

Competence in Functional Safety

Functional safety of globe valves, rotary plug valves, ball valves and butterfly valves







SMART IN FLOW CONTROL.



Founded in 1907, SAMSON has since become a worldwide leader in the manufacture of expertly engineered control valves.

SAMSON has over 50 subsidiaries, amongst them noted manufacturers of special valves.

With these subsidiaries, SAMSON is represented in over 80 countries to assist its customers on all continents.



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1 Scope

Valves and the associated actuators are used to isolate pipelines in safety-instrumented systems. Alternatively, they can also be used for pressure relief, i.e. by completely opening valves.

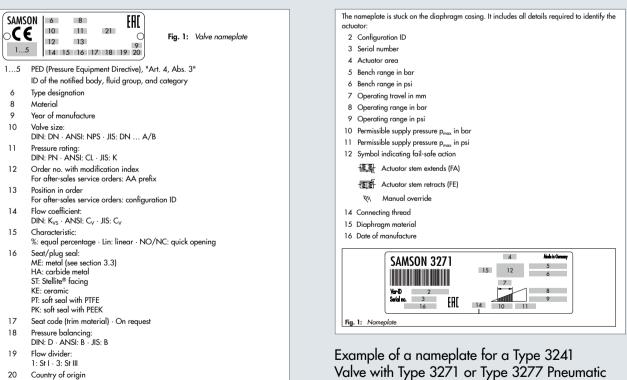
Validity of this manual 2

This manual applies to control valves manufactured by the following companies within SAMSON:

- SAMSON AG
- LEUSCH GmbH Industriearmaturen
- PFEIFFER Chemie-Armaturenbau GmbH
- VETEC Ventiltechnik GmbH

Refer to the manufacturer's declarations in Appendix 1 of this manual for the valve models concerned.

The individual versions of the valves can be identified by their nameplates



Actuator manufactured by SAMSON AG

- 20 Country of origin
- PSA version 21

3 Intended use of this manual

This manual is intended to assist planners and operators during the integration of control valves into a safety loop as part of the safety function and to enable them to safely operate control valves.

This manual contains information, safety-related data and warnings concerning the functional safety in accordance with IEC 61508 and concerning the application in the process industry in accordance with IEC 61511. It does not contain any particular details on other safety requirements, such as explosion protection or electrical safety.

Safety-instrumented systems are to be commissioned and maintained by qualified personnel only. Refer to the corresponding mounting and operating instructions of the valve.

4 General aspects of functional safety

4.1 Standards, terms and abbreviations

Abbreviation	Designation	Description
SIL	Safety Integrity Level	One of four discrete levels for specifying the safety integrity requirements of the safety functions to be allocated to the E/E/PE safety-related systems, where SIL 4 has the highest level of safety integrity and SIL 1 has the lowest.
MTBF	Mean Time Between Failures	Mean time between two failures
MTTR	Mean Time To Restoration	Mean time between the occurrence of a failure in a device or system and its repair
HFT	Hardware Fault Tolerance	Capability of a functional unit to continue executing the demanded function in case of faults or deviations.
λ_{sd}	Failure rate for all safe detected failures	
λ_{su}	Failure rate for all safe undetected failures	
λ_{dd}	Failure rate for all dangerous detected failures	
λ_{du}	Failure rate for all dangerous undetected failures	
SFF	Safe Failure Fraction	Fraction of non-hazardous failures, i.e. the fraction of failures without the potential to set the safety-related system to a dangerous or impermissible state.
PFD _{avg}	Average Probability of Failure on Demand	Average likelihood that a dangerous safety function failures occurs on demand.
T,	Test Interval between life testing of the safety function	Average likelihood that a dangerous safety function failures occurs on demand.
Low demand mode	Low demand mode of operation	Low demand mode is where the frequency of demands for operation made on a safety-related system is no greater than one per year and no greater than twice the proof test frequency.

Abbreviation	Designation	Description
MooN	Voting "M out of N" (e. g. 2003)	 Classification and description of the safety-related system regarding redundancy and the selection procedure used. "N" indicates how often the safety function is carried out (redundancy). "M" determines how many channels must work properly. Example: Pressure measurement in 1002 architecture A safety-instrumented system decides that a specified pressure limit has been exceeded if one of two pressure sensors reaches this limit. In a 1001 architecture, there is only one pressure sensor.
MooND	Voting "M out of N" with diagnostics	

Relevant standards

Norm	Designation		
IEC 61508 Parts 1 to 7	Functional safety of electrical/electronic/pro- grammable electronic safety-related systems		
IEC 61511 Parts 1 to 3	Functional safety – Safety instrumented systems for the process industry sector		
VDI 2180 Parts 1 to 5	Safeguarding of industrial process plants by means of process control engineering		

Terms and definitions

Term	Definition		
Dangerous failure	Failure with the potential to set the safety-related system to a dangerous or inoperative state.		
Safety-related system	A safety-related system carries out the safety functions needed to establish or maintain a safe state, e.g. in a plant. Example: Pressure measuring instrument, logic unit (e.g. limit switch) and valve form a safety-related system.		
Safety function	A defined function carried out by a safety-related system in order to establish or maintain a safe state of the plant, under consideration of a specified dangerous incident. Example: Pressure limit monitoring		

4.2 Determining the safety integrity level

The achievable safety integrity level (SIL) is determined by the following safety-related data:

- Average probability of failure on demand (PFD_{avg})
- Hardware fault tolerance (HFT)
- Safe failure fraction (SFF)

The following table in accordance with IEC 61508 and IEC 61511 shows how the safety integrity level (SIL) depends on the average probability of failure on demand (PFD_{avg}). It is based on low demand mode of operation, i.e. the frequency of demands on a safety-related system is no greater than once per year.

Safety integrity level (SIL)	PFDavg (low demand mode)
4	$\geq 10^{-5} \text{ to} < 10^{-4}$
3	$\geq 10^{-4} \text{ to} < 10^{-3}$
2	$\geq 10^{-3}$ to $< 10^{-2}$
1	$\geq 10^{-2} \text{ to} < 10^{-1}$

 $\mathsf{PFD}_{\scriptscriptstyle \mathsf{avg}}$ in low demand mode of operation according to IEC 61508-1, Table 2

The sensor, logic unit and final element form a safety-related system that performs a safety function.

	Sensor e.g. pressure measuring instrument	\Box	Logic unit e.g. PLC	Final element e.g. valve
PFD _{avg}	≤ X %	-	\leq X %	≤ X %

The average probability of failure on demand ($PFD_{avg} = sum$ of sensor, logic unit and final element failures) must be within the range of the demanded safety integrity level (SIL) in case of demand as listed in the above table.

4.3 Hardware fault tolerance

In the process industry, the achievable SIL classes for sensors, final elements and non-programmable logic modules, such as isolating amplifiers and relays, are restricted in accordance with IEC 61511 as shown in the following table.

Safety integrity level (SIL)	Minimum required hardware failure tolerance (HFT)
1	0
2	1
3	2
4	Special requirements (refer to IEC 61508)

Minimum required hardware failure tolerance (HFT) according to IEC 61511-1, Table 6, for the process industry

The minimum required hardware failure tolerance can be decreased by one if the following requirements are met:

The device is proven in use.

⇒ Take this into account when selecting devices!

- The device only allows process-relevant parameters to be set, e.g. measuring range, upscale or downscale function in case of failure.
 - ⇒ Final elements do not have any configurable functions.
- The process-relevant parameters of the device are access-protected, e.g. by jumper or password.
 - ⇒ Final elements do not have any configurable functions.
- The function requires a SIL less than 4.

A final element has a single-channel design, resulting in a hardware failure tolerance (HFT) = 0. This results in a single-channel application up to SIL 1 or up to SIL 2 for proven-in-use devices.

At least two redundant devices are required for SIL 3 with proven-in-use devices. At least three redundant devices are required for SIL 3 without proven-in-use devices.

5 Intended use of control valves in safety-instrumented systems

The reliability of mechanical components is significantly affected by the operating conditions and, as a result, by systematic failures. This needs to be taken into account when selecting and sizing devices.

