FUNCTIONAL SAFETY CERTIFICATE

This is to certify that the

SI-1Q and SI-2/2.1Q Skilmatic Intelligent Electro-hydraulic Quarter-turn Valve Actuators

manufactured by

Rotork Fluid Systems Ltd
(A Division of Rotork UK Ltd)
Unit 9, Brown Lane West
Leeds, West Yorkshire
LS12 6BH

have been assessed by Sira Certification Service with reference to the CASS methodologies and found to meet the requirements of

IEC 61508-2:2010

as an element/subsystem suitable for use in safety related systems performing safety functions up to and including

SIL 2 capable with HFT = 0 (1oo1)*
SIL 3 capable with HFT = 1 (1oo2)*

when used in accordance with the scope and conditions of this certificate.

* This certificate does not waive the need for further functional safety verification to establish the achieved Safety Integrity Level (SIL) of the safety related system

Certification Manager:

Wayne Thomas
Initial Certification : 10th October 2012
This certificate issued : 06th November 2017
Renewal date : 05th November 2022

UKAS PRODUCT CERTIFICATION
011

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Product description and scope of certification

The SI-1Q, SI-2Q and SI-2.1Q series are a family electromechanical valve actuators, categorized as the Skilmatic SI Actuator range, designed for use in safety critical shutdown systems. The body of the actuator is designed to ensure protection against external wear and corrosion whilst operating at 65° C.

The Skilmatic Range can be powered from Single-phase, three-phase or a 24VDC power supply; they are fully certified to ATEX, IEC, FM, CSA, INMETRO and TRCU standards. A user interface module is provided via a multilingual 32 character LCD display.

The actuators are available in a wide variety of configurations (up to 110). The SI-2Q and SI-2.1Q models are the same design except SI-2 is rated for IIB and SI-2.1Q is rated for IIC, therefore all of the design characteristics for the safety function as identical. All of the Skilmatic SI Actuators feature a fail-safe design and are available with different options in terms of return spring speed, control interface, supply voltage, mounting, size, torque, etc.

The Skilmatic SI Actuator Range consists of the following modules:

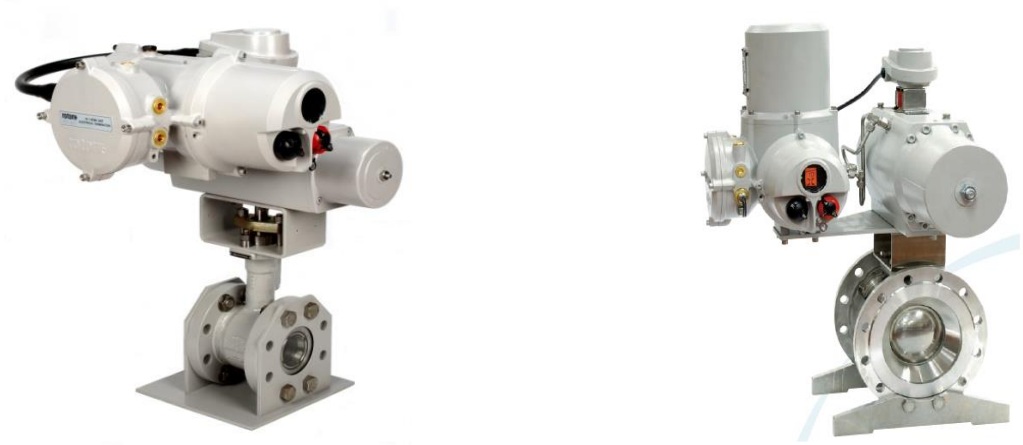

Figure 1. Skilmatic Actuator Range (SI-1Q and SI-2Q / 2.1Q fully assembled).

Modules in the equipment:

1. Flow control valve (optional)
2. Internal and external optional solenoids
3. Actuator
4. ESD circuit
5. Manual override hand pump (optional)

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Element Safety Function(s)

The safety function of the certified equipment is:

Safety Function*:
To move the actuator to the end position by mean of a spring when the ESD signal is removed.

* The safety function is applicable for low demand applications.
Note: The end position depends on the actuator configuration (closed or open)

Certified Data in support of use in safety functions

The assessment has been carried out with reference to the *Conformity Assessment of Safety-related Systems* (CASS) methodology[1] using the Route 1_H[2] approach.

