Type 3967 Solenoid Valve

Safety Manual

SH 3967-1 EN

Edition April 2015

CE Ex certified

Definition of signal words

DANGER!
Hazardous situations which, if not avoided, will result in death or serious injury

WARNING!
Hazardous situations which, if not avoided, could result in death or serious injury

NOTICE
Property damage message or malfunction

Note:
Additional information

Tip:
Recommended action

Purpose of this manual

The Safety Manual SH 3967-1 contains information relevant for the use of the Type 3967 Solenoid Valve in safety-instrumented systems according to IEC 61508 and IEC 61511. The safety manual is intended for planners, constructors and operators of safety-instrumented systems.

NOTICE

Risk of malfunction due to incorrect mounting, connection or start-up of the device. Refer to the Mounting and Operating Instructions EB 3967 on how to mount the positioner, perform the electric and pneumatic connections as well as start up the device. Observe the warnings and safety instructions written in the Mounting and Operating Instructions EB 3967.

Further documentation

The documents listed below contain descriptions of the start-up, functioning and operation of the solenoid valve. You can download these documents from the SAMSOMATIC website. The documents marked with an asterisk (*) are supplied with the solenoid valve either in printed or electronic form.

- T 3967: Data sheet
- EB 3967*: Mounting and operating instructions

Note:

In addition to the solenoid valve documentation, observe the documentation for the pneumatic actuator, valve and other valve accessories.

1 Scope

General

The Type 3967 Solenoid Valve converts binary voltage signals into pneumatic control signals. It is used to control pneumatic rotary and linear actuators with spring-return mechanism.

Use in safety-instrumented systems

Observing the requirements of IEC 61508, the systematic capability of the solenoid valve for emergency venting as a component in safety-instrumented systems is given.

Use of the solenoid valve is possible on observing the requirements of IEC 61511 and the required hardware fault tolerance in safety-instrumented systems up to SIL 2 (single device/ HFT = 0) and SIL 3 (redundant configuration/HFT = 1).

The individual safety functions of the solenoid valve are to be regarded as Type A elements in accordance with IEC 61508-2.

Note:
The architecture and the interval between proof tests must be changed accordingly for a higher safety integrity level.

Versions and ordering data

All versions of the solenoid valve marked with the prefix **SIL** are suitable for use in safety-instrumented systems. The article code written on the nameplate (see table on page 6 to 8) provides details on the optional equipment of the solenoid valve.

Article code

Solenoid valve	Type 3967-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Type of protection																						
Without explosion protection		**SIL**	**0**	**0**	**0**																	
II G Ex ia IIC/ II 2D Ex tb IIIC T80°C IP65 (ATEX) [1]		**SIL**	**1**	**1**	**0**																	
Ex ia IIC T6/ Ex tD A21 IP65 T80°C (IECEx)		**SIL**	**1**	**1**	**2**																	
0Ex ia IIC T6/T5/T4 Ga/ Ex tb IIIC T80°C IP65 (GOST)		**SIL**	**1**	**1**	**3**																	
II 3G Ex nA II T6/II 3G Ex ic IIC T6/ II 3D Ex tc IIIC T80°C IP65 (ATEX) [2]		**SIL**	**8**	**1**	**0**																	
Ex nA II T6/Ex nL IIIC T6/ Ex tD A22 IP65 T80°C (IECEx)		**SIL**	**8**	**1**	**2**																	
2Ex nA II T6/T5/T4 Gc X/ 2Ex ic IIC T6/T5/T4 Gc X/ Ex tc IIIC T80°C Dc X (GOST)		**SIL**	**8**	**1**	**3**																	
Nominal signal																						
6 V DC				**SIL**	**1**																	
12 V DC				**SIL**	**2**																	
24 V DC				**SIL**	**3**																	
Manual override																						
Pushbutton underneath the enclosure cover						**SIL**	**1**															
Pushbutton in the enclosure cover							**2**															
Switch in the enclosure cover							**3**															
Switching function																						
3/2-way function with spring-return mechanism						**SIL**	**0**	**0**														
Attachment																						
NAMUR interface ¼" according to VDI/VDE 3845 for rotary actuators								**SIL**	**0**													
NAMUR rib according to IEC 60534-6-1 for linear actuators or panel, wall or rail mounting								**SIL**	**2**													
Mounting block with positioner for SAMSON Type 3277 Pneumatic Actuator								**SIL**	**3**													
NAMUR interface ½" according to VDI/VDE 3845 for rotary actuators								**SIL**	**4**													

