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

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 generated.

Special features

- Various mounting versions:
  - Hooked up as required
  - Direct attachment to positioners [1)]
  - Attachment to rotary actuators according to VDI/VDE 3845
  - Sandwich style
- 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

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

Type 4763/4765	▶ T 8359
Type 3766/3767	▶ T 8355
Type 3730-0	▶ T 8384-0
Type 3730-1	▶ T 8384-1
Type 3730-2	▶ T 8384-2
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

Design and principle of operation

– **Type 3709-01 and Type 3709-02**
(version without booster, see Fig. 1)

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, input (p_e) and output (p_a) are connected, i.e. the signal pressure supplied by the positioner flows 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.

– **Type 3709-04 to Type 3709-08**
(version with booster, see Fig. 2)

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 body seat (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.

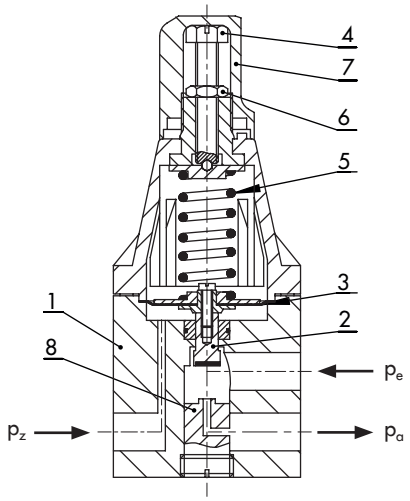


Fig. 1: *Control head of pneumatic lock-up valve (Type 3709-01 and Type 3709-02)*

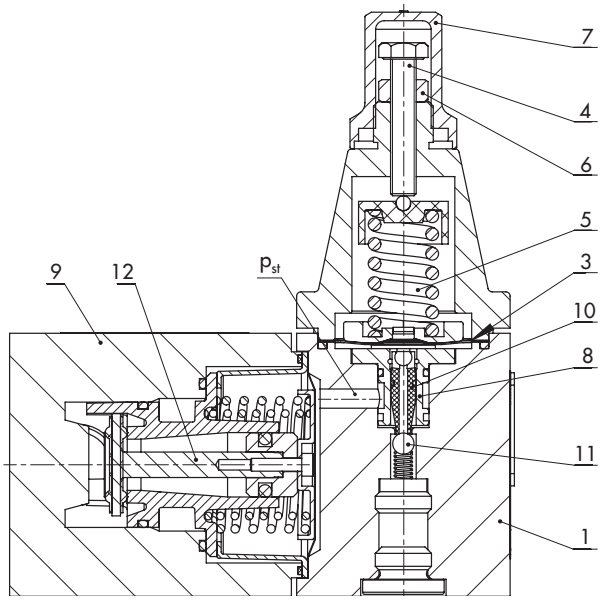


Fig. 2: *Type 3709-04/-05/-06/-07/-08 Pneumatic Lock-up Valve, control head and booster*

1 Body (control head)
2 Plug
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_e Input
p_a Output
p_{st} Control pressure

Versions

- **Type 3709-01** (Fig. 3)
  - Pneumatic lock-up valve for direct attachment to a positioner
  - Connecting thread G ¼ or ¼ NPT
  - K_{VS} 0.2
  - Designed for linear actuators and rotary actuators according to VDI/VDE 3845, fixing level 1 (not in combination with Types 4708-53/-54/-64 Supply Pressure Regulators)
- **Type 3709-02** (Fig. 4)
  - Pneumatic lock-up valve for installation in the signal pressure line in any position as required
  - Connecting thread G ¼ or ¼ NPT
  - K_{VS} 0.2
- **Type 3709-04** (Fig. 5)
  - 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
- **Type 3709-05** (Fig. 6)
  - Pneumatic lock-up valve with booster
  - Input hooked-up as required
  - G ¼ or ¼ NPT thread
  - Mounting on single-acting rotary actuators according to VDI/VDE 3845
  - K_{VS} 2.0
- **Type 3709-06** [1] (Fig. 7)
  - Pneumatic lock-up valve with booster
  - Input hooked-up as required
  - G ½ or ½ NPT thread
  - Mounting on single-acting rotary actuators according to VDI/VDE 3845
  - K_{VS} 4.3
- **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
  - Sandwich-style solenoid valve
  - K_{VS} 2.0
- **Type 3709-08** [1]
  - Pneumatic lock-up valve with booster
  - Input and output connections without thread (½")
  - Mounting on single-acting rotary actuators according to VDI/VDE 3845
  - Sandwich-style solenoid valve
  - K_{VS} 4.3

