

Certificate



Functional
Safety

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No.: 968/FSP 1559.00/18

Product tested	Magnetostrictive Liquid Level Transmitter	Certificate holder	ABB Engineering (Shanghai) Ltd. No. 4528, Kangxin Highway Pudong New District Shanghai, 201319 P.R. China
Type designation	LMT100, LMT200, LMT300		
Codes and standards	IEC 61508 Parts 1-7:2010		
Intended application	The magnetostrictive liquid level transmitters comply with the requirements of the relevant standards (Safety integrity Level 2 (SIL 2) and Systematic Capability 3 (SC 3) acc. to IEC 61508) and can be used in applications up to SIL 2 (HFT=0) resp. SIL 3 (HFT=1). The product can be used in the application area of IEC 61511-1 up to SIL 2 (HFT=0) / SIL 3 (HFT=1). Further details see page 2 of certificate.		
Specific requirements	The instructions of the associated Safety Manual shall be considered.		
Valid until	2023-01-24		

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/FSP 1559.00/18 dated 2018-01-24.

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, 2018-01-24

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Thomas Steffens

Manufacturing plants:

1. **ABB Engineering (Shanghai) Ltd.**
 No. 4528, Kangxin Highway
 Pudong New District
 Shanghai, 201319
 P.R. China
2. **ABB Limited**
 125 East County Line Road, Warminster, PA 18974

Characteristics as per IEC 61508

Safety architecture	1oo1
Hardware Fault Tolerance (HFT)	0
Hardware Safety Integrity Level (SIL)	SIL 2
Systematic Capability (SC)	SC 3
Device type of E/E/PE parts	TYPE B
Device type of mechanical level sensor parts	TYPE A
Safe Failure Fraction (SFF) of each element	> 90%
*Safe failure rate λ_S	2.756E-06 (2756FIT)
*Detected dangerous failure rate λ_{DD}	1.552E-06 (1552FIT)
*Undetected dangerous failure rate λ_{DU}	2.23E-07 (223 FIT)
Mean Time To Repair (MTTR)	8h
Mean Repair Time (MTTR)	8h
*PFDavg	9.92E-04 (9.9% of SIL 2, at PTI=1 year) 1.98E-03 (19.8% of SIL 2, at PTI=2 years)
*PFH	2.23E-07 (22.3% of SIL 2)
Notes: <ul style="list-style-type: none"> - *: Those safety related parameters include both E/E/PE parts and mechanical level sensor parts - If the user would like to achieve SIL 3 safety application by using two sets of Level Transmitters (HFT=1), the following Common Cause Failure (CCF) factors must be considered as required within the Safety Manual: $\beta = \beta_D = 5\%$ 	

1 FIT = 1 E-09 1/h

Remark: Failure rates of the electronic components as per Siemens SN 29500, calculated based upon an ambient temperature of 100 °C.