

Certificate



Nr./No.: 968/V 1042.02/21

**Prüfgegenstand
Product tested**

Exzentrisches Drehkegelventil (mit NR...-Stellantrieben)
Eccentric Rotary Plug Control Valve
(with actuators type NR...)

**Zertifikats-
inhaber
Certificate
holder**

Flowserve Control Valves
GmbH
Kasernengasse 6
9500 Villach
Austria

**Typbezeichnung
Type designation**

MaxFlo 4 (MFL 4)

**Prüfgrundlagen
Codes and standards**

IEC 61508 Parts 1-2 and 4-7:2010

**Bestimmungsgemäße
Verwendung
Intended application**

Sicherheitsfunktion: Einnehmen der definierten Sicherheitsstellung (NC oder NO) innerhalb der spezifizierten Zeit bei Anforderung.
Die Armaturen sind zur Verwendung in einem sicherheitsgerichteten System bis SIL 2 (Low Demand Mode) 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: Move into fail safety position (NC or NO) within specified time upon request of safety function.
The valves 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 the valves may be used in a redundant architecture 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 Seiten 2-4 des Zertifikates.
Summary of test results see pages 2-4 of this certificate.

Gültig bis / Valid until 2026-11-19


Der Ausstellung dieses Zertifikates liegt eine Evaluierung entsprechend dem Zertifizierungsprogramm CERT FSP1 V1.0:2017 in der aktuellen Version zugrunde, deren Ergebnisse im Bericht Nr. 968/V 1042.02/21 vom 08.11.2021 dokumentiert sind. Dieses Zertifikat ist nur gültig für Erzeugnisse, die mit dem Prüfgegenstand übereinstimmen.

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 1042.02/21 dated 2021-11-08. This certificate is valid only for products, which are identical with the product tested.

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit

Köln, 2021-11-19

Certification Body Safety & Security for Automation & Grid


Dipl.-Ing. (FH) Wolf Rückwart

Holder: Flowserve Control Valves GmbH
Kasernengasse 6
A-9500 Villach
Austria

Product tested: Eccentric Rotary Plug Control Valve

MaxFlo 4

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 request

| | | | |
|---|------------------|---------------|----------------|
| Dangerous Failure Rate | λ_D | 2.87 E-07 / h | 287 FIT |
| Average Probability of Failure on Demand 1oo1 | $PFD_{avg}(T_1)$ | 1.28 E-03 | |
| Average Probability of Failure on Demand 1oo2 | $PFD_{avg}(T_1)$ | 1.30 E-04 | |

Safe opening on request

| | | | |
|---|------------------|---------------|----------------|
| Dangerous Failure Rate | λ_D | 2.73 E-07 / h | 273 FIT |
| Average Probability of Failure on Demand 1oo1 | $PFD_{avg}(T_1)$ | 1.22 E-03 | |
| Average Probability of Failure on Demand 1oo2 | $PFD_{avg}(T_1)$ | 1.23 E-04 | |

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

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.

Holder: Flowserve Control Valves GmbH
Kasernengasse 6
A-9500 Villach
Austria

Product tested: NR... Actuator

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 request

| | | | |
|---|------------------|---------------|----------------|
| Dangerous Failure Rate | λ_D | 3.16 E-07 / h | 316 FIT |
| Average Probability of Failure on Demand 1oo1 | $PFD_{avg}(T_1)$ | 1.41 E-03 | |
| Average Probability of Failure on Demand 1oo2 | $PFD_{avg}(T_1)$ | 1.43 E-04 | |

Safe opening on request

| | | | |
|---|------------------|---------------|----------------|
| Dangerous Failure Rate | λ_D | 2.93 E-07 / h | 293 FIT |
| Average Probability of Failure on Demand 1oo1 | $PFD_{avg}(T_1)$ | 1.30 E-03 | |
| Average Probability of Failure on Demand 1oo2 | $PFD_{avg}(T_1)$ | 1.32 E-04 | |

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

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Holder: Flowserve Control Valves GmbH
Kasernengasse 6
A-9500 Villach
Austria

**Product tested: Eccentric Rotary Plug Control Valve MaxFlo 4
& NR... Actuator**

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 request

| | | | |
|---|------------------|---------------|----------------|
| Dangerous Failure Rate | λ_D | 6.03 E-07 / h | 603 FIT |
| Average Probability of Failure on Demand 1oo1 | $PFD_{avg}(T_1)$ | 2.68 E-03 | |
| Average Probability of Failure on Demand 1oo2 | $PFD_{avg}(T_1)$ | 2.76 E-04 | |

Safe opening on request

| | | | |
|---|------------------|---------------|----------------|
| Dangerous Failure Rate | λ_D | 5.66 E-07 / h | 566 FIT |
| Average Probability of Failure on Demand 1oo1 | $PFD_{avg}(T_1)$ | 2.52 E-03 | |
| Average Probability of Failure on Demand 1oo2 | $PFD_{avg}(T_1)$ | 2.59 E-04 | |

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

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