



The manufacturer
may use the mark:



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



ANSI Accredited Program
PRODUCT CERTIFICATION
#1004

Certificate / Certificat Zertifikat / 合格証

ROT 1101097 C001

exida hereby confirms that the:

Rotex Direct Acting Solenoids Type 32D

**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

Sugay Sank

Certifying Assessor

Certificate / Certificat / Zertifikat / 合格証

ROT 1101097 C001

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.

Direct Acting Solenoid Valve Series Assessed¹

Valve Group	Valve Type Series	Description and Application
Type 32D-A	M3015	Direct Acting, manually reset Valve, De-energize To Trip (DTT) only
Type 32D-B	20105, 20205, 30308, 30316, 30318, 30332, 30333, 30334, 30335, 30318LW, M3006, P3005, P3012, & P3014	Direct Acting, De-energize To Trip (DTT) or Energize To Trip (ETT), 3-8 W Coils
Type 32D-C	20106, 20206, 30309, 30317, 30319, 30329, & M3007	Direct Acting, De-energize To Trip (DTT) or Energize To Trip (ETT), >10W Coils
Type 32D-D	P3017	Direct Acting, De-energize To Trip (DTT) or Energize To Trip (ETT), <2W Coils

IEC 61508 Failure Rates in FIT²

Valve Group and Application	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
32D-A; DTT	0	142	0	150
32D-B Valve Types; DTT	0	142	0	150
32D-B Valve Types; DTT w/PVST ³	142	0	140	10
32D-B Valve Types; ETT	0	32	0	213
32D-B Valve Types; ETT w/PVST	32	0	203	10
32D-C Valve Types; DTT	0	367	0	163
32D-C Valve Types; DTT w/PVST	367	0	152	11
32D-C Valve Types; ETT	0	34	0	273
32D-C Valve Types; ETT w/PVST	34	0	262	11
32D-D Valve Types; DTT	0	83	0	149
32D-D Valve Types; DTT w/PVST	83	0	139	10
32D-D Valve Types; ETT	0	32	0	164
32D-D Valve Types; ETT w/PVST	32	0	155	9

¹ Excludes Latching Coil (LC) and Coils with Driver Circuitry (62 and 66) options

² FIT = 1 failure / 10⁹ 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/0039 Rev 2 (or later)

Rotex Direct Acting
Solenoids – Type 32D



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T-109, V1R1