Certificate

No.: 968/V 460.03/19

Product tested	Electro pneumatic positioner (called smart positioner) for the control of pneumatic valve actuators	**Certificate holder**	Rotork YTC Limited 81, Hwanggeum-ro 89 beon-gil Gimpo-si Gyeonggi-do, 10048 South Korea
Type designation	YT-3300 L/R, YT-3301 L/R, YT-3302 L/R, YT-3303 L/R, YT-3350 L/R, YT-3400 L/R, YT-3410 L/R, YT-3450 L/R		
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010		IEC 61511 Parts 1-3:2004 (in extracts)
Intended application	The Safety Function is defined as the following: • Move into fail-safe-position within 1 second, when signal to positioner is interrupted (loss of power supply) • Fail-safe means venting of "Out1" (and pressurize "Out2" - only double acting) The positioners are suitable for use in a safety instrumented system up to SIL 2. Under consideration of the minimum required hardware fault tolerance HFT=1 the positioners may be used in a redundant structure up to SIL 3.		
Specific requirements	The instructions of the associated Installation and Operating Manual have to be considered.		

Summary of test results see back side of this certificate.

Valid until 2020-05-29

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 460.03/19 dated 2019-02-18.
This certificate is valid only for products which are identical with the product tested.

Köln, 2019-02-18

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit
Am Grauen Stein, 51105 Köln
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, Hwangguem-ro, 89 beon-gil Gimpo-si,** **Gyeonggi-do, 10048** **South Korea**
Product tested	**smart positioner** **YT- 3300, 3301, 3302, 3303, 3350, 3400, 3410, 3450 -R/L**

Device-Specific Values

Probability of Dangerous Failure on Demand	PFD_{spec}	8.15 E-04 Failure / h
Test Interval	Ti	1 a
Confidence Level	1-α	95 %
Safe Failure Fraction (see note)	SFF	82 %
Hardware Fault Tolerance	HFT	0
Diagnostic Coverage	DC	0 %
Type of Sub System		Type A
Mode of Operation		Low Demand
Proof Test Coverage	PTC	not applicable
Partial Stroke Test Coverage	PSTC	not applicable

Note

The Safe Failure Fraction (SFF) was estimated by an alternative method with a FMEDA according to EN161:2011/A3:2013.

Derived Values for 1oo1-Architecture

Assumed Demands per Year	η_{op}	1 / a	1.14 E-04 / h
Total Failure Rate	$\lambda_S + \lambda_D$	5.17 E-07 / h	517 FIT
Lambda Dangerous Detected	λ_{DD}	0.00 E+00 / h	0 FIT
Lambda Dangerous Undetected	λ_{DU}	9.31 E-08 / h	93 FIT
Lambda Safe Detected	λ_{SD}	0.00 E+00 / h	0 FIT
Lambda Safe Undetected	λ_{SU}	4.24 E-07 / h	424 FIT
Mean Time To Failure	MTTF	1.93 E+06 h	221 a
Mean Time To Dangerous Failure	$MTTF_D$	1.07 E+07 h	1 226 a
Average Probability of Failure on Demand	**PFD_{avg}**	**4.08 E-04 Failure / Demand**	

Time of Usage

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.

Quality Management

These statements are bound to a proven and verified deployment of safety-related quality management of the manufacturer.