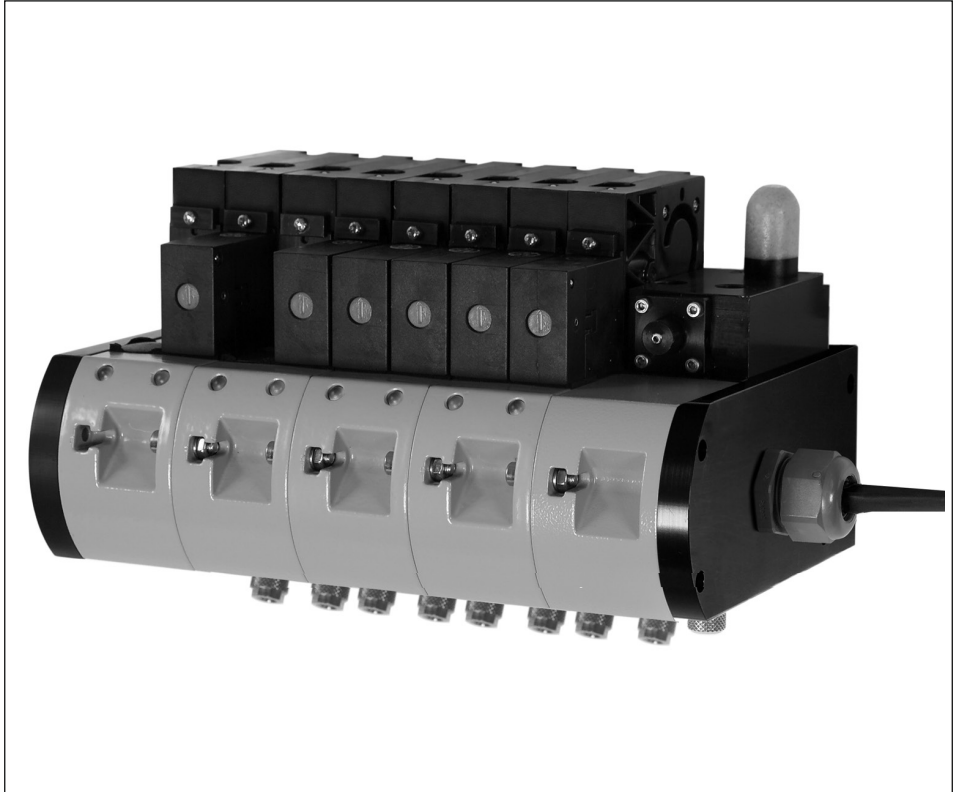


# MOUNTING AND OPERATING INSTRUCTIONS



## EB 3965 EN

Translation of original instructions



## Type 3965 Solenoid Valve Island

Edition April 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 (aftersaleservice@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](http://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*

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# 1 Safety instructions and safety measures

## Intended use

The Type 3965 Solenoid Valve Island is used for the central control of pneumatic actuators in chemical and pharmaceutical plants. The device is designed to operate under exactly defined conditions (e.g. operating pressure, temperature). Therefore, operators must ensure that the solenoid valve island is only used in applications where the operating conditions correspond to the technical data. In case operators intend to use the solenoid valve island 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 and nameplate for limits and fields of application as well as possible uses.

## Reasonably foreseeable misuse

The solenoid valve island 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 island must be mounted, started up, serviced and repaired 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.

## **Safety instructions and safety measures**

### **Personal protective equipment**

Personal protective equipment is not required to mount or operate the solenoid valve island. Work on the control valve may be necessary when mounting or removing the solenoid valve.

- ➔ 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 island has a direct effect on the control valve when it has been installed. 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. Furthermore, the intended purpose may involve the use of the device in hazardous areas. All work on the device must only be performed when no potentially explosive atmosphere is present.

### **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 as well as the referenced documents to the operating personnel and to instruct them in proper operation. Furthermore, operators 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 referenced documents and observe the specified hazard statements, warnings 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 intrinsically safe circuits.

### **Referenced standards and regulations**

The solenoid valve islands comply with the requirements of Directives 2014/30/EU and 2014/35/EU for applications without explosion protection as well as Directive 2014/34/EU for explosion-protected applications. The declaration of conformity includes information about the applied conformity assessment procedure. This 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:

- Data sheet ► T 3965
- The mounting and operating instructions of the components on which the solenoid valve island is mounted (valve, actuator, valve accessories etc.)

## 1.1 Notes on possible severe personal injury

### DANGER

#### **Risk of electric shock.**

Before starting up the solenoid valve island, electrical installation work must be performed. An electric shock due to incorrect work practices may cause death.

- Before connecting wiring, performing any work on the device or opening the device, disconnect the power supply and protect it against unintentional reconnection.
- For electrical installation, observe the relevant electrotechnical regulations and the accident prevention regulations that apply in the country of use.
- In Germany, observe the VDE regulations and the accident prevention regulations of the employers' liability insurance.

#### **Risk of fatal injury due to the ignition of an explosive atmosphere.**

Incorrect installation, operation or maintenance of the solenoid valve island 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: 2008 (VDE 0165, Part 1).
- Installation, operation or maintenance of the solenoid valve island must only be 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 EC 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 island is triggered, the valve 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 island due to impermissible mounting position.**

- Do not mount the solenoid valve island with the vent opening facing upward.
- Do not seal the vent opening when the device is installed on site.

#### **Risk of damage to the solenoid valve island due to impermissible pressures.**

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

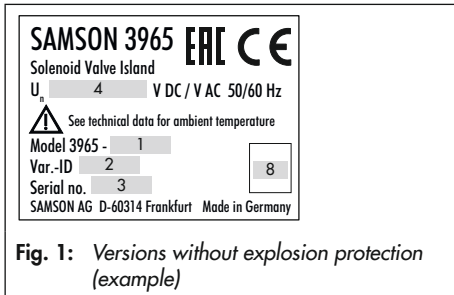
#### **Incorrect assignment of the terminals will damage the solenoid valve island and will lead to malfunction.**

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

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

## 2 Markings on the device

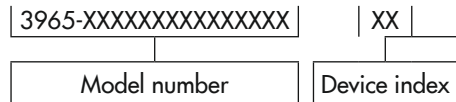
### 2.1 Nameplate



### 2.2 Article code

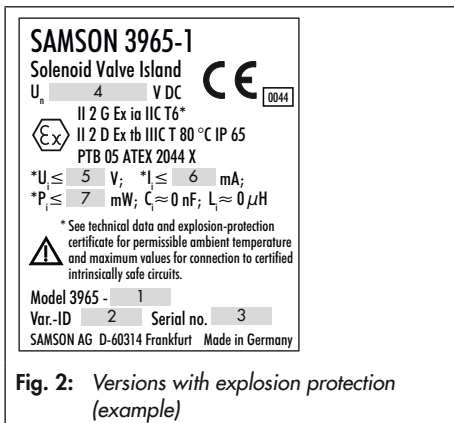
#### Article code and device index

The article code and device index are specified on the nameplate:



#### Structure of the article code

See following three pages.



#### Legend

- 1 Model number
- 2 Configuration ID
- 3 Serial number
- 4 Nominal signal
- 5 Voltage
- 6 Current
- 7 Capacity
- 8 Data Matrix code

Type 3965 Solenoid Valve Island	Order no. 3965-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0	0
Type of protection																	
No explosion protection	0	0															
II 2 G Ex ia IIC T6 and II 2 D IP 65 T 80 °C <sup>1)</sup>	1	1															
Ex ia IIC T6 and Ex tD A21 IP 65 T 80 °C <sup>2)</sup>	1	2															
II 3 G Ex nA II T6 or II 3 G Ex nL IIC T6 and II 3 D IP 54 T 80 °C or II 3 D IP 65 T 80 °C <sup>3)</sup>	8	1															
Ex nA II T6 or Ex nL IIC T6 and Ex tD A21 IP 54 T 80 °C or Ex tD A21 IP 65 T 80 °C <sup>4)</sup>	8	2															
Electrical connection																	
Single connector, type C, without cable socket according to DIN EN 175301-803 (IP 20)	0	0															
Single connector, type C, with cable socket according to DIN EN 175301-803 (IP 54)	0	1															
Common cable (0.25 mm <sup>2</sup> wire cross-section, 1.5 m long) with M20x1.5 cable gland, polyamide, IP 54	0	2															
Multi-pole connector with cable socket, 32-pole, made of gray polyamide, IP 54	1	0															
Bus connection for PROFIBUS-DP (Ex ia) with connecting cable, IP 40, for 6 V DC nominal signal	3	1	1														
Nominal signal																	
6 V DC, 5.47 mW power consumption																	1
12 V DC, 13.05 mW power consumption																	2
24 V DC, 26.71 mW power consumption																	3
Electric status indication																	
Without <sup>8)</sup>																	0
Switching function																	
3/2-way function (with uneven number of switching function including dummy plate for a reserve switching function)																	0
5/2-way function																	1
2/2-way function (with uneven number of switching function including dummy plate for a reserve switching function)																	2
Special switching function or combined switching functions <sup>6)</sup>																	9

## Markings on the device

Type 3965 Solenoid Valve Island	Order no. 3965-	x	x	x	x	x	x	x	x	x	x	x	x	x	0	0
Number of switching functions																
1		0	1													
2		0	2													
3		0	3													
4		0	4													
5		0	5													
6		0	6													
7		0	7													
8		0	8													
9		0	9													
10		1	0													
11		1	1													
12		1	2													
13		1	3													
14		1	4													
15		1	5													
16		1	6													
Base module for reserve switching functions																
Without		0														
1 base module with 2x 2/2-way or 3/2-way function or 1x 5/2-way function		1														
2 base modules with 4x 2/2-way or 3/2-way function or 2x 5/2-way function		2														
3 base modules with 6x 2/2-way or 3/2-way function or 3x 5/2-way function		3														
4 base modules with 8x 2/2-way or 3/2-way function or 4x 5/2-way function		4														
5 base modules with 10x 2/2-way or 3/2-way function or 5x 5/2-way function		5														
6 base modules with 12x 2/2-way or 3/2-way function or 6x 5/2-way function		6														
7 base modules with 14x 2/2-way or 3/2-way function or 7x 5/2-way function		7														

Type 3965 Solenoid Valve Island	Order no. 3965-	x	x	x	x	x	x	x	x	x	x	x	x	0	0
Pneumatic connection module															
With pressure reducer, G threaded connection	0														
Without pressure reducer, G threaded connection	2														
Manual override															
Without	0														
Pushbutton	1														
Switch	2														
Ambient temperature <sup>7)</sup>															
-25 to +80 °C	0														
Input module for NAMUR sensors (Ex ia)															
Without														0	
Safety function															
Without															0

- 1) According to EC type examination certificate PTB 05 ATEX 2044 X, 2032, 2033
- 2) According to IECEx certificate of conformity IECEx PTB 07.0026 X
- 3) According to statement of conformity PTB 06 ATEX 2003 X
- 4) According to IECEx certificate of conformity IECEx PTB 07.0051 X
- 5) The cable socket with seal is not included in the scope of delivery (see section 3.1).
- 6) A combination of a maximum of 16 switching functions (including reserve switching functions) is possible.
- 7) The maximum permissible ambient temperature of the solenoid valve island depends on the permissible ambient temperature of the components, type of protection and temperature class.
- 8) When a common cable, multi-pole connector or PROFIBUS is used to connect the electric signal, a yellow LED is integrated into the device per switching function to indicate that a nominal signal exists.

**Versions and ordering data of Type 3964 Solenoid Pilot Valve ► T 3964**

**Versions and ordering data of Type 3965-DPplus Valve Control Module ► T 3965-2**

### 3 Design and principle of operation

#### Function

The Type 3965 Solenoid Valve Island consists of base modules and connection modules in a row which are connected to each other over separate common ducts for the operating medium and exhaust air.

A row starts with a pneumatic connection module for common compressed air supply and exhaust. Solenoid valves, each consisting of a solenoid pilot valve and a poppet valve, are mounted onto the base modules. The solenoid pilot valves can be actuated by an electric signal over a common cable, multi-pole connector, single connectors or a bus connection for PROFIBUS-DP.

#### Pneumatic connection modules

A pneumatic connection module is used for common compressed air supply and exhaust.

With internal pilot supply over port (9), the pneumatic connection module with a pressure reducer is used. For an external pilot supply over port (8), the pneumatic connection module without pressure reducer is used.

