

# Solenoid Valve Type 3963



## General notes

The Type 3963 Solenoid Valves ensure a high level of operational reliability and fast response times for controlling pneumatic actuators in hazardous areas.

Intrinsically safe, low-power binary signals issued by automation or fieldbus systems can be used for controlling purposes.

The Type 3963 Solenoid Valves offer a variety of switching functions, flow rates and connections for all desired applications (Fig. 1).

Special features of the Type 3963 Solenoid Valves include:

### General

- Safety Integrity Level SIL according to IEC 61508 (optional)
- Safety function for use on control valves (optional)
- Corrosion-resistant enclosure with degree of protection IP 54 or IP 65 for applications in humid, aggressive environments
- Versions compatible with paint (on request)
- Service life more than 20 millions switching cycles
- Ambient temperature range  $-20$  to  $+80$  °C or  $-45$  to  $+80$  °C
- Rail mounting, wall mounting or mounting with pipe fittings
- Attachment to linear actuators with NAMUR rib according to IEC 60534-6-1 or to rotary actuators with NAMUR interface according to VDI/VDE 3845

### Pilot valve

- e/p binary converter with flapper/nozzle assembly
- Nominal signal 6/12/24 V DC or 24/48/115/230 V AC
- Type of protection II 2 G Ex ia IIC T6 or II 3 G Ex nA II T6 according to ATEX, additional certifications according to CSA, FM, GOST and NEPSI
- Power consumption 6 to 27 mW or 0.04 to 0.46 VA, depending on the nominal signal
- Manual override as pushbutton or pushbutton switch (optional)
- Air supply 1.4 to 6 bar
- Electrical connection using a cable gland M 20 × 1.5 to terminals or using a plug-type connector
- Cable break protection device (accessory)

### Booster valve

- Diaphragm with return spring or piston, single or double actuated
- 3/2, 5/2, 5/3 or 6/2-way function
- Exhaust air return (optional)
- $K_{vs}$  0.16 to 4.3
- Supply air/exhaust air restrictors for adjusting different closing and opening times in a ratio of 1:1.5 (optional)
- Threaded connection G (NPT)  $\frac{1}{4}$  or  $\frac{1}{2}$
- NAMUR interface  $\frac{1}{4}$ " or  $\frac{1}{2}$ "



5/2-way solenoid valve, single actuated with spring return mechanism,  $K_{vs}$  0.16, connection G  $\frac{1}{4}$



3/2-way solenoid valve, single actuated with spring return mechanism,  $K_{vs}$  4.3, connection G  $\frac{1}{2}$



5/2-way solenoid valve, double actuated with two locking positions,  $K_{vs}$  1.4, connection G  $\frac{1}{4}$ /NAMUR

Fig. 1

## Versions with threaded connection

### Type 3963 Solenoid Valves for continuous and on-off actuators



Fig. 2



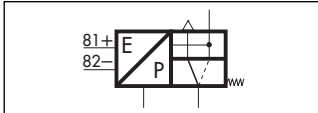
Fig. 3



Fig. 4

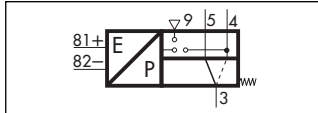


Fig. 5



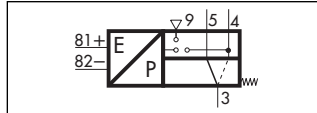
#### Type 3963-XXX003240XXXXX Solenoid Valve

- 3/2-way function
- $K_{vs}$  0.32
- Safety function SIL/TÜV
- Attachment via a connection block to SAMSON's Type 3277 Linear Actuator with SAMSON's Type 3730, 3766, 3767 or 378X Positioner (see Fig. 2)



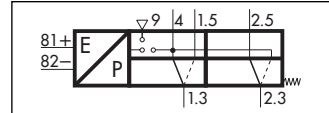
#### Type 3963-XXX0022XXXXXX Solenoid Valve

- 3/2-way function
- $K_{vs}$  0.32
- Connection G (NPT)  $\frac{1}{4}$
- Safety function SIL/TÜV
- Attachment to linear actuators with NAMUR rib, e. g. SAMSON's Type 3271 (see Fig. 3)



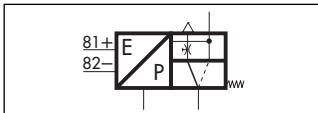
#### Type 3963-XXX0012XXXXXX Solenoid Valve

- 3/2-way function
- $K_{vs}$  0.32
- Connection G (NPT)  $\frac{1}{4}$
- Safety function SIL/TÜV
- Rail mounting, wall mounting or mounting with pipe fittings to linear actuators, e. g. SAMSON's Type 3271 or 3277



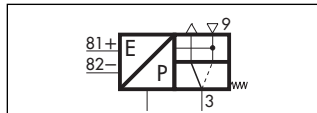
#### Type 3963-XXX1011XXXXXX Solenoid Valve

- 5/2-way function
- $K_{vs}$  0.16
- Connection G (NPT)  $\frac{1}{4}$
- Rail mounting or wall mounting



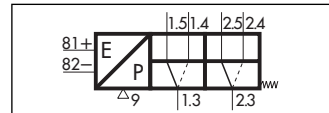
#### Type 3963-XXX013141XXXXX Solenoid Valve

- 3/2-way function
- Adjustable exhaust air restrictor
- $K_{vs}$  0.16
- Attachment via a connection block to SAMSON's Type 3277 Linear Actuator with SAMSON's Type 3730, 3766, 3767 or 378X Positioner (see Fig. 2)



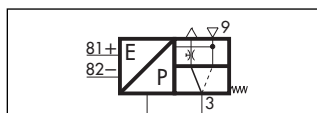
#### Type 3963-XXX0011X0XXXXX Solenoid Valve

- 3/2-way function
- $K_{vs}$  0.16
- Connection G (NPT)  $\frac{1}{4}$
- Rail mounting, wall mounting or mounting with pipe fittings to on-off linear actuators, e. g. SAMSON's Type 3271 or 3277



#### Type 3963-XXX8011XXXXXX Solenoid Valve

- 6/2-way function
- $K_{vs}$  0.16
- Connection G (NPT)  $\frac{1}{4}$
- Rail mounting or wall mounting



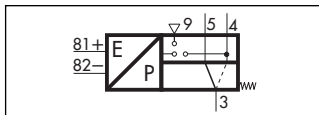
#### Type 3963-XXX0111X0XXXXX Solenoid Valve

- 3/2-way function
- Adjustable exhaust air restrictor
- $K_{vs}$  0.16
- Connection G (NPT)  $\frac{1}{4}$
- Rail mounting, wall mounting or mounting with pipe fittings to on-off linear actuators, e. g. SAMSON's Type 3271 or 3277

Type 3963 Solenoid Valves for continuous and on-off actuators



Fig. 6

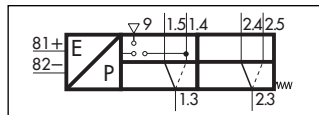


**Type 3963-XXX0014XXXXXX Solenoid Valve**

- 3/2-way function
- $K_{vs}$  4.3
- Connection G (NPT)  $\frac{1}{2}$
- Safety function SIL/TÜV
- Wall mounting or mounting with pipe fittings to linear actuators, e. g. SAMSON's Type 3271 or 3277



Fig. 7

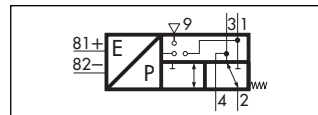


**Type 3963-XXX1014XXXXXX Solenoid Valve**

- 5/2-way function
- $K_{vs}$  4.3
- Connection G (NPT)  $\frac{1}{2}$
- Wall mounting or mounting with pipe fittings



Fig. 8



**Type 3963-XXX0013XXXXXX Solenoid Valve**

- 3/2-way function
- Exhaust air return
- $K_{vs}$  1.4
- Connection G (NPT)  $\frac{1}{4}$
- Safety function TÜV
- Wall mounting or mounting with pipe fittings to linear actuators, e. g. SAMSON's Type 3271 or 3277

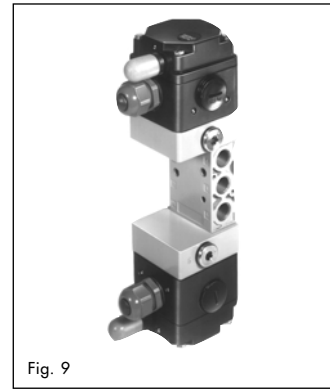
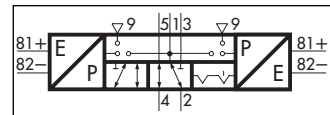
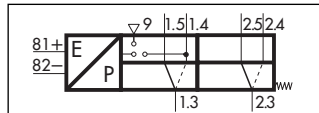


Fig. 9



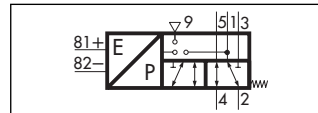
**Type 3963-XXX2013XXXXXX Solenoid Valve**

- 5/2-way function with two locking positions
- $K_{vs}$  1.4
- Connection G (NPT)  $\frac{1}{4}$
- Safety function TÜV
- Wall mounting or mounting with pipe fittings



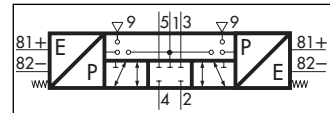
**Type 3963-XXX8014XXXXXX Solenoid Valve**

- 6/2-way function
- $K_{vs}$  4.3
- Connection G (NPT)  $\frac{1}{2}$
- Wall mounting or mounting with pipe fittings



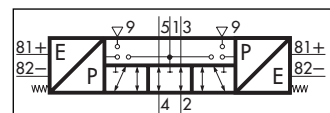
**Type 3963-XXX1013XXXXXX Solenoid Valve**

- 5/2-way function
- $K_{vs}$  1.4
- Connection G (NPT)  $\frac{1}{4}$
- Wall mounting or mounting with pipe fittings to linear actuators, e. g. SAMSON's Type 3271 or 3277



**Type 3963-XXX3013XXXXXX Solenoid Valve**

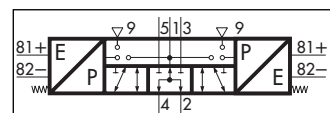
- 5/3-way function with spring-centered mid-position (connections 2 and 4 closed)
- $K_{vs}$  1.4
- Connection G (NPT)  $\frac{1}{4}$
- Wall mounting or mounting with pipe fittings



**Solenoid Valve**

**Type 3963-XXX5013XXXXXX**

- 5/3-way function with spring-centered mid-position (connections 2 and 4 vented)
- $K_{vs}$  1.4
- Connection G (NPT)  $\frac{1}{4}$
- Safety function TÜV
- Wall mounting or mounting with pipe fittings



**Type 3963-XXX4013XXXXXX Solenoid Valves**

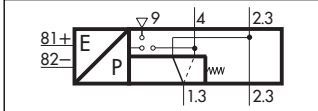
- 5/3-way function with spring-centered mid-position (connections 2 and 4 to air supply)
- $K_{vs}$  1.4
- Connection G (NPT)  $\frac{1}{4}$
- Wall mounting or mounting with pipe fittings

## Versions with NAMUR interface

### Type 3963 Solenoid Valves for continuous and on-off actuators



Fig. 10

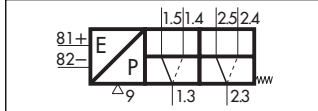


#### Type 3963-XXX0002XXXXXX Solenoid Valve

- 3/2-way function
- Exhaust air return
- $K_{vs}$  0.32
- Connection G (NPT)  $1/4$ "/NAMUR
- Safety function SIL/TÜV
- Mounting to rotary actuators with NAMUR interface, optionally with a positioner (see Fig. 10)



Fig. 11

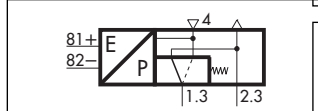


#### Type 3963-XXX8001XXXXXX Solenoid Valve

- 6/2-way function
- $K_{vs}$  0.16
- Connection G (NPT)  $1/4$ "/NAMUR
- Mounting to rotary actuators with NAMUR interface



Fig. 12

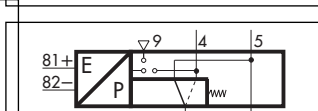


#### Type 3963-XXX0001X0XXXX Solenoid Valve

- 3/2-way function
- Exhaust air return
- $K_{vs}$  0.16
- Connection G (NPT)  $1/4$ "/NAMUR
- Safety function SIL/TÜV
- Mounting to on-off rotary actuators with NAMUR interface or with adapter plate (order no. 1400-6751) to linear actuators with NAMUR rib, e. g. SAMSON's Type 3241-1 (see Fig. 12)

