

# Certificate



Functional  
Safety

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**No.: 968/FSP 1559.01/21**

<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
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<b>Type designation</b>	LMT100, LMT200, LMT300 For details see actual "Revision List"
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<b>Codes and standards</b>	IEC 61508 Parts 1-7:2010
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<b>Intended application</b>	The product complies with the requirements of relevant standards (SC 3 and SIL 2 according to IEC 61508) and can be used in safety-related applications up to SIL 2 with a hardware fault tolerance of HFT=0 and up to SIL 3 with at least a hardware fault tolerance of HFT=1. The product was also reviewed in reference to the applicable requirements of IEC 61511-1:2016 + Corr.1:2016 + AMD1:2017 applicable during a type examination and can be used in application as such. Further details see page 2 of certificate.
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<b>Specific requirements</b>	The instructions of the associated Safety Manual shall be considered.
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The issue of this certificate is based upon an evaluation in accordance with the Certification Program CERT FSP1 V1.0:2017 in its actual version, whose results are documented in Report No. 968/FSP 1559.01/21 dated 2021-11-30. 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, 2021-11-30

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
Sate Failure Fraction (SFF) of each element	>90%
*Sate tailure rate $\lambda_s$	1.643 E-06 (1643 FIT)
*Detected dangerous failure rate $\lambda_{DD}$	1.935 E-06 (1935 FIT)
*Undetected dangerous failure rate $\lambda_{DU}$	1.93 E-07 (193 FIT)
Mean Time To Repair (MTTR)	8h
Mean Repair Time (MRT)	8h
*PFDavg	8.63 E-04 (8.6% of SIL 2, at PTI=1 year) 1.73 E-03 (17.3% of SIL 2, at PTI=2 year) 2.59 E-03 (25.9% of SIL 2, at PTI=3 year) 3.45 E-03 (34.5% of SIL 2, at PTI=4 year) 4.32 E-03 (43.2% of SIL 2, at PTI=5 year)
*PFH	1.93 E-07 (19.3% of SIL 2)
<b>Notes:</b> - *: 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.