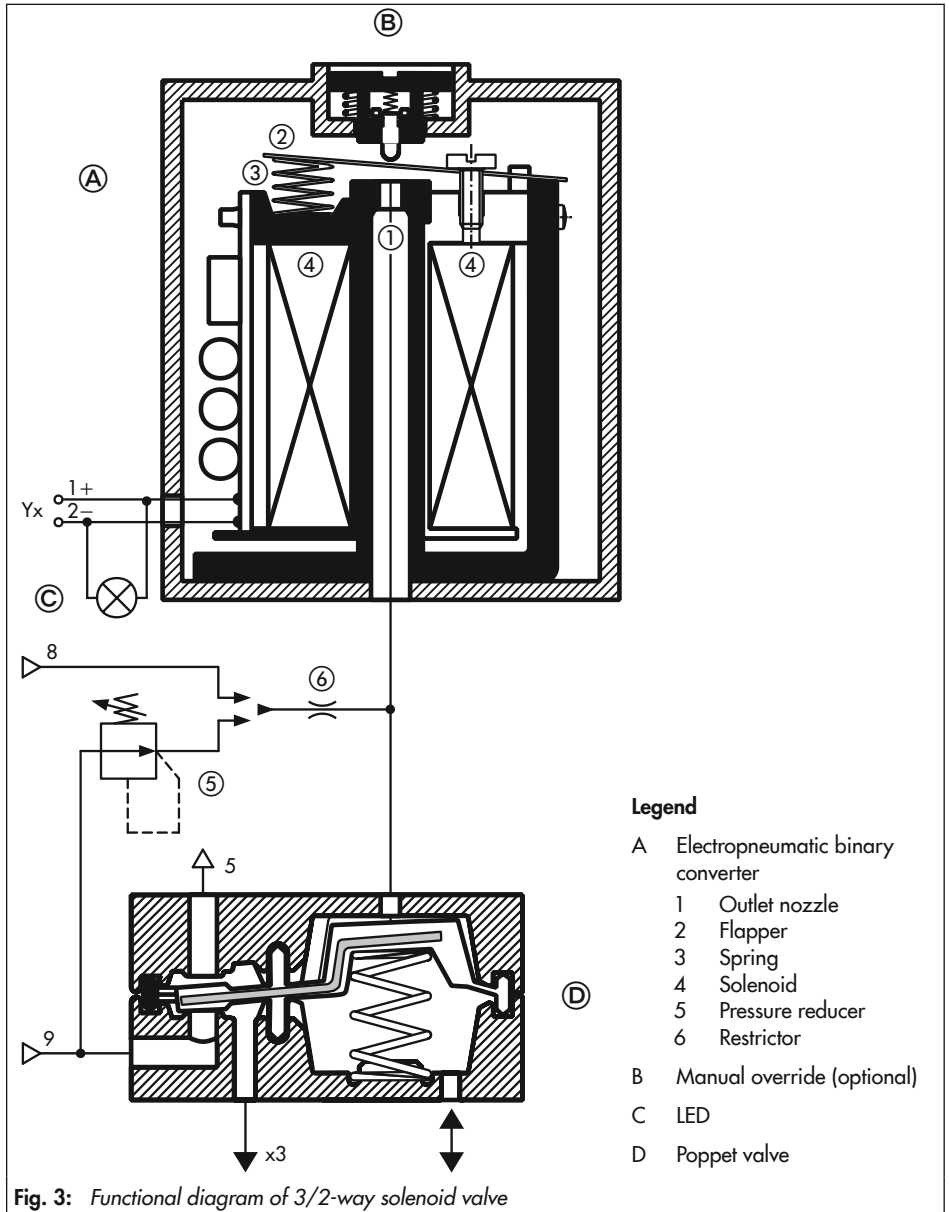
#### Solenoid pilot valves

The solenoid pilot valves consist of an electropneumatic binary converter (A) with a manual override (B) and LED (C). The pilot supply for the electropneumatic binary converter (A) is routed through the pressure reducer (5) and the restrictor (6). See Fig. 3.

In the idle position, the flapper (2) is lifted off the outlet nozzle (1) by the spring (3). As a result, a pressure lower than the deactivation pressure of the poppet valve (D) builds up in the pressure divider, which consists of the restrictor (6) and outlet nozzle (1). When the solenoid coil (4) is energized by an electric binary signal, the outlet nozzle (1) is closed by the flapper (2) against the force of the spring (3). This causes the pressure in the pressure divider to rise above the activation pressure of the poppet valve (D), switching it to the operating position. After the solenoid coil is de-energized, the poppet valve (D) is switched to the idle position again by a return spring.

#### Poppet valves

The 2/2-way and 3/2-way poppet valves consist of a diaphragm switching element with return spring. The 5/2-way poppet valve consists of two parallel controlled diaphragm switching elements with return spring. A combination of a maximum of 16 switching functions is possible.



### 3.1 Accessories

Order no.	Accessories
0790-6658	Cable socket according to DIN EN 175301-803, type C, made of black polyamide, with cable gland Pg 9 (for 4 to 8 mm cable diameter) and seal of nitrile butadiene rubber Connecting cable with M12x1 round connector, five-pole, at both ends
8831-...	(for electrical connection module for PROFIBUS-DP and input module for NAMUR sensors) <b>8831-0873</b> – 0.3 m long <b>8831-0874</b> – 1.0 m long
1400-9321	Low mounting bracket set consisting of 2 mounting brackets and 6 cap screws ISO 4762 – M5x6
1400-9322	High mounting bracket set consisting of 2 mounting brackets and 6 cap screws ISO 4762 – M5x6
0790-6123	M5 male connector, brass, for 4x1 mm hose (for test connector)
8582-1450	G 1/8 male connector, brass, for 4x1 mm hose (for output connections)
8582-1684	G 1/4 male connector, brass, for 9x3 mm hose (for pilot supply connection)
8395-0040	Hose clamp Ø10 to 16 mm (for 9x3 mm hose)
8414-0136	Seal 10x13x1.5 mm, polyvinyl chloride (for G 1/8 male connector)
8414-0140	Seal 13.5x17x1.5 mm, polyvinyl chloride (for G 1/4 male connector)
8504-0066	Filter G 1/4 (for exhaust port)

Order no.	Accessories
3964-...	Type 3964 Solenoid Pilot Valve ▶ T 3964 <b>3964-XXX000300010</b> for single connector <b>3964-X1X000100010</b> for common cable, multi-pole connector or bus connection for PROFIBUS-DP (Ex ia)
	Poppet valve and accessories
1400-9392	3/2-way poppet valve, including mounting accessories
1400-9393	5/2-way poppet valve, including mounting accessories
1400-9395	Connecting plate G 1/8, including mounting accessories
0550-0189	Filter (for pilot duct in poppet valve)
	Interface base between module and poppet valve
0430-1725	Turnable gasket for 3/2-way and 5/2-way function
0430-1956	Turnable gasket for 2/2-way
0430-1761	Molded seal for pilot supply for solenoid pilot valve



Order no.	Accessories
8421-0016	O-ring 2.7x1.5 for fastening screw at the poppet valve
8421-0314	O-ring 12x1 for connecting plate at the poppet valve (2 pcs. required)
1400-9394	Dummy plate for reserve switching function, including mounting accessories
Interface between poppet valve and solenoid pilot valve	
1690-4844	Seal with restriction
8421-0012	O-ring 2x1 (2 pcs. required)
8421-0279	O-ring 8x1.5
0360-3350	Dummy plate (for second poppet valve when 5/2-way function is used)
0320-2501	Holder for solenoid pilot valve
8336-1101	Self-tapping screw 2.5x10 (for holder)
Pneumatic connection module and end plates	
1400-9397	Pressure reducer with G thread, including mounting accessories
1400-9399	Connecting plate with G thread, including mounting accessories
0430-1658	Molded seal (for interface between base module, pneumatic connection module and end plate)
0430-1858	Molded seal (for interface between pneumatic connection module/pressure reducer or connecting plate)
0550-0213	Filter G ¼ (for pilot supply port)
1690-3110	Vent plug G ¼, black polyamide (for left end plate)
8808-1011	Cable gland M20x1.5 made of black polyamide (for common cable)
8808-1012	Cable gland M20x1.5 made of blue polyamide (for common cable)
1400-9389	Multi-pole cable socket, 32-pole, made of gray polyamide
Input module for NAMUR sensors	
8862-0100	Input module for 16 NAMUR sensors (Ex ia), IP 20

### 3.2 Technical data

Pneumatic connection module			
Version	Without pressure reducer	With pressure reducer	
Material	GD AlSi 12, powder coated, gray beige RAL 1019 GD AlSi12, anodized black Stainless steel 1.4571 – – – – –		
Module enclosure			
Connecting plate			
Screws			
Pressure reducer			GD AlSi12, anodized black
Diaphragm			Silicone rubber
Spring			Stainless steel 1.4310
Seat, plug			CuZn40Pb2
Pilot supply	Instrument air (free from corrosive substances) or nitrogen 2.2 bar $\pm$ 10 % <sup>1)</sup> 2.2 to 6.0 bar <sup>2)</sup>		
Medium			
Pressure			
Operating medium	Instrument air (free from corrosive substances) or nitrogen <sup>2)</sup> , Instrument air (free from corrosive substances), air containing oil or non-corrosive gases <sup>1)</sup>		
Operating pressure	Max. 6.0 bar <sup>1)</sup>	2.2 to 6.0 bar <sup>2)</sup>	
Pilot supply (8)	G 1/8	–	
Operating medium (9)	G 1/4		
Exhaust air (5)	G 1/4		
Degree of protection	IP 54		
Ambient temperature <sup>3)</sup>	–25 to +80 °C		
Approx. weight	150 g	200 g	

<sup>1)</sup> External pilot supply over port 8

<sup>2)</sup> Internal pilot supply over port 9

<sup>3)</sup> The maximum permissible ambient temperature of the solenoid valve island depends on the permissible ambient temperature of the components, type of protection and temperature class.

Base module with solenoid valve				
Type 3965	-XXXXXX2	-XXXXXX0	-XXXXXX1	
Switching function	2/2-way function <sup>1)</sup>	3/2-way function <sup>1)</sup>	5/2-way function	
$K_{VS}$ <sup>2)</sup>	0.13			
Design	Solenoid with flapper/nozzle assembly and diaphragm switching element with return spring			
Material	GD AlSi 12, powder coated, gray beige RAL 1019			
Module enclosure				
Connecting plate				GD AlSi 12, anodized black
Valve body				Polyamide PA6-3-T, black
Screws				Stainless steel 1.4571
Springs				Stainless steel 1.4310
Seals				Silicone rubber, nitrile butadiene rubber
Diaphragm				Chloroprene rubber
Electric status indication	Yellow LED: nominal signal connected			
Air consumption per switching function	$\leq 10$ l/h (in operating position) $\leq 80$ l/h (in idle position)			
Switching cycles	$\geq 2 \times 10^7$			
Switching time	$\leq 65$ ms			
Ambient temperature <sup>3)</sup>	-25 to +80 °C			
Degree of protection	IP 54			
Connection	See End plates on page 22.			
Electric				
Pneumatic	G 1/8			
Approx. weight	150 g			

<sup>1)</sup> One or two switching functions are possible per base module.

<sup>2)</sup> 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  $m^3/h$ .

<sup>3)</sup> The maximum permissible ambient temperature of the solenoid valve island depends on the permissible ambient temperature of the components, type of protection and temperature class.

## Design and principle of operation

Electric data of solenoid valve					
Type 3965		-XXXX1	-XXXX2	-XXXX3	
Nominal signal	$U_N$	6 V DC Max. 27 V <sup>1)</sup>	12 V DC Max. 25 V <sup>1)</sup>	24 V DC Max. 32 V <sup>1)</sup>	
	$f_N$	–	–	–	
Switching point	ON	$U_{+80^\circ\text{C}}$	$\geq 4.8$ V	$\geq 9.6$ V	$\geq 18.0$ V
		$I_{+20^\circ\text{C}}$	$\geq 1.41$ mA	$\geq 1.52$ mA	$\geq 1.57$ mA
		$P_{+20^\circ\text{C}}$	$\geq 5.47$ mW	$\geq 13.05$ mW	$\geq 26.71$ mW
	OFF	$U_{-25^\circ\text{C}}$	$\leq 1.0$ V	$\leq 2.4$ V	$\leq 4.7$ V
Impedance	$R_{+20^\circ\text{C}}$	2.6 k $\Omega$	5.5 k $\Omega$	10.7 k $\Omega$	
Temperature influence		0.4 %/ $^\circ\text{C}$	0.2 %/ $^\circ\text{C}$	0.1 %/ $^\circ\text{C}$	
Type 3965		-11XX1	-11XX2	-11XX3	
Type of protection		Ex ia IIC <sup>2)</sup> for use in hazardous areas (Zone 1 or 21)			
Maximum values when connected to a certified intrinsically safe circuit	Output voltage <sup>3)</sup>	$U_i$	Pairs of values $U_i/I_i$ apply to 6, 12, 24 V DC nominal signals:		
	Output current <sup>3)</sup>	$I_i$	25 V/150 mA, 27 V/125 mA, 28 V/115 mA, 30 V/100 mA, 32 V/85 mA		
	Power dissipation <sup>3)</sup>	$P_i$	250 mW	No restrictions	
	Outer capacitance <sup>3)</sup>	$C_i$	$\approx 0$		
	Outer inductance <sup>3)</sup>	$L_i$	$\approx 0$		
Ambient temperature	Temperature class	T6	–45 to +60 $^\circ\text{C}$		
		T5	–45 to +70 $^\circ\text{C}$		
		T4	–45 to +80 $^\circ\text{C}$		

Electric data of solenoid valve				
Type 3965		-81XX1	-81XX2	-81XX3
Type of protection		Ex nA II/Ex nL IIC <sup>4)</sup> for use in hazardous areas (Zone 2 or 22)		
Maximum values when connected to a certified energy-limited circuit	Output voltage <sup>5)</sup>	32 V		
	Output current <sup>5)</sup>	132 mA		
	Power dissipation <sup>5)</sup>	250 mW	No restrictions	
	Outer capacitance <sup>5)</sup>	≈ 0		
	Outer inductance <sup>5)</sup>	≈ 0		
Ambient temperature	Temperature class	T6	-45 to +60 °C	
		T5	-45 to +70 °C	
		T4	-45 to +80 °C	

- 1) Maximum permissible value at 100 % duty cycle. The maximum permissible value U<sub>i</sub> applies to explosion-protected versions.
- 2) II 2 G Ex ia IIC T6 (Zone 1) and II 2 D IP 65 T 80°C (Zone 21) according to EC type examination certificate PTB 05 ATEX 2044 X
- 3) Permissible maximum values when connected to a certified intrinsically safe circuit
- 4) II 3 G Ex nA II T6 or II 3 G Ex nL IIC T6 (Zone 2) and II 3 D IP 54 T 80°C or II 3 D IP 65 T 80°C (Zone 22) according to statement of conformity PTB 06 ATEX 2003 X
- 5) Permissible maximum values when connected to a certified energy-limited circuit

