MOUNTING AND OPERATING INSTRUCTIONS

EB 3966 EN

Translation of original instructions

Type 3966 Solenoid Valve

Edition March 2019

CE Ex certified

Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices.

➔ For the safe and proper use of these instructions, read them carefully and keep them for later reference.

➔ If you have any questions about these instructions, contact SAMSON's After-sales Service Department (aftersalesservice@samson.de).

The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website at ***www.samson.de > Service & Support > Downloads > Documentation***.

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

1 Safety instructions and measures

Intended use

The Type 3966 Solenoid Valve is used to control pneumatic actuators with NAMUR interface according to VDI/VDE 3845, with integral attachment according to VDI/VDE 3847 or with NAMUR rib according to IEC 60534. Upon failure of the air supply, the solenoid valve vents the actuator, causing the valve to move to the fail-safe position determined by the actuator. The device is designed to operate under exactly defined conditions (e.g. operating pressure, temperature). Therefore, operators must ensure that the solenoid valve is only used in applications where the operating conditions correspond to the technical data. In case operators intend to use the solenoid valve in other applications or conditions than specified, contact SAMSON.

SAMSON does not assume any liability for damage resulting from the failure to use the device for its intended purpose or for damage caused by external forces or any other external factors.

➔ Refer to the technical data for limits and fields of application as well as possible uses.

Reasonably foreseeable misuse

The solenoid valve is ***not*** suitable for the following applications:

– Use outside the limits defined during sizing and by the technical data

Furthermore, the following activities do not comply with the intended use:

– Use of non-original spare parts
– Performing maintenance activities not specified

Qualifications of operating personnel

The solenoid valve must be mounted, started up and serviced by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible hazards due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.

Explosion-protected versions of this device must be operated only by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.

Personal protective equipment

No personal protective equipment is required for the direct handling of the solenoid valve. Work on the control valve may be necessary when mounting or removing the device.

➔ Observe the requirements for personal protective equipment specified in the valve documentation.

➔ Check with the plant operator for details on further protective equipment.

Revisions and other modifications

Revisions, conversions or other modifications of the product are not authorized by SAMSON. They are performed at the user's own risk and may lead to safety hazards, for example. Furthermore, the product may no longer meet the requirements for its intended use.

Warning against residual hazards

The solenoid valve has a direct effect on the control valve. To avoid personal injury or property damage, plant operators and operating personnel must prevent hazards that could be caused in the control valve by the process medium, the operating pressure, the signal pressure or by moving parts by taking appropriate precautions. They must observe all hazard statements, warning and caution notes in these mounting and operating instructions, especially for installation, start-up and service work.

If inadmissible motions or forces are produced in the pneumatic actuator as a result of the supply pressure, it must be restricted using a suitable supply pressure reducing station.

Responsibilities of the operator

The operator is responsible for proper operation and compliance with the safety regulations. Operators are obliged to provide these mounting and operating instructions to the operating personnel and to instruct them in proper operation. Furthermore, the operator must ensure that operating personnel or third persons are not exposed to any danger.

Responsibilities of operating personnel

Operating personnel must read and understand these mounting and operating instructions as well as the specified hazard statements, warning and caution notes. Furthermore, the operating personnel must be familiar with the applicable health, safety and accident prevention regulations and comply with them.

Servicing explosion-protected devices

If a part of the device on which the explosion protection is based needs to be serviced, the device must not be put back into operation until a qualified inspector has assessed it according to explosion protection requirements, has issued an inspection certificate, or given the device a mark of conformity. Inspection by a qualified inspector is not required if the manufacturer performs a routine test on the device before putting it back into operation. Document the passing of the routine test by attaching a mark of conformity to the device. Replace explosion-protected components only with original, routine-tested components by the manufacturer.

Devices that have already been operated outside hazardous areas and are intended for future use inside hazardous areas must comply with the safety requirements placed on serviced devices. Before being operated inside hazardous areas, test the devices according to the specifications for servicing explosion-protected devices.

Maintenance, calibration and work on equipment

➔ Only use intrinsically safe current/voltage calibrators and measuring instruments for interconnection with intrinsically safe circuits to check or calibrate the equipment inside or outside hazardous areas.

➔ Observe the maximum permissible values specified in the certificates for the intrinsically safe circuit.

Referenced standards and regulations

Devices with a CE marking fulfill the requirements of the Directives 2014/30/EU and 2014/34/EU. This EU declaration of conformity is included in the Appendix of these instructions.

Referenced documentation

The following documents apply in addition to these mounting and operating instructions:

– The mounting and operating instructions of the components on which the solenoid valve is mounted (valve, actuator, valve accessories etc.)

1.1 Notes on possible severe personal injury

⚠ DANGER

Risk of fatal injury due to the formation of an explosive atmosphere.

Incorrect installation, operation or maintenance of the solenoid valve in potentially explosive atmospheres may lead to ignition of the atmosphere and cause death.

➔ The following regulations apply to installation in hazardous areas: EN 60079-14 (VDE 0165, Part 1).

➔ Installation, operation or maintenance of the solenoid valve must only performed by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.

➔ Observe the type of protection and the conditions for control specific to the type of protection according to the EU type examination certificate.

1.2 Notes on possible personal injury

⚠ WARNING

Risk of personal injury due to moving parts on the valve.

During operation and when the solenoid valve is triggered, the actuator stem moves through its entire travel range. Injury to hands or fingers is possible if they are inserted into the valve.

➔ While the valve moves, do not insert hands or fingers into the valve yoke and do not touch any moving valve parts.

1.3 Notes on possible property damage

NOTICE

Risk of damage to the solenoid valve due to incorrect mounting position.

➔ Do not seal the vent opening when the device is installed on site.

Risk of damage to the solenoid valve due to impermissible pressures.

➔ Do not connect a supply pressure to the solenoid valve that exceeds the maximum supply pressure.

Incorrect assignment of the terminals will damage the solenoid valve and will lead to malfunction.

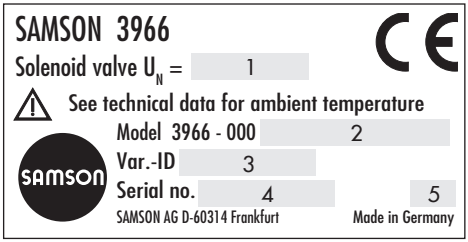
For the solenoid valve to function properly, the prescribed terminal assignment must be observed.

➔ Connect the electrical wiring to the solenoid valve according to the prescribed terminal assignment.

