

Certificate



Functional
Safety

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ID 0600000000

No.: 968/FSP 1070.01/16

Product tested	Vortex/Swirl Flow Meter	Certificate holder	ABB Engineering (Shanghai) Ltd. No. 4528, Kangxin Highway Pudong New District Shanghai, 201319 P.R. China
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Type designation	VortexMaster FSV450 / FSV430 (with output signal H5) SwirlMaster FSS450 / FSS430 (with output signal H5)
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Codes and standards	IEC 61508 Parts 1-7:2010 IEC 61511-1:2003 + Corr. 1:2004	EN 50178:1997 EN 61326-3-1:2008
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Intended application	Flow measuring of gas, steam and liquids in pipes as part of a Safety Instrumented System (SIS). The flow meter complies with the requirements for SIL 2 / SC 2 acc. to IEC 61508 and can be used in a SIS up to SIL 2 acc. to IEC 61508 / IEC 61511. Further details see page 2 of certificate.
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Specific requirements	The instructions of the associated Installation and Operating Manual shall be considered.
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Valid until 2021-04-14

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/FSP 1070.01/16 dated 2016-04-14.

This certificate is valid only for products which are identical with the product tested. It becomes invalid at any change of the codes and standards forming the basis of testing for the intended application.

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit
Am Grauen Stein, 51105 Köln

Köln, 2016-04-14

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Thomas Steffens

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TÜVRheinland
Precisely Right.

Safety function: Measuring of the flow rate and output of an analog signal 4 – 20mA proportional to the volume flow rate. The total valid range of the output signal shall be configured to a minimum of 3.8 mA and a maximum of 20.5 mA (Factory Default).

The safety related function of the transmitter is the safe monitoring of the volume flow rate with a tolerance of $\pm 4\%$ of the span (16mA). The safety state is that the output current is lower than 3.6 mA or greater than 21 mA.

The downstream safety device must be configured to recognize the configured high alarms or low alarms as a malfunction detection.

Characteristics as per IEC 61508	Value
SIL	SIL 2 (single-channel architecture 1oo1, HFT = 0)
HFT	0
Device Type	B
Mode of operation	Low demand mode
SFF	CB board 94.3 % FE board 97.7 % Total: 97.07 %
Recommended time interval for proof-testing T1	2 years
PFD _{avg} for T1 = 2 year	CB board 1.00 E-03 10 % of SIL 2 FE board 1.46 E-03 14.6 % of SIL 2 Total: 2.47 E-03 24.7 % of SIL 2
λ_{sd}	1520 FIT
λ_{su}	2730 FIT
λ_{dd}	5080 FIT
λ_{du}	282 FIT
λ_{tot}	9612 FIT

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.