Certificate

No.: 968/V 1031.01/23

Product tested	Pressure Switches	**Certificate holder**	Ruelco, Inc. 1209 Distributors Row New Orleans, LA 70123 USA
Type designation	Series SS-4XXX and Model BS		
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010		
Intended application	Safety Function: The pressure switches change state either of a 3-way valve or of a micro switch, when the set trigger pressure is reached. The switches 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 for the complete system the switches may be used up to SIL 3.		
Specific requirements	The instructions of the associated Installation, Operating and Safety Manual shall be considered. It has to be ensured that the pressure setpoint cannot be changed. For safety applications the idle current principle has to be applied. The redundant contacts of the DPDT micro switch have to be wired in series.		

Summary of test results see back side of this certificate.

Valid until 2028-03-14

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 1031.01/23 dated 2023-02-09. 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
Am Grauen Stein, 51105 Köln

Köln, 2023-03-14	Certification Body Safety & Security for Automation & Grid	Dipl.-Ing. (FH) Wolf Rückwart

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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

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Holder: **Ruelco, Inc.**
1209 Distributors Row
NEW ORLEANS LA 70123
USA

Product tested: **Pressure Switches**
SS - 4xxx and Model BS

Results of Assessment for mechanical devices 4202, 4222(H) and Model BS

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	
Lambda Dangerous confidence level of calculation 1-α = 95 %	λ_D	4.94 E-08 / h	49 FIT
Lambda Dangerous Undetected assumed Diagnostic Coverage DC = 0 %	λ_{DU}	4.94 E-08 / h	49 FIT
Average Probability of Failure on Demand 1oo1 assumed Proof Test Interval T_1 = 730 h (once every month)	**$PFD_{avg}(T_1)$**	**1.80 E-05**	
Average Probability of Failure on Demand 1oo2 assumed Proof Test Interval T_1 = 730 h (once every month) assumed β_{1oo2} = 10 %	**$PFD_{avg}(T_1)$**	**1.80 E-06**	

Results of Assessment for device with micro switch 4E02		**SPDT**		**DPDT**	
Lambda Dangerous - AC confidence level of calculation 1-α = 95 %	λ_{D_AC}	7.34 E-08 /h	73 FIT	5.18 E-08 /h	52 FIT
Average Probability of Failure on Demand 1oo1 - AC assumed Proof Test Interval T_1 = 730 h (once every month)	**PFD_{avg_AC} (T_1)**	**2.68 E-05**		**1.89 E-05**	
Lambda Dangerous - DC confidence level of calculation 1-α = 95 %	λ_{D_DC}	1.69 E-07 /h	169 FIT	6.14 E-08 /h	61 FIT
Average Probability of Failure on Demand 1oo1 - DC assumed Proof Test Interval T_1 = 730 h (once every month)	**PFD_{avg_DC} (T_1)**	**6.18 E-05**		**2.24 E-05**	

Origin of failure rates

The stated failure rates are the result of the analysis of 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.

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.