A Failure Mode and Effect Analysis (FMEA) has established the failure modes and failure rates for the products assessed as shown in Table 1 below. Failure sources have been taken from RIAC NPRD-2011/FMD, Item Software and Faradip version 6.5.

The following results in Table 1a for the **Skilmatic SI-1Q Actuator Series** are based on; the best configuration, the worst configuration and the average value of all the configurations based on PFD value. These results are produced from the 22 possible configurations the SI-1Q has.

Safety Function: ***'To move the actuator to the end position by means of a spring when the ESD signal is removed'.***					
Summary of clauses 2/7.4.2&2/7.4.4		Best Config Value	Worst Config Value	Average Value	Verdict
Architectural constraints		**HFT=0**			Type A
Safe Failure Fraction (SFF)		**83%**	**87%**	**85%**	SIL 2
Random hardware failures: [h^{-1}]	λ_{DD} λ_{DU}	0.00×10^{0} 1.20×10^{-7}	0.00×10^{0} 2.69×10^{-7}	0.00×10^{0} 1.85×10^{-7}	
Random hardware failures: [h^{-1}]	λ_{SD} λ_{SU}	0.00×10^{0} 5.80×10^{-7}	0.00×10^{0} 1.80×10^{-6}	0.00×10^{0} 1.07×10^{-6}	
PFD @ PTI = 8760Hrs[1] MTTR = 8 Hrs[1]		**5.27×10^{-4}**	**1.18×10^{-3}**	**8.11×10^{-4}**	SIL 2
Hardware safety integrity compliance		Route 1_H			
Systematic safety integrity compliance		Route 1_S			
Systematic capability		*SC3* (See report 56A28091B)*			
Overall SIL achieved		**SIL 2 due to architectural constraints (SFF)**			

Table 1a: Summary of Failure Data of SI-1Q

[1] www.cass.uk.net
[2] Refer to IEC 61508-2, 7.4.4, for a definition of this term

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Summary of the SI-1Q FMEA analysis of Table (1a)

SIRA FMEA FIGURES FOR SI-1Q																		
Conf No.	Actuator	SOV config	FCV	ESD circuit	**Dang**	**Safe**	**SFF**	**PFDavg**	**SIL**	**Conf No.**	Actuator	SOV config	FCV	ESD circuit	**Dang**	**Safe**	**SFF**	**PFDavg**	**SIL**
1	Q31-Q61	0	N	Y	1.60E-07	9.03E-07	84.55%	7.24E-04	**2**	**12**	Q31-Q61	6	Y	N	1.61E-07	8.00E-07	83.25%	7.06E-04	**2**
2	Q31-Q61	0	Y	Y	2.01E-07	1.11E-06	84.67%	8.82E-04	**2**	**13**	Q31-Q61	7	N	N	1.61E-07	9.40E-07	85.38%	7.06E-04	**2**
3	Q31-Q61	1 or 3	N	Y	1.28E-07	6.40E-07	83.33%	5.62E-04	**2**	**14**	Q31-Q61	7	Y	N	1.97E-07	1.15E-06	85.37%	8.64E-04	**2**
4	Q31-Q61	1 or 3	Y	Y	1.64E-07	8.50E-07	83.83%	7.20E-04	**2**	**15**	Q31-Q61	7	N	N	1.26E-07	6.82E-07	84.41%	5.53E-04	**2**
5	Q31-Q61	2 or 5	N	Y	2.01E-07	1.26E-06	86.24%	8.82E-04	**2**	**16**	Q31-Q61	7	Y	N	1.97E-07	1.15E-06	85.37%	8.64E-04	**2**
6	Q31-Q61	2 or 5	Y	Y	2.37E-07	1.46E-06	86.03%	1.04E-03	**2**	**17**	Q31-Q61	7	N	N	1.26E-07	6.36E-07	83.46%	5.53E-04	**2**
7	Q31-Q61	2 or 5	N	Y	1.66E-07	9.49E-07	85.11%	7.28E-04	**2**	**18**	Q31-Q61	7	Y	N	1.62E-07	8.46E-07	83.93%	7.11E-04	**2**
8	Q31-Q61	2 or 5	Y	Y	2.02E-07	1.16E-06	85.17%	8.86E-04	**2**	**19**	Q31-Q61	7	N	N	1.26E-07	6.82E-07	84.41%	5.53E-04	**2**
9	Q31-Q61	5	N	Y	2.37E-07	1.60E-06	87.10%	1.04E-03	**2**	**20**	Q31-Q61	7	N	N	1.26E-07	6.82E-07	84.41%	5.53E-04	**2**
10	Q31-Q61	5	Y	Y	2.73E-07	1.81E-06	86.89%	1.20E-03	**2**	**21**	Q31-Q61	7	N	N	1.26E-07	6.36E-07	83.46%	5.53E-04	**2**
11	Q31-Q61	6	N	N	1.25E-07	5.90E-07	82.52%	5.49E-04	**2**	**22**	Q31-Q61	7	N	N	1.26E-07	6.36E-07	83.46%	5.53E-04	**2**