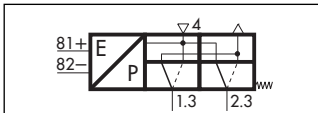


Fig. 13



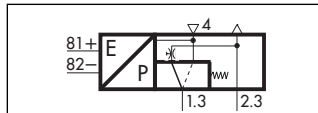
#### Type 3963-XXX0007XXXXXX Solenoid Valve

- 3/2-way function
- Exhaust air return
- $K_{vs}$  2.0
- Connection G (NPT)  $1/4$ ",  $1/2$ "/NAMUR  $1/4$ "
- Safety function SIL/TÜV
- Mounting to on-off rotary actuators with NAMUR interface  $1/8$ " or  $1/4$ " or with adapter plate (order no. 1400-6751) to linear actuators with NAMUR rib



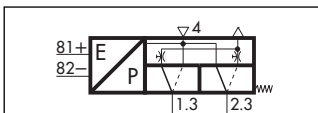
#### Type 3963-XXX1001XXXXXX Solenoid Valve

- 5/2-way function
- $K_{vs}$  0.16
- Connection G (NPT)  $1/4$ "/NAMUR
- Mounting to on-off rotary actuators with NAMUR interface (see Fig. 10)



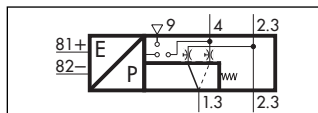
#### Type 3963-XXX0101X0XXXX Solenoid Valve

- 3/2-way function
- Exhaust air return
- Adjustable exhaust air restrictor
- $K_{vs}$  0.16
- Connection G (NPT)  $1/4$ "/NAMUR
- Mounting to on-off rotary actuators with NAMUR interface or with adapter plate (order no. 1400-6751) to linear actuators with NAMUR rib, e. g. SAMSON's Type 3241-1 (see Fig. 12)



#### Type 3963-XXX1201X0XXXX Solenoid Valve

- 5/2-way function
- Two adjustable exhaust air restrictors
- $K_{vs}$  0.16
- Connection G (NPT)  $1/4$ "/NAMUR
- Mounting to on-off rotary actuators with NAMUR interface (see Fig. 10)



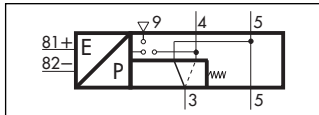
#### Type 3963-XXX0301XXXXXX Solenoid Valve

- 3/2-way function
- Adjustable supply air/exhaust air restrictors
- $K_{vs}$  0.16
- Connection G (NPT)  $1/4$ "/NAMUR
- Mounting to on-off rotary actuators with NAMUR interface or with adapter plate (order no. 1400-6751) to linear actuators with NAMUR rib, e. g. SAMSON's Type 3241-1 (see Fig. 12)

Type 3963 Solenoid Valves for continuous and on-off actuators



Fig. 14

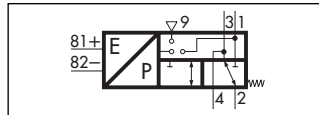


**Type 3963-XXX0004XXXXXX Solenoid Valve**

- 3/2-way function
- Exhaust air return
- $K_{vs}$  4.3
- Connection G (NPT) 1/2"/NAMUR 1/2"
- Safety function SIL/TÜV
- Mounting to on-off rotary actuators with NAMUR interface 3/8" or 1/2"



Fig. 15



**Type 3963-XXX0003XXXXXX Solenoid Valve**

- 3/2-way function
- Exhaust air return
- $K_{vs}$  1.4
- Connection G (NPT) 1/4"/NAMUR
- Safety function TÜV
- Mounting to rotary actuators with NAMUR interface or with adapter plate (order no. 1400-6751) to linear actuators with NAMUR rib

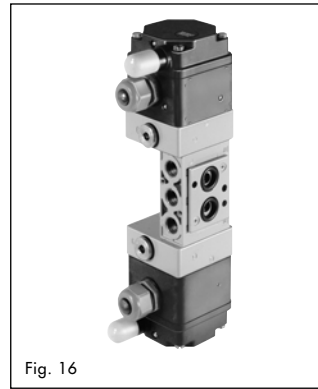
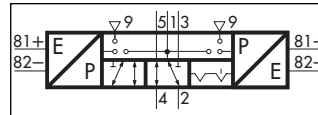


Fig. 16

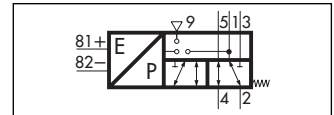


**Type 3963-XXX2003XXXXXX Solenoid Valve**

- 5/2-way function with two locking positions
- $K_{vs}$  1.4
- Connection G (NPT) 1/4"/NAMUR
- Safety function TÜV
- Mounting to rotary actuators with NAMUR interface

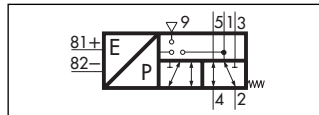


Fig. 17



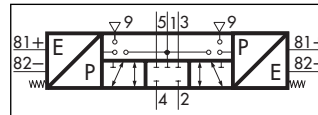
**Type 3963-XXX1006XXXXXX Solenoid Valve**

- 5/2-way function
- $K_{vs}$  2.9
- Connection G (NPT) 1/2"/NAMUR 1/2"
- Mounting to rotary actuators with NAMUR interface 3/8" or 1/2"



**Type 3963-XXX1003XXXXXX0 Solenoid Valve**

- 5/2-way function
- $K_{vs}$  1.4
- Connection G (NPT) 1/4"/NAMUR
- Mounting to rotary actuators with NAMUR interface or with adapter plate (order no. 1400-6751) to linear actuators with NAMUR rib



**Type 3963-XXX3003XXXXXX0 Solenoid Valve**

- 5/3-way function with spring-centered mid-position (connections 2 and 4 closed)
- $K_{vs}$  1.4
- Connection G (NPT) 1/4"/NAMUR
- Mounting to rotary actuators with NAMUR interface

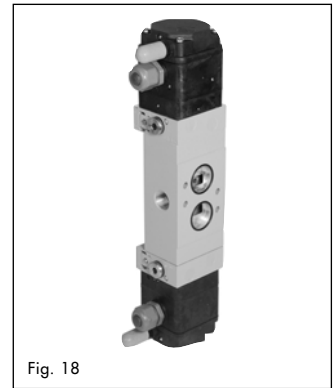
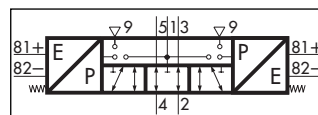
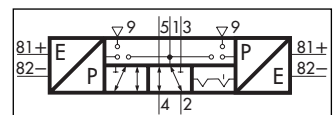


Fig. 18



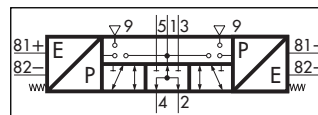
**Type 3963-XXX5003XXXXXX0 Solenoid Valve**

- 5/3-way function with spring-centered mid-position (connections 2 and 4 vented)
- $K_{vs}$  1.4
- Connection G (NPT) 1/4"/NAMUR
- Safety function TÜV
- Mounting to rotary actuators with NAMUR interface



**Type 3963-XXX2006XXXXXX0 Solenoid Valve**

- 5/2-way function with two locking positions
- $K_{vs}$  2.9
- Connection G (NPT) 1/2"/NAMUR 1/2"
- Mounting to rotary actuators with NAMUR interface 3/8" or 1/2"



**Type 3963-XXX4003XXXXXX0 Solenoid Valve**

- 5/3-way function with spring-centered mid-position (connections 2 and 4 to air supply)
- $K_{vs}$  1.4
- Connection G (NPT) 1/4"/NAMUR
- Mounting to rotary actuators with NAMUR interface

## Function

### Solenoid valves with single actuation

The solenoid valves consist of an e/p binary converter (A) with manual override (B) (optional) and a single actuated booster valve (C) with return spring (Fig. 18).

The booster valve (C) supplies the e/p binary converter (A) internally with the supply air (delivery state). Rotating a flat gasket allows the E/P binary converter (A) to be supplied with external air supply via connection 9.

The pressure reducer (5) reduces the air supply pressure to 1.4 bar.

In the normal position the flapper (2) is lifted off the outlet nozzle (1) by the spring (3). As a result, a pressure lower than the switch-off pressure of the booster valve (C) builds up in the pressure divider that consists of the restriction (6) and the outlet nozzle (1).

When the solenoid (4) is energized by an electrical binary signal, the outlet nozzle (1) is closed by the flapper (2) against the force of the spring (3). As a result, the pressure in the pressure divider rises above the switch-on pressure of the booster valve (C), thus switching it to the operating position.

After de-energizing the electrical binary signal, the booster valve (C) will be switched to the normal position by a return spring.

### Solenoid valves with double actuation

The solenoid valves consist of two e/p binary converters (A) with manual override (B) (optional) and a double-actuated booster valve (C) with two locking positions or spring-centered mid-position.

The booster valve (C) supplies the e/p binary converters (A) internally with the supply air (delivery state). Rotating two flat gaskets allows the E/P binary converters (A) to be supplied with external air supply via connections 9.

The pressure reducer (5) reduces the air supply pressure to 1.4 bar.

In the normal position, the flapper (2) is lifted off the outlet nozzle (1) by the spring (3). As a result, a pressure lower than the switch-off pressure of the booster valve (C) builds up in the pressure divider that consists of a restriction (6) and an outlet nozzle (1).

When the solenoid is energized by an electrical binary signal, the outlet nozzle (1) is closed by the flapper (2) against the force of the spring (3). As a result, the pressure in the pressure divider rises above the switch-on pressure of the booster valve (C), thus switching it to the operating position.

After de-energizing the electrical binary signal, the operating position of the detented booster valve (C) will be retained until a reverse signal is received. After de-energizing the electrical binary signal the spring-centered booster valve (C) will be switched to the mid-position by a return spring.

Energizing both e/p binary converters (A) at the same time must be prevented by appropriate electrical control.

### Functional diagram

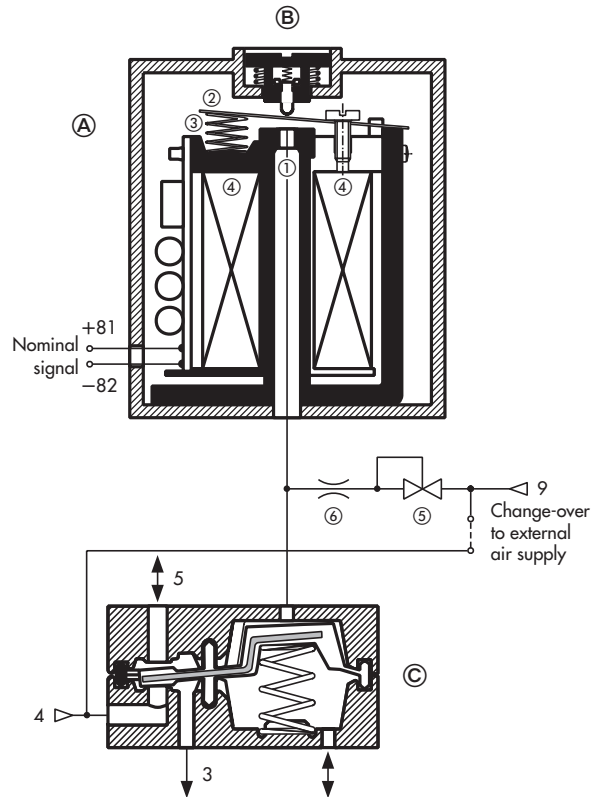


Fig. 19 · Solenoid valve with diaphragm element as booster valve ( $K_{vs}$  0.16)

## Technical data

General data of the solenoid valves	
Construction	Solenoid with flapper/nozzle assembly and booster valve
Degree of protection	IP 54 with filter, IP 65 with filter check valve
Material Enclosure	Polyamide PA 6-3-T-GF35, black
Connection plate	Al Mg, powder-coated, grayish-beige RAL 1019, Stainless steel 1.4404 (special versions see "Versions and ordering data", page 23), Polyamide PA 6-3-T-GF35, black
Screws	Stainless steel 1.4571
Springs	Stainless steel 1.4310
Gaskets	Silicone rubber, Perbunan
Diaphragms	Chloroprene 57 Cr 868 (–20 to +80 °C), Silicone rubber (–45 to +80 °C)
Air supply	Medium Pressure Instrument air, free of corrosive particles, or nitrogen
	1.4 to 6 bar
Air consumption	≤ 80 l/h at 1.4 bar air supply in normal position, ≤ 10 l/h at 1.4 bar air supply in operating position
Switching time	≤ 65 ms
Switching cycles	≥ 2 × 10 <sup>7</sup> (at –20 to +80 °C), ≥ 2 × 10 <sup>6</sup> (at –45 to +80 °C)
Ambient temperature	see „Electrical data“
Mounting position	As desired (see Mounting and Operating Instructions EB 3963 EN)

