MOUNTING AND OPERATING INSTRUCTIONS



EB 8391 EN

Translation of original instructions



Type 3709 Pneumatic Lock-Up Valve

Edition July 2017

Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices.

- ➔ For the safe and proper use of these instructions, read them carefully and keep them for later reference.
- → If you have any questions about these instructions, contact SAMSON's After-sales Service (aftersalesservice@samsongroup.com).



The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website at www.samsongroup.com > Service & Support > Downloads > Documentation.

Definition of signal words

Hazardous situations which, if not avoided, will result in death or serious injury

Hazardous situations which, if not avoided, could result in death or serious injury

Property damage message or malfunction

i Note

Additional information

∹∑: Tip

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1 Safety instructions and measures

Intended use

The Type 3709 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 device is designed to operate under exactly defined conditions (e.g. operating pressure, temperature). Therefore, operators must ensure that the pneumatic lock-up valve is only used in operating conditions that meet the specifications used for sizing the device at the ordering stage. In case operators intend to use the lock-up valve in applications or conditions other than those specified, contact SAMSON.

SAMSON does not assume any liability for damage resulting from the failure to use the device for its intended purpose or for damage caused by external forces or any other external factors.

→ Refer to the technical data for limits and fields of application as well as possible uses.

Reasonably foreseeable misuse

The Type 3709 Lock-up Valve is *not* suitable for the following applications:

- Use outside the limits defined during sizing and by the technical data

Furthermore, the following activities do not comply with the intended use:

- Use of non-original spare parts
- Performing maintenance activities not described in these instructions

Qualifications of operating personnel

The pneumatic lock-up valve must be mounted, started up and serviced by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible hazards due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.

Personal protective equipment

No personal protective equipment is required for the direct handling of the pneumatic lockup valve. Work on the valve or valve accessories may be necessary when mounting or removing the device.

- → Observe the requirements for personal protective equipment specified in the valve or valve accessories documentation.
- → Check with the plant operator for details on further protective equipment.

Revisions and other modifications

Revisions, conversions or other modifications of the product are not authorized by SAMSON. They are performed at the user's own risk and may lead to safety hazards, for example. Furthermore, the product may no longer meet the requirements for its intended use.

Warning against residual hazards

To avoid personal injury or property damage, plant operators and operating personnel must prevent hazards that could be caused in the control valve by the process medium, the operating pressure, the signal pressure or by moving parts by taking appropriate precautions. Plant operators and operating personnel must observe all hazard statements, warnings and caution notes in these mounting and operating instructions, especially for installation, start-up and service work.

If inadmissible motions or forces are produced in the pneumatic actuator as a result of the supply pressure, it must be restricted using a suitable supply pressure reducing station.

Responsibilities of the operator

Operators are responsible for proper use and compliance with the safety regulations. Operators are obliged to provide these mounting and operating instructions to the operating personnel and to instruct them in proper operation. Furthermore, operators must ensure that operating personnel or third parties are not exposed to any danger.

Responsibilities of operating personnel

Operating personnel must read and understand these mounting and operating instructions as well as the specified hazard statements, warnings and caution notes. Furthermore, the operating personnel must be familiar with the applicable health, safety and accident prevention regulations and comply with them.

Referenced documentation

The following documents apply in addition to these mounting and operating instructions:

- The mounting and operating instructions of the components with which the pneumatic lock-up valve is combined (valve, actuator, solenoid valve etc.).

1.1 Notes on possible personal injury

Risk of injury due to high pressure inside device.

The pneumatic lock-up valve is pressurized. Improper removal of the installed pneumatic lock-up valve or opening of the body can lead to device components bursting and cause serious injury.

➔ Disconnect the signal pressure before removing an installed pneumatic lock-up valve or opening the valve body.

Loud noise. Risk of damage to hearing.

Without a noise-reducing element screwed into the exhaust port, the lock-up valve generates a loud noise on venting.

→ Wear hearing protection.

1.2 Notes on possible property damage

Risk of damage to the pneumatic lock-up valve due to contamination.

Improper handling may allow dirt or other foreign particles to enter the device and lead to malfunctioning or damage.

Protect the pneumatic lock-up valve against dirt particles entering it during mounting, transport or storage.

Risk of malfunction due to the incorrect mounting of the pneumatic lock-up valve.

