DATA SHEET

T 8391 EN

Type 3709 Pneumatic Lock-Up Valve

Application

Pneumatic lock-up valve used to shut off the signal pressure line of pneumatic actuators

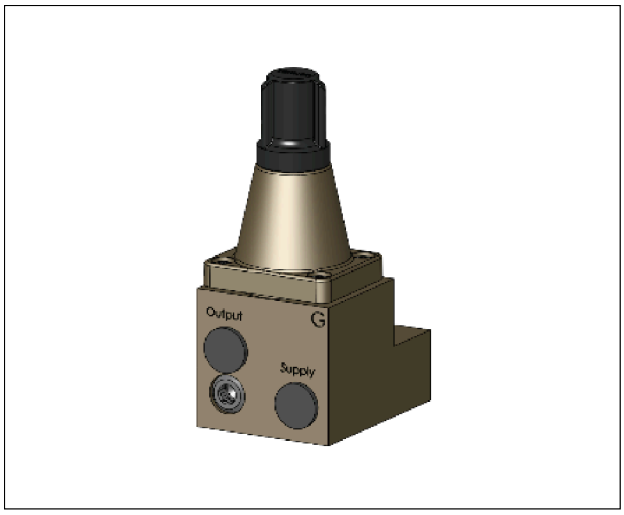


Fig. 1: *Type 3709-01 Pneumatic Lock-Up Valve (version without booster)*



Fig. 2: *Type 3709-04 Pneumatic Lock-Up Valve (version with booster)*

The pneumatic lock-up valve shuts off the signal pressure line either when the air supply falls below an adjusted value or upon complete air supply failure. This causes the actuator to fail in place.

Versions with booster allows higher air capacities to be used.

Special features

- Various attachment versions:
  - Can be hooked up as required
  - Direct attachment to positioners
  - Attachment to single- and double-acting rotary actuators according to VDI/VDE 3845
- Versions for high air capacities with flow coefficients up to K_{VS} 4.3
- All versions optionally with aluminum or stainless steel body
- Easy adjustment of the switching point by turning a screw

Pneumatic lock-up valve for direct attachment to the following positioners

- Type 3766/3767 (▶ T 8355)
- Type 3730-0 (▶ T 8384-0)
- Type 3730-3 (▶ T 8384-3)
- Type 3730-4 (▶ T 8384-4)
- Type 3730-5 (▶ T 8384-5)
- Type 3730-6 (▶ T 8384-6)
- Type 3731-3 (▶ T 8387-3)
- Type 3731-5 (▶ T 8387-5)
- TROVIS 3730-1 (▶ T 8484-1)
- TROVIS 3730-3 (▶ T 8484-3)
- TROVIS SAFE 3730-6 (▶ T 8384-6S)
- TROVIS SAFE 3731-3 (▶ T 8387-3S)

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Design and principle of operation

The pneumatic lock-up valve shuts off the signal pressure line either when the air supply falls below an adjusted value or upon complete air supply failure. This causes the pneumatic actuator to remain in its last position.

The versions with booster allows higher air capacities to be used.

Type 3709-01 and Type 3709-02

Version without booster (Fig. 3)

The supply air (p_z) creates a force on the diaphragm (3), which is balanced by the spring (5). When the force produced on the diaphragm is greater than the spring force, input (p_e) and output (p_a) are connected, i.e. the signal pressure supplied by the positioner is transmitted unobstructed to the pneumatic actuator. When the supply air pressure falls below the adjusted value, the spring force dominates and the spring (5) moves the plug (2) fully into the seat (8). As a result, the pressure in the pneumatic actuator is blocked.

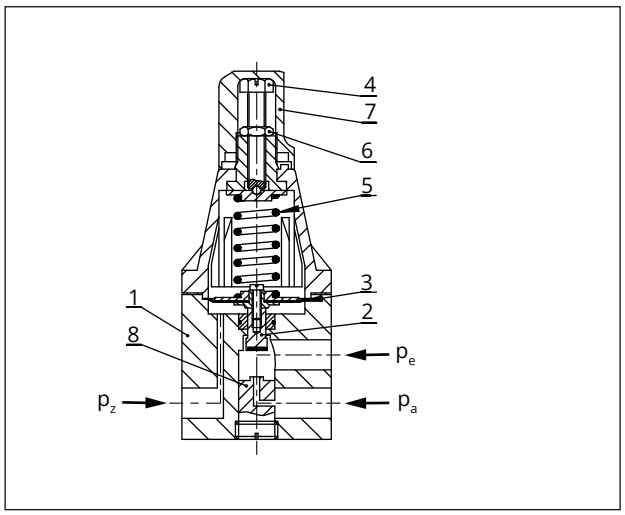


Fig. 3: *Control head of pneumatic lock-up valve (Type 3709-01/-02)*

1 Body (control head)
2 Plug
3 Diaphragm
4 Adjustment screw
5 Spring
6 Lock nut
7 Cap
8 Seat
p_z Supply air
p_e Input
p_a Output

Type 3709-04 to Type 3709-08

Version with booster (Fig. 4)

The supply air (p_z) creates a force on the diaphragm (3), which is balanced by the spring (5). When the force created at the diaphragm is greater than the spring force, the pressure flows internally to the booster and serves as the control pressure (p_{st}). A double-seat system is used to release the pressure.

– Spool (10) on ball (11)
– Ball (11) on the seat in the body (1)

The control pressure (p_{st}) opens the plug (12) of the booster allowing the air to flow unobstructed to the pneumatic actuator. When the spring force (5) is greater than the force created at the diaphragm (3), the signal pressure line is blocked and the control pressure is vented to the atmosphere.