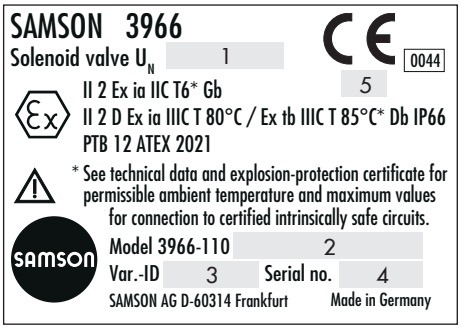
2 Markings on the device

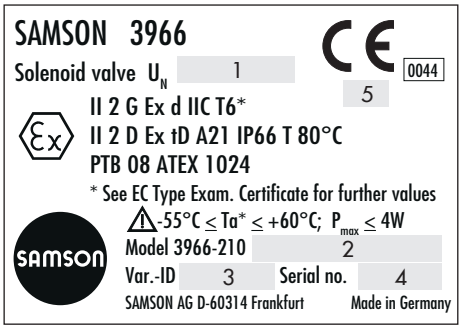
2.1 Nameplate

Version without explosion protection



Version with explosion protection





1 Nominal signal
2 Article code
3 Configuration ID
4 Serial number
5 Device index

2.2 Article code

Solenoid valve Type 3966-		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Type of protection																		
No explosion protection		0	0	0														
ATEX	II 2 G Ex ia IIC T6 Gb II 2 D Ex ia IIIC T80°C Db IP66 II 2 D Ex tb IIIC T85°C Db IP66	1	1	0														
ATEX	II 2 G Ex d IIC T6 II 2 D Ex tD A21 IP66 T80°C	2	1	0														
FM	AEx d IIC T6 … T4	2	3	0														
CSA	Class I, Div 1 + 2, Groups A, B, C, D Class II, Div 1 + 2, Groups E, F, G Class III Class 1, Zone 1, EX d IIC, T6… T4 Class II, Zone 21, EX tb IIIC T85 °C Type 4X, IP 66	2	3	1														
ATEX	II 3 G Ex ic IIC T6 Gc II 3 G Ex nAc II T6 Gc II 3 D Ex tc IIIC T80°C Dc IP66	8	1	0														
Nominal signal																		
6 V DC					1													
12 V DC					2													
24 V DC					3													
120 V DC					4													
240 V AC					5													
120 V AC					6													
Manual override																		
Without						0												
Pushbutton underneath the enclosure cover						1												
Switching function																		
Without (pilot valve as spare part)							0											
3/2-way function with spring-return mechanism							1											
Attachment																		
Without (pilot valve as spare part)								0										
Rotary actuators with NAMUR interface according to VDI/VDE 3845								1										
Linear actuators with NAMUR rib according to IEC 60534, for panel, wall or rail mounting								2										
Mounting block with positioner for SAMSON Type 3277 Pneumatic Actuator								3										

Solenoid valve Type 3966-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
K_{VS} [1]																	
Without (pilot valve as spare part)								0	0								
0.9								0	1								
Enclosure material																	
Aluminum									1								
Pneumatic connection																	
Without (pilot valve as spare part)										0							
G ¼										1							
¼ NPT										2							
Pilot supply																	
Internal supply over port 1 (when mounted onto actuators for on/off service)											1						
External supply over port 9 (when mounted onto actuators for throttling service or mounting block with positioner)											2						
Electrical connection																	
M20x1.5 cable entry												0	0				
½ NPT cable entry												0	1				
Cable gland M20x1.5 made of black polyamide												1	0				
Cable gland M20x1.5 made of blue polyamide												1	1				
Cable gland M20x1.5, black polyamide (CEAG)												1	3				
Cable gland M20x1.5, nickel-plated brass												1	4				
Cable gland M20x1.5, nickel-plated brass, blue												1	5				
Cable gland M20x1.5, blue polyamide (CEAG)												1	6				
Degree of protection																	
IP 66														1			
Type 4X														2			
Ambient temperature [2]																	
–20 to +80 °C															0		
–45 to +80 °C															1		
Safety function																	
Without																	0

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

2.3 Summary of explosion protection approvals

		Certification			Type of protection/comments
Type 3966	-110	EC type examination certificate	Number Date	PTB 10 ATEX 2021 2013-05-27	II 2 G Ex ia IIC T6 Gb II 2 D Ex ia IIIC T80°C Db IP66 II 2 D Ex tb IIIC T85°C Db IP66
	-210	EC type examination certificate	Number Date	PTB 08 ATEX 1024 2008-05-06	II 2 G Ex d IIC T6 II 2 D Ex tD A21 IP66 T80°C
	-230	**FM**	Number Date	3037211 2011-03-08	AEx d IIC T6 … T4
	-231	**CSA**	Number Date	70004606 2016-06-06	Class I, Div 1 + 2, Groups A, B, C, D Class II, Div 1 + 2, Groups E, F, G Class III Class 1, Zone 1, EX d IIC, T6... T4 Class II, Zone 21, EX tb IIIC T85 °C Type 4X, IP 66
	-810	EC type examination certificate	Number Date	PTB 12 ATEX 2021 2013-05-27	II 3 G Ex ic IIC T6 Gc II 3 G Ex nAc II T6 Gc II 3 D Ex tc IIIC T80°C Dc IP66

3 Design and principle of operation

The solenoid valve consists of an electropneumatic binary converter with manual override and integrated poppet valve actuated on one side with return spring.

The pilot supply for the electropneumatic binary converter is fed internally through port 1 or externally through port 9. By turning the turnable gasket, the pilot supply can be changed.

In the idle position, the armature is pressed against the seat of the supply air port by the spring. The solenoid coil is energized by an electric binary signal which causes the armature to be lifted out of the seat of the supply air port against the force of the spring and drawn into the exhaust air port. This causes the pressure to rise above the activation pressure of the integrated poppet valve and switches it to the operating position. After the solenoid coil is de-energized, the integrated poppet valve is switched to the idle position again by a return spring.

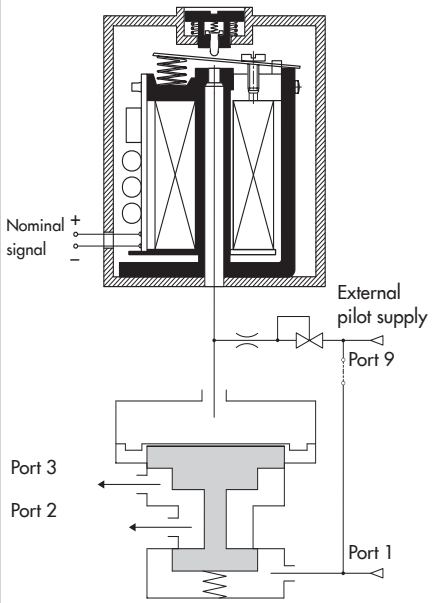


Fig. 1: *Functional diagram*

3.1 Accessories

General accessories

Designation	Order no.
¼" screw plug, stainless steel	0070-0799
¼" screw plug, nickel-plated brass	0070-0804
Screw plug G ¼ (for pneumatic connection)	0070-0858
Screw plug ¼ NPT (for pneumatic connection)	0070-0862
NBR O-ring 14x1.5 (for ¼" screw plug)	8421-0070
VMQ switching diaphragm (for poppet valve)	0520-1428
¼" filter (for screwing into the ports)	0550-0213
Stainless steel restriction (for screwing into port 1)	0570-0390
NBR O-ring 7.5x2 (for NAMUR interface, 2 pcs. required)	8421-0273
NBR O-ring 16x2 (for NAMUR interface, 2 pcs. required)	8421-0364
NBR O-ring 40x2 (inner seal between pilot valve and poppet valve)	8421-1002
NBR O-ring 56x2 (middle seal between pilot valve and poppet valve)	8421-0124
NBR O-ring 70x2 (external seal between pilot valve and poppet valve)	0520-0099
NBR O-ring 18x2 (for cable gland)	8421-0067
Hexagon socket screw ISO 4762, M5x20, stainless steel (for fastening the pilot valve onto the poppet valve, 4 pcs. required)	8333-1265
Washer ISO 7089-5, stainless steel (for hexagon socket screws, 4 pcs. required)	8390-0061
Clamp, nickel-plated brass, with ground symbol (for equipotential bonding terminals)	8804-0322
Slotted pan head screw ISO 1580, M4x8, nickel-plated brass (for equipotential bonding terminals)	8330-0688
Spring washer DIN 128, B4 form, stainless steel (for equipotential bonding terminals)	8392-0654
Hexagon socket screw DIN 7984, M4x10, stainless steel (to lock the enclosure cover)	8333-0774
NBR turnable gasket (to convert internal/external pilot supply)	0430-1151
Fastening plate, aluminum, powder coated, gray beige RAL 1019 (for turnable gasket)	0360-2785
Fastening plate, stainless steel (for turnable gasket)	0360-3693
Cap screw with slot ISO 1207, M3x8, stainless steel (for fastening plate)	8333-0095