The proper shut-off of the signal pressure line is only guaranteed by the pneumatic lockup valve when it is mounted properly.

→ Mount the pneumatic lock-up valve as close to the actuator as possible.

2 Markings on the device

2.1 Article code

Lock-up valves	Туре 3709-	x	х	x	x	x	x	x	 0	0	0	0	0	0	0) (0 0
Version																	
For positioner attachment, $K_{VS}0.2;{}^{1\!\!/}_{4}{}^{\prime\prime}$ co	nnection	0	1														
Hook-up as required, $K_{VS}0.2;{}^{1}\!$	tion	0	2														
Hook-up as required, K_{VS} 4.3; $^{1\!\!/_2''}$ connect	tion	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 VDE 3845, ¼"; K _{VS} 2.0, sandwich-style	g to VDI/	0	7														
For actuator and solenoid valve according VDE 3845, ½"; K _{VS} 4.3, sandwich-style	g to VDI/	0	8														
Connecting thread					Τ	Τ	Τ										
Input and output 1/4 NPT			1/2/5	0	1												
Input and output G ¼			1/2/5	0	2												
Input and output $\frac{1}{2}$ NPT, supply air $\frac{1}{4}$ NP	Т		4/6	0	3												
Input and output G $^{1\!\!/_2}\!$			4/6	0	4												
Input and output connections without three air $^{1\!\!/}_{\!\!/}$ NPT	ad, supply		7/8	0	5												
Input and output connections without three air G $^{1\!\!/}_{\!$	ad, supply		7/8	0	6												
Input G ¼, output connection without thre	ad, supply air (G ¼	5	0	7												
Input $^{1\!\!/}_{\!$	read, supply		5	0	8												
Input G $^{1\!\!/_2}$, output connection without threa ir G $^{1\!\!/_2}$	ad, supply		6	0	9												
Input $\frac{1}{2}$ NPT, output connection without that $\frac{1}{2}$ NPT	read, supply		6	1	0												
Adjustment range																	
0.5 to 6 bar						1											
1.5 to 6 bar						2											

Lock-up valves	Туре 3709-	х х	хххх	хх	. 0	0 0	0 0	0	0 0	0	0
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 adhe	sion			1							

3 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 generated.

3.1 Version without booster

- Type 3709-01 and Type 3709-02
- → Refer to Fig. 1

The supply air (p_2) 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.

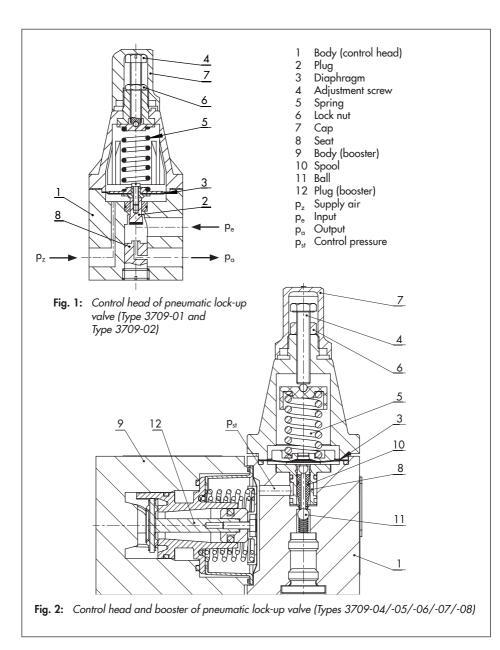
3.2 Version with booster

- Type 3709-04 to Type 3709-08
- ➔ Refer to 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.



3.3 Versions

- Type 3709-01 (Fig. 3): for direct attachment to the positioner (see section 3.3.1), ¼ NPT or G ¼ connections, K_{VS} 0.2
- Type 3709-02 (Fig. 4): hooked-up as required, G ¼ or ¼ NPT connections, K_{VS} 0.2
- Type 3709-04 (Fig. 5): with booster, for single-acting actuators, hooked-up as required, G ½ or ½ NPT connections, K_{VS} 4.3
- Type 3709-05 (Fig. 6): with booster, for single-acting actuators with VDI/VDE 3845 interface (1/4"), G 1/4 or 1/4 NPT connections, K_{VS} 2
- Type 3709-06 (Fig. 7): with booster, for single-acting actuators with VDI/VDE 3845 interface (½"), G ¼ or ¼ NPT connections, K_{VS} 4.3
- Type 3709-07: with booster, for single-acting actuators with VDI/VDE 3845 interface (1/4"), con-

nections for solenoid valve, K_{VS} 2

- Type 3709-08 ¹⁾:

