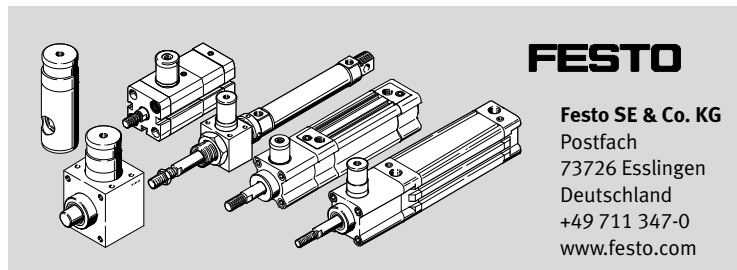


KP, KPE, ADN-...-KP, DNC-...-KP, DSBC-...-C, DSNU-...-KP



Operating instructions (Original instructions) 8067784
1701g
[8067786]

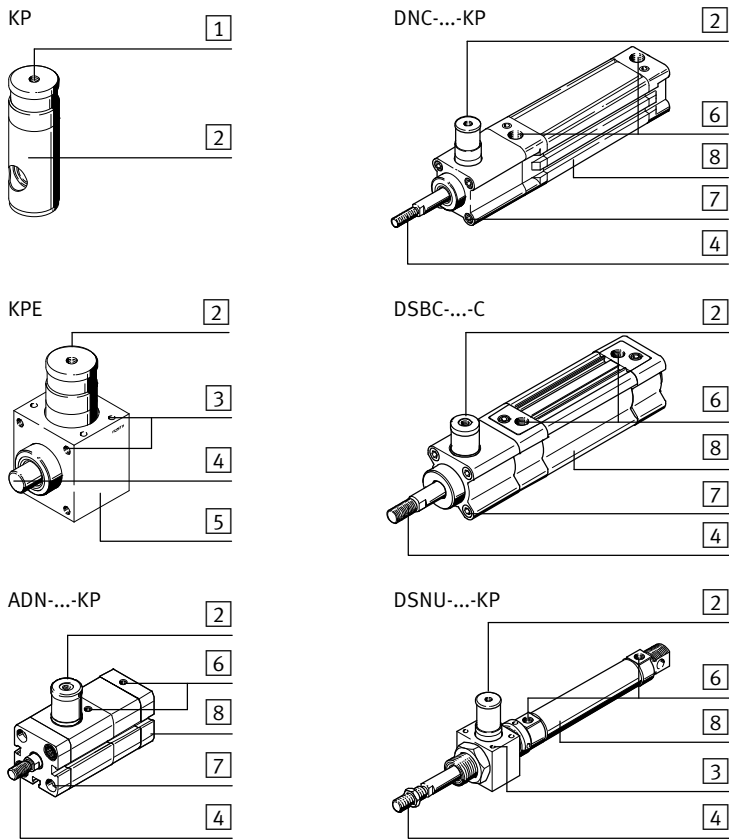
Clamping cartridge, clamping unit, cylinder with clamping unit English

Note
Installation and commissioning are to be carried out only by qualified personnel in accordance with the operating instructions.

1 Applicable documents

For all available product documentation → www.festo.com/pk

Control sections and connections



- 1 Thread for
 - Supply port or
 - Mounting screw
- 2 Clamping cartridge (KP or C characteristic)
- 3 Holes and threads for mounting
- 4 Clamping rod (piston rod or round material)
- 5 Clamping unit; housing for holding the clamping cartridge
- 6 Supply port for cylinder (with adjusting screw for end-position cushioning, if applicable)
- 7 Thread for mounting
- 8 Cylinder with clamping unit

Fig. 1

2 Function and application

The clamping cartridge 2 holds the clamping rod 4 (with effective load) firmly in any position.

Clamping the clamping rod 4
When the clamping cartridge 2 is exhausted, a spring presses the clamping jaws apart. As a result of the clamping jaws being pushed apart, the jaws are tilted on the clamping rod 4. The clamping rod 4 is clamped in a friction-locking manner.

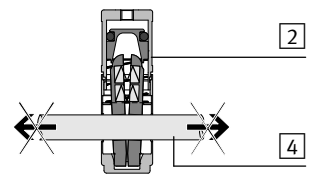


Fig. 2

Pneumatically releasing the clamping rod 4
When the clamping cartridge 2 is pressurised (supply port 1), a piston presses the clamping jaws together until the jaws are parallel to each other. The holes in the clamping jaws then lie in an axis with the clamping rod 4. The clamp is released.