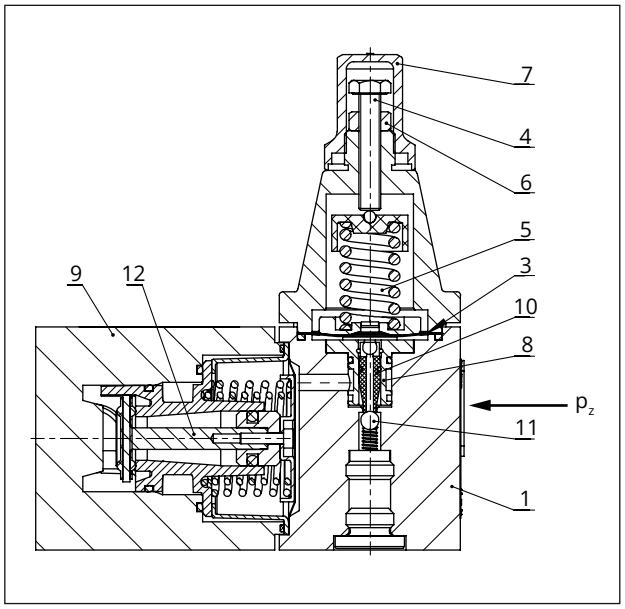


Fig. 4: *Control head and booster of pneumatic lock-up valve (Types 3709-04/-05/-06/-07/-08/-09/10/-12/-13)*

1 Body (control head)
3 Diaphragm
4 Adjustment screw
5 Spring
6 Lock nut
7 Cap
8 Seat
9 Body (booster)
10 Spool
11 Ball
12 Plug (booster)
p_z Supply air
p_{st} Control pressure

Pneumatic lock-up valve with booster (double-acting)

Type 3709-12 and Type 3709-13

Version with booster (double-acting, Fig. 4)

The supply air (p_z) creates a force on the diaphragm (3), which is balanced by the spring (5). When the force created at the diaphragm is greater than the spring force, the pressure flows internally to the booster and serves as the control pressure (p_{st}). A double-seat system is used to release the pressure.

- Spool (10) on ball (11)
- Ball (11) on the seat in the body (1)

The control pressure (p_{st}) is routed over a capillary tube to both spring systems. This causes both plugs (12) to open in a synchronized manner allowing the air to flow unobstructed to the pneumatic actuator. When the spring force (5) is greater than the force created at the diaphragm (3), the signal pressure line is blocked and the control pressure is vented to the atmosphere.

Versions

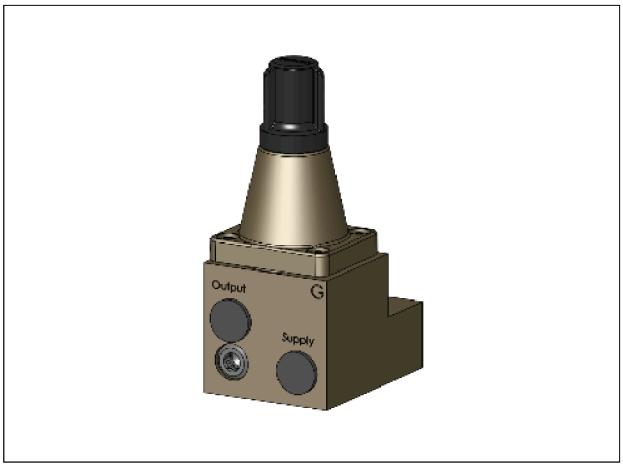


Fig. 5: *Type 3709-01*

Pneumatic lock-up valve for direct attachment to a positioner

G ¼ or ¼ NPT connecting thread

K_{VS} 0.2

Designed for linear actuators and rotary actuators according to VDI/VDE 3845 (not in combination with Types 4708-53/-54/-64 Supply Pressure Regulators)



Fig. 6: *Type 3709-02*

Pneumatic lock-up valve for installation in the signal pressure line in any position as required

G ¼ or ¼ NPT connecting thread

K_{VS} 0.2



Fig. 7: *Type 3709-04*

Pneumatic lock-up valve with booster for installation in the signal pressure line in any position as required

G ½ or ½ NPT connecting thread

K_{VS} 4.3



Fig. 8: *Type 3709-05*

Pneumatic lock-up valve with booster

Input hooked up as required

G ¼ or ¼ NPT connecting thread

Mounting on single-acting rotary actuators according to VDI/VDE 3845

K_{VS} 2.0

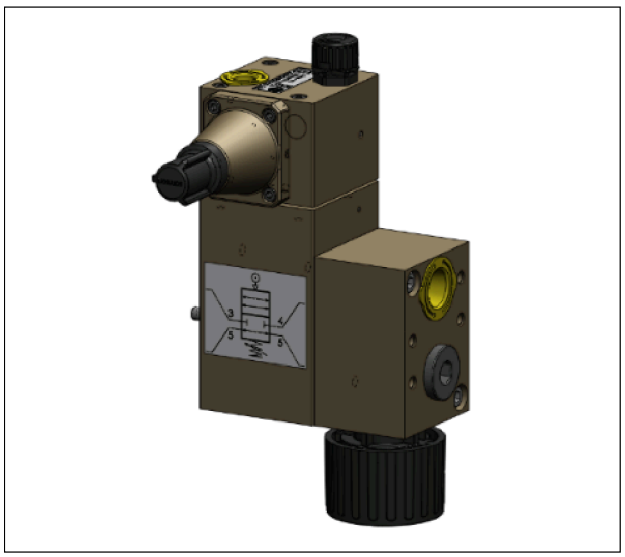


Fig. 9: *Type 3709-06 (on request)*

Pneumatic lock-up valve with booster

Input hooked up as required

G ½ or ½ NPT connecting thread

Mounting on single-acting rotary actuators according to VDI/VDE 3845

K_{VS} 4.3

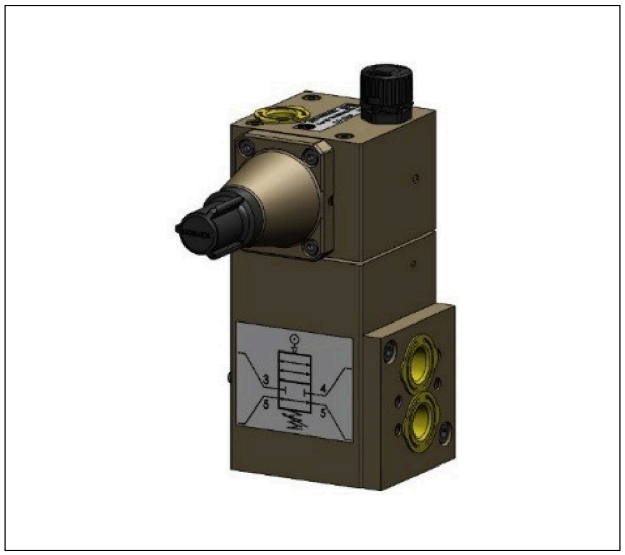


Fig. 10: *Type 3709-07*

Pneumatic lock-up valve with booster

Input and output connections without thread (¼“)

Mounting on single-acting rotary actuators according to VDI/VDE 3845

For mounting a solenoid valve (without volume booster) with NAMUR interface according to VDI/VDE 3845