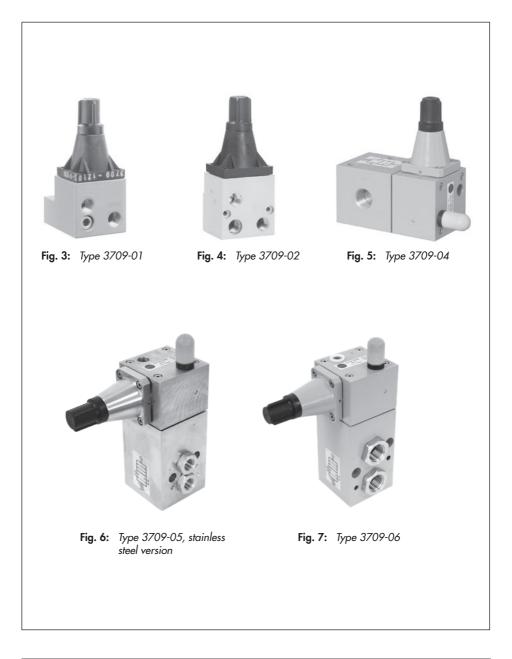
with booster, for single-acting actuators with VDI/VDE 3845 interface ($\frac{1}{2}$ "), connections for solenoid valve, K_{VS} 4.3

3.3.1 Direct attachment to positioners

The Type 3709-01x Lock-up Valve can be mounted directly onto 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

1) On request



3.4 Technical data

Туре 3709	-01	-02					
Attachment	Positioner	Hooked up as required					
Supply air Max.	12	bar					
Signal pressure Max.	61	bar					
K _{vs} coefficient Approx.	0	.2					
Set point range (continuously adjustable)	0.5 to	6 bar					
Switching accuracy	Approx. 0.3 bar → F	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					
	-25 to +80 °C						
Permissible ambient tem- perature range	−45 to +80 °C						
pordioro rango	Extended range on request						
Compatibility with paint	On request						
Connections							
Signal pressure output p _a	G 1/4/1	1/4 NPT					
Signal pressure input p _e	G 1/4/1	1/4 NPT					
Supply air p _z	G 1/4/1/4 NPT						
Weight							
Aluminum Approx.	0.4	kg					
Stainless steel Approx.	1	kg					

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

Туре 3709		-04	-05	-06 ¹⁾	-07	-08 ¹⁾		
		Heeleed	Actuators according to VDI/VDE 3845					
Attachment		Hooked up as required	Input hooked-	up as required	Solenoid valve (sandwich style)			
Supply air	Max.	6 bar	6 bar	6 bar	6 bar	6 bar		
Signal pressure	Max.	6 bar	6 bar	6 bar	6 bar	6 bar		
K _{vs} coefficient	Approx.	4.3	2.0	4.3	2.0	4.3		
Set point range (co ously adjustable)	ontinu-	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	у	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 ambier perature range	nt tem-	-40 to +80 °C						
Compatibility with	paint	On request						
Connections								
Signal pressure ou	ıtput p _α	G/NPT 1/2 2)	NAMUR 1/4	NAMUR 1/2	NAMUR 1/4	NAMUR 1/2		
Signal pressure inp	put p _e	G/NPT 1/2 2)	G/NPT 1/4 3)	G/NPT 1/2 3)	NAMUR 1/4	NAMUR 1/2		
Vent plugs		-	G 3⁄8	G ¾	_	_		
Supply air p _z		G/NPT 1/4 2)	G/NPT 1/4 2)	G/NPT 1/4 2)	G/NPT 1/4 2)	G/NPT 1/4 2)		
Weight		·						
Aluminum A	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		