Designation	Order no.
Cable gland (without explosion protection, Ex i, Ex nA)	
M20x1.5, black polyamide	8808-1011
M20x1.5, blue polyamide	8808-1012
M20x1.5, black polyamide (CEAG)	8808-0178
M20x1.5, blue polyamide (CEAG)	8808-0179
M20x1.5, nickel-plated brass	1890-4875
M20x1.5, nickel-plated brass, blue	1890-4876
Adapter M20x1.5 to ½ NPT made of aluminum, powder coated, gray beige RAL 1019	0310-2149
Mounting base according to EN 60715 including stainless steel mounting material	
For G-profile rail 32 (2 pcs. required)	1400-5930
For 35 mm top-hat rail mounting (2 pcs. required)	1400-5931
Mounting plate for wall mounting including stainless steel mounting material	1400-6726
Filter check valve with sintered polyethylene filter disk polyethylene for noise reduction,	
¼" connection, stainless steel, degree of protection IP 66	1790-7253
¼" connection, stainless steel, degree of protection NEMA 4	1790-9646

Accessories for direct attachment to Type 3277 Linear Actuators

Designation	Order no.
Mounting block for SAMSON Type 3277 Pneumatic Actuator	
G ¼ connection	1400-8817
¼ NPT connection	1400-8818
Pressure gauge mounting block, 1x Output and 1x Supply, made of stainless steel/ brass (for mounting block)	1400-6950
240 cm² actuator area, zinc-plated steel	1400-6444
240 cm² actuator area, stainless steel	1400-6445
350 cm² actuator area, zinc-plated steel	1400-6446
350 cm² actuator area, stainless steel	1400-6447
700 cm² actuator area, zinc-plated steel	1400-6448
700 cm² actuator area, stainless steel	1400-6449

Accessories for attachment according to IEC 60534-6

Designation	Order no.
Adapter plate for linear actuators with NAMUR rib according to IEC 60534-6-1, for panel, wall or rail mounting, including stainless steel mounting material, filters in ports and screw plug made of stainless steel with NBR O-ring in port 9,	
Aluminum, powder coated, gray beige RAL 1019, G ¼ connection	1400-9598
Aluminum, powder coated, gray beige RAL 1019, ¼ NPT connection	1400-9599
Stainless steel, G ¼ connection	1400-9600
Stainless steel, ¼ NPT connection	1400-9601
Mounting parts for valves with rod-type yokes (18 to 32 mm rod diameter)	1400-5342

Accessories for attachment to rotary actuators

Designation	Order no.
For K_{VS} coefficient 0.9; Adapter plate for NAMUR interface ½ on NAMUR rib ½	
Aluminum, powder coated, gray beige RAL 1019	1380-1652

3.2 Technical data

Technical data

General data	
Design	Solenoid with flapper/nozzle assembly and poppet valve
Material	
Enclosure	Aluminum, powder coated, gray beige RAL 1019 (pilot valve), Black anodized aluminum (poppet valve), stainless steel (optional)
Mounting plate for internal/ external pilot supply	Aluminum, powder coated, gray beige RAL 1019 or stainless steel (optional)
Gaskets and diaphragms	Nitrile butadiene rubber (NBR), vinyl methyl silicone rubber (VMQ)
External parts	Stainless steel
Electromagnetic compatibility	Complying with EN 61000-6-2, EN 61000-6-3 and NAMUR Recommendation NE 21
Degree of protection	IP 66, Type 4X
Explosion protection	See section 2.3 on page 14.
Electrical connection	M20x1.5 (½ NPT)
Cable entry	To a two-pole screw terminal and two equipotential bonding terminals (inside and outside)
Connecting cable	Wire cross-section 0.2 to 2.5 mm² (flexible) or 0.2 to 4 mm² (rigid)
Pneumatic connection	G ¼ (¼ NPT) and NAMUR interface ¼" according to VDI/VDE 3845
Ambient temperature [1)]	−20 to +80 °C −45 to +80 °C
Weight, approx.	1.60 kg, 1.95 kg with aluminum adapter plate

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

Pneumatic data	
Design	Plug/seat poppet valve with return spring
Switching function	3/2-way function, can be connected as normally closed (NC) or normally open (NO)
K_{VS} [1]	
Normally closed (NC)	0.35 (supply flow direction from 1 to 2 including restriction) 0.90 (supply flow direction from 1 to 2 without restriction) 0.90 (exhaust flow direction 2 to 3)
Normally open (NO)	0.90 (supply flow direction from 3 to 2) 0.90 (exhaust flow direction from 2 to 1 without restriction) 0.35 (exhaust flow direction from 2 to 1 including restriction)
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
Flow rate	At least 1.6 times greater K_{VS} coefficient than the K_{VS} coefficient of the device
Pilot supply pressure	
Internal (1)	1.4 to 6.0 bar
External (9)	1.4 to 6.0 bar (with 0 to 6.0 bar operating pressure), 1.9 to 6.0 bar (with 0 to 10.0 bar operating pressure)
Operating pressure	0 to 6.0 bar [2] 0 to 10.0 bar [3]
Air consumption of the pilot valve with 1.4 bar pilot supply	≤25 l/h (in operating position) ≤80 l/h (in idle position)

[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 m^3/h.

[2] With internal pilot supply

[3] With external pilot supply, operating pressure max. 6.0 bar with type of protection Ex d

Electric data								
Type 3966			**-0001**	**-0002**	**-0003**	**-0004**	**-0005**	**-0006**
Nominal signal		U_N	6 V DC	12 V DC	24 V DC	120 V DC	240 V AC	120 V AC
		U_{max} [1]	36 V	60 V	60 V	240 V	340 V	240 V
		f_N	–	–	–	–	50 to 60 Hz	
Switching point	ON	$U_{min. +80 °C}$	≥4.8 V	≥8.6 V	≥15.6 V	≥87 V	≥188 V	≥97 V
		I_N	≥1.4 mA	≥1.4 mA	≥1.4 mA	≥1.9 mA	≥2.0 mA	≥1.9 mA
		P_N	≥5.3 mW	≥10.4 mW	≥19.7 mW	≥209 mW	≥459 mW	≥225 mW
	OFF	$U_{max. –45 °C}$	≤1.0 V	≤2.2 V	≤4.2 V	≤26 V	≤55 V	≤29 V

Type of protection Ex d IIC [2]			
Type 3966	**-2101**	**-2102**	**-2103**
Nominal signal U_N	6 V DC	12 V DC	24 V DC
See EU type examination certificate PTB 08 ATEX 1024 for permissible ambient temperature			
Type of protection Ex ia IIC, Ex ia IIIC, Ex tb IIIC [2]			
Type 3966	**-1101**	**-1102**	**-1103**
Nominal signal U_N	6 V DC	12 V DC	24 V DC
See EU type examination certificate PTB 12 ATEX 2021 for maximum permissible values when connected to a certified intrinsically safe circuit.			
Type of protection Ex ia IIC, Ex ia IIIC, Ex tb IIIC [2]			
Type 3966	**-8101**	**-8102**	**-8103**
Nominal signal U_N	6 V DC	12 V DC	24 V DC
See EU type examination certificate PTB 12 ATEX 2021 for maximum permissible values when connected to a certified intrinsically safe circuit.			