Safety-instrumented function

During normal operation, the signal pressure is applied to the pneumatic actuator. To meet the requirements of the safety-instrumented function, the actuator is usually vented by a solenoid valve. The force of the actuator springs moves the valve to its end position, i.e. the valve is either completely opened or closed.

The end position of the valve must not be impeded by mechanical equipment, such as travel stops or handwheels, under any circumstances.

When the signal pressure is applied to the actuator again, the valve moves to the corresponding position. If the actuator is to be locked after a case of demand, this must be ensured by the operator using suitable means.

Features of final elements

Contact with the process media may cause systematic failure and, as a result, affect the safety-related availability of the safety-instrumented systems. The influence of specific process conditions must be analyzed and taken into account during sizing and maintenance.

These conditions arise from process requirements. To rule out systematic failure, we recommend creating a loop data sheet according to the German standard VDI 2180-5, section 4 (recommendations for final elements).

In case of doubt, consult the manufacturer for valve sizing.

To reduce systematic failure, diverse redundancies may be advantageous (e.g. globe valve and ball valve).

Responsibility



Operator



	Responsib
 The joint use of a control valve within the safety loop by a control loop of a basic process control system makes it possible to increase the diagnostic coverage of the safety-instrumented system. This joint use can lead to additional risk. This aspect must be taken into account in the risk analysis. Online tests, such as the partial stroke test and other diagnostic processes integrated into the valve positioner, can be regarded as state-of-the-art test methods. They can 	
be used to lengthen the proof test interval or to improve the safety margin (discovery of undetected systematic failures).	
VDI 2180-5, section 4 provides special instructions.	
Avoiding systematic failure	
To avoid systematic failure, the user must take into account the following application- specific factors besides the manufacturer specifications:	Operato
 Corrosion (destruction primarily of metals due to chemical and physical processes) 	
Material fatigue, e.g. in bellows seals	
Wear induced by the process medium	
Abrasion (material removed by solids contained in the process medium)	
Medium deposits	
 Aging (damage caused to organic materials, e.g. plastics or elastomers, by exposure to light and heat) 	
 Chemical attack (organic materials, e.g. plastics or elastomers, which swell, leach out or decompose due to exposure to chemicals) 	
If no experience data exist for the devices used, a visual inspection of the safety equip- ment must be performed after a short time in operation .	

5.1 General control valve requirements

For each application, the user must specify the following conditions:

- Permissible leakage rate
- Maximum/minimum supply pressure of the compressed air network
- Air capacity available in relation to pressure
 ⇒ Connecting pipe cross-sections must be adhered to.

Nominal size (connection length ≤ 2 m)							
	K_{vs} coefficient	3					
	0.16 · 0.32	1.4	4.3	-			
	Connection						
Pressure (bar)	4	1 and 3	4	9			
≥ 1.4	≥ DN 6	≥ DN 8	≥ DN 10				
≥ 2.5		≥ DN 6	≥ DN 8	≥ DN 4			
≥6	≥ DN 4	≥ DN 4	≥ DN 6				
Note: A larger nominal size is needed when the connection length exceeds 2 m.							

Example: Connecting pipe cross-sections required for SAMSOMATIC Type 3963 Solenoid Valve

SAMSON uses calculation methods to predict the transit time and to size the pneumatic hook-up. SAMSON can support users in selecting devices on request.

The seat shut-off performance (leakage rate) must be tested at regular intervals by

- performing plausibility checks while the process is running or
- measuring it on a leakage test bench.

The type of test depends on the application.

The external leakage (fugitive emissions) must be tested at regular intervals, e.g. by spraying with foaming agent.

The conditions depend on the process requirements.

Res	po	nsil	bili	ty

Operator

Manufacturer

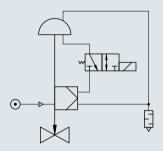
Manufacturer

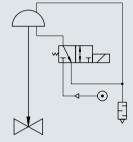
5.2 Globe valve requirements

If there is a risk of solids contained in the process medium causing blockage, a strainer must be fitted.

Safety equipment with fail-open action must <u>not</u> be operated with strainers.

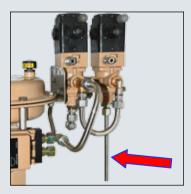
- To reduce friction, it is preferable to use spring-loaded stem packings. Adjustable stem packings are to be tightened by qualified staff only to prevent the stem from becoming blocked.
- To prevent corrosion of the actuator springs, measures must be taken to prevent water or moisture from entering the actuator. Such measures include fitting a venting pipe or air purging of the actuator's spring chamber.





Example: Control and quick-acting shut-off valve with air purging of the actuator's spring chamber Example: On-off valve with air purging of the actuator's spring chamber

Suitable measures must be taken to ensure that the venting port of the solenoid valve is kept open.



Example: Venting pipe on the solenoid valve

Responsibility

Operator



Operator



Manufacturer/ operator It is essential to check the actuator forces to ensure that the valve can overcome the process pressures to reach its fail-safe position. This can be checked by the manufacturer if requested.

The actual actuator forces must not close the valve against a pressure which is 1.5 times above the nominal pressure (PN) of the plant or valve. If this actuator force restriction cannot be implemented, an excess pressure valve is necessary for valves connected in series to prevent that the permissible operating pressure is exceeded.

Responsibility



Manufacturer/ operator



Example: Valves connected in series

It is essential to observe the prescribed direction of flow (arrow on the valve body) of globe valves.



5.3 Ball valve requirements

Note for ball valves that higher initial breakaway torques arise as the differential pressure of the process medium rises, requiring higher actuator torques.

Differential pressure Δp (bar)			0	3	6	10	16	40
DN	M _{dmax} (Nm)	M _d (Nm)	M _{dl} (Nm)					
15	60	3	5	5	5	8	9	11
25	240	5	10	10	10	14	18	28
40	450	10	20	20	20	26	35	52
50	450	15	30	30	33	36	42	73
80	750	25	60	60	66	72	86	144
100	750	40	90	90	105	120	140	251
150	3160	60	120	120	160	210	290	450

Max. permissible torque, required torques and initial breakaway torques

Example: Torque specifications for a ball valve

- Media, especially degreasing, swelling and fibrous media, may affect the torque.
- The operating conditions, e.g. switching interval and the medium temperature, have an effect on the torques.
- The mounting of the valve and actuator is of vital importance.
- The permissible torques for the ball valve shaft, shaft adapter and bridge have been verified by the manufacturer. As a result, the max. torque of the actuator (air or spring torque) must not exceed these torques under any circumstances. The corresponding specifications in accordance with DIN EN ISO 5211/DIN EN 15081 (NAMUR Recommendation NE 14) must be observed

Flange type	F03	F04	F05	F07	F10	F12	F14	F16	F25	F30	F35	F40	F48	F60
Maximum torque of the attachment flanges (Nm)	32	63	125	250	500	1000	2000	4000	8000	16000	32000	63000	125000	250000

Maximum torque of the attachment flanges according to DIN EN ISO 5211

Responsibility

Manufacturer



Manufacturer



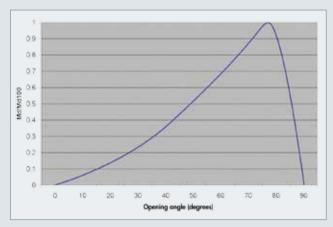
5.4 Butterfly valve requirements

- On sizing actuators for butterfly valves, note that the actuator must provide sufficient torque to overcome the breakaway torque and closing torque in closed position as well as the dynamic torque in open position.
- On mounting the actuator on the butterfly valve, the breakaway torque of the butterfly valve in relation to the differential pressure and the permissible torque of the butterfly valve shaft must be observed.