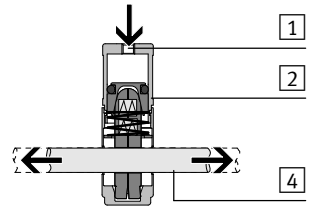


Fig. 3

Manually releasing the clamping rod 4

• Screw the supplied mounting screw 9 (M5 DIN 912 or G1/8) into the supply port 1 of the clamping cartridge 2. This presses the clamping jaws together over the piston until the clamping is loosened.

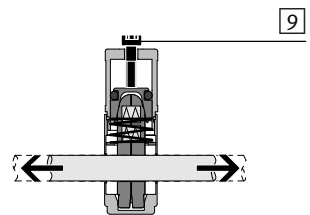


Fig. 4

Note
The clamping cartridge 2 can be damaged when manually releasing the clamp.
• Only screw the mounting screw 9 into the supply port 1 until the clamp is released.

The clamping cartridge 2 is designed for holding a clamping rod 4 (in most cases a piston rod).

The clamping unit is intended for the following applications:

- Holding or clamping the clamping rod 4 in any position.
- Avoiding stroke movements:
 - due to fluctuations in the operating pressure
 - due to leakage on seals or tubing.

Note
Clamping in movement sequences (braking) is not permitted. Increased wear leading to complete failure is possible.
• Make sure that the dynamic holding force is always less than the static holding force.

If a pressure failure occurs (e.g. caused by an emergency switch off), continued use is only permitted after a subsequent functional test (→ Operation). Except in the event of sudden pressure failure, clamping may only be undertaken when the cylinder is in the intermediate or end positions of the cylinder, referred to here as the parking position.

- Only pressurise a clamped piston rod 4 that is resting in a park position in chamber (K_h) on the stroke side. This is to prevent the piston from moving to a non-pressurised chamber when clamping is released.

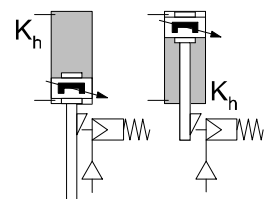


Fig. 5

3 Requirements for use



Note

Incorrect handling can result in malfunctions.

- Make sure that the specifications contained in this chapter are adhered to at all times.
This is the only way to ensure correct and safe product behaviour.



Note

Additional measures are necessary if used in safety relevant applications, e.g. in Europe the standards listed under the EC machinery directive must be observed. Without additional measures in accordance with statutory minimum requirements, the product is not suitable for use in safety-related sections of control systems.



Note

The clamping cartridge [2] may be damaged if the clamping rod [4] is braked.

- Make sure that the following points are observed for clamping:
 - The clamp is only released in the pressurised park or end position of the cylinder.
 - The clamping cartridge [2] is only pressurised and exhausted when the clamping rod [4] has come to a complete standstill.
 - There are no dynamic forces.
- Take into consideration the legal regulations applicable for the destination, as well as:
 - regulations and standards
 - regulations of the testing organizations and insurers
 - national specifications.
- Note the warnings and instructions on the product and in the relevant operating instructions.
- Remove all transport packaging such as foils, caps and cartons (except for any plugs in the pneumatic connections).
The material used in the packaging has been specifically chosen for its recyclability (exception: oil paper = residual waste).
- Observe the local regulations for environmentally friendly waste management of electronic components.
- Take into account the material specifications (→ Technical data).
- Use the product in its original status, without any unauthorised product modifications.
- Take into consideration the ambient conditions at the location of use.
Corrosive environments (e.g. ozone) will reduce the service life of the product.
- Compare the limit values specified in these operating instructions with your actual application (e.g. pressures, forces, torques, temperatures, masses, speeds, etc.).
Operation of the product in compliance with the relevant safety regulations is contingent on adherence to the load limits.
- Take the tolerance of the tightening torques into account.
Unless otherwise specified, the tolerance is $\pm 20\%$.
- Make sure the compressed air is properly prepared (→ Technical data).
- Maintain the selected medium for the total service life of the product. Example: Always use non-lubricated compressed air.
- Slowly pressurise the system as a whole.
There will then be no uncontrolled movements.
For slow start-up pressurisation, use start-up valve type HEL.