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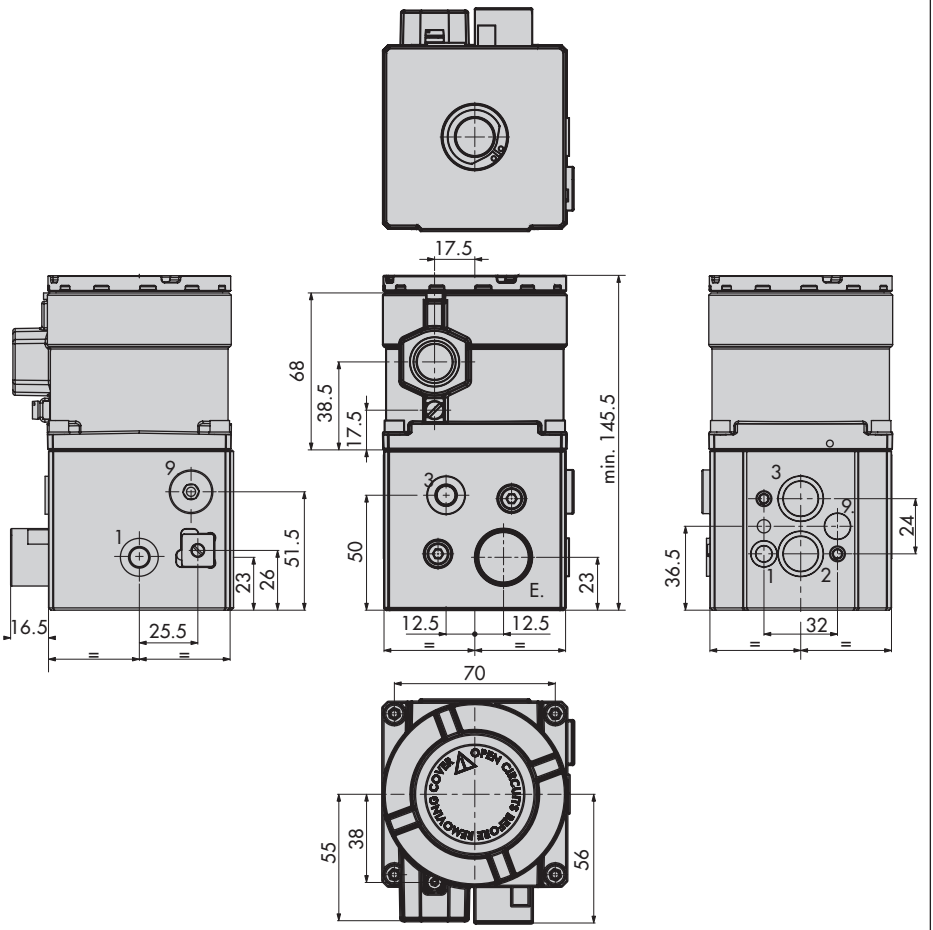
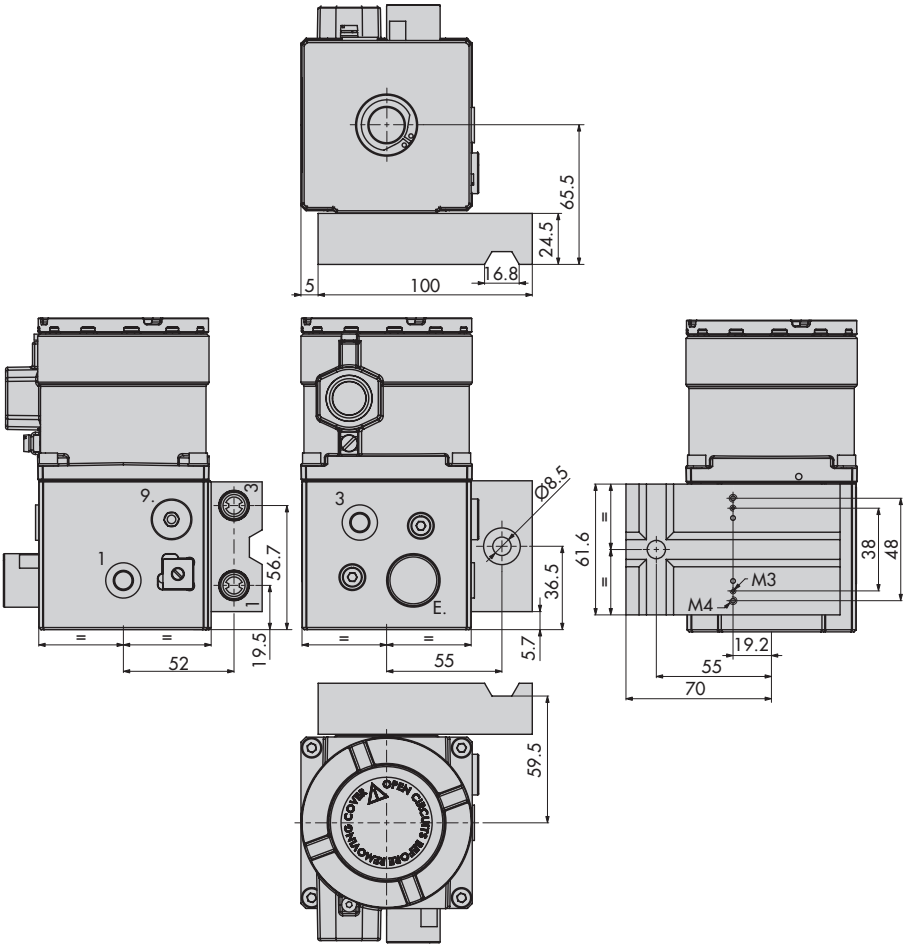
[1] Duty cycle 100 %
[2] See section 2.3 on page 14 for markings.

3.3 Dimensions in mm

Type 3966 Solenoid Valve with NAMUR interface according to VDI/VDE 3845 for rotary actuators or mounting block with positioner for Type 3277 Linear Actuators



Type 3966 Solenoid Valve with adapter plate for linear actuators with NAMUR rib according to IEC 60534-6-1, for panel, wall or rail mounting



4 Measures for preparation

After receiving the shipment, proceed as follows:

1. Check the scope of delivery. Compare the shipment received with the delivery note.
2. Check the shipment for transportation damage. Report any transportation damage.

4.1 Unpacking

NOTICE

Risk of solenoid valve damage due to foreign particles entering the valve.
Do not remove the packaging and protective film/protective caps until immediately before mounting and start-up.

1. Remove the packaging from the solenoid valve.
2. Dispose of the packaging in accordance with the valid regulations.

4.2 Transporting

– Protect the solenoid valve against external influences (e.g. impact).
– Protect the solenoid valve against moisture and dirt.
– Observe transport temperature depending on the permissible ambient temperature (see technical data in section 3.2).

4.3 Storage

NOTICE

Risk of solenoid valve damage due to improper storage.
– Observe storage instructions.
– Avoid long storage times.
– Contact SAMSON in case of different storage conditions or long storage periods.

