Declaration of Conformity acc. to IEC 61508

Product name: Pneumatic Rack & Pinion valve actuator
Figure numbers: 7901 and 7902

We herewith declare that the ECON actuators fig. 7901 and fig. 7902 are intended to be used to move the attached valve to its safe position (open or close).
They are suitable for use in safety-related systems up to SIL 3.

Based on the results of the analysis of the manufacturer's field experience and the requirements as mentioned in the following standard:

IEC 61508 (edition 2) – Parts 1 and 3

Achieved SIL for each safety function are detailed in the tables below.
[SIL 2 is achievable with a 1oo1 architecture and SIL 3 with a 1oo2 architecture.
PFD_{AVG} and architectural constraints have to be verified for each application.]

The product Safety Function found compliant to SIL 3 is the following:

- SF1: To open or close valve on demand.

Hypothesis and calculation results

Hypothesis taken into account are the following

- The mode of operation is "Low demand", which means less than 1 trip demand each year;
- The proof test interval is 1 year;
- The MTTR (Mean Time To Repair) used for each component is 24 hours;
- Failure rates are considered constant and do not take into account early life and end-of-life failures;
- The redundancy level (1oo1 or 1oo2) required to reach the certificate SIL is indicated in the table below.

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Synthesis of the results of the safety integrity assessment

Results of the safety integrity assessment of the **spring return actuators with figure number 7901** are presented in the table below:

Safety function	Archi-tecture	Architectural constraints					Random Failures			Systematic failures		SIL
		Type	Route H	HFT	SFF/ DC (%)	Architectural SIL	λ_{du} (FIT)	PFD (-)	Random SIL	Route S	SC	
SF1	1oo1	A	2H	0	0	SIL 2	37,4	$1{,}64\ 10^{-4}$	SIL 3	2S	SC 2	SIL 2
SF2	1oo2	A	2H	1	NA	SIL 3	-	$1{,}65\ 10^{-5}$	SIL 4	2S	SC 3	SIL 3

Results of the safety integrity assessment of the **double acting actuators with figure number 7902** are presented in the table below:

Safety function	Archi-tecture	Architectural constraints					Random Failures			Systematic failures		SIL
		Type	Route H	HFT	SFF/ DC (%)	Architectural SIL	λ_{du} (FIT)	PFD (-)	Random SIL	Route S	SC	
SF1	1oo1	A	2H	0	0	SIL 2	18,0	$7{,}87\ 10^{-5}$	SIL 4	2S	SC 2	SIL 2
SF2	1oo2	A	2H	1	NA	SIL 3	-	$7{,}92\ 10^{-6}$	SIL 4	2S	SC 3	SIL 3

Explanatory note on the synthesis table

SIL (safety integrity level) of a safety function for a given architecture corresponds at the minimum between the “architectural SIL", the “random SIL" and the systematic capability “SC“ of the system, as presented in the synthesis table.

- The “architectural SIL" quantifies the safety integrity provided by hardware architectural constraints. It depends on architecture (HFT), hardware type (A or B), hardware safety integrity considered route (1H or 2H) and SFF (safety failure fraction). The SFF given in the table is the one of the element of the system which represents the lowest fraction.
- The “random SIL" quantifies the safety integrity of the system to avoid dangerous hardware random failures. It depends on PFD (mean probability of dangerous failure on demand) or PFH (mean frequency of dangerous failure per hour) according to the mode of operation of the system.
- The “SC" is the systematic capability of the system. It quantifies the safety integrity of the system to avoid systematic failures. The systematic capability depends on the systematic safety integrity considered route (1S, 2S or 3S), including applicable techniques and measures.

ERIKS Flow Control
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