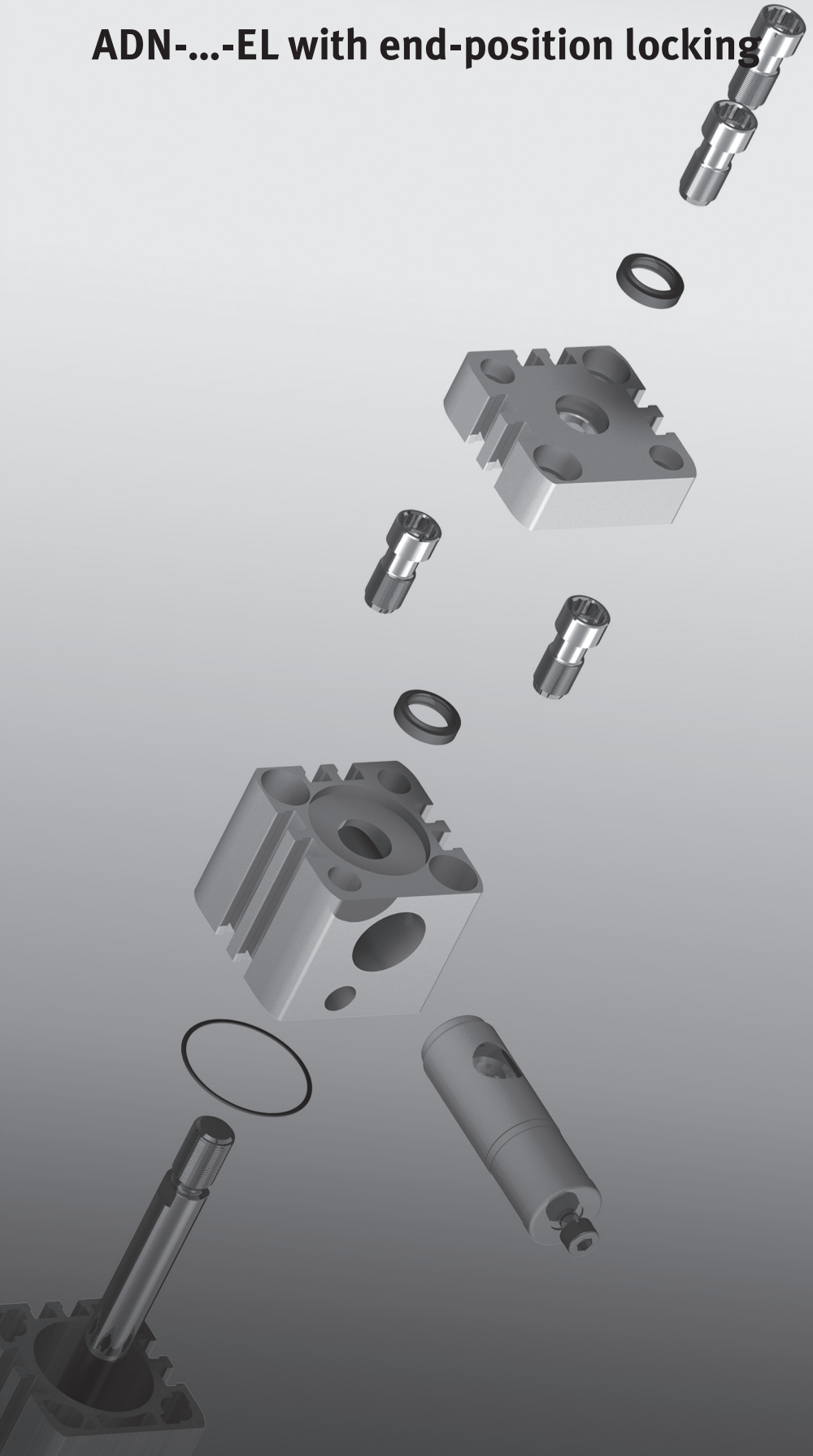
Cylinder with piston rod

Compact cylinder with standard hole pattern

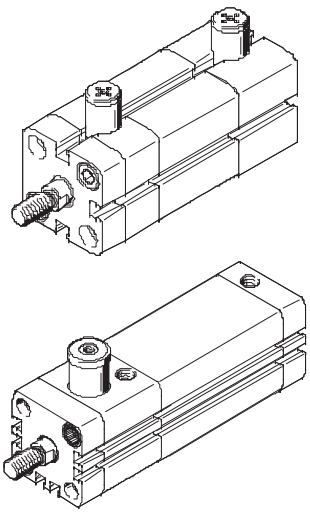
ADN-...-KP with clamping unit and

ADN-...-EL with end-position locking



FESTO

Repair instructions (en)



7ADN-KP_ADN-ELa_en

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Preface

These repair instructions are valid for the cylinders with piston rod listed on the title page to the exclusion of any liability claims.

Deviations compared to the descriptions in these repair instructions may arise depending on the design and/or modification status of the cylinder with piston rod. The user must check this prior to carrying out the repair and take the deviations into consideration if necessary.

These repair instructions have been prepared with care.

Festo AG & Co. KG does not, however, accept liability for any errors in these repair instructions or their consequences. Likewise no liability is accepted for direct or consequential damage resulting from improper use of the products.

More detailed information on this can be found in chapter 10 "Liability".

The relevant regulations on occupational safety, safety engineering and interference suppression as well as the stipulations contained in these repair instructions must be observed when working on the products.

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Table of contents

1 Important information

1.1 About these repair instructions

This document contains important information about the professional repair of the cylinder with piston rod of the type ADN-...-KP and ADN-...-EL.

The cylinder with piston rod ADN-...-KP and ADN-...-EL is fully repairable in the event of damage due to normal wear. The entire cylinder must be replaced in the event of damage to the cylinder barrel.

Before carrying out a repair, the relevant chapter in these instructions must be read in full and followed consistently.

For reasons of clarity, these repair instructions do not contain complete detailed information. The following documents should therefore also be available when repairing the cylinder with piston rod:

- **Operating instructions for the respective cylinder with piston rod**

  Contains information about the operating elements and connections of the cylinder with piston rod as well as the function, structure, application, installation, commissioning, maintenance and care, etc. can be found on the Festo website (www.Festo.com).
- **Spare parts documentation**

  Contains an overview of the spare and wearing parts as well as information on their installation. Can be found in the online spare parts catalogue on the Festo website (spareparts.festo.com).
- **Assembly aids**

  Contains an overview of available assembly aids such as lubricating greases, locking agents, maintenance tools, etc. (aids for assembly and maintenance). Can be found in the online spare parts catalogue on the Festo website (www.Festo.com).

1.2 Pictograms used in these repair instructions

Warning

This sign indicates a dangerous situation for persons and/or the product. Failure to observe this warning can result in injury to persons and/or damage to the device.

Note

This sign provides important tips and information that can make your work easier.

Environment

This sign provides information on the steps required for environmentally-friendly use of materials and equipment, as well as the guidelines and regulations that may need to be observed.

Accessories

This sign contains information on accessories and attachments relevant to the context.

Documents

This sign contains references to other chapters or documents containing additional information.

1.3 General safety instructions

Warning

The cylinder with piston rod must only be repaired by authorised and trained persons in accordance with the specifications in the technical documentation and using original spare parts.

Installation and repair by unauthorised and untrained persons, repairs using non-original spare parts or without the technical documentation required for installation and/or repair are dangerous and therefore not permitted.

Repairs must only be carried out in conjunction with these repair instructions and the device-specific operating instructions.

Note

Instead of carrying out the repair yourself, your local Festo sales office offers the option of having the repair carried out by Festo.

Environment

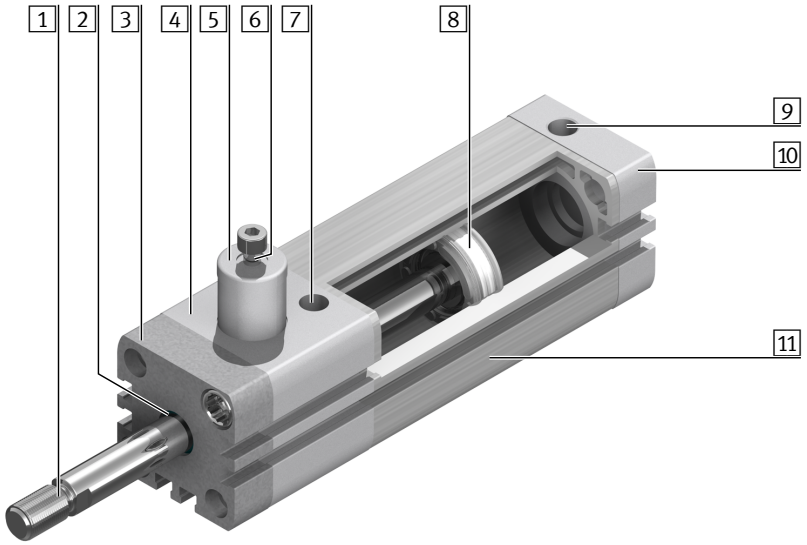
Components and equipment replaced as part of a repair must be disposed of in accordance with the locally valid environmental protection regulations.