Electrical data of the solenoid valves									
Type 3963		-X1	-X2	-X3	-08	-07	-06	-05	
Nominal signal	U <sub>N</sub>	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>	24 V AC Max. 36 V <sup>1)</sup>	48 V AC Max. 80 V <sup>1)</sup>	115 V AC Max. 130 V <sup>1)</sup>	230 V AC Max. 255 V <sup>1)</sup>	
	f <sub>N</sub>				48 ... 62 Hz				
Switching point "On"	U <sub>+80°C</sub>	≥ 4.8 V	≥ 9.6 V	≥ 18 V	19 ... 36 V	42 ... 80 V	82 ... 130 V	183 ... 255 V	
	I <sub>+20°C</sub>	≥ 1.41 mA	≥ 1.52 mA	≥ 1.57 mA	≥ 1.9 mA	≥ 1.9 mA	≥ 2.2 mA	≥ 2.6 mA	
	P <sub>+20°C</sub>	≥ 5.47 mW	≥ 13.05 mW	≥ 26.71 mW	≥ 0.04 VA	≥ 0.07 VA	≥ 0.17 VA	≥ 0.46 VA	
"Off"	U <sub>–25°C</sub>	≤ 1.0 V	≤ 2.4 V	≤ 4.7 V	≤ 4.5 V	≤ 9 V	≤ 18 V	≤ 36 V	
	R <sub>+20°C</sub>	2.6 kΩ	5.5 kΩ	10.7 kΩ	Approx. 10 kΩ	Approx. 24 kΩ	Approx. 40 kΩ	Approx. 80 kΩ	
Temperature effect		0.4 %/°C	0.2 %/°C	0.1 %/°C	0.1 %/°C	0.1 %/°C	0.05 %/°C	0.03 %/°C	
Type of protection Ex ia IIC <sup>2)</sup> for use in hazardous areas (zone 1)									
Type 3963		-11	-12	-13					
Permissible maximum values for connection to a certified intrinsically safe circuit									
Output voltage <sup>4)</sup>	U <sub>i</sub>	25 V	27 V	28 V	30 V	32 V			
Output current <sup>4)</sup>	I <sub>i</sub>	150 mA	125 mA	115 mA	100 mA	85 mA			
Power dissipation	P <sub>i</sub>	250 mW	No Limitation						
External capacitance	C <sub>i</sub>	≈ 0							
External inductance	L <sub>i</sub>	≈ 0							
Ambient temperature in temperature class									
	T6	–45 ... +60 °C							
	T5	–45 ... +70 °C							
	T4	–45 ... +80 °C							
Type of protection Ex nA II <sup>3)</sup> for use in hazardous areas (zone 2)									
Type 3963		-81	-82	-83					
Ambient temperature in temperature class									
	T6	–45 ... +60 °C							
	T5	–45 ... +70 °C							
	T4	–45 ... +80 °C							

1) Permissible maximum value at continuous duty. For Ex versions, the permissible maximum value U<sub>i</sub> applies

2) II 2 G Ex ia IIC T6 according to EC Type Examination Certificate PTB 01 ATEX 2085

3) II 3 G Ex nA II T6 according to Statement of Conformity PTB 01 ATEX 2086 X

4) The U<sub>i</sub>/I<sub>i</sub> values apply to nominal signals 6/12/24 V DC

**Technical data** (continued from page 7)

<b>Solenoid valves with single actuation, <math>K_{vs}</math> 0.16 or 0.32</b>				
Switching function	3/2-way function	3/2-way function	5/2-way function	6/2-way function
$K_{vs}$ <sup>1)</sup>	0.16	0.32	0.16	0.16
Safety function	SIL <sup>3)</sup> , TÜV <sup>4)</sup>	SIL <sup>3)</sup> , TÜV <sup>4)</sup>	SIL <sup>3)</sup> , TÜV <sup>4)</sup>	-
Construction	Diaphragm element, soft-seated type, with return spring			
Operating medium	Instrument air, free of corrosive particles <sup>4)</sup> , oil-containing air or noncorrosive gases <sup>5)</sup>			
Operating pressure max.	6 bar			
Output signal	Operating pressure			
Ambient temperature <sup>2)</sup>	-45 to +80 °C			
Connection	G (NPT) 1/4			
Weight approx.	570 g (standard version)			

<b>Solenoid valves with single actuation, <math>K_{vs}</math> 4.3, threaded connection</b>				
Switching function	3/2-way function	3/2-way function	5/2-way function	6/2-way function
$K_{vs}$ <sup>1)</sup> (in direction of flow)	1.9 (4→3), 1.5 (3→4) 4.3 (3→5), 4.7 (5→3)	1.9 (4→3), 1.5 (3→4) 4.3 (3→5), 4.7 (5→3)	1.9 (4→3), 1.5 (3→4) 4.3 (3→5), 4.7 (5→3)	1.9 (4→3), 1.5 (3→4) 4.3 (3→5), 4.7 (5→3)
Ambient temperature <sup>2)</sup>	-20 to +80 °C		-20 to +80 °C	
Safety function	SIL <sup>3)</sup> , TÜV <sup>4)</sup>	SIL <sup>3)</sup> , TÜV <sup>4)</sup>	-	-
Construction	Seat valve, soft-seated type, with return spring			
Material	Enclosure	GD AlSi 12, powder-coated, grayish-beige RAL 1019, stainless steel 1.4404 (special versions see "Versions and ordering data", page 23)		
	Diaphragm	Chloroprene	Silicone rubber	Chloroprene
	Gaskets	Chloroprene	Silicone rubber	Chloroprene
	Screws	Stainless steel 1.4571		
Actuation	Single actuated by one pilot valve, $K_{vs}$ 0.16			
Operating medium	Instrument air, free of corrosive particles, or nitrogen <sup>5)</sup> , instrument air, free of corrosive particles, oil-containing air or noncorrosive gases <sup>6)</sup>			
Operating pressure max. (in direction of flow)	10 bar (4→3, 3→5) 2 bar (as desired)	10 bar (4→3, 3→5) 2 bar (as desired)	10 bar (as desired) 2 bar (as desired)	10 bar (as desired) 2 bar (as desired)
Switching cycles (operating pressure)	$\geq 10^7$ ( 6 bar) $\geq 10^6$ (10 bar)	$\geq 10^6$ ( 6 bar) $\geq 10^5$ (10 bar)	$\geq 10^7$ ( 6 bar) $\geq 10^6$ (10 bar)	$\geq 10^7$ ( 6 bar) $\geq 10^6$ (10 bar)
Connection	G (NPT) 1/2			
Weight approx.	585 g (standard version)		1 100 g (standard version)	

<b>Solenoid valves with single actuation, <math>K_{vs}</math> 2.0 or 4.3, with NAMUR interface</b>				
Switching function	3/2 way function with exhaust air return			
$K_{vs}$ <sup>1)</sup> (in direction of flow)	1.1 (4→3) 2.0 (3→5)	1.1 (4→3) 2.0 (3→5)	1.9 (4→3) 4.3 (3→5)	1.9 (4→3) 4.3 (3→5)
Ambient temperature <sup>2)</sup>	-20 to +80 °C		-20 to +80 °C	
Safety function	SIL <sup>3)</sup> , TÜV <sup>4)</sup>	SIL <sup>3)</sup> , TÜV <sup>4)</sup>	SIL <sup>3)</sup> , TÜV <sup>4)</sup>	TÜV <sup>4)</sup>
Construction	Seat valve, soft-seated type, with return spring			
Material	Enclosure	GD AlSi 12, powder-coated, grayish-beige RAL 1019, stainless steel 1.4404 (special versions see "Versions and ordering data", page 23)		
	Diaphragm	Chloroprene	Silicone rubber	Silicone rubber
	Gaskets	Chloroprene	Silicone rubber	Silicone rubber
	Screws	Stainless steel 1.4571		
Actuation	Single actuated by one pilot valve, $K_{vs}$ 0.16			
Operating medium	Instrument air, free of corrosive particles, or nitrogen <sup>5)</sup> , Instrument air, free of corrosive particles, oil containing air or noncorrosive gases <sup>6)</sup>			
Operating pressure max.	10 bar		10 bar	
Switching cycles (operating pressure)	$\geq 10^7$ ( 6 bar) $\geq 10^6$ (10 bar)	$\geq 10^6$ ( 6 bar) $\geq 10^5$ (10 bar)	$\geq 10^7$ ( 6 bar) $\geq 10^6$ (10 bar)	$\geq 10^6$ ( 6 bar) $\geq 10^5$ (10 bar)
Connection	air supply	G (NPT) 1/4/NAMUR interface 1/4" <sup>7)</sup> , G 3/8		G (NPT) 1/2/NAMUR interface 1/2" <sup>7)</sup>
	exhaust air	G (NPT) 1/2/NAMUR interface 1/4" <sup>7)</sup> , G 3/8		G (NPT) 1/2/NAMUR interface 1/2" <sup>7)</sup>
Weight approx.	1 380 g (standard version)		1 500 g (standard version)	

<sup>1)</sup> Air flow at  $p_1=2.4$  bar and  $p_2=1.0$  bar can be calculated according to the following equation:  $Q=K_{vs} \times 36.22$ , expressed in  $m^3/h$

<sup>2)</sup> The permissible maximum temperature of the solenoid valve depends on the permissible ambient temperature of the components, the type of protection and the temperature class

<sup>3)</sup> Safety Integrity Level SIL according to IEC 61508

<sup>4)</sup> Emergency release or locking of compressed air supply

<sup>5)</sup> With internal air supply

<sup>6)</sup> With external air supply

<sup>7)</sup> NAMUR interface according to VDI/VDE 3845



**Technical data** (continued from page 8)

<b>Solenoid valves with single actuation, <math>K_{vs}</math> 1.4 or 2.9</b>		
Switching function	3/2-way function with exhaust air return	5/2-way function
$K_{vs}$ <sup>1)</sup>	1.4 or 2.9	
Safety function	TÜV <sup>2)</sup> (for $K_{vs}$ 1.4)	–
Construction	Piston valve, metal-to-metal seating, without overlap, with return spring	
Material	Enclosure	GD AlSi 12, powder-coated, grayish-beige RAL 1019, stainless steel 1.4404 (special versions see "Versions and ordering data", page 23)
	Gaskets	Silicone
	Filter	Polyethylene
	Screws	Stainless steel 1.4571
Actuation	Single actuated by one pilot valve, $K_{vs}$ 0.01 (at 1.4) or $K_{vs}$ 0.16 (at 2.9)	
Operating medium	Instrument air, free of corrosive particles, or nitrogen <sup>3)</sup> , instrument air, free of corrosive particles, oil-containing air or noncorrosive gases <sup>4)</sup>	
Operating pressure max.	6 bar <sup>3)</sup> or 10 bar <sup>4)</sup>	
Ambient temperature <sup>5)</sup>	–45 to +80 °C	
Switching cycles	$\geq 2 \times 10^7$	
Connection	$K_{vs}$ 1.4	G (NPT) $\frac{1}{4}$ or NAMUR interface <sup>6)</sup>
	$K_{vs}$ 2.9	G (NPT) $\frac{1}{2}$ or NAMUR interface <sup>6)</sup>
Weight approx.	$K_{vs}$ 1.4	485 g (standard version)
	$K_{vs}$ 2.9	1760 g (standard version)