4 Installation

4.1 Mechanical installation

- Make sure there is sufficient space for the pneumatic connections as well as their tubing connections.



Note

If a clamping rod has insufficient surface quality, it may lead to the maximum holding force **not** being reached.

- Make sure the rod has the required quality (→ Technical data).

If a housing is used:



Note

There will be increased wear as the holes are not aligned exactly.

- Make sure of the following:
 - the tolerance field of the hole for holding the clamping cartridge [2] (KP) must correspond to size D9 (DIN ISO 286)
 - 2 plain bearings are used on the housing, whose reference axes A lie within a coaxial cylinder measuring 0.05 mm in diameter.

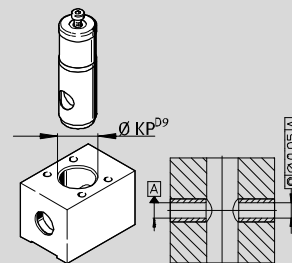


Fig. 6

Mounting the clamping rod [4]:

1. Manually:
 - Leave the pre-assembled mounting screw [9] in the thread of the supply port [1].
 - Only remove it after mounting the clamping rod [4].
2. Pneumatic:
 - Remove the pre-assembled mounting screw [9].
 - Pressurise the supply port [1].

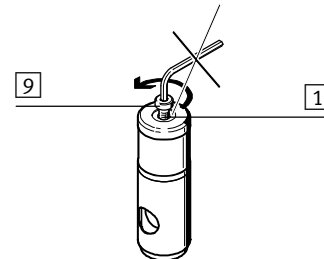


Fig. 7

The clamp is released in both cases and the clamping rod [4] can be mounted.

Mounting the clamping cartridge [2]:

1. Push the clamping cartridge [2] from above into the locating hole of the housing [5].
2. Push the clamping rod [4] through the housing [5] and the clamping cartridge [2].

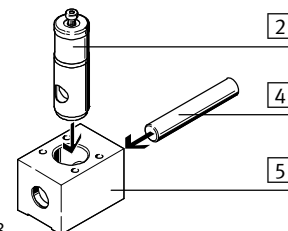


Fig. 8

Mounting the clamping unit [5]:

1. Push the clamping rod [4] into the clamping unit [5].
2. Mount the clamping unit [5] at the intended position.
The clamping unit has holes and threads [3] for mounting purposes.

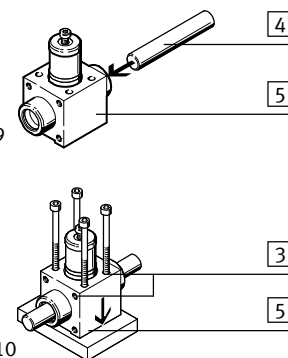


Fig. 10

Mounting the cylinder with clamping unit [8]:

1. Mount the cylinder [8] on the end face or use suitable mounting components.

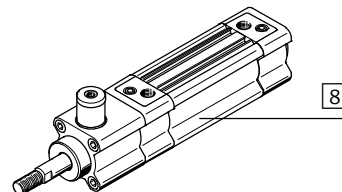


Fig. 11

Mounting components for the various cylinders [8] can be found in Festo's accessories (→ www.festo.de/catalogue).

4.2 Pneumatic installation

Connecting the tubing for the clamping cartridge 2/clamping unit 5:

1. Remove the mounting screw 9 on the supply port 1 of the clamping cartridge 2.
2. Insert a push-in fitting (M5 DIN 912 or G1/8) into the supply port 1 of the clamping cartridge 2.
The tightening torque is 0.5 Nm.

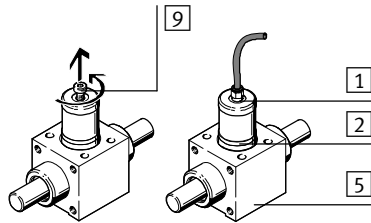
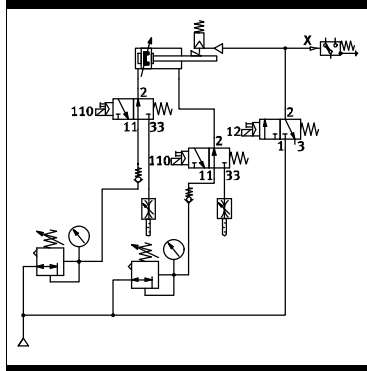


Fig. 12

Connecting the tubing of the cylinder 8:

- Connect the tubing of the clamping cartridge 2 and the cylinder 8 with the directional control valves intended for this purpose.
The following shows two examples of control circuits.