2 General product description

2.1 Functional description

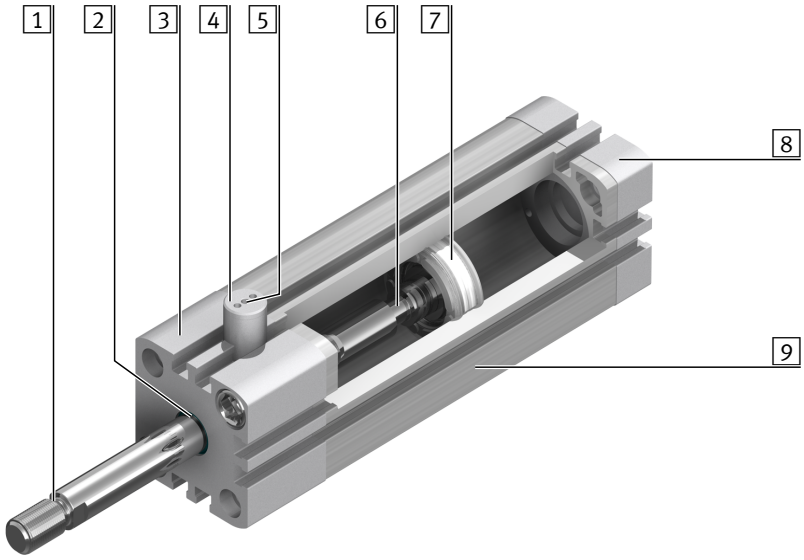
The piston moves in the cylinder barrel when the cylinder chamber is pressurised. The piston rod transmits the movement to the outside. The advanced piston rod is retracted again when the other cylinder chamber is pressurised.

2.2 Functional description of ADN-...-KP



1 Piston rod
2 Piston rod seal
3 Bearing cap
4 Cover
5 Clamping unit KP
6 Compressed air connection clamping unit KP
7 Front compressed air connection
8 Piston (one-piece)
(only ADN-20 / 25 / 32-...-KP)
9 Rear compressed air connection
10 End cap
11 Cylinder barrel

2.3 Functional description of ADN-...-EL



1 Piston rod
2 Piston rod seal
3 Bearing cap
4 End-position locking at front
5 Compressed air connection end-position locking
6 Slot in the piston rod for the end-position locking.
7 Piston (one-piece)
(only ADN-20 / 25 / 32-...-EL)
8 End cap
9 Cylinder barrel

2.4 Type codes (ascertaining the features of a cylinder)

The precise features of the current cylinder with piston rod can be ascertained with the help of the rating plate on the cylinder. The type designation is located directly beneath the Festo logo and describes the cylinder's features separated by a hyphen (-).

Example:

1 Type designation
2 Serial number
3 Technical information
4 Part number

The type designation on this rating plate provides the following information:

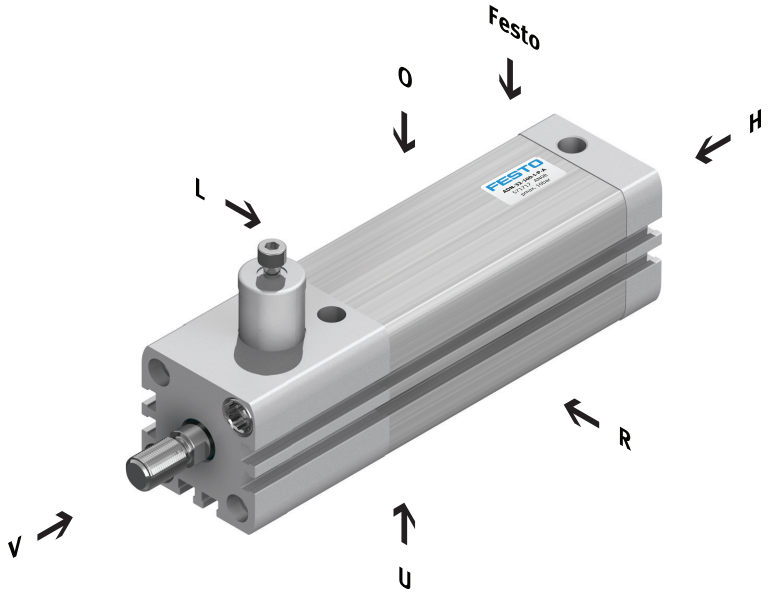
ADN Compact cylinder, double-acting, standard hole pattern, with clamping unit KP
32 Piston diameter 32 mm
50 Stroke 50 mm
KP Clamping unit attached
A Male thread
P Elastic cushioning rings/pads at both ends
A Sensing option (magnetic piston)

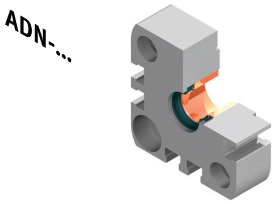
Note

A list and description of all possible equipment features of the cylinder with piston rod can be found in the data sheet. It is available on the Festo website (www.Festo.com).

2.5 Orientation designations and bearing cap variants

This diagram provides an overview of the orientation designations for the cylinder with piston rod.





Orientation:

