

Certificate



Nr./No.: 968/V 1099.00/19

**Prüfgegenstand
Product tested**

Pneumatische Schwenkantriebe
Pneumatic actuators

**Zertifikats-
inhaber
Certificate
holder**

EBRO Armaturen International
Est. Co. KG
Gewerbestr. 5
6330 Cham
Switzerland

**Typbezeichnung
Type designation**

EB SYS (einfachwirkend / single acting)
Baugröße/Size: 5.1, 6.1, 8.1, 9.1, 10.1, 12.1, 14.1, 16.1, 18.1, 20.1, 22.1, 26.1

EB SYD (doppeltwirkend / double acting)
Baugröße/Size: 4.1, 5.1, 6.1, 8.1, 9.1, 10.1, 12.1, 14.1, 16.1, 18.1, 20.1, 22.1, 26.1

**Prüfgrundlagen
Codes and standards**

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

**Bestimmungsgemäße
Verwendung
Intended application**

Sicherheitsfunktion: Öffnen oder Schließen bei Anforderung
Die Antriebe sind zur Verwendung in einem sicherheitsgerichteten System bis SIL 2 (Low Demand Mode) bzw. SIL 1 (High Demand Mode) geeignet. Unter Berücksichtigung der mindestens erforderlichen Hardware-Fehlertoleranz von HFT = 1 können die Antriebe in redundanter Ausführung auch bis SIL 3 eingesetzt werden.
Safety Function: Close or open on demand
The actuators are suitable for use in a safety instrumented system up to SIL 2 (low demand mode) or SIL 1 (high demand mode). Under consideration of the minimum required hardware fault tolerance HFT = 1 the actuators 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 Rückseite des Zertifikates.
Summary of test results see back side of this certificate.

Gültig bis / Valid until 2024-03-26

Der Ausstellung dieses Zertifikates liegt eine Prüfung zugrunde, deren Ergebnisse im Bericht Nr. 968/V 1099.00/19 vom 26.03.2019 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 1099.00/19 dated 2019-03-26.

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, 2019-03-26

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Gebhard Bouwer

Holder: Ebro Armaturen International Est. Co. KG
 Gewerbestraße 5
 CH – 6330 Cham

Product tested: Pneumatische Schwenkantriebe
Pneumatic Actuator
 EB SYS 5.1 - 26.1
 EB SYD 4.1 - 26.1

Results of Assessment

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

EB SYD (double acting)

Dangerous Failure Rate	λ_D	3.41 E-07 / h	341 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.49 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.52 E-04	

EB SYS (single acting)

Dangerous Failure Rate	λ_D	2.83 E-07 / h	283 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.24 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.26 E-04	

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

High demand Mode (see note)

Assumed Demands per Year	n_{op}	8,760 / a	1 / h
Average Frequency of a dangerous Failure per Hour	PFH	7.60 E-08	

Note: PFH has to be verified by the end user with the correct demand rate for the certain application.

The resulting PFH shall not be lower than 10 FIT. If the PFH calculation results in a lower value, 10 FIT shall be used for further investigation.

Origin of values

The stated values are the results of a FMEDA for the design and manufacturing process. In addition, the failure rate was verified by the analysis of field feedback of the last five years and by results of qualification tests.

Random and systematic failures which are in the responsibility of the manufacturer were examined.

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.