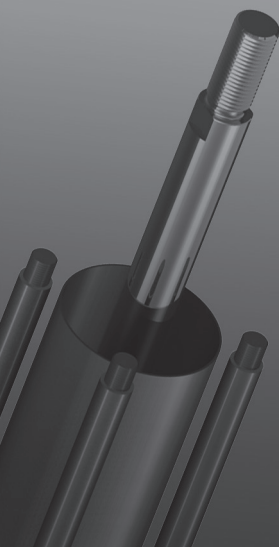
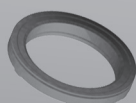
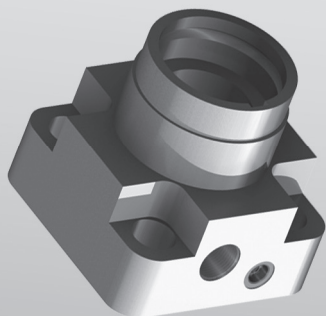
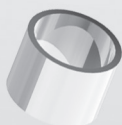
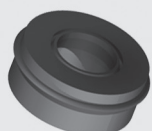
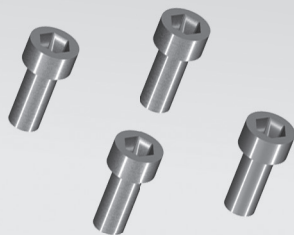


Cylinder with piston rod

Standard cylinder to ISO 15552

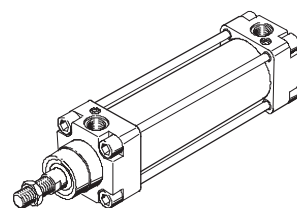
DNG / DNGL / DNGLZ

DNGZK / DNGZS



FESTO

Repair
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All technical data are subject to change according to technical updates.

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 deviation 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 [8 "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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1 Important information

1.1 About these repair instructions

This document contains important information about the professional repair of cylinders with piston rod type DNG / DNGL / DNGLZ / DNGZK / DNGZS.

The cylinders with piston rod DNG / DNGL / DNGLZ / DNGZK / DNGZS are fully repairable in the event of damage caused by 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 control sections 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**

Contain 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 as well as 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.



