

# Certificate



**No.: 968/V 1153.00/20**

<b>Product tested</b>	Pneumatic Actuators	<b>Certificate holder</b>	C+T Flow Control Equipments (Chengdu) Co., Ltd. Tower 15, No. 428, Hanjiang Road, Jiaolong Industry Port, Shuangliu, Chengdu, Sichuan, P.R. China
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<b>Type designation</b>	CTB - medium torque actuators - single acting series: CTB130S, CTB170S, CTB200S, CTB250S, CTB280S, CTB320S - double acting series: CTB130, CTB170, CTB200, CTB250, CTB280, CTB320
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	CTC - high torque actuators - single acting series: CTC355S, CTC490S, CTC600S, CTC700S - double acting series: CTC355, CTC490, CTC600, CTC700
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<b>Codes and standards</b>	IEC 61508 Parts 1-2 and 4-7:2010
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<b>Intended application</b>	Safety Function: Single Acting: Move to its fail-safe position by internal spring force Double Acting: Move to its safe position by external pneumatic pressure
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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 the actuators may be used in a redundant architecture up to SIL 3.

<b>Specific requirements</b>	The instructions of the associated Installation, Operating and Safety Manual shall be considered.
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Summary of test results see back side of this certificate.

Valid until 2025-09-22

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 1153.00/20 dated 2020-09-04. This certificate is valid only for products, which are identical with the product tested.

**TÜV Rheinland Industrie Service GmbH**

Bereich Automation  
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Köln, 2020-09-22

Certification Body Safety & Security for Automation & Grid

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**Holder:** C+T Flow Control Equipments (Chengdu) Co., Ltd.  
 Tower 15, No. 428, Hanjiang Road,  
 Jiaolong Industry Port,  
 Shuangliu, Chendu, Sichuan,  
 P.R. China

**Product tested:** Pneumatic Actuators (types including: CTB - medium torque actuator, including single acting types CTB130S, CTB170S, CTB200S, CTB250S, CTB280S, CTB320S, and double acting types CTB130, CTB170, CTB200, CTB250, CTB280, CTB320, and CTC - high torque actuator, including single acting types CTC355S, CTC490S, CTC600S, CTC700S, and double acting types CTC355, CTC490, CTC600, CTC700)

### Results of Assessment

Route of Assessment		2 <sub>H</sub> / 1 <sub>s</sub>
Type of Sub-system		Type A
Mode of Operation		Low Demand Mode
Hardware Fault Tolerance	HFT	0
Systematic Capability		<b>SC 3</b>

### CTB – medium torque actuator

		CTB130S		CTB170S-CTB320S		CTB130		CTB170-CTB320	
Dangerous Failure Rate	$\lambda_D$	3.51 E-07 / h	351 FIT	2.35 E-07 / h	235 FIT	5.74 E-07 / h	574 FIT	5.38 E-07 / h	538 FIT
Average Probability of Failure on Demand 1001	PFD <sub>avg</sub> (T <sub>1</sub> )	1.54 E-03		1.03 E-03		2.51 E-03		2.36 E-03	
Average Probability of Failure on Demand 1002	PFD <sub>avg</sub> (T <sub>1</sub> )	1.57 E-04		1.04 E-04		2.59 E-04		2.42 E-04	

### CTC – high torque actuator

		CTC355S-CTC700S		CTC355-CTC700	
Dangerous Failure Rate	$\lambda_D$	2.65 E-07 / h	265 FIT	5.43 E-07 / h	543 FIT
Average Probability of Failure on Demand 1001	PFD <sub>avg</sub> (T <sub>1</sub> )	1.16 E-03		2.38 E-03	
Average Probability of Failure on Demand 1002	PFD <sub>avg</sub> (T <sub>1</sub> )	1.18 E-04		2.45 E-04	

Assumptions for the calculations above: DC = 0%, T<sub>1</sub> = 1 year,  $\beta_{1002}$  = 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 of the last five years.

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.