[1] According to EC type examination certificate PTB 06 ATEX 2027

[2] According to statement of conformity PTB 06 ATEX 2028 X.

(continued on page 7)

(continued from page 6)

Solenoid valve	Type 3967- x x x x x x x x x x x x x x x x x x x x x x x x
K_{VS} [1]	
0.32	**SIL 0**
2.0	**SIL 2**
4.3	**SIL 4**
Material	
Polyamide and powder-coated aluminum	**SIL 0**
Polyamide and stainless steel	**SIL 0**
Pneumatic connection	
Two blanking plugs (connection to the adapter plate or on mounting block)	**SIL 0**
G ¼	**SIL 1**
¼ NPT	**SIL 2**
G ½	**SIL 3**
½ NPT	**SIL 4**
Pilot valve connection	
Two blanking plugs (connection to the adapter plate or on mounting block)	**SIL 0**
One G ¼ or ¼ NPT (with internal air supply)	**SIL 1**
Two G ¼ or ¼ NPT (with external air supply)	**SIL 2**
Supply air	
Internal supply over port 1 (for actuators for on/off service)	**SIL 0**
External supply over port 9 (for actuators for throttling service or mounting block with positioner)	**SIL 1**
Electrical connection	
Without cable gland	**SIL 0 0**
Cable gland M16 x 1.5 made of black polyamide	**SIL 0 1**
M16 x 1.5 cable gland made of blue polyamide	**SIL 1 1**
Cable gland M16 x 1.5 (CEAG) made of black polyamide	**SIL 1 3**
Cable gland M16 x 1.5, nickel-plated brass	**SIL 1 4**
Cable gland M16 x 1.5, brass, blue	**SIL 1 5**

[1] The air flow rate when p_1 = 2.4 bar and p_2 = 1.0 bar is calculated using the following formula: $Q = K_{VS} \times 36.22$ in m³/h.

(continued on page 8)

(continued from page 7)

Solenoid valve	Type 3967- x x x x x x x x x x x x x x x x x x x x x x
Degree of protection	
IP 65	**SIL 0**
Ambient temperature [1]	
–20 to +80 °C	**SIL 0**
–45 to +80 °C	**SIL 1**
Safety function	
Without	**0**
SIL [2] and PL [3]	**SIL 1**
Special version	
Without	**SIL 0 0 0**

[1] The maximum permissible ambient temperature depends on the permissible ambient temperature of the cable gland, type of protection and temperature class.

[2] SIL according to IEC 61508 (certificate no. V 177 2009 C2/C6)

[3] Safety performance level PL e according to ISO 13849 (certificate no. V 177 2010 C4)

Mounting versions

The solenoid valve is suitable for the following types of attachment in combination with various mounting parts:

– Attachment to rotary actuators with NAMUR interface according to VDI/VDE 3845
– Attachment to linear actuators with NAMUR rib according to IEC 60534-6-1
– Direct attachment to SAMSON Type 3277 Linear Actuator using mounting block
– Pipe mounting
– Panel, wall or rail mounting