Nomin	nal size Perm. torque		Perm. torque \mathbf{M}_{dl} in Nm at a differential pressure $\Delta \mathbf{p}$ (bar)							
DN	NPS	M _{dmax} (Nm)	0 bar	5 bar	10 bar	16 bar				
80	3	280	40	43	45	51				
100	4	280	48	54	59	67				
150	6	505	91	106	114	157				
200	8	785	190	219	269	288				
250	10	785	320	364	433	480				
300	12	1591	370	467	578	654				
400	16	3215	690	903	1089	1239				

Example: Required manufacturer specifications

Note that high dynamic torques can arise at high differential pressures in the process medium, pushing open the butterfly disc.



Dynamic torque of butterfly valves in relation to the opening angle

Responsibility

Manufacturer





- Media, especially degreasing, swelling and fibrous media, may affect the torque.
- The operating conditions, e.g. switching interval and the medium temperature, have an effect on the torques.
- The mounting of the valve and actuator is of vital importance.
- The permissible torques for the butterfly valve shaft, shaft adapter and bridge have been verified by the manufacturer. As a result, the max. torque of the actuator (air or spring torque) must not exceed these torques under any circumstances. The corresponding specifications in accordance with DIN EN ISO 5211/DIN EN 15081 (NAMUR Recommendation NE 14) must be observed. See section 5.3 on ball valve requirements.

Responsibility





Manufacturer



5.5 Rotary plug valve requirements

- On sizing actuators, note that the actuator must provide sufficient torque to overcome the closing torque in closed position as well as the dynamic torque in open position.
- Adjustable stem packings are to be tightened by qualified staff only to prevent the stem from becoming blocked.
- To prevent corrosion of the actuator springs, measures must be taken to prevent water or moisture from entering the actuator. Such measures include fitting a venting pipe or air purging of the actuator's spring chamber.
- The proper mounting of the valve onto the actuator is of vital importance.
- The permissible torques for the valve shaft, shaft adapter and bridge have been verified by the manufacturer. As a result, the max. torque of the actuator (air or spring torque) must not exceed these torques under any circumstances. The corresponding specifications in accordance with DIN EN ISO 5211/DIN EN 15081 (NAMUR Recommendation NE 14) must be observed. See section 5.3 on ball valve requirements.

5.6 Proof tests and service life

- The proof test interval and the extent of the test lie within the operator's responsibility. This must be documented correspondingly.
- During the proof test, suitable means must be used to test the control value to ensure its proper functioning. Worn components must be replaced by **original spare parts** from the manufacturer.
- The maximum service life must be specified.
- It is recommended to summarize the requirements of the proof test in a checklist. Refer to Appendix 2 for an example.

Responsibility

Operator



Manufacturer



6 Installation, piping and wiring

6.1 Mechanical and pneumatic installation

 During mechanical and pneumatic installation, the mounting and operating instructions of the corresponding device must be observed.

The pneumatic connection must only be connected to instrument air networks that meet the quality requirements in accordance with ISO 8573-1:2001, Class 3 or 4.

Compressed air quality according to ISO 8573-1							
Particle size and quantity	Oil content	Pressure dew point					
Class 4	Class 3	Class 3					
\leq 5 µm and 1000/m ³	$\leq 1 \text{ mg/m}^3$	-20 °C or at least 10 K below the lowest ambient tem- perature to be expected					

The required minimum cross-sections of the supply air lines must be observed. Refer to section 5.1 (General control valve requirements).

After mounting, the position of the filters or filter check valves on the valve accessories, e.g. pilot valves, must be checked and, if necessary, corrected.



Example: Pilot-controlled Ex i solenoid valve (SAMSOMATIC)

- The prescribed mounting position of the devices must be observed.
- Booster valve ports not connected by pipe or hose must be protected properly against dirt, water etc. from entering the device by using appropriate filters.

Responsibility

Operator

6.2 Electrical installation

- Only cables with the prescribed outer diameter of the cable glands may be used.
- For EExi circuits the electrical cable data must comply with the data taken as the basis during planning.
- Cable glands and cover screws must be fastened tightly to ensure that the degree of protection is met.
- Only devices with suitable equipotential bonding may be connected.
- The installation regulations for the respective explosion protection measures must be observed.
- Prior to start-up, the voltage must be checked to ensure that it meets the permissible range.
- Prior to start-up, the necessary verifications (verification of intrinsic safety) must be available.
- The effect of disturbances to lines must be checked, especially
 - disturbance caused by EMC influences and
 - disturbance caused by capacitance influences when long lines are used (risk that a solenoid valve remains energized).
- The special conditions specified in the explosion protection certificates must be adhered to.

6.3 Installation of control valves

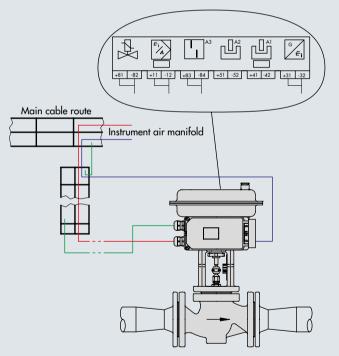
- Control valves must be installed free of stress and with low degrees of vibration.
- After installation, the flange joints must be checked for leaks.
- The pipeline must be rinsed prior to installing the control valve.

Responsibility



Responsibility

- To ensure the control valve functions properly, the pipeline must be designed to be straight and without any manifolds or disturbances for a distance of at least six times the pipe size (DN) upstream and downstream of the valve.
- It must be checked whether the mounting position of the control valve complies with the manufacturer's specifications (operating instructions).
- The devices used must be checked to ensure they are suitable for use under the prevailing ambient conditions (temperature, humidity etc.).
- While installing the control valves, sufficient space must be left to remove the valve for maintenance.
- The wiring and function of devices must be documented in a wiring plan.



Example: Wiring plan for a control valve with positioner, solenoid valve and limit signals

7 Applicable device documentation

Each control valve has a data sheet, mounting and operating instructions as well as a certificate of conformity in accordance with the European Pressure Equipment Directive (PED) 2014/68/EU and, if applicable, an explosion protection certificate. These documents are available in various languages on the Internet at www.samson.de, www.vetec.de, www.pfeiffer-armaturen.com and www.leusch.de.

8 Appendix 1 – Manufacturer's declarations

- Series 240 und 250 Globe Valves with Type 3271 and 3277 Pneumatic Actuators (valve manufacturer: SAMSON AG)
- Type LTR43 Butterfly Valve with actuator (valve manufacturer: LEUSCH GmbH Industriearmaturen)
- Series 1a and 1b Globe Valves with Type 3271 and 3277 Pneumatic Actuators (valve manufacturer: PFEIFFER Chemie-Armaturen GmbH)
- Series 20a and 20b Ball Valves with Series 31a Actuator (valve manufacturer: PFEIFFER Chemie-Armaturen GmbH)
- Series BR 26d Ball Valve with Series 31a Actuator (valve manufacturer: PFEIFFER Chemie-Armaturen GmbH)
- Series 14b and 14c Butterfly Valves with Series 31a or 30 Actuators (valve manufacturer: PFEIFFER Chemie-Armaturen GmbH)
- Series 72 and 73 Rotary Plug Valves with Type AT, R and M Pneumatic Actuators (valve manufacturer: VETEC Ventiltechnik GmbH)

SMART IN FLOW CONTROL

HERSTELLERERKLÄRUNG Für folgende Produkte

Stellventile der Bauart 240 und 250

Hermit wird bestätigt, dass das o. g. Gerät für die Verwendung in sicherheitsgerichteten Systemen nach IEC 61508 und IEC 61511 einsetzber ist

Das Gentt ist geeignet für den Einsatz in sicher-heitsgerichteten Anwendungen bis SE, 2 (einzel-nes Gentt) und SII, 3 (redundante Verschaltung) gemaß JEC 61508.

Der Nachweis erfolgte auf der Basis der Betriebs-bewährtheit (proven in use) kombiniert mit einer bewähr FMEA

Sicherheitstechnische Kenndaten

860 FIT		
0 FIT		
54.6 FIT		
0 FIT		
2,4 - 10*		
0		
0		
A		
94 %		
125 Jahre		
2090 Jahre		

Nutzbare Lebensdauer

Nach IEC 61508-2 Abschnitt 7,4.9.5 können acht bis zwolf Janre angenommen oder ein Wert be-nutzt werden, der sich durch Betriebebewahrung des Anwendenz ergibt.