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The following results in Tables 1b and 1c for the **Skilmatic SI-2.1Q Actuator Series** are based on the best configuration, the worst configuration and the average value of all the configurations based on PFD value. These results are produced from the 44 possible configurations of each of the SI-2Q has.

Safety Function: ***'To move the actuator to the end position by means of a spring when the ESD signal is removed'.***					
Summary of clauses 2/7.4.2&2/7.4.4		Best Config Value	Worst Config Value	Average Value	Verdict
Architectural constraints		**HFT=0**			Type A
Safe Failure Fraction (SFF)		**83%**	**87%**	**85%**	SIL 2
Random hardware failures: [h^{-1}]	λ_{DD} λ_{DU}	0.00×10^{0} 1.20×10^{-7}	0.00×10^{0} 2.66×10^{-7}	0.00×10^{0} 1.82×10^{-7}	
Random hardware failures: [h^{-1}]	λ_{SD} λ_{SU}	0.00×10^{0} 5.81×10^{-7}	0.00×10^{0} 1.83×10^{-6}	0.00×10^{0} 1.11×10^{-6}	
PFD @ PTI = 8760Hrs[1] MTTR = 8 Hrs[1]		**5.27×10^{-4}**	**1.17×10^{-3}**	**7.99×10^{-4}**	SIL 2
Hardware safety integrity compliance		Route 1_H			
Systematic safety integrity compliance		Route 1_S			
Systematic capability		*SC3* (See report 56A28091B)*			
Overall SIL achieved		**SIL 2 due to architectural constraints (SFF)**			

Table 1b: Summary of Failure Data of SI-2.1Q.

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Summary of the SI-2.1Q FMEA analysis of Table (1b)

