

# Certificate



**No.: 968/V 1106.01/23**

<b>Product tested</b>	Quarter Turn Pneumatic Actuators	<b>Certificate holder</b>	Festo SE & Co. KG Ruiter Straße 82 73734 Esslingen Germany
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<b>Type designation</b>	DFPD-...-  see Revision List
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<b>Codes and standards</b>	IEC 61508 Parts 1-2 and 4-7:2010
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<b>Intended application</b>	The safety function is to switch the actuator to the defined safety switching position. Single acting: This switching movement is achieved by pressurising the corresponding pressure chamber by spring force. Double acting: This switching movement is achieved by pressurising the corresponding pressure chamber by supplied compressed air.  The actuators are suitable for use in a safety instrumented system up to SIL 2 (low demand mode) and SIL 1 (high demand mode of operation). 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.
<b>Specific requirements</b>	The instructions of the associated Installation, Operating and Safety Manual shall be considered.

Summary of test results see Revision List.

Valid until 2028-03-07

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 1106.01/23 dated 2023-02-24. 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

Köln, 2023-03-07

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. (FH) Wolf Rückwart

# Revision List



referred to on Certificate No.: 968/V 1106.01/23

**Certified Product: Quarter Turn Actuators  
DFPD**



## Safety related modules / components

Type Designation	Description	Revision	Report-No.:	Certification Status
DFPD-...-	For variants and sizes, see type code table below.	-	968/V 1106.01/23 968/V 1106.02/23 968/V 1106.03/23 968/V 1106.04/24	<i>Valid</i> <i>Valid</i> <i>Valid</i> <i>Valid</i>

### Safety Function:

#### Double acting:

The safety function is to switch the actuator to the defined safety switching position. This switching movement is achieved by pressurising the corresponding pressure chamber with compressed air. The value of the torque generated depends on the pressure difference between the two pressure chambers separated by the piston.

#### Single acting:

The safety function is to switch the actuator to the defined safety switching position when the compressed air is switched off and the spring chamber is exhausted. This switching movement is achieved through the spring force of the spring assembly.

### Type code table:

DFPD-a-b-c-d-e-f-g-h-i-j-k-l-m-n-o-p-q-r-s-t	Definition
a= _ / N	System of units
b= _	Edition
c= 10 / 20 / 40 / 80 / 120 / 160 / 240 / 300 / 480 / 700 / 900 / 1200 / 2300	Size
d= RP	Design
e= 90 / 120 / 135 / 180	Swivel angle
f= L / R	Swivel direction
g= D / S	Function
h= _ / 20 / 25 / 30 / 35 / 40 / 45 / 50 / 55 / 60	Spring strength
i= _ / U	Normal position
j= F03 / F04 / F05 / F07 / F10 / F12 / F14 / F16	Flange pattern
k= _ / F07 / F10 / F12 / F16	Flange pattern
l= _ / 9 / 11 / 17 / 27 / 36	Width across flats
m= _ / X	Pneumatic Connection
n* = _	Temperature range
o= _ / R3	Shaft material
p= _ / EP	Housing surface treatment
q= _ / C	Industry focus
r= _ / VDE2	Mechanical interface
s= _ / GL	Approval for installation on ships

\*T4 / T6 excluded from the scope of certification

Festo SE & Co KG

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73734 Esslingen / Germany

TÜV Rheinland Industrie Service GmbH

Automation - Functional Safety & Cyber  
Security (A-FS & CS)  
Am Grauen Stein

51105 Köln / Germany

# Revision List



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## 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 and High Demand Mode
Hardware Fault Tolerance	HFT = 0
Systematic Capability	<b>SC 3</b>

### Low Demand Mode

#### Move into fail safe position by Supplier Air (DA)

Dangerous Failure Rate	$\lambda_D$	2.46 E-07 / h	<b>246 FIT</b>
Average Probability of Failure on Demand 1001	$PFD_{avg}(T_1)$	1.10 E-03	

#### Move into fail safe position by Springforce (SA)

Dangerous Failure Rate	$\lambda_D$	1.24 E-07 / h	<b>124 FIT</b>
Average Probability of Failure on Demand 1001	$PFD_{avg}(T_1)$	5.52 E-04	

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

### High Demand Mode<sup>(see note)</sup>

Assumed Demands per Year	$n_{op}$	8,760 / a	1 / h
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#### DFPD-...-10 / 20 / 40 / 80 / 120 / 160 / 240 / 300-...-90

Average Frequency of a dangerous Failure per Hour	PFH	<b>2.03 E-07</b>
Nominal lifetime	$B_{10D}$	492,700 <sup>1</sup>

#### DFPD-...-40 / 120 / 240-...-120 / 135 / 180

Average Frequency of a dangerous Failure per Hour	PFH	<b>4.07 E-07</b>
Nominal lifetime	$B_{10D}$	245,578 <sup>1</sup>

#### DFPD-...-480 / 700 / 900 / 1200 / 2300

Average Frequency of a dangerous Failure per Hour	PFH	<b>1.01 E-07</b>
Nominal lifetime	$B_{10D}$	986,500 <sup>2</sup>

**Note:** PFH has to be verified by the end user with the correct demand rate of the certain application. The resulting PFH shall not be lower than 10 FIT. If the PFH calculation results in a lower value, 10 FIT shall be used for further investigation.

<sup>1</sup> Value determined with 60 % load in accordance with DIN EN 15714

<sup>2</sup> Value determined without load

## Revision List



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### 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. The stated failure rates for high demand are the result of tests over the whole temperature range. If the conditions vary widely from the test conditions, the failure rates might be adjusted. 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.

### 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.

### Safety Manual / User documentation

Document No.	Description	Report-No.:	Certification Status
TN: 8147709	<del>Operating Instructions DFPD-... / Rev. 2020-11d</del>	968/V 1106.00/19	<i>invalid</i>
TN: 8179575	<del>Operating Instructions DFPD-... / Rev. 2023-03e</del>	968/V 1106.01/23	<i>invalid</i>
TN: 8202412	Operating Instructions DFPD-... / Rev. 2023-11f	968/V 1106.03/23	<i>Valid</i>

**The content of this Revision List has been agreed between Manufacturer and Certification Body.**

### Revision:

Date	Rev.	Description / Changes	Author
2023-03-06	1.0	Initial creation, based on Report-No.: 968/V 1106.01/23	TÜV Rheinland / Festo
2023-08-22	2.0	Inclusion of variants, based on Report-No.: 968/V 1106.02/23	TÜV Rheinland / Festo
2023-11-17	3.0	Inclusion of variants, based on Report-No.: 968/V 1106.03/23	TÜV Rheinland / Festo
2024-07-04	4.0	Inclusion of variants, based on Report-No.: 968/V 1106.04/24	TÜV Rheinland / Festo

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