Storage instructions

– Protect the solenoid valve against external influences (e.g. impact, shocks, vibration).
– Do not damage the corrosion protection (coating).
– Protect the solenoid valve against moisture and dirt. In damp spaces, prevent condensation. If necessary, use a drying agent or heating.
– Observe storage temperature depending on the permissible ambient temperature (see technical data in section 3.2).
– Store solenoid valve with the cover closed.
– Seal the pneumatic and electrical connections.

5 Mounting and start-up

NOTICE

Risk of malfunction due to incorrect sequence of mounting, installation and start-up. Observe the prescribed sequence.

➔ Sequence:

1. **Remove the protective caps from the pneumatic connections.**
2. **Mount the solenoid valve.**
➔ Section 5.1 onwards
3. **Perform pneumatic installation.**
➔ Section 5.3 onwards
4. **Perform electrical installation.**
➔ Section 5.4 onwards

5.1 Installation

Any mounting position may be used. The following applies concerning the installation:

➔ Install the solenoid valve in such a way that the cable entry faces downward (in cases where this is not possible, mount it in the horizontal position).

➔ On mounting, make sure that 200 mm or more clearance is kept above the enclosure cover.

5.1.1 Direct attachment according to VDI/ VDE 3847

For Type 3277 Actuators with 175 to 750 cm² or solenoid valve interfaces according to VDI/VDE 3847. Required mounting parts and accessories: see section 3.1 (Direct attachment to Type 3277 Actuator).

1. Seal ports 1 and 9 at the device with stainless steel blanking plugs.
2. Remove the connecting plate and turn the turnable gasket so that its tag points to port 9. Remount the connecting plate.

If the solenoid valve is configured for direct attachment to the mounting block with positioner according to VDI/VDE 3847, steps 1 and 2 are not required.

3. Check the location of the formed seal and the code screw on the NAMUR interface.
4. Use two cap screws to fasten the solenoid valve onto the mounting block.

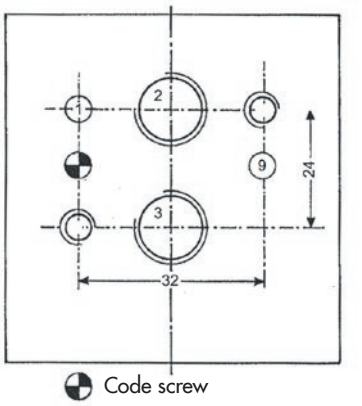


Fig. 2: *Connection diagram according to VDI/ VDE 3847*

5.1.2 Rotary actuators according to VDI/ VDE 3845

Required mounting parts and accessories: See section 3.1 (Attachment to rotary actuators).

If the solenoid valve is configured for attachment to rotary actuators according to VDI/ VDE 3845, no additional mounting parts are required.

1. Check the location of the formed seal or O-rings on the NAMUR interface and that of the code screw.
2. Use two cap screws to fasten the solenoid valve on to the rotary actuator.

The solenoid valve can be configured with an external connecting plate to facilitate servicing work, device replacement or interconnection with other devices for exhaust air feedback (see section 5.2.2).

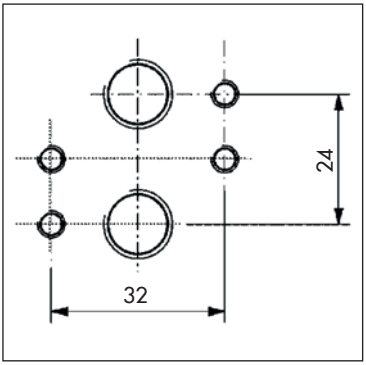


Fig. 3: *Connection diagram according to VDI/ VDE 3845*

5.1.3 Attachment according to IEC 60534-6

Required mounting parts and accessories: See section 3.1 (Accessories for attachment according to IEC 60534-6)

If the solenoid valve is configured for attachment according to IEC 60534-6 (NAMUR rib), additional mounting parts are only required for mounting onto valves with rod-type yokes.

1. Check the location of the formed seal or O-rings on the NAMUR interface and that of the code screw.
2. Use two cap screws to fasten the solenoid valve on to the adapter plate of the NAMUR rib.

If the solenoid valve is configured for attachment according to IEC 60534-6 (NAMUR rib), steps 1 and 2 are not required.

3. For valves with rod-type yokes only: Fasten the support and the rod clamping plate loosely to the rod.
4. Use a cap screw to fasten the solenoid valve to the yoke/support.

5.2 Exhaust air feedback for single-acting actuators

The instrument air leaving the solenoid valve is diverted to the actuator spring chamber to provide corrosion protection inside the actuator.

5.2.1 Direct attachment according to VDI/ VDE 3847

Direction of action: actuator stem extends

Remove the blanking plug in the vent connection at the connection block and make a pneumatic connection to the spring chamber on the vented side.

Tip

The corresponding pipe fittings to establish the air connections are listed in section 3.1 (Accessories for direct attachment to Type 3277 Linear Actuators).

Direction of action: actuator stem retracts

The exhaust air feedback is automatically provided.

5.2.2 Rotary actuators according to VDI/ VDE 3845

The exhaust air feedback is automatically provided. Should other valve accessories be used which vent the actuator (e.g. positioner etc.), the exhaust air of this device can also be included in the exhaust air feedback over port 3 of the adapter plate as part of the configuration of the external connecting plate (see section 3.2). A separate venting is not required since the air is vented through the solenoid valve cover.

5.2.3 Attachment according to IEC 60534-6

1. Mount the solenoid valve as described in section 5.1.3.
2. Connect port 3 to the actuator's spring chamber.

Should other valve accessories be used which vent the actuator (e.g. positioner etc.), the exhaust air of this device can also be included in the pipe hook-up. A separate venting is not required since the air is vented through the solenoid valve cover.

5.3 Pneumatic connections

⚠ WARNING

Risk of injury by possible movement of exposed parts (actuator or valve) after connecting the signal pressure.
Do not touch or block exposed moving parts.

5.3.1 Connecting the supply air

! NOTICE

Risk of malfunction due to incorrect sequence of mounting, installation and start-up.
Keep the following sequence.

1. *Remove the protective caps from the pneumatic connections.*
2. *Mount the solenoid valve to the control valve.*
3. *Connect the supply air.*
4. *Connect the electrical power.*

The pneumatic connections are optionally designed as a bore with ¼ NPT or G ¼ thread. Customary fittings for metal or copper tubing or plastic hoses can be used.

➔ Run and attach the connecting lines and screw joints according to good professional practice.

➔ Check the connecting lines and screw joints for leaks and damage at regular intervals and repair them.

➔ The K_{VS} coefficient of an upstream pressure reducing valve must be at least 1.6 times larger than the K_{VS} coefficient of the solenoid valve.

5.3.2 Port labeling

K_{VS} 0.9

Inscription	Function
1	Supply air
9	External pilot supply
2	Output
3	Venting

5.3.3 Sizing of the connecting line

➔ Refer to the table below for the minimum required nominal size of the connecting line at the port **1** of the enclosure.

The specifications apply to a connecting line shorter than 2 m. Use a larger nominal size for lines longer than 2 m.

