Certificate

SIL/PL Capability

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Nr./No.: 968/V 1230.00/21

Prüfgegenstand **Product tested**	2/2-Wege Kolbensitzventile 2/2-way piston valves	**Zertifikats-inhaber** **Certificate holder**	Buschjost GmbH Detmolder Str. 256 32545 Bad Oeynhausen Germany
Typbezeichnung **Type designation**	85840, 85850, 85780 (zzgl. abgeleitete Sondernummern / plus derived special products)		
Prüfgrundlagen **Codes and standards**	IEC 61508 Parts 1-2 and 4-7:2010		
Bestimmungsgemäße Verwendung **Intended application**	Sicherheitsfunktion: Einnehmen der Ruhestellung (NO oder NC) bei Wegfall der Spannungsversorgung. Die Armaturen sind zur Verwendung in einem sicherheitsgerichteten System bis SIL 2 geeignet. Unter Berücksichtigung der mindestens erforderlichen Hardware-Fehlertoleranz von HFT=1 können die Armaturen in redundanter Ausführung auch bis SIL 3 eingesetzt werden. Safety function: Switch to normal position (NC or NO) on demand when solenoid is de-energized. The valves are suitable for use in a safety instrumented system up to SIL 2. Under consideration of the minimum required hardware fault tolerance HFT=1 they may be used in a redundant structure up to SIL 3.		
Besondere Bedingungen **Specific requirements**	Die Hinweise in der zugehörigen Installations- und Betriebsanleitung sowie des Sicherheitshandbuchs sind zu beachten. The instructions of the associated Installation, Operating and Safety Manual shall be considered.		

Zusammenfassung der Testergebnisse siehe Rückseite des Zertifikates.
Summary of test results see back side of this certificate.

Gültig bis / Valid until 2026-04-22

Der Ausstellung dieses Zertifikates liegt eine Prüfung zugrunde, deren Ergebnisse im Bericht Nr. 968/V 1230.00/21 vom 19.04.2021 dokumentiert sind.
Dieses Zertifikat ist nur gültig für Erzeugnisse, die mit dem Prüfgegenstand übereinstimmen.
The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 1230.00/21 dated 2021-04-19.
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, 2021-04-22	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: Buschjost GmbH
Detmolder Str. 256
32545 Bad Oeynhausen
Germany

Product tested: **2/2-way piston valves**
85840, 85850, 85780

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**

Safe closing on demand (NC, normally closed)

Dangerous Failure Rate	λ_D	1.54 E-07 / h	**154 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	6.86 E-04	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	6.91 E-05	

Safe opening on demand (NO, normally open)

Dangerous Failure Rate	λ_D	9.20 E-08 / h	**92 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	4.10 E-04	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	4.11 E-05	

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 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.