2 Technical data

Type 3967-xxxxxxxx0 Solenoid Valve (K_{VS} 0.32)		
Switching function	3/2-way function with exhaust air feedback, actuated on one side	
K_{VS} [1]	0.32	
Safety function	SIL [2] and PL [3]	
Design	Solenoid with flapper/nozzle assembly and plug/seat valve with return spring	
Material	Enclosure:	Black polyamide
	Connecting plate:	Aluminum, powder coated, black or stainless steel 1.4404
	Adapter plate:	Aluminum, powder coated, gray beige RAL 1019, or stainless steel 1.4404
	Screws:	Stainless steel A2-70
	Springs:	Stainless steel 1.4310
	Seals:	Silicone rubber
Supply air	Instrument air (free from corrosive substances) or nitrogen	
Supply pressure	1.4 to 10.0 bar [4], 1.4 to 6.0 bar [5] (with 0 to 6.0 bar operating pressure) [5], 1.9 to 10.0 bar [5] (with 0 to 10.0 bar operating pressure) [5]	
Operating medium	Instrument air (free from corrosive substances) or nitrogen [4], Instrument air (free from corrosive substances), air containing oil or non-corrosive gases [5]	
Compressed air quality according to ISO 8573-1	Particle size and density: Class 4 · Oil content: Class 3 · Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected	
Operating pressure	1.4 to 10.0 bar [4], max. 10.0 bar [5]	
Output signal	Operating pressure	
Air consumption (binary e/p converter)	≤25 l/h at 1.4 bar supply air in operating position, ≤80 l/h at 1.4 bar supply air in neutral position	
Switching time	65 ms	
Electrical connection	Screw terminal, 2-pole, with cable gland M16 x 1.5	
Pneumatic connection	G ¼ or ¼ NPT and NAMUR interface ¼" [6]	
Degree of protection	IP 65	
Ambient temperature [7]	–20 to +80 °C, –45 to +80 °C	
Weight	0.45 kg, 0.80 kg (with adapter plate)	

1) The air flow rate when p_1 = 2.4 bar and p_2 = 1.0 bar is calculated using the following formula: $Q = K_{VS} \times 36.22$ in m³/h.
2) SIL according to IEC 61508 (certificate no. V 177 2009 C2/C6)
3) Safety performance level PL e according to ISO 13849 (certificate no. V 177 2010 C4)
4) With internal air supply
5) With external air supply
6) NAMUR interface according to VDI/VDE 3845
7) The maximum permissible ambient temperature depends on the permissible ambient temperature of the cable gland, type of protection and temperature class.

Type 3967-xxxxxxxx2 Solenoid Valve (K_{VS} 2.0)		
Switching function	3/2-way function with exhaust air feedback, actuated on one side	
K_{VS} [1] (in direction of flow)	2.0 (3 → 5), 1.1 (4 → 3)	
Safety function	SIL [2]	
Design	Solenoid with flapper/nozzle assembly and plug/seat valve with return spring	
Material	Enclosure:	Black polyamide, aluminum, powder coated, gray beige RAL 1019, or stainless steel 1.4404
	Connecting plate:	Aluminum, powder coated, black or stainless steel 1.4404
	Adapter plate:	Aluminum, powder coated, gray beige RAL 1019, or stainless steel 1.4404
	Screws:	Stainless steel A2-70
	Springs:	Stainless steel 1.4310
	Seals:	Chloroprene rubber (–20 to +80 °C) or silicone rubber (–45 to +80 °C)
	Diaphragm:	Chloroprene rubber (–20 to +80 °C) or silicone rubber (–45 to +80 °C)
Supply air	Instrument air (free from corrosive substances) or nitrogen	
Supply pressure	1.4 to 10.0 bar [3], 1.4 to 6.0 bar [4] (with 0 to 6.0 bar operating pressure), 1.9 to 10.0 bar [4] (with 0 to 10.0 bar operating pressure)	
Operating medium	Instrument air (free from corrosive substances) or nitrogen [3], Instrument air (free from corrosive substances), air containing oil or non-corrosive gases [4]	
Compressed air quality according to ISO 8573-1	Particle size and density: Class 4 · Oil content: Class 3 · Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected	
Operating pressure	Max. 10.0 bar	
Output signal	Operating pressure	
Air consumption (binary e/p converter)	≤25 l/h at 1.4 bar supply air in operating position, ≤80 l/h at 1.4 bar supply air in neutral position	
Switching time	65 ms	
Electrical connection	Screw terminal, 2-pole, with cable gland M16 x 1.5	
Pneumatic connection	Supply air: Exhaust air:	G ¼ or ¼ NPT and NAMUR interface ¼" [5] with G ⅜ G ½ or ½ NPT and NAMUR interface ¼" [5] with G ⅜
Degree of protection	IP 65	
Ambient temperature [6]	–20 to +80 °C, –45 to +80 °C	
Weight	1.65 kg, 1.95 kg (with adapter plate)	