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

1) On request

²⁾ Double nipple for G/NPT thread. See Accessories on page 17

³⁾ G or NPT nipple. See Accessories on page 17

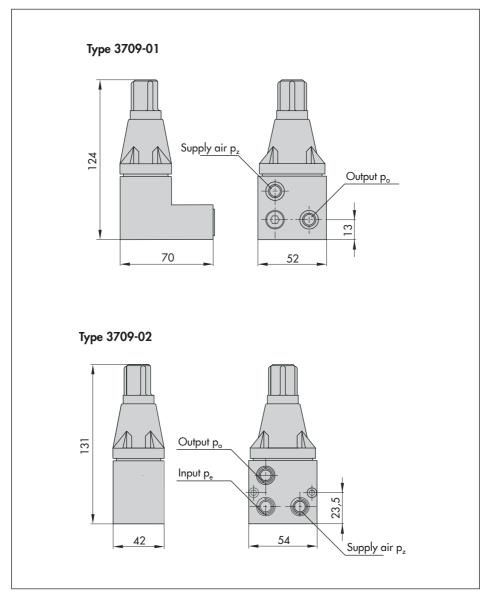
Table 3: Materials

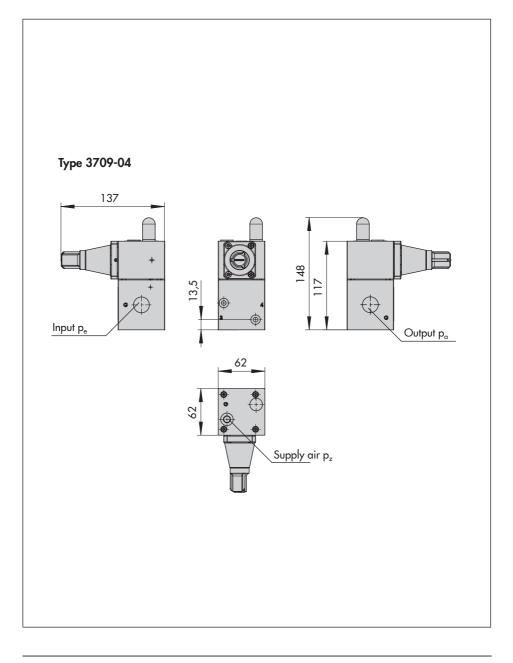
		Types 370	09-01/-02		/-05/-06/-07/ 08		
	Version	Aluminum	Stainless steel	Aluminum	Stainless steel		
	Body	3.3547	1.4404	3.2315	1.4404		
	Cover	PA B3WG5 and 3.2315	PA B3WG5 and 1.4404	3.2382	1.4404		
	Diaphragm plate	3.1325 ai	nd 3.3547	3.2315 a	nd 3.3547		
	Diaphragm		'45N Yg290) 'MQ	VMQ			
Control	Plug	3.1325 and	NBR or VMQ	Delrin®/POM			
head	Bushing		_	Delrin®/POM			
	Seat	3.1	3.1325 –				
	Ball		_	1.4	034		
	O-rings	NBR o	r VMQ	V	NQ		
	Spring	1.4	310	1.4	310		
	Сар	PA	66	PA	66		
	Body			3.2315	1.4404		
	Booster section			POM, VMQ and stainless s			
Booster	Intermediate piece		_	1.0338 (DC04-A)			
	Diaphragm			VMQ			
	O-rings			V	NQ		

3.5 Accessories

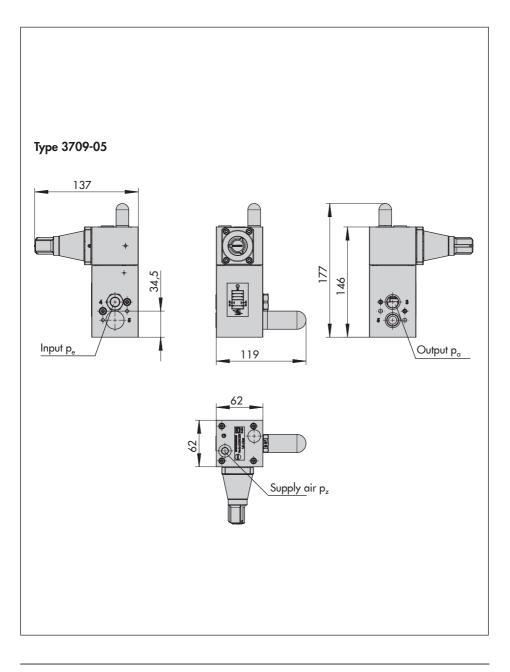
	Ordering	Pneumatic Lock-up Valve Type 3709-				•		
Accessories	number	01	02	04	05	06	07	08
Silencer	8504-0066			•	•	٠	•	•
Silencer G ¾ (venting)	8504-0067				•			
Silencer G ¾ (venting)	8504-0069					٠		
Double nipple G $^{1}\!\!/_{4} \rightarrow ^{1}\!\!/_{4}$ NPT (supply air)	0239-0165			•	•	٠	•	•
Double nipple G $\frac{1}{2} \rightarrow \frac{1}{2}$ NPT (input and output)	0239-0166			•				
Nipple G 1/4	0239-0148				٠			
Nipple ¼ NPT	0239-0163				•			
Nipple G 1/2	0239-0149					•		
Nipple 1/2 NPT	0239-0164					•		