SIRA FMEA FIGURES FOR SI-2Q SERIES																			
Conf No.	Actuator	SOV config	FCV	ESD circuit	Dang	Safe	SFF	PFDavg	SIL	Conf No.	Actuator	SOV config	FCV	ESD circuit	Dang	Safe	SFF	PFDavg	SIL
23	Q110-Q112	0	N	Y	1.54E-07	8.23E-07	84.24%	6.76E-04	2	45	Q61-Q80	0	N	Y	1.61E-07	8.85E-07	84.61%	7.06E-04	2
24	Q110-Q112	0	Y	Y	1.90E-07	1.03E-06	84.43%	8.34E-04	2	46	Q61-Q80	0	Y	Y	1.97E-07	8.85E-07	81.79%	8.64E-04	2
25	Q110-Q112	1 or 3	N	Y	1.20E-07	5.80E-07	82.76%	5.27E-04	2	47	Q61-Q80	1 or 3	N	Y	1.30E-07	6.40E-07	83.40%	5.57E-04	2
26	Q110-Q112	1 or 3	Y	Y	1.60E-07	7.90E-07	83.44%	6.85E-04	2	48	Q61-Q80	1 or 3	Y	Y	1.60E-07	8.50E-07	83.88%	7.15E-04	2
27	Q110-Q112	2 or 5	N	Y	1.90E-07	1.17E-06	86.03%	8.34E-04	2	49	Q61-Q80	2 or 5	N	Y	1.97E-07	1.24E-06	86.29%	8.64E-04	2
28	Q110-Q112	2 or 5	Y	Y	2.26E-07	1.38E-06	85.93%	9.92E-04	2	50	Q61-Q80	2 or 5	Y	Y	2.33E-07	1.45E-06	86.16%	1.02E-03	2
29	Q110-Q112	2 or 5	N	Y	1.55E-07	8.36E-07	84.36%	6.80E-04	2	51	Q61-Q80	2 or 5	N	Y	1.62E-07	9.31E-07	85.18%	7.11E-04	2
30	Q110-Q112	2 or 5	Y	Y	1.91E-07	1.08E-06	84.97%	8.38E-04	2	52	Q61-Q80	2 or 5	Y	Y	1.98E-07	1.14E-06	85.20%	8.69E-04	2
31	Q110-Q112	5	N	Y	2.30E-07	1.50E-06	87.06%	9.92E-04	2	53	Q61-Q80	5	N	Y	2.33E-07	1.59E-06	87.22%	1.02E-03	2
32	Q110-Q112	5	Y	Y	2.60E-07	1.80E-06	87.04%	1.15E-03	2	54	Q61-Q80	5	Y	Y	2.69E-07	1.80E-06	87.00%	1.18E-03	2
33	Q110-Q112	6	N	N	1.52E-07	7.73E-07	83.57%	6.67E-04	2	55	Q61-Q80	6	N	N	1.59E-07	8.35E-07	84.00%	6.98E-04	2
34	Q110-Q112	6	Y	N	1.88E-07	9.38E-07	83.30%	8.25E-04	2	56	Q61-Q80	6	Y	N	1.95E-07	1.05E-06	84.34%	8.56E-04	2
35	Q110-Q112	7	N	N	1.88E-07	1.12E-06	85.63%	8.25E-04	2	57	Q61-Q80	7	N	N	1.95E-07	1.19E-06	85.92%	8.56E-04	2
36	Q110-Q112	7	Y	N	2.24E-07	1.33E-06	85.59%	9.83E-04	2	58	Q61-Q80	7	Y	N	2.31E-07	1.40E-06	85.84%	1.01E-03	2
37	Q110-Q112	7	N	N	1.51E-07	8.64E-07	85.12%	6.63E-04	2	59	Q61-Q80	7	N	N	1.60E-07	9.26E-07	85.27%	7.02E-04	2
38	Q110-Q112	7	Y	N	2.59E-07	1.68E-06	86.64%	1.14E-03	2	60	Q61-Q80	7	Y	N	2.66E-07	1.75E-06	86.81%	1.17E-03	2
39	Q110-Q112	7	N	N	1.53E-07	8.19E-07	84.26%	6.71E-04	2	61	Q61-Q80	7	N	N	1.60E-07	8.81E-07	84.63%	7.02E-04	2
40	Q110-Q112	7	Y	N	1.89E-07	1.03E-06	84.50%	8.29E-04	2	62	Q61-Q80	7	Y	N	1.96E-07	1.09E-06	84.76%	8.60E-04	2
41	Q110-Q112	7	N	N	1.53E-07	8.64E-07	84.96%	6.71E-04	2	63	Q61-Q80	7	N	N	1.60E-07	9.26E-07	85.27%	7.02E-04	2
42	Q110-Q112	7	N	N	1.53E-07	8.64E-07	84.96%	6.71E-04	2	64	Q61-Q80	7	N	N	1.60E-07	9.26E-07	85.27%	7.02E-04	2
43	Q110-Q112	7	N	N	1.53E-07	8.19E-07	84.26%	6.71E-04	2	65	Q61-Q80	7	N	N	1.60E-07	8.81E-07	84.63%	7.02E-04	2
44	Q110-Q112	7	N	N	1.53E-07	8.19E-07	84.26%	6.71E-04	2	66	Q61-Q80	7	N	N	1.60E-07	8.81E-07	84.63%	7.02E-04	2

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Table 1c: Summary of Failure Data of SI-2Q.

Safety Function: ***To de-power the internal solenoids so the actuator fails safe when the ESD signal is disabled***					
Summary of clauses 2/7.4.2&2/7.4.4		Best Config Value	Worst Config Value	Average Value	Verdict
Architectural constraints		**HFT=0**			Type A
Safe Failure Fraction (SFF)		**83%**	**80%**	**81%**	SIL 2
Random hardware failures: [h^{-1}]	λ_{DD} λ_{DU}	0.00×10^{0} 1.37×10^{-7}	0.00×10^{0} 4.38×10^{-7}	0.00×10^{0} 2.80×10^{-7}	
Random hardware failures: [h^{-1}]	λ_{SD} λ_{SU}	0.00×10^{0} 6.59×10^{-7}	0.00×10^{0} 1.80×10^{-6}	0.00×10^{0} 1.14×10^{-6}	
PFD @ PTI = 8760Hrs[1] MTTR = 8 Hrs[1]		**6.01×10^{-4}**	**1.92×10^{-3}**	**1.23×10^{-3}**	SIL 2
Hardware safety integrity compliance		Route 1_H			
Systematic safety integrity compliance		Route 1_S			
Systematic capability		*SC3* (See report 56A28091B)*			
Overall SIL achieved		**SIL 2 due to architectural constraints (SFF)**			

