

Certificate



Product Safety
Functional
Safety

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No.: 968/FSP 1344.00/17

Product tested	Intelligent Safety Solenoid including a local control panel	Certificate holder	Metso Flow Control, Oy. Vanha Porvoontie 229 01380 Vantaa Finland
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Type designation	VG9000H_L3 in combination with the loop powered control panel LCPH9_L
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Codes and standards	IEC 61508 Parts 1-7:2010
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Intended application	Safety-related Emergency Shut-down of a valve by releasing pressurized air from the actuator. It can be used in combination with the loop powered control panel LCPH9_L in low demand mode applications up to SIL 3.
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Specific requirements	The overall safety integrity depends mainly on the connected actuator and the final valve (ESD or ESV) to the safety solenoid. Therefore a hardware fault tolerance (HFT) of 1 in SIL 3 applications is strongly recommended.
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The instructions of the associated safety and installation manual shall be considered.

Summary of test results see back side of this certificate.

Valid until 2022-01-12

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/FSP 1344.00/17 dated 2017-01-12.

This certificate is valid only for products which are identical with the product tested. It becomes invalid at any change of the codes and standards forming the basis of testing for the intended application.

TÜV Rheinland Industrie Service GmbH

Bereich Automation
Funktionale Sicherheit

Am Grauen Stein, 51105 Köln

Köln, 2017-01-12

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Stephan Häb

Safety function: Safety-related Emergency Shut-down (<10mA) of a valve by releasing pressurized air from the actuator.

Operation with diagnostics tests enabled (pneumatics test and/or PST) for ValvGuard mechanical part				
Probability of Dangerous Failure on Demand	PFD _{spec}		2.61 E-05	
Assumed Valve Proof Test Interval	T _i	y	5	
Confidence Interval	1-α	%	95 %	
Safe Failure Fraction	SFF	%	> 90 %	
Hardware Fault Tolerance	HFT	[-]	0	
Diagnostic Coverage	DC	%	94.7 %	
Type of Sub System IEC 61508-2, 7.4.4.1.2/3		[-]	Typ A	
Mode of Operation IEC 61508-4, 3.5.16		[-]	Low demand	
Derived Values				
Assumed Demands per Year	f _{np}		1 /a	1.14E-04 /h
Total Failure Rate	λ _S + λ _D	1/h	1.06 E-06 /h	1058 FIT
Lambda Dangerous Detected	λ _{DD}	1/h	5.28 E-08 /h	53 FIT
Lambda Dangerous Undetected	λ _{DU}	1/h	2.98 E-09 /h	3 FIT
Lambda Safe Detected	λ _{SD}	1/h	8.42 E-08 /h	84 FIT
Lambda Safe Undetected	λ _{SU}	1/h	9.18 E-07 /h	918 FIT
MTBF total		h	9.45 E+08 h	1.08 E+05 a
MTBF (Dangerous Failures)	MTBF _D	h	1.79 E+07 h	2.05 E+03 a
Average Probability of Failure on Demand	PFD _{avg}		6.53 E-05	

Operation with diagnostics disabled for ValvGuard mechanical part				
Probability of Dangerous Failure on Demand	PFD _{spec}		3.35 E-05	
Assumed Valve Proof Test Interval	T _i	y	1	
Confidence Interval	1-α	%	95 %	
Safe Failure Fraction	SFF	%	> 90 %	
Hardware Fault Tolerance	HFT	[-]	0	
Diagnostic Coverage	DC	%	93.2 %	
Type of Sub System IEC 61508-2, 7.4.4.1.2/3		[-]	Type A	
Mode of Operation IEC 61508-4, 3.5.16		[-]	Low demand	
Derived Values				
Assumed Demands per Year	f _{np}		1 /a	1.14E-04 /h
Total Failure Rate	λ _S + λ _D	1/h	9.79 E-07 /h	979 FIT
Lambda Dangerous Detected	λ _{DD}	1/h	5.20 E-08 /h	52 FIT
Lambda Dangerous Undetected	λ _{DU}	1/h	3.82 E-09 /h	4 FIT
Lambda Safe Detected	λ _{SD}	1/h	6.40 E-08 /h	64 FIT
Lambda Safe Undetected	λ _{SU}	1/h	8.59 E-07 /h	859 FIT
MTBF total		h	1.02 E+06 h	116 a
MTBF (Dangerous Failures)	MTBF _D	h	1.79 E+07 h	2.05 E+03 a
Average Probability of Failure on Demand	PFD _{avg}		8.37 E-05	

Application Requirements:

The overall safety integrity depends mainly on the connected actuator and the final valve (ESD or ESV) to the safety solenoid. Therefore a hardware fault tolerance (HFT) of 1 in SIL 3 applications is strongly recommended.

Proof Test:

Safety shutdown valve proof-test is related to the required SIL level of the application. PFD calculations should define this safety shutdown valve proof test interval. The valve proof test can be performed by using VG9000H's Emergency Trip Test (ETT) and it is available via HART. ETT can only check the valve closing/opening time, but not the tightness. See the valve safety manual for further info regarding the proof testing. The whole safety loop shall be tested via the safety system / logic solver.

For a detailed description the instructions of the associated safety and installation manual shall be considered.