## Design and principle of operation

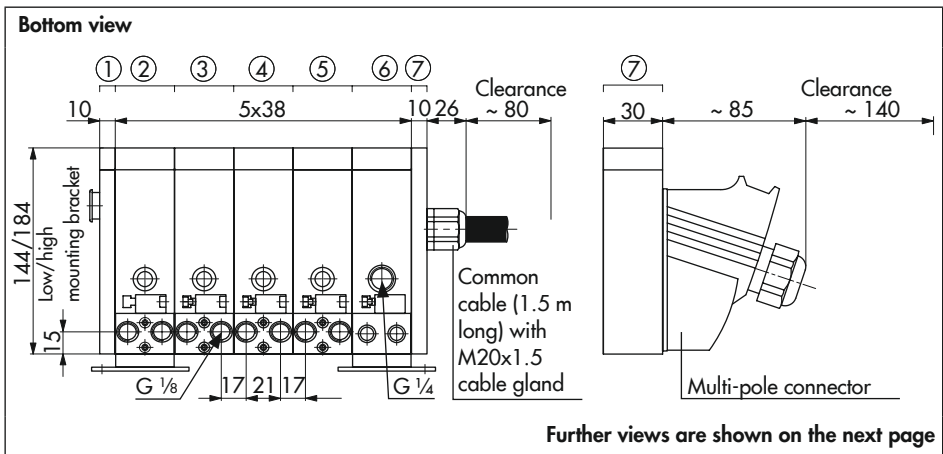
End plates				
Version	Left end plate	Right end plate		
Electrical connection	–	Common cable <sup>1)</sup> with M20x1.5 cable gland	Multi-pole connector <sup>2)</sup>	Single connector according to DIN EN 175301-803 <sup>3)</sup> on solenoid pilot valve
Material				
End plate	GD AlSi12, anodized black			
Seals	Silicone rubber			
Screws	Stainless steel 1.4571			
Vent plug	Polyamide	–	–	–
Connector	–	–	Polyamide	Polyamide
Degree of protection	IP 54			
Ambient temperature	–25 to +80 °C			
Approx. weight	200 g	200 g	500 g	200 g

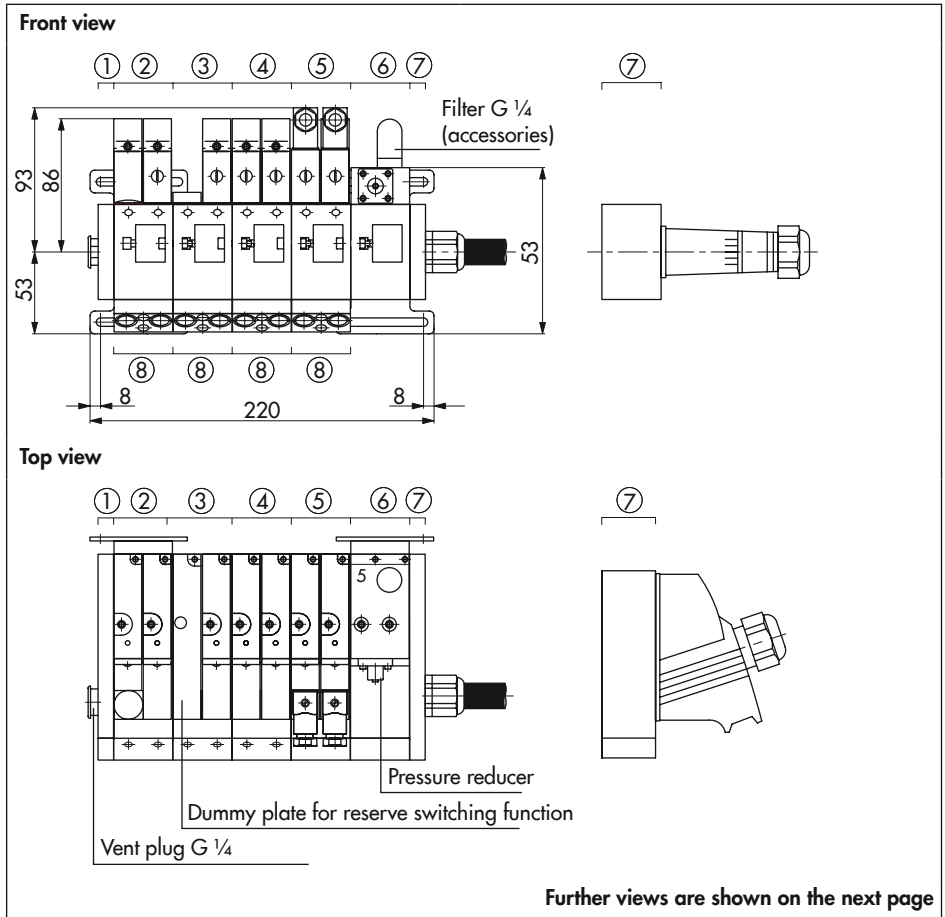
1) 0.25 mm<sup>2</sup> wire cross-section, 1.5 m long

2) A maximum of 14 switching functions are possible when connected to a galvanically isolated circuit.

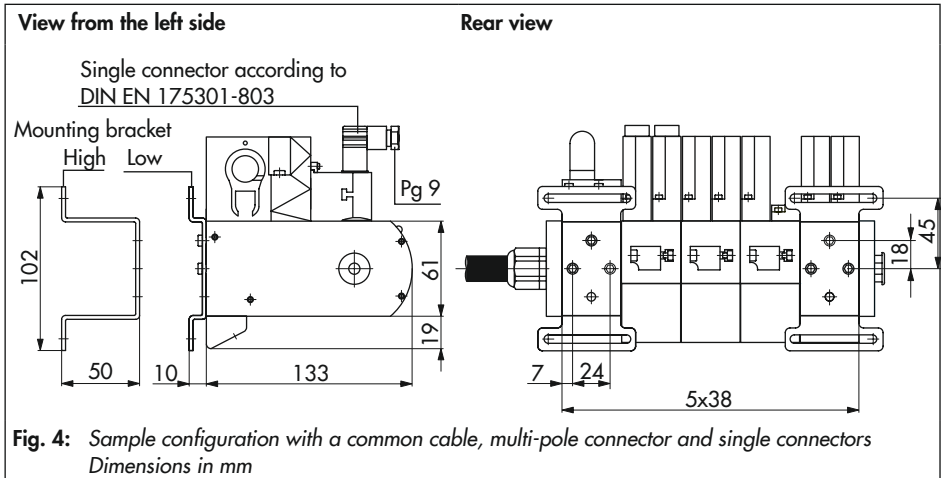
3) The cable socket with seal is not included in the scope of delivery (see section 3.1).

## 3.3 Dimensions





## Design and principle of operation



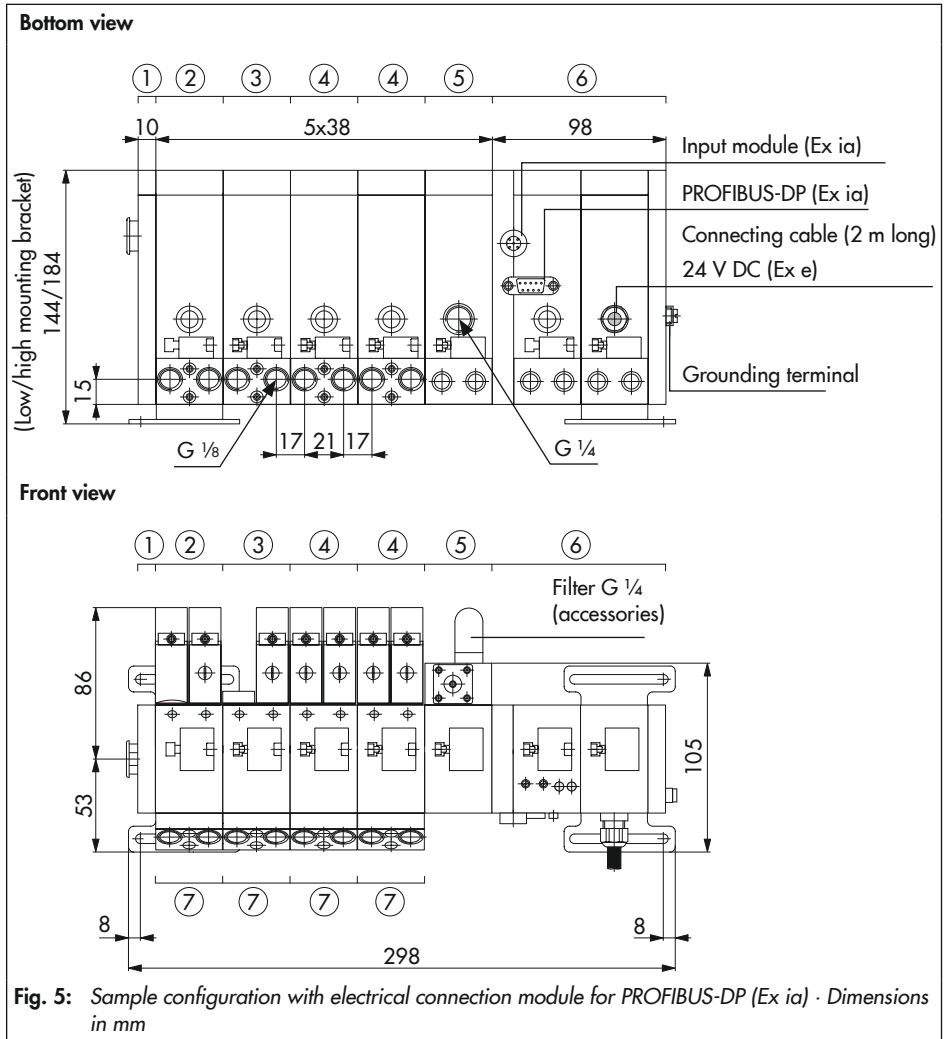
### Legend for Fig. 4 on page 22 to 24

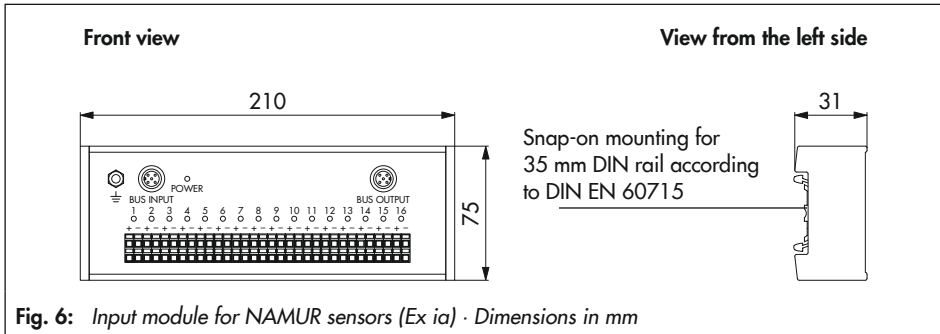
- 1 Left end plate
- 2 Base module with 5/2-way solenoid valve
- 3 Base module with 3/2-way solenoid valve and dummy plate for reserve switching function
- 4 Base module with 2x 2/2-way or 3/2-way solenoid valve
- 5 Base module with 2x 2/2-way or 3/2-way solenoid valve with single connectors
- 6 Pneumatic connection module with pressure reducer
- 7 Right end plate
- 8 Connecting plate G 1/8

### Legend for Fig. 5 on page 25

- 1 Left end plate
- 2 Base module with 5/2-way solenoid valve
- 3 Base module with 3/2-way solenoid valve and dummy plate for reserve switching function
- 4 Base module with 2x 2/2-way or 3/2-way solenoid valve
- 5 Pneumatic connection module with pressure reducer
- 6 Electrical connection module for PROFIBUS-DP
- 7 Connecting plate G 1/8







**Fig. 6:** Input module for NAMUR sensors (Ex ia) · Dimensions in mm



### 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 damage to SAMSON and the forwarding agent (refer to delivery note).

#### 4.1 Unpacking

##### **NOTICE**

*Risk of device damage due to foreign particles entering it.*

*Do not remove the packaging and protective film/protective caps until immediately before mounting and start-up.*

Before mounting the solenoid valve island, proceed as follows:

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

#### 4.2 Transporting

- Protect the solenoid valve island against external influences (e.g. impact).
- Protect the solenoid valve island against moisture and dirt.

- Observe storage temperature depending on the permissible ambient temperature (see technical data in section 3.2).

#### 4.3 Storage

##### **NOTICE**

*Risk of 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 island against external influences (e.g. impact, shocks, vibration).
- Do not damage the corrosion protection (coating).
- Protect the solenoid valve island 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 the solenoid valve island in its packaging.

## 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 island.**

→ Section 5.1 onward

**3. Perform pneumatic installation.**

→ Section 5.2 onward

**4. Perform electrical installation.**

→ Section 5.3 onward

### 5.1 Installation

### WARNING

*Risk of personal injury due to parts bursting or the process medium spurting out under high pressure.*

*Before installation, depressurize the relevant plant section.*

### NOTICE

*Risk of degree of protection being rendered ineffective.*

*Only operate the device with the enclosure closed and the exhaust air filters installed.*

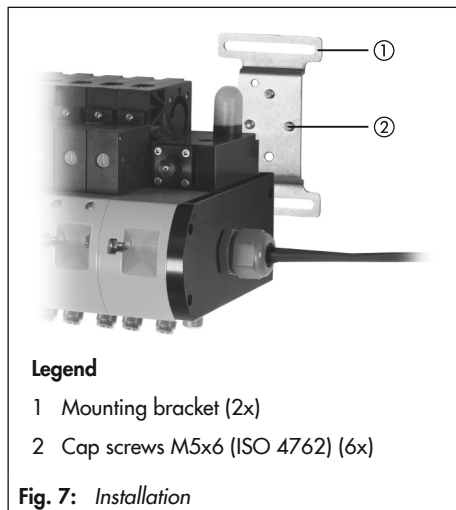
The screws required for mounting are included in the scope of delivery of the accessories (mounting bracket set, see section 3.1).