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Summary of the SI-2Q FMEA analysis of Table (1c)

SIRA FMEA FIGURES FOR SI-2.1Q SERIES																		
Conf No.	Actuator	SOV config	FCV	ESD circuit	**Dang**	**Safe**	**SFF**	**PFDavg**	**SIL**	**Conf No.**	Actuator	SOV config	FCV	ESD circuit	**Dang**	**Safe**	**SFF**	**PFDavg**	**SIL**
67	Q110-Q112	0	N	Y	1.51E-07	8.57E-07	85.02%	6.63E-04	**2**	**89**	Q61-Q80	0	N	Y	1.58E-07	9.19E-07	85.33%	6.93E-04	**2**
68	Q110-Q112	0	Y	Y	1.87E-07	1.07E-06	85.12%	8.21E-04	**2**	**90**	Q61-Q80	0	Y	Y	1.94E-07	1.13E-06	85.35%	8.51E-04	**2**
69	Q110-Q112	1 or 3	N	Y	1.20E-07	5.80E-07	82.86%	5.27E-04	**2**	**91**	Q61-Q80	1 or 3	N	Y	1.27E-07	6.42E-07	83.49%	5.57E-04	**2**
70	Q110-Q112	1 or 3	Y	Y	1.56E-07	7.90E-07	83.51%	6.85E-04	**2**	**92**	Q61-Q80	1 or 3	Y	Y	1.63E-07	8.52E-07	83.94%	7.15E-04	**2**
71	Q110-Q112	2 or 5	N	Y	1.87E-07	1.21E-06	86.61%	8.21E-04	**2**	**93**	Q61-Q80	2 or 5	N	Y	1.94E-07	1.27E-06	86.75%	8.51E-04	**2**
72	Q110-Q112	2 or 5	Y	Y	2.23E-07	1.42E-06	86.43%	9.79E-04	**2**	**94**	Q61-Q80	2 or 5	Y	Y	2.30E-07	1.48E-06	86.55%	1.01E-03	**2**
73	Q110-Q112	2 or 5	N	Y	1.52E-07	9.03E-07	85.59%	6.67E-04	**2**	**95**	Q61-Q80	2 or 5	N	Y	1.59E-07	9.65E-07	85.85%	6.98E-04	**2**
74	Q110-Q112	2 or 5	Y	Y	1.88E-07	1.11E-06	85.52%	8.25E-04	**2**	**96**	Q61-Q80	2 or 5	Y	Y	1.95E-07	1.17E-06	85.71%	8.56E-04	**2**
75	Q110-Q112	5	N	Y	2.23E-07	1.56E-06	87.49%	9.79E-04	**2**	**97**	Q61-Q80	5	N	Y	2.30E-07	1.62E-06	87.57%	1.01E-03	**2**
76	Q110-Q112	5	Y	Y	2.59E-07	1.77E-06	87.24%	1.14E-03	**2**	**98**	Q61-Q80	5	Y	Y	2.66E-07	1.83E-06	87.31%	1.17E-03	**2**
77	Q110-Q112	6	N	N	1.49E-07	8.07E-07	84.41%	6.54E-04	**2**	**99**	Q61-Q80	6	N	N	1.56E-07	8.69E-07	84.78%	6.85E-04	**2**
78	Q110-Q112	6	Y	N	1.85E-07	1.02E-06	84.65%	8.12E-04	**2**	**100**	Q61-Q80	6	Y	N	1.92E-07	1.08E-06	84.91%	8.42E-04	**2**
79	Q110-Q112	7	N	N	1.85E-07	1.16E-06	86.25%	8.12E-04	**2**	**101**	Q61-Q80	7	N	N	1.92E-07	1.22E-06	86.40%	8.42E-04	**2**
80	Q110-Q112	7	Y	N	2.21E-07	1.37E-06	86.11%	9.70E-04	**2**	**102**	Q61-Q80	7	Y	N	2.28E-07	1.43E-06	86.25%	1.00E-03	**2**
81	Q110-Q112	7	N	N	1.50E-07	8.98E-07	85.69%	6.58E-04	**2**	**103**	Q61-Q80	7	N	N	1.57E-07	9.60E-07	85.94%	6.89E-04	**2**
82	Q110-Q112	7	Y	N	2.56E-07	1.72E-06	87.04%	1.12E-03	**2**	**104**	Q61-Q80	7	Y	N	2.63E-07	1.78E-06	87.13%	1.15E-03	**2**
83	Q110-Q112	7	N	N	1.50E-07	8.53E-07	85.04%	6.58E-04	**2**	**105**	Q61-Q80	7	N	N	1.57E-07	9.15E-07	85.35%	6.89E-04	**2**