Bestimmungsgemäße Verwendung – Bedienungsanleitung

- Anforderung an instrumentenluft-Qualität (Si-cherheitshandbuch, soweit vorhanden)



MANUFACTURER'S DECLARATION For the following products

Series 240 and 250 Valves

We hereby certify that the above mentioned de-vice can be used in safety-instrumented systems according to IEC 61508 and IEC 61511

The device is suitable for use in safety-instrumented systems up to SiL 2 (single device) and SiL 3 (redundant configuration) according to IEC 61508.

The evidence is based on prior use (proven in use) combined with an FMEA.

Safety-related data

instrumented at	860 FIT
Austa assume	0 FIT
Adergemus, undetected	54.6 FIT
Agengemus, detected	0 FIT
PPDerg with annual test	24.10*
HFT (Hardware Fault Tolerance)	0
DC (Diagnostic Coverage)	0
Device type	A
Safe failure fraction (SFF)	94 %
MTBF	125 years
MTBF sergerius undetected	2090 years

Useful lifetime

According to IEC 61508-2, section 7.4.9.5, a useful lifetime of eight to twelve years can be assumed. Other values can be used based on the user's previous experience (prior use/ proven-in-use)

Intended use

- Operating instructions

Quality requirements for instrument air (safety manual if available)

Manufacturer's Declaration WHE-1079-4 DE-EN. Changed on: 2016-10-18. Changed by: V42tr8VT4/myV73/bmv

BAMSON AKTIENGESELLSCHAFT - Wesmustentrisse 3 - 80314 Planifiet an Man. Germany www.samson.de

SHARE HIROW CONTROL

Sicherheitstechnische Annahmen

Im Störfall wird der Antrieb erdloffet, dadurch fehrt das Ventil in die Sicherheitslage.

Durch Einsatz eines Stellungaregten kann eine untangreiche Diagnose auch im lautenden Betrieb durchgeführt werden. Damit kann sich je nach Einsatztal ein Diagnosegraug (diagnostic onvenige factor) für gefährliche Fehler von is 70 % eigeben.

Verasserutangen Die Reparatuzzeit ist klein gegenüber der mittleren Antrodesingente. Durchschnittliche Beanspru-strung in industrieller Umgebung durch Meden und Umgebungsbedingungen. Die Anwender ist für bestimmungsgemätigen Gebrauch veranteortlich.



Safety-related assumptions

In case of failure, the preumatic actuator is verif-ed, causing the valve to move to its fail-safe posi-tion

Note A positioner can be used to perform extensive diagnostics where the process is running. De-pending on the application, this may result in a diagnostic overage for dangerous taikures of 7D % or higher.

Requirements

Short mean time to reper compared to the aver age rate of demand. Normal exposure to indu-tial environment and fuids. The user is respon-sible for ensuring that the device is used as in-tended.

SAMSON AG.

Voraussetzungen

The Mpd.

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Hermann T. Leusch				intended //		
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EUSCH GmbH Industnearmaturen Phone +49 2131 709+0 vesteestinglie 10 Fax +40 2131 7699-29						_

