

# Certificate



SIL/PL  
Capability

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**No.: 968/V 1054.05/23**

**Product tested** Pneumatic actuator for valves with safety function

**Certificate holder** Air Torque S.p.A.  
Via dei Livelli di Sopra, 11  
24060 Costa di Mezzate  
(BG)  
Italy

**Type designation** AT - R&P aluminium series  
PT - R&P aluminium series  
SB/SC AT - R&P Stainless Steel series

different variants see pages 2 and 3

**Codes and standards** IEC 61508 Parts 1-2 and 4-7:2010

**Intended application** Safety function: Actuate the valve into a safety position

The actuators are suitable for use in a safety instrumented system up to SIL 2 (low demand mode). Under consideration of the minimum required hardware fault tolerance HFT = 1 for the complete final element the actuator may be used up to SIL 3.

**Specific requirements** The instructions of the associated Installation, Operating and Safety Manual shall be considered.


Summary of test results see pages 2 - 3 of this certificate.

The issue of this certificate is based upon an evaluation in accordance with the Certification Program CERT FSP1 V1.0:2017 in its actual version, whose results are documented in Report No. 968/V 1054.05/23 dated 2023-12-12. This certificate is valid only for products, which are identical with the product tested. Issued by the certification body accredited by DAkkS according to DIN EN ISO/IEC 17065. The accreditation is only valid for the scope listed in the annex to the accreditation certificate D-ZE-11052-02-01.

**TÜV Rheinland Industrie Service GmbH**  
Bereich Automation  
Funktionale Sicherheit  
Am Grauen Stein, 51105 Köln

Köln, 2024-01-04

Certification Body Safety & Security for Automation & Grid

  
Dipl.-Ing. (FH) Wolf Rückwart

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**Holder** Air Torque SpA  
Via dei Livelli di Sopra, 11  
I – 24060 – Costa di Mezzate (BG)  
Italy

**Product tested** Pneumatic Rack & Pinion actuators  
series :  
- AT {Aluminium}  
- PT {Aluminium}  
- SB/SC AT {Stainless Steel}  
types :  
spring return {S} and double acting {D}

### Results of Assessment

Route of Assessment	2 <sub>H</sub> / 1 <sub>S</sub>
Type of Sub-system	Type A
Mode of Operation	Low Demand Mode High Demand Mode (see remark)
Hardware Fault Tolerance	HFT = 0
Systematic Capability	<b>SC 3</b>

### Failure Rates

Aluminium series :	AT	PT	
models :	from AT045 U to AT1001 U	from PT045 B/U to PT1000 B/U	
types :	Spring Return	Double Acting	
Safety Function :	FTC / FTO	FTC	FTO
Versions :	$\lambda_D$ [FIT]	$\lambda_D$ [FIT]	$\lambda_D$ [FIT]
Std 90°	138	229	237
Std Greater 90° rotation / up to AT40x U included Std Greater 90° rotation / up to PT40x B/U included	202	230	237
Std Greater 90° rotation / from AT45x U and bigger Std Greater 90° rotation / from PT45x B/U and bigger	272		
Fail Mid	246	==	==
Hydraulic Dampened	255	282	331
Hydraulic Dampened greater 90° rotation	==	282	331
RC100	149	262	260
R100	138	254	242
R100 greater 90° rotation / up to AT40x U included R100 greater 90° rotation / up to PT40x B/U included	202	254	242
R100 greater 90° rotation / from AT45x U and bigger R100 greater 90° rotation / from PT45x B/U and bigger	272		
3P	146	==	==
3PD	159	281	341
3PD greater 90° rotation	==	281	341
Fast Acting	138	270	256
Fast Acting greater 90° rotation / up to AT40x U incl. Fast Acting greater 90° rotation / up to PT40x B/U incl.	202	270	256
Fast Acting greater 90° rotation / from AT45x U and bigger Fast Acting greater 90° rotation / from PT45x B/U and bigger	272		

Stainless Steel series :	SB/SC AT		
models :	from SB/SC AT054U to SB/SC AT654		
types :	Spring Return	Double Acting	
Safety Function :	FTC / FTO	FTC	FTO
Versions :	$\lambda_D$ [FIT]	$\lambda_D$ [FIT]	$\lambda_D$ [FIT]
Std 90°	145	266	281
Std greater 90° rotation / up to SB/SC AT 404 included	217	267	281
Std greater 90° rotation / from SB/SC AT 454 and bigger	260		
R100	145	286	282
R100 greater 90° rotation / up to SB/SC AT 404 included	217	286	282
R100 greater 90° rotation / from SB/SC AT 454 and bigger	260		
Fast Acting	145	301	296
Fast Acting greater 90° rotation / up to SB/SC AT 404 included	217	301	296
Fast Acting greater 90° rotation / from SB/SC AT 454 and bigger	260		

### PFD<sub>avg</sub>

Average probability of a failure on demand can be calculated with the following formulas:

- $PFD_{avg,1001} = \lambda_{DU} \cdot (\frac{1}{2} T_1 + MRT)$
- $PFD_{avg,1002} = 2 \cdot (1 - \beta) \cdot \lambda_{DU}^2 \cdot t_{CE} \cdot t_{GE} + \beta \cdot \lambda_{DU} \cdot (\frac{1}{2} T_1 + MRT)$
- $t_{CE} = (\frac{1}{2} T_1 + MRT)$
- $t_{GE} = (\frac{1}{3} T_1 + MRT)$

### Usage in high demand mode

If the number of demands does not exceed  $n_{op,maximum} = 50$  1/year the actuators can also be used in high demand mode applications with the given failure rates.

### Origin of failure rates

The stated failure rates for low demand are the result of an FMEDA with tailored failure rates for the design and manufacturing process.

Furthermore the results have been verified by qualification tests and field-feedback data.

Failure rates include failures that occur at a random point in time and are due to degradation mechanisms such as ageing.

The stated failure rates do not release the end-user from collecting and evaluating application-specific reliability data.

### Periodic Tests and Maintenance

The given values require periodic tests and maintenance as described in the Safety Manual.

The operator is responsible for the consideration of specific external conditions (e.g. ensuring of required quality of media, max. temperature, time of impact), and adequate test cycles.