



Application

Solenoid valve to control of pneumatic linear or rotary actuators

General

The Type 3962 Solenoid Valve provides a high level of operating safety for controlling pneumatic actuators in hazardous areas. Different types of protection, switching functions, flow rates and connection types allow the solenoid valve to be optimally adapted for the specific task.

The Type 3962 Solenoid Valve consists of a solenoid pilot valve and booster valve and has the following special features:

General data

- Ambient temperature -45 to $+80$ °C, depending on type of protection and temperature class
- Wall or pipe mounting
- Attachment to rotary actuators with NAMUR interface according to VDI/VDE 3845
- Attachment to linear actuators with NAMUR rib according to IEC 60534-6-1

Solenoid pilot valve

- Solenoid and poppet valve with return spring
- Version without explosion protection, IP 65
- Type of protection: increased safety Ex em, IP 65
- Type of protection: flameproof enclosure Ex d, IP 66
- Pilot supply 1.4 to 10.0 bar
- Electrical connection using M20x1.5 cable gland to terminals or with connector

Booster valve

- Poppet valve with diaphragm actuator and return spring
- Spool actuated either on one side or both sides
- 3/2-, 5/2-, 5/3 or 6/2-way function
- Exhaust air feedback (optional)
- K_{VS} 1.4, 2.0, 2.9 or 4.3
- Max. operating pressure 10.0 bar
- Threaded connection G (NPT) $\frac{1}{4}$ or $\frac{1}{2}$ "
- NAMUR interface $\frac{1}{4}$ " or $\frac{1}{2}$ "

Version without explosion protection



Type 3962-0 Solenoid Valve

Ex em



Type 3962-4 Solenoid Valve

Ex d



Type 3962-9 Solenoid Valve

Fig. 1: Overview of solenoid valves

Solenoid valves with threaded connections for wall or pipe mounting

<ul style="list-style-type: none"> - 3/2-way function with spring-return mechanism - Exhaust air feedback - K_{VS} 1.4 - G 1/4/1/4 NPT connection 	<ul style="list-style-type: none"> - 5/2-way function with spring-return mechanism - K_{VS} 1.4 - G 1/4/1/4 NPT connection 	<ul style="list-style-type: none"> - 5/3-way function with spring-centered mid-position (ports 2 and 4 closed) - K_{VS} 1.4 - G 1/4/1/4 NPT connection 	<ul style="list-style-type: none"> - 6/2-way function with spring-return mechanism - K_{VS} 4.3 - G 1/2/1/2 NPT connection
<ul style="list-style-type: none"> - 3/2-way function with spring-return mechanism - K_{VS} 4.3 - G 1/2/1/2 NPT connection 	<ul style="list-style-type: none"> - 5/2-way function with spring-return mechanism - K_{VS} 4.3 - G 1/2/1/2 NPT connection 	<ul style="list-style-type: none"> - 5/3-way function with spring-centered mid-position (ports 2 and 4 supplied with air) - K_{VS} 1.4 - G 1/4/1/4 NPT connection 	
	<ul style="list-style-type: none"> - 5/2-way function with two detent positions - K_{VS} 1.4 - G 1/4/1/4 NPT connection 	<ul style="list-style-type: none"> - 5/3-way function with spring-centered mid-position (ports 2 and 4 vented) - K_{VS} 1.4 - G 1/4/1/4 NPT connection 	