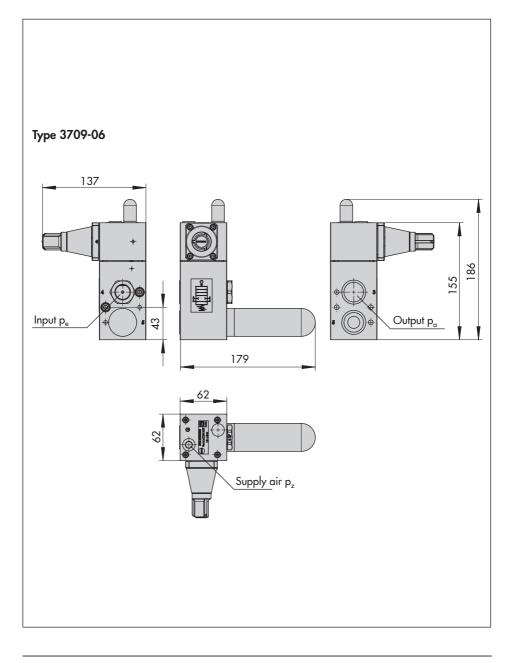
3.6 Dimensions in mm



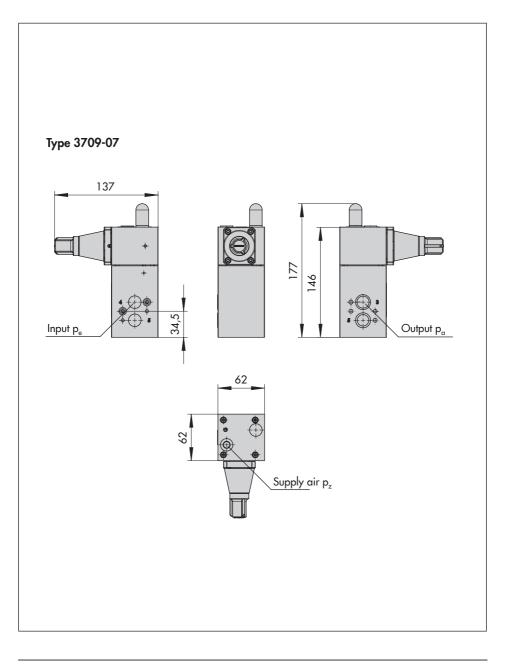


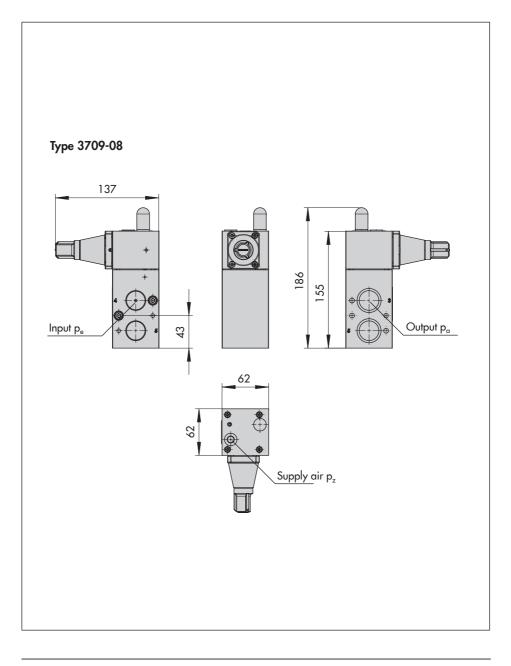
Design and principle of operation





Design and principle of operation





4 Measures for preparation

After receiving the shipment, proceed as follows:

- Check the scope of delivery. Compare the shipment received with the delivery note.
- Check the shipment for transportation damage. Report any transportation damage.

