

# Certificate



SIL/PL  
Capability

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**No.: 968/V 1005.01/23**

<b>Product tested</b>	Ball Segment Valves	<b>Certificate holder</b>	Somas Instrument AB Box 107 66123 Säffle Sweden
<b>Type designation</b>	KVT, KVTW, KVTF, K VX, KVXW, KVXF		
<b>Codes and standards</b>	IEC 61508 Parts 1-2 and 4-7:2010 ISO 13849-1:2015		
<b>Intended application</b>	<p>Safety Function: Open or close on demand.</p> <p>The valves are suitable for use in a safety instrumented system up to SIL 2 acc. IEC 61508 / IEC 61511. Under consideration of the minimum required hardware fault tolerance <math>HFT = 1</math> for the complete final element the valves may be used up to SIL 3. Constraints of the calculated probability of dangerous failures acc. to the frequency of demand and Proof Test Intervals have to be considered.</p> <p>The ball segment valves are also suitable for operation in safety related systems with a Performance Level PL c acc. ISO 13849-1. In a redundant structure (<math>HFT \geq 1</math>) they can be used in applications up to PL e, if sufficient external diagnostics (<math>DC \geq 60\%</math> (low) for PL d, resp. <math>DC \geq 90\%</math> (medium) for PL e) and plausibility checks by the upstream safety controller are realized.</p>		
<b>Specific requirements</b>	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 1005.01/23 dated 2023-03-16. 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**  
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Certification Body Safety & Security for Automation & Grid

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**Holder:** Somas Instrument AB  
Box 107  
SE-66123 Säffle  
Sweden

**Product tested:** Ball Segment Valves  
Type KVT, KVTW, KVTF, KVX, KVXW, KVXF

### Results of Assessment

Route of Assessment		$2_H / 1_S$
Type of Sub-system		Type A
Mode of Operation		Low and High Demand Mode <sup>1)</sup>
Hardware Fault Tolerance	HFT	0
Systematic Capability		<b>SC 3</b>

### Closing on Demand

Dangerous Failure Rate	$\lambda_D$	8.40 E-08 / h	<b>84 FIT</b>
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	3.74 E-04	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	3.75 E-05	

### Open on Demand

Dangerous Failure Rate	$\lambda_D$	7.20 E-08 / h	<b>72 FIT</b>
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	3.21 E-04	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	3.22 E-05	

Assumptions for the calculations above: DC = 0 %,  $T_1$  = 1 year, MRT = 72 h,  $\beta_{1oo2}$  = 10 %

Maximum Demands per Year <sup>1)</sup>	$n_{op}$	100 / a	1.14 E-02 / h
Mean Time to Dangerous Failure	$MTTF_D$	2674 a	

1) The usage in applications with a demand rate of maximum  $n_{op} = 100 / a$  is justified by the fact, that within this range wearing effects are negligible and ageing effects of sealing materials are predominant. Therefore the methods from low demand mode can be applied on this limited high demand mode.

### 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 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.

### Systematic Capability

The development and manufacturing processes and the functional safety management applied by the manufacturer in the relevant lifecycle phases of the product has been audited and assessed as suitable for the use in applications with a maximum Safety Integrity Level of 3 (SC 3).