<b>Solenoid valves with double actuation, <math>K_{vs}</math> 1.4 or 2.9</b>				
Switching function	5/2-way function with two locking positions	5/3-way function with spring-centered mid-position, connections 2 and 4 closed	5/3-way function with spring-centered mid-position, connections 2 and 4 vented	5/3-way function with spring-centered mid-position, connections 2 and 4 to air supply
$K_{vs}$ <sup>1)</sup>	1.4 or 2.9	1.4 (2.9 on request)	1.4 (2.9 on request)	1.4 (2.9 on request)
Safety function	TÜV <sup>2)</sup> (for $K_{vs}$ 1.4)	–	TÜV <sup>2)</sup> (for $K_{vs}$ 1.4)	–
Construction	Piston valve, metal-to-metal seating, without overlap			
Material	Enclosure	GD AlSi 12, powder-coated, grayish-beige RAL 1019, stainless steel 1.4404 (special versions see "Versions and ordering data", page 23)		
	Gaskets	Silicone		
	Filter	Polyethylene		
	Screws	Stainless steel 1.4571		
Actuation	Double actuated by two pilot valves, $K_{vs}$ 0.01 (at 1.4) or $K_{vs}$ 0.16 (at 2.9)			
Operating medium	Instrument air, free of corrosive particles, or nitrogen <sup>3)</sup> , instrument air, free of corrosive particles, oil-containing air or noncorrosive gases <sup>4)</sup>			
Operating pressure max.	6 bar <sup>3)</sup> or 10 bar <sup>4)</sup>			
Ambient temperature <sup>5)</sup>	–45 to +80 °C			
Switching cycles	$\geq 2 \times 10^7$			
Connection	$K_{vs}$ 1.4	G (NPT) $\frac{1}{4}$ or NAMUR interface <sup>6)</sup>		
	$K_{vs}$ 2.9	G (NPT) $\frac{1}{2}$ or NAMUR interface <sup>6)</sup>		
Weight approx.	$K_{vs}$ 1.4	685 g (standard version)		
	$K_{vs}$ 2.9	2180 g (standard version)		

1) Air flow at  $p_1=2.4$  bar and  $p_2=1.0$  bar can be calculated according to the following equation:  $Q=K_{vs} \times 36.22$ , expressed in  $m^3/h$

2) Emergency release or locking of compressed air supply

3) With internal air supply

4) With external air supply

5) The permissible maximum temperature of the solenoid valve depends on the permissible ambient temperature of the components, the type of protection and the temperature class

6) NAMUR interface according to VDI/VDE 3845

## Dimensions of devices without threaded connection

Pilot valve,  $K_{vs}$  0.01

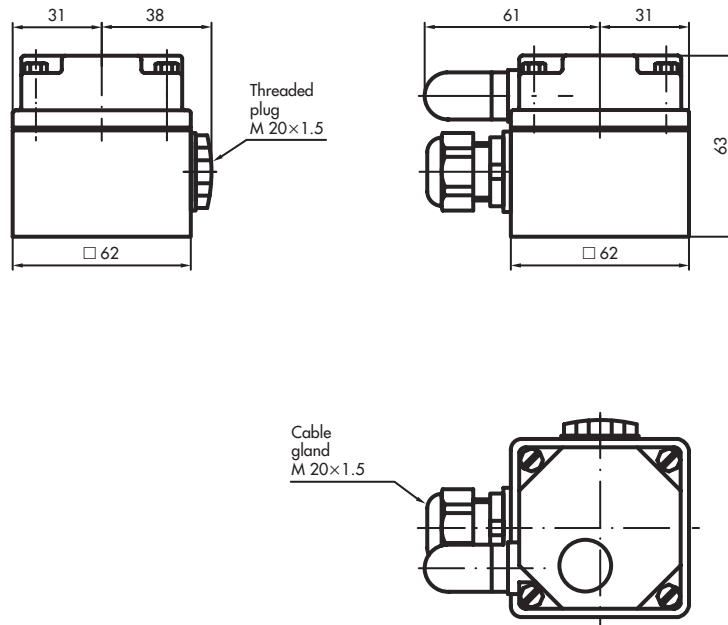


Fig. 20 · Dimensions in mm

Pilot valve,  $K_{vs}$  0.16

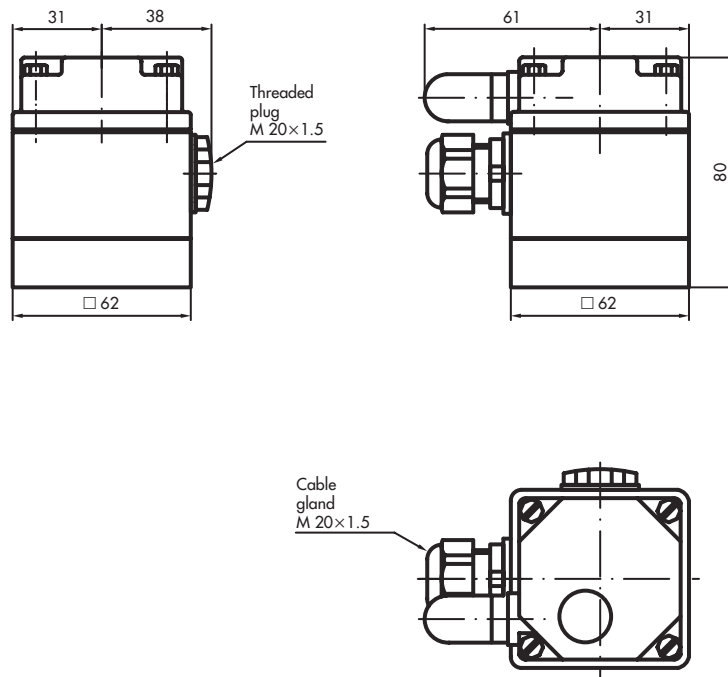


Fig. 21 · Dimensions in mm

## Dimensions of devices with threaded connection

### 5/2-way solenoid valve, single actuated, $K_{vs}$ 0.16

Underneath view of connection plate

- ① M 4 / 7 mm depth
- ② M 3 / 6 mm depth
- ③  $\varnothing$  3 mm / 3.5 mm depth

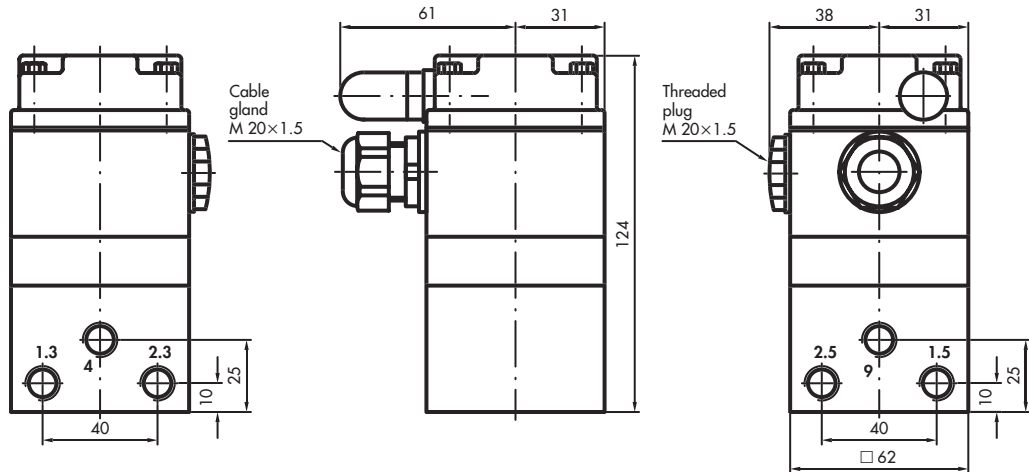
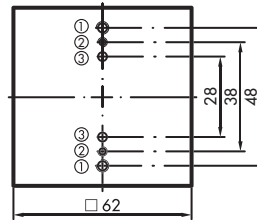
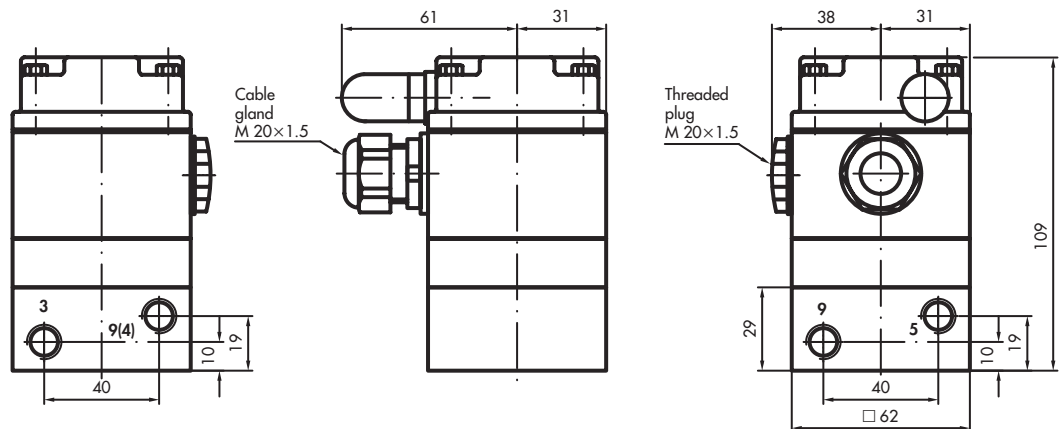
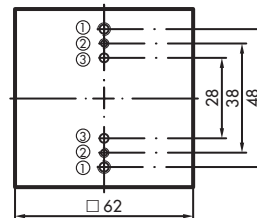


Fig. 22 · Dimensions in mm

### 3/2-way solenoid valve, single actuated, $K_{vs}$ 0.16 or 0.32

Underneath view of connection plate

- ① M 4 / 7 mm depth
- ② M 3 / 6 mm depth
- ③  $\varnothing$  3 mm / 3.5 mm depth



Connection 9 on Type 3963-XXX0X11X0XXXXX  
 Connection 4 on Type 3963-XXX0X12XXXXXX

Connections 5 and 9 only on Type 3963-XXX0X12XXXXXX

Fig. 23 · Dimensions in mm

6/2-way solenoid valve, single actuated,  $K_{vs}$  0.16

Underneath view of connection plate

- ① M 4 / 7 mm depth
- ② M 3 / 6 mm depth
- ③  $\varnothing$  3 mm / 3.5 mm depth

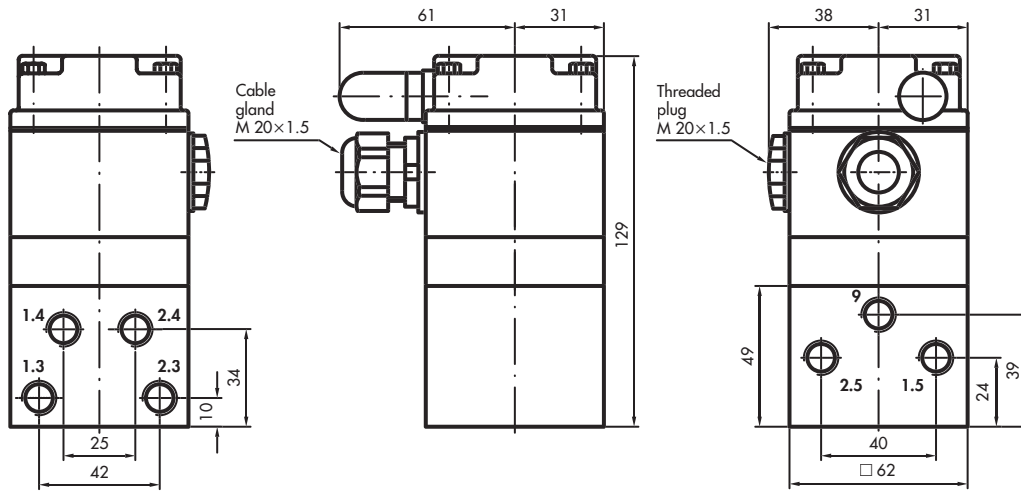
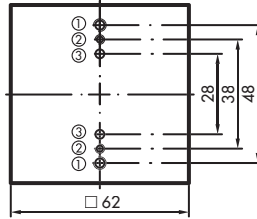
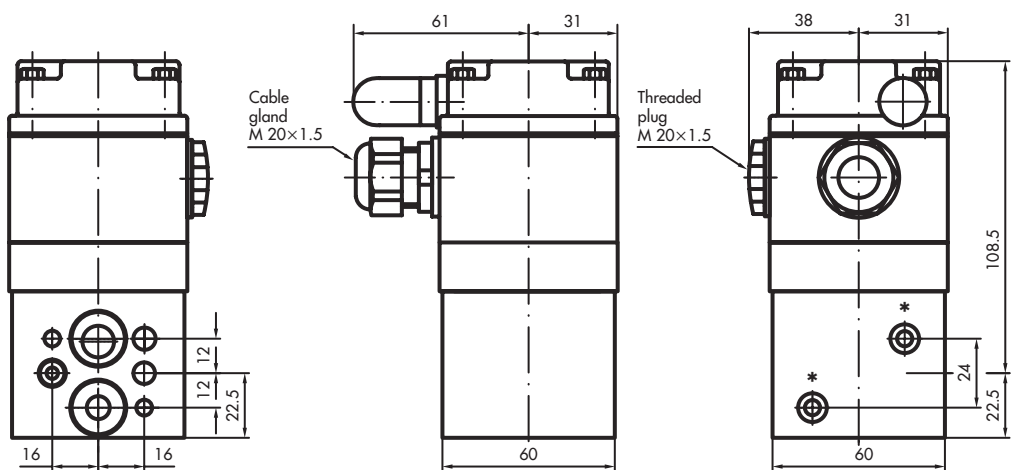