- Observe installation conditions (see section 5.1.1) and instructions in section 5.1.2.
- Fasten the solenoid valve island using the two mounting brackets and six screws M5x6 (ISO 4762).
- Read the actuator and positioner mounting instructions.

#### 5.1.1 Installation conditions

The device is to be preferably mounted in the horizontal position (see Fig. 7).

- On mounting, make sure that at least 150 mm clearance is kept above the device and at least 100 mm clearance at the right end plate (for common cable) or 200 mm clearance (for multi-pole connector).
- If an enclosure is used for installation, keep a minimum distance of 100 mm between the devices in the row and a minimum distance of 200 mm between the bottom device and the bottom of the enclosure.
- In cases where mechanical damage of the enclosure cannot be ruled out at the site of installation, mount additional protection to the enclosure.



### 5.1.2 Use in hazardous areas of zones 21 and 22

The enclosure of the solenoid valve island fulfills the requirements specified in clause 8.2.12 of EN 61242-1:2007 for dust-protected apparatus (degree of protection IP 40 according to IEC 60529).

For use in explosive atmospheres of zone 21 and zone 22 with conductive dust, the solenoid valve island and the input module for NAMUR sensors must be installed in a dust-tight enclosure (degree of protection IP 65 according to IEC 60529).

For use in explosive atmospheres zone 22 with non-conductive dust, the solenoid valve island and the input module for NAMUR sensors must be installed in an enclosure (degree of protection IP 54 according to IEC 60529).

#### Stainless steel or steel enclosure

To ensure degree of protection IP 65 or IP 54 according to IEC 60529 is achieved, use an enclosure, air vent valves and cable glands approved by certification body (e.g. VDE, German Association of German Electrical Engineers). Use metal cable glands and air vent valves for ambient temperatures below  $-20^{\circ}\text{C}$ .

#### Plastic enclosure

Use KEL.92.XX.YYY enclosures by Rittal GmbH & Co. KG which are certified for type of protection II 2 G Ex e II (PTB 03 ATEX 1011 U).

The enclosure, air vent valves and cable glands must ensure that the degree of protection IP 65 according to IEC 60529 is achieved (verified by an EC type examination certificate or test report issued by a certification body).

Enclosures by other manufacturers can also be used, provided they have an EC type examination certificate for type of protection II 2 G Ex e II and meet the requirements specified above.

For use in the presence of combustible dust in compliance with type of protection Ex tD (protection by enclosure), observe clauses 5.6.3.2 and 18.2 of EN 60079-14:2008 for method A.

## 5.2 Pneumatic connection

### **⚠ WARNING**

*Risk of injury due to high pressure inside device.*

*Prior to work on the device, depressurize the connecting lines.*

The air connections are designed as threaded holes with G 1/8 and G 1/4 thread.

- 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, if necessary.
- 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 island.
- Protect the exhaust air connections by installing a filter or taking other appropriate precautions to prevent water or dirt from entering them.

### 5.2.1 Sizing of the connecting line

- Refer to the table below for the minimum required nominal size of the connecting lines. The specifications apply to a connecting line shorter than 2 m. Use a larger nominal size for lines longer than 2 m.

Connecting lines (<2 m)		
Connection (see Fig. 3)	Pilot supply 8	Operating medium 9
	Outputs 3, 2, 4	Exhaust air 5
Thread	G 1/8	G 1/4
Pipe <sup>1)</sup>	≥6x1 mm	≥12x1 mm
Hose <sup>2)</sup>	≥4x1 mm	≥9x3 mm

1) Outside diameter x Wall thickness

2) Inside diameter x Wall thickness

### 5.2.2 Compressed air quality

### **⚠ DANGER**

*Risk of asphyxiation through displacement of air on using nitrogen in unventilated spaces. Discharge the exhaust air of the solenoid pilot valve and poppet valve over a common pipe to the atmosphere.*

### **ⓘ NOTICE**

*An operating pressure above the maximum permissible operating pressure will damage the solenoid valve island.*

- Observe the max. operating pressure (see technical data in section 3.2).

## Mounting and start-up

– If necessary, use a pressure reducer to restrict the operating pressure.

### 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.

### Pilot supply

With external pilot supply over port 8 (without pressure reducer):

- Instrument air (free from corrosive substances) or nitrogen
- Pressure 2.2 bar  $\pm$ 10 %

With internal pilot supply over port 9 (with pressure reducer):

- Instrument air (free from corrosive substances) or nitrogen
- Pressure 2.2 to 6.0 bar

### Operating medium

With external pilot supply over port 8 (without pressure reducer):

- Instrument air (free from corrosive substances), air containing oil or non-corrosive gases
- Pressure max. 6.0 bar

With internal pilot supply over port 9 (with pressure reducer):

- Instrument air (free from corrosive substances) or nitrogen
- Pressure 2.2 to 6.0 bar

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

## 5.2.3 Connections for pilot supply and operating medium

A strainer with 100  $\mu\text{m}$  mesh size is installed in port 8 (external pilot supply without pressure reducer) and in port 9 (operating medium) of the pneumatic connection module to prevent dirt particles from entering.

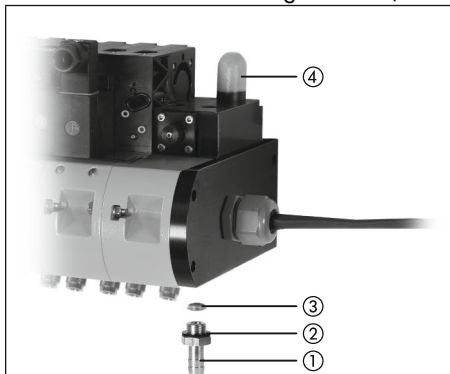
The strainer must be cleaned or replaced when it is blocked (see Fig. 8).

1. Unscrew the male connector (1) with seal (2) out of the port.
2. Unscrew the strainer (3) with a screwdriver (7 to 9 mm blade) out of the port.
3. Clean the strainer (3) or renew it and screw it back into the port.
4. Screw the male connector (1) with seal (2) back into the port.



## 5.2.4 Exhaust port

- Install a filter (4) into the exhaust port 5 of the pneumatic connection module to prevent water or dirt from entering when the exhaust air is not discharged over a common pipe or when the devices are not mounted in an enclosure (see Fig. 8).
- When the devices are mounted in an enclosure, fit the enclosure with a filter with the specified degree of protection.
- Select the filter's thread size suitable for the number of switching functions (e.g. at least 1/2" for 16 switching functions).



### Legend

- 1 G 1/4 male connector for 9x3 mm hose
- 2 Seal 13.5x17x1.5
- 3 Strainer G 1/4
- 4 Filter G 1/4

Fig. 8: Supply air and exhaust air connections

## 5.3 Electrical connection

### **⚠ DANGER**

*Risk of electric shock.*

*For electrical installation, observe the relevant electrotechnical regulations and the accident prevention regulations that apply in the country of use.*

*Valid regulations in Germany:*

- VDE regulations
- Accident prevention regulations of the employers' liability insurance.

### **⚠ 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.*

*Valid standards 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 in or on the housing.
- Do not exceed the maximum permissible values specified in the EC type examination certificates when interconnecting intrinsically safe electrical equipment ( $U_i$  or  $U_o$ ,  $I_i$  or  $I_o$ ,  $P_i$  or  $P_o$ ,  $C_i$  or  $C_o$  and  $L_i$  or  $L_o$ ).

### 5.3.1 Selecting cables and wires

- **Observe clause 12 of EN 60079-14: 2008 (VDE 0165, Part 1) for installation of the intrinsically safe circuits.**
- Clause 12.2.2.7 applies when running multi-core cables and wires with more than one intrinsically safe circuit.
- Preferably use connecting lines with minimum 0.5 mm<sup>2</sup> conductor cross-section and 6 to 12 mm outside diameter.
- **Radial thickness of the insulation** of a conductor for common insulating materials (e.g. polyethylene): **minimum 0.2 mm.**
- **Diameter of an individual wire** in a fine-stranded conductor: **minimum 0.1 mm.**
- Protect the conductor ends against splicing, e.g. by using wire-end ferrules.
- Seal cable entries left unused with screw plugs.
- For use in ambient temperatures **below -20 °C**: use metal cable gland.

### 5.3.2 Conditions concerning connection

The specifications in the EC type examination certificate PTB 05 ATEX 2044 X for zone 1 or 21 and the statement of conformity PTB 06 ATEX 2003 X for zone 2 or 22 apply for connection to intrinsically safe current circuits (see pages 73 to 50).

Observe the correct polarity on connecting DC voltage signals.

The electrical connection is made using single connectors, a common cable with cable gland or a multi-pole connector (see pages 41 to 37).

#### Degree of protection

The devices are fitted with a vent plug (1) on the left end plate (see Fig. 9).

The degree of protection IP 40 (according to IEC 60529: 1989) is only guaranteed when the vent plug is mounted and the connections have been properly mounted.

#### Equipment for zone 2

In equipment operated according to type of protection Ex nA II (non-sparking equipment) according to EN 60079-15:2003, circuits may be connected, interrupted or switched while energized only during installation, maintenance or repair.

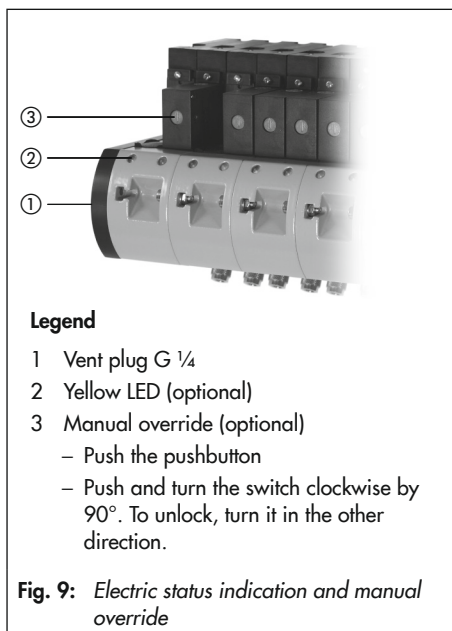
Equipment with protection level 'ic' according to EN 60079-11:2007 and equipment connected to energy-limited circuits with type of protection Ex nL (energy-limited equipment) according to EN 60079-15:2003 may be switched under normal operating conditions.

The maximum permissible values specified in the EC type examination certificates apply when interconnecting equipment with protection level 'ic' and equipment operated according to type of protection Ex nL IIC (see page 71) and the statement of conformity (see page 51).



### 5.3.3 Electric status indication

When the electrical signal is connected over a common cable, multi-pole connector or PROFIBUS, a yellow LED is integrated into the device per switching function to indicate that a nominal signal is connected. The electric control signals for the solenoid pilot valves are indicated by these LEDs (2). See Fig. 9.

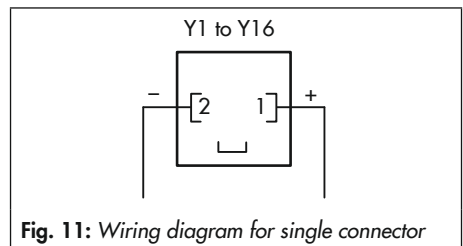
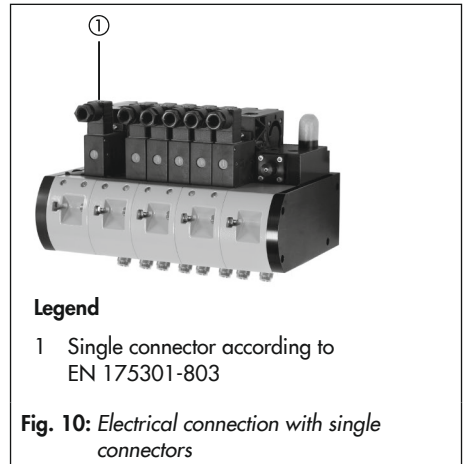


### 5.3.4 Electrical connection with single connectors

Single connectors (1) are used for electrical connection at the solenoid pilot valves (see Fig. 10 and Fig. 11).

Preferably use connecting lines with minimum 0.5 mm<sup>2</sup> conductor cross-section and 4 to 8 mm outside diameter.

The degree of protection IP 40 (according to IEC 60529: 1989) is only guaranteed when the cable socket is mounted properly with the seal underneath it.

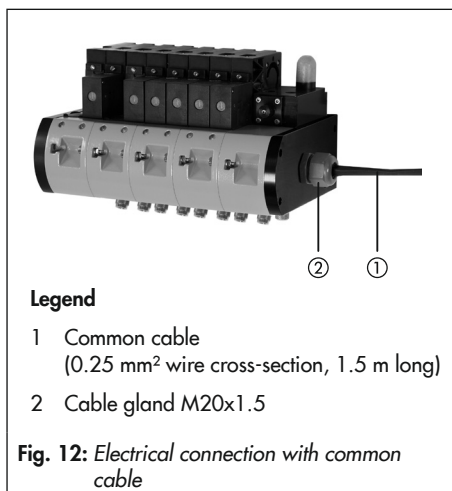


### 5.3.5 Electrical connection with common cable

A common cable (1) is used for electrical connection, which is guided through a cable gland (2) at the right end plate (see Fig. 12).

Four pairs of conductors (Y1 – Y4 to Y13 – Y16) are grouped together in the devices with 2/2-way and 3/2-way functions and tied together with a correspondingly labeled cable tie (see Fig. 13).

