

# Certificate



Functional  
Safety

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**No.: 968/FSP 1559.00/18**

<b>Product tested</b>	Magnetostrictive Liquid Level Transmitter	<b>Certificate holder</b>	ABB Engineering (Shanghai) Ltd. No. 4528, Kangxin Highway Pudong New District Shanghai, 201319 P.R. China
<b>Type designation</b>	LMT100, LMT200, LMT300		
<b>Codes and standards</b>	IEC 61508 Parts 1-7:2010		
<b>Intended application</b>	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.		
<b>Specific requirements</b>	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

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**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 $\lambda_S$	2.756E-06 (2756FIT)
*Detected dangerous failure rate $\lambda_{DD}$	1.552E-06 (1552FIT)
*Undetected dangerous failure rate $\lambda_{DU}$	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)
<b>Notes:</b> <ul style="list-style-type: none"> <li>- *: Those safety related parameters include both E/E/PE parts and mechanical level sensor parts</li> <li>- 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:  <math>\beta = \beta_D = 5\%</math></li> </ul>	

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.