Solenoid valves with NAMUR interface for rotary actuators

<ul style="list-style-type: none"> - 3/2-way function with spring-return mechanism - Exhaust air feedback - K_{VS} 1.4 - G 1/4/1/4 NPT connection/ NAMUR 1/4" 	<ul style="list-style-type: none"> - 5/2-way function with spring-return mechanism - K_{VS} 1.4 - G 1/4/1/4 NPT connection/ NAMUR 1/4" 	<ul style="list-style-type: none"> - 5/3-way function with spring-centered mid-position (ports 2 and 4 closed) - K_{VS} 1.4 - G 1/4/1/4 NPT connection/ NAMUR 1/4" 	
<ul style="list-style-type: none"> - 3/2-way function with spring-return mechanism - Exhaust air feedback - K_{VS} 2.0 - G 1/4/1/4 NPT connection/ NAMUR 1/4" 	<ul style="list-style-type: none"> - 5/2-way function with two detent positions - K_{VS} 1.4 - G 1/4/1/4 NPT connection/ NAMUR 1/4" 	<ul style="list-style-type: none"> - 5/3-way function with spring-centered mid-position (ports 2 and 4 supplied with air) - K_{VS} 1.4 - G 1/4/1/4 NPT connection/ NAMUR 1/4" 	
<ul style="list-style-type: none"> - 3/2-way function with spring-return mechanism - Exhaust air feedback - K_{VS} 4.3 - G 1/2/1/2 NPT connection/ NAMUR 1/2" 		<ul style="list-style-type: none"> - 5/3-way function with spring-centered mid-position (ports 2 and 4 vented) - K_{VS} 1.4 - G 1/4/1/4 NPT connection/ NAMUR 1/4" 	

Technical data

General data for pilot valve				
Type		3962-0	3962-4	3962-9
Design		Solenoid and poppet valve with return spring		
Degree of protection		IP 65 (with mounted cable socket)	IP 65	IP 66
Material	Casting compound	Polyamide	Polyurethane	–
	Enclosure	Black polyamide	Polyamide and powder-coated aluminum, gray beige	Stainless steel, epoxy powder coated, red (spool housing) aluminum, hard anodized, black (CNO-MO connection block)
	Internal parts	Stainless steel and brass	Stainless steel and nickel-plated brass	Stainless steel and brass
	Screws	Zinc-plated steel	Stainless steel	
	Seals	FKM	Nitrile butadiene rubber	FKM
Mounting position		Any desired position		
Approx. weight		0.17 kg	0.55 or 0.65 kg	0.85 kg

Electrical data for pilot valve without explosion protection					
Type		3962-030	3962-050	3962-060	3962-080
Nominal signal	U_N	24 V DC ($\pm 10\%$)	230 V AC ($\pm 10\%$), 50 to 60 Hz, 110 V DC ($\pm 10\%$)	115 V AC ($\pm 10\%$), 50 to 60 Hz	24 V AC ($\pm 10\%$), 50 to 60 Hz
Power consumption	Inrush	2.7 W	4.9 VA, 3.9 W	4.8 VA	5.2 VA
	Holding	2.7 W	3.7 VA, 3.9 W	3.6 VA	3.9 VA
Duty cycle		100 %			
Ambient temperature ¹⁾		–20 to +80 °C			
Connection		Connector according to EN 175301-803, type A			

Electrical data for pilot valve with type of protection increased safety and encapsulation Ex em				
Type		3962-42	3962-44	3962-47
Nominal signal	U_N	24 V AC/DC (–15 to +10 %), 40 to 65 Hz	115 V AC/DC (–15 to +10 %), 40 to 65 Hz	230 V AC/DC (–15 to +10 %), 40 to 65 Hz
Power consumption		1.8 W		
Duty cycle		100 %		
Ambient temperature in temperature class ¹⁾	T6	–20 to +50 °C		
	T5	–20 to +60 °C		
Connection		M20x1.5 cable gland		

