Certificate

SIL/PL Capability

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ID 0600000000

No.: 968/V 1100.00/19

Product tested	Residual Pressure Exhaust Valve with spool position detection	**Certificate holder**	CKD Corporation 2800, Takayama Komaki-cho, Yokkaichi Mie, 512-1303 Japan
Type designation	SNS series		
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010 ISO 13849-2:2012 ISO 13849-1:2015		
Intended application	Safety Function: When the solenoid valve is de-energized, the spool moves to its fail-safe (exhaust) position by spring force. The solenoid valves are suitable for use in a safety related systems in high demand mode. The 1 station solenoid valves are suitable up to SIL 1 or PL c in Cat. 1. The 2 station solenoid valves are suitable up to SIL 3 or PL d in Cat. 3 with DC low (In this case plausibility monitoring and sufficient diagnostic must be realized).		
Specific requirements	The instructions of the associated Installation, Operating and Safety Manual shall be considered.		

Summary of test results see page 2 of this certificate.

Valid until 2024-03-11

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 1100.00/19 dated 2019-03-11.
This certificate is valid only for products which are identical with the product tested.

Köln, 2019-03-11

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit
Am Grauen Stein, 51105 Köln
Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Gebhard Bouwer

TÜV Rheinland Industrie Service GmbH, Am Grauen Stein, 51105 Köln / Germany
Tel.: +49 221 806-1790, Fax: +49 221 806-1539, E-Mail: industrie-service@de.tuv.com

Manufacturer / Holder: **CKD Corporation**
2800, Takayama, Komaki-cho, Yokkaichi
Mie, 512-1303, Japan

Product tested: Residual Pressure Exhaust Valve
SNS series

Results of Assessment

Route of Assessment		2_H / 1_S	
Type of Sub-system		Type A	
Mode of Operation		High Demand Mode	
Hardware Fault Tolerance	HFT	0	
B_{10d}		10,984,840	
Mean Time To Dangerous Failure	$MTTF_D$	1.10 E+08 h	12,540 a
Average Frequency of dangerous Failure per Hour (1oo1 architecture) assumed demands per year: 8760 / a	**PFH_{1oo1}**	**9.10 E-09 / h**	
Average Frequency of dangerous Failure per Hour (1oo2 architecture) assumed demands per year: 8760 / a	**PFH_{1oo2}**	**9.10 E-10 / h**	

Note: PFH has to be verified by the end user with the correct demand rate for the certain application.
The resulting PFH shall not be lower than 9 FIT. If the PFH calculation results in a lower value, 9 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).

Maintenance
The given values require periodic 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 maintenance.