Clamping when there is a sudden pressure failure



Moving to any desired position and clamping

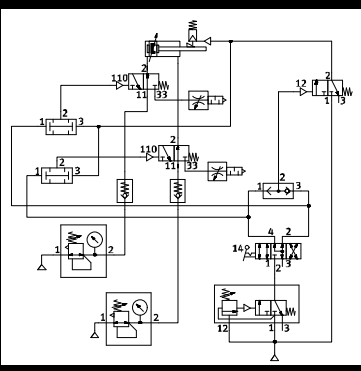


Fig. 13

5 Commissioning



Warning

Clamping rods can move out suddenly and unexpectedly, thereby causing injury to anybody who is in the positioning range.

- Make sure that:
 - nobody reaches into the positioning range of the moveable load
 - no objects project into the danger zone of the moving load
 - the clamping cartridge 2 is logically controlled in a correct manner
 - no modifications may be made to the product.
- Improper modifications impair the functioning and represent a safety risk.

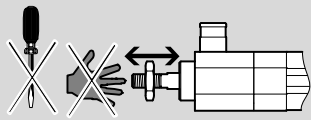


Fig. 14



Note

Clamping in movement sequences (braking) is not permitted. Increased wear leading to complete failure is possible.

- Make sure that the dynamic holding force is always less than the static holding force.
Apart from that, the clamping rod can break through.
- Make sure that the cylinder 8 is only pressurised in the park position when the clamp is released.
Movement against a non-pressurised chamber will create an acceleration which can damage the cylinder 8.

1. Slowly pressurise the complete system with at least 3 bar.
2. Exhaust the cylinder 8.
3. Completely screw in the adjusting screws on the cylinder 8 for the end-position cushioning 6.
4. Start a test run as described in table Fig. 15.
5. End the test run.

Clamping cartridge 2/ clamping unit 5

Cylinder with clamping unit 8

Pressurise the supply port 1 on the clamping cartridge 2 with 3 to max. 10 bar.	
Move the clamping rod 4 in a longitudinal direction.	Pressurise both ports of the cylinder 8 slowly in order to prevent danger caused by the piston rod 4 accelerating suddenly.
	Adjust the pneumatic end-position cushioning by means of the adjusting screws (not on cylinders with elastomer cushioning).
Check the clamping function of the clamping rod 4 by exhausting the supply port 1.	

Fig. 15

6 Operation

The clamping rod 4 can only be moved if the clamping cartridge 2 is pressurised or if the mounting screw 9 is screwed in.



Note

Transverse loadings due to non-aligned guides lead to increased wear.

- Make sure the clamping rod 4 is only loaded in the direction of movement.
- Use a self-aligning rod coupler (→ Accessories) in order to avoid transverse forces.

6.1 Clamping during operation

1. Pressurise the supply port of the park position on the cylinder 8.
2. Exhaust the clamping cartridge 2 and then the cylinder 8.

6.2 Moving out of a clamped parking position

Clamping cartridge 2/ clamping unit 5

Cylinder with clamping unit 8

<ol style="list-style-type: none"> 1. Pressurise the supply port 1 on the clamping cartridge 2 with 3 to max. 10 bar. 2. Move the clamping rod 4 into the desired position. 	<ol style="list-style-type: none"> 1. Pressurise the piston of the cylinder 8 on both sides. 2. Pressurise the supply port 1 on the clamping cartridge 2 with 3 to max. 10 bar. 3. Switch the directional control valve for controlling the cylinder 8.
---	--

Fig. 16

6.3 Checking the clamping function of a cylinder with clamping unit 8:

- Check the clamping function on a regular basis and immediately after a sudden pressure failure. The piston rod should be located in a park position when doing this.

Positioning the piston rod:

1. Pressurise the supply ports on the cylinder 8 on both sides.
2. Release the clamping function of the clamping cartridge 2 manually or pneumatically.
3. Exhaust one of the supply ports on the cylinder 8 and, in doing so, move the piston rod 4 to a park position.

