SIL_00264_01.18

Endress+Hauser
People for Process Automation

Declaration of Conformity

Functional Safety according to IEC 61508
Based on NE 130 Form B.1

Endress+Hauser SE+Co. KG, Hauptstraße 1, 79689 Maulburg

being the manufacturer, declares that the product

Tankside Monitor NRF81

is suitable for the use in safety-instrumented systems according to IEC 61508. The instructions of the corresponding functional safety manual must be followed.

This declaration of compliance is exclusively valid for the customer listed in the cover letter of the respective Endress+Hauser sales center and for the listed products and accessories in delivery status.

Maulburg, 2-August-2018
Endress+Hauser SE+Co. KG

i. V.

Manfred Hammer
Dept. Man. R&D Quality Management/FSM
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Endress+Hauser
People for Process Automation

General

Device designation and permissible types	Tankside Monitor NRF8x - *********+LA		
	x = 1		
Safety-related output signal [a] [b]	[a] 4...20 mA	[b] relay contact	
Fault signal [a] [b]	[a] ≤ 3.6 mA ; ≥ 21 mA	[b] open contact	
Process variable/function	Current in measurement		
Safety function(s)	MIN, MAX, Range		
Device type acc. to IEC 61508-2	☐ Type A	☒ Type B	
Operating mode	☒ Low Demand Mode	☒ High Demand Mode	☐ Continuous Mode
Valid hardware version	As of manufacturing date after Nov.28,2016		
Valid software version	01.02.zz or 01.03.zz (zz: any double number)		
Safety manual	SD01929G		
Type of evalulation (check only one box)	☒	Complete HW/SW evaluation parallel to development incl. FMEDA and change request acc. to IEC 61508-2, 3	
	☐	Evaluation of "proven in use" performance for HW/SW incl. FMEDA and change request acc. to IEC 61508-2, 3	
	☐	Evaluation of HW/SW field data to verify „prior use" acc. to IEC 61511	
	☐	Evaluation by FMEDA acc. to IEC 61508-2 for devices w/o software	
Evaluation through – report/certificate no.	Tank Side Monitor NRF81 Assessment report SIL2 (27.03.2017)		
Test documents	Development documents	Test reports	Data sheets

SIL - Integrity

Systematic safety integrity		☒ SIL 2 capable	☐ SIL 3 capable
Hardware safety integrity	Single channel use (HFT = 0)	☒ SIL 2 capable	☐ SIL 3 capable
	Multi channel use (HFT ≥ 1)	☒ SIL 2 capable	☐ SIL 3 capable

FMEDA

Safety function	MIN	MAX	Range
λ_{DU} [1),2)]	146 FIT	146 FIT	146 FIT
λ_{DD} [1),2)]	5101 FIT	5101 FIT	5101 FIT
λ_{SU} [1),2)]	2254 FIT	2254 FIT	2254 FIT
λ_{SD} [1),2)]	0 FIT	0 FIT	0 FIT
SFF	98 %	98 %	98 %
PFD_{avg} (T_1 = 1 year) [2)] (single channel architecture)	6.81×10^{-4}	6.81×10^{-4}	6.81×10^{-4}
PFD_{avg} (T_1 = 2 years) [2)] (single channel architecture)	1.32×10^{-3}	1.32×10^{-3}	1.32×10^{-3}
PFH	1.46×10^{-7} 1/h	1.46×10^{-7} 1/h	1.46×10^{-7} 1/h
PTC [3)]	Depending on the proof test, see safety manual	Depending on the proof test, see safety manual	Depending on the proof test, see safety manual
λ_{total} [1,2)]	7501 FIT	7501 FIT	7501 FIT
Diagnostic test interval [4)]	60 min	60 min	60 min
Fault reaction time [5)]	1 min	1 min	1 min

Comments

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Declaration

☒	Our internal company quality management system ensures information on safety-related systematic faults which become evident in the future

[1)] FIT = Failure In Time, number of failures per 10^9 h
[2)] Valid for average ambient temperature up to +40 °C (+104 °F)
For continuous operation at ambient temperature close to +60 °C (+140 °F), a factor of 2.1 should be applied
[3)] PTC = Proof Test Coverage
[4)] All diagnostic functions are performed at least once within the diagnostic test interval
[5)] Maximum time between error recognition and error response