1) The air flow rate when p_1 = 2.4 bar and p_2 = 1.0 bar is calculated using the following formula: $Q = K_{VS} \times 36.22$ in m³/h.
2) SIL according to IEC 61508 (see Manufacturer's Declaration)
3) With internal air supply
4) With external air supply
5) NAMUR interface according to VDI/VDE 3845
6) The maximum permissible ambient temperature depends on the permissible ambient temperature of the cable gland, type of protection and temperature class.

Type 3967-xxxxxxxx4 Solenoid Valve (K_{VS} 4.3)		
Switching function	3/2-way function with exhaust air feedback, actuated on one side	
K_{VS} [1] (in direction of flow)	4.3 (3 → 5), 1.9 (4 → 3)	
Safety function	SIL [2]	
Design	Solenoid with flapper/nozzle assembly and plug/seat valve with return spring	
Material	Enclosure:	Black polyamide, aluminum, powder coated, gray beige RAL 1019, or stainless steel 1.4404
	Connecting plate:	Aluminum, powder coated, black or stainless steel 1.4404
	Adapter plate:	Aluminum, powder coated, gray beige RAL 1019, or stainless steel 1.4404
	Screws:	Stainless steel A2-70
	Springs:	Stainless steel 1.4310
	Seals:	Chloroprene rubber (–20 to +80 °C) or silicone rubber (–45 to +80 °C)
	Diaphragm:	Chloroprene rubber (–20 to +80 °C) or silicone rubber (–45 to +80 °C)
Supply air	Instrument air (free from corrosive substances) or nitrogen	
Supply pressure	1.4 to 10.0 bar [3], 1.4 to 6.0 bar [4] (with 0 to 6.0 bar operating pressure) [4], 1.9 to 10.0 bar [4] (with 0 to 10.0 bar operating pressure) [4]	
Operating medium	Instrument air (free from corrosive substances) or nitrogen [3], Instrument air (free from corrosive substances), air containing oil or non-corrosive gases [4]	
Compressed air quality according to ISO 8573-1	Particle size and density: Class 4 · Oil content: Class 3 · Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected	
Operating pressure	Max. 10.0 bar	
Output signal	Operating pressure	
Air consumption (binary e/p converter)	≤25 l/h at 1.4 bar supply air in operating position, ≤80 l/h at 1.4 bar supply air in neutral position	
Switching time	65 ms	
Electrical connection	Screw terminal, 2-pole, with cable gland M16 x 1.5	
Pneumatic connection	G ½ or ½ NPT and NAMUR interface ½" [5]	
Degree of protection	IP 65	
Ambient temperature [6]	–20 to +80 °C, –45 to +80 °C	
Weight	1.6 kg, 1.9 kg (with adapter plate)	

1) The air flow rate when p_1 = 2.4 bar and p_2 = 1.0 bar is calculated using the following formula: $Q = K_{VS} \times 36.22$ in m³/h.
2) SIL according to IEC 61508 (see Manufacturer's Declaration)
3) With internal air supply
4) With external air supply
5) NAMUR interface according to VDI/VDE 3845
6) The maximum permissible ambient temperature depends on the permissible ambient temperature of the cable gland, type of protection and temperature class.