[1] On request

Fig. 3: *Type 3709-01 Pneumatic Lock-up Valve*

Fig. 4: *Type 3709-02 Pneumatic Lock-up Valve*

Fig. 5: *Type 3709-04 Pneumatic Lock-up Valve*

Fig. 6: *Type 3709-05 Pneumatic Lock-Up Valve, stainless steel version*

Fig. 7: *Type 3709-06 Pneumatic Lock-up Valve*

Sample applications

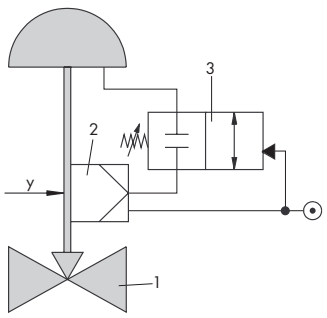


Fig. 8: *Closed loop control and fail-in-place*

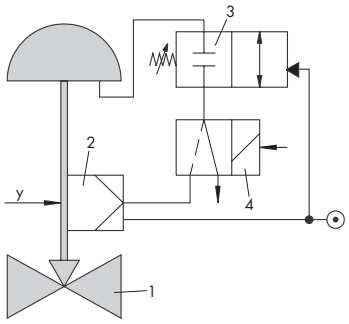


Fig. 9: *Closed loop control with safety function and fail-in-place, the pneumatic lock-up valve has priority over the solenoid valve*

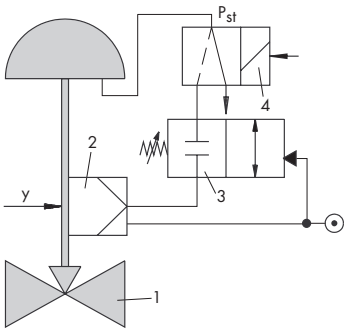


Fig. 10: *Closed loop control with safety function and fail-in-place, the solenoid valve has priority over the pneumatic lock-up valve*

1 Pneumatic control valve
2 Positioner
3 Pneumatic lock-up valve
4 Solenoid valve

Table 1: *Technical data for Type 3709-01 and Type 3709-02*

Type 3709		**-01**	**-02**
Attachment		Positioner	Hooked up as required
Supply air	max.	12 bar	
Signal pressure	max.	6 bar	
K_{VS} coefficient	approx.	0.2	
Set point range (continuously adjustable)		0.5 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	
Compatibility with paint		On request	
Connections			
Signal pressure output p_a		G ¼/ ¼ NPT	
Signal pressure input p_e		G ¼/ ¼ NPT	
Supply air p_z		G ¼/ ¼ NPT	
Weight			
Aluminum	Approx.	0.4 kg	
Stainless steel	Approx.	1 kg	

Table 2: *Technical data for Type 3709-04 to Type 3709-08 (pneumatic lock-up valve with booster)*

Type 3709	-04	-05	-06 [1]	-07	-08 [1]
Attachment	Hooked up as required	Actuators according to VDI/VDE 3845			
		Input hooked-up as required		Sandwich-style solenoid valve	
Supply air	Max. 6 bar	Max. 6 bar	Max. 6 bar	Max. 6 bar	Max. 6 bar
Signal pressure	Max. 6 bar	Max. 6 bar	Max. 6 bar	Max. 6 bar	Max. 6 bar
K_{VS} coefficient Approx.	4.3	2.0	4.3	2.0	4.3
Set point range (continuously adjustable)	1.5 to 6 bar	1.5 to 6 bar	1.5 to 6 bar	1.5 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	–40 to +80 °C				
Compatibility with paint	On request				
Connections					
Signal pressure output p_a	G/NPT ½ [2]	NAMUR ¼	NAMUR ½	NAMUR ¼	NAMUR ½
Signal pressure input p_e	G/NPT ½ [2]	G/NPT ¼ [3]	G/NPT ½ [3]	NAMUR ¼	NAMUR ½
Vent plugs	–	G ⅜	G ¾	–	–
Supply air p_z	G/NPT ¼ [2]	G/NPT ¼ [2]	G/NPT ¼ [2]	G/NPT ¼ [2]	G/NPT ¼ [2]
Weight					
Aluminum Approx.	1.2 kg	1.5 kg	1.5 kg	1.5 kg	1.5 kg
Stainless steel Approx.	3.1 kg	4 kg	4 kg	4 kg	4 kg

