

Certificate



No.: 968/V 1078.00/18

Product tested	Orbit Cylinder Actuators	Certificate holder	Cameron Valves & Measurement 7200 Interstate 30 Drive Little Rock, AR 72209 USA
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Type designation	Double Acting: LS-ab-D-c, LG-ab-D-c, LG-ab-T-c a: 12 - 42 b: 3 - 14 c: 5 - 33 Single Acting: LS-ab-D-c-X-S a: 12 - 26 b: 4 - 7 c: 5 - 19
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Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010
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Intended application	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 the actuators may be used in a redundant architecture up to SIL 3.
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Specific requirements	The instructions of the associated Installation, Operating and Safety Manual shall be considered.
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Summary of test results see back side of this certificate.

Valid until 2023-09-20

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 1078.00/18 dated 2018-09-20.
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, 2018-09-20

Certification Body Safety & Security for Automation & Grid

Dr. R. G. A.
Dr.-Ing. Thorsten Gantevoort

Holder: Cameron Valves & Measurement
7200 Interstate 30 Drive
Little Rock, Arkansas 72209
United States of America

Product tested: Spring return: Double Acting:
LS-ab-D-c-X-S LS-ab-D-c, LG-ab-D-c,
LG-ab-T-c

a: 12 – 26	a: 12 – 42
b: 4 – 7	b: 3 – 14
c: 5 - 19	c: 5 - 33

Results of Assessment

Results of Assessment		Spring return		Double Acting	
		$2_H / 1_S$	$2_H / 1_S$	$2_H / 1_S$	$2_H / 1_S$
Route of Assessment		Type A		Type A	
Type of Sub-system		Low Demand Mode		Low Demand Mode	
Mode of Operation		0		0	
Hardware Fault Tolerance	HFT				
Lambda Dangerous confidence level of calculation $1-\alpha = 95 \%$	λ_D	1.90 E-07 / h	190 FIT	6.91 E-07 / h	691 FIT
Lambda Dangerous Undetected assumed Diagnostic Coverage DC = 0 %	λ_{DU}	1.90 E-07 / h	190 FIT	6.91 E-07 / h	691 FIT
Mean Time To Dangerous Failure	MTTF _D	5.27 E+06 h	601 a	1.45 E+06 h	165 a
Average Probability of Failure on Demand 1oo1 assumed Proof Test Interval $T_1 = 1$ year	PFD_{avg}(T₁)	8.31 E-04		3.03 E-03	
Average Probability of Failure on Demand 1oo2 assumed Proof Test Interval $T_1 = 1$ year assumed $\beta_{1oo2} = 10 \%$	PFD_{avg}(T₁)	8.40 E-05		3.14 E-04	

Origin of values

The stated values are the results of a FMEDA examination and verification by the analysis of field feedback of the last five years. 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.