Electrical data for pilot valve with type of protection flameproof enclosure Ex d					
Type		3962-930	3962-940	3962-960 / -970	3962-980
Nominal signal ²⁾	U_N	24 V DC ($\pm 10\%$)	230 V AC/DC ($\pm 10\%$) 50 to 60 Hz	115 V AC/DC ($\pm 10\%$) 50 to 60 Hz	24 V AC ($\pm 10\%$) 50 to 60 Hz
Power consumption	Inrush	3 W	3 W	9.5 VA, 3 W	9.5 VA
	Holding	3 W	3 W	5 VA, 3 W	5 VA
Duty cycle		100 %			
Ambient temperature in temperature class ¹⁾ (max. cable temperature)	T6	–60 to +40 °C	–	–	–
	T5	–60 to +55 °C	–60 to +55 °C	–60 to +55 °C (Type 3962-970 only)	–
	T4	–60 to +65 °C (85 °C) –60 to +80 °C (105 °C)	–	–60 to +40 °C (90 °C) (Type 3962-960 only)	–60 to +40 °C (90 °C)
	T3	–	–	–60 to +55 °C (105 °C) (Type 3962-960 only)	–60 to +55 °C (105 °C)
Connection		Female thread M20 x 1.5			

Pneumatic data for pilot valve				
Type		3962-0	3962-4	3962-9
Pilot supply	Medium	Instrument air or nitrogen		
	Pressure	1.4 to 10 bar	1.4 to 8 bar	1.4 to 10 bar
Output signal		Same pressure as pilot supply		
Air consumption		No air consumption		
K_{VS} ³⁾		0.06	0.05	0.05
Switching time		10 ms	30 ms	30 ms
Control pressure connection		CNOMO interface		

¹⁾ The permissible ambient temperature of the solenoid valve depends on the permissible ambient temperature of the components, type of protection and temperature class.

²⁾ Other nominal signals on request

³⁾ The air flow rate when $p_1 = 2.4$ bar and $p_2 = 1.0$ bar is calculated using the following formula: $Q = K_{VS} \times 36.22$ in m³/h.

Technical data

Booster valve, actuated on one side, K_{VS} 4.3, with threaded connections			
Switching function	3/2-way function	5/2-way function	6/2-way function
K_{VS} ¹⁾ (direction of flow)	1.9 (4 → 3), 1.5 (3 → 4), 4.3 (3 → 5), 4.7 (5 → 3)		
Design	Poppet valve with diaphragm actuator, soft seated, with return spring		
Material	Enclosure	Aluminum, powder coated, gray beige RAL 1019 or stainless steel 1.4404	
	Diaphragms	Chloroprene rubber (-20 to +80 °C) or silicone rubber (-45 to +80 °C)	
	Seals	Chloroprene rubber (-20 to +80 °C) or silicone rubber (-45 to +80 °C)	
	Springs	Stainless steel 1.4310	
	Screws	Stainless steel 1.4571	
Actuation	Controlled on one side by a pilot valve		
Operating medium	Instrument air (free from corrosive substances) or nitrogen ²⁾ , Instrument air (free from corrosive substances), air containing oil or non-corrosive gases ³⁾		
Compressed air quality according to ISO 8573-1	Particle size and density: Class 4 · Oil content: Class 3 · Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected		
Max. operating pressure ⁴⁾	10.0 bar		
Output signal	Operating pressure		
Pneumatic connection	G ½ or ½ NPT		
Ambient temperature ⁵⁾	-20 to +80 °C, -45 to +80 °C		
Approx. weight	0.585 kg	1.1 kg	