Two pairs of conductors (Y1 – Y2 to Y15 – Y16) are grouped together in the devices with 5/2-way function and tied together with a correspondingly labeled cable tie (see Fig. 14).



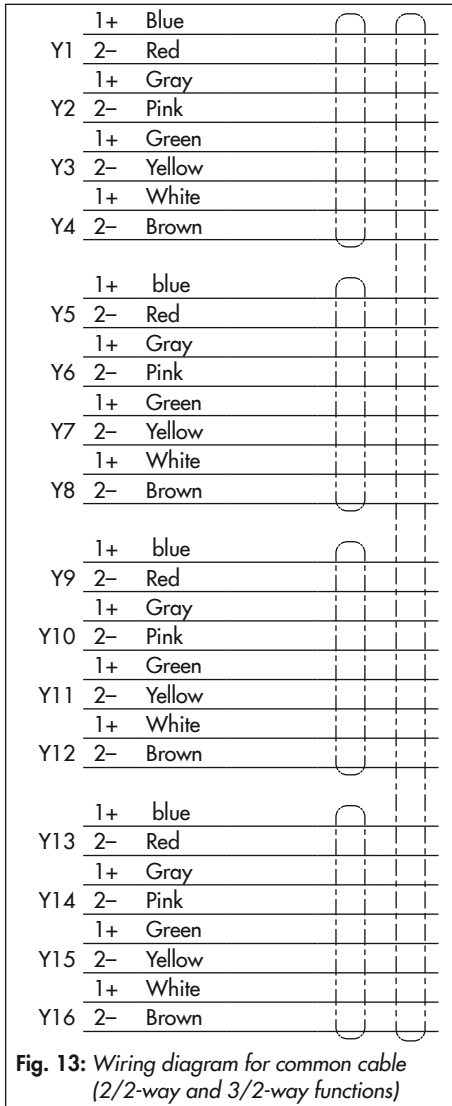


Fig. 13: Wiring diagram for common cable (2/2-way and 3/2-way functions)

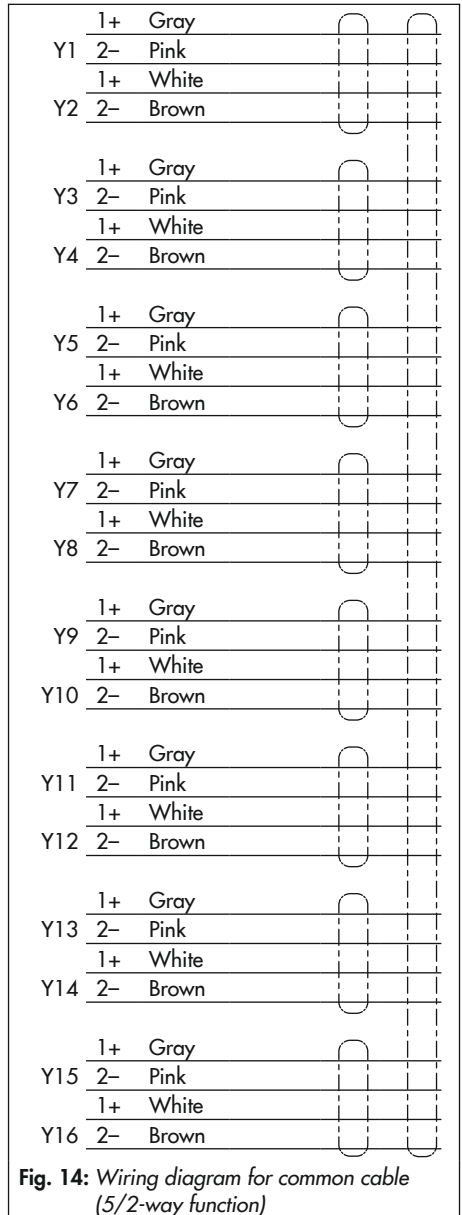


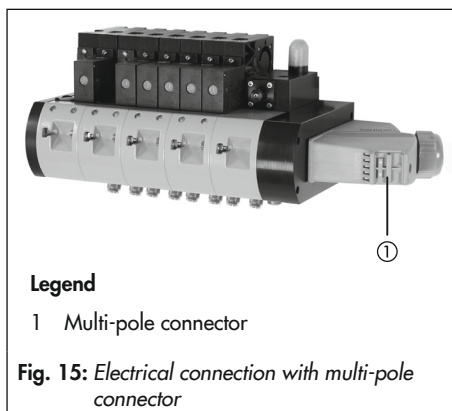
Fig. 14: Wiring diagram for common cable (5/2-way function)

### 5.3.6 Electrical connection with multi-pole connector

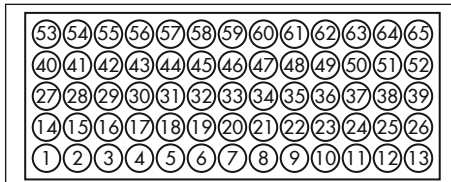
A multi-pole connector (1) at the right end plate (see Fig. 15) is used for electrical connection.

Four pairs of conductors (Y1 – Y4 to Y13 – Y16) are grouped together in the devices with 2/2-way and 3/2-way functions (see Fig. 16).

Two pairs of conductors (Y1 – Y2 to Y15 – Y16) are grouped together in the devices with 5/2-way function (see Fig. 17).







Assignment of the male contact carrier (at the cable)

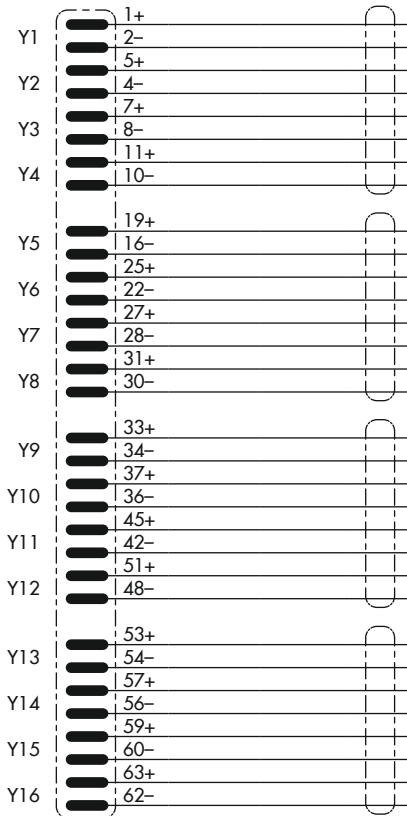
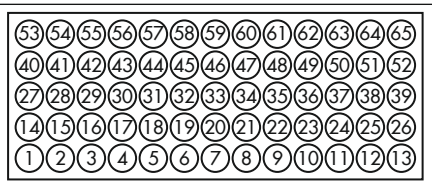


Fig. 16: Wiring diagram for multi-pole connector (2/2-way and 3/2-way functions)



Assignment of the male contact carrier (at the cable)

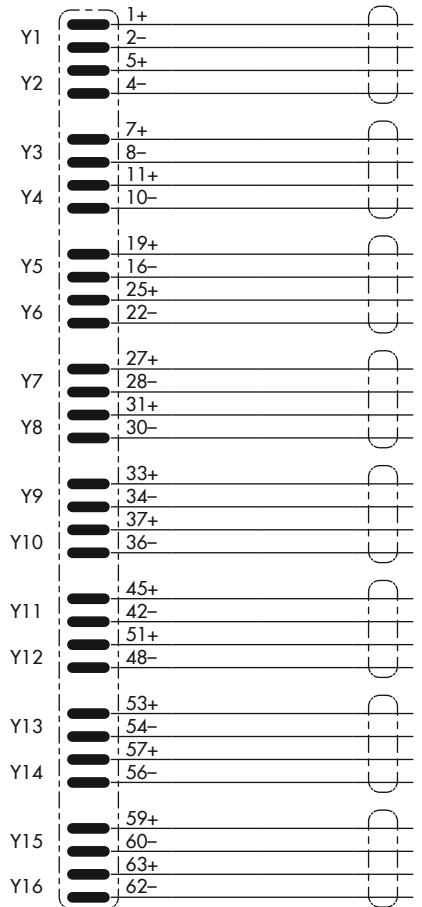


Fig. 17: Wiring diagram for multi-pole connector (5/2-way function)

# 6 Operation

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

## 6.1 Manual override

The solenoid pilot valves can optionally be fitted with manual override (3). See Fig. 9.

When a nominal electric signal is not connected, the solenoid pilot valve can be actuated at the pushbutton/switch using a screwdriver (4.5 mm blade width).

We recommend using devices **without manual override** for **safety circuits**.

# 7 Servicing

### **i Note**

*The solenoid valve island 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 (see Data Sheet ► T 3965)*

## 7.1 Exchanging solenoid pilot valves

The solenoid pilot valves can be replaced with new ones in the event of malfunction. In this case, replace the seal with restriction since it is not possible to check on site whether the restriction still functions properly.

### 7.1.1 Exchanging solenoid pilot valves with single connector

Solenoid pilot valves with single connector can be exchanged as follows (see Fig. 18):

1. Disconnect the power supply.
2. Loosen the fastening screw on the metal contacts of the solenoid pilot valve and pull off the cable socket.
3. Unscrew the self-tapping screw (2) and remove the holder (1). Remove the defective solenoid pilot valve from the poppet valve.

### **i Note**

*A Torx TX 9 screwdriver is required for the self-tapping screw.*

4. Use a needle to pull the seal with restriction (5) out of the poppet valve flange. Renew it.
5. Fasten the new solenoid pilot valve using the holder (1) and self-tapping screw (2) to the poppet valve.

**! NOTICE**

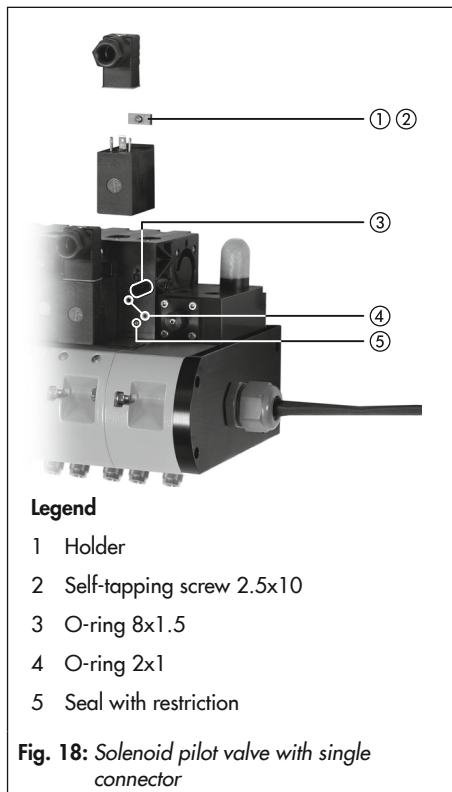
Prior to assembly, check that the O-rings (3 and 4) and seal with restriction (5) are seated correctly on the poppet valve flange.

6. Place the cable socket on the metal contacts of the solenoid pilot valve and secure it using the fastening screw.

**! NOTICE**

Prior to assembly, check that the gasket is seated correctly on the solenoid pilot valve.

7. Switch on the power supply.



## 7.1.2 Exchanging solenoid pilot valves with common cable or multi-pole connector

Solenoid pilot valves with common cable or multi-pole connector can be exchanged as follows (see Fig. 19):

1. Disconnect the power supply.
2. Unscrew the self-tapping screw (2) and remove the holder (1). Pull the solenoid pilot valve off the metal contacts.

### **i** Note

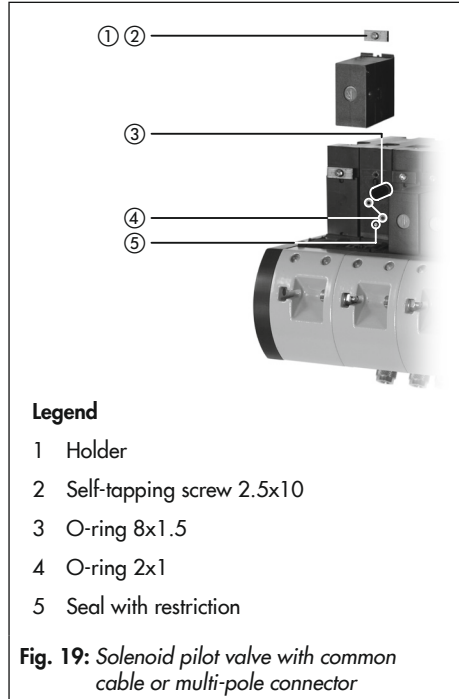
A *Torx TX 9* screwdriver is required for the self-tapping screw.

3. Use a needle to pull the seal with restriction (5) out of the poppet valve flange. Renew it.
4. Place the new solenoid pilot valve on the metal contacts of the base module and use the holder (1) and self-tapping screw (2) to fasten it to the poppet valve.

### **!** NOTICE

Prior to assembly, check that the O-rings (3 and 4) and seal with restriction (5) are seated correctly on the poppet valve flange.

5. Switch on the power supply.
6. An LED (optional) indicates the functioning of the solenoid pilot valve.



## 7.2 Returns

Defective solenoid valve islands can be returned to SAMSON for repair.

Proceed as follows to return devices:

1. Exceptions apply concerning some special device models ► [www.samson.de](http://www.samson.de) > Service & Support > After-sales Service.
2. Send an e-mail ► [retouren@samson.de](mailto:retouren@samson.de) to register the return shipment including the following information:
  - Type
  - Article no.
  - Configuration ID
  - Original order
  - Completed Declaration on Contamination, which can be downloaded from our website at ► [www.samson.de](http://www.samson.de) > Service & Support > After-sales Service.

