

# Certificate



**Nr./No.: V 538.01/16**

<b>Prüfgegenstand Product tested</b>	Pneumatische Schwenkantriebe Quarter Turn Pneumatic Actuator (Standardtype)	<b>Zertifikats- inhaber Certificate holder</b>	Festo AG & Co. KG Ruiter Straße 82 73734 Esslingen Germany
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<b>Typbezeichnung Type designation</b>	DFPD-...-S (einfachwirkend / single acting), DFPD-...-D (doppeltwirkend / double acting)
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<b>Prüfgrundlagen Codes and standards</b>	IEC 61508 Parts 1-2 and 4-7:2010	IEC 61511-1:2016
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<b>Bestimmungsgemäße Verwendung Intended application</b>	Die Antriebe sind zur Verwendung in einem sicherheitsgerichteten System bis SIL 2 geeignet. Unter Berücksichtigung der mindestens erforderlichen Hardware-Fehlertoleranz von HFT = 1 können die Antriebe in redundanter Ausführung auch bis SIL 3 eingesetzt werden.
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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.

<b>Besondere Bedingungen Specific requirements</b>	Die Hinweise in der zugehörigen Installations- und Betriebsanleitung sowie des Sicherheitshandbuchs sind zu beachten. The instructions of the associated Installation, Operating and Safety Manual shall be considered.
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Zusammenfassung der Testergebnisse siehe Rückseite des Zertifikates.  
Summary of test results see back side of this certificate.

Gültig bis / Valid until 2021-09-30

Der Ausstellung dieses Zertifikates liegt eine Prüfung zugrunde, deren Ergebnisse im Bericht Nr. V 538.01/16 vom 30.09.2016 dokumentiert sind.

Dieses Zertifikat ist nur gültig für Erzeugnisse, die mit dem Prüfgegenstand übereinstimmen. Es wird ungültig bei jeglicher Änderung der Prüfgrundlagen für den angegebenen Verwendungszweck.

The issue of this certificate is based upon an examination, whose results are documented in Report No. V 538.01/16 dated 2016-09-30.

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, 2016-09-30

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Stephan Häb

**Manufacturer Festo AG & Co. KG**  
Ruiter Straße 82  
73734 Esslingen

**Product Pneumatische Schwenkantriebe / pneumatic actuator**  
**(Standardvariante / Standardtype)**  
**DFPD-...-S (einfachwirkend / single acting)**  
**DFPD-...-D (doppeltwirkend / double acting)**

**Device-Specific Values**

Recommended Test Interval	$T_i$	1 a
Confidence Level	$1-\alpha$	95 %
Hardware Fault Tolerance	HFT	0
Diagnostic Coverage	DC	0 %
Type of Sub System		Typ A
Mode of Operation		Low and High Demand
Proof Test Coverage	PTC	88 %

**Derived Values for 1oo1-Architecture**

Probability of Dangerous Failure on Demand	$PFD_{spec}$	8,89 E-04	
Lambda Dangerous Undetected	$\lambda_{DU}$	1,01 E-07 / h	101 FIT
Mean Time To Dangerous Failure	$MTTF_D$	9,87 E+06 h	1.126 a

**Low demand Mode**

Assumed Demands per Year	$n_{op}$	1 / a	1,14 E-04 / h
<b>Average Probability of Failure on Demand</b>	<b><math>PFD_{avg}</math></b>	<b>4,44 E-04</b>	

**High demand Mode**

Assumed Demands per Year	$n_{op}$	8760 / a	1 / h
<b>Average Frequency of dangerous Failure per Hour</b>	<b>PFH</b>	<b>1,01 E-07 / h</b>	

**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 (ensuring of required quality of media, max. temperature, time of impact), and adequate test cycles.

If the test cycles are observed the actuators can be used up to 8 years (+2 years storage).

**Origin of values**

The stated values are the result of extensive test series on the reliability of the safety function under critical conditions. In addition, the test results were verified by the analysis of sales and return statistics for the last five years. Random and systematic failures were examined, which are the responsibility of the manufacturer.

**Systematic Capability**

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