Booster valve, actuated on one side, K_{VS} 2.0 or 4.3, with NAMUR interface			
Switching function	3/2-way function with exhaust air feedback		
K_{VS} ¹⁾ (direction of flow)	1.1 (4 → 3), 2.0 (3 → 5)	1.9 (4 → 3), 4.3 (3 → 5)	
Design	Poppet valve with diaphragm actuator, soft seated, with return spring		
Material	Enclosure	Aluminum, powder coated, gray beige RAL 1019 or stainless steel 1.4404	
	Diaphragms	Chloroprene rubber (-20 to +80 °C) or silicone rubber (-45 to +80 °C)	
	Seals	Chloroprene rubber (-20 to +80 °C) or silicone rubber (-45 to +80 °C)	
	Springs	Stainless steel 1.4310	
	Screws	Stainless steel 1.4571	
Actuation	Controlled on one side by a pilot valve		
Operating medium	Instrument air (free from corrosive substances) or nitrogen ²⁾ , Instrument air (free from corrosive substances), air containing oil or non-corrosive gases ³⁾		
Compressed air quality according to ISO 8573-1	Particle size and density: Class 4 · Oil content: Class 3 · Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected		
Max. operating pressure	10.0 bar		
Output signal	Operating pressure		
Pneumatic connection	Supply air	G ¼ or ¼ NPT and NAMUR interface ¼" ⁶⁾ with G ¾ / ¾ NPT	G ½ or ½ NPT and NAMUR interface ½" ⁶⁾
	Exhaust air	G ½ or ½ NPT and NAMUR interface ¼" ⁶⁾ with G ¾ / ¾ NPT	G ½ or ½ NPT and NAMUR interface ½" ⁶⁾
Ambient temperature ⁵⁾	-20 to +80 °C, -45 to +80 °C		
Approx. weight	1.38 kg	1.5 kg	

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

²⁾ With internal pilot supply

³⁾ With external pilot supply

⁴⁾ To control the booster valve in the reversed direction of flow, the supply pressure must be higher than the operating pressure.

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

⁶⁾ NAMUR interface according to VDI/VDE 3845

Technical data

Booster valve, actuated on one side, K_{VS} 1.4 or 2.9¹⁾, with threaded connections or NAMUR interface	
Switching function	3/2-way function with exhaust air feedback 5/2-way function
K_{VS} ²⁾	1.4 or 2.9 ¹⁾
Design	Spool, metal-to-metal seat, zero overlap, with return spring
Material	Enclosure Aluminum, powder coated, gray beige RAL 1019 or stainless steel 1.4404
	Seals Silicone rubber
	Filter Polyethylene
	Screws Stainless steel 1.4571
Actuation	Controlled on one side by a pilot valve
Operating medium	Instrument air (free from corrosive substances) or nitrogen ³⁾ , Instrument air (free from corrosive substances), air containing oil or non-corrosive gases ⁴⁾
Compressed air quality according to ISO 8573-1	Particle size and density: Class 4 · Oil content: Class 3 · Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected
Max. operating pressure	10.0 bar
Output signal	Operating pressure
Pneumatic connection	G 1/4 or 1/4 NPT and NAMUR interface 1/4" ⁵⁾ (K_{VS} 1.4) G 1/2 or 1/2 NPT and NAMUR interface 1/2" ⁵⁾ (K_{VS} 2.9)
Ambient temperature ⁶⁾	-45 to +80 °C
Approx. weight	0.485 kg (K_{VS} 1.4) 1.760 kg (K_{VS} 2.9)

Booster valve, actuated on both sides, K_{VS} 1.4, with threaded connections or NAMUR interface				
Switching function	5/2-way function with two detent positions	5/3-way function with spring-centered mid-position (ports 2 and 4 closed)	5/3-way function with spring-centered mid-position (ports 2 and 4 vented)	5/3-way function with spring-centered mid-position (ports 2 and 4 supplied with air)
K_{VS} ²⁾	1.4			
Design	Spool, metal-to-metal seat, zero overlap			
Material	Enclosure	Aluminum, powder coated, gray beige RAL 1019 or stainless steel 1.4404		
	Seals	Silicone rubber		
	Filter	Polyethylene		
	Screws	Stainless steel 1.4571		
Actuation	Controlled on both sides by two pilot valves			
Operating medium	Instrument air (free from corrosive substances) or nitrogen ³⁾ , Instrument air (free from corrosive substances), air containing oil or non-corrosive gases ⁴⁾			
Compressed air quality according to ISO 8573-1	Particle size and density: Class 4 · Oil content: Class 3 · Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected			
Max. operating pressure	10.0 bar			
Output signal	Operating pressure			
Pneumatic connection	G 1/4 or 1/4 NPT and NAMUR interface 1/4" ⁵⁾			
Ambient temperature ⁶⁾	-45 to +80 °C			
Approx. weight	0.685 kg			

¹⁾ On request

²⁾ The air flow rate when $p_1 = 2.4$ bar and $p_2 = 1.0$ bar is calculated using the following formula: $Q = K_{VS} \times 36.22$ in m³/h.