4.1 Unpacking

i Note

Do not remove the packaging if the pneumatic lock-up valve is to be transported to another location or kept in storage.

Before mounting the pneumatic lock-up valve, proceed as follows:

- 1. Remove the packaging from the pneumatic lock-up valve.
- 2. Dispose of the packaging in accordance with the valid regulations.

Risk of damage to the pneumatic lock-up valve through foreign particles entering it.

Do not remove the protective caps until immediately before mounting.

4.2 Transporting

- Protect the pneumatic lock-up valve against external influences (e.g. impact).
- Protect the pneumatic lock-up valve against moisture and dirt.
- Observe transport temperature depending on the permissible ambient temperature (see technical data in section 3.4).

4.3 Storage

Risk of damage to the pneumatic lock-up valve through improper storage.

Observe the storage instructions. Contact SAMSON, if need be.

Storage instructions

- Protect the pneumatic lock-up valve against external influences (e.g. impact, shocks, vibration).
- Do not damage the corrosion protection (coating).
- Protect the pneumatic lock-up valve against moisture and dirt. In damp spaces, prevent condensation. If necessary, use a drying agent or heating.
- Observe storage temperature depending on the permissible ambient temperature (see technical data in section 3.4).
- Pack the pneumatic lock-up valve in airtight packaging.

5 Mounting and start-up

Fig. 8 and Fig. 9 show various typical applications for attachment of a pneumatic lockup valve:

- Fig. 8: standard application, pneumatic lock-up valve mounted between positioner and actuator.
- Fig. 9: Use of solenoid valve:
 - Top: pneumatic lock-up valve has priority over the solenoid valve.
 - Bottom: solenoid valve has priority over the pneumatic lock-up valve.

The following general applies to mounting:

- → The process medium must not be allowed to enter the device during mounting, transport or storage.
- → Mount the pneumatic lock-up valve as close to the actuator as possible.
- → Mount the pneumatic lock-up valve according to the assignment of the connections (see section 5.1).
- → Mount the pneumatic lock-up valve between the positioner or solenoid valve and the pneumatic actuator.

Legend for Fig. 8 and Fig. 9

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

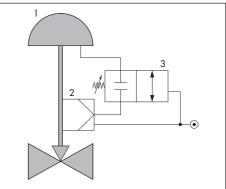
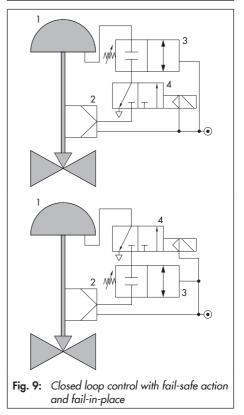


Fig. 8: Closed loop control and fail-in-place



5.1 Pneumatic connections

The connections of the pneumatic lock-up valve are designed with either G or NPT threads depending on the version. The labeling of the pneumatic connections depends on the version:

Types 3709-01/-02

Port	Inscription	Abbreviation
Supply air	Supp.	pz
Input	Input	p _e
Output	Output	Pα

Туре 3709-04

Port	Inscription	Abbreviation
Supply air	G	pz
Input	4	p _e
Output	3	Pα

Туре 3709-05/-06/-07/-08

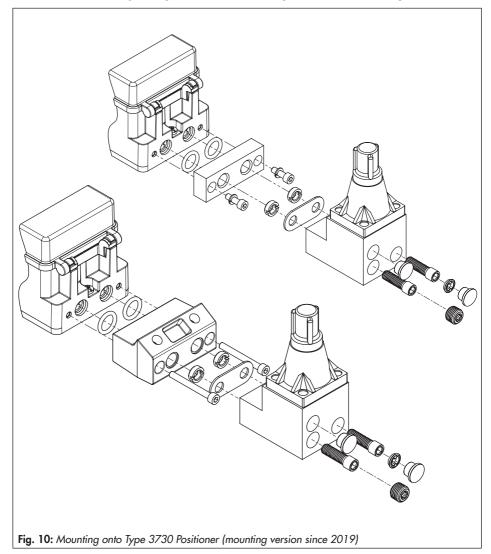
Port	Inscription	Abbreviation
Supply air	G	pz
Input	4	P _e
Output	3	Pα
Venting from the actuator	5	-

