

Certificate

No. V 386 2011 C2-1

Manufacturer: Youngtech Co., LTD.
3022, Hagun-ri Yangchon-myeon, Gimpo
Gyeonggi-do 415-843
Republic of Korea

Test item: Electro Pneumatic Positioners for the control of
valve actuators

Type: YT-2500, YT-2600

**Use/
Safety function:** Return connected actuator to design required
position (fail safe) or keep connected actuator in
current position (fail freeze)

Test results: The devices of the above mentioned series are suitable
for use in safety related systems in low demand mode of
operation as a safety related subsystem according to
IEC 61508 up to and including SIL 2.

For detailed results see test report

No. V386 2011 S1-1 dated 2011-06-09

A short summary of test results is filed up on the backside of this
certificate.

**The suitability for certain fields of application can only
be assessed by the evaluation of the complete safety
related system incorporating the test item in regard to
the requirements of the IEC 61508.**

This certificate remains valid until June 2016

Cologne 2011-06-09

Inspector

Dipl.-Ing. Th. Küppers

**Test Laboratory
for Energy Appliances
Head of Laboratory**

Dipl.-Ing. F. Rick

TÜV Rheinland Energie und Umwelt GmbH, Am Grauen Stein, D-51105 Köln, Germany

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Manufacturer:	Youngtech Co., LTD.
type series	YT-2500, YT-2600

Appliance-specific values determined:

Probability of dangerous failure on demand	PFD _{spec}	Failure/demand	1.42E-07
Test interval	Ti	y	1
Confidence niveau	1- α	%	90
Safe failure fraction	SFF	%	91.6
Hardware fault tolerance	HFT	[-]	0
Diagnostic coverage	DC	%	0
Type of sub system	IEC 61508-2, 7.4.4.1.2		Type A
Mode of Operation	IEC 61508-4, 3.5.16		Low Demand Mode
Assumed demands per year*	f _{np}	demand/y	8760
Interval for closing test		y	1
Derived Values			
Demand/hour*	f _{np}	demand/h	1.00E+00
Meantime between demands		h	1.00E+00
Dangerous failure rate	λ_D	1/h	1.42E-07
		FIT	142.00
MTBF dangerous failures	MTBF _D	h	7.04E+06
		y	803.91
Safe failure rate	λ_S	1/h	1.55E-06
		FIT	1548.48
Total failure rate	$\lambda_S + \lambda_D$		1.69E-06
		FIT	1690.48
MTBF total		h	5.92E+05
MTBF total		y	67.53
Dangerous detected	λ_{DD}	1/h	0.00E+00
Dangerous undetected	λ_{DU}	1/h	1.42E-07
Safe detected	λ_{SD}	1/h	0.00E+00
Safe undetected	λ_{SU}	1/h	1.55E-06
Average probability of failure on demand	PFD_{avg}	Failure/demand	1.24E-03

*: Assumed demands include safety related and non safety related demands

Test results

It is the opinion of the test laboratory that the test item is suitable for use in safety related systems in low demand mode of operation as an element of a safety related subsystem according to IEC 61508 up to and including SIL 2. The appliance-specific values determined apply to the test item. The controlled valves and actuators and the supply of compressed air and supply voltage are not covered by this test statement.

Useful life time under operation conditions

Based on the experience up to now with these devices and regarding the corrosion protection and aging behavior of the materials used in the FMEA, a maximum operation time of 5 years can be assumed if the test item is operated according to the specifications of the manufacturer. In the opinion of the test laboratory storage under the conditions given by manufacturer of 1.5 years after production and before taking into operation will not have a negative influence. The operation time can only be extended under the responsibility of the plant operator regarding the special operation conditions and regarding special test intervals and maintenance procedures.

Assessment of the safety related system incorporating the test item

The requirements of IEC 61508 apply to complete safety related systems. For a final assessment whether a specific component can be used in a specific safety related system, the complete safety related system has to be assessed. For this assessment the appliance specific values of the test item can be used. The remarks of the report V386 2011 S1-1 shall be considered.

Quality management

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