Festo = product identification (rating plate) as reference point

O = top

U = underneath

R = right

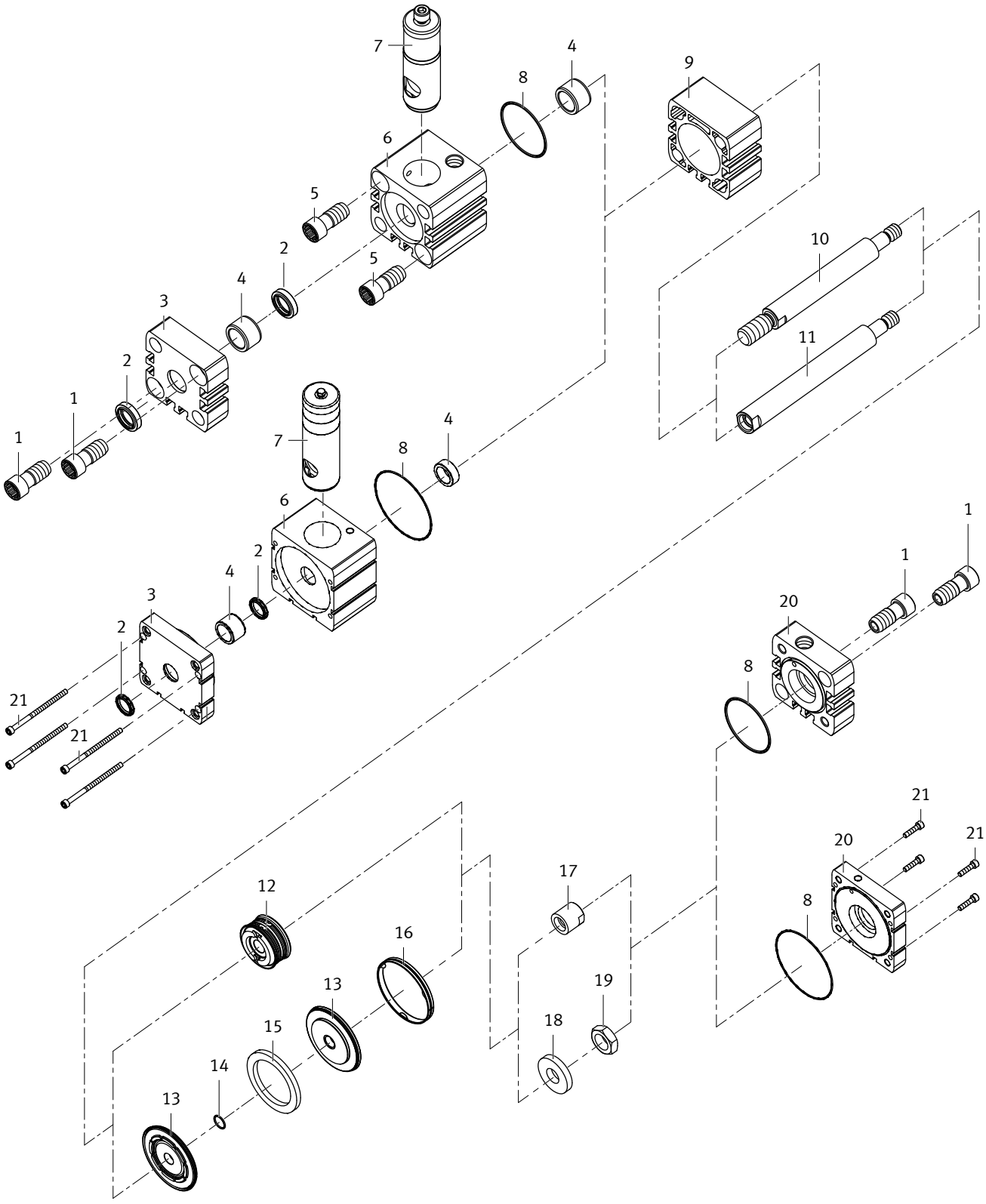
L = left

V = front

H = rear

3 Component overview

3.1 Compact cylinders ADN-KP, standard hole pattern, with clamping unit KP

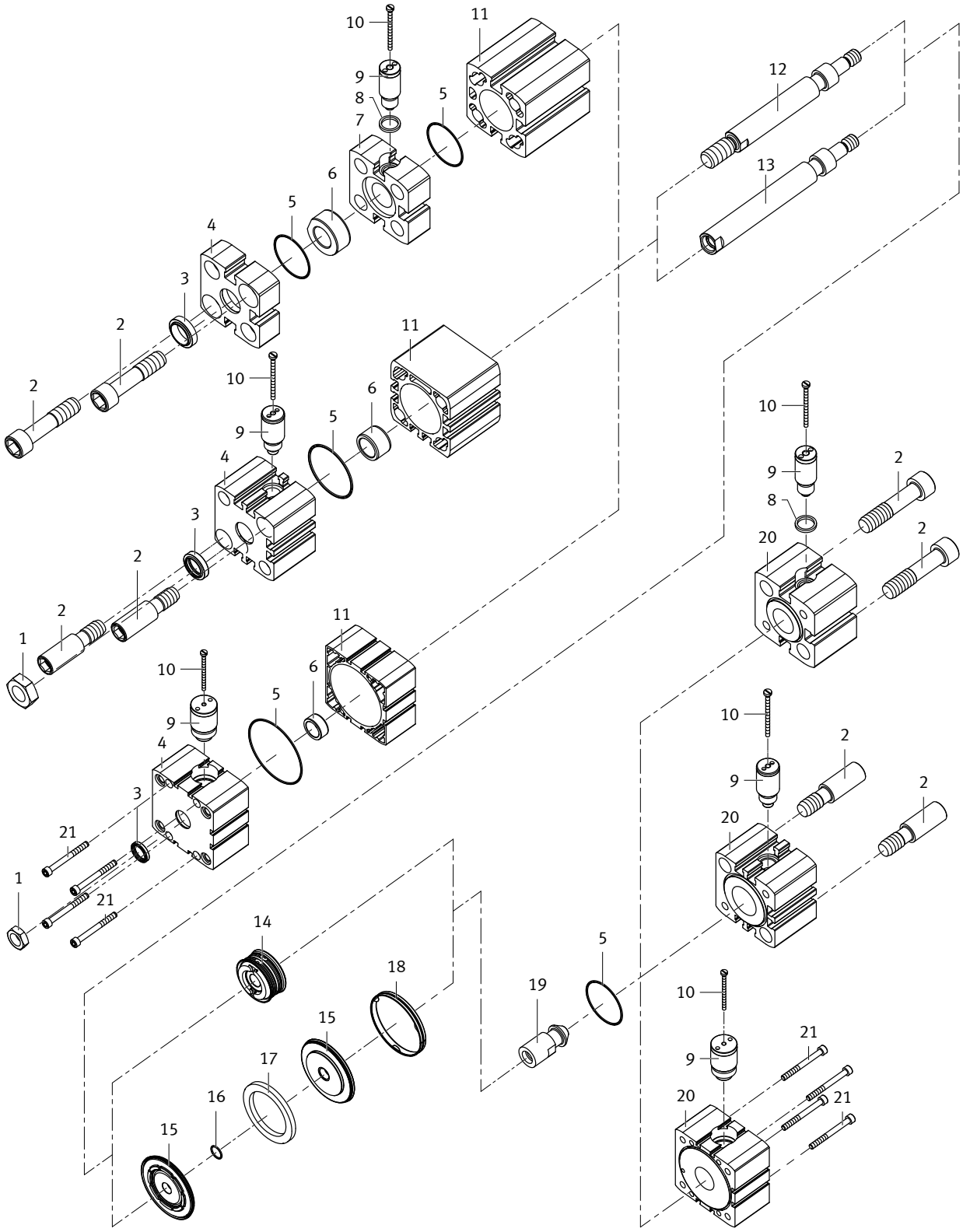


This diagram is intended only to provide an overview of the individual components. To order spare and wearing parts, please use the online spare parts catalogue on the Festo website (spareparts.festo.com).

Item	Designation	Note
1	Flange screw	Only ADN-20–63-...-KP, use screw locking agent
2	Piston rod seal	
3	Bearing cap	
4	Bearing	
5	Flange screw	Use screw locking agent
6	Cover	
7	Clamping cartridge	
8	O-ring	
9	Cylinder barrel	
10	Piston rod, male thread	Only ADN-...-...-KP-A-...
11	Piston rod, female thread	Only ADN-...-...-KP-I-...
12	Piston	Only ADN-20–32-...-KP
13	Seal piston	
14	O-ring	
15	Magnet	
16	Guiding band	
17	Nut	Only ADN-20 / 25-...-KP, use screw locking agent
18	Washer	Only ADN-32–100-...-KP
19	Hex nut	Only ADN-32–100-...-KP, use screw locking agent
20	End cap	
21	Socket head screw	Only ADN-80 / 100-...-KP, use screw locking agent

3.2 Compact cylinders ADN-EL, standard hole pattern, with end-position locking

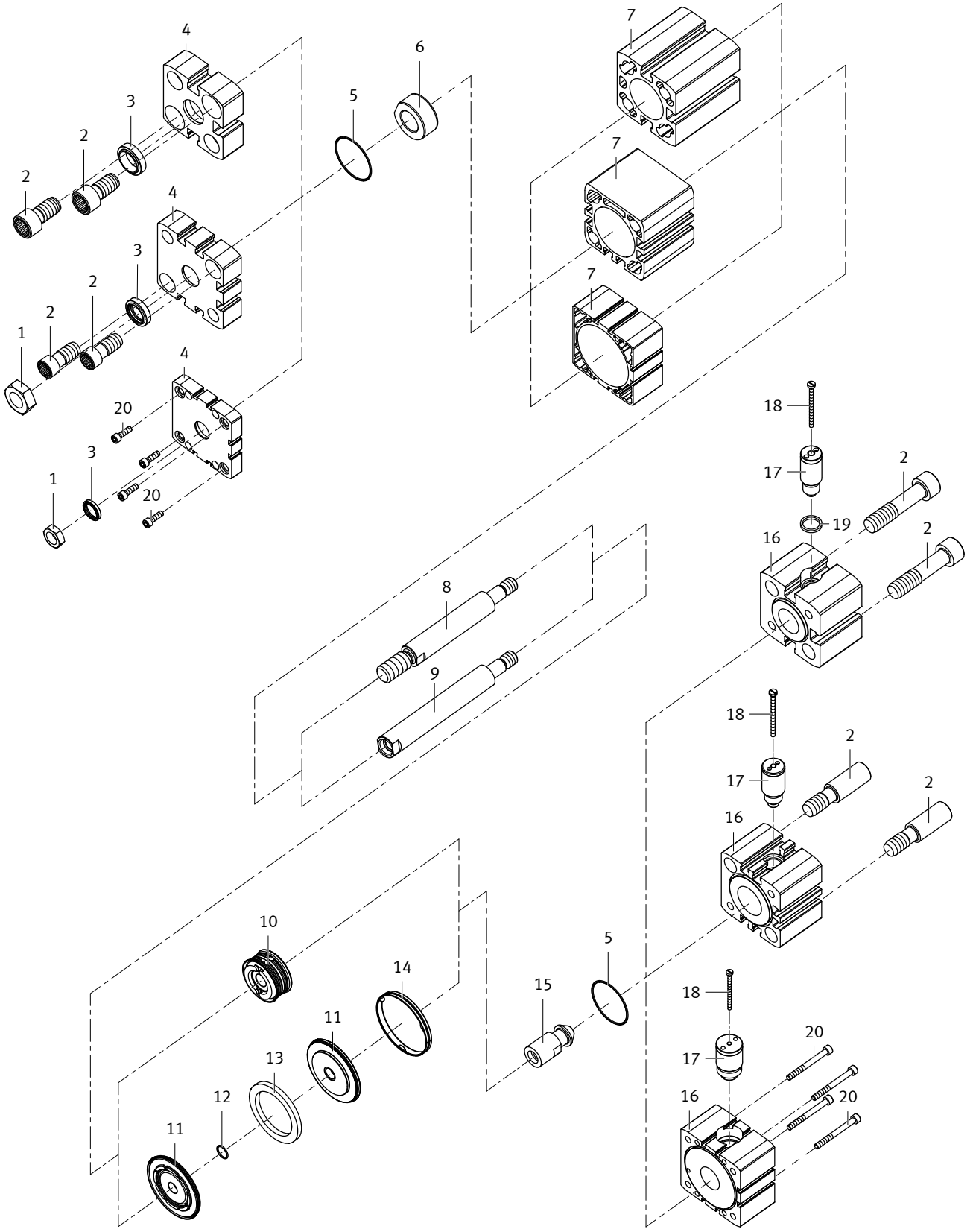
3.2.1 ADN-...-...-ELB-...



This diagram is intended only to provide an overview of the individual components. To order spare and wearing parts, please use the online spare parts catalogue on the Festo website (spareparts.festo.com).

Item	Designation	Note
1	Hex nut	Not ADN-20 / 25-...-ELB-A-..., not ADN-...-...-ELB-I-...
2	Flange screw	Only ADN-20–63-...-ELB, use screw locking agent
3	Piston rod seal	
4	Bearing cap	
5	O-ring	
6	Bearing	
7	Intermediate cap	Only ADN-20 / 25-...-ELB
8	Spacer ring	Only ADN-20 / 25-...-ELB
9	Locking cylinder	Use screw locking agent
10	Socket head screw	
11	Cylinder barrel	
12	Piston rod, male thread	Only ADN-...-...-ELB-A-...
13	Piston rod, female thread	Only ADN-...-...-ELB-I-...
14	Piston	Only ADN-20–32-...-ELB
15	Seal piston	
16	O-ring	
17	Magnet	
18	Guiding band	
19	Threaded coupling	Use screw locking agent
20	End cap	
21	Socket head screw	Only ADN-80 / 100-...-ELB, use screw locking agent