Electric data					
Type 3967			**-xxx1**	**-xxx2**	**-xxx3**
Nominal signal		U_N	6 V DC	12 V DC	24 V DC
		U_{max} [1]	27 V	40 V	60 V
Switching point	On	$U_{+80\ °C}$	≥4.8 V	≥9.6 V	≥18 V
		$P_{+20\ °C}$	≥5.47 mW	≥13.05 mW	≥26.71 mW
	Off	$U_{-25\ °C}$	≤1.0 V	≤2.3 V	≤4.6 V
Impedance		$R_{+20\ °C}$	2.6 kΩ	5.3 kΩ	10.5 kΩ
Temperature influence on R			0.4 %/°C	0.2 %/°C	0.1 %/°C
Type of protection Ex ia IIC [2]/Ex tb IIIC [3]					
Type 3967			**-1101**	**-1102**	**-1103**
Nominal signal		U_N	6 V DC	12 V DC	24 V DC
See EC type examination certificate PTB 06 ATEX 2027 for maximum permissible values when connected to a certified intrinsically safe circuit.					
Type of protection Ex nA II [4]/Ex tc IIIC [5]					
Type 3967			**-8101**	**-8102**	**-8103**
Nominal signal		U_N	6 V DC	12 V DC	24 V DC
See statement of conformity PTB 06 ATEX 2028 X for maximum permissible values when connected to a certified intrinsically safe circuit.					

[1] Maximum permissible value at 100 % duty cycle. The maximum permissible value U_i applies to explosion-protected versions.
[2] Marking II 2G Ex ia IIC T6 (gases in Zone 1)
[3] Marking II 2D Ex tb IIIC T80°C IP65 (dusts in Zone 21)
[4] Marking II 3G Ex nA II T6/II 3G Ex ic IIC T6 (gases in Zone 2)
[5] Marking II 3D Ex tc IIIC T80°C IP65 (dusts in Zone 22)