**After checking your registration, we will send you a return merchandise authorization (RMA).**

3. Attach the RMA (together with the Declaration on Decontamination) to the outside of your shipment so that the documents are clearly visible.
4. Send the shipment to the address given on the RMA.

---

**i Note**

*Further information on returned devices and how they are handled can be found at ► [www.samson.de](http://www.samson.de) > Service & Support > After Sales Service.*

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## 8 Malfunctions

**i Note**

Contact SAMSON's After-sales Service department for malfunctions not listed in Table 1 (see section 10.1).

**Table 1: Troubleshooting**

Malfunction	Possible reasons	Recommended action													
Entire solenoid valve island no longer functions.	Pilot supply pressure at the pneumatic connection module is outside the permissible range.	<b>For pneumatic connection module with pressure reducer:</b> <ul style="list-style-type: none"> <li>– Unscrew the screw plug out of the pressure reducer.</li> <li>– Screw in a quick connector with M4 male thread (order no. 0230-1679).</li> <li>– Connect a pressure gauge with a 2x1 mm hose.</li> </ul> The output pressure of the pressure reducer must be between 1.8 and 2.0 bar (pilot supply pressure between 2.2 and 6.0 bar)													
		<b>For pneumatic connection module without pressure reducer:</b> Connect a pressure gauge using a tee at the pilot supply port 8. The pilot supply pressure must be 2.2 bar ± 10 %.													
Single solenoid valve no longer functions.	Incorrect nominal signal at the solenoid pilot valve	<b>Solenoid pilot valve with electric status indication:</b> When a nominal electric signal is connected, the yellow LED is constantly illuminated when the circuit is not interrupted.													
		<b>Solenoid pilot valve without electric status indication:</b> Measure the nominal voltage $U_N$ using a voltmeter at the contacts of the connector (single connector or multi-pole connector) or at the terminals (common cable). Refer to the table below for the nominal voltage $U_N$ required to switch the solenoid pilot valve on and off: <table border="1" style="margin-left: 20px; margin-top: 10px;"> <thead> <tr> <th>Nominal voltage <math>U_N</math></th> <th>6 V DC</th> <th>12 V DC</th> <th>24 V DC</th> <th>24 V AC</th> </tr> </thead> <tbody> <tr> <td>Switching point ON <math>U_{+80^\circ\text{C}}</math></td> <td>≥4.8 V</td> <td>≥9.6 V</td> <td>≥18.0 V</td> <td>≥19.0 V</td> </tr> <tr> <td>OFF <math>U_{-25^\circ\text{C}}</math></td> <td>≤1.0 V</td> <td>≤2.4 V</td> <td>≤4.7 V</td> <td>≤4.5 V</td> </tr> </tbody> </table>	Nominal voltage $U_N$	6 V DC	12 V DC	24 V DC	24 V AC	Switching point ON $U_{+80^\circ\text{C}}$	≥4.8 V	≥9.6 V	≥18.0 V	≥19.0 V	OFF $U_{-25^\circ\text{C}}$	≤1.0 V	≤2.4 V
Nominal voltage $U_N$	6 V DC	12 V DC	24 V DC	24 V AC											
Switching point ON $U_{+80^\circ\text{C}}$	≥4.8 V	≥9.6 V	≥18.0 V	≥19.0 V											
OFF $U_{-25^\circ\text{C}}$	≤1.0 V	≤2.4 V	≤4.7 V	≤4.5 V											
	Incorrect pneumatic output signal at the solenoid pilot valve	Remove the solenoid pilot valve and install a new one, if necessary (see section 7.1).													

## 9 Decommissioning and removal

### **⚠ DANGER**

*Risk of electric shock.*

- Before performing any work on the device and before opening the device, disconnect the power supply and protect it against unintentional reconnection.
- Only use power interruption devices that are protected against unintentional reconnection of the power supply.

### **⚠ DANGER**

*Risk of bursting in control valve components due to incorrect opening.*

- Before starting any work on the solenoid valve island, depressurize all plant sections concerned.
- Observe the warnings in the actuator and valve documentation.

### 9.1 Decommissioning

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

1. Close the shut-off valves upstream of the solenoid valve island to stop the compressed air from flowing through the solenoid valve island.
2. Relieve the pipelines completely of pressure.
3. Disconnect and lock the power supply.
4. Remove the solenoid valve island from the pipeline.

## 10 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.

### **i Note**

We can provide you with a recycling passport according to PAS 1049 on request. Simply e-mail us at [aftersalesservice@samsongroup.com](mailto:aftersalesservice@samsongroup.com) giving details of your company address.

### **💡 Tip**

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

# 11 Appendix

## 11.1 After-sales service

Contact SAMSON's After-sales Service department 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 [aftersaleservice@samson](mailto:aftersaleservice@samson).

### 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](http://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

## 11.2 Certificates

The certificates valid at the time when these instructions were published are included on the next pages. The latest versions of the documents are available on our website at [www.samson.de](http://www.samson.de) > Product selector > 3965 > Downloads > Certificates.







**T R A N S L A T I O N**

(1) **EC TYPE EXAMINATION CERTIFICATE**

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

(3) EC Type Examination Certificate Number

**PTB 05 ATEX 2044 X**

(4) Equipment: Model 3965-1.. Solenoid-operated Valve Block

(5) Manufacturer: SAMSON AG Mess- und Regeltechnik

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

(7) The equipment and any acceptable variations thereof are specified in the schedule to this certificate.

(8) The Physikalisch-Technische Bundesanstalt, notified body number 01 02 according to 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 specified in Annex II to the Directive.

The examination and test results are recorded in confidential report  
PTB Ex 05-24269

(9) The essential health and safety requirements are satisfied by compliance with

**EN 50014:1997 + A1 + A2      EN 50020 :2002      EN 50281-1-1:1988**

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

(11) This EC Type Examination Certificate relates only to the design and examination of the specified equipment in compliance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment. These requirements are not covered by this Certificate.

Statements of Conformity without signature and seal are invalid.  
This Statement of Conformity may be reproduced only in its entirety without any changes.  
Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.



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

 II 2 G EEx ia IIC T6 and II2 D IP 65 T 80 °C

Zertifizierungsstelle Explosionsschutz  
By order

Braunschweig, 10. June 2005

(Signature)

(Seal)

Dr.-Ing. Johannmeyer  
Director and Professor

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This Statement of Conformity may be reproduced only in its entirety without any changes.  
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Physikalisch-Technische Bundesanstalt Bundesallee 100 D-38116 Braunschweig PTB49-3965.doc

(13) **S c h e d u l e**

(14) **EC Type Examination Certificate No. PTB 05 ATEX 2044 X**

(15) **Description of Equipment**

The Model 3965-1...operated Valve Block serves for converting electrical binary signals into pneumatic output signals.

The equipment is intended for use in hazardous areas.

The correlation between version, temperature classification, permissible ambient temperature ranges and maximum power dissipation is shown in the table below:

Version	UN	6 V	12 V	24 V
Temperature class	T6	60		
	T5	-45 °C ... 70 °C		
	T4	80 °C		
Characteristic linear or rectangular	Pi	250 mW	No limitation	

CI negligible

LI negligible

**Electrical data**

Input circuit

Type of protection: Intrinsic safety EEx ia IIC  
Only for connection to certified intrinsically safe circuits. The maximum values of  $U_i$  and  $I_i$  for all versions UN are shown in the table below:

$U_i$	25 V	27 V	28 V	30 V	32 V
$I_i$	150 mA	125 mA	115 mA	100 mA	85 mA
Pi	No limitation				

(16) Test report **PTB Ex 05-24269**

Statements of Conformity without signature and seal are invalid.

This Statement of Conformity may be reproduced only in its entirety without any changes. Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

(17) **Special conditions for safe use**

If the Model 3965-1.. Solenoid-operated Valve Block is to be used in Zone 21 hazardous locations according to EN 50281-1-1:1998, the equipment shall be mounted in an additional enclosure made of steel or stainless steel resp. or of plastic. The enclosure with its connection facilities and bushes shall be proven to comply with degree of protection IP 65 according to IEC 50529.

If the solenoid-operated valve block is to be mounted in a plastic enclosure, the enclosure made by Messrs. Rittal and certified under PTB 03 ATEX 1011 U shall be used.

(18) **Basic safety and health requirements**

In compliance with the standards specified above.

Zertifizierungsstelle Explosionsschutz  
By order

Braunschweig, 10. June 2005

(Signature)                      (seal)

Dr. Ing. U. Johannsmeyer  
Director and Professor

Statements of Conformity without signature and seal are invalid.  
This Statement of Conformity may be reproduced only in its entirety without any changes.  
Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

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**T R A N S L A T I O N**

**A D D E N D U M N o.: 1**

**in compliance with Directive 94/9/EC Annex III Clause 6  
to the EC Type Examination Certificate PTB 05 ATEX 2044 X**

Equipment: Model 3965-1 .. Solenoid Valve Island

Marking:  II 2 G Ex ia IIC T 6 and II 2 D Ex tD A21 IP 65 T 80 °C

Manufacturer: SAMSON AG, Mess- und Regeltechnik

Address: Weismüllerstrasse 3  
60314 Frankfurt am Main, Germany

Description of the additions and modifications

The subject of this Addendum is the assessment of the Model 3965-1 .... Solenoid Valve Island with respect to the requirements of the standard series EN 60079 and EN 61241.

The interrelationship between execution, temperature classification, permissible ambient temperature ranges and maximum power dissipation, the special conditions, the notes on manufactures and operation and all the other data contained in the EC Type Examination Certificate apply unaltered also to this Addendum No. 1.

The marking of the equipment is permitted in the future to comply with the standards specified below.

Standards applied:

**EN 60079-0:2004**

**EN 60079-11:2007**

**EN 61241-0:2004**

**EN 61241-1:2004**

Test report: **PTB Ex 07-27125**

Zertifizierungsstelle Explosionsschutz  
By order

Braunschweig, 16. August 2007

Dr.-Ing. U. Johannsmeyer

EC Type examination Certificates without signature and seal are invalid.

This EC Type Examination Certificate may only be reproduced in its entirety and without any change, schedule included. Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch Technische Bundesanstalt - Bundesallee 100 -D - 38116 Braunschweig

Ptb49Add-1.doc



## TRANSLATION

### (1) EC TYPE EXAMINATION CERTIFICATE

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



- (3) EC type examination certificate number

**PTB 09 ATEX 2032**

- (4) Equipment: Type 1170-3010 Power Supply Unit for Type 3965-1131 Solenoid Valve Island (PROFIBUS DP)
- (5) Manufacturer: SAMSON AG, Mess- und Regeltechnik
- (6) Address: Weismüllerstrasse 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) 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 Assessment and Test Report  
**PTB Ex 10-28134.**

- (9) Compliance with the essential health and safety requirements is ensured by compliance with:

EN 60079-0:2006    EN 60079-7:2007    EN 61241-0:2006  
EN 60079-11:2007    EN 60079-18:2004    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 as specified in the schedule to this certificate.
- (11) This EC Type Examination Certificate relates only to the design and construction of the specified equipment or protective system in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment. These requirements are not covered by this certificate.


The results laid down in this test report refer exclusively to the test object and the technical documentation submitted. Test reports without signature and seal are invalid. This test report may be reproduced unaltered only. Extracts or amendments shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

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

 II 2G Ex e mb [ib/ia] IIC T4 or II 2D Ex tD A21 IP 54 T80 °C

Certification Sector for Explosion Protection  
O/o

Braunschweig, 9 February 2010

[Signature Johannsmeyer, stamp: Physikalisch-Technische Bundesanstalt 56]

Dr.-Ing. U. Johannsmeyer  
Director and Professor

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**Enclosure to EC Type Examination Certificate PTB 09 ATEX 2032**

(13) **Enclosure**

(14) **EC Type Examination Certificate PTB 09 ATEX 2032**

(15) **Description of the equipment or protective system:**

The Type 1170-3010 Power Supply Unit is an optional component of the Type 3965-1.. Solenoid Valve Island type tested in PTB 05 ATEX 2044 X and is designed for intrinsically safe voltage supply for the Type 3965-1131 (PROFIBUS DP). The Type 3965-1131 is composed of the Type 1170-3184 CPU Module and the Type 1170-3185 NAMUR Module certified in PTB 09 ATEX 2033.

The power supply unit is designed for use inside hazardous areas.  
 The permissible ambient temperature range is  $-20^{\circ}\text{C}$  to  $60^{\circ}\text{C}$

**Electric data**

Voltage supply ..... U = 18 to 32 V DC  
 U<sub>m</sub> = 60 V  
 P = 4.5 W

Output circuit Vcc-A..... in type of protection Intrinsic Safety Ex ib IIC  
 In-system, no external connection options

Max. values:

(terminal X1, contacts 10/11) U<sub>0</sub> = 9.6 V  
 I<sub>0</sub> = 145 mA  
 P<sub>0</sub> = 1 W  
 L<sub>i</sub> negligibly small  
 C<sub>i</sub> = 63.5 nF

Output circuit Vcc-B..... in type of protection Intrinsic Safety Ex ib IIC  
 In-system, no external connection options

Max. values:

(terminal X1, contacts 7/14) U<sub>0</sub> = 14.1 V  
 I<sub>0</sub> = 105 mA  
 P<sub>0</sub> = 500 mW  
 L<sub>i</sub> negligibly small  
 C<sub>i</sub> = 56.3 nF

Output circuit Vcc-C..... in type of protection Intrinsic Safety Ex ib IIC  
 In-system, no external connection options

Max. values:

(terminal X1, contacts 4/17) U<sub>0</sub> = 9.6 V  
 I<sub>0</sub> = 145 mA  
 P<sub>0</sub> = 1 W  
 L<sub>i</sub> negligibly small  
 C<sub>i</sub> = 254 nF

The results laid down in this test report refer exclusively to the test object and the technical documentation submitted. Test reports without signature and seal are invalid. This test report may be reproduced unaltered only. Extracts or amendments shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

**Enclosure to EC Type Examination Certificate PTB 09 ATEX 2032**

Output circuit Vcc-D..... in type of protection Intrinsic Safety Ex ia IIC  
In-system, no external connection options

(terminal X1, contacts 1/20)

Max. values:

$U_0$	=	9,6 V
$I_0$	=	145 mA
$P_0$	=	1 W
$L_i$	=	negligibly small
$C_i$	=	254 nF

Under normal operating conditions, the output circuits Vcc-A and Vcc-C are to be considered as galvanically coupled. They are safely galvanically isolated from the input circuit Vcc-B up to a maximum peak voltage of 30 V.