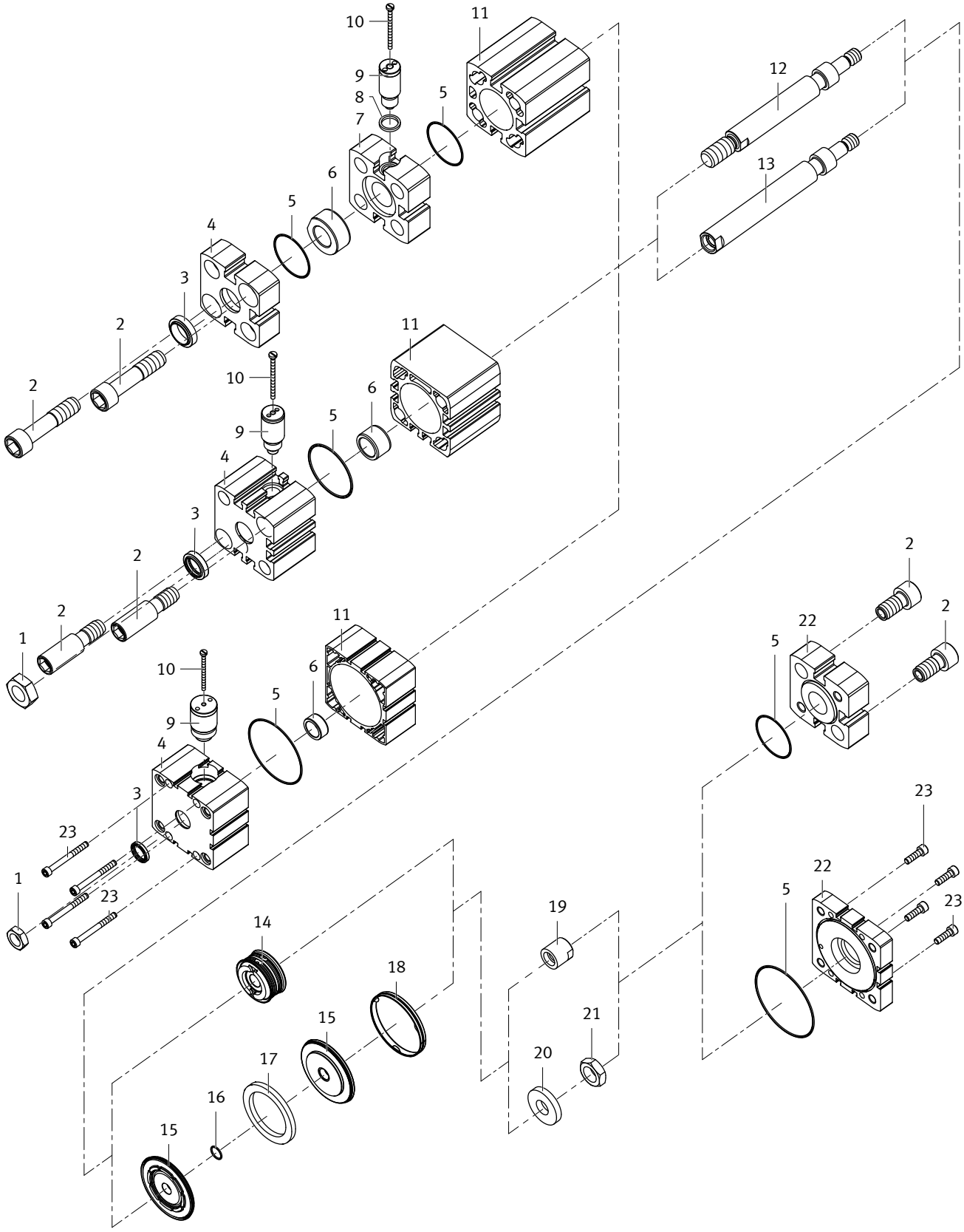
3.2.2 ADN-...-...-ELH-...



This diagram is intended only to provide an overview of the individual components. To order spare and wearing parts, please use the online spare parts catalogue on the Festo website (spareparts.festo.com).

Item	Designation	Note
1	Hex nut	Only ADN-20 / 25-...-ELH-A-..., not ADN-...-...-ELH-I-...
2	Flange screw	Only ADN-20–63-...-ELH; use screw locking agent
3	Piston rod seal	
4	Bearing cap	
5	O-ring	
6	Bearing	
7	Cylinder barrel	
8	Piston rod, male thread	Only ADN-...-...-ELH-A-...
9	Piston rod, female thread	Only ADN-...-...-ELH-I-...
10	Piston	Only ADN-20–32-...-ELH
11	Seal piston	
12	O-ring	
13	Magnet	
14	Guiding band	
15	Threaded coupling	Use screw locking agent
16	End cap	
17	Locking cylinder	Use screw locking agent
18	Socket head screw	
19	Spacer ring	Only ADN-20 / 25-...-ELH
20	Socket head screw	Only ADN-80 / 100-...-ELH, use screw locking agent

3.2.3 ADN-...-...-ELV-...



This diagram is intended only to provide an overview of the individual components. To order spare and wearing parts, please use the online spare parts catalogue on the Festo website (spareparts.festo.com).

Item	Designation	Note
1	Hex nut	Not ADN-20 / 25-...-ELV-A-..., not ADN-...-...-ELV-I-...
2	Flange screw	Only ADN-20–63-...-ELV, use screw locking agent
3	Piston rod seal	
4	Bearing cap	
5	O-ring	
6	Bearing	
7	Intermediate cap	Only ADN-20 / 25-...-ELV
8	Spacer ring	Only ADN-20 / 25-...-ELV
9	Locking cylinder	Use screw locking agent
10	Socket head screw	
11	Cylinder barrel	
12	Piston rod, male thread	Only ADN-...-...-ELV-A-...
13	Piston rod, female thread	Only ADN-...-...-ELV-I-...
14	Piston	Only ADN-20–32-...-ELV
15	Seal piston	
16	O-ring	
17	Magnet	
18	Guiding band	
19	Nut	Use screw locking agent
20	Washer	Only ADN-20 / 25-...-ELV
21	Hex nut	Only ADN-20 / 25-...-ELV, use screw locking agent
22	End cap	
23	Socket head screw	Only ADN-80 / 100-...-ELV, use screw locking agent

4 Repair steps

4.1 Preparation

- Before starting the repair, remove any attachments (clamping device, end-position locking, etc.) in accordance with the accompanying operating instructions.
- Keep your working environment tidy.
- Only use the spare parts and assembly aids (grease, locking agent, etc.) provided in the set of wearing parts.

Warning

Make sure that the bearing cap cannot suddenly come flying off.

- Remove the non-return valves and tubing connection from the cylinder and depressurise the cylinder completely so that any pressure present is not suddenly released when the cylinder is opened.

To prevent damage to sealing rims or guide surfaces, do not use pointed or sharp-edged assembly aids.

4.2 Visual inspection

Check the cylinder for visible damage that might impair its function (e.g. warping of the piston rod) as well as deposits and scoring. The entire cylinder must be replaced if the cylinder barrel is showing signs of significant damage.

4.3 Cylinders ADN-...-KP

The description in this chapter can be used to repair cylinders of the type ADN-...-KP with the following features:

Code	Description
KP	Clamping unit KP attached
A	Male thread
I	Female thread
P	Elastic cushioning rings/pads at both ends
A	External position sensing

Code	Description
K2	Piston rod with extended male thread
K5	Piston rod with special thread
K8	Extended piston rod
TI	Captive rating plate

The repair steps can be found in chapter 5 "Repairing cylinder ADN-...-KP".

4.4 Cylinders ADN-...-EL

The description in this chapter can be used to repair cylinders of the type ADN-...-EL with the following features:

Code	Description
ELB	End-position locking at both ends
ELV	End-position lock at front
ELH	End-position locking, rear
A	Male thread
I	Female thread
P	Elastic cushioning rings/pads at both ends

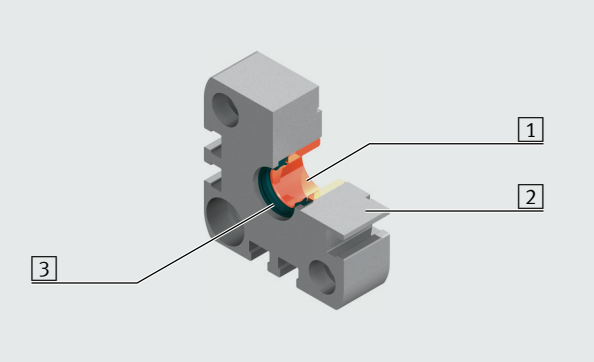
Code	Description
A	External position sensing
K2	Piston rod with extended male thread
K5	Piston rod with special thread
K8	Extended piston rod
TI	Captive rating plate

The repair steps can be found in chapter 6 "Repairing cylinder ADN-...- EL".

5 Repairing cylinder ADN-...-KP

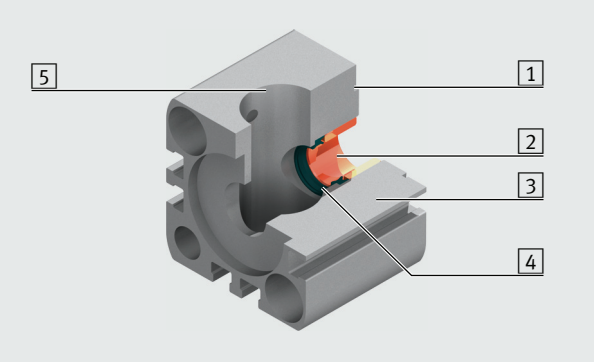
5.1 Structure of the covers

5.1.1 Structure of the bearing cap



1 Bearing
2 Bearing cap
3 Piston rod seal

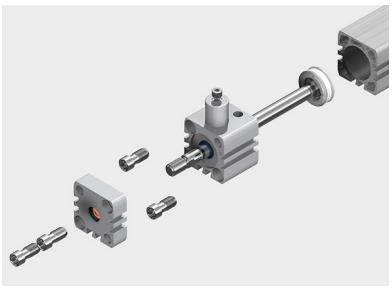
5.1.2 Structure of cover with clamping unit KP



1 O-ring
2 Bearing
3 Clamping unit KP cover
4 Piston rod seal
5 Location hole for clamping unit KP

5.2 Removing the covers

- **ADN-20 to 63-...-KP**
  - Loosen the flange screws in the bearing cap and and end cap and remove them.
  - Pull the bearing cap away from the piston rod.
  - Remove the end cap from the cylinder barrel.
  - Loosen the flange screws in the cover with clamping unit KP and remove them.
  - Pull the cylinder barrel from the piston rod.
  - Remove any residue of the screw locking agent from the threads of the screws.

