Certificate

Functional Safety

TÜVRheinland® CERTIFIED

www.tuv.com
ID 0600000000

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.

Köln, 2018-01-24

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit
Am Grauen Stein, 51105 Köln
Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Thomas Steffens

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

10/222 12. 12 E A4 ® TÜV, TUEV and TUV are registered trademarks. Utilisation and application requires prior approval.

TÜVRheinland®
Precisely Right.

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: - *: 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.