The output circuit Vcc-D is safely galvanically isolated from all other circuits up to a maximum peak voltage of 60 V.

All output circuits are safely galvanically isolated from the supply circuit up to a maximum peak voltage of 60 V.

- (1) **Assessment and Test Report PTB Ex 10-28134**
- (2) **Special conditions for safe use**  
None, see notes on manufacturing and operation in the assessment and test report.
- (3) **Essential health and safety requirements**  
Compliance with the essential health and safety requirements is ensured by compliance with the standards mentioned above.

Certification Sector for Explosion Protection  
O/o

Braunschweig, 9 February 2010

[Signature Johannsmeyer, stamp: Physikalisch-Technische Bundesanstalt 56]

Dr.-Ing. U. Johannsmeyer  
Director and Professor

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## TRANSLATION

### (1) EC TYPE EXAMINATION CERTIFICATE

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



- (3) EC Type Examination Certificate Number

**PTB 09 ATEX 2033**

- (4) Equipment: Type 1170-3184 CPU Module and Type 1170-3185 NAMUR Module for Type 3965-1131 Solenoid Valve Island (PROFIBUS DP)
- (5) Manufacturer: SAMSON AG, Mess- und Regeltechnik
- (6) Address: Weismüllerstrasse 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 number 0102 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 as specified in Annex II to the Directive.

The examination and test results are recorded in the confidential Assessment and Test  
**PTB Ex 10-28235**


- (9) Compliance with the essential health and safety requirements is ensured by compliance with:  
**EN 60079-0:2006**                      **EN 61241-0:2006**  
**EN 60079-11:2007**                    **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 as specified in the schedule to this certificate.
- (11) This EC Type Examination Certificate relates only to the design and construction of the specified equipment or protective system in accordance with Directive 94/9/EC. Further

The results laid down in this test report refer exclusively to the test object and the technical documentation submitted. Test reports without signature and seal are invalid. This test report may be reproduced unaltered only. Extracts or amendments shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt – Bundesallee 100 - D 38116 Braunschweig

requirements of this Directive apply to the manufacture and supply of this equipment. These requirements are not covered by this certificate.

- (12) The marking of the equipment must include the following:

 II 2 (1)G Ex ib [ia] IIC T4 or II 2 D Ex tD A21 IP54 T120 °C

Certification Sector for Explosion Protection

Braunschweig, 10 February 2010

O/o

[Signature Johannsmeyer, stamp: Physikalisch-Technische Bundesanstalt 56]

Dr.-Ing. U. Johannsmeyer

Director and Professor

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Physikalisch-Technische Bundesanstalt – Bundesallee 100 - D 38116 Braunschweig

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(13)

## Schedule

(14)

**EC Type Examination Certificate Number PTB 09 ATEX 2033**

(15) **Description of Equipment**

The Type 1170-3184 CPU Module and the Type 1170-3185 NAMUR Module is an optional component of the Type 3965-1.. Solenoid Valve Island type tested in version Type 3965-1131 for PROFIBUS DP connection in PTB 05 ATEX 2044 X. The CPU module serves as communication interface between the in-system communication lines and the external RS485 IS bus systems (PROFIBUS DP).

The NAMUR module serves for connection of inductive proximity sensors and assessment of their signals.

The voltage for the CPU and NAMUR module is supplied intrinsically safe by the Type 1170-3010 Power Supply Unit certified in PTB 09 ATEX 2032.

The modules are designed for use inside hazardous areas.

The permissible ambient temperature range is  $-20^{\circ}\text{C}$  to  $60^{\circ}\text{C}$ .

**Electric data**

All circuits are safely galvanically isolated from each other up to a maximum peak voltage of 30 V. The input circuit Vcc-D is safely galvanically isolated from all other circuits up to a maximum peak voltage of 60 V.

The input circuits are supplied by the internal circuits certified in PTB 09 ATEX 2032

Input circuit Vcc-A ..... in-system circuit without external connection  
 (strip X5, pin 19/20) options

Input circuit Vcc-B..... in-system circuit without external connection  
 (strip X5, pin 13/14) options

Input circuit Vcc-C..... in-system circuit without external connection  
 (strip X5, pin 7/8) options

Input circuit Vcc-D ..... in-system circuit without external connection  
 (strip X5, pin 1/2) options

**Enclosure to EC Type Examination Certificate PTB 09 ATEX 2033**

**PROFIBUS DP, RS-485-IS**

RS-485-IS fieldbus connection ..... in type of protection Intrinsic Safety Ex ib IIC  
 (D-SUB port X1, pin 3, 5, 6, 8)

Max. values:

$U_0 = 4.1 \text{ V}$

$I_0 = 82 \text{ mA}$

$P_0 = 84 \text{ mW}$

Linear characteristic

$C_i$  negligibly small

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$L_i$  negligibly small

External RS-485-IS fieldbus system ..... in type of protection Intrinsic Safety Ex ib IIC

Max. value per pair of terminals:

$$U_i = 4.2 \text{ V}$$

Max. value of sum per pair of terminals:

$$I_i = 4.8 \text{ A}$$

Lines (loop resistance) ..... cable type A or B acc. to EN 60079-25 with the following linear electric constants:

$$L/R' \leq 15 \text{ } \mu\text{H}/\Omega$$

$$C' \leq 250 \text{ nF/km}$$

Braided wire diameter  $\geq 0.2 \text{ mm}$

Concentrated reactance across the external RS485 IS fieldbus systems are not permissible.

**Note!**

*Specifications on the maximum permissible external reactance on the fieldbus connections of the individual devices in the external RS-485-IS fieldbus network are not applied in this EC Type Examination Certificate.*

**Type 1170-3185 NAMUR Module**

Input circuit Vcc-D ..... in-system circuit without external connection options  
(round connector X8)

Signal current circuits ..... in type of protection Intrinsic Safety Ex ia IIC  
(terminals X1 to X8)

Max. values per channel:

$$U_0 = 9.6 \text{ V}$$

$$I_0 = 27 \text{ mA}$$

$$P_0 = 66 \text{ mW}$$

Linear characteristic

$L_i$  negligibly small

$$C_i = 210\text{pF}$$

The relation between explosion group and external reactances is shown in the table:

	IIC	IIB
$L_0$	2 mH	5 mH
$C_0$	875 nF	3 $\mu\text{F}$

**Solenoid valves**

Input circuits ..... in type of protection Intrinsic Safety Ex ia IIC  
(terminal rows X10 to X13) only for connection to a certified intrinsically safe circuit

The results laid down in this test report refer exclusively to the test object and the technical documentation submitted. Test reports without signature and seal are invalid. This test report may be reproduced unaltered only. Extracts or amendments shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

**Enclosure to EC Type Examination Certificate PTB 09 ATEX 2033**

Max. values per channel:

$$\begin{aligned} U_i &= 28 \text{ V} \\ I_i &= 100 \text{ mA} \\ P_i &= 250 \text{ mW} \end{aligned}$$

or

Solenoid valve control ..... in type of protection Intrinsic Safety Ex ib IIC

Max. values per channel:

$$\begin{aligned} U_0 &= 9,6 \text{ V} \\ I_0 &= 32 \text{ mA} \\ P_0 &= 78 \text{ mW} \end{aligned}$$

Linear characteristic

$$\begin{aligned} L_i &\text{ negligibly small} \\ C_i &\text{ negligibly small} \end{aligned}$$

The relation between explosion group and external reactance's is shown in the table:

	IIC	IIB
$L_0$	5 mH	5 mH
$C_0$	650 nF	3.7 $\mu$ F

(16) **Assessment and Test Report PTB Ex 10-28235**

(17) **Special conditions for safe use**

None, see notes on manufacturing and operation in the assessment and test report

(18) **Essential health and safety requirements**

Compliance with the essential health and safety requirements is ensured by compliance with the standards mentioned above.

Certification Sector for Explosion Protection  
 O/o

Braunschweig, 10 February 2010

[Signature Johannsmeyer, stamp: Physikalisch-Technische Bundesanstalt 56]

Dr.-Ing. U. Johannsmeyer  
 Director and Professor

The results laid down in this test report refer exclusively to the test object and the technical documentation submitted. Test reports without signature and seal are invalid. This test report may be reproduced unaltered only. Extracts or amendments shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

[federal eagle logo]

(1) **EC Type Examination Certificate**



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

(3) EC type examination certificate number

**PTB 11 ATEX 2021 X**

(4) Equipment: Type 3965-1131 PROFIBUS DPplus Solenoid Valve Island

(5) Manufacturer: SAMSON AG Mess- und Regeltechnik

(6) Address: Weismüllerstraße 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) 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 Assessment and Test Report PTB Ex 12-21283.


(9) Compliance with the essential health and safety requirements has been assured by compliance with:

**EN 60079-0:2009 EN 60079-7:2007 EN 60079-11:2012**  
**EN 60079-18:2009 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 of safe use specified in the schedule to this certificate.

(11) This EC Type Examination Certificate relates only to the design and testing of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment. These requirements are not covered by this certificate.

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

 **II 2 G Ex eb mb [ib/ia] IIC T4 or II 2(1) G Ex ib[ia] IIC T4 and**

 **II 2 D Ex tb IIIC T80 °C IP 54**

Certification Sector for Explosion Protection  
O/o

Braunschweig, 1 August 2012

[signature Dr.-Ing. U. Klausmeyer, round stamp with federal eagle logo and  
Director and Professor Physikalisch Technische Bundesanstalt 56 lettering]

EC type examination certificates without signature nor seal are invalid.

This EC type examination certificate may only be reproduced without changes.

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Physikalisch-Technische Bundesanstalt · Bundesallee 100 · 38116 Braunschweig · Germany



- (13) **Schedule**
- (14) **EC Type Examination Certificate PTB 11 ATEX 2021 X**
- (15) Description of the equipment

The Type 3965-1131 PROFIBUS DPplus Solenoid Valve Island consists of the Type 1170-3010 Power Supply Module, the Type 1170-3184 CPU Module and the Type 1170-3185 NAMUR Module. The solenoid valve island is designed as a communication interface between the internal communication lines within the system and the external RS-485-IS bus system (PROFIBUS DP). The NAMUR module is designed for connection of inductive proximity sensors and assessing their signals.

The solenoid valve island is designed for use inside hazardous areas.

The electric data of the individual modules are summarized in the following.

Electric data

**Type 1170-3010 Power Supply Module**

Voltage supply..... in type of protection Increased Safety Ex eb II

$$U = 18 \text{ to } 32 \text{ V DC}$$

$$U_m = 60 \text{ V}$$

$$P = 4.5 \text{ W}$$

Output circuit Vcc-A..... in type of protection Intrinsic Safety Ex ib IIC  
In-system, no external connection options

Max. values:

(terminal X1, contacts 10/11)

$$U_o = 9.6 \text{ V}$$

$$I_o = 145 \text{ mA}$$

$$P_o = 1 \text{ W}$$

$$L_i \text{ negligibly small}$$

$$C_i = 63.5 \text{ nF}$$

Output circuit Vcc-B..... in type of protection Intrinsic Safety Ex ib IIC  
In-system, no external connection options

Max. values:

(terminal X1, contacts 7/14)

$$U_o = 14.1 \text{ V}$$

$$I_o = 105 \text{ mA}$$

$$P_o = 500 \text{ mW}$$

$$L_i \text{ negligibly small}$$

$$C_i = 56.3 \text{ nF}$$

**Schedule to EC Type Examination Certificate PTB 11 ATEX 2021 X**

Output circuit Vcc-C .....in type of protection Intrinsic Safety Ex ib IIC  
 In-system, no external connection options

Max. values:

(terminal X1, contacts 4/17)

$U_o = 9.6 \text{ V}$   
 $I_o = 145 \text{ mA}$   
 $P_o = 1 \text{ W}$   
 $L_i$  negligibly small  
 $C_i = 254 \text{ nF}$

Output circuit Vcc-D .....in type of protection Intrinsic Safety Ex ia IIC  
 In-system, without external connection options

Max. values:

(terminal X1, contacts 1/20)

$U_o = 9.6 \text{ V}$   
 $I_o = 145 \text{ mA}$   
 $P_o = 1 \text{ W}$   
 $L_i$  negligibly small  
 $C_i = 254 \text{ nF}$

Under normal operating conditions, the output circuits Vcc-A and Vcc-C are to be considered as galvanically coupled with each other. They are safely galvanically isolated from the input circuit Vcc-B up to a maximum peak voltage of 30 V.

The output circuit Vcc-D is safely galvanically isolated from all circuits up to a maximum peak voltage of 60 V.

All output circuits are safely galvanically isolated from the supply circuit up to a maximum peak voltage of 60 V.