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84	Q110-Q112	7	Y	N	1.86E-07	1.06E-06	85.07%	8.16E-04	**2**	**106**	Q61-Q80	7	Y	N	1.93E-07	1.12E-06	85.30%	8.47E-04	**2**
85	Q110-Q112	7	N	N	1.50E-07	8.98E-07	85.69%	6.58E-04	**2**	**107**	Q61-Q80	7	N	N	1.57E-07	9.60E-07	85.94%	6.89E-04	**2**
86	Q110-Q112	7	N	N	1.50E-07	8.98E-07	85.69%	6.58E-04	**2**	**108**	Q61-Q80	7	N	N	1.57E-07	9.60E-07	85.94%	6.89E-04	**2**
87	Q110-Q112	7	N	N	1.50E-07	8.53E-07	85.04%	6.58E-04	**2**	**109**	Q61-Q80	7	N	N	1.57E-07	9.15E-07	85.35%	6.89E-04	**2**
88	Q110-Q112	7	N	N	1.50E-07	8.53E-07	85.04%	6.58E-04	**2**	**110**	Q61-Q80	7	N	N	1.57E-07	9.15E-07	85.35%	6.89E-04	**2**

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Note 1: The product includes the feature of having Partial Valve Stroke Test (PST) in order to identify some faults during the time between Proof Test Intervals. This could be used in safety functions with higher SILs, such as SIL 3 if the end user wishes to implement this feature. Sira has not assessed this option during the product assessment; hence this option is left to the discretion of the end user.

Note 2: The failure data:

1) Failure rates stated in Figure 1 are in units of failures per hour
2) The PFD_{AVG} figure shown is for illustration only assuming a proof test interval of 8760 hours and MTTR of 8 hours. Refer to IEC 61508-6 for guidance on PFD_{AVG} calculations from the failure data.
3) The internal architecture is of 1oo1 (no redundancy). Where solenoids used in redundant modes, FMEA calculation have been adjusted for $\beta = 0.1$.
4) Environment / stress criteria used in the FMEDA: 'Ground; stationary; non-weather protected' conditions.
5) The failure rates do not include no parts failures and no diagnostics functions.
6) PST assessment. See note 1 above.

The failure data above is supported by the base information given in Table 2 below.

Table 2

1	Product identification:	Rotork Fluid Systems models: • SI-1Q, SI-2Q and SI-2.1Q Skilmatic Actuators
2	Functional specification:	To move the actuator to the **end position** by mean of a spring when the ESD signal is removed. Note: The end position depends on the actuator configuration (closed or open)
3-5	Random hardware failure rates:	Refer to previous table above
6	Environment limits:	Temperature range: -40°C to +65°C operational
7	Lifetime/replacement limits:	Refer to installation, operation and maintenance (I, O & M) instructions.
8	Proof Test requirements:	Refer to Safety Manual
9	Maintenance requirements:	Refer to Safety Manual
10	Diagnostic coverage:	Refer to previous tables above
11	Diagnostic test interval:	PST can be implemented, Refer to Safety Manual
12	Repair constraints:	None, other than compliance with the I, O & M instructions
13	Safe Failure Fraction:	Refer to previous tables above
14	Hardware fault tolerance (HFT):	none
15	Highest SIL (architecture/type A/B):	Type A, SIL 2 with (HFT =0) & SIL 3 with (HFT =1)
16	Systematic failure constraints:	None, other than compliance with the I, O & M instructions
17	Evidence of similar conditions in previous use:	Not applicable
18	Evidence supporting the application under different conditions of use:	Not applicable
19	Evidence of period of operational	Not applicable

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	use:	
20	Statement of restrictions on functionality:	Not applicable
21	Systematic capability:	Up to SC3
22	Systematic fault avoidance measures:	Refer to assessment of the techniques and measures used to avoid systematic failures introduced during the realization lifecycle from 61508-2 Annex B. see report R56A28091B
23	Systematic fault tolerance measures:	Diagnostic can be available via PST
24	Validation records:	Functional testing assessed in Sira report R56A28091A and R56A28091B

Management of functional safety

The assessment has demonstrated that the product is supported by an appropriate functional safety management system that meets the relevant requirements of IEC 61508-1:2010 clause 6. See report R56A28091B

Identification of certified equipment

The certified equipment and it's safe use is defined in the manufacturer's documentation listed in Table 3 below.

