

Certificate



SIL/PL
Capability

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ID 0600000000

No.: 968/V 1174.00/20

Product tested

3/2 Direct operated solenoid valves

Certificate holder

Parker Hannifin Motion & Control (Wuxi) Company Ltd.
No.200, Furong Zhong Si Lu, Xishan Economic Development Zone, Wuxi
214192 Jiangsu Province
P.R. China

Type designation

A03 series

Codes and standards

IEC 61508 Parts 1-2 and 4-7:2010

Intended application

Safety Function: Move to fail-safe position by spring force if auxilliary power is cut of or fails.

The valves 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 valves may be used in a redundant architecture up to SIL 3.

Specific requirements

The instructions of the associated Installation, Operating and Safety Manual shall be considered.

Summary of test results see back side of this certificate.

Valid until 2025-08-06

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 1174.00/20 dated 2020-08-06.

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, 2020-08-06

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Thomas Steffens

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Precisely Right.

Holder: Parker Hannifin Motion & Control (Wuxi) Company Ltd.
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Product tested: 3/2 Direct operated solenoid valves
 (Type: A03 Series)

Results of Assessment

Route of Assessment		$2_H / 1_S$
Type of Sub-system		Type A
Mode of Operation		Low Demand Mode
Hardware Fault Tolerance	HFT	0
Systematic Capability		SC 3

MN series

Dangerous Failure Rate	λ_D	2.89 E-07 / h	289 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.27 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.29 E-04	

MO series

Dangerous Failure Rate	λ_D	3.85 E-07 / h	385 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.69 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.72 E-04	

MS series

Dangerous Failure Rate	λ_D	3.61 E-07 / h	361 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.58 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.61 E-04	

Assumptions for the calculations above: DC = 0 %, $T_1 = 1$ year, $\beta_{1oo2} = 10$ %

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.

Furthermore the results have been verified by qualification tests.

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.

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.