Certificate

No.: 968/V 356.06/19

Product tested	Volume Booster	**Certificate holder**	Rotork YTC Limited 81, Hwanggeum-ro 89 beon-gil Gimpo-si Gyeonggi-do, 10048 South Korea
Type designation	YT-300, YT-305, YT-310, YT-315, YT-320, YT-325		
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010 IEC 61511 Parts 1-3:2004		
Intended application	The volume boosters are suitable for use in a safety instrumented system up to SIL 2. Under consideration of the minimum required hardware fault tolerance the devices may be used in a redundant architecture (HFT=1) up to SIL 3.		
Specific requirements	The instructions of the associated Installation, Operating and Safety Manual have to be considered.		

Summary of test results see back side of this certificate.

Valid until 2021-02-22

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 356.06/19 dated 2019-02-18.
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, 2019-02-18

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Gebhard Bouwer

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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

Manufacturer	**Rotork YTC Limited** **81, Hwanggeum-ro 89 beon-gil,** **Yangchon-eup, Gimpo-si, Gyeonggi-do, 10048** **South Korea**
Product tested	**Volume Booster** **YT-300, YT-305, YT-310, YT-315, YT-320, YT-325**

Device-Specific Values

Probability of Dangerous Failure on Demand	PFD_{spec}	3,26 E-05
Confidence Level	1-α	95 %
Safe Failure Fraction (see note)	SFF	84 %
Hardware Fault Tolerance	HFT	0
Diagnostic Coverage	DC	0 %
Type of Sub System		Type A
Mode of Operation		Low Demand
Proof Test Coverage	PTC	82 %

Note

The Safe Failure Fraction (SFF) was estimated by an alternative method with a FMEA according to EN 161:2011/A3:2013.

Derived Values for 1oo1-Architecture

Assumed Demands per Year	n_{op}	1 / a	1,14 E-04 / h
Assumed Test Interval	T_i	8760 h	1 a
Total Failure Rate	$\lambda_S + \lambda_D$	2,32 E-08 / h	23 FIT
Lambda Dangerous	λ_D	3,72 E-09 / h	4 FIT
Lambda Safe	λ_S	1,95 E-08 / h	20 FIT
Mean Time To Failure	MTTF	4,30 E+07 h	4.911 a
Mean Time To Dangerous Failure	$MTTF_D$	2,69 E+08 h	30.694 a
Average Probability of Failure on Demand	**PFD_{avg}**	**1,63 E-05**	

Useful Lifetime

A time of usage of more than 5 years (+ 1.5 years of storage) can only be favored under responsibility of the operator, consideration of specific external conditions (securing of required quality of media, max. temperature, time of impact), and adequate test cycles.