Fig. 24 · Dimensions in mm

3/2-way solenoid valve, single actuated,  $K_{vs}$  0.16 or 0.32, for attachment with connection block to linear actuators



\* Attachment to connection block with 2 hexagon socket head screws M 5×60 DIN 912

Fig. 25 · Dimensions in mm

3/2-way solenoid valve, single actuated,  $K_{vs}$  4.3

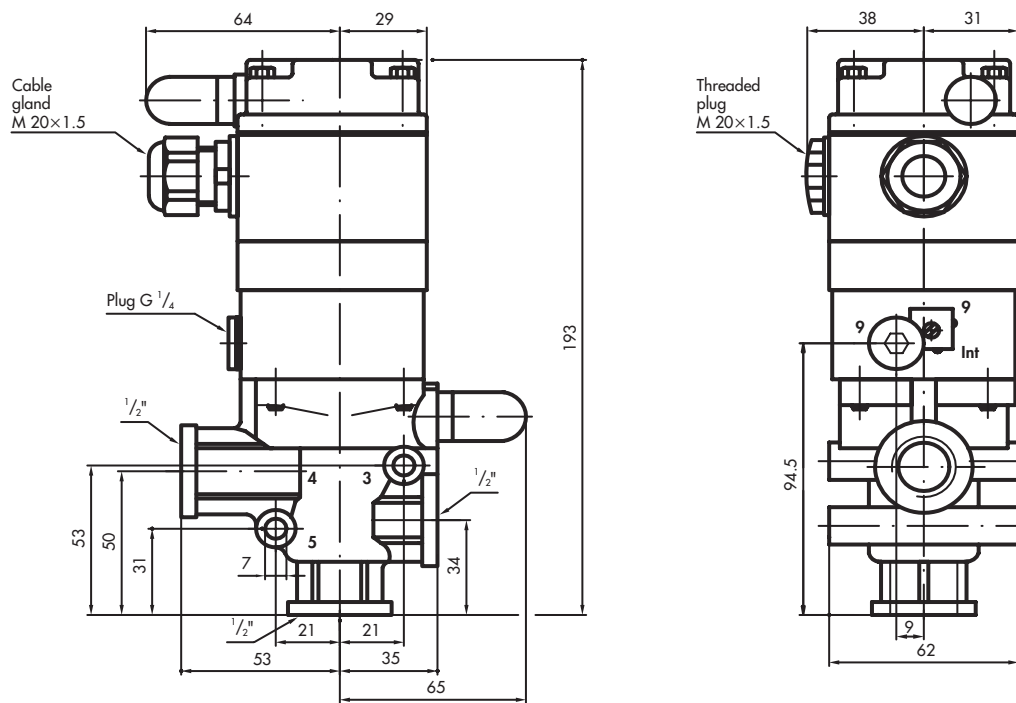


Fig. 26 · Dimensions in mm

5/2-way solenoid valve, single actuated,  $K_{vs}$  4.3

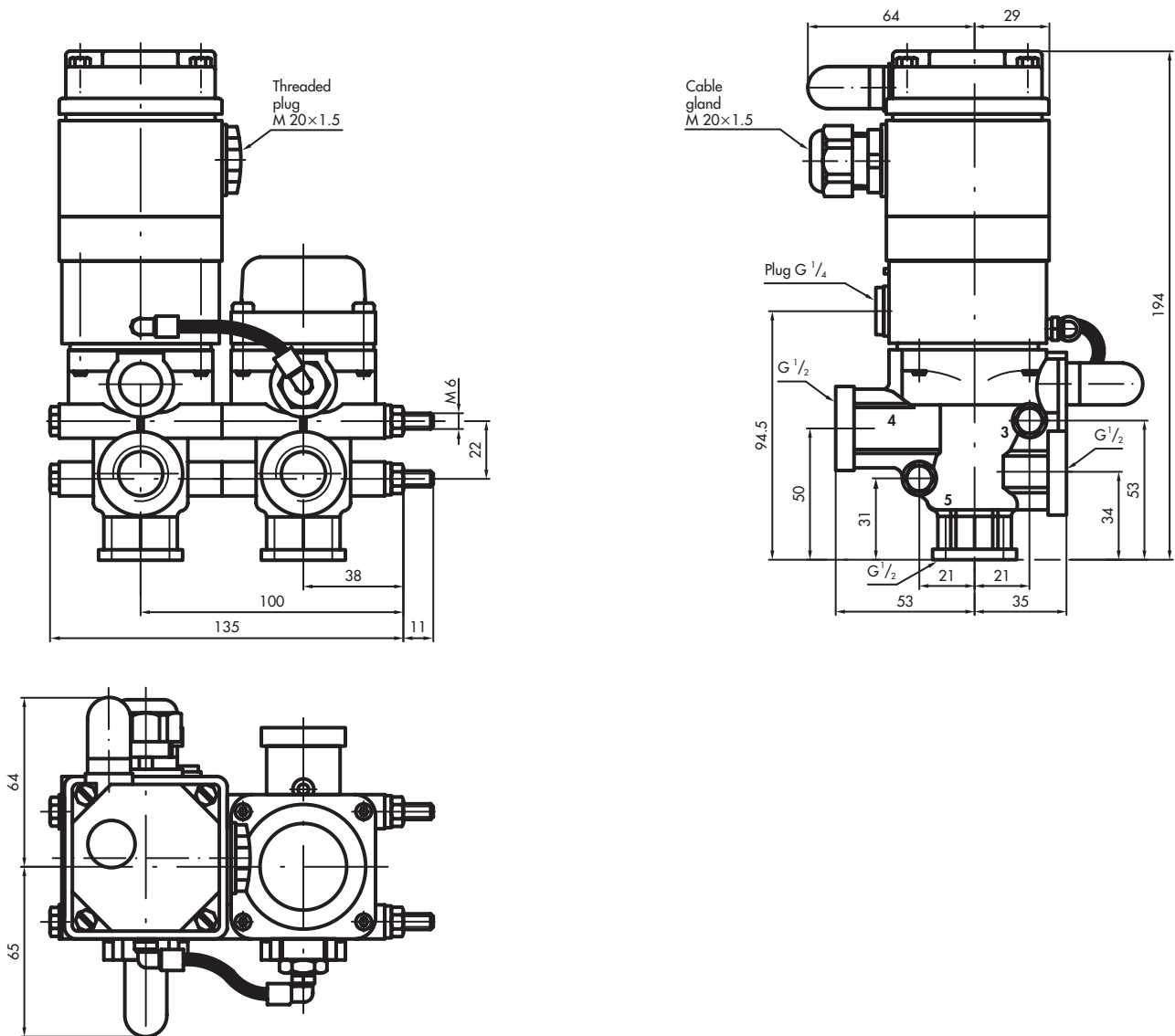


Fig. 27 · Dimensions in mm

6/2-way solenoid valve, single actuated,  $K_{vs}$  4.3

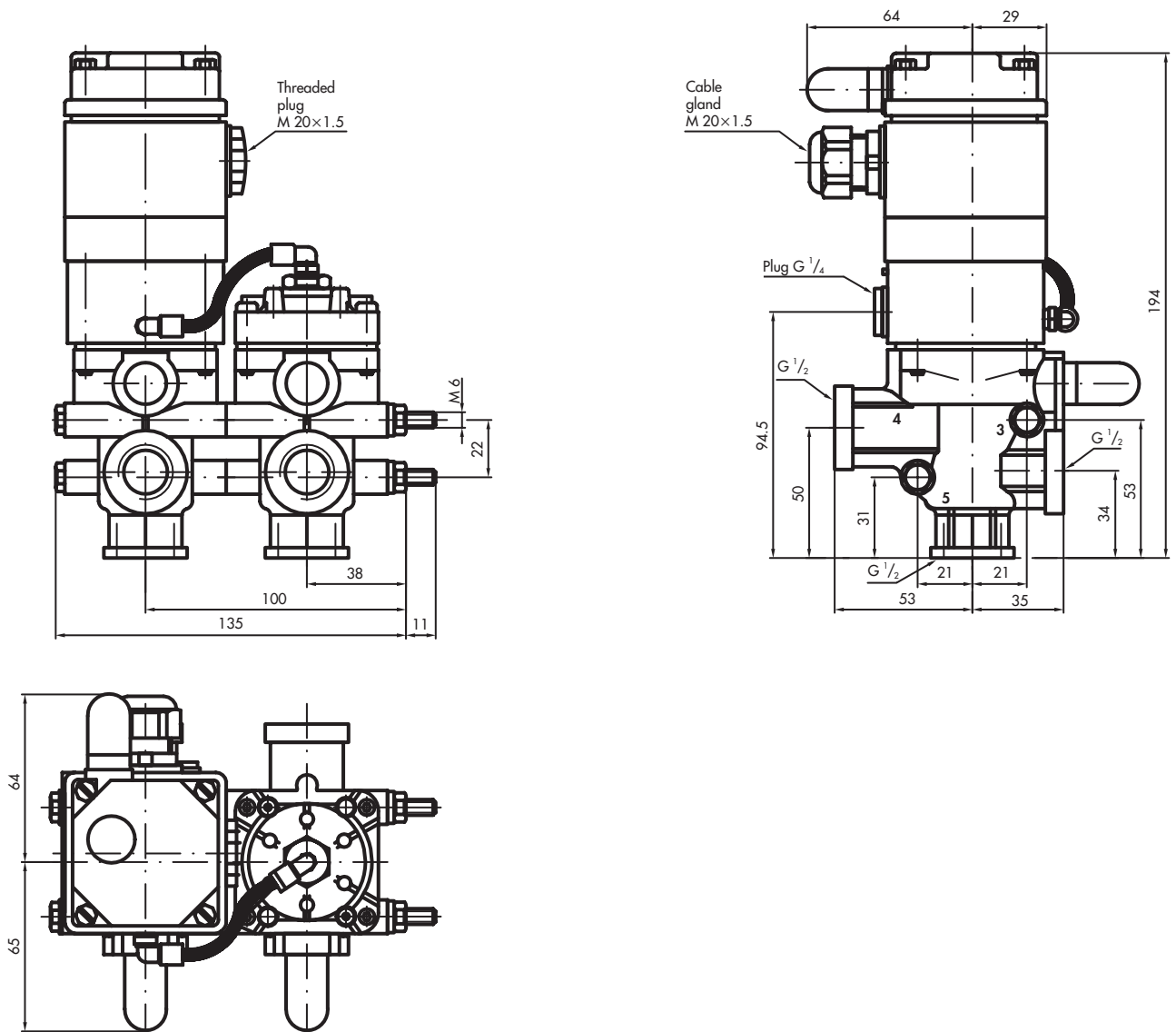
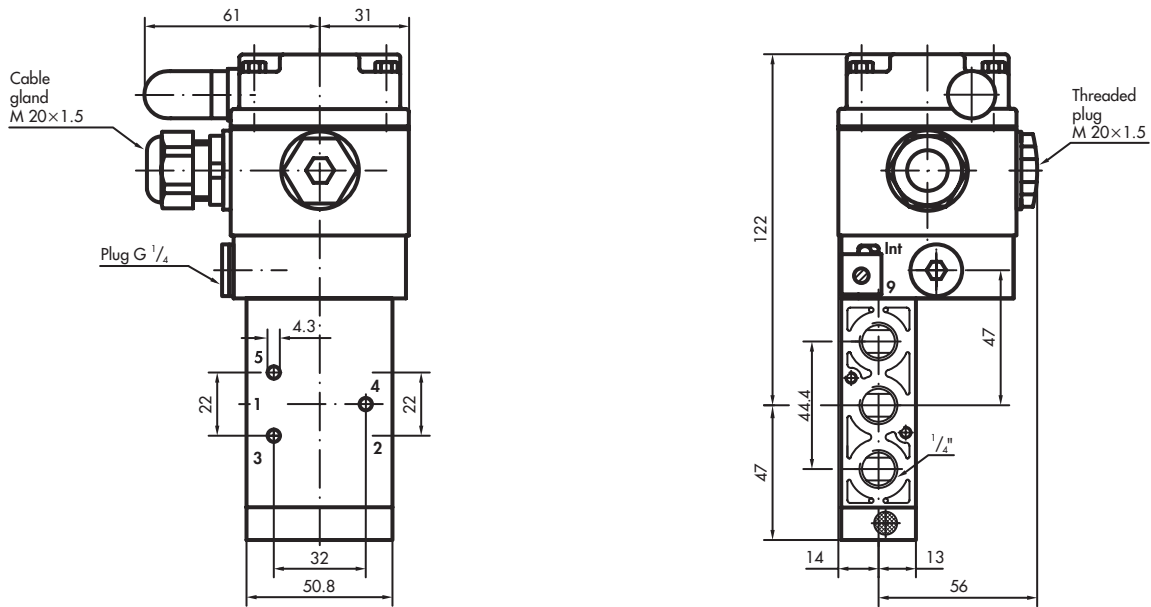