K_{VS} 2.0



Fig. 11: *Type 3709-08 (on request)*

Pneumatic lock-up valve with booster

Input and output connections without thread (½“)

Mounting on single-acting rotary actuators according to VDI/VDE 3845

For mounting a solenoid valve (without volume booster) with NAMUR interface according to VDI/VDE 3845

K_{VS} 4.3



Fig. 12: *Type 3709-09 (on request)*

Pneumatic lock-up valve with booster

Input and output connections without thread (¼“)

Mounting on single-acting rotary actuators according to VDI/VDE 3845

Sandwich-style and attachment according to VDI/VDE 3845

K_{VS} 2.0



Fig. 13: *Type 3709-10 (on request)*

Pneumatic lock-up valve with booster

G ½ or ½ NPT connecting thread

Mounting on single-acting rotary actuators according to VDI/VDE 3845

Sandwich-style and attachment according to VDI/VDE 3845

K_{VS} 4.3

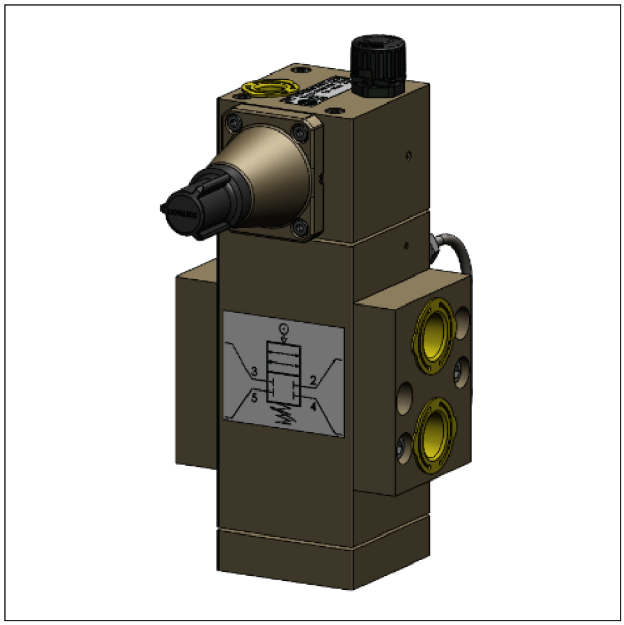


Fig. 14: *Type 3709-12*

Pneumatic lock-up valve with booster (double-acting) for installation in the signal pressure line in any position as required

G ½ or ½ NPT connecting thread

K_{VS} 4.3

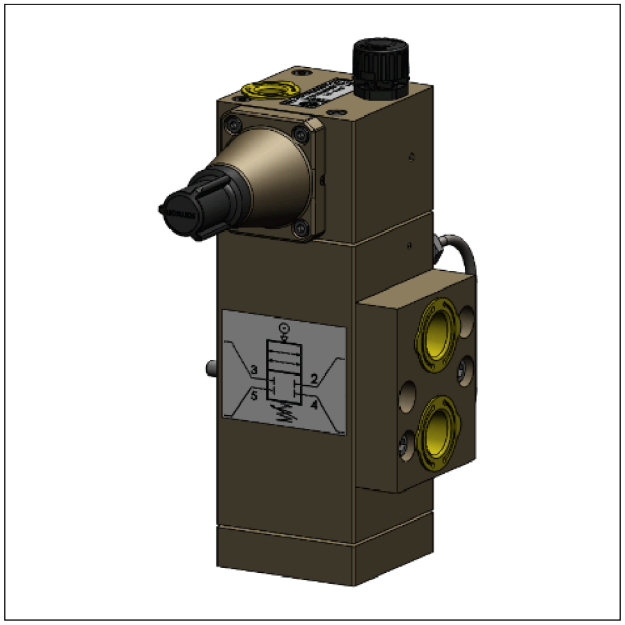


Fig. 15: *Type 3709-13*

Pneumatic lock-up valve with booster

G ½ or ½ NPT connecting thread

Attachment to double-acting rotary actuators according to VDI/VDE 3845

K_{VS} 4.3

Sample applications

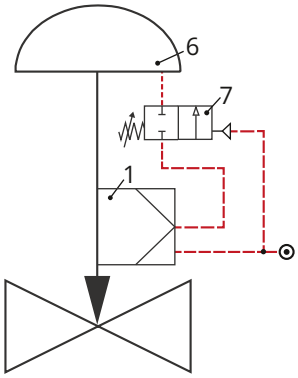


Fig. 16: *Closed loop control and fail-in-place*

1 Positioner
6 Pneumatic actuator
7 Pneumatic lock-up valve

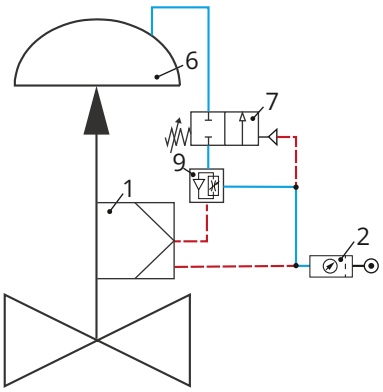


Fig. 17: *Closed loop control and fail-in-place with volume booster (the volume booster must be installed upstream of the lock-up valve)*

1 Positioner
2 Supply pressure regulator
6 Pneumatic actuator
7 Pneumatic lock-up valve
9 Pneumatic volume booster

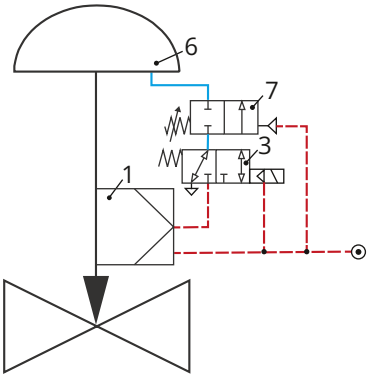


Fig. 18: *Closed loop control with safety function and fail-in-place, the pneumatic lock-up valve has priority over the solenoid valve*

1 Positioner
3 Solenoid valve
6 Pneumatic actuator
7 Pneumatic lock-up valve

Technical data

Table 1: *Technical data for Type 3709-04 to Type 3709-13 Pneumatic Lock-up Valve*

