

Certificate



No.: 968/V 1317.00/23

Product tested	Pneumatic Actuators	Certificate holder	AZ Armaturen (Taicang) Co., Ltd. NO. 1 Zhengzhou Road Taicang Economic development zone Taicang, Jiangsu P.R. China
Type designation	KM series scotch yoke actuators KMYxxyy-abc/KMYxxyy-abx KM series rack and pinion actuators KMaxxx/KMaxxx-byy (For detailed information see test report)		
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010		
Intended application	Safety Function: On demand, the complete pneumatic actuator assembly actuate a valve into a safety position. The safety position of the actuator can correspond to either "closed" or "open". 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 actuators 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 back side of this certificate.			
Valid until 2028-03-29			

The issue of this certificate is based upon an evaluation in accordance with the Certification Program CERT FSP1 V3.0:2020 in its actual version, whose results are documented in Report No. 968/V 1317.00/23 dated 2023-07-04. 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.

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Köln, 2023-09-04

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. (FH) Wolf Rückwart

Holder: AZ Armaturen (Taicang) Co., Ltd.
NO. 1 Zhengzhou Road
Taicang Economic development zone
Taicang, Jiangsu
P.R. China

Product tested: Pneumatic Actuators
KM Series Scotch Yoke Actuators
KM Series Rack and Pinion Actuators

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
Systematic Capability	SC 3

Rack and pinion series KMaxxx/KMaxxx-by Double acting
Move to safe position by external pneumatic energy

Dangerous Failure Rate	λ_D	4.42 E-07 / h	442 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.97 E-03	

Rack and pinion series KMaxxx/KMaxxx-by Spring return
Move to safe position by internal spring force

Dangerous Failure Rate	λ_D	2.61 E-07 / h	261 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.16 E-03	

Scotch yoke series KMYxxyy-abc/KMYxxyy-abx Double acting with single cylinders
Move to safe position by external pneumatic energy

Dangerous Failure Rate	λ_D	2.09 E-07 / h	209 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	9.30 E-04	

Scotch yoke series KMYxxyy-abc/KMYxxyy-abx Double acting with double cylinders
Move to safe position by external pneumatic energy

Dangerous Failure Rate	λ_D	2.62 E-07 / h	262 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.17 E-03	

Scotch yoke series KMYxxyy-abc/KMYxxyy-abx Spring return
Move to safe position by internal spring force

Dangerous Failure Rate	λ_D	2.27 E-07 / h	227 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.01 E-03	

Assumptions for the calculations above: DC = 0 %, $T_1 = 1$ year, MRT = 72 h

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 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.