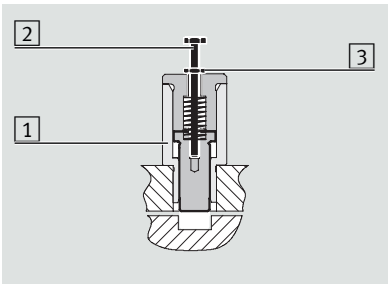


- **Only ADN-80 / 100-...-KP**
  - Loosen the socket head screws in the bearing and end caps and remove them.
  - Pull the bearing cap away from the piston rod.
  - Remove the end cap from the cylinder barrel.
  - Pull the cylinder barrel from the piston rod.
  - Remove any residue of the screw locking agent from the threads of the screws.

5.3 Removing the piston rod from clamping unit KP

Note
The piston rod can only be pulled out of clamping unit KP if the clamping is released.

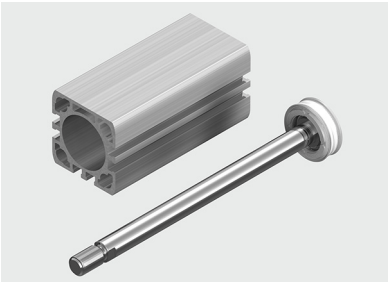
- To remove the piston rod, pressurise the compressed air connection of the clamping unit KP [1] (3 to max. 10 bar) or insert a screw (M5 or G1/8) into the thread for the compressed air connection [2] until the clamping is released.
- Pull the piston rod out of the cover with clamping unit KP.



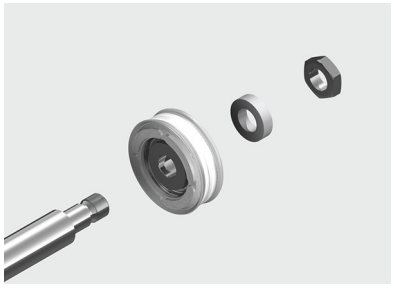
- Pull the clamping unit KP out of the location hole in the cover.
- Clean the location hole and clamping unit KP.

Note
The entire clamping unit KP must be replaced if it is showing any damage.

- Check the cylinder barrel and piston rod for damage.
  The entire cylinder must be replaced if the cylinder barrel (particularly the bearing surface) is showing significant damage.



5.4 Replacing the piston components

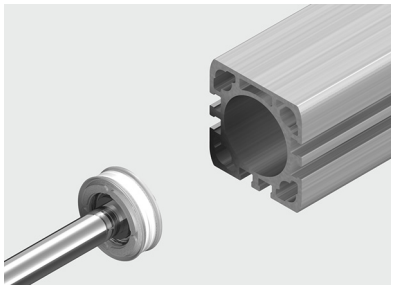


- **ADN-20 / 25-...-KP**
  - Unscrew the nut from the piston rod.
- **ADN-32 to 100-...-KP**
  - Remove the hex nut and washer from the piston rod.
- Remove the piston components from the piston rod, noting the order and orientation.
- Remove any residue of the screw locking agent from the threads of the piston rod and nut or hex nut.
- Replace the components with those included in the set of wearing parts and reassemble the piston components on the piston rod in the correct order.

- **Only ADN-20 / 25-...-KP**
  - Apply the screw locking agent included in the set of wearing parts to the nut and screw it onto the piston rod with the corresponding torque (see table).
- **ADN-32 to 100-...-KP**
  - Place the washer on the piston rod.
  - Apply the screw locking agent included in the set of wearing parts to the hex nut and screw it onto the piston rod with the corresponding torque (see table).

Type	Torque
ADN-20-...-KP	2.7 Nm
ADN-25-...-KP	7 Nm
ADN-32-...-KP	9.2 Nm
ADN-40-...-KP	13.5 Nm
ADN-50-...-KP	30 Nm
ADN-63-...-KP	12 Nm
ADN-80-...-KP	45.5 Nm
ADN-100-...-KP	45.5 Nm

5.5 Inserting the piston rod into the cylinder barrel



- Clean the inside surface of the cylinder barrel as described in chapter 7.1 "Cleaning".
- Apply the grease included in the set of wearing parts to the following parts:

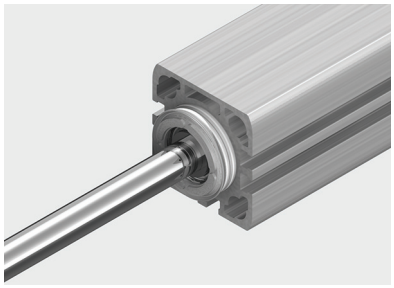
Component	Greasing
Inside surface of cylinder barrel	Thin film[1)]
Surface of piston rod	Thin film[1)]
Piston seal lip rings	Thin film[1)] on outside
Piston surface between lip rings (grease reservoir[2)])	Fill 2/3 with grease

[1)] See chapter 7.2.2 "Thin grease film"

[2)] See chapter 7.2.3 "Grease reservoir"

- Place the piston flat against the front side of the cylinder barrel and insert the lip ring into the cylinder barrel by tilting and turning it slightly.

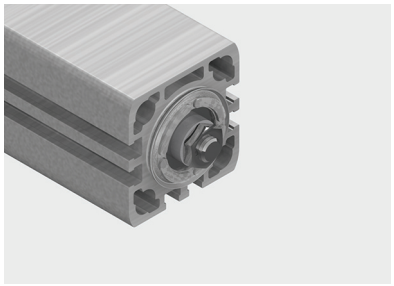
  The sealing lip must not fold back against the inside of the piston.



Note

If necessary use a flat and blunt-edged object to insert the lip ring into the cylinder barrel.

- Insert the piston fully into the cylinder barrel.
- Push the piston far enough into the cylinder barrel so that the first lip ring protrudes slightly at the other end of the cylinder barrel.
- Pull the piston rod back again until the piston is sitting fully in the cylinder barrel.

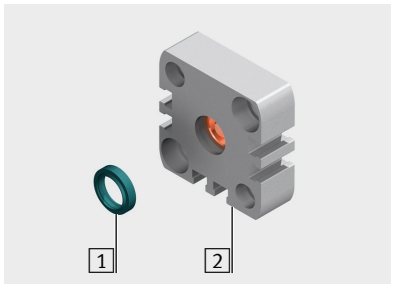


Note

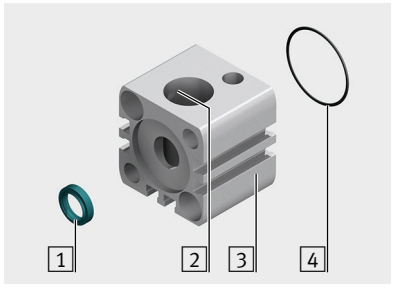
This approach ensures that the sealing lips of the two lip rings sit correctly in the cylinder barrel.

5.6 Repairing and attaching the covers

- Remove the piston rod seal [1] from the bearing cap [2].



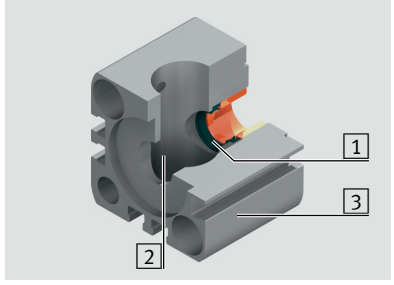
- Remove the piston rod seal [1] from the cover with clamping unit KP [3].



Note

The piston rod seal [1] is positioned at the location hole for clamping unit KP [2] in the cover [3].

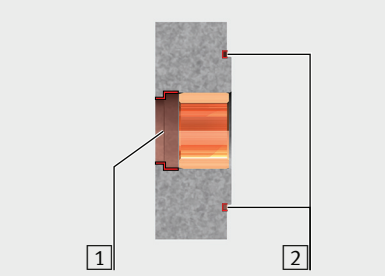
- Remove the O-ring [4] from the slot of the cover with clamping unit KP and the end cap.



Warning

Check the plain bearing in the bearing cap and in the cover with the location hole for claming unit KP for visible damage that might impair their function, such as deposits and scoring. The entire bearing cap or cover with the location hole for clamping unit KP must be replaced if the plain bearing is showing significant damage.

- Clean the seats of the piston rod seals [1] in the bearing cap and in the cover with clamping unit KP.
- Clean the seat of the O-ring [2] in the end cap and in the cover with clamping unit KP.

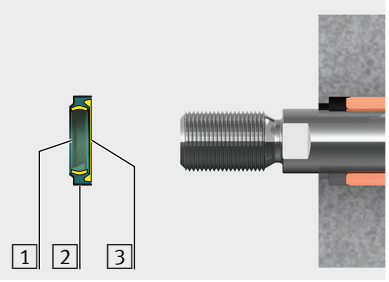


- Grease the new piston rod seals as follows:

Area	Greasing
[1] Grease reservoir[1)] for piston rod	Fill 2/3 with grease
[2] External surface for bearing cap	Thin film[2)]
[3] Grease reservoir[1)] for bearing	Fill 2/3 with grease

[1)] See chapter 7.2.3 "Grease reservoir"

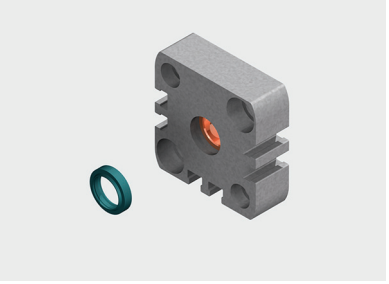
[2)] See chapter 7.2.2 "Thin grease film"



- Insert the piston rod seals into the bearing cap and the cover with clamping unit KP.