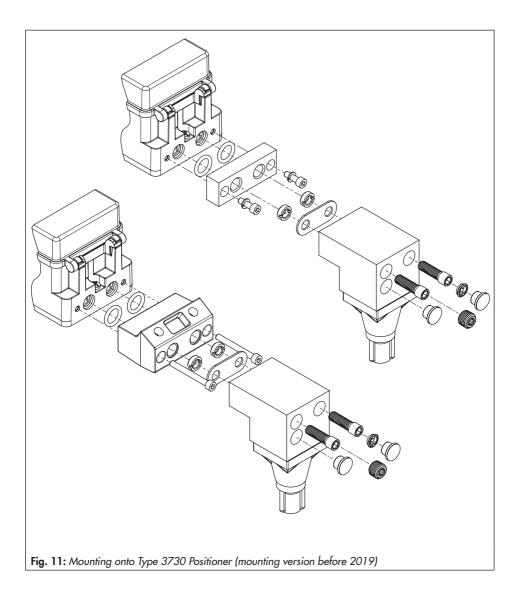
The following general applies to the screw fittings:

- → Before mounting, all pipes must be free of dirt and foreign matter.
- → Mount the screw fittings properly using suitable tools and sealant to prevent thread galling (seizure).
- → The use of Teflon tape as a sealant for the fittings is not permitted. Thread lubricants or thread sealants can be used.
- → Tighten all screw fittings securely.

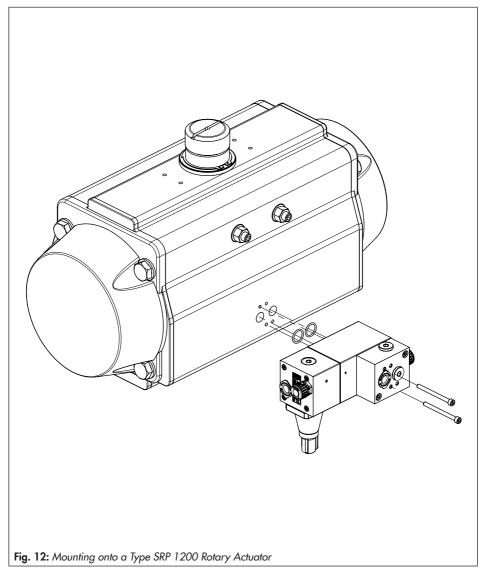
5.2 Mounting options

5.2.1 Mounting the pneumatic lock-up valve onto the positioner

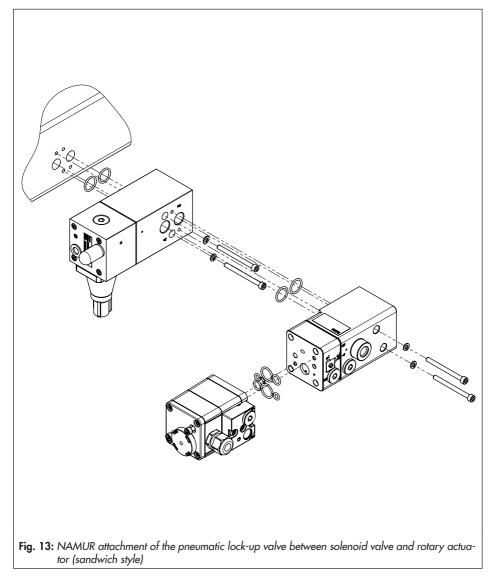








5.2.3 Mounting the pneumatic lock-up valve between the rotary actuator and solenoid valve



5.3 Start-up

- 1. Mount the pneumatic lock-up valve as described in section 5.
- Apply supply air to the pneumatic lockup valve.
- 3. Finely tune the dynamic response as described in section 5.3.1.

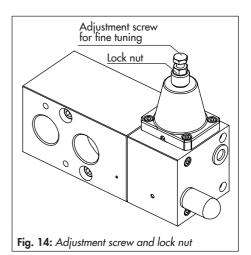
5.3.1 Fine tuning

The procedure described is based on a pneumatic lock-up valve mounted onto a fail-close pneumatic actuator.

