-A Valve Types; DTT w/ PVST[3]	240	0	382	29
52S-A Valve Types; ETT	0	101	0	503
52S-A Valve Types; ETT w/ PVST	101	0	473	30
52S-B Valve Types; ETT	0	96	0	578
52S-B Valve Types; ETT w/ PVST	96	0	541	37
52S-C Valve Types; DTT	0	118	0	298
52S-C Valve Types; DTT w/ PVST	118	0	273	25
52S-C Valve Types; ETT	0	61	0	349
52S-C Valve Types; ETT w/ PVST	61	0	324	25
52S-D Valve Types; ETT	0	41	0	377
52S-D Valve Types; ETT w/ PVST	41	0	350	27

[1] Excludes Latching Coil, ETT Manual Reset and Coils with Driver Circuitry (62 and 66) options
[2] FIT = 1 failure / 10^9 hours
[3] PVST = Partial Valve Stroke Test of a final element Device

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: ROT 11/01-097 R002 V2 R1 (or later)

Safety Manual: IM/V/059 Rev 2 (or later)

64 N Main St
Sellersville, PA 18960