

	CERTIFICADO SIL		Nº 2C0322300644-SIL															
	CLIENTE: BRASKEM		FOLHA: 01 a 09															
	PROJETO: PJ-0602565		PLANTA: BA01-02															
	TAG: XV-441054		ÁREA: 4400															
ENGENHARIA	TÍTULO: VÁLVULA ON-OFF		CENTRO LOGÍSTICO		BA01 - UNIB-BA													
FLOWSERVE LTDA		RAZAO SOCIAL FORNECEDOR: FLOWSERVE DO BRASIL LTDA		PEDIDO DE COMPRA Nº 4503649776														
		ENG. RESP. / CREA Nº: NILO FERNANDES GIRON / CREA-SP: 0527090		DOC. FORNECEDOR Nº 2C0322300644														
ÍNDICE DE REVISÕES																		
REV.	DESCRIÇÃO E/OU FOLHAS ATINGIDAS																	
0	<div><div><table><tr><td><input checked="" type="checkbox"/></td><td>SEM COMENTÁRIOS. Enviar cópias certificadas. Prosseguir a Fabricação</td></tr><tr><td><input type="checkbox"/></td><td>COM COMENTÁRIOS. Reemitir documento para comentários. Prosseguir fabricação com exceção das partes comentadas</td></tr><tr><td><input type="checkbox"/></td><td>COM COMENTÁRIOS. Enviar cópias certificadas. Prosseguir a fabricação</td></tr><tr><td><input type="checkbox"/></td><td>REJEITADO. Reenviar para comentários. NÃO PROSSEGUIR a fabricação.</td></tr><tr><td><input type="checkbox"/></td><td>ACEITE DO CERTIFICADO</td></tr><tr><td><input type="checkbox"/></td><td>PARA INFORMAÇÃO</td></tr></table><div>Ass  Data 21/09/23</div><p>OS COMENTÁRIOS FEITOS NESTE DOCUMENTO NÃO EXIMEM O FABRICANTE DA RESPONSABILIDADE SOBRE O PROJETO, A FABRICAÇÃO E O DESEMPENHO DO EQUIPAMENTO OU SISTEMA.</p></div><div>PLANTA: BA01-02; ÁREA: 4400; PROJETO: PJ-0602565; NÚMERO DO PJ: 10002-6255-126-4-00004; → NÚMERO KEMPETRO: 10002-6255F-130-4-00026 NÚMERO DA RM: BK-BA01-04400-RM-81-00116_00000; PEDIDO DE COMPRA: 4503649776; ITEM: 00010; → 3247794 TAG: XV-441054.</div></div>						<input checked="" type="checkbox"/>	SEM COMENTÁRIOS. Enviar cópias certificadas. Prosseguir a Fabricação	<input type="checkbox"/>	COM COMENTÁRIOS. Reemitir documento para comentários. Prosseguir fabricação com exceção das partes comentadas	<input type="checkbox"/>	COM COMENTÁRIOS. Enviar cópias certificadas. Prosseguir a fabricação	<input type="checkbox"/>	REJEITADO. Reenviar para comentários. NÃO PROSSEGUIR a fabricação.	<input type="checkbox"/>	ACEITE DO CERTIFICADO	<input type="checkbox"/>	PARA INFORMAÇÃO
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DATA	18/09/2023																	
PROJETO	PJ-0602565																	
EXECUÇÃO	VG																	
VERIFICAÇÃO	LB																	
APROVAÇÃO	NG																	

Certificate



SIL/PL
Capability

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No.: 968/V 1079.01/18

Product tested	Ball Valves	Certificate holder	Flowserve S.r.l. Valbart Via delle Industrie 15 20883 Mezzago (MB) Italy
Type designation	Side Entry Trunnion Mounted Ball Valves: VB2, VB3, VW1, TMCBV Top Entry Trunnion Mounted Ball Valves: VT1 Rising Stem Ball Valves: RSBV		
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010		
Intended application	Safety Functions: The valves can be used for Closing or Opening on Demand Application as well as for Tight Shut Off. The assessment based on the certification program of the Certification Body comes to the result that the valves meet the requirements of IEC 61508:2010 and are therefore suitable for use in a safety instrumented system up to SIL 2 (low demand mode). Under consideration of the minimum required hardware fault tolerance $HFT = 1$ the valves may be used in a redundant architecture up to SIL 3 according to IEC 61511.		
Specific requirements	The instructions of the associated Installation, Operating and Maintenance Manual and the Safety Manual shall be considered.		

Summary of test results see back side of this certificate.

Valid until 2023-11-07

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 1079.01/18 dated 2018-10-30.

This certificate is valid only for products which are identical with the product tested.