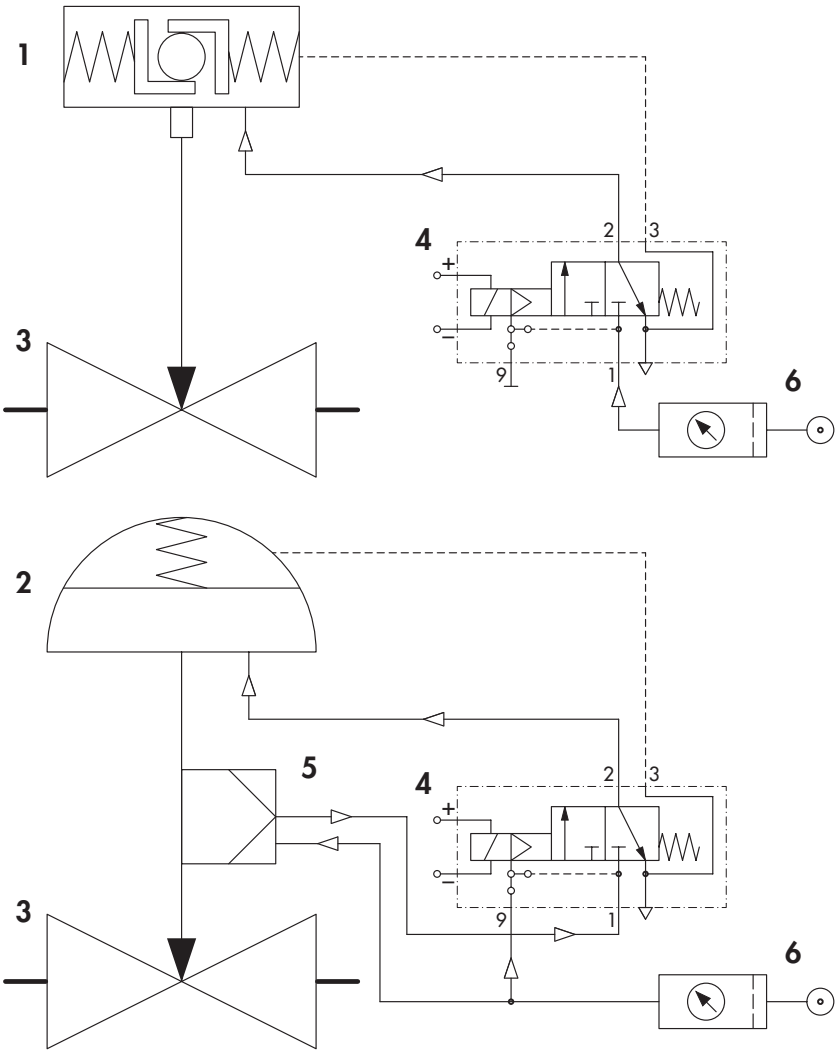
3 Safety-related functions

Emergency venting

The solenoid valve is energized by a binary voltage signal. Fail-safe action is triggered when no voltage signal (0 V DC) is applied to terminals + and –. The solenoid valve vents to the atmosphere and the actuator is vented as well (see Fig. 1 on page 15).

Fail-safe action

Fail-safe action is triggered by the solenoid valve and upon supply air failure.
The solenoid valve fully discharges its pneumatic output to the atmosphere, causing the mounted actuator to be vented. As a result, the valve moves to the fail-safe position. The fail-safe position depends on how the springs are arranged in the pneumatic actuator (air-to-close or air-to-open).



1 Rotary actuator
2 Linear actuator
3 Valve
4 Solenoid valve
5 Pneumatic positioner
6 Compressed air supply

Fig. 1: *Functional diagram showing emergency venting in actuators for on/off and throttling service*

4 Mounting, connection and start-up

Refer to Mounting and Operating Instructions ▶ EB 3967 on how to mount, perform the electric and pneumatic connections as well as start up the solenoid valve.
Only use original mounting parts and accessories.

5 Required conditions

WARNING!
Risk of malfunction due to incorrect selection or wrong installation and operating conditions.
Only use control valves in safety-instrumented systems after the necessary conditions in the plant have been fulfilled. This also applies to the mounted solenoid valve.

Selection

➔ The required transit times of the control valve are kept.
The transit times to be implemented are determined by the process engineering requirements.

➔ The solenoid valve is suitable for the prevailing ambient temperature.

Versions	Temperature range
With diaphragm and seals made of chloroprene rubber	–20 to +80 °C
With diaphragm and seals made of silicone rubber	–45 to +80 °C
With plastic cable gland	–20 to +80 °C
With metal cable gland	–45 to +80 °C
The specifications in the test certificates additionally apply to explosion-protected versions.	

➔ The temperature limits are observed.

Mechanical and pneumatic installation

➔ The solenoid valve is mounted properly as described in the mounting and operating instructions and connected to the air supply.

➔ The maximum supply pressure does not exceed 10.0 bar.

➔ The pneumatic air supply meets the instrument air specifications.

Particle size and quantity	Oil content	Pressure dew point
Class 4	Class 3	Class 3
≤5 µm and 1000/m³	≤1 mg/m³	–20 °C or at least 10 K below the lowest ambient temperature to be expected

Tip:
We recommend installing a pressure reducing valve/filter (e.g. SAMSOMATIC Type 3999-009x Service Unit or Type 3999-0096 Filter Regulator) upstream of the solenoid valve.

➔ The external supply air line (9) has a minimum inside diameter of 4 mm. The internal supply air line (1) and output (2) have a minimum inside diameter of 9 mm.
See "Sizing of the connecting line" in the mounting and operating instructions ▶ EB 3967.

➔ Select the cross section and length of the line to ensure that the supply pressure at the positioner on filling the actuator with air does not fall below the minimum limit of 1.4 (1.9) bar.

➔ The solenoid valve is mounted as prescribed.