Type 3709	-01	-02	-04	-05	-06	-07
Attachment	Positioner	Can be hooked up as required		Actuators according to VDI/VDE 3845 Input hooked up as required	Solenoid valve only acc. to VDI/VDE 3845	
Max. supply pressure	12 bar	12 bar	6 bar	6 bar	6 bar	6 bar
Max. output pressure	6 bar	6 bar	6 bar	6 bar	6 bar	6 bar
K_{VS} coefficient	Approx. 0.2	Approx. 0.2	Approx. 4.3	Approx. 2.0	Approx. 4.3	Approx. 2.0
Set point range (continuously adjustable)	0.5 to 6 bar		1.5 to 6 bar			
Switching accuracy	Approx. 0.2 bar → For a set point of 2 bar Approx. 0.3 bar → For a set point of 4 bar Approx. 0.4 bar → For a set point of 6 bar					
Permissible ambient temperature range	-25 to +80 °C -45 to +80 °C Extended range on request		-40 to +80 °C			
Compatibility with paint	On request					
Connections						
Signal pressure output p_a	G/NPT ¼	G/NPT ¼	G/NPT ½	NAMUR ¼	NAMUR ½	NAMUR ¼
Signal pressure input p_e	G/NPT ¼	G/NPT ¼	G/NPT ½	G/NPT ¼	G/NPT ½	NAMUR ¼
Vent plug	–	–	–	G ¼	G/NPT ½	–
Supply air p_z	G/NPT ¼	G/NPT ¼	G/NPT ¼	G/NPT ¼	G/NPT ¼	G/NPT ¼
Weight (approx.)						
Aluminum	0.4 kg	0.4 kg	1.3 kg	1.9 kg	2.6 kg	1.6 kg
Stainless steel	0.4 kg	0.4 kg	3.0 kg	5.0 kg	6.1 kg	4.3 kg

Type 3709	-08	-09	-10	-12	-13
Attachment	Actuators acc. to VDI/VDE 3845 Accessories with interface according to VDI/VDE 3845		Can be hooked up as required	Actuators according to VDI/VDE 3845 Input hooked up as required	
Max. supply pressure	6 bar	6 bar	6 bar	6 bar	6 bar
Max. output pressure	6 bar	6 bar	6 bar	6 bar	6 bar
K_{VS} coefficient	Approx. 4.3	Approx. 2.0	Approx. 4.3	Approx. 4.3	Approx. 4.3
Set point range (continuously adjustable)	1.5 to 6 bar				
Switching accuracy	Approx. 0.2 bar → For a set point of 2 bar Approx. 0.3 bar → For a set point of 4 bar Approx. 0.4 bar → For a set point of 6 bar				
Permissible ambient temperature range	-40 to +80 °C				
Compatibility with paint	On request				
Connections					
Signal pressure output p_a	NAMUR ½	NAMUR ¼	NAMUR ½	G/NPT ½	NAMUR ½
Signal pressure input p_e	NAMUR ½	NAMUR ¼	NAMUR ½	G/NPT ½	G/NPT ½
Vent plug	–	–	–	–	–
Supply air p_z	G/NPT ¼	G/NPT ¼	G/NPT ¼	G/NPT ¼	G/NPT ¼
Weight (approx.)					
Aluminum	1.6 kg	1.5 kg	1.5 kg	2.3 kg	2.1 kg
Stainless steel	4.4 kg	4.0 kg	4.0 kg	5.9 kg	5.3 kg

Table 2: *Materials*

		Type 3709-01/-02		Type 3709-04/-05/-06/-07/-08/-09/-10/-12/-13	
	Version	**Aluminum**	**Stainless steel**	**Aluminum**	**Stainless steel**
Control head	Body	3.3547	1.4404	3.2315	1.4404
	Cover	3.2315	1.4404	3.2315	1.4404
	Diaphragm plate	3.1325 and 3.3547		3.2315 and 3.3547	
	Diaphragm	NBR or VMQ		VMQ	
	Plug	3.1325 and NBR or VMQ		Delrin/POM	
	Bushing	–		Delrin/POM	
	Seat	3.1325		–	
	Ball	–		1.4034	
	O-rings	NBR or VMQ		VMQ	
	Spring	1.4401		1.4401	
	Cap	PA 66		PA 66	
Booster	Body	–		3.2315	1.4404
	Booster section			POM, VMQ and stainless steel	
	Intermediate piece			1.0338	
	Diaphragm			VMQ	
	O-rings			VMQ	

Article code

Pneumatic lock-up valve	**Type 3709-**	x	x	x	x	x	x	x	x	0000000000
Device version		|	|	|	|	|	|	|	|	
For positioner attachment, K_{VS} 0.2; ¼" connection		0	1	|	|	|	|	|	|	
Can be hooked up as required, K_{VS} 0.2; ¼" connection		0	1	|	|	|	|	|	|	
Can be hooked up as required, K_{VS} 4.3; ½" connection		0	4	|	|	|	|	|	|	
For actuator according to VDI/VDE 3845, ¼"; K_{VS} 2.0		0	5	|	|	|	|	|	|	
For actuator according to VDI/VDE 3845, ½"; K_{VS} 4.3		0	6	|	|	|	|	|	|	
For actuator and Type 3967 Solenoid Valve according to VDI/VDE 3845, ¼"; K_{VS} 2.0		0	7	|	|	|	|	|	|	
For actuator and Type 3967 Solenoid Valve according to VDI/VDE 3845, ½"; K_{VS} 4.3		0	8	|	|	|	|	|	|	
For actuator and solenoid valve according to VDI/VDE 3845, ¼"; K_{VS} 2.0; sandwich-style		0	9	|	|	|	|	|	|	
For actuator and solenoid valve according to VDI/VDE 3845, ½"; K_{VS} 4.3; sandwich-style		1	0	|	|	|	|	|	|	
For double-acting actuator, hook-up as required, ½"; K_{VS} 4.3		1	1	|	|	|	|	|	|	
For double-acting actuator according to VDI/VDE 3845, ½"; K_{VS} 4.3		1	2	|	|	|	|	|	|	
Connecting thread			|	|	|	|	|	|	|	
Input and output ¼ NPT			1/2/5	0	1	|	|	|	|	
Input and output G ¼			1/2/5	0	2	|	|	|	|	
Input and output ½ NPT, supply air ¼ NPT			4/6/12	0	3	|	|	|	|	
Input and output G ½, supply air G ¼			4/6/12	0	4	|	|	|	|	
Input and output connections without thread, supply air ¼ NPT			7/8/9/10	0	5	|	|	|	|	
Input and output connections without thread, supply air G ¼			7/8/9/10	0	6	|	|	|	|	
Input G ¼, output connection without thread, supply air G ¼			5	0	7	|	|	|	|	
Input ¼ NPT, output connection without thread, supply air ¼ NPT			5	0	8	|	|	|	|	
Input G ½, output connection without thread, supply air G ¼			6/13	0	9	|	|	|	|	
Input ½ NPT, output connection without thread, supply air ¼ NPT			6/13	1	0	|	|	|	|	

