

# Certificate



**No.: V 356.05/16**

<b>Product tested</b>	Volume Booster	<b>Certificate holder</b>	Young Tech Co., LTD. 81, Hwanggeum-ro, 89 beon-gil Yangchon-eup, Gimpo-si Gyeonggi-do, 10048 South Korea
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<b>Type designation</b>	YT-300, YT-305, YT-310, YT-315, YT-320, YT-325
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<b>Codes and standards</b>	IEC 61508 Parts 1-2 and 4-7:2010 IEC 61511 Parts 1-3:2004
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<b>Intended application</b>	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.
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<b>Specific requirements</b>	The instructions of the associated Installation, Operating and Safety Manual have to be considered.
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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. V 356.05/16 dated 2016-02-22.

This certificate is valid only for products which are identical with the product tested. It becomes invalid at any change of the codes and standards forming the basis of testing for the intended application.

**TÜV Rheinland Industrie Service GmbH**  
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Köln, 2016-02-22

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Stephan Häb

Manufacturer	<b>Young Tech Co., Ltd</b> <b>81, Hwanggeum-ro 89 beon-gil,</b> <b>Yangchon-eup, Gimpo-si, Gyeonggi-do, 10048</b> <b>South Korea</b>
Product tested	<b>Volume Booster</b> <b>YT-300, YT-305, YT-310, YT-315, YT-320, YT-325</b>

**Device-Specific Values**

Probability of Dangerous Failure on Demand	$PFD_{spec}$	3,26 E-05
Confidence Level	$1-\alpha$	95 %
Safe Failure Fraction <sup>(see note)</sup>	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	$\lambda_D$	3,72 E-09 / h	4 FIT
Lambda Safe	$\lambda_S$	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 <sub>D</sub>	2,69 E+08 h	30.694 a
<b>Average Probability of Failure on Demand</b>	<b><math>PFD_{avg}</math></b>	<b>1,63 E-05</b>	

**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.