Connection	9	1
Pipe [1]	6x1 mm	12x1 mm
Hose [2]	4x1 mm	9x3 mm

[1] Outside diameter x Wall thickness
[2] Inside diameter x Wall thickness

5.3.4 Compressed air quality

NOTICE

Risk of malfunction due to failure to comply with required air quality.
Only use supply air that is dry and free of oil and dust.
Read the maintenance instructions for upstream pressure reducing stations.
Blow through all air pipes and hoses thoroughly before connecting them.

With internal pilot supply over port **1**:

Instrument air (free from corrosive substances), 1.4 to 6 bar operating pressure

With external pilot supply over port **9**

Instrument air (free from corrosive substances), air containing oil or non-corrosive gases with 0 to 10 bar operating pressure

Compressed air quality according to ISO 8573-1		
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/10 K below the lowest ambient temperature to be expected

5.3.5 Pilot supply

K_{VS} 0.9

In the delivered state, the pilot supply is fed internally over port **1**, if not configured otherwise.

On mounting the solenoid valve to rotary or linear actuators fitted with positioners, change the pilot supply to an external pilot supply over port **9**.

To change to an external supply through port **9**, proceed as follows:

1. Unscrew the fastening screws on the cover plate.
2. Take the connecting plate off the enclosure.
3. Remove the turnable gasket from the groove and turn it so that the tag points to **9**.
4. Refasten the connecting plate.

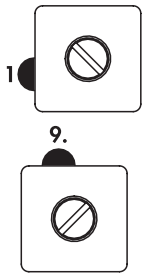


Fig. 4: *Internal/external pilot supply*

5.4 Electrical connections

⚠ DANGER

Risk of fatal injury due to the formation of an explosive atmosphere.

For installation in hazardous areas, observe the relevant standards that apply in the country of use.

Standard applicable in Germany:
EN 60079-14: 2008 (VDE 0165, Part 1) Explosive Atmospheres – Electrical Installations Design, Selection and Erection.

⚠ WARNING

Incorrect electrical connection will render the explosion protection unsafe.

- *Adhere to the terminal assignment.*
- *Do not undo the enameled screws.*
- *Do not exceed the maximum permissible values specified in the EC type examination certificates when interconnecting intrinsically safe electrical equipment (U_i or U_0, I_i or I_0, P_i or P_0, C_i or C_0 and L_i or L_0).*
- *Include the solenoid valve in the on-site equipotential bonding system.*

Selecting cables and wires for type of protection Ex ia

➔ Observe the relevant clauses of EN 60079-14 for installation of intrinsically safe circuits.

➔ Seal cable entries left unused with screw plugs.

➔ Fit equipment used in ambient temperatures below –20 °C with metal cable entries.

Selecting cables and wires for type of protection Ex d

➔ Observe the relevant clauses of EN 60079-1 for installation.

➔ Only use cable entries or conduit systems that comply with EN 60079-1 and for which a separate test certificate is available.

➔ Seal cable entries left unused with suitable screw plugs.

5.4.1 Conditions concerning connection according to PTB 08 ATEX 1024

➔ The Type 3766 Solenoid Valve is to be connected using suitable cable entries or conduit systems that comply with EN 60079-1, clauses 13.1 and 13.2 and for which a separate test certificate is available.

➔ Do not use cable glands (PG cable glands) and blanking plugs of simple construction.

➔ Seal entries left unused in the Type 3966 Solenoid Valve as specified in EN 60079-1, clause 11.9.

➔ Install the connecting cable of the Type 3966 Solenoid Valve properly so that it is protected against mechanical damage.

➔ If the temperature at the inlet parts exceeds 70 °C, use a temperature-resistant connecting cable.

➔ Include the Type 3966 Solenoid Valve into the on-site equipotential bonding system.

➔ If connection is made in a potentially explosive atmosphere, connect the connecting cable (unconnected cable end) of the Type 3966 Solenoid Valve in an enclosure that meets the requirements of an approved type of protection according to Clause 1 of IEC 60079-0.

Components attached or installed (terminal components, bushings, Ex cable glands, mounting parts) must have the minimum technical specifications that comply with the standards specified on the cover sheet and for which a separate test certificate is available. The operating conditions specified in the component certificates must be met.

Ambient temperature

The Type 3966 Solenoid Valve can be operated within the following temperature ranges:

in temperature class T6 at ambient temperatures from –55 to +66 °C,
in temperature class T5 at ambient temperatures from –55 to +70 °C and
in temperature class T4 at ambient temperatures from –55 to +80 °C.

5.4.2 Cable entry with cable gland

The enclosure of the solenoid valve has a cable entry (optionally M20x1.5 or ½ NPT). It can be fitted with cable glands as required.

➔ The cable gland design depends on the ambient temperature range. See technical data in section 3.2.

➔ The screw terminals are designed for wire cross-sections of 0.2 to 2.5 mm². Tighten by at least 0.5 Nm.

➔ Connect **one** current source at the maximum.

➔ The solenoid valve must be included in the on-site equipotential bonding system. Connect the conductor outside of the device.

5.4.3 Connect the electrical power

NOTICE

Risk of malfunction due to incorrect sequence of mounting, installation and start-up.
Keep the following sequence.

1. *Remove the protective caps from the pneumatic connections.*
2. *Mount the solenoid valve to the control valve.*
3. *Connect the supply air.*
4. *Connect the electrical power.*

➔ Connect the electrical power (voltage) as shown in Fig. 5.

Fig. 5: *Terminal connection in the enclosure*

6 Operation

The solenoid valve is ready for use when mounting and start-up have been completed.

7 Servicing

Note

The solenoid valve was checked by SAMSON before it left the factory.
– The product warranty becomes void if service or repair work not described in these instructions is performed without prior agreement by SAMSON's After-sales Service department.
– Only use original spare parts by SAMSON, which comply with the original specifications.

7.1 Preparation for return shipment

Defective solenoid valves can be returned to SAMSON for repair.

Proceed as follows to return devices to SAMSON:

1. Decommission the solenoid valve (see associated valve documentation).
2. Remove the solenoid valve (see section 9).
3. Continue as described on our website at ▶ www.samsongroup.com > Service & Support > After-sales Service > Returning goods.

8 Malfunctions

Note

Contact SAMSON's After-sales Service for malfunctions not listed in the table (see section 10.1).

8.1 Emergency action

The solenoid valve has a safety function. Upon failure of the supply voltage, it automatically closes (closed in the de-energized state).

The plant operator is responsible for emergency action to be taken in the plant.

Malfunction	Possible reasons	Recommended action
The solenoid valve does not switch.	Incorrect terminal assignment.	Check electrical connection.
	Turn turnable gasket to external pilot supply.	Connect port 9 and supply it with compressed air. Alternatively, turn the turnable gasket to internal pilot supply.
The solenoid valve leaks to the atmosphere.	Gasket slipped.	Check that the formed seal and O-rings are correctly seated.
	Pilot pressure is insufficient and an intermediate position of the solenoid valve is reached (air is constantly vented)	Check the pressure line. Check the pressure line for leakage. Use a larger cross-section for the pressure line.

9 Decommissioning and removal

⚠ DANGER

Risk of fatal injury due to ineffective explosion protection.
The following regulations apply to installation in hazardous areas: EN 60079-14 (VDE 0165, Part 1).

NOTICE

An interruption will disturb the process.
Do not mount or service the solenoid valve while the process is running and only after isolating the plant by closing the shut-off valves.

9.1 Decommissioning

To decommission the solenoid valve for disassembly, proceed as follows:

1. Disconnect and lock the air supply and signal pressure.
2. Relieve the pipelines completely of pressure.
3. Open the solenoid valve cover and disconnect the wires for the control signal.

