ENGINEERING SAFETY CONSULTANTS

The Global Provider of Functional Safety Expertise and Technical Consultancy

Certificate of Conformity to IEC 61508 Safety Integrity Level (SIL) 2 in terms of Random Hardware Requirements

Functional Safety of Safety-Related Programmable Electronic Systems

The **Moto Mecánica Argentina S.A., Electro-Hydraulic Assembly,** has been assessed and is considered capable, in terms of random hardware requirements, for use in a low demand Safety Function up to SIL 2.

The assessment was carried out to determine compliance with IEC 61508 with regards to:

- Random Hardware Failure;
- Architectural Constraint (HFT = 0).

The assessment was based on the assumptions, data provided, and recommendations given in:

[1] Gefran KS Series TUV Rheinland State of conformity no: 28712235, Certificate.
[2] Gefran KX Series TUV Rheinland State of conformity no: 28713306, Certificate.
[3] SW digiSens-F02 Technical datasheet, Page 3.
[4] Danfoss DST P92S PT Safety Guide – 2017.01. IC.PS.P21.1A.02, 520B7782. Page 9.
[5] Hydac Electronic Pressure Transmitter Safety Manual, Electronic Pressure Transmitter HDA 8XXN-A-XXXX-S2PD-XXX (PSI), HDA 8XX6-A-XXXX-S2PD-XXX (PSI) - Sensors for applications with increased functional safety, (SIL 2 / PL d), Part no.: 669912 / Edition: 2015/10/06 E.
[6] ESC Ltd Report: J038_FM001 Rev.2.
[7] ESC Ltd Report: J038_FM002 Rev.2.

The product was assessed against the following safety function:

- When the Pressure Transmitter detects the configured alarm settings the Logic Solver (PCB L03-60590-01) will cause de-energising and opening of solenoid relief valve;
- The response time of the Safety Function is of 15 seconds;
- The output of the Logic Solver is normally energised.

The system will also be configured to react to the following fault conditions:

- The Pressure Transmitter is to be configured in such a way that any self-detected fault or out of range (high or low) causes de-energising and opening of solenoid relief valve via Logic Solver (PCB L03-60590-01);
- Any self-detected fault in the Logic Solver will cause de-energising and opening of solenoid relief valve.

The Electro-hydraulic assembly assessed comprises the following sub-elements / functional blocks:

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Acceptable Pressure Transmitters for use in the Safety Function are:

N	Brand	Model	HFT
1	Gefran [1]	KS	0
2	Gefran [2]	KX	0
3	SW [3]	DigiSens F02	0
4	Danfoss [4]	DST P92S	0
5	Hydac [5]	HDA 8700	0

All these transmitters are suitable for use in the SIL 2 capable Electro-Hydraulic Assembly.

- Printed Circuit Board (PCB L03-60590-01): consisting of a power supply, an analogue input, a microcontroller, an external memory and a digital output (See ESC Ltd Report: J038_FM001 Rev.2 [6]);
- Hydraulic Assembly: manufactured by Bucher Hydraulics and assessed via FMECA technique (See ESC Ltd Report: J038_FM002 Rev.2 [7]).

The assessment results are as follows:

System	Component	Proof Testing Period	SFF (%)	Type	HFT	Max. SIL (Arch)	Overall PFD Achieved	SIL Capability (PFD)	Achieved SIL
Electro Hydraulic Assembly	Pressure Transmitter	1 year	92	B	0	2	9.36E-04	SIL 3	SIL 2
	Power Supply / Analogue Input (PCB)		98	A	0	3			
	Microcontroller / Memory (PCB)		90	B	0	2			
	Digital Output (PCB)		83	A	0	2			
	Hydraulic Assembly		98	A	0	3			

Chairman: Kenneth G L Simpson
Member of the IEC61508 committee
Assessment Date: May 2019, valid to May 2021
Certificate: J038_CT002 (Rev.0)

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