1) On request
2) Double nipple for G/NPT thread. Refer to Accessories on page 6
3) G or NPT nipple. Refer to Accessories on page 6

Table 3: *Materials*

	Version	Type 3709-01/-02		Type 3709-04/-05/-06/-07/-08	
		Aluminum	Stainless steel	Aluminum	Stainless steel
Control head	Body	3.3547	1.4404	3.2315	1.4404
	Cover	PA B3WG5 and 3.2315	PA B3WG5 and 1.4404	3.2382	1.4404
	Diaphragm plate	3.1325 and 3.3547		3.2315 and 3.3547	
	Diaphragm	NBR/PVC (745N Yg290) 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	1.4310		1.4310	
	Cap	PA 66		PA 66	
Booster	Body	–		3.2315	1.4404
	Booster section			POM, VMQ and stainless steel	
	Intermediate piece			1.0338 (DC04-A)	
	Diaphragm			VMQ	
	O-rings			VMQ	

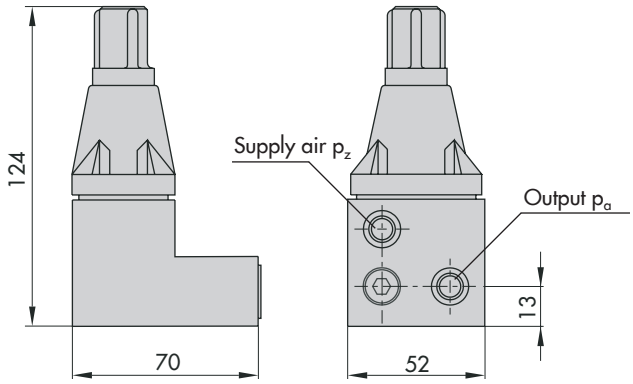
Article code

Lock-up valves Type 3709-	x	x	x	x	x	x	x	x	0	0	0	0	0	0	0	0	0	0
Version																		
For positioner attachment, K_{VS} 0.2; ¼" connection	0	1																
Hook-up as required, K_{VS} 0.2; ¼" connection	0	2																
Hook-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 solenoid valve according to VDI/VDE 3845, ¼"; K_{VS} 2.0, sandwich-style	0	7																
For actuator and solenoid valve according to VDI/VDE 3845, ½"; K_{VS} 4.3, sandwich-style	0	8																
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	0	3														
Input and output G ½, supply air G ¼		4/6	0	4														
Input and output connections without thread, supply air ¼ NPT		7/8	0	5														
Input and output connections without thread, supply air G ¼		7/8	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	0	9														
Input ½ NPT, output connection without thread, supply air ¼ NPT		6	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										

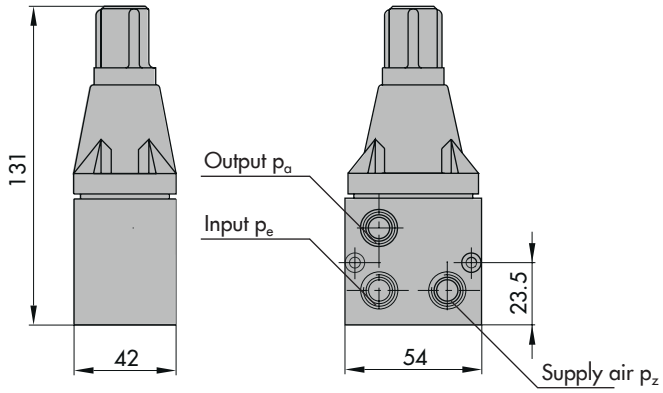
Accessories

Accessories	Ordering number	Type 3709-x Pneumatic Lock-up Valve						
		01	02	04	05	06	07	08
Silencer	8504-0066			•	•	•	•	•
Silencer G ⅜ (venting)	8504-0067				•			
Silencer G ¾ (venting)	8504-0069					•		
Double nipple G ¼ → ¼ NPT (supply air)	0239-0165			•	•	•	•	•
Double nipple G ½ → ½ NPT (input and output)	0239-0166			•				
Nipple G ¼	0239-0148				•			
Nipple ¼ NPT	0239-0163				•			
Nipple G ½	0239-0149					•		
Nipple ½ NPT	0239-0164					•		

