Certificate

SIL/PL Capability

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No.: 968/V 1022.01/22

Product tested	Spring Return Fail-safe Electric Valve Actuator	**Certificate holder**	Sun Yeh Electrical Ind. Co., Ltd. No. 68, Lane 854, Sec. 1, Shatian Rd. Dadu Dist. Taichung City 43244 Taiwan, R.O.C.
Type designation	S-500, S-1300, S-2000, S-2600, SE-500, SE-1300, SE-2000, SE-2600		
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010		
Intended application	Safety Function: When de-energized, the actuator moves valves or dampers into its fail-safe position. Depending on which configuration is selected Fail-Closed or Fail-Open, the actuator rotates the valve plug to close-off the flow path through the valve body or open the flow path through the valve body. The actuators 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 final element the actuators may be used 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.

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 1022.01/22 dated 2022-11-09. 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, 2022-11-25	Certification Body Safety & Security for Automation & Grid	Dipl.-Ing. (FH) Wolf Rückwart

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DAkkS Deutsche Akkreditierungsstelle D-ZE-11052-02-01

TÜVRheinland® Precisely Right.

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Precisely Right.

Holder: Sun Yeh Electrical Ind. Co., Ltd.
No. 68, Lane 854, Sec. 1, Shatian Rd.
Dadu Dist., Taichung City 43244
Taiwan

Product tested: **Spring Return Fail-safe Electric Valve Actuators - S series and SE 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**

Move valves or dampers to fail-safe position by internal spring force

Dangerous Failure Rate	λ_D	4.09 E-07 / h	**409 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.82 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.86 E-04	

Assumptions for the calculations above: DC = 0 %, T_1 = 1 year, MRT = 72 h, β_{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 and 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.