



# 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<sub>H</sub> Device**

**PFH/PFD<sub>avg</sub> 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.

The manufacturer  
may use the mark:



Revision 2.4 February 28, 2019  
Surveillance Audit Due  
November 1, 2021



ISO/IEC 17065  
PRODUCT CERTIFICATION BODY  
#1004



Evaluating Assessor

Certifying Assessor

ROT 1101097 C001

**Systematic Capability: SC 3 (SIL 3 Capable)****Random Capability: Type A, Route 2<sub>H</sub> Device****PFH/PFD<sub>avg</sub> and Architecture Constraints  
must be verified for each application****Systematic Capability:**

These products have 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<sub>H</sub>.

**Direct Acting Solenoid Valve Series Assessed<sup>1</sup>**

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

**IEC 61508 Failure Rates in FIT<sup>2</sup>**

| Valve Group and Application                | $\lambda_{SD}$ | $\lambda_{SU}$ | $\lambda_{DD}$ | $\lambda_{DU}$ |
|--------------------------------------------|----------------|----------------|----------------|----------------|
| 32D-A Valve Types; DTT                     | 0              | 142            | 0              | 150            |
| 32D-B Valve Types; DTT                     | 0              | 142            | 0              | 150            |
| 32D-B Valve Types; DTT w/PVST <sup>3</sup> | 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              |
| Adder for Type 62 or 66 Coil, DTT          | 0              | 23             | 0              | 0              |
| Adder for Type 62 or 66 Coil, DTT w/PVST   | 23             | 0              | 0              | 0              |

<sup>1</sup> Includes Coil Types 16, 17, 19, 22, 25, 37, 39, 58, 62, 65CR, 66, 67, 71, & 87, Voltages 12 to 240V, and excludes Latching Coil (LC)

<sup>2</sup> FIT = 1 failure / 10<sup>9</sup> hours

<sup>3</sup> 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 PFH/PFD<sub>avg</sub> 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 V3R1 (or later)

**Safety Manual:** IM/V/0039 Rev 5 (or later)

Rotex Direct Acting  
Solenoids – Type 32D



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