PFEIFFER				Pfeiff	
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der o.g. Baureihen für die Verwendung in si System nach IEC 61508 und IEC 61511 ein		hteten	use in safety instrumented systems act IEC 61508 and IEC 61511.	cording to	
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(redundante Verschaltung) gemäß IEC 615			according to IEC 61508.		
Der Nachweis erfolgte auf der Basis der Be		neit	The evidence is based on proven in us	e combined with a	3
(proven in use) kombiniert mit einer FMEDA	ι.		FMEDA.		
Bescheinigt wird hiermit SIL 2			Device compliance with SIL 2 is hereby	certified.	
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ergibt. Daraus ergeben sich: SFF MTBF _{dengerous} DC (Diagnostic coverage) <u>Bestimmungsgemäße Verwendung ist zu</u> - Bedienungsanleitung - Anforderung an instrumentenluft-Qualität (siehe Sicherheitshandbuch) <u>Sicherheitstechnische Annahme</u> :	94% 53 880 0 u <u>beachten</u> : h fährt das Ve	Jahre Jahre	This results in: Safe failure fraction (SFF) MTBF _{otal} MTBF _{dangerose} Diagnostic coverage (DC) Intended use must be observed: -Operation instructions -Requirements for the instrument air qui (see safety manual) Safety-related assumptions: In case of failure, the pneumatic actuat causing the valve to move to its fail-safe	94% 53 880 0 aality	
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ergibt. Daraus ergeben sich: SFF MTBF _{dergeros} DC (Diagnostic coverage) Bestimmungsgemäße Verwendung ist zu - Bedienungsanleitung - Anforderung an Instrumentenluft-Qualität (siehe Sicherheitshandbuch) Sicherheitstechnische Annahme: Im Störfall wird der Antrieb entlüftet, dadurc die Sicherheitstellung. (Falls Antrieb monti Hinweis: Durch Einsatz eines Stellungsregiers kann e Diagnose auch im laufenden Betrieb durchg	94% 53 880 0 a <u>beachten</u> : h fährt das Ver ert). eine umfangrei geführt werden	Jahre Jahre ntil in iche . Damit	This results in: Safe failure fraction (SFF) MTBF _{ctail} MTBF _{dangerose} Diagnostic coverage (DC) Intended use must be observed: -Operation instructions -Requirements for the instrument air qu (see safety manual) Safety-related assumptions: In case of failure, the pneumatic actuat causing the valve to move to its fail-saf (if actuator is mounted). Note: By using digital valves positioners, the extensive diagnostic functions also while	94% 53 880 0 sality or is vented, e position user has access is le the process is	years
ergibt. Daraus ergeben sich: SFF MTBF _{gengeros} DC (Diagnostic coverage) Bestimmungsgemäße Verwendung ist zu e Bodienungsanleitung - Anforderung an Instrumentenluft-Qualität (siehe Sicherheitshandbuch) Sicherheitstechnische Annahme: Im Störfall wird der Antrieb entlüftet, dadurc die Sicherheitsstellung. (Falls Antrieb monti Hinweis: Durch Einsatz eines Stellungsreglers kann ei Diagnose auch im laufenden Betrieb durchg kann sich je nach Einsatzfall ein Diagnoseg	94% 53 880 0 a beachten: h fährt das Ver ert). eine umfangrei geführt werden rad (diagnostic	Jahre Jahre ntil in iche . Damit	This results in: Safe failure fraction (SFF) MTBF _{total} MTBF _{dagenous} Diagnostic coverage (DC) Intended use must be observed: -Operation instructions -Requirements for the instrument air qui (see safety manual) Safety-related assumptions: In case of failure, the pneumatic actuati causing the valve to move to its fail-safi (if actuator is mounted). Note: By using digital valves positioners, the extensive diagnostic functions also whilrunning. As a result the diagnostic cover	94% 53 880 0 uality or is vented, e position user has access is arage factor for	years
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ergibt. Daraus ergeben sich: SFF MTBF _{gengenus} DC (Diagnostic coverage) Bestimmungsgemäße Verwendung ist zu - Bedienungsanleitung - Anforderung an Instrumentenluft-Qualität (siehe Sicherheitshandbuch) Sicherheitstechnische Annahme: Im Stöffall wird der Antrieb entüfftet, dadurc die Sicherheitsstellung. (Falls Antrieb monti Hinweis: Durch Einsatz eines Stellungsregiers kann e Diagnose auch im laufenden Betrieb durchg kann sich je nach Einsatzfall ein Diagnoseg coverage factor) für gefährliche Fehler von g Voraussetzungen: Die Reparaturzeit ist klein gegenüber der m rate. Durchschnittliche Beanspruchung in in	94% 53 880 0 a beachten: h fährt das Ver ert). eine umfangrei peführt werden rad (diagnostic größer 70 % er ittleren Anford dustrielter Um, b. Der Anwende	Jahre Jahre ntil in iche Damit papeen. erungs- gebung	This results in: Safe failure fraction (SFF) MTBF _{total} MTBF _{dangenous} Diagnostic coverage (DC) Intended use must be observed: -Operation instructions -Requirements for the instrument air qui (see safety manual) Safety-related assumptions: In case of failure, the pneumatic actuat causing the valve to move to its fail-saf (if actuator is mounted). Note: By using digital valves positioners, the extensive diagnostic functions also whil running. As a result the diagnostic cover dangerous failures can exceed 70% de application. Preconditions: The mean time to repair is short comps of demand. Normal exposure to industry	94% 53 880 0 wality or is vented, 'e position user has access lie the process is srage factor for pending on the ared to the averag ial environments.	years to
ergibt. Daraus ergeben sich: SFF MTBF _{dengeros} DC (Diagnostic coverage) Bestimmungsgemäße Verwendung ist zu - Bedienungsanleitung - Anforderung an Instrumentenluft-Qualität (siehe Sicherheitshandbuch) Sicherheitstechnische Annahme: Im Stöffall wird der Antrieb enttöfftet, dadurc die Sicherheitsstellung. (Falls Antrieb monti Hinweis: Durch Einsatz eines Stellungsregters kann e Diagnose auch im laufenden Betrieb durchg kann sich je nach Einsatzfall ein Diagnoseg coverage factor) für gefährliche Fehler von g Voraussetzungen: Die Reparaturzeit ist klein gegenüber der m iste. Durchschnittliche Beanspruchung in in durch Medien und Umgebungsbedingungen	94% 53 880 0 a beachten: h fährt das Ver ert). eine umfangrei peführt werden rad (diagnostic größer 70 % er ittleren Anford dustrielter Um, b. Der Anwende	Jahre Jahre ntil in iche Damit papeen. erungs- gebung	This results in: Safe failure fraction (SFF) MTBF _{total} MTBF _{dangerous} Diagnostic coverage (DC) Intended use must be observed: -Operation instructions -Requirements for the instrument air que (see safety manual) Safety-related assumptions: In case of failure, the pneumatic actuat causing the valve to move to its fail-safe (if actuator is mounted). Note: By using digital valves positioners, the extensive diagnostic functions also whi running. As a result the diagnostic cover dangerous failures can exceed 70% de application. Preconditions: The mean time to repair is short compa of demand. Normal exposure to industr fluids. The user is responsible for ensure	94% 53 880 0 wality or is vented, 'e position user has access lie the process is srage factor for pending on the ared to the averag ial environments.	years to
ergibt. Daraus ergeben sich: SFF MTBF _{gengenee} DC (Diagnostic coverage) Bestimmungsgemäße Verwendung ist zu - Bedienungsanleitung - Anforderung an Instrumentenluft-Qualität (siehe Sicherheitshandbuch) Sicherheitstechnische Annahme: Im Stöffall wird der Antrieb entüfftet, dadurc: die Sicherheitsstellung. (Falls Antrieb montii Hinweis: Durch Einsatz eines Stellungsregiers kann er Diagnose auch im laufenden Betrieb durchg kann sich je nach Einsatzfall ein Diagnoseg coverage factor) für gefährliche Fehler von g Voraussetzungen: Die Reparaturzeit ist lein gegenüber der m rate. Durchschnittliche Beanspruchung in in durch Medien und Umgebungsbedingungen für bestimmungagemäßen Gebrauch verant	94% 53 880 0 a beachten: h fährt das Ver ert). eine umfangrei peführt werden rad (diagnostic größer 70 % er ittleren Anford dustrielter Um, b. Der Anwende	Jahre Jahre ntil in iche Damit papeen. erungs- gebung	This results in: Safe failure fraction (SFF) MTBF _{total} MTBF _{dangenous} Diagnostic coverage (DC) Intended use must be observed: -Operation instructions -Requirements for the instrument air que (see safety manual) Safety-related assumptions: In case of failure, the pneumatic actuat causing the valve to move to its fail-saft (if actuator is mounted). Note: By using digital valves positioners, the extensive diagnostic functions also whilmunning. As a result the diagnostic cover dangerous failures can exceed 70% de application. Preconditions: The mean time to repair is short compe of demand. Normal exposure to industr fluids. The user is responsible for ensurused as intended. WM MMAN	94% 53 880 0 wality or is vented, 'e position user has access lie the process is srage factor for pending on the ared to the averag ial environments.	years to
ergibt. Daraus ergeben sich: SFF MTBF _{genset} MTBF _{genset} DC (Diagnostic coverage) Bestimmungsgemäße Verwendung ist zu - Bedienungsanleitung - Anforderung an Instrumentenluft-Qualität (siehe Sicherheitshandbuch) Sicherheitstechnische Annahme: Im Stöffall wird der Antrieb entüfftet, dadurce die Sicherheitsstellung. (Falls Antrieb monti Hinweis: Durch Einsatz eines Stellungsregters kann e Diagnose auch im laufenden Betrieb durchg kann sich je nach Einsatzfall ein Diagnoseg coverage factor) für gefährliche Fehler von g Voraussetzungen: Die Reparaturzeit ist klein gegenüber der mi rate. Durchschnittliche Beanspruchung in in durch Medien und Umgebungsbedingungen für bestimmungsgemäßen Gebrauch verant	94% 53 880 0 a beachten: h fährt das Ver ert). eine umfangrei geführt werden größer 70 % er ittleren Anford dustrieller Um b. Der Anwende wortlich.	Jahre Jahre Intil in Damit Speben. erungs- gebung er ist	This results in: Safe failure fraction (SFF) MTBF _{total} MTBF _{dangerous} Diagnostic coverage (DC) Intended use must be observed: -Operation instructions -Requirements for the instrument air que (see safety manual) Safety-related assumptions: In case of failure, the pneumatic actuat causing the valve to move to its fail-safe (if actuator is mounted). Note: By using digital valves positioners, the extensive diagnostic functions also whill running. As a result the diagnostic cover dangerous failures can exceed 70% de application. Preconditions: The mean time to repair is short compare of demand. Normal exposure to industrifuids. The user is responsible for ensure used as intended. Mathematical could be application. Andre' Schnepper	94% 53 880 0 wality or is vented, 'e position user has access to le the process is prage factor for pending on the arred to the average ial environments- ring that the device	years to perate and se is
ergibt. Daraus ergeben sich: SFF MTBF _{dengeros} DC (Diagnostic coverage) Bestimmungsgemäße Verwendung ist zu - Bedienungsanleitung - Anforderung an Instrumentenluft-Qualität (siehe Sicherheitshandbuch) Sicherheitstechnische Annahme: Im Stöffall wird der Antrieb enttöfftet, dadurc die Sicherheitsstellung. (Falls Antrieb monti Hinweis: Durch Einsatz eines Stellungsregters kann e Diagnose auch im laufenden Betrieb durchg kann sich je nach Einsatzfall ein Diagnoseg coverage factor) für gefährliche Fehler von g Voraussetzungen: Die Reparaturzeit ist klein gegenüber der m iste. Durchschnittliche Beanspruchung in in durch Medien und Umgebungsbedingungen	94% 53 880 0 a beachten: h fährt das Ver ert). eine umfangrei peführt werden rad (diagnostic größer 70 % er ittleren Anford dustrielter Um, b. Der Anwende	Jahre Jahre Intil in iche . Damit geben. gebung er ist 	This results in: Safe failure fraction (SFF) MTBF _{total} MTBF _{dangenous} Diagnostic coverage (DC) Intended use must be observed: -Operation instructions -Requirements for the instrument air que (see safety manual) Safety-related assumptions: In case of failure, the pneumatic actuat causing the valve to move to its fail-saft (if actuator is mounted). Note: By using digital valves positioners, the extensive diagnostic functions also whilmunning. As a result the diagnostic cover dangerous failures can exceed 70% de application. Preconditions: The mean time to repair is short compe of demand. Normal exposure to industr fluids. The user is responsible for ensurused as intended. WMCMAN	94% 53 880 0 eality or is vented, 'e position user has access t is the process is prage factor for pending on the aread to the averag ial environments ring that the device Date:	years to