Fig. 28 · Dimensions in mm

3/2 or 5/2-way solenoid valve, single actuated,  $K_{vs}$  1.4



Connection 5 is closed on 3/2-way valve

Fig. 29 · Dimensions in mm

5/2 or 5/3-way solenoid valve, double actuated,  $K_{vs}$  1.4

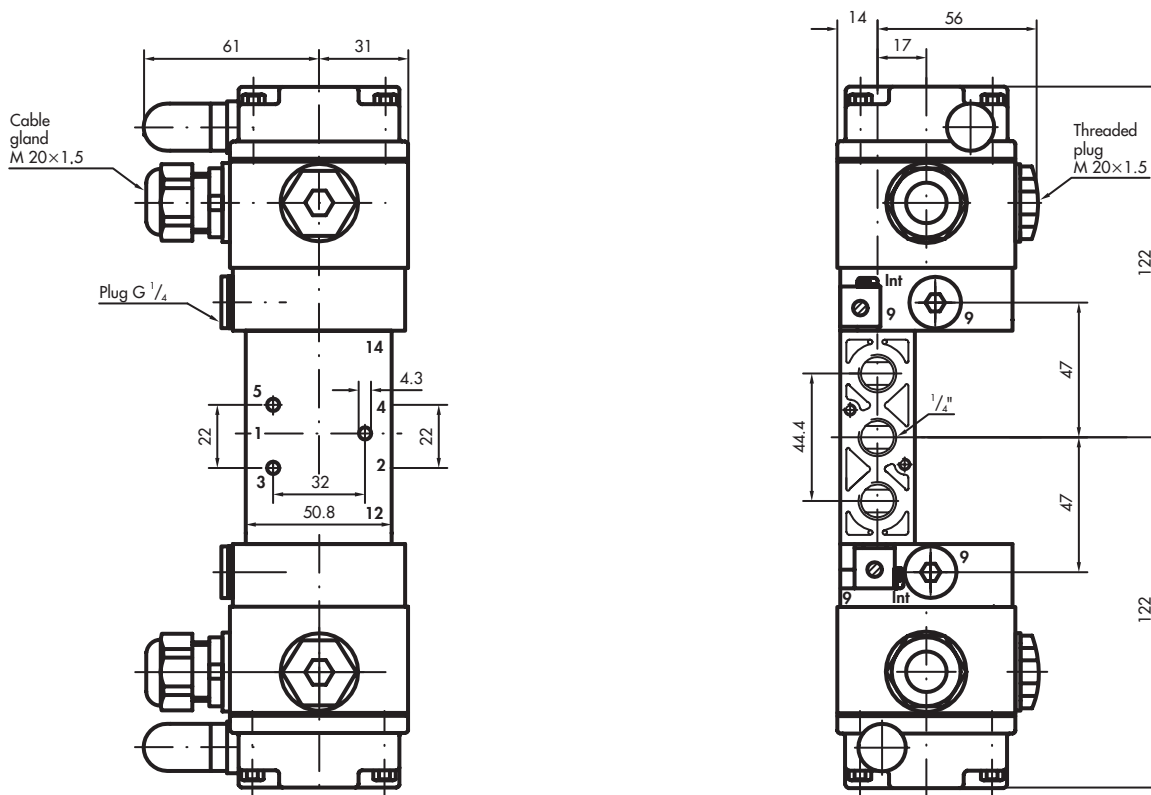


Fig. 30 · Dimensions in mm





Dimensions for devices with NAMUR interface for rotary actuators

3/2 or 5/2-way solenoid valve, single actuated,  $K_{vs}$  0.16

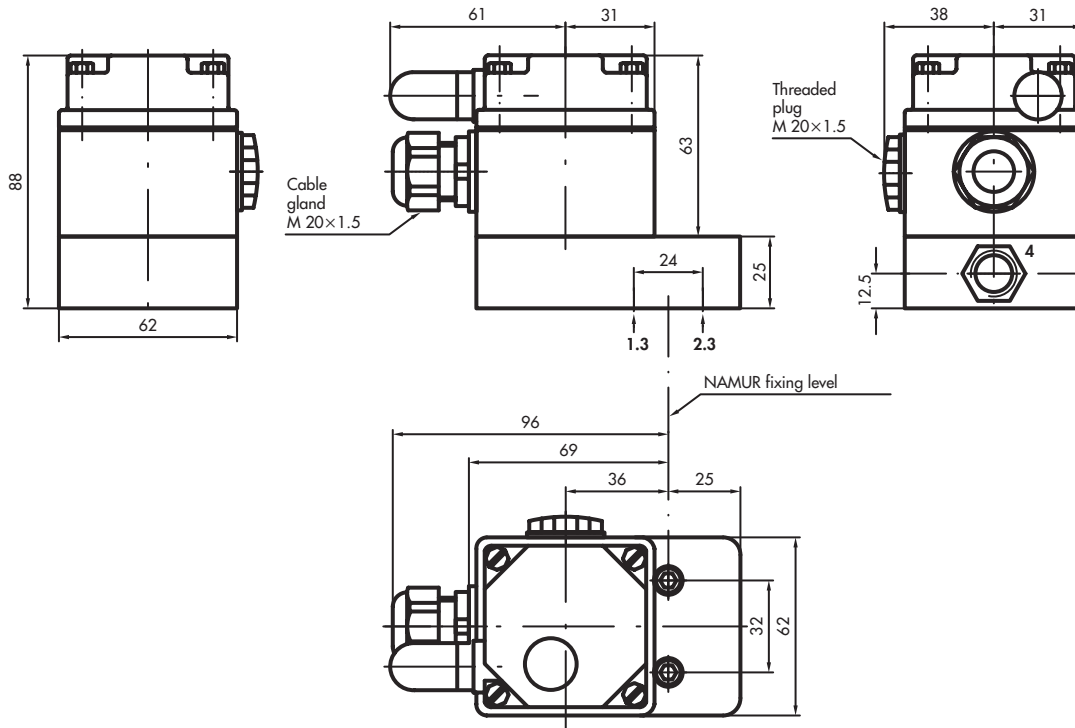


Fig. 33 · Dimensions in mm

3/2-way solenoid valve, single actuated,  $K_{vs}$  0.32

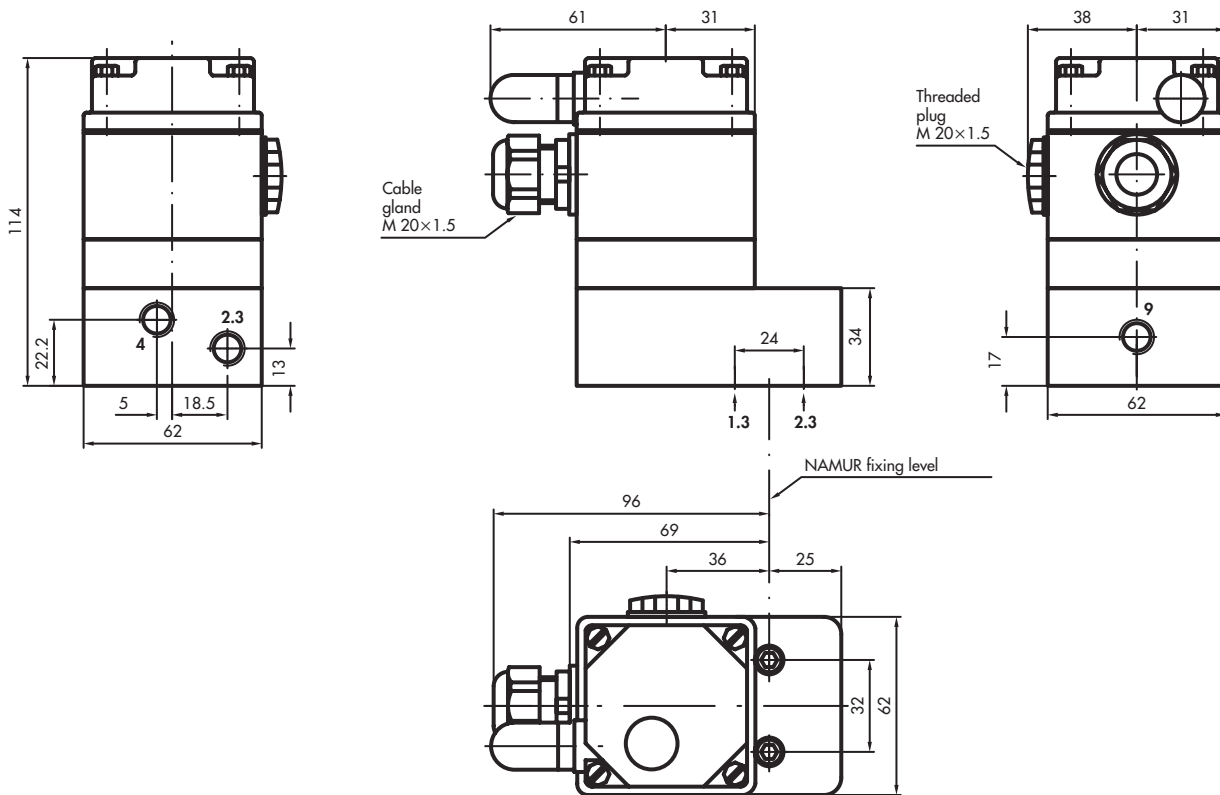


Fig. 34 · Dimensions in mm

6/2-way solenoid valve, single actuated,  $K_{vs}$  0.16

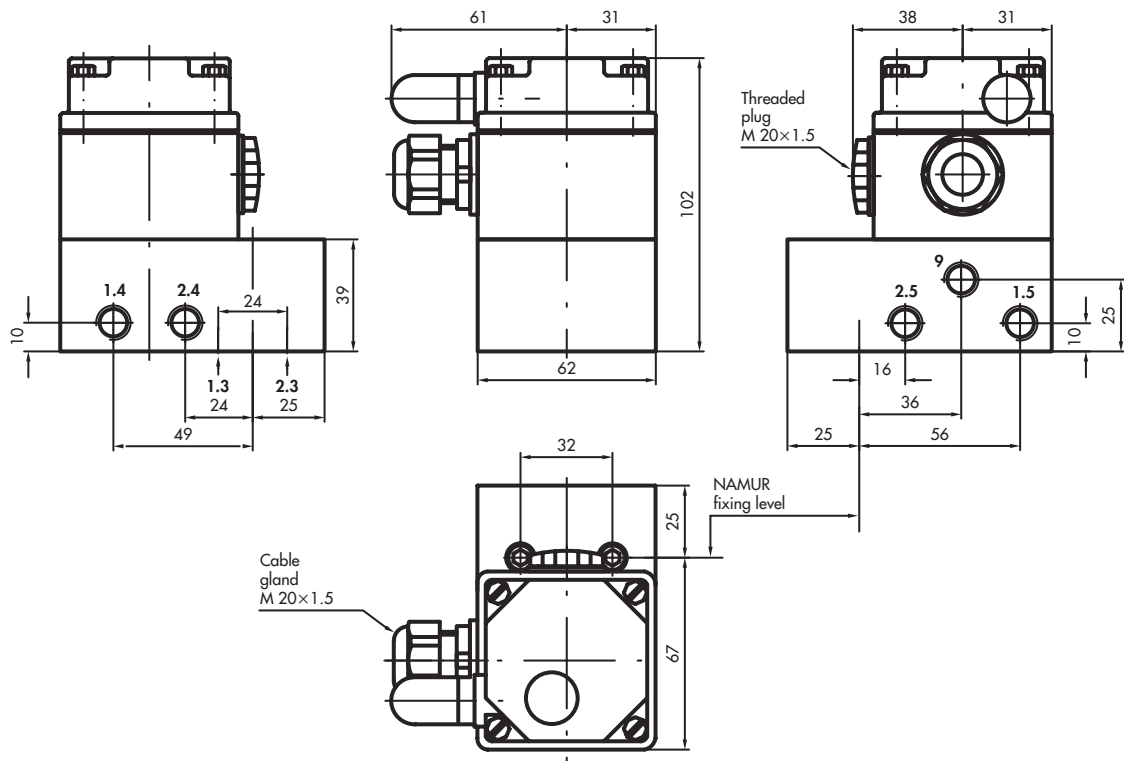
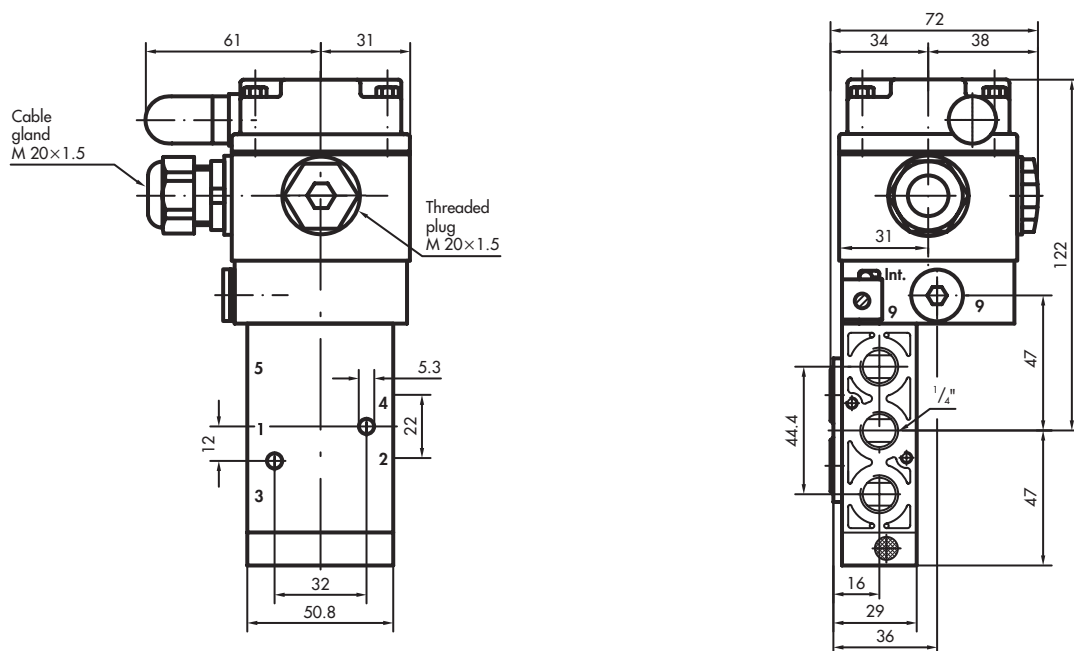