Adjustment range	|	|	|	|
0.5 to 6 bar	1	|	|	|
1.5 to 6 bar	2	|	|	|
Ambient temperature		|	|	|
-25 to +80 °C		0	|	|
-40 to +80 °C		1	|	|
-45 to +80 °C		2	|	|
Body material			|	|
Aluminum			0	|
Stainless steel			1	|
Compatibility with paint				|
Without				0
Free of substances that impair paint adhesion				1

Accessories

Accessories	Order no.
Vent plug G ¼[1)], polyamide, degree of protection IP54	1992-3966
Vent plug G ¼, polycarbonate (PC), degree of protection IP54	1992-3413
Vent plug ½ NPT, polycarbonate (PC), degree of protection IP54	1992-3414

1) Also fits NPT connections

Spare parts

Spare part	Order no.
Cap, plastic (PA66)	0079-0023
Cap, stainless steel (1.4404)	0079-0118
O-ring 16x2, -45 to +80 °C (for NAMUR interface ¼)	8421-0368
O-ring 24x2, -20 to +80 °C (for NAMUR interface ½)	8421-9146
Blanking plug G ¼, 1.4571	0070-0858
Blanking plug ¼ NPT, 1.4571	0070-0862
O-ring 14x1.5 made of silicone rubber (VMQ) (for blanking plug ¼")	8421-9103
Blanking plug G ½, 1.4571	0070-0873
Blanking plug ½ NPT, 1.4571	0070-0874
O-ring 21x1.5 made of silicone rubber (VMQ) (for blanking plug ½")	8421-9176
Pipe (small) for double-acting version (Type 3709-12/-13)	0409-0810
Pipe (large) for double-acting version (Type 3709-12/-13)	0409-0811
Pipe mounting	8582-0145