³⁾ With internal pilot supply

⁴⁾ With external pilot supply

⁵⁾ NAMUR interface according to VDI/VDE 3845

⁶⁾ The permissible ambient temperature of the solenoid valve depends on the permissible ambient temperature of the components, type of protection and temperature class.

Spare parts and accessories

Spare parts	
Designation	Order no.
Molded seal (for supply air in booster valves with K_{VS} 1.4)	8502-1091
O-ring 2.9x1.78 made of nitrile butadiene rubber (for CNOMO interface)	8421-0044
O-ring 13x3.5, -45 to +80 °C (for booster valves with NAMUR interface 1/4", K_{VS} 1.4)	8421-9002
O-ring 16x2, -20 to +80 °C (for booster valves with NAMUR interface 1/4", K_{VS} 2.0)	8421-0364
O-ring 16x2, -45 to +80 °C (for booster valves with NAMUR interface 1/4", K_{VS} 2.0)	8421-0368
O-ring 24x2, -20 to +80 °C (for booster valves with NAMUR interface 1/2", K_{VS} 4.3)	8421-1077
O-ring 24x2, -45 to +80 °C (for booster valves with NAMUR interface 1/2", K_{VS} 4.3)	8421-0425
O-ring 28x2, -45 to +80 °C (for booster valves with NAMUR interface 1/2", K_{VS} 2.9)	8421-0419
Screw M5x60 A4 (for booster valves with NAMUR interface, K_{VS} 2.0)	8333-1303
Spring washer A5-A4 (for booster valves with NAMUR interface, K_{VS} 2.0 and 2.9)	8392-0651
Screw M6x60 A4 (for booster valves with NAMUR interface, K_{VS} 4.3)	8333-0538
Spring washer B-A4 (for booster valves with NAMUR interface, K_{VS} 4.3)	8392-0658
Screw M5x30 A4 (for booster valves with NAMUR interface, K_{VS} 2.9)	8333-1272

Accessories	
Designation	Order no.
Cable socket according to EN 175301-803, type A, made of black polyamide, degree of protection IP 65, with Pg 9 cable gland (for 4 to 8 mm cable diameter) and gasket of nitrile butadiene rubber	0790-6658
M20x1.5 Ex d cable gland, made of brass (for 6.5 to 14 mm cable diameter)	8808-0200
Distance plate with NAMUR interface 1/4" on rotary actuators 1/4", including fastening screws and gaskets	
Aluminum, powder coated, gray beige RAL 1019	1400-9741
Stainless steel 1.4404	1402-0234
Adapter plate with NAMUR interface 1/4" on NAMUR rib (G 1/4)	1400-6751
Adapter plate with NAMUR interface 1/4" on NAMUR rib (1/4 NPT)	1400-9924
Support for NAMUR rib including fastening screw (required when a positioner or limit switch is additionally mounted to the linear actuator, DN 15 to 80)	1400-5905
Filter made of polyethylene, G 1/4 connection, degree of protection IP 54	8504-0066
Filter made of polyethylene, G 1/2 connection, degree of protection IP 54	8504-0068