Note

Note the mounting direction (individual sealing lips facing out).

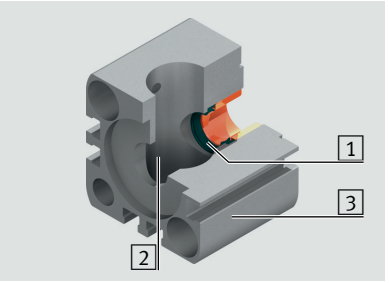


- Insert the piston rod seals [1] into the cover with the location hole for clamping unit KP [3].

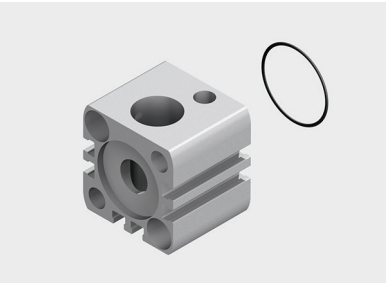
  The piston rod seal [1] is positioned at the location hole for clamping unit KP [2] in the cover [3].

Note

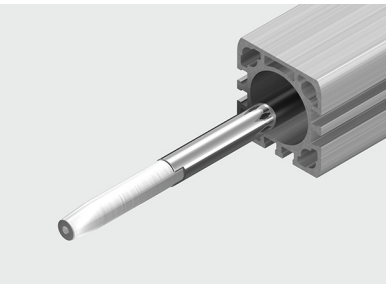
Note the mounting direction (individual sealing lips facing out).



- Grease the new O-rings and insert them into the slots in the end cap and cover with clamping unit KP.



- To protect the bearing and seals, place the appropriate mounting sleeve (see chapter 9.2 "Special tools") on the thread of the piston rod to prevent damage.

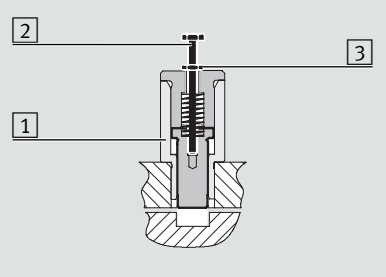


- Insert clamping unit KP in the location hole of the cover.

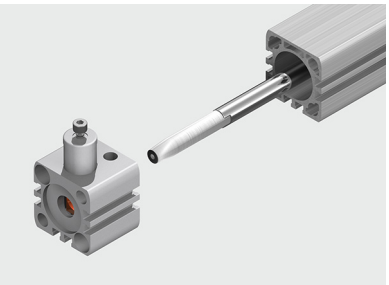
Note

The piston rod can only be pushed through clamping unit KP if the clamping is released.

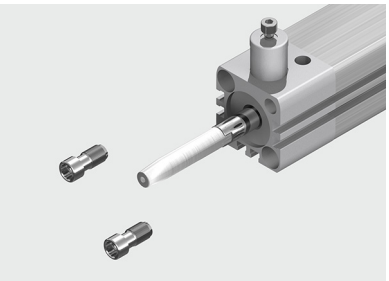
- To insert the piston rod, pressurise the compressed air connection of the clamping unit KP [1] (3 to max. 10 bar) or insert a screw (M5 or G1/8) into the thread for the compressed air connection [2] until the clamping is released.



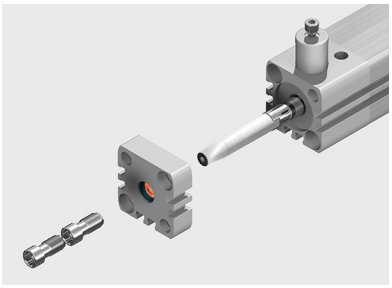
- Guide the cover with clamping unit KP over the mounting sleeve (see chapter 9.2 "Special tools") onto the piston rod as far as the cylinder barrel.



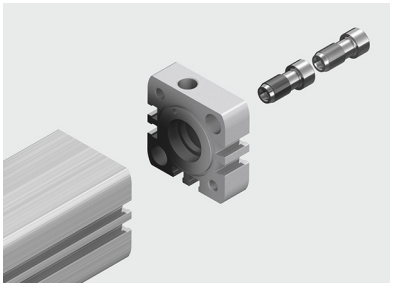
- **ADN-20 to 63-...-KP**
  - Align the cover with clamping unit KP flush with the cylinder barrel.
  - Apply the screw locking agent included in the set of wearing parts to the flange screws and screw these through the cover with clamping unit KP into the cylinder barrel.
  - Tighten the screws using the appropriate torque (see table).



– Guide the bearing cap over the mounting sleeve (see chapter 9.2 "Special tools") onto the piston rod as far as the cover with clamping unit KP.
– Apply the screw locking agent included in the set of wearing parts to the flange screws and screw these through the bearing cap into the cover with clamping unit KP.
– Align the bearing cap flush with the cylinder barrel.
– Tighten the screws using the appropriate torque (see table).



– Place the end cap at the other end of the cylinder barrel.
– Apply the screw locking agent included in the set of wearing parts to the flange screws and screw these through the end cap into the cylinder barrel.
– Align the end cap flush with the cylinder barrel.
– Tighten the screws using the appropriate torque (see table).



Type	Torque
ADN-20-...-KP	9 Nm
ADN-25-...-KP	9 Nm
ADN-32-...-KP	27 Nm
ADN-40-...-KP	27 Nm
ADN-50-...-KP	35 Nm
ADN-63-...-KP	35 Nm

- **ADN-80 / 100-...-KP**
  – Guide the bearing cap over the mounting sleeve (see chapter 9.2 "Special tools") onto the piston rod as far as the cover with clamping unit KP.
  – Apply the screw locking agent included in the set of wearing parts to the socket head screws and screw these through the bearing cap and cover with clamping unit KP into the cylinder barrel.
  – Align the bearing cap and the cover with clamping unit KP flush with the cylinder barrel.
  – Tighten the screws using the appropriate torque (see table).

  – Place the end cap at the other end of the cylinder barrel.
  – Apply the screw locking agent included in the set of wearing parts to the socket head screws and screw these through the end cap into the cylinder barrel.
  – Align the end cap flush with the cylinder barrel.
  – Tighten the screws using the appropriate torque (see table).

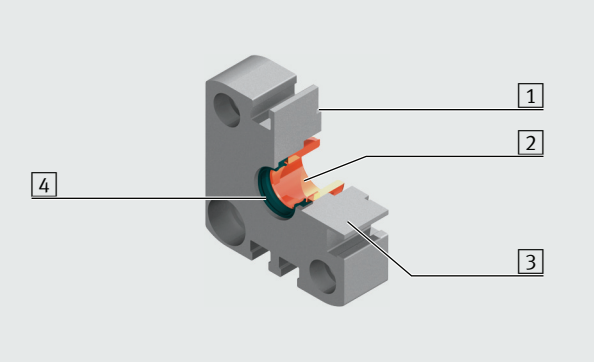
Type	Torque
ADN-80-...-KP	12 Nm
ADN-100-...-KP	9 Nm

- Perform a functional test as per the operating instructions (enclosed with the cylinder or can be called up on the Festo website (www.Festo.com)) and commission the repaired cylinder.

6 Repairing cylinder ADN-...- EL

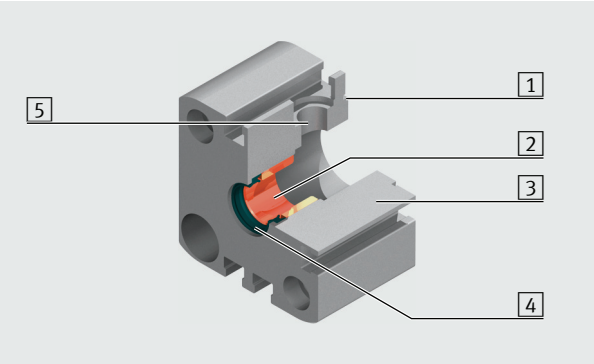
6.1 Structure of the bearing cap

6.1.1 Structure of the bearing cap without end-position locking



1 O-ring
2 Bearing
3 Bearing cap
4 Piston rod seal

6.1.2 Structure of the bearing cap with end-position locking



1 O-ring
2 Bearing
3 Bearing cap with end-position locking
4 Piston rod seal
5 Fixture for the end-position locking

6.2 Removing the covers

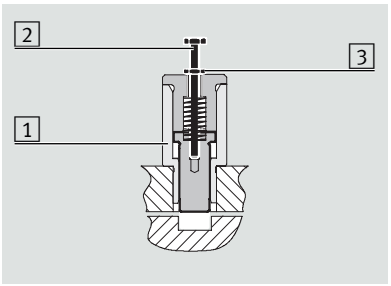
Note

The bearing, end and intermediate cap with end-position locking can only be removed from the piston rod when the end-position locking is **unlocked**.

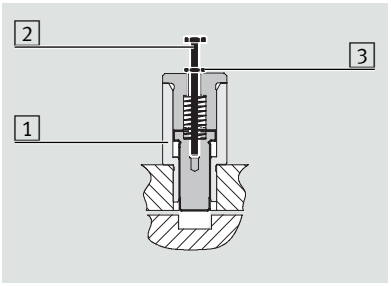
Unlocking the end-position locking

- Unscrew the locking cylinder from the relevant cover and remove the spacer ring (only ADN-20 / 25-...-EL)
- or manually unlock the end-position locking:
  – Insert a screw (see table) into the bolt through the opening 1 of the locking cylinder 2.