Dimensions in mm

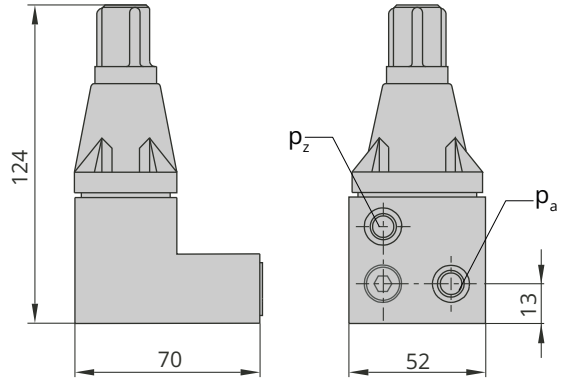


Fig. 19: *Type 3709-01*

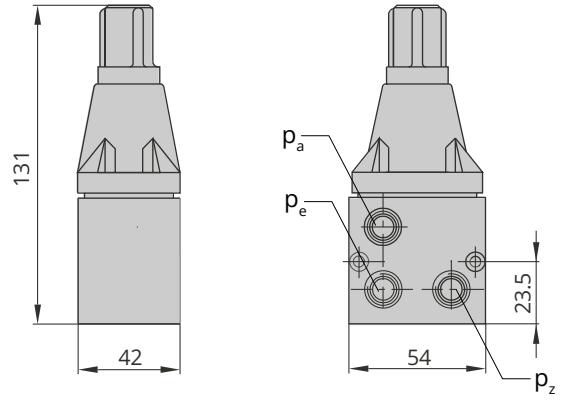


Fig. 20: *Type 3709-02*

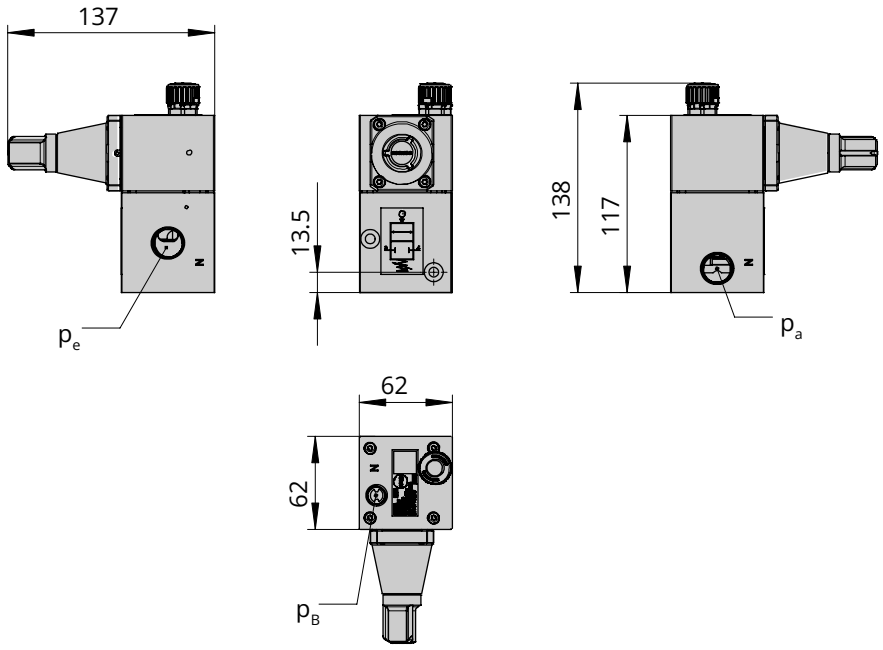


Fig. 21: *Type 3709-04*

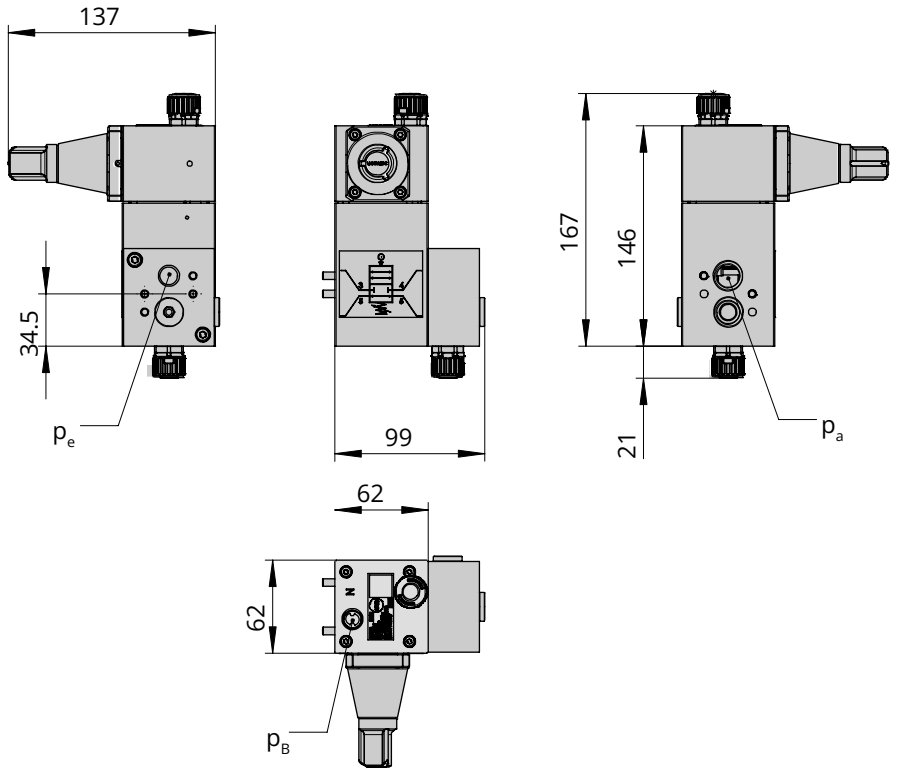