Checking to ensure a safe clamping function without an effective load:

1. Pressurise the cylinder 8 on the stroke side chamber so that the piston rod 4 is held securely in the park position.
2. Exhaust the clamping cartridge 2 to clamp the piston rod 4.
3. Pressurise the cylinder 8 in the stroke direction.



Note

- Make sure that the maximum holding force of the clamping cartridge 2 is not exceeded with the cylinder pressure.

The clamping function of the clamping cartridge 2 is fine if the piston rod 4 only moves slightly (→ axial play in the chapter “Technical data”).

7 Maintenance and care

Cleaning:

1. Exhaust the cylinder 8 and the clamping cartridge 2.
2. Clean the clamping unit and the clamping rod 4 with a soft cloth.

Avoiding unlubricated operation:

3. Lubricate the surface of the clamping rod 4 with a thin layer of grease.
 - Use lubricating grease LUB-KC1 SILIKONFREI. The lubricating grease should only be recognisable by a slight darkening of the surface due to the colour of the grease.
 - Recommendation: Apply the grease with a cloth or soft brush.

8 Disassembly and repair



Caution

Danger of injury due to uncontrolled movement of components!

Before dismantling:

- Make sure that the cylinder [8] and the clamping cartridge [2] are exhausted.

- Loosen all of the mounting components on the cylinder [8] or clamping unit [5].
- Recommendation: Send the product to our repair service.
This way the fine tuning and tests that are required will be taken into particular consideration.

9 Accessories



Note

- Please select the corresponding accessories from our catalogue (→ www.festo.de/catalogue).

10 Troubleshooting

Malfunction	Possible cause	Remedy
The clamping rod [4] moves more than the max. permitted axial play despite an exhausted clamping cartridge [2]	Incorrect pneumatic actuation	Check pneumatic actuation
	Permanent manual un-locking	Remove the mounting screw [9] from the supply port [1]
	Load too great and/or static holding force exceeded	Reduce holding force, do not exceed static holding force
	Contamination on the clamping rod [4]	(→ Maintenance and care)
	Clamping cartridge [2] defective	Replace clamping cartridge [2]
	Wear	Send clamping cartridge [2] to Festo
Clamping rod [4] does not move despite an exhausted clamping cartridge [2]	Insufficient operating pressure on the clamping cartridge [2]	Increase operating pressure (→ Technical data)
	Clamping cartridge [2] defective	Send clamping cartridge [2] to Festo
After pressurisation the clamping rod [4] moves to the end position at high speed	Cylinder strikes against a non-pressurised chamber	Always strike against a pressurised chamber (→ Commissioning)

Fig. 17

11 Technical data

KP	
Mounting position	Any
Operating pressure (on the clamping cartridge [2]) [bar]	3 ... 10
Operating medium	Compressed air to ISO 8573-1:2010 [7:4:4]
Ambient temperature [°C]	-10 ... +80
Rod quality (KP/KPE)	<ul style="list-style-type: none"> - Steel, rod rolled smooth (e.g. X20Cr13, X6CrNiMoTi 17222); tensile strength > 650 N/mm²; hardness [HB30] > 175 - Hardened steel: min. HRC 60 - Hard-chromium plated steel: thickness of layer min. 20 µm - Tolerance range of rod diameter h8 - Surface roughness R_{max.} = 4 µm
Material (clamping cartridge [2])	
Housing:	Anodised aluminium
Piston:	Polyacetal
Spring:	Spring steel
Clamping jaws:	Brass
Seals:	Nitrile rubber, polyurethane

Fig. 18

KP-...	4-80	6-180	8-350	10-350	12-600	16-1000	20-1400	20-2000	25-5000	32-7500		
KPE-...	4	6	8	10	12	16	-	20	25	32		
ADN-...-KP	-			20/25	32	40	50	63	80/100	-		
DNC-...-KP	-				32	40	50	63	80/100	125		
DSBC-...-C	-				32	40	50	63	80/100	125		
DSNU-...-KP	8/10	12/16	20	25	32	40	50	63	-			
Clamping rod Ø	Dia-meter [mm]		4	6	8	10	12	16	20	20	25	32
Supply port [1]	M5	M5	M5	M5	M5	G½	G½	G½	G½	G½		
Static holding force	[N]	80	180	350	350	600	1000	1400	2000	5000	7500	
Axial play under load	Dia-meter [mm]		0.2	0.3	0.5			0.8			1.8	

Fig. 19