9.2 Removing the solenoid valve

1. Disconnect the wire for the control signal from the solenoid valve.
2. Disconnect the lines for supply air and signal pressure (not required for direct attachment according to VDI/ VDE 3847).
3. To remove the positioner, loosen the two fastening screws on the solenoid valve.

9.3 Disposal

We are registered with the German national register for waste electric equipment (stiftung ear) as a producer of electrical and electronic equipment, WEEE reg. no.: DE 62194439

➔ Observe local, national and international refuse regulations.

➔ Do not dispose of components, lubricants and hazardous substances together with your other household waste.

Tip

On request, we can appoint a service provider to dismantle and recycle the product.

10 Appendix

10.1 After-sales service

Contact SAMSON's After-sales Service for support concerning service or repair work or when malfunctions or defects arise.

E-mail address

You can reach the After-sales Service Department at aftersalesservice@samson.de.

Addresses of SAMSON AG and its subsidiaries

The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on our website (www.samson.de) or in all SAMSON product catalogs.

Required specifications

Please submit the following details:

- Order number and position number in the order
- Type designation and model number or configuration ID
- Other mounted valve accessories (positioner, supply pressure regulator etc.)
- Pressure
- Wire cross-section
- Actuator type and manufacturer

SAMSON

EU Konformitätserklärung / EU Declaration of Conformity / Déclaration UE de conformité

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller/
This declaration of conformity is issued under the sole responsibility of the manufacturer/
La présente déclaration de conformité est établie sous la seule responsabilité du fabricant.

Für das folgende Produkt / For the following product / Nous certifions que le produit

Magnetventil / Solenoid Valve / Electrovanne
Typ / Type / Type 3966

wird die Konformität mit den einschlägigen Harmonisierungsrechtsvorschriften der Union bestätigt /
the conformity with the relevant Union harmonisation legislation is declared with/
est conforme à la législation d'harmonisation de l'Union applicable selon les normes:

EMC 2014/30/EU	EN 61000-6-2:2005, EN 61000-6-3:2007 +A1:2011, EN 61326-1:2013
LVD 2014/35/EU	EN 61010-1:2010
RoHS 2011/65/EU	EN 50581:2012

Hersteller / Manufacturer / Fabricant:

SAMSON AKTIENGESELLSCHAFT
Weismüllerstraße 3
D-60314 Frankfurt am Main
Deutschland/Germany/Allemagne

Frankfurt / Francfort, 2017-07-29

Im Namen des Herstellers/ On behalf of the Manufacturer/ Au nom du fabricant.

i.V. H. Zager

Hanno Zager
Leiter Qualitätssicherung/Head of Quality Managment/
Responsable de l'assurance de la qualité

i.V. Dirk Hoffmann

Dirk Hoffmann
Zentralabteilungsleiter/Head of Department/Chef du département
Entwicklungsorganisation/Development Organization

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SAMSON AKTIENGESELLSCHAFT
Weismüllerstraße 3 60314 Frankfurt am Main
Telefon: 069 4009-0 · Telefax: 069 4009-1507
E-Mail: samson@samson.de

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La présente déclaration de conformité est établie sous la seule responsabilité du fabricant.

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Magnetventil / Solenoid Valve / Electrovanne
Typ / Type / Type 3966-110...

entsprechend der EU-Baumusterprüfbescheingung PTB 12 ATEX 2021 ausgestellt von der/
according to the EU Type Examination PTB 12 ATEX 2021 issued by/
établi selon le certificat CE d'essais sur échantillons PTB 12 ATEX 2021 émis par:

Physikalisch Technische Bundesanstalt
Bundesallee 100
D-38116 Braunschweig
Benannte Stelle/Notified Body/Organisme notifié 0102

wird die Konformität mit den einschlägigen Harmonisierungsrechtsvorschriften der Union bestätigt /
the conformity with the relevant Union harmonisation legislation is declared with/
est conforme à la législation d'harmonisation de l'Union applicable selon les normes:

EMC 2014/30/EU	EN 61000-6-2:2005, EN 61000-6-3:2010, EN 61326-1:2013
Explosion Protection 94/9/EC (bis/to 2016-04-19) Explosion Protection 2014/34/EU (ab/from 2016-04-20)	EN 60079-0:2009, EN 60079-11:2012, EN 60079-31:2009
RoHS 2011/65/EU	EN 50581:2012

Hersteller / Manufacturer / Fabricant:

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Dirk Hoffmann
Zentralabteilungsleiter/Head of Department/Chef du département
Entwicklungsorganisation/Development Organization

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Für das folgende Produkt / For the following product / Nous certifions que le produit

Magnetventil / Solenoid Valve / Electrovanne
Typ / Type / Type 3966-210...

entsprechend der EU-Baumusterprüfbescheingung PTB 08 ATEX 1024 ausgestellt von der/
according to the EU Type Examination PTB 08 ATEX 1024 issued by/
établi selon le certificat CE d'essais sur échantillons PTB 08 ATEX 1024 émis par:

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Bundesallee 100
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Benannte Stelle/Notified Body/Organisme notifié 0102

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Explosion Protection 94/9/EC (bis/to 2016-04-19) Explosion Protection 2014/34/EU (ab/from 2016-04-20)	EN 60079-0:2006, EN 60079-1:2004, EN 61241-0:2006, EN 61241-1:2004
RoHS 2011/65/EU	EN 50581:2012

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Frankfurt / Francfort, 2017-07-29

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Zentralabteilungsleiter/Head of Department/Chef du département
Entwicklungsorganisation/Development Organization

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E-Mail: samson@samson.de
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Für das folgende Produkt / For the following product / Nous certifions que le produit

Magnetventil / Solenoid Valve / Electrovanne
Typ / Type / Type 3966-810...

entsprechend der EU-Baumusterprüfbescheingung PTB 12 ATEX 2021 ausgestellt von der/
according to the EU Type Examination PTB 12 ATEX 2021 issued by/
établi selon le certificat CE d'essais sur échantillons PTB 12 ATEX 2021 émis par:

Physikalisch Technische Bundesanstalt
Bundesallee 100
D-38116 Braunschweig
Benannte Stelle/Notified Body/Organisme notifié 0102

wird die Konformität mit den einschlägigen Harmonisierungsrechtsvorschriften der Union bestätigt /
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Explosion Protection 94/9/EC (bis/to 2016-04-19) Explosion Protection 2014/34/EU (ab/from 2016-04-20)	EN 60079-0:2009, EN 60079-11:2012, EN 60079-15:2010, EN 60079-31:2009
RoHS 2011/65/EU	EN 50581:2012

Hersteller / Manufacturer / Fabricant:

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Zentralabteilungsleiter/Head of Department/Chef du département
Entwicklungsorganisation/Development Organization

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E-Mail: samson@samson.de
Revison 07

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(1) **EC-TYPE-EXAMINATION CERTIFICATE**

(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 12 ATEX 2021

(4)	Equipment:	Solenoid, type 3966-110.. / -810..
(5)	Manufacturer:	SAMSON AG Mess- und Regeltechnik
(6)	Address:	Weismüllerstr. 3, 60314 Frankfurt, Germany

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential test report PTB Ex 13-22148.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2009 **EN 60079-11:2012** **EN 60079-15:2010** **EN 60079-31:2009**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

see (15) description

ZSEx10100e.dotm

Zertifizierungssektor Explosionsschutz
On behalf of PTB:

Dr.-Ing. U. Johannsmeyer
Direktor und Professor

Braunschweig, May 27, 2013

(13) # SCHEDULE

(14) ## EC-TYPE-EXAMINATION CERTIFICATE PTB 12 ATEX 2021

(15) Description of equipment

The solenoids of types 3966-110.., 3966-110.. ..25 and 3966-810.. are used for the conversion of binary electrical input signals into pneumatic output signals and for the control of pneumatic actuators. The solenoids are intended for the installation inside or outside of the hazardous area.