PFEIFFER				Pfeif	fer			
Chemie-Armaturenbau Gm	ьн			Chemie-Armaturen	bau GmbH			
Herstellererklärung			Manufacturer's Declarat	on				
Hiermit bestätigt die Firma			The manufacturer					
PF	EIFFER CHE	MIE-AR	MATURENBAU GMBH					
	Hooghe	Weg 41,	47906 Kempen					
		Germ	any					
für			hereby certifies that					
Kugel	hähne/ball v	alves BR	VSeries 20a und/and 20b					
dass die Geräte			with the corresponding pneumatic actua	tors are suitable	for			
der o.g. Baureihen für die Verwendung in s	icherheitsgerich	teten	use in safety instrumented systems acc					
System nach IEC 61508 und IEC 61511 e			IEC 61508 and IEC 61511.					
Die Geräte sind geeignet für den Einsatz in			The devices are suitable for use in safe					
gerichteten Anwendungen bis SIL 2 (einze (redundante Verschaltung) gemäß IEC 61		SIL 3	up to SIL 2 (single device) and SIL 3 (re according to IEC 61508.	idundant configu	iration)			
Der Nachweis erfolgte auf der Basis der B		hit	The evidence is based on proven in use	combined with	а			
(proven in use) kombiniert mit einer FMED			FMEDA.		-			
Bescheinigt wird hiermit SIL 2			Device compliance with SIL 2 is hereby	certified.				
Sicherheitstechnische Kenndaten:			Safety-related data:					
Lambda safe, undetected	1,3E-06	1/hr	Lambda safe, undetected	1,3E-06	1/hr			
Lambda safe, detected	0		Lambda safe, detected	0				
Lambda dangerous, undetected	1,2E-07	1/hr	Lambda dangerous, undetected	1,2E-07	1/hr			
Lambda dangerous, detected PFD (avg) bei jährlicher Prüfung	0 5.4E-04		Lambda dangerous, detected PFD (avg) with annual tests	5.4E-04				
HFT	0		HFT	0				
Gerätetyp	A		Device type	A				
Nutzbare Lebensdauer : Nach IEC 61508- 8 - 12 Jahre angenommen werden oder ei		n	Useful lifetime: According to IEC 61508 useful lifetime of 8 – 12 years can be a					
werden, der sich durch Betriebsbewährung			can be used based on the user's exper		andra			
ergibt.								
Daraus ergeben sich: SFF	91%		This results in: Safe failure fraction (SFF)	91%				
MTBFgesamt	83	Jahre	MTBF _{intel}	83	years			
MTBF _{dargerous}	920	Jahre	MTBFdangerous	920	years			
DC (Diagnostic coverage)	0		Diagnostic coverage (DC)	0				
Pastimente and Re Versendure ist -			Internet days and the observed					
Bestimmungsgemäße Verwendung ist a - Bedienungsanleitung	to beachten.		Intended use must be observed: -Operation instructions					
 Anforderung an Instrumentenluft-Qualität 			-Requirements for the instrument air qu	ality				
(siehe Sicherheitshandbuch)			(see safety manual)					
Sicherheitstechnische Annahme: Im Störfall wird der Antrieb entlüftet, dadur	ch fährt das Vos	dil lo	Safety-related assumptions:	or in unstad				
die Sicherheitsstellung. (Falls Antrieb mon			In case of failure, the pneumatic actuator is vented, causing the valve to move to its fail-safe position					
			(if actuator is mounted).					
Hinweis:			Note:					
Durch Einsatz eines Stellungsreglers kann			By using digital valves positioners, the user has access to					
Diagnose auch im laufenden Betrieb durch		Damit	extensive diagnostic functions also while the process is					
kann sich je nach Einsatzfall ein Diagnose coverage factor) für gefährliche Fehler von		neben	running. As a result the diagnostic coverage factor for dangerous failures can exceed 70% depending on the					
orrendge laster, for genarmente i erner for	Brown to to en	application.	penning on the					
Voraussetzungen:			Preconditions:					
Die Reparaturzeit ist klein gegenüber der r		-	The mean time to repair is short compa					
rate. Durchschnittliche Beanspruchung in i			of demand. Normal exposure to industr					
durch Medien und Umgebungsbedingunge für bestimmungsgemäßen Gebrauch verar		rist	fluids. The user is responsible for ensur used as intended.	ning that the devi	Cells			
Contraction of the second	informula.							
6.0.0.			del fing					
Dieter van den Eeden			Andre' Schnepper					
Qualitätssicherung/Quality Assurance	Datum:	22.01.10	Vertriebsleitung/Sales Management	Date:	22.01.2010			
	Walterney a life state	0.000 C	Eingetragen beim Amtsgericht Krefeld, H	RB Nr. 9000				
PFEIFFER Chemie-Armaturenbau GmbH	PFE/FFER Chemie-Armaturenbeu GmbH Telefon: +49 (0)2152 2005 0 Hooghe Weg 41 Telefax: +49 (0)2152 1580			Geschäftsführer: DiplIng. Lorenz Stolzenberg.				