Fig. 35 · Dimensions in mm

3/2 or 5/2-way solenoid valve, single actuated,  $K_{vs}$  1.4



Connection 5 is closed on 3/2-way valve

Fig. 36 · Dimensions in mm

3/2-way solenoid valve, single actuated,  $K_{vs}$  2.0

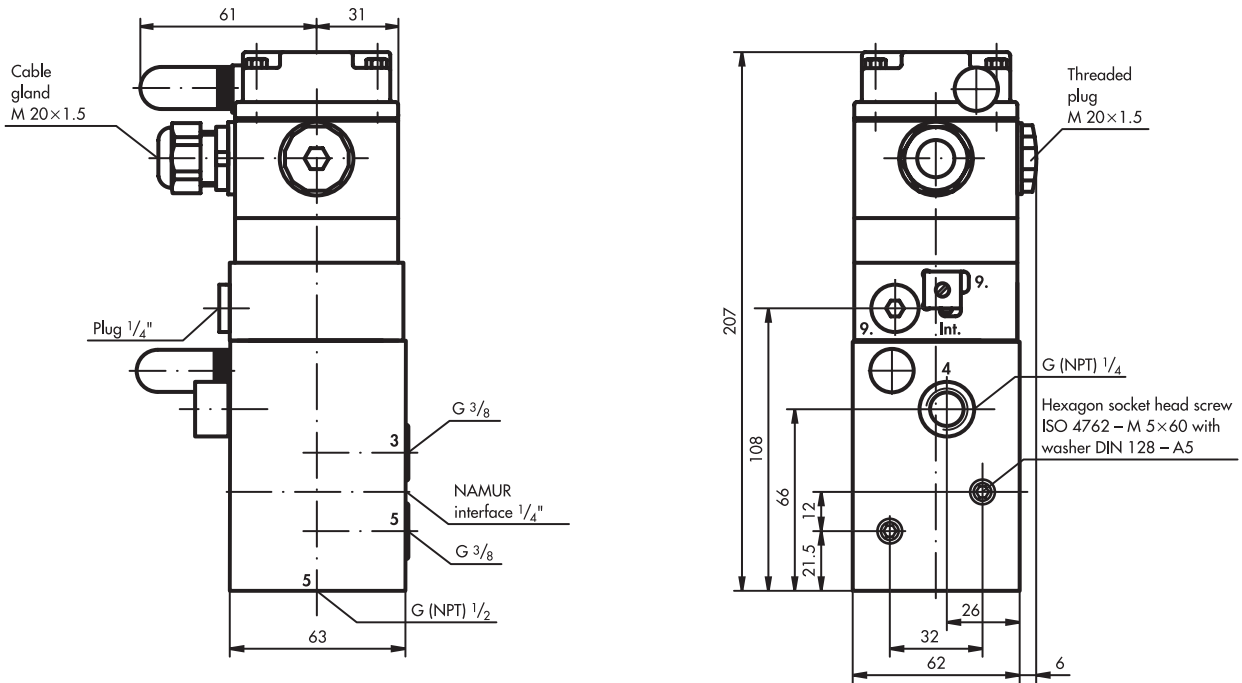


Fig. 37 · Dimensions in mm

3/2-way solenoid valve, single actuated,  $K_{vs}$  4,3

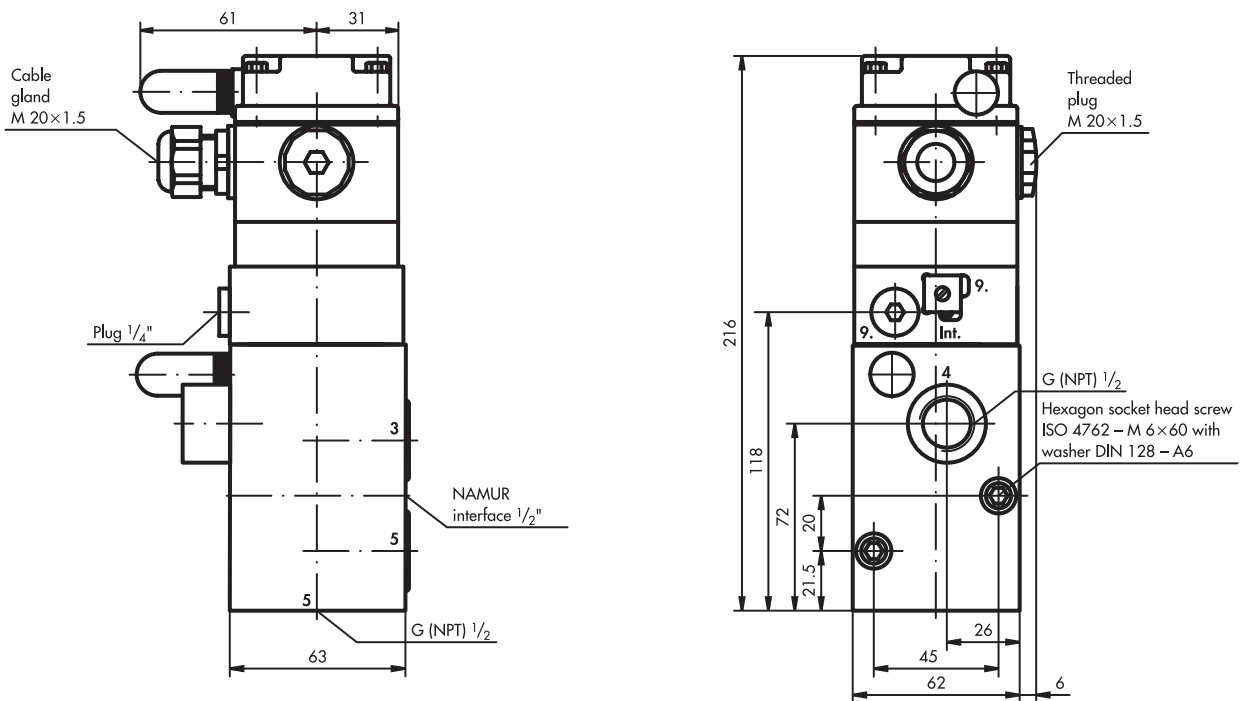


Fig. 38 · Dimensions in mm



5/2-way solenoid valve, double-actuated,  $K_{vs}$  2.9

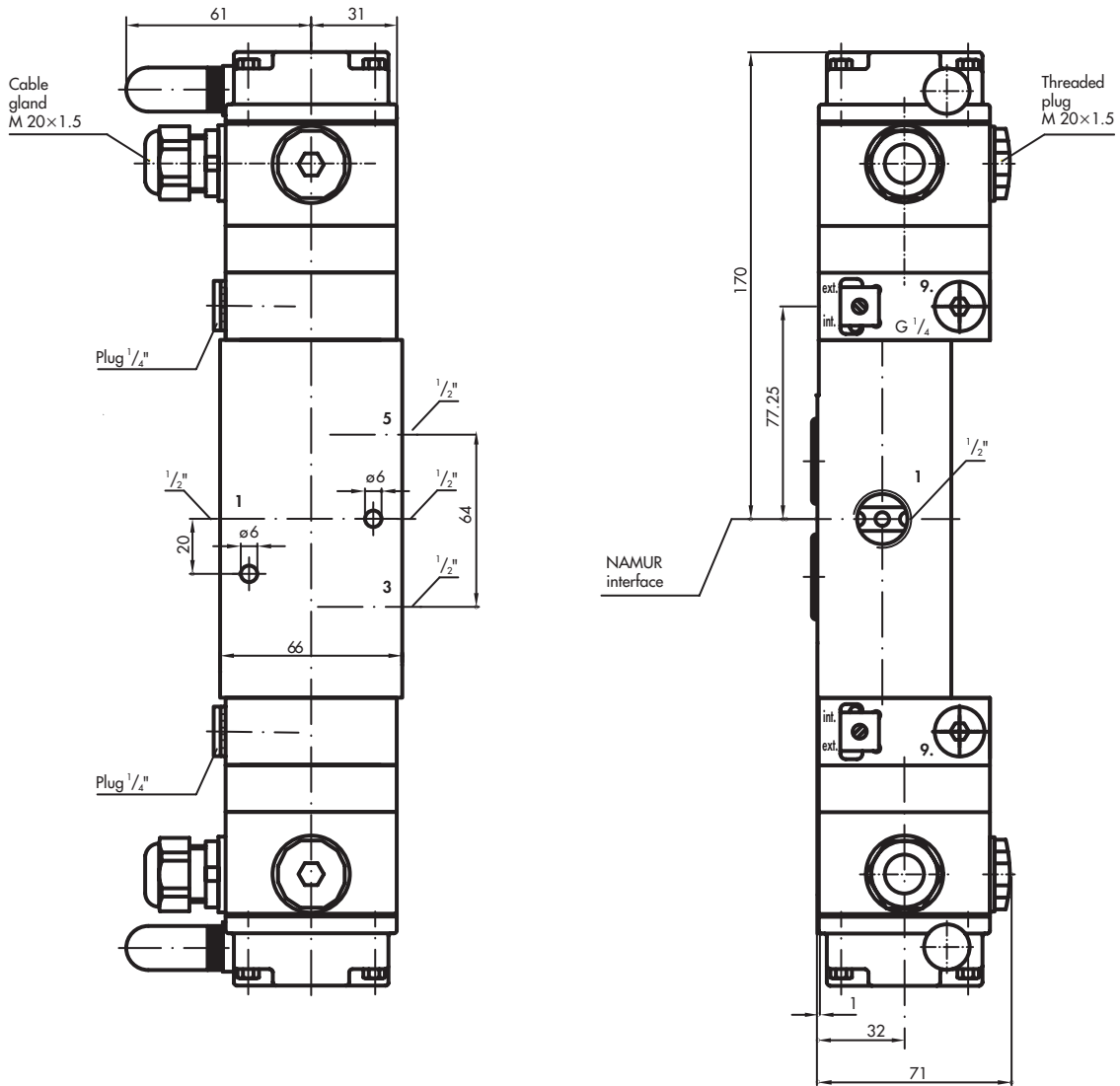


Fig. 41 · Dimensions in mm



## Spare parts and accessories

Spare parts for Type 3963 Solenoid Valves	
Order no.	Designation
0430-2287 8502-1091	Flat gasket made of silicone rubber, -45 to +80 °C (for connection plate) Molded gasket (for air supply on booster valve with $K_{vs}$ 1.4)
0520-0620 0520-0622 0520-1097 0520-1128	Diaphragm made of chloroprene, -20 to +80 °C (for booster valve with $K_{vs}$ 2.0 or 4.3) Diaphragm made of chloroprene, -20 to +80 °C (for all booster valves, except with $K_{vs}$ 2.0 or 4.3) Diaphragm made of silicone rubber, -45 to +80 °C (for booster valve with $K_{vs}$ 2.0 or 4.3) Diaphragm made of silicone rubber, -45 to +80 °C (for all booster valves, except with $K_{vs}$ 2.0 or 4.3)
1180-8311 1180-8553	Actuating element insert, -20 to +80 °C (for booster valve with $K_{vs}$ 2.0 or 4.3) Actuating element insert, -45 to +80 °C (for booster valve with $K_{vs}$ 2.0 or 4.3)
8421-0021 8421-9002 8421-0364 8421-0368 8421-1077 8421-0425 8421-0419 8421-0085 8421-0418 8421-0439 8421-0102 8421-0101 8421-0112 8421-0474 8421-1027 8421-1061	O-ring 2 × 1, -45 ... +80 °C (for connection plate) O-ring 13 × 3,5, -45 ... +80 °C (for NAMUR interface 1/4", $K_{vs}$ 1.4) O-ring 16 × 2, -20 ... +80 °C (for NAMUR interface 1/4", $K_{vs}$ 2.0) O-ring 16 × 2, -45 ... +80 °C (for NAMUR interface 1/4", $K_{vs}$ 2.0) O-ring 24 × 2, -20 ... +80 °C (for NAMUR interface 1/2", $K_{vs}$ 4.3) O-ring 24 × 2, -45 ... +80 °C (for NAMUR interface 1/2", $K_{vs}$ 4.3) O-ring 28 × 2, -45 ... +80 °C (for NAMUR interface 1/2", $K_{vs}$ 2.9) O-ring 26 × 2, -20 ... +80 °C (for booster valve with $K_{vs}$ 2.0 or 4.3) O-ring 26 × 2, -45 ... +80 °C (for booster valve with $K_{vs}$ 2.0 or 4.3) O-ring 30 × 2, -45 ... +80 °C (for booster valve with $K_{vs}$ 2.9) O-ring 36 × 2, -20 ... +80 °C (for booster valve with $K_{vs}$ 2.0, 2.9 or 4.3) O-ring 36 × 2, -45 ... +80 °C (for booster valve with $K_{vs}$ 2.0 or 4.3) O-ring 48 × 1, -20 ... +80 °C (for booster valve with $K_{vs}$ 4.3) O-ring 48 × 1, -45 ... +80 °C (for booster valve with $K_{vs}$ 4.3) O-ring 48 × 1,5, -45 ... +80 °C (for booster valve with $K_{vs}$ 2.0 or 4.3) O-ring 48 × 1,5, -20 ... +80 °C (for booster valve with $K_{vs}$ 2.0 or 4.3)
1099-0673 1099-0674 1099-0675 1099-1194	Enclosure cover without filter (for pilot valve) without manual override with pushbutton switch, screwdriver-actuated, accessible from outside with pushbutton, pin-actuated, accessible from outside with lever switch, accessible from outside
1402-1298	Enclosure cover for start-up
0070-0858 0070-0862 8421-0070	Plug G 1/4 made of stainless steel 1.4571 (for connection 9 on the pilot valve) Plug 1/4 NPT made of stainless steel 1.4571 (for connection 9 on the pilot valve) O-ring 14 × 1.5 made of NBR (for plug)

Accessories for Type 3963 Solenoid Valves	
Order no.	Designation
0790-6658 1170-4069 1400-8298 8801-2810 8831-0716 8831-0865	Female connector according to EN 175301-803, type A, made of polyamide, black, IP 65 Female connector LED according to EN 175301-803, type A, made of polyamide, black, IP 65 Female connector (manufactured by Harting), 7 poles, made of aluminum, silvery gray, IP 65 Sensor connecting cable, 2 wires, length 3 m, blue, with angle connector M 12 × 1, 4 poles, IP 68 Female connector (manufactured by Binder), 7 poles, made of PBT GV, black, IP 67 Female connector M 12 × 1, 4 poles, angle type, made of polyamide, black, IP 67
3994-0158	Cable break protection device with enclosure for top hat rail 35, IP 20 (for Type 3963-X1 with 6 V DC solenoid)
1400-5268 8504-0066 8504-0068	Filter made of polyethylene, connection G 1/G 1/2, IP 54 (required for actuator size > 1 400 cm <sup>2</sup> ) Filter made of polyethylene, connection G 1/4, IP 54 Filter made of polyethylene, connection G 1/2, IP 54
1790-7408 1790-7253 1790-9645 1790-9646	Filter check valve with screw-in case G 1/4, made of polyamide, IP 65 Filter check valve with screw-in case G 1/4, made of stainless steel 1.4571, IP 65 Filter check valve with screw-in case G 1/4, made of polyamide, NEMA 4 Filter check valve with screw-in case G 1/4, made of stainless steel 1.4571, NEMA 4
1400-5930 1400-5931 1400-6726	Mounting base for G profile 32 according to EN 50035 (2 pieces are required!) Mounting base for top hat rail 35 according to EN 50022 (2 pieces are required!) Mounting plate for wall mounting



**Spare parts and accessories** (continued from page 24)

<b>Mounting kits for Type 3963 Solenoid Valves with threaded connection</b>	
<b>Order no.</b>	<b>Designation</b>
<b>1400-6759</b>	Mounting kit for linear actuators (actuator size 80/240 cm <sup>2</sup> , connection G 1/4) with screwed pipe connection, connection G 1/4/G 1/4, made of stainless steel
