



**Certificate no. TAI-FS-C-23-0026**

WE HEREBY CERTIFY THAT

**Product description** ELECTRO-HYDRAULIC SCOTCH-YOKE SPRING RETURN ACTUATOR

**Models** BETTIS™ SERIES EHO

**Manufacturer** EMERSON AUTOMATION SOLUTIONS  
Valve Automation, Inc.  
19200 Northwest Freeway  
Houston, Texas 77065  
USA

IS IN COMPLIANCE WITH THE REQUIREMENTS OF THE STANDARDS

**IEC 61508 Parts 1–7:2010**

AS RESULT OF THE ASSESSMENT ACCORDING TO THE PROVISION SET OUT IN THE ABOVE-MENTIONED STANDARDS

**Report no. TAI-FS-R-23-0053**

**Expiry date 20.04.2026**

**Issue date 21.04.2023**

TÜV AUSTRIA ITALIA - Blu Solutions s.r.l.  
21.04.2023, Monte Roberto (AN)

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## Annex to certificate no. TAI-FS-C-23-0026

<b>Type</b>	A
<b>HFT</b>	0
<b>Safety functions</b>	1. Delivery of a full stroke driven by the spring, with power fluid exhausted from the cylinder through the control system
<b>Mode of operation</b>	Low Demand Mode

Random failure rates						
Schematic	$\lambda_D$ [1/h]	$\lambda_{DD(PS)}$ [1/h]	PFD <sub>AVG</sub> (T <sub>I</sub> =12 m, MRT=24 h)	PFD <sub>AVG</sub> (T <sub>I</sub> =12 m, T <sub>IO</sub> =1 m, MRT=24 h)	PFD <sub>AVG</sub> (T <sub>I</sub> =12 m, T <sub>IO</sub> =3 m, MRT=24 h)	
11636-S, 11962-S, 11828-S with SOV Hawe series G and actuator series G	8,13E-08	7,76E-08	3,58E-04	4,63E-05	1,03E-04	
11636-S, 11962-S, 11828-S with SOV Bifold Fluidpower series FP05 and actuator series G	1,73E-07	1,68E-07	7,60E-04	8,55E-05	2,08E-04	
11636-S, 11962-S, 11828-S with SOV Bifold Fluidpower series FP15 and actuator series G	2,63E-07	2,57E-07	1,16E-03	1,24E-04	3,12E-04	
11636-S, 11962-S, 11828-S with SOV Thompson Valves series ICO and actuator series G	4,06E-08	3,74E-08	1,79E-04	2,89E-05	5,62E-05	
11829-S, 11645-S, 11845-S with redundant SOVs Hawe series G and actuator series G	4,02E-08	3,69E-08	1,77E-04	2,87E-05	5,56E-05	
11829-S, 11645-S, 11845-S with redundant SOVs Bifold Fluidpower series FP05 and actuator series G	4,93E-08	4,60E-08	2,17E-04	3,26E-05	6,61E-05	
11829-S, 11645-S, 11845-S with redundant SOVs Bifold Fluidpower series FP15 and actuator series G	5,83E-08	5,49E-08	2,57E-04	3,64E-05	7,65E-05	
11829-S, 11645-S, 11845-S with redundant SOVs Thompson Valves series ICO and actuator series G	3,61E-08	3,29E-08	1,59E-04	2,69E-05	5,09E-05	
12014-S with SOV Hawe series G, quick exhaust valve Bifold Fluidpower and actuator series G	1,34E-07	1,30E-07	5,91E-04	6,90E-05	1,64E-04	
12014-S with SOV Hawe series G, quick exhaust valve SigmaHLR and actuator series G	1,17E-07	1,13E-07	5,16E-04	6,17E-05	1,44E-04	
12014-S with SOV Bifold Fluidpower series FP05, quick exhaust valve Bifold Fluidpower and actuator series G	2,26E-07	2,21E-07	9,94E-04	1,08E-04	2,69E-04	
12014-S with SOV Bifold Fluidpower series FP05, quick exhaust valve SigmaHLR and actuator series G	2,09E-07	2,04E-07	9,19E-04	1,01E-04	2,50E-04	
12014-S with SOV Bifold Fluidpower series FP15, quick exhaust valve Bifold Fluidpower and actuator series G	3,16E-07	3,10E-07	1,39E-03	1,47E-04	3,73E-04	
12014-S with SOV Bifold Fluidpower series FP15, quick exhaust valve SigmaHLR and actuator series G	2,99E-07	2,93E-07	1,32E-03	1,40E-04	3,53E-04	
12014-S with SOV Thompson Valves series ICO, quick exhaust valve Bifold Fluidpower and actuator series G	9,36E-08	8,99E-08	4,12E-04	5,16E-05	1,17E-04	
12014-S with SOV Thompson Valves series ICO, quick exhaust valve SigmaHLR and actuator series G	7,66E-08	7,30E-08	3,38E-04	4,43E-05	9,76E-05	

