

Certificate



SIL/PL
Capability

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ID 060000000

No.: V 488.01/15 REV01

Product tested	Linear Pneumatic Actuators	Certificate holder	Emerson Process Management Fisher Controls International, LLC 205 S Center St Marshalltown, IA 50158 USA
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Type designation	Fisher 685, Fisher 685SE, Fisher 685SR
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Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010	IEC 61511 Parts 1-3:2004
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Intended application	Safety Function: Return into default position (open or close) when control medium is cut off and vented (spring return), maintain functionality under all conditions to move actuator into application dependend safe position by means of control medium (double acting).
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The actuators are suitable for use in a safety instrumented system up to SIL 2. Under consideration of the minimum hardware fault tolerance HFT = 1 the actuators may be used in a redundant structure up to SIL 3.

Specific requirements	The unit must be properly designed into a Safety Instrumented System per the Safety Manual requirements.
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Summary of test results see annex of this certificate.

Valid until 2020-06-08

The issue of this certificate is based upon an examination, whose results are documented in Report No. V 488.01/15 REV01 dated 2016-08-08.

This certificate is valid only for products which are identical with the product tested. It becomes invalid at any change of the codes and standards forming the basis of testing for the intended application.

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

Köln, 2016-08-08

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Heinz Gall

Manufacturer / Contractor

**Emerson Process Management
Fisher Controls Int. LLC
205 S Center St
Marshalltown, IA, 50158
USA**

Product tested

Fisher 685SE / Fisher 685SR - Series of Pneumatic Piston Actuators

Device-Specific Values

Probability of Dangerous Failure on Demand	PFD_{spec}	7.97 E-04
Test Interval	T_i	1 a
Confidence Level	$1-\alpha$	95 %
Safe Failure Fraction	SFF	83.7 %
Hardware Fault Tolerance	HFT	0
Diagnostic Coverage	DC	0 %
Type of Sub System		Type A
Mode of Operation		Low Demand
Proof Test Coverage	PTC	not considered
Partial Stroke Test Coverage	PSTC	not considered

Derived Values for 1oo1-Architecture

Assumed Demands per Year	f_{np}	1 / a	1.14 E-04 / h
Total Failure Rate	$\lambda_S + \lambda_D$	5.58 E-07 / h	558 FIT
Lambda Dangerous Detected	λ_{DD}	0.00 E+00 / h	0 FIT
Lambda Dangerous Undetected	λ_{DU}	9.10 E-08 / h	91 FIT
Lambda Safe	λ_S	4.67 E-07 / h	467 FIT
Mean Time Between Failures	MTBF	1.79 E+06 h	205 a
Mean Time Between Dangerous Failures	$MTBF_D$	1.10 E+07 h	1,255 a
Average Probability of Failure on Demand	PFD_{avg}	3.98 E-04	

Time of Usage

A time of usage of more than 5 years (+ 1.5 years of storage) can only be favored under responsibility of the operator, consideration of specific external conditions (securing of required quality of media, max. temperature, time of impact), and adequate test cycles.

Quality Management

These statements are bound to a proven and verified deployment of safety-related quality management of the manufacturer.

Manufacturer / Contractor

Emerson Process Management
Fisher Controls Int. LLC
205 S Center St
Marshalltown, IA, 50158
USA

Product tested

Fisher 685 - Series of Pneumatic Piston Actuators**Device-Specific Values**

Probability of Dangerous Failure on Demand	PFD_{spec}	4.34 E-04
Test Interval	T_i	1 a
Confidence Level	$1-\alpha$	95 %
Safe Failure Fraction	SFF	83.6 %
Hardware Fault Tolerance	HFT	0
Diagnostic Coverage	DC	0 %
Type of Sub System		Type A
Mode of Operation		Low Demand
Proof Test Coverage	PTC	not considered
Partial Stroke Test Coverage	PSTC	not considered

Derived Values for 1oo1-Architecture

Assumed Demands per Year	f_{np}	1 / a	1.14 E-04 / h
Total Failure Rate	$\lambda_S + \lambda_D$	3.02 E-07 / h	302 FIT
Lambda Dangerous Detected	λ_{DD}	0.00 E+00 / h	0 FIT
Lambda Dangerous Undetected	λ_{DU}	4.96 E-08 / h	50 FIT
Lambda Safe	λ_S	2.53 E-07 / h	253 FIT
Mean Time Between Failures	MTBF	3.31 E+06 h	378 a
Mean Time Between Dangerous Failures	MTBF _D	2.02 E+07 h	2,302 a
Average Probability of Failure on Demand	PFD_{avg}	2.17 E-04	

Time of Usage

A time of usage of more than 5 years (+ 1.5 years of storage) can only be favored under responsibility of the operator, consideration of specific external conditions (securing of required quality of media, max. temperature, time of impact), and adequate test cycles.

Quality Management

These statements are bound to a proven and verified deployment of safety-related quality management of the manufacturer.