<b>1400-6735</b> <b>1400-6761</b>	Mounting kit for linear actuators (actuator size 350/700 cm <sup>2</sup> , connection G 3/8) with screwed pipe connection, connection G 1/2/G 3/8, made of stainless steel with screwed pipe connection, connection G 1/4/G 3/8, made of stainless steel
<b>1400-6736</b>	Mounting kit for linear actuators (actuator size 1 400 cm <sup>2</sup> , connection G 3/4) with screwed pipe connection, connection G 1/2/G 3/4, made of stainless steel
<b>1400-6737</b>	Mounting kit for linear actuators (actuator size 2 800 cm <sup>2</sup> , connection G 1) with screwed pipe connection, connection G 1/2/G 1, made of stainless steel
<b>1400-6749</b> <b>1400-6750</b>	Mounting kit for linear actuators (actuator size 80/240 cm <sup>2</sup> , connection G 1/4) with angle bracket made of stainless steel and screwed joints for pipe 8 × 1, connection G 1/4/G 1/4, made of steel, galvanised and screwed joints for pipe 8 × 1, connection G 1/4/G 1/4, made of stainless steel
<b>1400-6738</b> <b>1400-6739</b> <b>1400-6743</b> <b>1400-6744</b> <b>1400-6745</b>	Mounting kit for linear actuators (actuator size 350/700 cm <sup>2</sup> , connection G 3/8) with angle bracket made of stainless steel and screwed joints for pipe 8 × 1, connection G 1/4/G 3/8, made of steel, galvanised and screwed joints for pipe 8 × 1, connection G 1/4/G 3/8, made of stainless steel and screwed joints for pipe 12 × 1, connection G 1/4/G 3/8, made of stainless steel and screwed joints for pipe 10 × 1, connection G 1/2/G 3/8, made of polyamide and screwed joints for pipe 10 × 1, connection G 1/4/G 3/8, made of polyamide
<b>1400-6740</b> <b>1400-6741</b> <b>1400-6742</b>	Mounting kit for linear actuators (actuator size 700 cm <sup>2</sup> , connection G 3/8) with angle bracket made of stainless steel and screwed joints for pipe 12 × 1, connection G 1/2/G 3/8, made of steel, galvanised and screwed joints for pipe 12 × 1, connection G 1/4/G 3/8, made of steel, galvanised and screwed joints for pipe 12 × 1, connection G 1/2/G 3/8, made of stainless steel

<b>Mounting kits for Type 3963 Solenoid Valves with NAMUR interface</b>	
<b>Order no.</b>	<b>Designation</b>
<b>1400-6746</b> <b>1400-6747</b> <b>1400-6748</b>	Mounting kit for linear actuators (actuator size 350/700 cm <sup>2</sup> , connection G 3/8) with NAMUR rib via adapter plate NAMUR rib/NAMUR interface (order no. 1400-6751) with screwed joints for pipe 12 × 1, connection G 1/4/G 3/8, made of steel, galvanised with screwed joints for pipe 12 × 1, connection G 1/4/G 3/8, made of stainless steel with screwed joints for pipe 10 × 1, connection G 1/4/G 3/8, made of polyamide
<b>1400-6752</b> <b>1400-6753</b> <b>1400-6756</b>	Mounting kit for linear actuators (actuator size 80/240 cm <sup>2</sup> , connection G 1/4) with NAMUR rib via adapter plate NAMUR rib/NAMUR interface (order no. 1400-6751) with screwed joints for pipe 6 × 1, connection G 1/4/G 1/4, made of steel, galvanised with screwed joints for pipe 6 × 1, connection G 1/4/G 1/4, made of stainless steel with screwed joints for hose 10 × 1, connection G 1/4/G 1/4, made of polyamide
<b>1400-6754</b> <b>1400-6755</b> <b>1400-6757</b>	Mounting kit for linear actuators (actuator size 350/700 cm <sup>2</sup> , connection G 3/8) with NAMUR rib via adapter plate NAMUR rib/NAMUR interface (order no. 1400-6751) with screwed joints for pipe 8 × 1, connection G 1/4/G 3/8, made of steel, galvanised with screwed joints for pipe 8 × 1, connection G 1/4/G 3/8, made of stainless steel with screwed joints for pipe 10 × 1, connection G 1/4/G 3/8, made of polyamide
<b>1400-6759</b>	Mounting kit for linear actuators (actuator size 80/240 cm <sup>2</sup> , connection G 1/4) with screwed pipe connection G 1/4/G 1/4, made of stainless steel
<b>1400-3001</b>	Mounting kit for Type 3353 Angle Seat Valve with adapter plate for NAMUR interface made of stainless steel 1.4301

<b>Accessories for mounting kits</b>	
<b>Order no.</b>	<b>Designation</b>
<b>0320-1416</b>	Bracket for NAMUR rib (required when a positioner or a limit switch is to be mounted to linear actuators with nominal size < DN 50 at the same time)
<b>8320-0131</b>	Hexagon socket head screw M 8 × 60 – A 4 DIN 931
<b>1400-6751</b> <b>1400-9924</b>	Adapter plate NAMUR rib/NAMUR interface, connection G 1/4 Adapter plate NAMUR rib/NAMUR interface, connection 1/4 NPT

## Spare parts and accessories (continued from page 25)

Connection blocks and accessories for attaching solenoid valves to Type 3277 Linear Actuators	
Order no.	Designation
1400-8813	Connection block for Type 3277 Linear Actuators with integral Type 3766/3767/3780/3730 Positioner attachment
1400-8814	Connection $G \frac{1}{4}$ Connection $\frac{1}{4}$ NPT
1400-6950	Pressure gauge build-on block, 1 × "Output" and 1 × "Supply", made of stainless steel/brass (for connection block)
	Piping kit for "Stem retracts"
1400-6444	Actuator size 240 cm <sup>2</sup> , made of steel, galvanised
1400-6445	Actuator size 240 cm <sup>2</sup> , made of stainless steel
1400-6446	Actuator size 350 cm <sup>2</sup> , made of steel, galvanised
1400-6447	Actuator size 350 cm <sup>2</sup> , made of stainless steel
1400-6448	Actuator size 700 cm <sup>2</sup> , made of steel, galvanised
1400-6449	Actuator size 700 cm <sup>2</sup> , made of stainless steel



(Specifications subject to change without notice.)

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