Devices

Functional Safety Data Manual

MTTF, PFD and PFH

Contact

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1 Devices Functional Safety Data in Accordance with IEC 61508

The list in the following chapter specifies the MTTF, PFH and PFD values in accordance with IEC 61508.

General	
Test standards	IEC 61508, Part 1 - 7:2010 IEC 61511, Part 1 - 3:2004
Certificate no.	968/FSP 1235.00/16
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Table 1: General Information (IEC 61508)

1.1 Functional Safety Data of the Devices

The values indicated in the following tables were calculated in accordance with the IEC 61508 requirements and a detailed analysis (FMEDA).

Calculation of the Safety Function

The calculation of the safety function performed by a user must be based on the following assumptions:

Parameter	Value / Description
Type	A element
HFT	0, 2 for H 4135A and H 4136
MTTR	8 h
β factor	2 %
β_D factor	1 %
Mode of operation	Low demand / high demand
Safe state	In accordance with the de-energize to trip principle, see 1.1.1

Table 2: Calculation Assumptions (IEC 61508)

i All modules must meet the operating requirements specified in the module-specific manuals as well as in the safety manual.

1.1.1 De-Energize to Trip Principle

The proof test interval T_1 indicated for the following devices is 10 years.

Module	MTTF in years	λ_S / h^{-1}	λ_{DD} / h^{-1}	λ_{DU} / h^{-1}	PFD	PFH / h^{-1}	SFF	SIL
H 7014	640.60	9.21E-08	8.56E-08	8.65E-10	3.86E-05	8.65E-10	99.52 %	3
H 7505	296.97	2.55E-07	1.30E-07	1.30E-11	1.61E-06	1.30E-11	99.99 %	3
H 7506	5794.68	1.29E-08	6.80E-09	6.80E-13	8.42E-08	6.80E-13	99.99 %	3

Table 3: Functional Safety Data for the Devices (De-Energize to Trip Principle, T_1 = 10 Years)

The proof test interval T_1 indicated for the following relays is 5 years.

Module	MTTF in years	λ_S / h^{-1}	λ_{DD} / h^{-1}	λ_{DU} / h^{-1}	PFD	PFH / h^{-1}	SFF	SIL
H 4134	471.13	2.02E-07	0.00E+00	4.01E-08	8.79E-04	4.01E-08	83.45%	2
H 4136	339.75	1.16E-07	0.00E+00	2.01E-08	1.12E-05	5.10E-10	85.21%	3
H 4116	798.85	1.23E-07	0.00E+00	2.01E-08	4.41E-04	2.01E-08	85.93%	2
H 4135A	333.20	1.23E-07	0.00E+00	2.01E-08	1.12E-05	5.10E-10	85.90%	3

Table 4: Functional Safety Data for the Relays (De-Energize to Trip Principle, T_1 = 5 Years)

The proof test interval T_1 indicated for the following relays is 20 years.

Module	MTTF in years	λ_S / h^{-1}	λ_{DD} / h^{-1}	λ_{DU} / h^{-1}	PFD	PFH / h^{-1}	SFF	SIL
H 4136	339.75	1.16E-07	0.00E+00	2.01E-08	4.47E-05	5.10E-10	85.21%	2
H 4135A	333.20	1.23E-07	0.00E+00	2.01E-08	4.47E-05	5.10E-10	85.90%	2

Table 5: Functional Safety Data for the Relays (De-Energize to Trip Principle, T_1 = 20 Years)

The proof test interval T_1 indicated for the HART device is 10 years.

Module	MTTF in years	λ_S / h^{-1}	λ_{DD} / h^{-1}	λ_{DU} / h^{-1}	PFD	PFH / h^{-1}	SFF	SIL
H 6200A	86.03	5.85E-07	3.73E-07	3.48E-09	7.01E-05	1.57E-09	99.64%	3

Table 6: Functional Safety Data for the HART Device (De-Energize to Trip Principle, T_1 = 20 Years)

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