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit
Am Grauen Stein, 51105 Köln

Köln, 2018-11-07

Certification Body Safety & Security for Automation & Grid

Dr. R. G. A.
Dr.-Ing. Thorsten Gantevoort

Holder: Flowserve S.r.l.**Valbart**
 Via delle Industrie 15
 20883 Mezzago (MB)
 Italy

Product tested: Side Entry Trunnion Mounted Ball Valves:
 VB2, VB3, VW1, TMCBV
 Top Entry Trunnion Mounted Ball Valves: VT1
 Rising Stem Ball Valves: RSBV

Results of Assessment

Route of Assessment		$2_H / 1_S$	
Type of Sub-system		Type A	
Mode of Operation		Low Demand Mode	
Hardware Fault Tolerance	HFT	0	
Safety Function		Fail to Close Fail to Open	Tight Shut Off
Lambda Dangerous confidence level of calculation $1-\alpha = 95\%$	λ_D	118 FIT	429 FIT
Lambda Dangerous Undetected assumed Diagnostic Coverage DC = 0 %	λ_{DU}	118 FIT	429 FIT
Mean Time To Dangerous Failure	MTTF _D	967 a	266 a
Average Probability of Failure on Demand 1oo1 assumed Proof Test Interval $T_1 = 1$ year	PFD_{avg}(T₁)	5.17 E-04	1.88 E-03
Average Probability of Failure on Demand 1oo2 assumed Proof Test Interval $T_1 = 1$ year assumed $\beta_{1oo2} = 10\%$	PFD_{avg}(T₁)	5.20 E-05	1.88 E-04

Origin of values

The stated values are the results of an FMEDA. It was verified by qualification test of the safety function under critical conditions and the analysis of field feedback of the last eight years. Random and systematic failures which are the responsibility of the manufacturer were examined.

Systematic Capability

The development and manufacturing process and the functional safety management applied by the manufacturer in the relevant lifecycle phases of the product have been audited and assessed as suitable for the manufacturing of products for use in applications with a maximum Safety Integrity Level of 3 (SC 3).

Periodic Tests and Maintenance

The given values require periodic tests and maintenance as described in the Installation, Operating and Maintenance Manual and the Safety Manual.

The operator is responsible for the consideration of specific external conditions (e.g. ensuring of required quality of media, max. temperature, time of impact), and adequate test cycles.



The manufacturer
may use the mark:



Revision 3.0 March 3, 2022
Surveillance Audit Due
April 3, 2025



Certificate / Certificat Zertifikat / 合格証

FLO 1303024 C006

exida hereby confirms that the:

Automax Supernova Pneumatic Rack & Pinion Actuators

**Flowserve Flow Control
Haywards Heath, West Sussex - UK**

Have been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-2

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

**PFH/PFD_{avg} and Architecture Constraints
must be verified for each application**

Safety Function:

The Actuator will move to the designed safe position per the actuator design within the specified safety time.

Application Restrictions:

The unit must be properly designed into a Safety Instrumented Function per the Safety Manual requirements.



Evaluating Assessor

Certifying Assessor

FLO 1303024 C006

Systematic Capability: SC 3 (SIL 3 Capable)**Random Capability: Type A, Route 2_H Device****PFH/PFD_{avg} and Architecture Constraints
must be verified for each application****Systematic Capability:**

These product have met manufacturer design process requirements of Safety Integrity Level (SIL) 3. These are intended to achieve sufficient integrity against systematic errors of design by the manufacturer.

A Safety Instrumented Function (SIF) designed with this product must not be used at a SIL level higher than stated.

Random Capability:

The SIL limit imposed by the Architectural Constraints must be met for each element. This device meets *exida* criteria for Route 2_H.

Versions:

Device	Description and Application
SuperNova S Series	Spring Return & Double Acting Actuators, Sizes 050 to 200
SuperNova SN Series	Spring Return & Double Acting Actuators, Sizes 250 & 300
SuperNova B Series	Spring Return & Double Acting Actuators, Sizes 050 to 200
SuperNova SNA Series	Spring Return & Double Acting Actuators, Sizes 250 & 300

IEC 61508 Failure Rates in FIT¹

Device	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
Spring Return, De-energize to Trip	0	166	0	312
Double Acting	0	0	0	407

¹ FIT = 1 failure / 10⁹ hours

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFH/PFD_{avg} considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

The following documents are a mandatory part of certification:

Assessment Report: FLO 13/03-024 R006 V3R2 (or later)

Safety Manual: FLOSILAMAXR&P Rev 2 (or later)



80 N Main St
Sellersville, PA 18960



The manufacturer
may use the mark:



Revision 2.0 September 27, 2022
Surveillance Audit Due
August 1, 2025



Certificate / Certificat Zertifikat / 合格証

ASC 2112125 C001

exida hereby confirms that the:

Series 327/8327G Solenoid Valves

ASCO
Ede, The Netherlands

Have been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-2

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

**PFH/PFD_{avg} and Architecture Constraints
must be verified for each application**

Safety Function:

The Valve will move to the designed safe position when de-energized within the specified safety time.

Application Restrictions:

The unit must be properly designed into a Safety Instrumented Function per the Safety Manual requirements.



Evaluating Assessor

Certifying Assessor

ASC 2112125 C001

Systematic Capability: SC 3 (SIL 3 Capable)**Random Capability: Type A, Route 2_H Device****PFH/PFD_{avg} and Architecture Constraints
must be verified for each application****Systematic Capability :**

These products have met manufacturer design process requirements of Safety Integrity Level (SIL) 3. These are intended to achieve sufficient integrity against systematic errors of design by the manufacturer.