➔ The exhaust opening at the solenoid valve remains open when the solenoid valve is installed on site.

Electrical installation

➔ The solenoid valve is mounted properly as described in the mounting and operating instructions and connected to the electric power supply.

➔ Only cables whose outside diameters are suitable for the cable glands are used.

➔ The electrical cables in Ex i circuits comply with the data that planning was based on.

➔ The cable glands and enclosure cover screws are fastened tightly to ensure that the degree of protection is met.

➔ The installation requirements for the applicable explosion protection measures are observed.

➔ The special conditions specified in the explosion protection certificates are observed.

6 Proof testing

The proof test interval and the extent of testing lie within the operator's responsibility. The operator must draw up a test plan, in which the proof tests and the interval between them are specified. We recommend summarizing the requirements of the proof test in a checklist.

WARNING!
Risk of dangerous failure due to malfunction in the event of emergency (actuator is not vented or the valve does not move to the fail-safe position).
Only use devices in safety-instrumented systems that have passed the proof test according to the test plan drawn up by the operator.

Regularly check the safety-instrumented function of the entire SIS loop. The test intervals are determined, for example on calculating each single SIS loop in a plant (PFD_{avg}).

Function test

Regularly check the safety function according to the test plan drawn up by the operator.

Refer to the SIL proof test when large deviations occur or any other irregularities. The necessary documentation for this is provided by SAMSOMATIC.

The SIL proof test can be performed by SAMSOMATIC on request.

Note:
Record any faults in the solenoid valve and inform SAMSOMATIC of them in writing.

➔ In case of internal supply air, air with the permissible operating pressure from 1.4 to 10.0 bar is applied to port 1.
In case of external supply air, air with the maximum operating pressure of 10.0 bar or the maximum available operating pressure must be applied to port 1. On using an upstream positioner, adjust it so that the maximum output pressure is available at the positioner output.

➔ Apply the nominal voltage U_N specified on the nameplate to the solenoid valve.

➔ Check whether the valve moves to its end position on demand.

➔ De-energize the solenoid valve.

Check whether the actuator is fully vented within the demanded time (fail-safe position).

Tip:
Connect a pressure gauge to check that the actuator has completely vented.

➔ Record the valve transit time and compare it to the time the valve took at start-up and during proof tests.

Visual inspection to avoid systematic failure

To avoid systematic failure, inspect the solenoid valve regularly. The frequency and the scope of the inspection lie within the operator's responsibility. Take application-specific influences into account, such as:

– Dirt blocking the pneumatic connections
– Corrosion (destruction primarily of metals due to chemical and physical processes)
– Material fatigue
– Aging (damage caused to organic materials, e.g. plastics or elastomer, by exposure to light and heat)
– Chemical attack (organic materials, e.g. plastics or elastomer, which swell, leach out or decompose due to exposure to chemicals)

NOTICE
Risk of malfunction due to the use of unauthorized parts.
Only use original parts to replace worn parts.

7 Repairs

Only perform the work on the solenoid valve described in ▶ EB 3967.

Only use the specified original mounting parts.

Herstellererklärung

Für folgende Produkte

Magnetventile Typ 3967 mit SIL-Kennzeichnung

Hiermit wird bestätigt, dass die o. g. Magnetventile gemäß IEC 61508 für den Einsatz in sicherheitsgerichteten Kreisen geeignet sind. Die Geräte haben eine HFT von 0 und können nach IEC 61511 bis SIL 2 (einzelnes Gerät, HFT = 0) und SIL 3 (redundante Verschaltung, HFT = 1) eingesetzt werden.

Die Konformität des Entwicklungsprozesses, der durchgeführten FMEDA und der Aussagen dieser Herstellererklärung sind von der TÜV Rheinland Industrie Service GmbH durch das Zertifikat V60.09/14 vom 27. November 2014 zertifiziert.