**Type 1170-3184 CPU Module**

Input circuit Vcc-A .....in-system circuit without external connection  
 (strip X5, pin 19/20) options

Input circuit Vcc-B .....in-system circuit without external connection  
 (strip X5, pin 13/14) options

Input circuit Vcc-C .....in-system circuit without external connection  
 (strip X5, pin 7/8) options

Input circuit Vcc-D .....in-system circuit without external connection  
 (strip X5, pin 1/2) options

**Schedule to EC Type Examination Certificate PTB 11 ATEX 2021 X**

**PROFIBUS DP, RS-485-IS**

RS-485-IS fieldbus connection ..... in type of protection Intrinsic Safety Ex ib IIC  
(D-SUB port X1, pin 3, 5, 6, 8)

Max. values:

$$\begin{aligned}U_o &= 4.1 \text{ V} \\I_o &= 82 \text{ mA} \\P_o &= 84 \text{ mW}\end{aligned}$$

Linear characteristic

$$\begin{aligned}C_i &\text{ negligibly small} \\L_i &\text{ negligibly small}\end{aligned}$$

External RS-485-IS fieldbus system ..... in type of protection Intrinsic Safety Ex ib IIC

Max. value per pair of terminals:

$$U_i = 4.2 \text{ V}$$

Max. value of sum per pair of terminals:

$$I_i = 4.8 \text{ A}$$

Lines (loop resistance) ..... cable type A or B acc. to EN 60079-25 with  
the following linear electric constants:

$$\begin{aligned}L'/R' &\leq 15 \text{ } \mu\text{H}/\Omega \\C' &\leq 250 \text{ nF/km}\end{aligned}$$

Braided wire diameter  $\geq 0.2 \text{ mm}$

Concentrated reactances across the external  
RS-485-IS fieldbus system are not permissi-  
ble.

Note!

*Specifications on the maximum permissible external reactances on the fieldbus connections of  
the individual devices in the external RS-485-IS fieldbus network are not applied in this EC Type  
Examination Certificate.*

**Schedule to EC Type Examination Certificate PTB 11 ATEX 2021 X**

**Type 1170-3185 NAMUR Module**

Input circuit Vcc-D ..... in-system circuit without external connection  
 (round connector X8) options

Signal current circuits ..... in type of protection Intrinsic Safety Ex ia IIC  
 (terminals X1 to X8)

Max. values per channel:

$U_o = 9.6 \text{ V}$   
 $I_o = 27 \text{ mA}$   
 $P_o = 66 \text{ mW}$

Linear characteristic

$L_i$  negligibly small  
 $C_i = 210 \text{ pF}$

The relation between explosion group and external reactances is shown in the table:

	IIC	IIB
$L_o$	2 mH	5 mH
$C_o$	875 nF	3 $\mu\text{F}$

**Solenoid valves**

Input circuits ..... in type of protection Intrinsic Safety Ex ia IIC  
 (terminal rows X10 to X13) only for connection to a certified intrinsically safe circuit

Max. values per channel:

$U_i = 28 \text{ V}$   
 $I_i = 100 \text{ mA}$

or

$U_i = 32 \text{ V}$   
 $I_i = 87.5 \text{ mA}$

Solenoid valve control ..... in type of protection Intrinsic Safety Ex ib IIC

Max. values per channel:

$U_o = 9.6 \text{ V}$   
 $I_o = 32 \text{ mA}$   
 $P_o = 78 \text{ mW}$

Linear characteristic

$L_i$  negligibly small  
 $C_i$  negligibly small

**Schedule to EC Type Examination Certificate PTB 11 ATEX 2021 X**

The relation between explosion group and external reactances is shown in the table:

	IIC	IIB
$L_o$	5 mH	5 mH
$C_o$	650 nF	3.7 $\mu$ F

(16) Assessment and Test Report PTB Ex 12-21283

(17) Special conditions

If the Type 3965-1131 PROFIBUS DPplus Solenoid Valve Island is to be used in hazardous areas of zone 21, it must be mounted in an additional enclosure made of steel, stainless steel or plastic. The enclosure with its connecting parts and entries must comply with degree of protection IP 65 as stipulated in IEC 60529.

If the solenoid valve island is mounted in a plastic enclosure, the enclosure by Rittal certified in PTB 03 ATEX 1011 U must be used. Enclosures by other manufacturers can be used provided these enclosures, their connecting parts and entries comply with type of protection Increased Safety.

(18) Essential health and safety requirements

Compliance with the essential health and safety requirements has been assured by compliance with the standards mentioned above.

Certification Sector for Explosion Protection  
O/o

Braunschweig, 1 August 2012

[Signature Klausmeyer, round stamp with federal eagle logo and Physikalisch Technische Bundesanstalt 56 lettering]

Dr.-Ing. U. Klausmeyer  
Director and Professor



**TRANSLATION**

(1) **Statement of Conformity**

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



(3) EC Type Examination Certificate Number

**PTB 06 ATEX 2003 X**

(4) Equipment: Model 3965-8. .Solenoid Operated Valve Block

(5) Manufacturer: SAMSON AG Mess- und Regeltechnik

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

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

(8) The Physikalisch-Technische Bundesanstalt, notified body number 0102 according to Article 9 of the Council Directive 94/9/ 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 specified in Annex II to the Directive.

The examination and test results are recorded in confidential report.

**PTB Ex 06-26021**

(9) The essential health and safety requirements are satisfied by compliance with

**EN 50021: 1999**

**EN 50281-1-1:1998**

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

(11) In compliance with the Directive 94/9/EC this Statement of Conformity relates only to the design and construction of the equipment specified. Further requirements of this Directive apply to manufacture and marketing of this equipment.

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Physikalisch-Technische Bundesanstalt., Bundesallee 100, D-38116 Braunschweig

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



II 3G EEx nA II T6 or. II 3G EEx nL IIC T6  
II 3D IP 54 T 80 C or. II 3D IP 65 T 80 C

Zertifizierungsstelle Explosionsschutz  
By order

Braunschweig, 22. February 2006

(Signature)

(Seal)

Dr. Ing. U. Johannsmeyer  
Regierungsdirektor

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(13) **S c h e d u l e**

(14) **Statement of Conformity PTB 06 ATEX 2003 X**

(15) **Description of Equipment**

The Model 3965-8... Solenoid Operated Valve Block serves for converting electrical binary signals into pneumatic output signals.

It is used in hazardous locations.

The correlation between version, temperature classification, permissible ambient temperature ranges and maximum power dissipation is show in the table below:

Version	UN	6V	12V	24V
Temperature class	T6	60 °C		
	T5	-45 °C ..... 70 °C		
	T4	80 °C		
Characteristic linear or rectangular	<b>P<sub>i</sub></b>	250mW	No limitations	

**Electrical data**

Input circuits ..... Type of protection EEx nA II  
 or EEx nL IIC

Maximum values:

U<sub>i</sub> = 32 V  
 I<sub>i</sub> = 132 mA

C<sub>i</sub> negligible  
 L<sub>i</sub> negligible

(16) Test report **PTB Ex 06-26021**

(17) **Special conditions for safe use**

- a) Under normal operating conditions the input circuits provided with type of protection EEx nA II are permitted to be connected, disconnected or switched on/off while live only during installation, maintenance and repair work.
- b) The input circuits provided with type of protection EEx nL IIC are permitted to be switched on/off in normal operation.

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Physikalisch-Technische Bundesanstalt., Bundesallee 100, D-38116 Braunschweig

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c) When the Model 3965-8... Solenoid Operated Valve Block is to be used in hazardous locations where conductive dusts according to EN 50281-1-1:1998 are present, it shall be mounted in an

additional enclosure or steel or stainless steel resp. or of plastic. Evidence shall be furnished that the enclosure inclusive of its connection facilities and bushings comply with Degree of Protection IP65 according to IEC 60529.

d) When the solenoid operated valve block is to be mounted in a plastic enclosure, the enclosure made by Messrs. Rittal certified under PTB 03 ATEX 1011 U usually be used.

(18) **Special health and safety requirements**

In compliance with the standard specified above.

Zertifizierungsstelle Explosionsschutz  
By order

Braunschweig, 22. February 2006

(Signature) (seal)

Dr. Ing. U. Johannsmeyer  
Regierungsdirektor

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## **ADDENDUM No. 1**

### **to the Statement of Conformity PTB 05 ATEX 2003 X**

Equipment: Model 3965-8 .. Solenoid valve Island

Marking:  II 3 G EEx nA II T6 or II 3 D EEx nL IIC T6 resp.  
II 3 D IP 54 T 80°C or II 3 D IP 65 T 80°C resp.

Manufacturer: SAMSON AG, Mess- und Regeltechnik

Address: Weismüllerstrasse 3

60314 Frankfurt am Main, Germany

#### **Description of the additions and modifications**

The subject of this Addendum is the assessment of the Model 3965-8 .... Solenoid Valve Island with respect to the requirements of the standard series EN 60079 and EN 61241.

The interrelationship between execution, temperature classification, permissible ambient temperature ranges and maximum power dissipation, the special conditions, the notes on manufactures and operation and all the other data contained in the Statement of Conformity apply unaltered also to this Addendum No. 1.

The marking of the equipment is permitted to comply in the future with the standards specified below.


#### **Standards applied:**

EN 60079-0:2004

EN 60079-15:2003

EN 61241-0:2004

EN 61241-1:2004

Marking:  II 3 G Ex nA II T6 or II 3 G Ex nL IIC T6 resp.  
II 3 tD A21 IP 54 T 80°C or II 3 D Ex tD A21 IP 65 T 80°C resp.

Test report: PTB Ex 07-27126

Zertifizierungsstelle Explosionsschutz

By order

Braunschweig, 16. August 2007

(Signature)

Dr.-Ing. U. Johansmeyer  
Director and Professor

Statements of Conformity without signature and seal are invalid. This Statement of Conformity may be reproduced only without changes. The results laid down in this test report refer exclusively to the test object and the technical documentation submitted. Extracts or changes will require the approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt – Bundesallee 100 - D 38116 Braunschweig

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### Magnetventilinsel / Solenoid Valve Cluster / Electrovanne Bloc Typ/Type/Type 3965

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.

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

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

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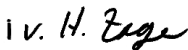
EMC 2014/30/EU	EN 61326-1:2013
LVD 2014/35/EU	EN 61010-1:2010
RoHS 2011/65/EU	EN 50581:2012

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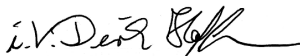
SAMSON AKTIENGESELLSCHAFT  
Weismüllerstraße 3  
D-60314 Frankfurt am Main  
Deutschland/Germany/Allemagne

Frankfurt / Francfort, 2017-07-29

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



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



Dirk Hoffmann  
Zentralabteilungsleiter/Head of Department/Chef du département  
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entsprechend der EU-Baumusterprüfbescheinigung PTB 09 ATEX 2032 ausgestellt von der/  
according to the EU Type Examination PTB 09 ATEX 2032 issued by/  
établi selon le certificat CE d'essais sur échantillons PTB 09 ATEX 2032 émis par:

Physikalisch Technische Bundesanstalt  
Bundesallee 100  
D-38116 Braunschweig

Benannte Stelle/Notified Body/Organisme notifié 0102

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EMC 2014/30/EU

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 60079-7:2007,  
EN 60079-11:2012, EN 60079-18:2009,  
EN 60079-31:2009

RoHS 2011/65/EU

EN 50581:2012

Hersteller / Manufacturer / Fabricant:

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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.

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Leiter Qualitätssicherung/Head of Quality Management/  
Responsable de l'assurance de la qualité

Dirk Hoffmann  
Zentralabteilungsleiter/Head of Department/Chef du département  
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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:

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.

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Dirk Hoffmann  
Zentralabteilungsleiter/Head of Department/Chef de département  
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Bundesallee 100  
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Benannte Stelle/Notified Body/Organisme notifié 0102

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EMC 2014/30/EU

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+A1:2011, 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

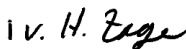
EN 50581:2012

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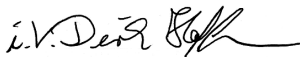
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This declaration of conformity is issued under the sole responsibility of the manufacturer/  
La présente déclaration de conformité est établie sous la seule responsabilité du fabricant.  
Für das folgende Produkt / For the following product / Nous certifions que le produit

### Magnetventilinsel / Solenoid Valve Cluster / Electrovanne Bloc Typ/Type/Type 3965-1...

entsprechend der EU-Baumusterprüfbescheinigung PTB 11 ATEX 2021 X ausgestellt von der/  
according to the EU Type Examination PTB 11 ATEX 2021 X issued by/  
établi selon le certificat CE d'essais sur échantillons PTB 11 ATEX 2021 X 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 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 60079-7:2007,  
EN 60079-11:2012, EN 60079-18:2009,  
EN 60079-31:2009

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.

*H. Zager*

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

*D. Hoffmann*

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





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

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

### Magnetventilinsel / Solenoid Valve Cluster / Electrovanne Bloc Typ/Type/Type 3965-8...

entsprechend der EU-Baumusterprüfbescheinigung PTB 06 ATEX 2003 X ausgestellt von der/  
according to the EU Type Examination PTB 06 ATEX 2003 X issued by/  
établi selon le certificat CE d'essais sur échantillons PTB 06 ATEX 2003 X 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 61000-6-3:2007  
+A1:2011, 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 60079-15:2010,  
EN 60079-31:2009

RoHS 2011/65/EU

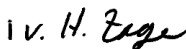
EN 50581:2012

Hersteller / Manufacturer / Fabricant:

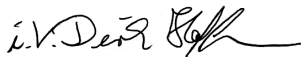
SAMSON AKTIENGESELLSCHAFT  
Weismüllerstraße 3  
D-60314 Frankfurt am Main  
Deutschland/Germany/Allemagne

Frankfurt / Francfort, 2017-07-29

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



Hanno Zager  
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Dirk Hoffmann  
Zentralabteilungsleiter/Head of Department/Chef de département  
Entwicklungsorganisation/Development Organization





**EB 3965 EN**



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