

Certificate



SIL/PL
Capability

www.tuv.com
ID 0600000000

No.: 968/V 1054.00/18

Product tested Pneumatic actuator for valves with safety function (std. 90° single / double, rotation angles 120°/135°/145°/180°, fast acting, travel stop, hydr. dampened, fail mid, stainless steel, 3 positions 180°/90°/0)

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

Type designation AT Upgrade R&P aluminum series,
PT R&P aluminum series,
SB/SC AT Stainless steel R&P series,
different variants see pages 2 - 6 of this certificate

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. Under consideration of the minimum required hardware fault tolerance HFT=1 the actuators may be used in a redundant architecture 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 - 6 of this certificate.

Valid until 2023-04-04

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 1054.00/18 dated 2018-04-04.

This certificate is valid only for products which are identical with the product tested.

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

Köln, 2018-04-04

Certification Body Safety & Security for Automation & Grid



Dipl.-Ing. Stephan Hüb

www.fs-products.com
www.tuv.com



Holder: AIR TORQUE S.p.A.
Via dei Livelli Sopra, 11
24060 Costa di Mezzate (Bergamo)
Italy

Product tested: AT045..U D to AT1000/1/4..U D
AT045..U S to AT1000/1/4..U S
PT045.. D to PT1000/1/4.. D
PT045.. S to PT1000/1/4.. S
(STD 90°, single / double acting)

Results of Assessment

Route of Assessment		$2_H / 1_S$
Type of Sub-system		Type A
Modes of Operation		Low and High Demand Mode
Hardware Fault Tolerance	HFT	0

Low Demand Mode

Lambda Dangerous confidence level of calculation $1-\alpha = 95\%$	λ_D	1.00 E-08 / h	10 FIT
Lambda Dangerous Undetected assumed Diagnostic Coverage DC = 0 %	λ_{DU}	1.00 E-08 / h	10 FIT
Mean Time To Dangerous Failure	MTTF _D	1.00 E+08 h	11,416 a
Average Probability of Failure on Demand 1oo1 assumed Proof Test Interval $T_1 = 1$ year	PFD_{avg}(T₁)	4.38 E-05	
Average Probability of Failure on Demand 1oo2 assumed Proof Test Interval $T_1 = 1$ year assumed $\beta_{1oo2} = 10\%$	PFD_{avg}(T₁)	4.38 E-06	

High Demand Mode

Average Frequency of a Dangerous Failure per Hour	PFH	4.56 E-07 / h	
Maximum number of demands	$n_{op,max}$	50 / a	

Origin of values

The stated values are the results of extensive qualification tests on the reliability of the safety function under critical conditions. In addition, the failure rate was verified by the analysis of field feedback.
Random and systematic failures which are the responsibility of the manufacturer were examined.

Systematic Capability

The development and manufacturing process and the functional safety management applied by the manufacturer in the relevant lifecycle phases of the product have been audited and assessed as suitable for the manufacturing of products for use in applications with a maximum Safety Integrity Level of 3 (SC 3).

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.

Holder: AIR TORQUE S.p.A.
 Via dei Livelli Sopra, 11
 24060 Costa di Mezzate (Bergamo)
 Italy

Product tested: AT052..U D/S to AT1002..U D/S (120°)
 PT052.. D/S to PT1002.. D/S (120°)
 AT053..U D/S to AT1003..U D/S (135°)
 PT053.. D/S to PT1003.. D/S (135°)
 AT055..U D/S to AT1005..U D/S (145°)
 PT055.. D/S to PT1005.. D/S (145°)
 AT058..U D/S to AT1008..U D/S (180°)
 PT058.. D/S to PT1008.. D/S (180°)
 (rotation angle, single / double acting)

Results of Assessment

Route of Assessment		$2_H / 1_S$	
Type of Sub-system		Type A	
Mode of Operation		Low Demand Mode	
Hardware Fault Tolerance	HFT	0	
Lambda Dangerous confidence level of calculation $1-\alpha = 95\%$	λ_D	1.00 E-08 / h	10 FIT
Lambda Dangerous Undetected assumed Diagnostic Coverage DC = 0 %	λ_{DU}	1.00 E-08 / h	10 FIT
Mean Time To Dangerous Failure	MTTF _D	1.00 E+08 h	11,416 a
Average Probability of Failure on Demand 1oo1 assumed Proof Test Interval $T_1 = 1$ year	PFD_{avg}(T₁)	4.38 E-05	
Average Probability of Failure on Demand 1oo2 assumed Proof Test Interval $T_1 = 1$ year assumed $\beta_{1oo2} = 10\%$	PFD_{avg}(T₁)	4.38 E-06	

Origin of values

The stated values are the results of extensive qualification tests on the reliability of the safety function under critical conditions. In addition, the failure rate was verified by the analysis of field feedback. Random and systematic failures which are the responsibility of the manufacturer were examined.

Systematic Capability

The development and manufacturing process and the functional safety management applied by the manufacturer in the relevant lifecycle phases of the product have been audited and assessed as suitable for the manufacturing of products for use in applications with a maximum Safety Integrity Level of 3 (SC 3).

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.