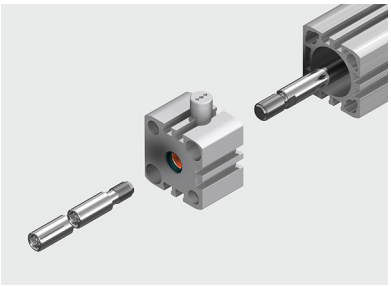
ADN-...-EL		20 / 25	32 / 40	50 / 63	80 / 100
Screw (minimum length)		M2x30	M2x30	M3x40	M3x50
Tensile force	[N]	4	4	10	25
Stroke	[mm]	2.7	3.5	4.7	6



  – Pull out the screw 1 and the bolt. The piston rod is now unlocked.
    When the screw is released, the bolt returns to the locked starting position.
  – To permanently unlock, fix the bolt in the unlocked position by means of a screw and a lock nut 3. Only this combination will ensure that the lock is fully unlocked.

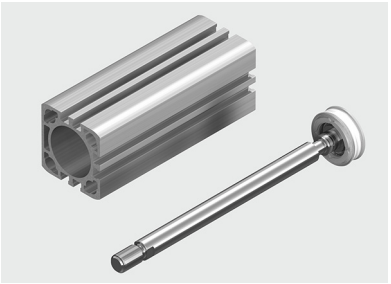


- Loosen the flange screws or socket head screws (only ADN-80 / 100-...-EL) in the bearing and end caps and remove them.
- Remove the bearing and end caps from the cylinder barrel and piston rod.
- **Only ADN-20 / 25-...-ELB / ELV**
  – Pull the intermediate cap away from the cylinder barrel and piston rod.
- Remove any residue of the screw locking agent from the threads of the screws.
- Pull the cylinder barrel from the piston rod.
- Remove any residue of the screw locking agent from the threads of the screws.

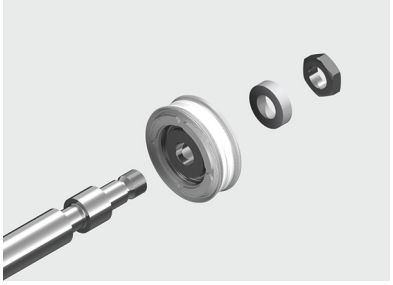


6.3 Replacing the piston components

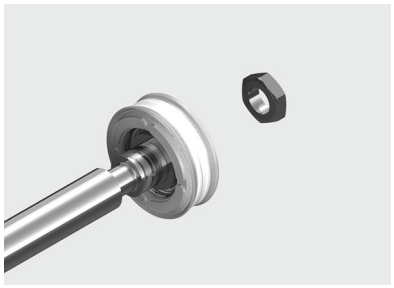
- Pull the piston rod out of the cylinder barrel.
- Check the cylinder barrel and piston rod for damage.
  The entire cylinder must be replaced if the cylinder barrel (particularly the bearing surface) is showing significant damage.



- Unscrew the threaded coupling from the piston rod.
- **Only ADN-32 / 40 /50 /63 /80 /100-...-ELV**
  – Remove the hex nut and washer from the piston rod.
- Remove the piston components from the piston rod, noting the order and orientation.
- Remove any residue of the screw locking agent from the threads of the piston rod and hex nut.
- Replace the components with those included in the set of wearing parts and reassemble the piston components on the piston rod in the correct order.



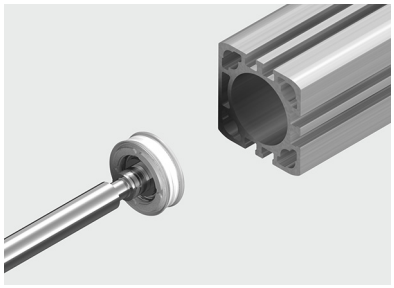
- Apply the screw locking agent included in the set of wearing parts to the threaded coupling and screw it onto the piston rod with the corresponding torque (see table).
- **Only ADN-32 / 40 /50 /63 /80 /100-...-ELV**
  - Place the washer on the piston rod.
  - Apply the screw locking agent included in the set of wearing parts to the hex nut and screw it onto the piston rod with the corresponding torque (see table).



Type	Torque
ADN-20-...-ELB / ELV	2.7 Nm
ADN-20-...- ELH	4.5 Nm
ADN-25-...-ELB / ELH / ELV	7.0 Nm
ADN-32-...-ELB / ELH / ELV	9.2 Nm
ADN-40-...-ELB / ELH / ELV	13.5 Nm
ADN-50-...-ELB / ELH	23.3 Nm
ADN-50-...-ELV	30 Nm
ADN-63-...-ELB / ELH	23.3 Nm
ADN-63-...-ELV	32 Nm
ADN-80-...-ELB / ELH / ELV	45.5 Nm
ADN-100-...-ELB / ELH / ELV	45.5 Nm

6.4 Inserting the piston rod into the cylinder barrel

- Clean the inside surface of the cylinder barrel as described in chapter 7.1 "Cleaning".
- Apply the grease included in the set of wearing parts to the following parts:



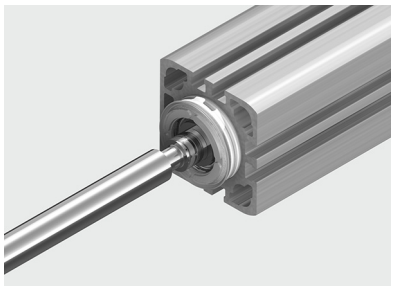
Component	Greasing
Inside surface of cylinder barrel	Thin film[1)]
Surface of piston rod	Thin film[1)]
Piston seal lip rings	Thin film[1)] on outside
Piston surface between lip rings (grease reservoir[2)])	Fill 2/3 with grease

[1)] See chapter 7.2.2 "Thin grease film"

[2)] See chapter 7.2.3 "Grease reservoir"

- Place the piston flat against the front side of the cylinder barrel and insert the lip ring into the cylinder barrel by tilting and turning it slightly.

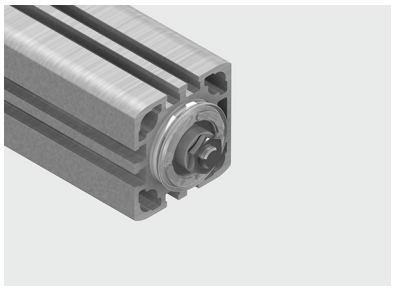
  The sealing lip must not fold back against the inside of the piston.



Note

If necessary use a flat and blunt-edged object to insert the lip ring into the cylinder barrel.

- Insert the piston fully into the cylinder barrel.
- Push the piston far enough into the cylinder barrel so that the first lip ring protrudes slightly at the other end of the cylinder barrel.
- Pull the piston rod back again until the piston is sitting fully in the cylinder barrel.

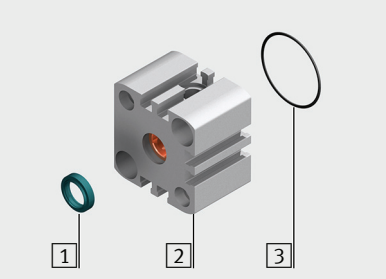


Note

This approach ensures that the sealing lips of the two lip rings sit correctly in the cylinder barrel.

6.5 Repairing and attaching the bearing, intermediate and end caps

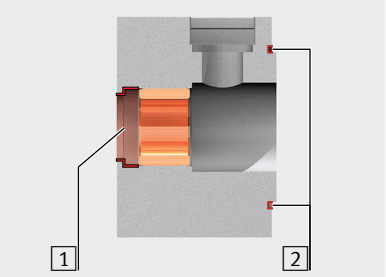
- Remove the piston rod seal [1] from the bearing cap [2].
- Remove the O-ring [3] from the slot of the bearing cap and end cap.
- **Only ADN-20 / 25-...-ELB / ELV**
  - Remove the O-ring [3] from the slot of the intermediate cap.



Warning

Check the plain bearing in the bearing cap or bearing cap with end-position locking for visible damage that might impair their function, such as deposits and scoring. The entire bearing cap or bearing cap with end-position locking must be replaced if the plain bearing is showing significant damage.

- **Only with the locking cylinder disassembled**
  - Clean the thread in the locking cylinder fixture in the bearing, intermediate and/or end cap.
- Clean the seat of the piston rod seal [1] in the bearing cap.
- Clean the seat of the O-ring [2] in the bearing and end caps.
- **Only ADN-20 / 25-...-ELB / ELV**
  - Clean the seat of the O-ring [3] in the intermediate cap.

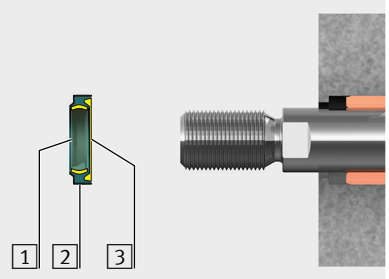


- Grease the new piston rod seal as follows:

Area	Greasing
[1] Grease reservoir[1] for piston rod	Fill 2/3 with grease
[2] External surface for bearing cap	Thin film[2]
[3] Grease reservoir[1] for bearing	Fill 2/3 with grease

[1] See chapter 7.2.3 "Grease reservoir"

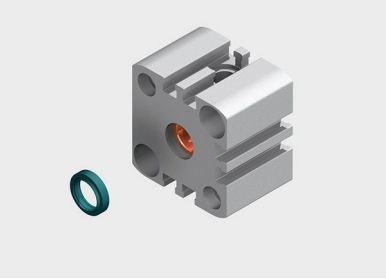
[2] See chapter 7.2.2 "Thin grease film"



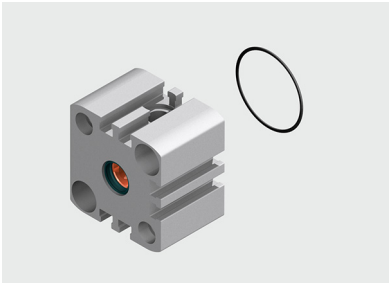
- Insert the piston rod seal into the bearing cap.