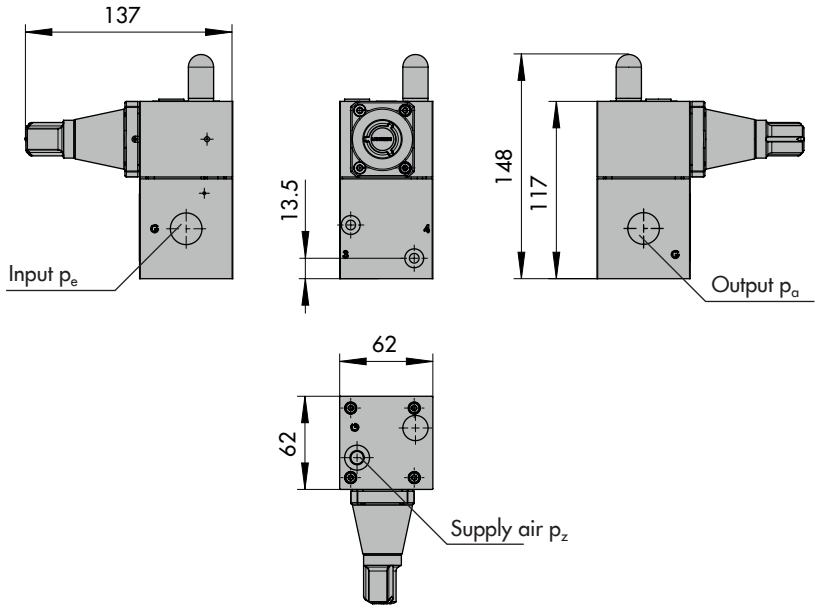
Type 3709-01



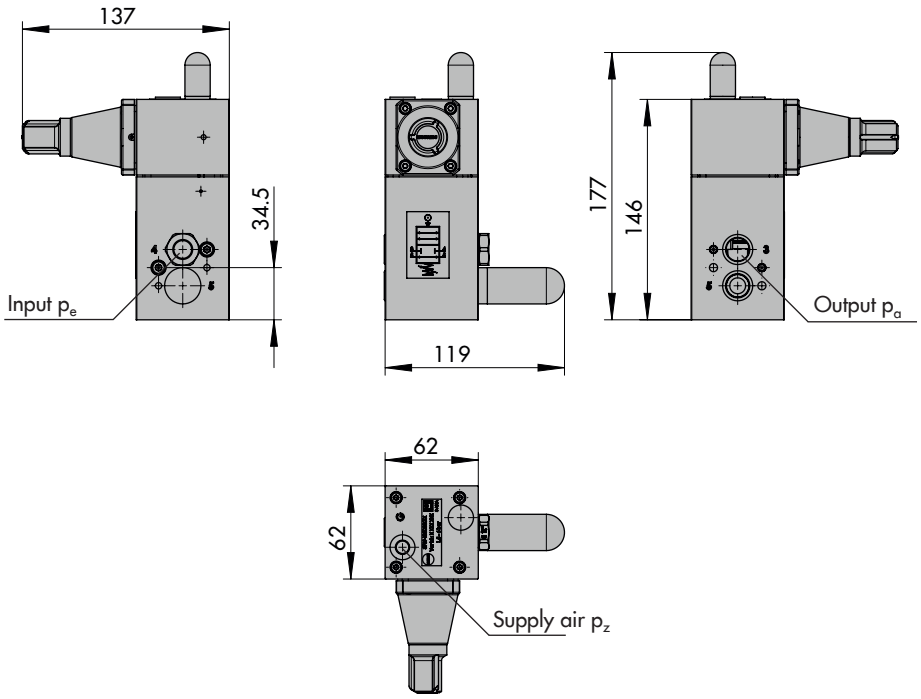
Type 3709-02



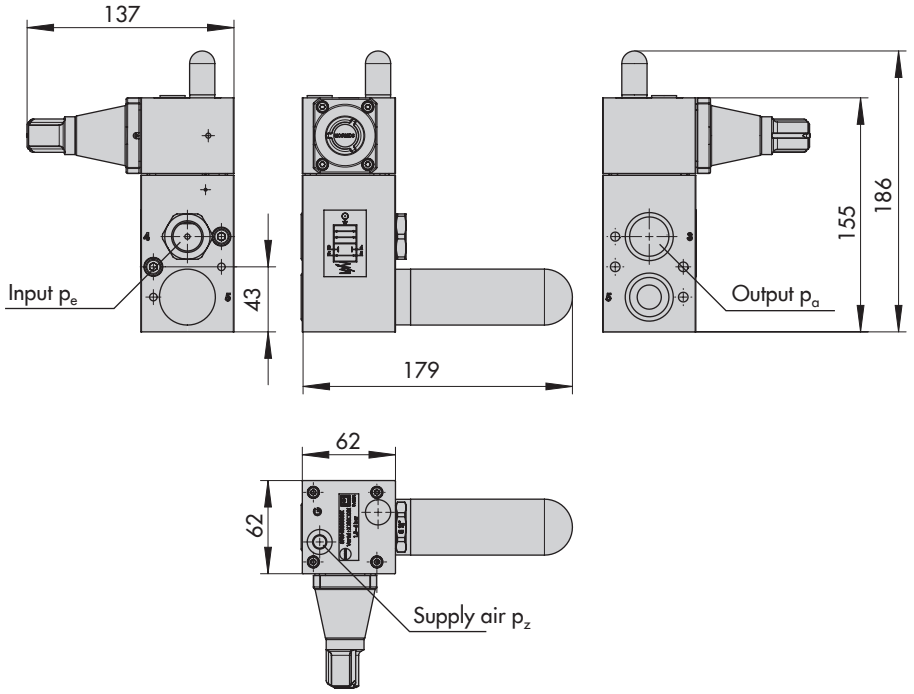