Fig. 22: *Type 3709-05*

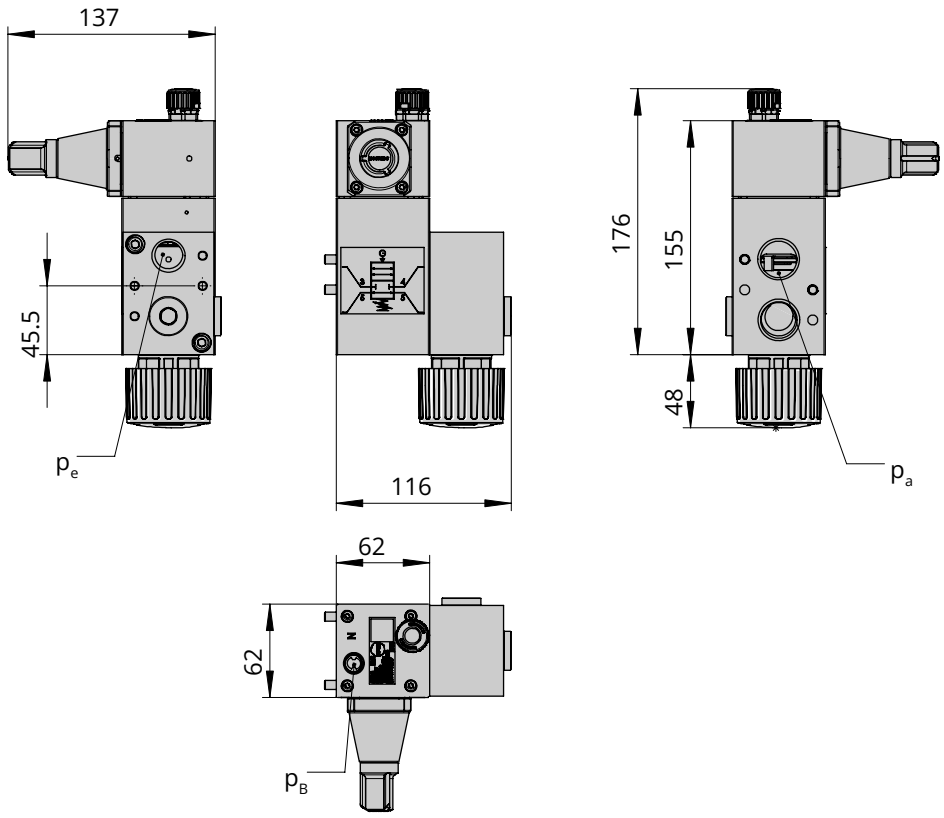


Fig. 23: *Type 3709-06*

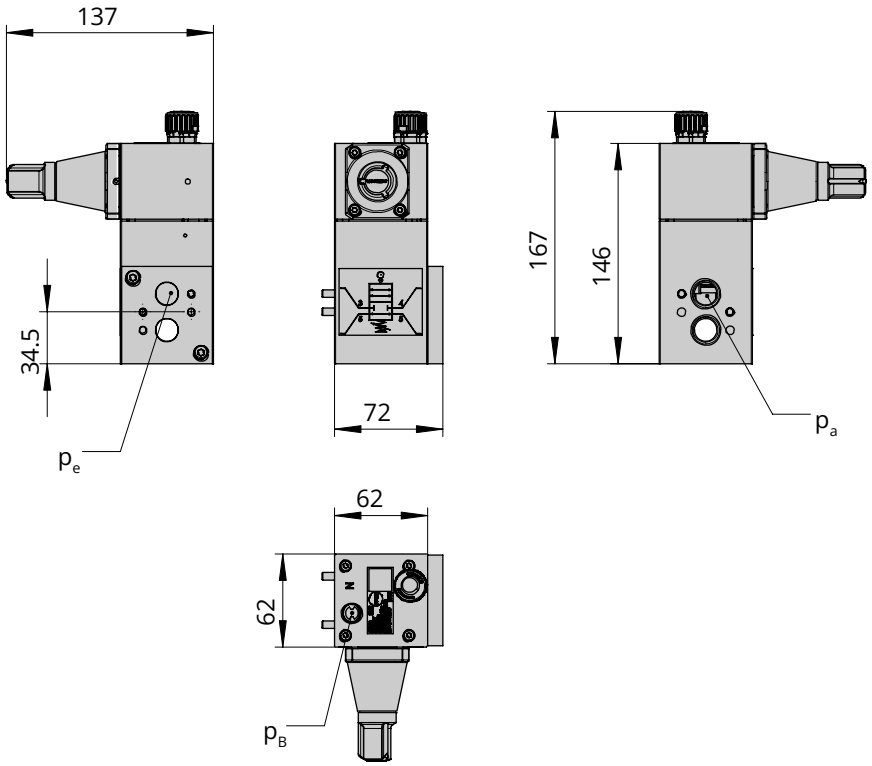


Fig. 24: *Type 3709-07*

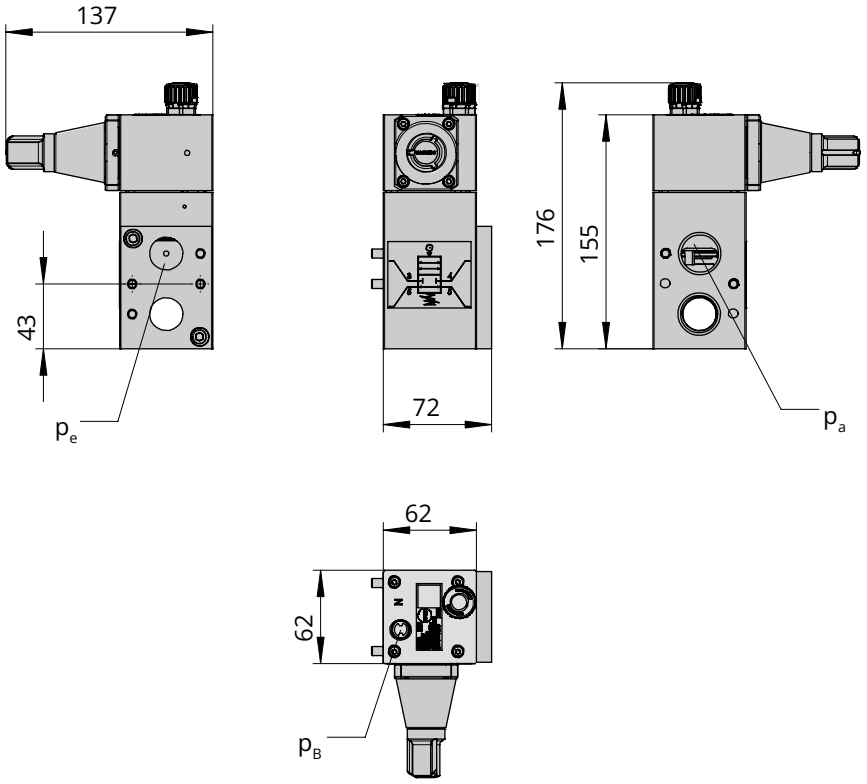


Fig. 25: *Type 3709-08*

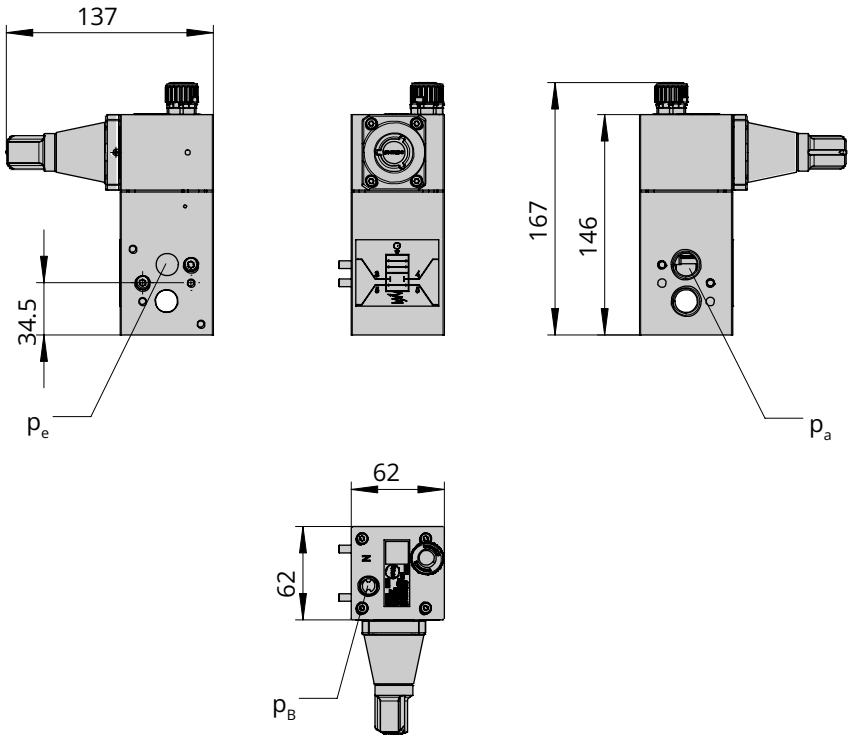