Table 3: Certified documents

Document no.	Rev	Date	Document description
Rotork-Sol.1	1.0	14/09/2012	FMEDA of solenoid showing SFF and PFD values.
Rotork-Sol.2	1.0	14/09/2012	FMEDA of solenoid showing SFF and PFD values.
Rotork-Sol.3	1.0	14/09/2012	FMEDA of solenoid showing SFF and PFD values.
Rotork-Sol.4	1.0	14/09/2012	FMEDA of solenoid showing SFF and PFD values.
Rotork-Sol.5	1.0	14/09/2012	FMEDA of solenoid showing SFF and PFD values.
SI ESD FMECA	1.0	14/09/2012	FMEDA of ESD circuit showing failure rates and failure modes.
Rotork-TUVFMEA	1.0	14/09/2012	110 configurations of the product including results for PFD, SFF for both PST and no PST.
SI-1Q Datasheet	1.0	29/08/2012	SI-1Qseries datasheet.
SI-2Q.1Q Datasheet	1.0	29/08/2012	SI-2Q & 2.1 series datasheet.
GP PFD Assessment Q110-112	1.0	03/10/2007	GP actuator SIL assessment report from TUV.
RC SIL Cert Q31-80	1.0	20/07/2010	RC actuator SIL assessment report from TUV.
SI SERIES REPORT	3.0	14/09/2012	Overview and system description for the Skilmatic SI Actuator range.
Safety Manual	2	11/04/2013	Product safety manual of overall Skilmatic Range.

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Conditions of Certification

The validity of the certified base data is conditional on the manufacturer complying with the following conditions:

1. The manufacturer shall analyse failure data from returned products on an on-going basis. Sira Certification Service shall be informed in the event of any indication that the actual failure rates are worse than the certified failure rates. (A process to rate the validity of field data should be used. To this end, the manufacturer should co-operate with users to operate a formal field-experience feedback programme).
2. Sira shall be notified in advance (with an impact analysis report) before any modifications to the certified equipment or the functional safety information in the user documentation is carried out. Sira may need to perform a re-assessment if modifications are judged to affect the product's functional safety certified herein.
3. On-going lifecycle activities associated with this product (e.g., modifications, corrective actions, field failure analysis) shall be subject to surveillance by Sira in accordance with 'Regulations Applicable to the Holders of Sira Certificates'.

Conditions of Safe Use

The validity of the certified base data in any specific user application is conditional on the user complying with the following conditions:

1. Selection of this equipment for use in safety functions and the installation, configuration, overall validation, maintenance and repair shall only be carried out by competent personnel, observing all the manufacturer's conditions and recommendations in the user documentation.
2. All information associated with any field failures of this product should be collected under a dependability management process (e.g., IEC 60300-3-2) and reported to the manufacturer.

General Conditions and Notes

1. This certificate is based upon a functional safety assessment of the product described in Sira Test & Certification Assessment Report R56A28091A and any further reports referenced (R56A28091B) and R70155535A.
2. If certified product or system is found not to comply, Sira Certification Service should be notified immediately at the address shown on this certificate.
3. The use of this Certificate and the Sira Certification Mark that can be applied to the product or used in publicity material are subject to the 'Regulations Applicable to the Holders of Sira Certificates' and 'Supplementary Regulations Specific to Functional Safety Certification'.
4. This document remains the property of Sira and shall be returned when requested by the issuer.

Certificate History

Issue	Date	Report no.	Comment
05	06/10/2017	R70155535A	Temporary 3-month certificate issued to allow time Rotork Fluid Systems to close out remaining NCRs from the recertification audit.
06	06/11/2017	R70155535R	Re-issued for a further 5 years after closure of all non-conformities from recertification audit.

UKAS PRODUCT CERTIFICATION
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