A Safety Instrumented Function (SIF) designed with these products must not be used at a SIL level higher than stated.

Random Capability:

The SIL limit imposed by the Architectural Constraints must be met for each element. This device meets *exida* criteria for Route 2_H.

IEC 61508 Failure Rates in FIT¹

Model	Application, Safe State	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
327B0/8327G...	DTT, NC, Out P2 to Vent P1	0	416	0	58
	DTT, NO, Pressure P1 to Out P2 P1	0	368	0	96
	ETT, NC, Pressure P3 to Out P2	0	9	0	199
	ETT, NO, Out P2 to Vent P3	0	48	0	160
327B1..., 327B2..., LP & LP2	DTT, NC, Out P2 to Vent P1	0	174	0	58
	DTT, NO, Pressure P1 to Out P2 P1	0	126	0	96
	ETT, NC, Pressure P3 to Out P2	0	9	0	162
	ETT, NO, Out P2 to Vent P3	0	48	0	123
327B3...	DTT, NC, Out P2 to Vent P1	0	130	0	58
	DTT, NO, Pressure P1 to Out P2 P1	0	82	0	96
	ETT, NC, Pressure P3 to Out P2	0	9	0	144
	ETT, NO, Out P2 to Vent P3	0	48	0	105
327B3NFIS... & 327B3WSCRS...	DTT, NC, Out P2 to Vent P1	0	168	0	64
	DTT, NO, Pressure P1 to Out P2 P1	0	120	0	103
	ETT, NC, Pressure P3 to Out P2	0	14	0	188
	ETT, NO, Out P2 to Vent P3	0	53	0	150
MO Option Adder	DTT, NC, Out P2 to Vent P1	0	45	0	39
	DTT, NO, Pressure P1 to Out P2 P1	0	0	0	39
	ETT, NC, Pressure P3 to Out P2	0	0	0	83
	ETT, NO, Out P2 to Vent P3	0	0	0	83
NVR Option Adder	DTT, NC, Out P2 to Vent P1	0	45	0	59
	DTT, NO, Pressure P1 to Out P2 P1	0	0	0	59
	ETT, NC, Pressure P3 to Out P2	0	0	0	103
	ETT, NO, Out P2 to Vent P3	0	0	0	103

¹ FIT = 1 Failure / 10⁹ hours**SIL Verification:**

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFH/PFD_{avg} considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

The following documents are a mandatory part of certification:

Assessment Report: ASC 21/12-125 R001 V2R1 (or later)

Safety Manual: V9629 Rev JC (or later)

Page 2 of 2

**Series 327/8327G
Solenoid Valves**



80 N Main St
Sellersville, PA 18960

T-061, V5R2



The manufacturer
may use the mark:



Revision 1.2 December 1, 2022
Surveillance Audit Due
November 1, 2025



Certificate / Certificat Zertifikat / 合格証

FLO 1905142 C004

exida hereby confirms that the:

XCL Series UltraSwitch Position Indicator PMV Automation AB Solna, Sweden

Has been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-2

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

**PFH/PFD_{avg} and Architecture Constraints
must be verified for each application**

Safety Function:

The Position Indicator Sensor/Switch Output will change when the attached Valve moves to the Switchbox's preset position.

Application Restrictions:

The unit must be properly designed into a Safety Instrumented Function per the Safety Manual requirements.



Evaluating Assessor

Certifying Assessor

Systematic Capability: SC 3 (SIL 3 Capable)**Random Capability: Type A, Route 2_H Device**

**PFH/PFD_{avg} and Architecture Constraints
must be verified for each application**

Systematic Capability :

The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3. These are intended to achieve sufficient integrity against systematic errors of design by the manufacturer.

A Safety Instrumented Function (SIF) designed with this product must not be used at a SIL level higher than stated.

Random Capability:

The SIL limit imposed by the Architectural Constraints must be met for each element. This device meets *exida* criteria for Route 2_H.

Versions:

Group	Description / Application	Applicable Switch Codes
Group 1	Namur Proximity Sensors	N8, NP
	MicroSwitches and Proximity Reed Switches, rated up to 3 Amps and external Current Limiting / Protection	MG, P5, PE, PP, & PT
Group 2	MicroSwitches (Applications with Switches rated up to 15 Amps)	M1, MC, & MK

IEC 61508 Failure Rates in FIT¹

Application/Device/Configuration	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
Group 1 – NAMUR Proximity Sensors, MicroSwitches ² , or Proximity Reed Switches ²	0	16	0	89
Group 2 – MicroSwitches (Applications with Switches rated up to 15 Amps)	0	18	0	119

¹ FIT = 1 failure / 10⁹ hours

² Failure rates listed are only applicable if the switch contacts current is limited to 60% of the switches rated capacity and the end user has added external transient protection if being used with non-resistive loads.

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFH/PFD_{avg} considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

The following documents are a mandatory part of certification:

Assessment Report: FLO 19/05-142 R005 V2R1 Switchbox Assessment Report (or later)

Safety Manual: Ultra-Switch Safety Manual _ V1R2 (or later)



80 N Main St
Sellersville, PA 18960