PFEIFFER				Pfeif	fer		
Chemie-Armaturenbau Gmb	н	_		Chemle-Armaturen	bau GmbH		
Herstellererklärung Hiermit bestätigt die Firma			Manufacturer's Declaration				
PFEIFFER CHEMIE-AR			MATURENBALL GMBH				
112			, 47906 Kempen				
	noogno	-	nany				
für		0011					
			hereby certifies that				
Ku	gelhähne/	ball val	ves BR/Series 26d/s				
dass die Geräte			with the corresponding pneumatic actu	ators are suitable	e for		
der o.g. Baureihen für die Verwendung in sich		teten	use in safety instrumented systems acc	cording to			
System nach IEC 61508 und IEC 61511 eins Die Costite sind oppinget für den Einsetz in ein			IEC 61508 and IEC 61511.	to entrete d one line			
Die Geräte sind geeignet für den Einsatz in si gerichteten Anwendungen bis SIL 2 (einzelne		511 3	The devices are suitable for use in safe up to SIL 2 (single device) and SIL 3 (n				
(redundante Verschaltung) gemäß IEC 61508		UIL U	according to IEC 61508.	oounoant coringe	naucit)		
Der Nachweis erfolgte auf der Basis der Betri		fic	The evidence is based on proven in use	e combined with	a		
(proven in use) kombiniert mit einer FMEDA.			FMEDA.				
Bescheinigt wird hiermit SIL 2			Device compliance with SIL 2 is hereby	certified.			
Sicherheitstechnische Kenndaten;			Safety-related data:				
Lambda safe, undetected	1,3E-06	1/hr	Lambda safe, undetected	1,3E-06	1/hr		
Lambda safe, detected	0		Lambda safe, detected	0			
Lambda dangerous, undetected	1,2E-07	1/hr	Lambda dangerous, undetected	1,2E-07	1/hr		
Lambda dangerous, detected PFD (avg) bei jährlicher Prüfung	0 5.4E-04		Lambda dangerous, detected PFD (avg) with annual tests	0 5.4E-04			
HFT	0,42-04		HFT	0,42-04			
Gerätetyp	Ă		Device type	A			
Nutzbare Lebensdauer : Nach IEC 61508-2		n	Useful lifetime: According to IEC 61508	3-2 section 7.4.7.			
8 - 12 Jahre angenommen werden oder ein V werden, der sich durch Betriebsbewährung de angeb.			useful lifetime of 8 – 12 years can be a can be used based on the user's exper		alues		
					alues		
werden, der sich durch Betriebsbewährung de ergibt. Daraus ergeben sich:	es Anwenders		can be used based on the user's exper This results in:	rience.	alues		
werden, der sich durch Betriebsbewährung de ergibt. Daraus ergeben sich: SFF	es Anwenders 91%		can be used based on the user's exper <u>This results in:</u> Safe failure fraction (SFF)	sience. 91%			
werden, der sich durch Betriebsbewährung de ergibt. Daraus ergeben sich: SFF MTBF _{omment}	es Anwenders 91% 83	Jahre	can be used based on the user's exper <u>This results in:</u> Safe failure fraction (SFF) MTBF _{lotal}	91% 83	years		
werden, der sich durch Betriebsbewährung de ergibt. Daraus ergeben sich: SFF MTBF _{gesamt} MTBF _{dengerous}	91% 83 920		can be used based on the user's exper <u>This results in:</u> Safe failure fraction (SFF) MTBF _{otal} MTBF _{dangerous}	sience. 91%			
werden, der sich durch Betriebsbewährung de ergibt. Daraus ergeben sich: SFF MTBF _{omment}	es Anwenders 91% 83	Jahre	can be used based on the user's exper <u>This results in:</u> Safe failure fraction (SFF) MTBF _{lotal}	91% 83 920	years		
werden, der sich durch Betriebsbewährung de ergibt. D <u>araus ergeben sich:</u> SFF MTBF _{gesant} MTBF _{dangeross} DC (Diagnostic coverage) Bestimmungsgemäße Verwendung ist zu i	91% 83 920 0	Jahre	can be used based on the user's exper <u>This results in:</u> Safe failure fraction (SFF) MTBF _{otal} MTBF _{dangerous}	91% 83 920	years		
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PFEIFFER Chemie-Armaturenbau Gn	ъН			Pfeif	fer Dau GmbH		
Herstellererklärung		1	Manufacturer's Declarat	ion			
Hiermit bestätigt die Firma			The manufacturer				
PF			MATURENBAU GMBH				
	Hooghe	-	47906 Kempen				
_		Gern					
für			hereby certifies that				
	Klappen/butt	erfly val	ves BR/Series 14b/c				
dass die Geräte			with the corresponding pneumatic actu	ators are suitable	for		
der o.g. Baureihen für die Verwendung in		teten	use in safety instrumented systems acc	cording to			
System nach IEC 61508 und IEC 61511 e Die Geräte sind geeignet für den Einsatz i			IEC 61508 and IEC 61511. The devices are suitable for use is set	the second as a factor			
gerichteten Anwendungen bis SIL 2 (einze		SIL 3	The devices are suitable for use in safe up to SIL 2 (single device) and SIL 3 (re				
(redundante Verschaltung) gemäß IEC 61		OIL O	according to IEC 61508.	eoundant coningu	auony		
Der Nachweis erfolgte auf der Basis der B		eit	The evidence is based on proven in use	e combined with			
(proven in use) kombiniert mit einer FMED	A.		FMEDA.				
Bescheinigt wird hiermit SIL 2			Device compliance with SIL 2 is hereby	certified.			
Sicherheitstechnische Kenndaten:			Safety-related data:				
Lambda safe, undetected	1,4E-06	1/hr	Lambda safe, undetected	1,4E-06	1/hr		
Lambda safe, delected Lambda dangerous, undetected	0	4.0	Lambda safe, detected	0			
Lambda dangerous, detected	1,3E-07 0	1/hr	Lambda dangerous, undetected Lambda dangerous, detected	1,3E-07 0	1/hr		
PFD (avg) bei jährlicher Prüfung	5.5E-04		PFD (avg) with annual tests	5,5E-04			
HFT	0		HFT	0			
Gerätetyp	A		Device type	A			
8 - 12 Jahre angenommen werden oder ei werden, der sich durch Betriebsbewährung ergibt.		•	useful lifetime of 8 – 12 years can be a can be used based on the user's exper				
Daraus ergeben sich:			This results in:				
SFF MTBF _{gesamt}	92% 73	Jahre	Safe failure fraction (SFF) MTBF _{weet}	92%			
MTBF _{dargerous}	910	Jahre	MTBF _{dengerous}	73 910	years		
DC (Diagnostic coverage)	0		Diagnostic coverage (DC)	0	Joard		
Bestimmungsgemäße Verwendung ist :	w beachten:		Intended use must be abased.				
- Bedienungsanleitung	to peachtern.		Intended use must be observed: -Operation instructions				
- Anforderung an Instrumentenluft-Qualität	1		-Requirements for the instrument air qu	ality			
(siehe Sicherheitshandbuch)			(see safety manual)				
Sicherheitstechnische Annahme:			Safety-related assumptions:				
Im Störfall wird der Antrieb entlüftet, dadur		til in	In case of failure, the pneumatic actuate	or is vented,			
die Sicherheitsstellung. (Falls Antrieb mon	tiert).		causing the valve to move to its fail-safe position				
Himania			(if actuator is mounted).				
Hinweis: Durch Einsatz eines Stellungsreglers kann	eine umfanoreik	he	Note: By using digital valves positioners, the user has access to				
Diagnose auch im laufenden Betrieb durch			extensive diagnostic functions also while the process is				
kann sich je nach Einsatzfall ein Diagnose	grad (diagnostic		running. As a result the diagnostic coverage factor for				
coverage factor) für gefährliche Fehler von	größer 70 % erg	dangerous failures can exceed 70% depending on the application.					
Voraussetzungen:			Preconditions:				
Die Reparaturzeit ist klein gegenüber der r			The mean time to repair is short compa				
rate. Durchschnittliche Beanspruchung in i durch Medien und Umgebungsbedingunge			of demand. Normal exposure to industri				
www.wearen.ana.oungeoungsoeangunge		191	fluids. The user is responsible for ensur used as intended.	ing that the devic	15		
ür bestimmungsgemäßen Gebrauch verar			1.1 -				
für bestimmungsgemäßen Gebrauch veran			_ (the strong				
lür bestimmungsgemäßen Gebrauch verar							
Dieter van den Eeden	Det		Andre' Schnepper				
Dieter van den Eeden Quelitätssicherung/Quality Assurance	Datum:	22.01.10	Vertriebsleitung/Sales Management	Date:	22.01.2010		
Dieter van den Eeden	Datum: Telefon: +49 (0)2 Telefax: +49 (0)2	152 2005 0		RB Nr. 9000	22.01.2010		

Herstellererklärung **Manufacturer's Declaration**



Hiermit bestätigt die Firma

The manufacturer

hereby certifies that Series

VETEC Ventiltechnik GmbH Siemensstraße 12, D - 67346 Speyer Germany

für Stellventile der Bauart

62, 72, 73, 82, 93

und die dazugehörigen pneumatischen Antriebe, dass die Geräte der o.g. Baureihen für die Verwendung in sicherheitsgerichteten Systemen nach IEC 61508 und IEC Sichermeitsgerichteten Systemen nach IEU 61504 und IEU 61511 einsetzbar sind. Die Geräte sind geeignet für den Einsatz in sicherheitsgerichteten Anwendungen bis SIL 2 (einzelnes Gerät) und SIL 3 (redundante Verschaltung) gemäß IEC 61508. Der Nachweis erfolgte auf Basis der Betriebsbewährtheit (proven in use) kombiniert mit einer FMEDA. Das Ergebnis der Untersuchungen wurde von EXIDA verifiziert.

Sicherheitstechnische Kenndaten:

Lambda safe undetected	6,7 * 10 ⁻⁷ 1/hr
Lambda safe detected	0
Lambda dangerous undetected	1,7 * 10 ⁻⁷ 1/hr
Lambda dangerous detected	0
PFD (avg) bei jährl. Prüfung	7,4 * 10 ⁻⁴
HFT	0
Gerätetyp	А

Nutzbare Lebensdauer: Nach IEC 61508-2 7 4 7 4 können 8-12 Jahre angenommen werden oder ein Wert benutzt werden, der sich durch Betriebsbewährung des Anwenders ergibt.

Jahre

Jahre

Daraus ergeben sich

SFF	80%
MTBFgesamt	136
MTBF _{dangerous}	671
DC (Diagnostic coverage)	0

Bestimmungsgemäße Verwendung ist zu beachten:

Bedienungsanleitung
 Anforderung an Instrumentenluftqualität (Sicherheitshandbuch)

Sicherheitstechnische Annahme: Im Störfall wird der Antrieb entlüftet, dadurch fährt das Ventil in die Sicherheitslage.