Type 3709-04



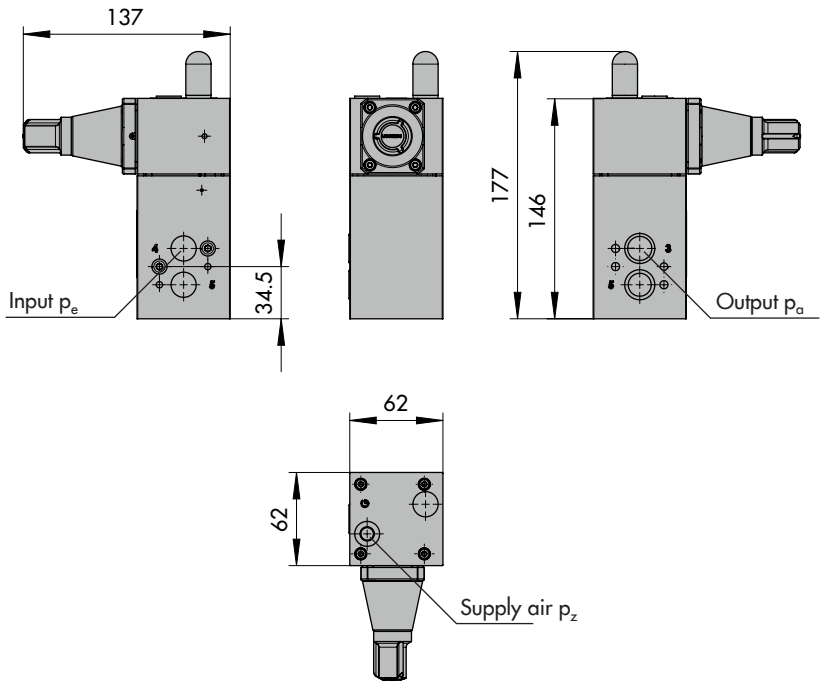
Type 3709-05



Type 3709-06



Type 3709-07



Type 3709-08