Fig. 26: *Type 3709-09*

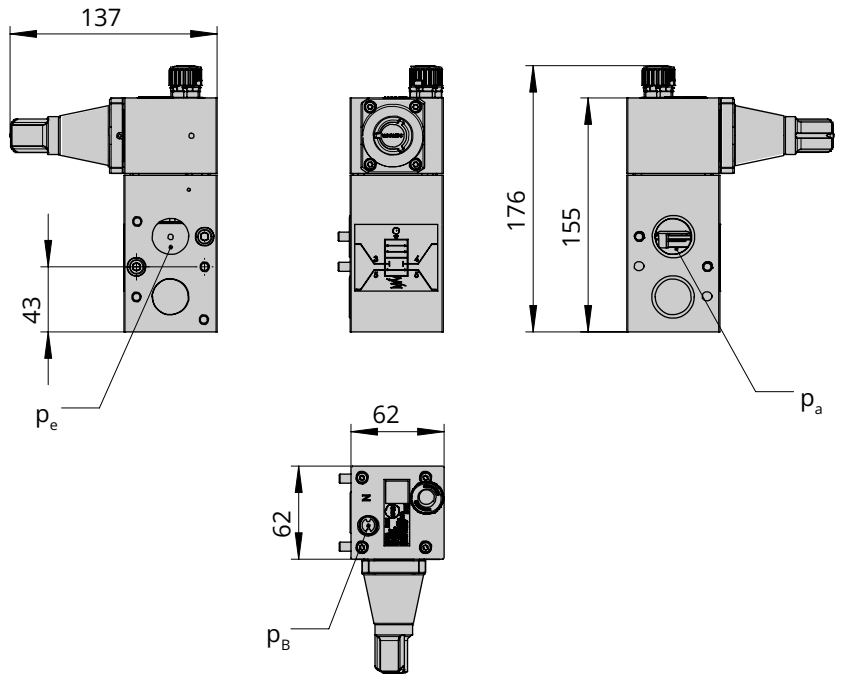


Fig. 27: *Type 3709-10*

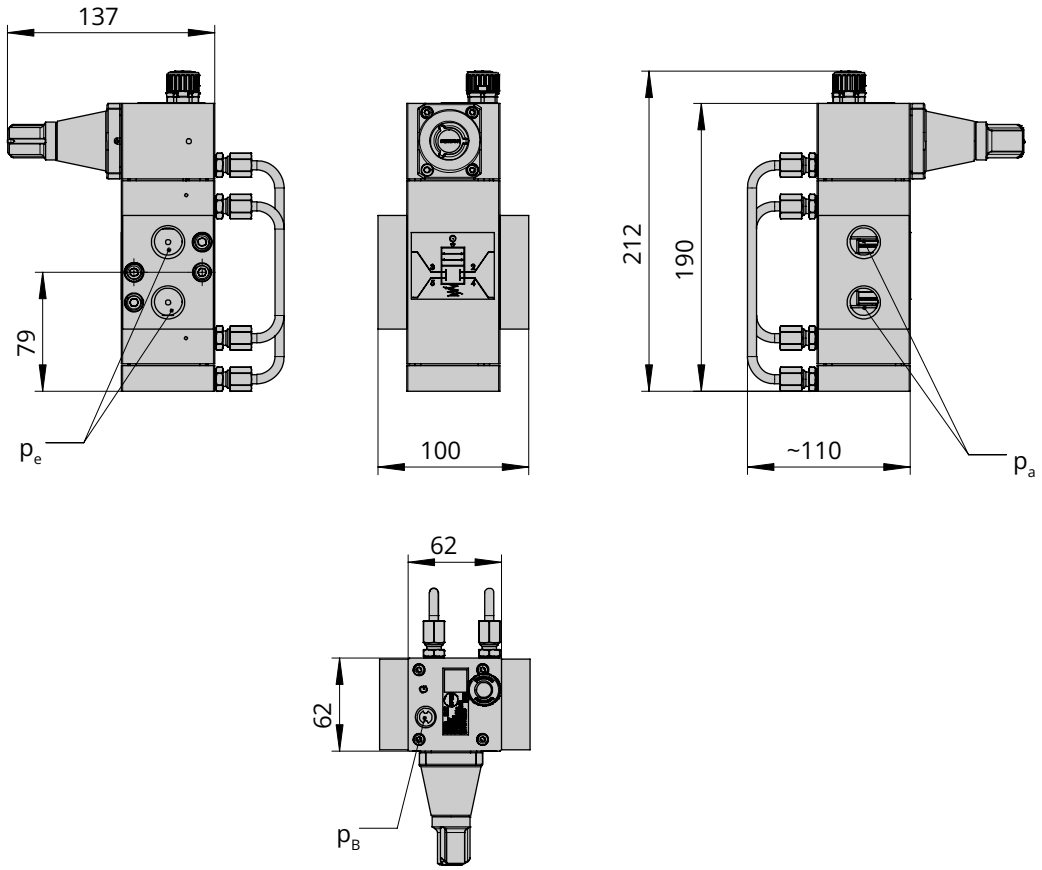


Fig. 28: *Type 3709-12*

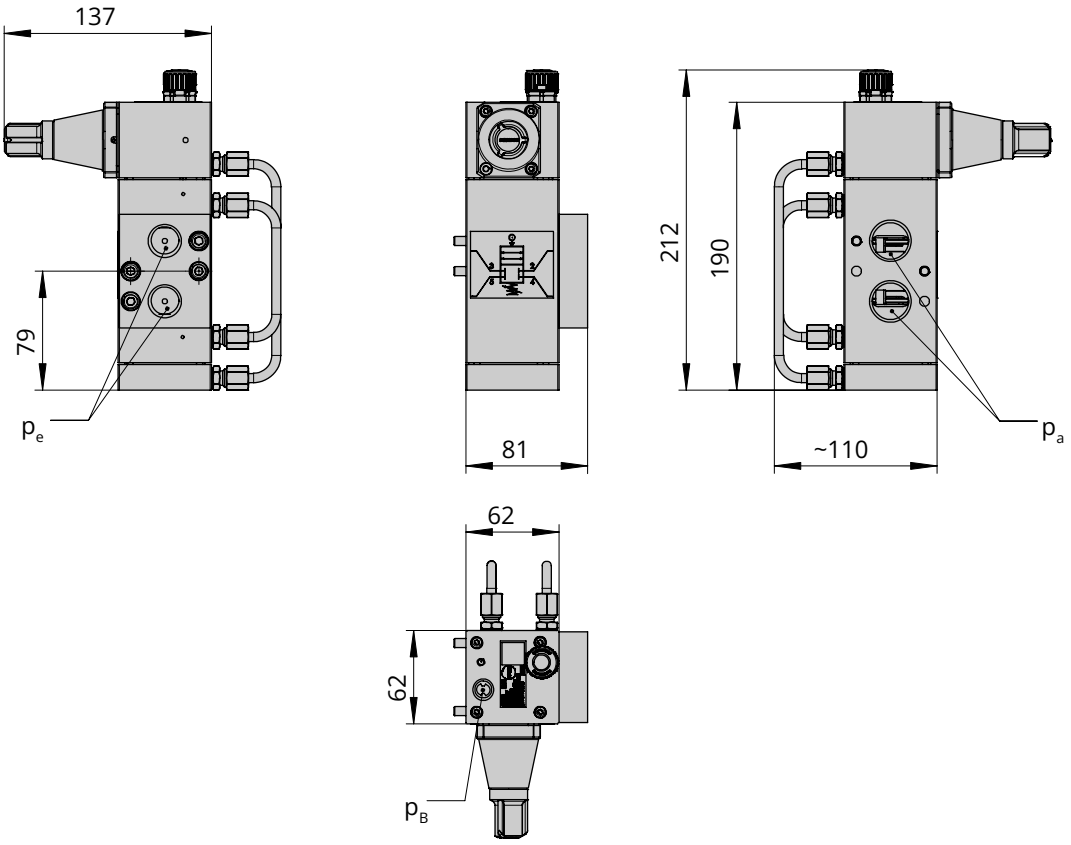


Fig. 29: *Type 3709-13*

p_a Output
p_e Input
p_z Supply air