Hinweis: Durch den Einsatz eines Stellungsreglers kann eine umfangreiche Diagnose auch im laufenden Betrieb durchgeführt werden. Damit kann sich je nach Einsatzfall ein Diagnosegrad (diagnostic coverage factor) für gefährliche Fehler von größer 70% ergeben.

Voraussetzungen: Die Reparaturzeit ist klein gegenüber der mittleren Anforderungsrate. Durchschnittliche Beanspruchung in industrielle Umgebung durch Medien und Umgebungsbedingungen. Der Anwender ist für bestimmungsgemäßen Gebrauch verantwortlich.

Speyer, 19.Jan.2010 / 19-Jan-10 Bernhard Beier

QM - Beauftragter / QA - Responsible

FB002_012Rev4.doc Erstellt: Bernhard Beier Datum: 22.01.2010	stellt: Bernhard Beier Genehmigt: P. Konzack			Seite 1 von 1	
Sitz: Speyer Geschäftsführer: Norbert Hock 26.01.2010	Register-Gericht: Ludwigshafen HRB 51677	Kreis-u-Stadisparkasse Speyer: Kio, 18101 BLZ 5475 00 10, IBAN: DE19 5475 0010 0000 018101, BIC/SWIFT: MALADE51SPY	Commerzbank Speyer: Kto. 5606181 BLZ 545 400 33	Postbank Ludwigshafen: Kto. 132110670 BLZ 545 100 67	GROUP

Control Valves with the corresponding pneumatic actuators are suitable for use in safety instrument systems according to IEC 61508 and IEC 61511. The devices are suitable for use in Safety-related applications up to SIL 2 (single device) and SIL 3 (redundant configuration) according to IEC 61508. The evidence is based on proven in use combined with FMEDA. The results were verified by EXIDA.

VETEC

FB002.012

Safety related characteristics:

Lambda safe undetected	6,7 * 10 ⁻⁷ 1/hr
Lambda safe detected	0
Lambda dangerous undetected	1,7 * 10 ⁻⁷ 1/hr
Lambda dangerous detected	0
PFD (avg) with annual tests	7,4 * 10 ⁻⁴
HFT	0
Device type	A
Usable lifetime: According to IEC 6 lifetime of 8 to12 years can be assu used based on the user's experien	umed. Other values can be

This results in: SFF MTBF_{total}

MTBF_{dangerousl} DC (Diagnostic coverage)

Intended use must be observed:

Operating instructi Requirements for instrument air quality (see safety manual)

Safety related assumption: In case of failure, the pneumatic actuator is vented, causing the valve to move to its fail-safe position.

Note:

By using digital valve positioners, the user has access to extensive diagnostic functions also while the process is running. As a result, the diagnostic coverage factor for dangerous failures can exceed 70% depending on the application.

Norbert Hock

Preconditions: The mean time to repair is short to the average rate of demand. Normal exposure to industrial environment and fluids. The user is responsible for ensuring that the device is used as intended.

80%

136 years

671 years

Geschäftsführer / Managing director

9 Appendix 2 – Example of a checklist for a final element

Checklist fo	or testing safe	ety equipm	ent					SAM	son
Final element t	lest							Yes	No
Is the tag docu	mentation comple	ete and up-to-do	ite?						
Are the connec	ting cables in go	od order?							
Are the screw f	fittings in good or	der?							
Is the labeling	complete and in a	a readable state	? Control room, o	n site, process cor	ntrol syste	em and s	safety PLC		
Are all connect	ting housings free	of moisture, wa	iter, oil and dust?	solenoid valve, fe	edback	etc.)			
Are the actuate	or or solenoid val	ve free of corro	ion? Paint finish ir	good order?					
Visual inspectio	on of the pneuma	tic system: Are o	all pneumatic conn	ections in good o	order and	l leak-tig	ht?		
Are the bridge	s, yokes, stem cor	nnectors, fasteni	ng nuts free of cor	rosion and fasten	ed prop	erly?			
Is the valve page	cking leak-tight? A	Are there any vi	ible signs of the p	rocess medium?					
Is the bellows s	eal/bellows moni	toring still in go	od order?						
Check of the e	chaust ports of the	e solenoid valve							
Fail-safe positi	on check								
Open final eler process control		Set to Manua	and move						
P&ID Fa	il Close	DCS		* Valve: Remove air hose at the air manifold					
Loop		Valve		while the valv	re is bein	g moved	łi		
Do the valve po	osition and output	t signal match?	Move valve to OP	EN and CLOSED	position	5!			
Does the actua	tor move smoothl	y to its operatin	g position when th	ne signal pressure	is applie	edș			
Is there any lec	akage at the actua	ator?							
Does the actua	tor move smoothl	y to its fail-safe	position when mo	ved by the spring	sş				
Valve transit tin	ne	N/A 🗆	Time to open t	ne valve	sec.	Time to	close the valve		sec
Closing time Fail-close positi	ion	N/A 🗆	Time allowed for to move to its for	or the valve ail-safe position	sec.	Valve closing time to fail-safe position		sec	
Permissible lea	kage rate	N/A 🗆	Leakage rate a fail-safe positio		m³∕min		ge rate measured safe position	1/min,	m³/mir
Refer to DIN El The following t For control val	N 12266-1 (A.4 S able contains the ves functioning as	ieat tightness) fo permissible lea safety equipme	ent, leakage can a	res. so be measured	accordin	g to DIN	EN 1349.		
Test medium	Leakage rate A	Leakage rate B	Leakage rate C	Leakage rate D	Leakag		Leakage rate F	Leakag	
Liquid	Liquid No visible	0.01 *DN	0.03 *DN	0.1 *DN	0.3 *D	N	1.0 *DN	2.0 *D	N
Gas	leaks found during test	0.3 *DN	3.0 *DN	30.0 *DN	300 *E	N	3000 *DN	6000 *	'DN
0	,,		rature prevails at bles. This correspo				•	means	
Attach green la	abel after the test	has been comp	leted.						
Does repair wa	ork need to be pe	rformed on the	system? If this is th	e case, write out	a separa	ite order			
Tester 1:		Tester 2:		Test date:			Signature:		

Checklist for testing safe	ety equipment			samson	
Owner		Created/Revised by:			
Operation:	Plant:	Subplant:	Tag no.:		
Operating state during test: Prüfung: Shutdown	PLC/DCS:	Tester:	Test date:		
Fail-safe position:	SIL level:	Architecture:	Measuring pr	inciple:	
Manufacturer:	Manufacturer model:	Body number/serial number/stamp number/ID:			
Site of installation:	Barrier medium:	+H551-1			
Final element exists in the follow	ing SIL loops				
SIF no.:	- ·				
Commissioning test:	Proof test:		Revision test:		
U		1.1			
Final element test		Lockout test			
	years			years	
-	rocess and safety hazard	s in the plant and ir	nstallation is necesso	ary.	
Obtain a permit to work! Wear suitable protection for th The person performing the wo of practice as well as for using The person performing the wo This includes, for example, the unprotected electrical installati	ne work! Observe explosion prote rk is responsible for using the app suitable and tested tools! rk bears the compulsory insuranc safeguarding of the workplace a ons while temporarily leaving the	ction regulations! propriate maintenance m e during the work! gainst unauthorized acce workplace.	ethods according to the re	ecognized codes contact with	
 Obtain a permit to work! Wear suitable protection for the person performing the work of practice as well as for using The person performing the work of the person performing the work of the person performing the work of the person performing the two performances of the person performance of the performan	ne work! Observe explosion prote rk is responsible for using the app suitable and tested tools! rk bears the compulsory insurance safeguarding of the workplace a	ction regulations! propriate maintenance m e during the work! gainst unauthorized acce workplace.	ethods according to the re	ecognized codes contact with	
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MANUAL



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