Mounting kits for solenoid valves with threaded connections	
Designation	Order no.
Mounting kit for linear actuators (80/240 cm ² actuator area, G ¼ connection) with pipe fitting, G ¼/G ¼ connection, made of CrNiMo steel	1400-6759
Mounting kit for linear actuators (350/700 cm ² actuator area, G ¾ connection) with pipe fitting, G ½/G ¾ connection, made of CrNiMo steel	1400-6735
with pipe fitting, G ¼/G ¾ connection, made of CrNiMo steel	1400-6761
Mounting kit for linear actuators (1400 cm ² actuator area, G ¾ connection) with pipe fitting, G ½/G ¾ connection, made of CrNiMo steel	1400-6736
Mounting kit for linear actuators (2800 cm ² actuator area, G 1 connection) with pipe fitting, G ½/G 1 connection, made of CrNiMo steel	1400-6737
Mounting kit for linear actuators (80/240 cm ² actuator area, G ¼ connection) with mounting bracket made of CrNiMo steel and screw fittings for 8 × 1 pipe, G ¼/G ¼ connection, made of zinc-plated steel	1400-6749
and screw fittings for 8x1 pipe, G ¼/G ¼ connection, made of CrNiMo steel	1400-6750
Mounting kit for linear actuators (350/700 cm ² actuator area, G ¾ connection) with mounting bracket made of CrNiMo steel and screw fittings for 8 × 1 pipe, G ¼/G ¾ connection, made of zinc-plated steel	1400-6738
and screw fittings for 8x1 pipe, G ¼/G ¾ connection, made of CrNiMo steel	1400-6739
and screw fittings for 12x1 pipe, G ¼/G ¾ connection, made of CrNiMo steel	1400-6743
and screw fittings for 10x1 pipe, G ½/G ¾ connection, made of polyamide	1400-6744
and screw fittings for 10x1 pipe, G ¼/G ¾ connection, made of polyamide	1400-6745
Mounting kit for linear actuators (700 cm ² actuator area, G ¾ connection) with mounting bracket made of CrNiMo steel and screw fittings for 12 × 1 pipe, G ½/G ¾ connection, made of zinc-plated steel	1400-6740
and screw fittings for 12 × 1 pipe, G ¼/G ¾ connection, made of zinc-plated steel	1400-6741
and screw fittings for 12x1 pipe, G ½/G ¾ connection, made of CrNiMo steel	1400-6742

Mounting kits for solenoid valves with NAMUR interface	
Designation	Order no.
Mounting kit for linear actuators (350/700 cm ² actuator area, G ¾ connection) with NAMUR rib using adapter plate for NAMUR rib/interface (order no. 1400-6751) with screw fittings for 12 × 1 pipe, G ¼/G ¾ connection, made of zinc-plated steel	1400-6746
with screw fittings for 12x1 pipe, G ¼/G ¾ connection, made of CrNiMo steel	1400-6747
with screw fittings for 10x1 pipe, G ¼/G ¾ connection, made of polyamide	1400-6748
Mounting kit for linear actuators (80/240 cm ² actuator area, G ¼ connection) with NAMUR rib using adapter plate for NAMUR rib/interface (order no. 1400-6751) with screw fittings for 6 × 1 pipe, G ¼/G ¼ connection, made of zinc-plated steel	1400-6752
with screw fittings for 6x1 pipe, G ¼/G ¼ connection, made of CrNiMo steel	1400-6753
with screw fittings for 10x1 hose, G ¼/G ¼ connection, made of polyamide	1400-6756
Mounting kit for linear actuators (350/700 cm ² actuator area, G ¾ connection) with NAMUR rib using adapter plate for NAMUR rib/interface (order no. 1400-6751) with screw fittings for 8 × 1 pipe, G ¼/G ¾ connection, made of zinc-plated steel	1400-6754
with screw fittings for 8x1 pipe, G ¼/G ¾ connection, made of CrNiMo steel	1400-6755
with screw fittings for 10x1 pipe, G ¼/G ¾ connection, made of polyamide	1400-6757
Mounting kit for linear actuators (80/240 cm ² actuator area, G ¼ connection) with pipe fitting, G ¼/G ¼ connection, made of CrNiMo steel	1400-6759
Mounting kit for Type 3353 Angle Seat Valve with adapter plate for NAMUR interface made of stainless steel 1.4301	1400-3001

