

Certificate



Nr./No.: 968/V 1069.00/18

Prüfgegenstand Product tested	Pneumatische Steuerventile Pneumatic control valve	Zertifikats- inhaber Certificate holder	AIRTEC Pneumatic GmbH Carl-Zeiss-Str. 72 72770 Reutlingen Germany
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Typbezeichnung Type designation	M-07-311-HN-142-SIL, M-07-311-HN-912-SIL, MN-06-311-HN-142-SIL, MN-06-311-HN-152-SIL, MN-06-311-HN-912-SIL
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Prüfgrundlagen Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010
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Bestimmungsgemäße Verwendung Intended application	Die Ventile sind zur Verwendung in einem sicherheitsgerichteten System bis SIL 2 (Low Demand Mode) und SIL 1 (High Demand Mode of Operation) geeignet. Unter Berücksichtigung der mindestens erforderlichen Hardware-Fehlertoleranz von HFT = 1 können die Armaturen in redundanter Ausführung auch bis SIL 3 eingesetzt werden. The valves 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 the valves may be used in a redundant architecture up to SIL 3.
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Besondere Bedingungen Specific requirements	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 2023-08-15

Der Ausstellung dieses Zertifikates liegt eine Prüfung zugrunde, deren Ergebnisse im Bericht Nr. 968/V 1069.00/18 vom 15.08.2018 dokumentiert sind.

Dieses Zertifikat ist nur gültig für Erzeugnisse, die mit dem Prüfgegenstand übereinstimmen.
The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 1069.00/18 dated 2018-08-15.

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, 2018-08-15

Certification Body Safety & Security for Automation & Grid

Dr. R. G. A.

Dr.-Ing. Thorsten Gantevoort

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Carl-Zeiss-Str. 72
72770 Reutlingen
Germany

Product tested: Pneumatische Steuerventile /
Pneumatic control valve
 M-07-311-HN-142-SIL, M-07-311-HN-912-SIL,
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Results of Assessment

Route of Assessment		$2_H / 1_S$
Type of Sub-system		Type A
Mode of Operation		Low / High Demand Mode
Hardware Fault Tolerance	HFT	0

Low demand Mode

Lambda Dangerous confidence level of calculation $1-\alpha = 95\%$	λ_D	8.8 E-08 / h	88 FIT
Lambda Dangerous Undetected assumed Diagnostic Coverage DC = 0 %	λ_{DU}	8.8 E-08 / h	88 FIT
Mean Time To Dangerous Failure	MTTF _D	1.14 E+07 h	1,297 a
Average Probability of Failure on Demand assumed Proof Test Interval $T_1 = 1$ year	PFD_{avg}(T₁)	3.9E-04	

High demand Mode ^(see note)

B _{10d}		10 540 000	
Assumed Demands per Year	n _{op}	8760 / a	1 / h
Average Frequency of a dangerous Failure per Hour	PFH	9.5 E-09 / h	10 FIT

Note

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

Origin of values

The stated values are the results of extensive qualification tests on the reliability of the safety function under critical conditions. 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.