The solenoids are electrically triggered by the e/p-binary converter coil of type 1079-40.. . This is a passive two-terminal network which may be connected to certified intrinsically safe circuits provided that the permissible maximum values for U_i, I_i and P_i are not exceeded.

For the remote indication of the operating state the solenoid of type 3966-110.. ..25 is provided with an additional cubic LED-plug.

All types of solenoids are mounted into type-tested enclosures which comply with the requirements to equipment protected by enclosures according to EN 60079-31:2009.

The marking of the individual types reads as follows:

Type 3966-110..

II 2 G Ex ia IIC T6 Gb and
II 2 D Ex ia IIIC T80 °C Db IP66 and
II 2 D Ex tb IIIC T85 °C Db IP66

Type 3966-110.. ..25

II 2 G Ex ia IIC T6 Gb

Type 3966-810..

II 3 G Ex ic IIC T6 Gc and
II 3 G Ex nAc II T6 Gc and
II 3 D Ex tc IIIC T80 °C Dc IP66

For relationship between type of equipment, temperature class, permissible ranges of the ambient temperature and degree of protection, reference is made to the following table:

Type of equipment	Temperature class	Permissible ambient temperature range	IP
3966-110..	T6 T5 T4	60 °C -45 °C ≤T_a ≤ 70 °C 80 °C	66
3966-110.. ..25	T6 T5 T4	55 °C -45 °C ≤T_a ≤ 70 °C 80 °C	65
3966-810..	T6 T5 T4	70 °C -45 °C ≤T_a ≤ 80 °C 80 °C	66

Electrical data

For relationship between type of equipment, type of protection and permissible maximum values, reference is made to the following tables:

Type 3966-110.. and 3966-110.. ..25

Ex ia IIC or **Ex ia IIIC** or **Ex ic IIIC**

Maximum values for connection to a certified intrinsically safe circuit:

U_i	25 V	27 V	28 V	30 V	32 V
I_i	150 mA	125 mA	115 mA	100 mA	85 mA

C_i negligibly low
L_i negligibly low

The e/p-binary converter coil of type 1079-40.. can be operated with nominal voltages of 6 V, 12 V and 24 V using appropriate resistors connected in series.

Solenoid		3966-1101	3966-1102	3966-1103
Binary converter coil	U_i	6 V DC	12 V DC	24 V DC
Rectangular characteristic	P_i	250 mW	*	
Linear characteristic	P_i	*	*	

* without restriction

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 12 ATEX 2021

Type 3966-810..

Ex nA II

Input circuit.....type of protection Ex nA II

(16) Test report PTB Ex 13-22148

(17) Special conditions for safe use

none

(18) Essential health and safety requirements

met by compliance with the standards mentioned above

Zertifizierungssektor Explosionsschutz
On behalf of PTB:

Dr.-Ing. U. Johannsmeyer
Direktor und Professor

Braunschweig, May 27, 2013

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(1) **EC-TYPE-EXAMINATION CERTIFICATE**

(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 08 ATEX 1024

(4) Equipment: Solenoid valve, type 3966

(5) Manufacturer: SAMSON AG Mess- und Regeltechnik

(6) Address: Weismüllerstr. 3, 60314 Frankfurt am Main, Germany

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 08-16347.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2006 **EN 60079-1:2004**

EN 61241-0:2006 **EN 61241-1:2004**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 2 G Ex d IIC T6

II 2 D Ex tD A21 IP 66 T80 °C

Zertifizierungsstelle Explosionsschutz
By order:
(*signature*)
Dr.-Ing. M. Thedens
Oberregierungsrat

Braunschweig, May 6, 2008

sheet 1/3

(13) # SCHEDULE

(14) ## EC-TYPE-EXAMINATION CERTIFICATE PTB 08 ATEX 1024

(15) Description of equipment

The type 3966 solenoid valve with flameproof enclosure is designed to convert binary electric input signals into pneumatic output signals; it is used to control pneumatic actuators. The solenoid valve is composed of a pilot valve and a subsequent booster valve. The pilot valve is an e/p binary converter consisting of a coil and a flapper/nozzle system. The booster valve is a purely pneumatic unit to increase the air capacity of the solenoid valve.

Technical data

Design	Operating values; max. dissipation
Type 3966-2101	U_N = 6 V DC; P_{max} = 4 W
Type 3966-2102	U_N = 12 V DC; P_{max} = 4 W
Type 3966-2103	U_N = 24 V DC; P_{max} = 4 W

Degree of protection according to EN 60529: IP 66

(16) Test Report PTB Ex 08-16347

(17) Special conditions for safe use

No conditions

Additional notes for safe operation:

Connection conditions

1. The type 3966 solenoid valve is to be connected with suitable cable glands or conduit systems that meet the requirements stipulated in EN 60079-1, sections 13.1 and 13.2, and for which a separate test certificate has been issued.
2. Cable glands (Pg type glands) and blanking plugs of a simple design must not be used.
3. Any openings of the type 3966 solenoid valve that are not used must be sealed as specified in EN 50018, section 11.9.
4. The connecting cable of the type 3966 solenoid valve must be fixed and routed so that it will be adequately protected against damage.
5. If the temperature at the input parts exceeds 70 °C, temperature-resistant connecting cables have to be used.

6. The type 3966 solenoid valves has to be included in the local equipotential bonding system.

7. If connection is made in the potentially explosive area, the connecting cable (unconnected cable end) of the solenoid valve has to be connected in an enclosure that meets the requirements of an approved type of protection in accordance with EN 60079-0, section 1.

These notes and instructions have to accompany each device in an adequate form.

Components attached or installed (terminal compartments, bushings, Ex-type cable glands, connectors) must be of a technical standard that complies as a minimum with the specifications on the cover sheet, and they must have a separate examination certificate. The operating conditions specified in the component certificates must be complied with!

Ambient temperature

The type 3966 solenoid valve can be operated within the following range:

in temperature class T6 at ambient temperatures between -55 °C and +60 °C,
in temperature class T5 at ambient temperatures between -55 °C and +70 °C, and
in temperature class T4 at ambient temperatures between -55 °C and +80 °C.

Operating medium in the pneumatic section

1. The maximum ingoing-air pressure is 6 bar.
2. The equipment operator must ensure that the operating medium does not form an explosive atmosphere, i.e. the gases used must not contain any substances whose presence in the medium may cause an explosive atmosphere (no flammable gases, no oxygen or oxygen-enriched gas).

(18) Essential health and safety requirements

Met by compliance with the afore-mentioned Standards.

Zertifizierungsstelle Explosionsschutz
By order:

(*signature*)

Dr.-Ing. M. Thedens
Oberregierungsrat

Braunschweig, 6 May 2008

3 pages, correct and complete as regards content.
By order:

Dipl.-Phys. U. Völkel

Braunschweig, May 11, 2010

sheet 3/3

EB 3966 EN

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