Nutzbare Lebensdauer

Nach IEC 61508-2, Abschnitt 7.4.9.5 können acht bis zwölf Jahre angenommen oder ein Wert benutzt werden, der sich durch Betriebsbewährung des Anwenders ergibt.

Sicherheitstechnische Kenndaten

$\lambda_{safe,\ undetected}$	20 FIT
$\lambda_{safe,\ detected}$	0
$\lambda_{dangerous,\ undetected}$	2 FIT
$\lambda_{dangerous,\ detected}$	0
$PFD_{avg.}$ bei jährlicher Prüfung	$7{,}79 \cdot 10^{-6}$
HFT (Hardware Fault Tolerance)	0
DC (Diagnostic Coverage)	0 %
Gerätetyp	A
Betriebsmodus	Low Demand
SFF (Safe Failure Fraction)	92 %
$MTBF_{gesamt}$	5.132 Jahre
$MTBF_{dangerous,\ undetected}$	64.156 Jahre

1 FIT = 1 Ausfall pro 10^9 Stunden

Bestimmungsgemäße Verwendung

- Bedienungsanleitung
- Sicherheitshandbuch
- Anforderungen an Instrumentenluftqualität (siehe Sicherheitshandbuch)

Manufacturer's Declaration

For the following products

Type 3967 Solenoid Valve with SIL marking

We hereby certify that the solenoid valves mentioned above are suitable for use in safety-instrumented systems according to IEC 61508. The devices have an HFT of 0 and can be used up to SIL 2 (single device, HFT = 0) and SIL 3 (redundant configuration, HFT = 1) according to IEC 61511.

The conformity of the development process and the performed FMEDA as well as the statements in this Manufacturer's Declaration are certified by TÜV Rheinland Industrie Service GmbH in the Certificate V60.09/14 of 27 November 2014.

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).

Safety-related data

$\lambda_{safe,\ undetected}$	20 FIT
$\lambda_{safe,\ detected}$	0
$\lambda_{dangerous,\ undetected}$	2 FIT
$\lambda_{dangerous,\ detected}$	0
$PFD_{avg.}$ with annual test	$7.79 \cdot 10^{-6}$
HFT (Hardware Fault Tolerance)	0
DC (Diagnostic Coverage)	0 %
Device type	A
Mode of operation	Low demand
Safe failure fraction (SFF)	92 %
$MTBF_{total}$	5.132 years
$MTBF_{dangerous,\ undetected}$	64.156 years

1 FIT = 1 failure per 10^9 hours

Intended use

- Operating instructions
- Safety manual
- Quality requirements for instrument air (refer to safety manual)

Sicherheitstechnische Annahmen

Bei Unterbrechung des elektrischen Signals oder Ausfall der pneumatischen Hilfsenergie schaltet der pneumatische Verstärker seinen Ausgang zur Atmosphäre durch und entlüftet dadurch den angeschlossenen Ventilantrieb.

Safety-related assumptions

When the power supply or the supply pressure fail, the pneumatic booster discharges its output to the atmosphere, thus venting the mounted actuator.

Voraussetzungen

Die Reparaturzeit ist klein gegenüber der mittleren Anforderungsrate.
Durchschnittliche Beanspruchung in industrieller Umgebung durch Medien und Umgebungsbedingungen wird vorausgesetzt.
Der Anwender ist für den bestimmungsgemäßen Gebrauch verantwortlich.

Requirements

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

SAMSOMATIC GmbH

Stefan Unland
Zentralabteilungsleiter
Prozessautomation

Head of Central Department
Process Automation

SAMSOMATIC GmbH

Marc Belzer
Produktmanager
Magnetventiltechnik

Product Management
Solenoid Valves

SAMSOMATIC GMBH · A member of the SAMSON GROUP
Weismüllerstraße 20 - 22 · 60314 Frankfurt am Main, Germany
Phone: +49 69 4009-0 · Fax: +49 69 4009-1644
samsomatic@samsomatic.de · www.samsomatic.de

SH 3967-1 EN

2015-08-14 · English