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## Annex to certificate no. TAI-FS-C-23-0026

Random failure rates					
Schematic	$\lambda_D$ [1/h]	$\lambda_{DD(PS)}$ [1/h]	PFD <sub>AVG</sub> (T <sub>F</sub> =12 m, MRT=24 h)	PFD <sub>AVG</sub> (T <sub>F</sub> =12 m, T <sub>b</sub> =1 m, MRT=24 h)	PFD <sub>AVG</sub> (T <sub>F</sub> =12 m, T <sub>b</sub> =3 m, MRT=24 h)
12088-S with redundant SOVs Hawe series G, quick exhaust valve Bifold Fluidpower and actuator series G	9,32E-08	8,94E-08	4,10E-04	5,14E-05	1,17E-04
12088-S with redundant SOVs Hawe series G, quick exhaust valve SigmaHLR and actuator series G	7,62E-08	7,26E-08	3,35E-04	4,41E-05	9,71E-05
12088-S with redundant SOVs Bifold Fluidpower series FP05, quick exhaust valve Bifold Fluidpower and actuator series G	1,02E-07	9,84E-08	4,51E-04	5,53E-05	1,27E-04
12088-S with redundant SOVs Bifold Fluidpower series FP05, quick exhaust valve SigmaHLR and actuator series G	8,53E-08	8,16E-08	3,76E-04	4,80E-05	1,08E-04
12088-S with redundant SOVs Bifold Fluidpower series FP15, quick exhaust valve Bifold Fluidpower and actuator series G	1,11E-07	1,07E-07	4,90E-04	5,92E-05	1,38E-04
12088-S with redundant SOVs Bifold Fluidpower series FP15, quick exhaust valve SigmaHLR and actuator series G	9,43E-08	9,05E-08	4,15E-04	5,19E-05	1,18E-04
12088-S with redundant SOVs Thompson Valves series ICO, quick exhaust valve Bifold Fluidpower and actuator series G	8,91E-08	8,54E-08	3,92E-04	4,97E-05	1,12E-04
12088-S with redundant SOVs Thompson Valves series ICO, quick exhaust valve SigmaHLR and actuator series G	7,21E-08	6,85E-08	3,18E-04	4,24E-05	9,24E-05
11788-S, 11904-S, 11831-S, 12054-S with SOV Hawe series G and actuator series E	7,79E-08	7,45E-08	3,43E-04	4,38E-05	9,82E-05
11788-S, 11904-S, 11831-S, 12054-S with SOV Bifold Fluidpower series FP05 and actuator series E	1,69E-07	1,65E-07	7,45E-04	8,30E-05	2,03E-04
11788-S, 11904-S, 11831-S, 12054-S with SOV Bifold Fluidpower series FP15 and actuator series E	2,59E-07	2,54E-07	1,14E-03	1,22E-04	3,07E-04
11788-S, 11904-S, 11831-S, 12054-S with SOV Thompson Valves series ICO and actuator series E	3,72E-08	3,43E-08	1,64E-04	2,63E-05	5,14E-05


<b>Systematic capability</b>	3 (Route 1s applied)			
<b>Architectural constraints</b>	Route 1H:	Applied	Route 2H:	Applied
	The product can be used in: <ul style="list-style-type: none"> <li>• single channel configuration:                             <ul style="list-style-type: none"> <li>○ up to SIL 2 without external diagnostic tests</li> <li>○ up to SIL 3 considering external diagnostic tests</li> </ul> </li> <li>• double channel configuration: up to SIL 3</li> </ul>			

**Remarks:**

- Modifications of the schemes, which do not involve the safety function, do not impair the validity of the present certificate.
- The above values of PFD<sub>AVG</sub> are calculated for MRT=24 h and Proof Test Coverage=100%. For other values of MRT, T<sub>F</sub>, T<sub>IPs</sub> and/or non-perfect Proof Test, the PFD<sub>AVG</sub> values must be re-calculated.
- For further details, including environmental conditions, limitations of use, lifetime, failure rates traceability, mean repair times, common cause factors and systematic capability constraints, make reference to Safety Manual ES 78\_SMA\_EHO

END OF CERTIFICATE

TÜV AUSTRIA ITALIA - Blu Solutions s.r.l.  
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