- 1. Connect a current source to the positioner according to the terminal assignment.
- Connect a supply air that can be regulated to the pneumatic lock-up valve and positioner.
- 3. Unscrew the cap from the pneumatic lock-up valve.
- 4. Undo the lock nut at the adjustment screw for fine tuning (see Fig. 14).
- Turn the adjustment screw counterclockwise until no resistance can be felt at the screw.

Make sure that the screw is not unscrewed too far. It is not secured against falling out.

- Adjust the supply pressure to the following value: Upper pressure range value of the pneumatic actuator +0.2 bar
- 7. Apply the lowest control signal (4 mA) to the positioner.



- 8. Fully vent the pneumatic actuator to move the valve to the fail-position.
- Turn the adjustment screw of the pneumatic lock-up valve clockwise as far as it will go.
- → The pneumatic lock-up valve shuts off the signal pressure line and the pneumatic actuator remains in its last position.
- 10. Apply the highest control signal (20 mA) to the positioner.
- 11. Slowly turn the adjustment screw of the pneumatic lock-up valve counterclockwise until the actuator stem starts to move. Turn the screw back a half turn at this point until the actuator stem stops moving.
- → The switching point of the pneumatic lock-up valve is adjusted.
- Check adjustment: reduce the supply pressure by 0.5 bar. Adjust the control signal through its range from 4 to 20 mA.

Measures for preparation

- → The setting is correct when the stem does not move. Raise the supply pressure again by 0.5 bar. Adjust the control signal through its range from 4 to 20 mA.
- → The setting is correct when the stem moves.
- 13. Tighten the lock nut at the adjustment screw of the pneumatic lock-up valve.
- 14. Screw the cap back on the pneumatic lock-up valve.

6 Servicing

i Note

The pneumatic lock-up valve was checked by SAMSON before it left the factory.

- The product warranty becomes void if service or repair work not described in these instructions is performed without prior agreement by SAMSON's After-sales Service.
- Only use original spare parts by SAMSON, which comply with the original specifications.

6.1 Maintenance

i Note

The Type 3709 Lock-up Valve requires no maintenance.

∹∑- Tip

We recommend to regularly check whether the pneumatic lock-up valve is leak-tight and whether the pipe screw fitting is screwed on properly.

6.2 Preparation for return shipment

Defective lock-up valves can be returned to SAMSON for repair.

Proceed as follows to return devices to SAMSON:

- 1. Put the control valve out of operation. See associated valve documentation.
- 2. Remove the pneumatic lock-up valve (see section 8.2).
- Proceed as described on our website at www.samsongroup.com > Service & Support > After-sales Service > Returning goods.

7 Malfunctions

7.1 Troubleshooting

Malfunction	Leakage between pneumatic lock-up valve and air connections
Possible reasons	Screw fittings are loose.
Recommended action	→ Check whether screw fitting leaks and is screwed on properly.

→ If other malfunctions occur, contact SAMSON's After-sales Service (see section 9).

8 Decommissioning and removal

Risk of bursting in pressure equipment.

Control valves, mounting parts and pipelines are pressure equipment. Improper opening can lead to bursting of the valve.

- Before starting any work on the control valve, depressurize all plant sections affected as well as the valve.
- Observe the valve's safety instructions.

8.1 Decommissioning

To decommission the pneumatic lock-up valve for maintenance work or disassembly, proceed as follows:

- 1. Disconnect the supply pressure of the pneumatic actuator.
- 2. Disconnect the supply air.
- If necessary, allow valve components to cool down or warm up to the ambient temperature.

8.2 Removing the pneumatic lock-up valve

- 1. Put the pneumatic lock-up valve out of operation (see section 8.1).
- 2. To remove the pneumatic lock-up valve, undo the threaded connections.

8.3 Disposal

- → Observe local, national and international refuse regulations.
- → Do not dispose of components, lubricants and hazardous substances together with your household waste.

9 After-sales service

Contact SAMSON's After-sales Service for support concerning service or repair work or when malfunctions or defects arise.

E-mail address

You can reach our after-sales service at aftersalesservice@samsongroup.com.

Addresses of SAMSON AG and its subsidiaries

The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on our website (www.samsongroup.com) or in all SAMSON product catalogs.

Required specifications

Please submit the following details:

- Order number and position number in the order
- Type, serial number, device version

EB 8391 EN



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