Holder: AIR TORQUE S.p.A.
Via dei Livelli Sopra, 11
24060 Costa di Mezzate (Bergamo)
Italy

Product tested: FA AT045..U D to FA AT1000/1/4..U D
FA AT045..U S to FA AT1000/1/4..U S
FA PT045.. D to FA PT1000/1/4.. D
FA PT045.. S to FA PT1000/1/4.. S
(fast acting, single / double acting)

Results of Assessment

Route of Assessment		$2_H / 1_S$	
Type of Sub-system		Type A	
Mode of Operation		Low Demand Mode	
Hardware Fault Tolerance	HFT	0	
Lambda Dangerous confidence level of calculation $1-\alpha = 95\%$	λ_D	1.00 E-08 / h	10 FIT
Lambda Dangerous Undetected assumed Diagnostic Coverage DC = 0 %	λ_{DU}	1.00 E-08 / h	10 FIT
Mean Time To Dangerous Failure	MTTF _D	1.00 E+08 h	11,416 a
Average Probability of Failure on Demand 1oo1 assumed Proof Test Interval $T_1 = 1$ year	PFD_{avg}(T₁)	4.38 E-05	
Average Probability of Failure on Demand 1oo2 assumed Proof Test Interval $T_1 = 1$ year assumed $\beta_{1oo2} = 10\%$	PFD_{avg}(T₁)	4.38 E-06	

Origin of values

The stated values are the results of extensive qualification tests on the reliability of the safety function under critical conditions. In addition, the failure rate was verified by the analysis of field feedback. Random and systematic failures which are the responsibility of the manufacturer were examined.

Systematic Capability

The development and manufacturing process and the functional safety management applied by the manufacturer in the relevant lifecycle phases of the product have been audited and assessed as suitable for the manufacturing of products for use in applications with a maximum Safety Integrity Level of 3 (SC 3).

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.

Holder: AIR TORQUE S.p.A.
Via dei Livelli Sopra, 11
24060 Costa di Mezzate (Bergamo)
Italy

Product tested: R50/100 AT045..U D to R50/100 AT1000/1/4..U D
R50/100 AT045..U S to R50/100 AT1000/1/4..U S
R50/100 PT045.. D to R50/100 PT1000/1/4.. D
R50/100 PT045.. S to R50/100 PT1000/1/4.. S
(travel stop, single / double acting)

Results of Assessment

Route of Assessment		$2_H / 1_S$
Type of Sub-system		Type A
Modes of Operation		Low and High Demand Mode
Hardware Fault Tolerance	HFT	0

Low Demand Mode

Lambda Dangerous confidence level of calculation $1-\alpha = 95\%$	λ_D	1.00 E-08 / h	10 FIT
Lambda Dangerous Undetected assumed Diagnostic Coverage DC = 0 %	λ_{DU}	1.00 E-08 / h	10 FIT
Mean Time To Dangerous Failure	MTTF _D	1.00 E+08 h	11,416 a
Average Probability of Failure on Demand 1oo1 assumed Proof Test Interval $T_1 = 1$ year	PFD_{avg}(T₁)	4.38 E-05	
Average Probability of Failure on Demand 1oo2 assumed Proof Test Interval $T_1 = 1$ year assumed $\beta_{1oo2} = 10\%$	PFD_{avg}(T₁)	4.38 E-06	

High Demand Mode

Average Frequency of a Dangerous Failure per Hour	PFH	7.54 E-09 / h	
Maximum number of demands	$n_{op,max}$	50 / a	

Origin of values

The stated values are the results of extensive qualification tests on the reliability of the safety function under critical conditions. In addition, the failure rate was verified by the analysis of field feedback.
Random and systematic failures which are the responsibility of the manufacturer were examined.

Systematic Capability

The development and manufacturing process and the functional safety management applied by the manufacturer in the relevant lifecycle phases of the product have been audited and assessed as suitable for the manufacturing of products for use in applications with a maximum Safety Integrity Level of 3 (SC 3).

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.

Holder: AIR TORQUE S.p.A.
 Via dei Livelli Sopra, 11
 24060 Costa di Mezzate (Bergamo)
 Italy

Product tested: HC AT051/054 to HC AT1001/1004 (hydraulic dampened)
 HC PT050/1/4 to HC PT1000/1/4 (hydraulic dampened)
 FM AT058 to FM AT1008 (fail mid)
 FM PT058 to FM PT1008 (fail mid)
 SB/SC AT051/054 to SB/SC AT1001/1004 (stainless steel)
 SB/SC PT050/1/4 to SB/SC PT1000/1/4 (stainless steel)
 3P/3PD AT058 to 3P/3PD AT1008 (3 position 180°)
 3P/3PD PT058 to 3P/3PD PT1008 (3 position 180°)
 3P/3PD AT051/054 to 3P/3PD AT1001/1004 (3 position 90°)
 3P/3PD PT050/1/4 to 3P/3PD PT1000/14 (3 position 90°)

Results of Assessment

Route of Assessment		$2_H / 1_S$	
Type of Sub-system		Type A	
Mode of Operation		Low Demand Mode	
Hardware Fault Tolerance	HFT	0	
Lambda Dangerous confidence level of calculation $1-\alpha = 95\%$	λ_D	1.00 E-08 / h	10 FIT
Lambda Dangerous Undetected assumed Diagnostic Coverage DC = 0 %	λ_{DU}	1.00 E-08 / h	10 FIT
Mean Time To Dangerous Failure	MTTF _D	1.00 E+08 h	11,416 a
Average Probability of Failure on Demand 1oo1 assumed Proof Test Interval $T_1 = 1$ year	PFD_{avg}(T₁)	4.38 E-05	
Average Probability of Failure on Demand 1oo2 assumed Proof Test Interval $T_1 = 1$ year assumed $\beta_{1oo2} = 10\%$	PFD_{avg}(T₁)	4.38 E-06	

Origin of values

The stated values are the results of extensive qualification tests on the reliability of the safety function under critical conditions. In addition, the failure rate was verified by the analysis of field feedback.
 Random and systematic failures which are the responsibility of the manufacturer were examined.

Systematic Capability

The development and manufacturing process and the functional safety management applied by the manufacturer in the relevant lifecycle phases of the product have been audited and assessed as suitable for the manufacturing of products for use in applications with a maximum Safety Integrity Level of 3 (SC 3).

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.