

Certificate



Functional Safety

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ID 060000000

No.: 968/FSP 1559.01/21

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

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
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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 λ_s	1.643 E-06 (1643 FIT)
*Detected dangerous failure rate λ_{DD}	1.935 E-06 (1935 FIT)
*Undetected dangerous failure rate λ_{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)
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.