Note

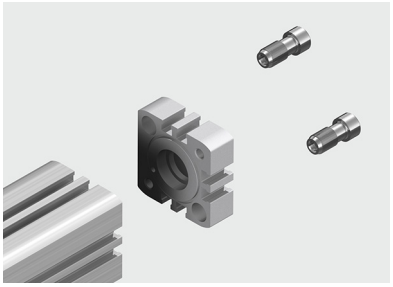
Note the mounting direction (individual sealing lips facing out).



- Grease the new O-rings and insert them into the slots in the bearing cap and end cap.
- **Only ADN-20 / 25-...-ELB / ELV**
  – Grease the new O-ring and insert it into the slot of the intermediate cap.

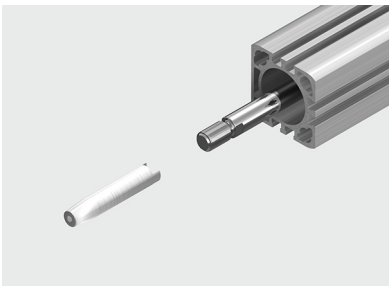


- Attach the end cap to the rear end of the cylinder barrel.
- Apply the screw locking agent included in the set of wearing parts to the screws and screw these through the end cap into the cylinder barrel.
- Align the end cap flush with the cylinder barrel.
- Tighten the screws using the appropriate torque (see table).

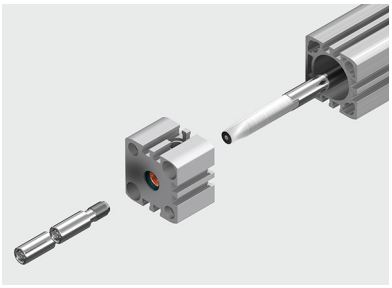


Type	Torque
Flange screw	
ADN-20-...-ELB / ELH / ELV	9 Nm
ADN-25-...-ELB / ELH / ELV	9 Nm
ADN-32-...-ELB / ELH / ELV	27 Nm
ADN-40-...-ELB / ELH / ELV	27 Nm
ADN-50-...-ELB / ELH / ELV	35 Nm
ADN-63-...-ELB / ELH / ELV	35 Nm
Socket head screw	
ADN-80-...-ELB / ELH	12 Nm
ADN-80-...-ELV	8 Nm
ADN-100-...-ELB / ELH / ELV	9 Nm

- Push the piston rod with the piston as far as possible onto the cylinder barrel.
- To protect the bearing and seals, place the appropriate mounting sleeve (see chapter 9.2 "Special tools") on the thread of the piston rod to prevent damage.
- **Only ADN-20 / 25-...-ELB / ELV**
  – Push the intermediate cap over the mounting sleeve (see chapter 9.2 "Special tools") onto the piston rod.



- Push the bearing cap over the mounting sleeve (see chapter 9.2 "Special tools") onto the piston rod.
- Apply the screw locking agent included in the set of wearing parts to the screws and screw these through the bearing cap and intermediate cap (only ADN-20 / 25-...-ELB / ELV) into the cylinder barrel.
- Align the bearing cap and intermediate cap (only ADN-20 / 25-...-ELB / ELV) flush with the cylinder barrel.
- Tighten the screws using the appropriate torque (see table).

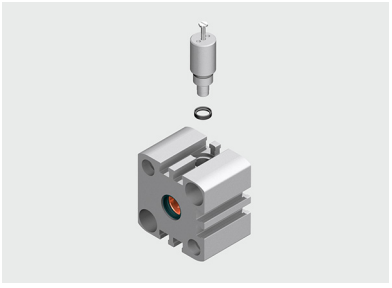


Type	Torque
Flange screw	
ADN-20-...-ELB / ELH / ELV	9 Nm
ADN-25-...-ELB / ELH / ELV	9 Nm
ADN-32-...-ELB / ELH / ELV	27 Nm
ADN-40-...-ELB / ELH / ELV	27 Nm
ADN-50-...-ELB / ELH / ELV	35 Nm
ADN-63-...-ELB / ELH / ELV	35 Nm
Socket head screw	
ADN-80-...-ELB / ELV	12 Nm
ADN-80-...-ELH	8 Nm
ADN-100-...-ELB / ELH / ELV	9 Nm

6.6 Reestablishing the functionality of the locking cylinder

6.6.1 Assembly of the locking cylinder following disassembly

- **Only with ADN-20 / 25-...-EL**
  - Insert the spacer ring in the locking cylinder fixture in the intermediate and/or end cap.
- Screw the locking cylinder into the relevant cover and tighten it with the corresponding torque (see table).



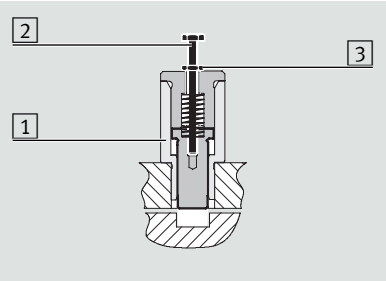
Type	Torque
ADN-20-...-ELB / ELH / ELV	2.0 Nm
ADN-25-...-ELB / ELH / ELV	3.0 Nm
ADN-32-...-ELB / ELH / ELV	3.0 Nm
ADN-40-...-ELB / ELH / ELV	3.0 Nm
ADN-50-...-ELB / ELH / ELV	5.0 Nm
ADN-63-...-ELB / ELH / ELV	5.0 Nm
ADN-80-...-ELB / ELH / ELV	10.0 Nm
ADN-100-...-ELB / ELH / ELV	10.0 Nm

Note

Ensure that the end-position locking is released (see chapter 6.6.2 "Releasing the end-position locking").

6.6.2 Releasing the end-position locking

- Loosen the lock nut [3] on the locking cylinder [1].
- Unscrew the screw [2] from the locking cylinder [1].



- Perform a functional test as per the operating instructions (enclosed with the cylinder or can be called up on the Festo website (www.Festo.com)) and commission the repaired cylinder.

7 Cleaning and greasing

7.1 Cleaning

The seals are designed so that the lubricant film applied to them will be effective for the entire service life. The cylinder must be thoroughly cleaned of all foreign particles, machining residues and old lubricants before it is greased to ensure that this "life-time lubrication" is retained.

Warning

Festo recommends Loctite 7063 and Loctite 7070 for cleaning.

When using other cleaning agents, make sure that they do not corrode the seals of the cylinder with piston rod. In case of doubt, check the resistance of the seals using the data on the Festo website (www.Festo.com).

7.2 Greasing

The various components and seals of the cylinder with piston rod require different levels of greasing depending on a number of factors.

Warning

To guarantee the life-time lubrication, the piston rod with assembled piston and piston seals must be moved a number of times across the entire stroke of the cylinder barrel to produce an even lubricant film.

7.2.1 Extremely thin grease film

A barely continuous film of grease covers the bearing surface. The grease can give a sheen to the surface; however, the colour of the grease must not darken it.

Recommendation:

Apply the grease using a cloth or similar dipped in the grease.

Remove the excess grease from the seal system components (e.g. by drawing the assembled piston with the piston rod once fully through the greased cylinder barrel) and then remove the excess from the seal components by wiping it off.

7.2.2 Thin grease film

A film of grease covers the bearing surface so that the grease colour darkens the surface slightly.

Recommendation:

Apply the grease with a soft brush or similar.

7.2.3 Grease reservoir

There is a certain amount of oil enclosed between two sealing rims or in enclosed ring volumes.

8 Maintenance and care

Clean any dirt from the piston rod using a soft cloth.

All non-abrasive cleaning agents are permissible. In addition, the cylinders are maintenance-free as they have been lubricated for life. Regular removal of the lubricant on the surface of the piston rod reduces its service life.

9 Tools

This chapter provides an overview of the tools and accessories required to repair the cylinder with piston rod.

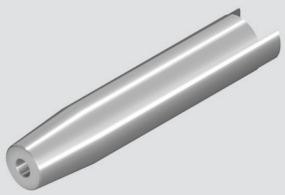
9.1 Standard tools

The following standard tools among others are required to repair the cylinder with piston rod:

- Screwdriver
- Wrench
- Flat pliers
- Torque wrench (see tables in the corresponding repair steps for values)

9.2 Special tools

The following special tools are required to repair and service the cylinder with piston rod:

Designation		Illustration
Mounting sleeve for piston rod	The mounting sleeve for piston rods for protecting the piston rod seal and the bearing in the bearing cap while the repair is being carried out must be produced by the customer. The schematic diagram is included in the information brochure **"Accessories, equipment and tools"** (7Accessories_a_en).	

Documents

Further information on the special tools and schematic diagrams is included in the information brochure **"Accessories, equipment and tools"** (7Accessories_a_en). This can be found in the online spare parts catalogue on the Festo website (http://spareparts.festo.com/xdki/data/SPC/0/PDF_SAFE/Hilfsmittel.pdf).

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