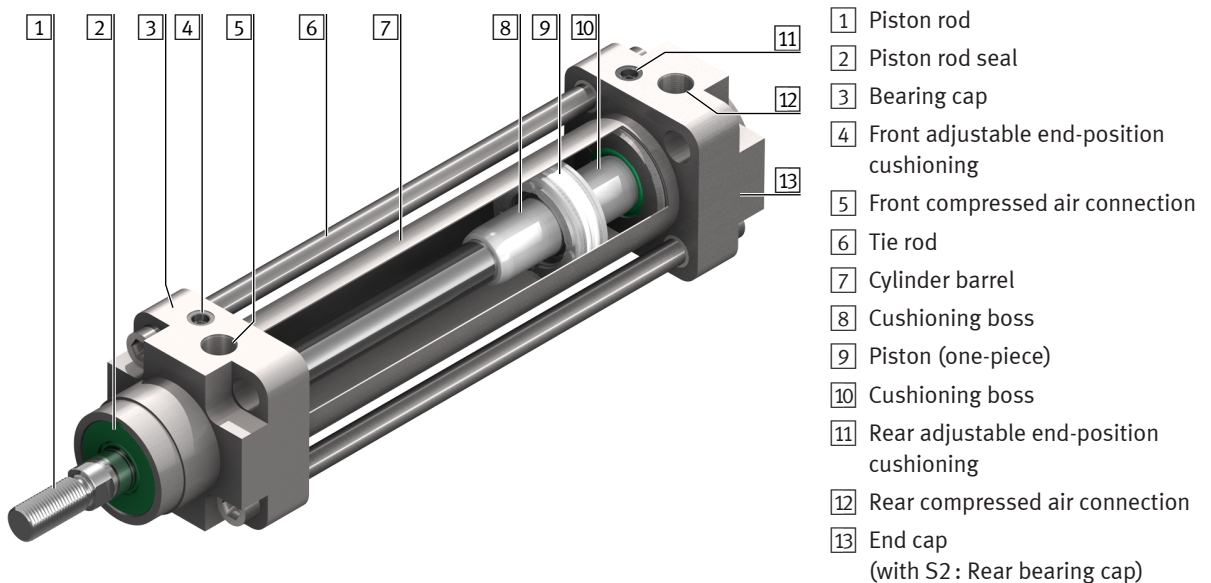
Environment

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

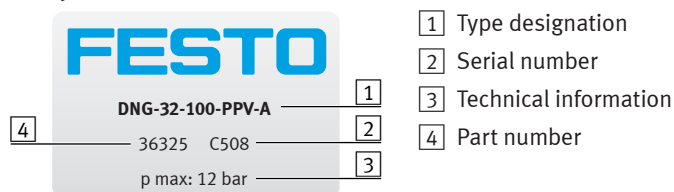
The piston moves in the cylinder barrel when the cylinder chamber is pressurised. The piston rod transmits the movement to the outside. The advanced piston rod is retracted again when the other cylinder chamber is pressurised.



2.2 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 logotype 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:

DNG	Cylinder type DNG
32	Piston diameter 32 mm
100	Stroke 100 mm
PPV	Adjustable end-position cushioning
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).

2.3 Repair-relevant features

Some of the features that the cylinder with piston rod can be equipped with require a different repair approach. These are referred to as "repair-relevant" features and are listed in the left-hand column in the table below.

If the cylinder to be repaired has one of these repair-relevant features, the appropriate repair description (see right-hand column in the table below) must be used.



Note

A cylinder can only have one repair-relevant feature. It can additionally be equipped with one or more other features (see middle column).

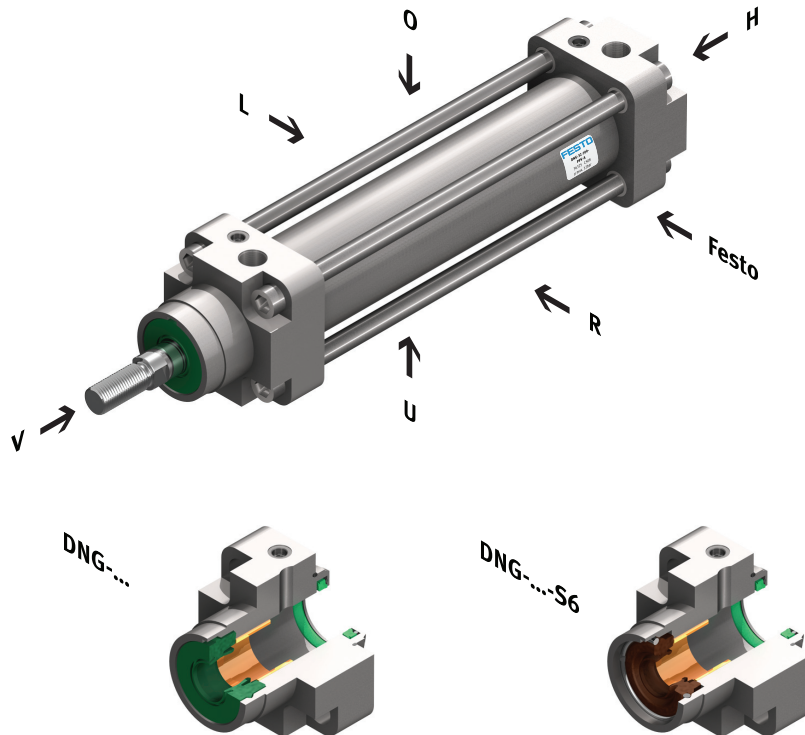
Cylinder and repair-relevant feature	Other features	Described from page
DNG / DNGL / DNGLZ / DNGZK / DNGLZS-... without repair-relevant feature	PPV, A, S2, S3, S8	13
DNG / DNGL / DNGLZ / DNGZK / DNGLZS-...- S6 (heat-resistant seals up to a max. 120°C)	PPV, A, S3, S8	19

Example for the cylinder in chapter [2.2 "Type codes \(ascertaining the features of a cylinder\)"](#)

Of the features in the sample cylinder, the feature "S6" is relevant to the repair. The description in chapter [4.4 "Repairing the cylinders DNG / DNGL / DNGLZ / DNGZK / DNGLZS-...-S6"](#) on page [19](#) must therefore be used to repair this cylinder with piston rod.

2.4 Mounting direction and bearing cap variants

This diagram provides an overview of the orientation designations of the cylinder with piston rod as well as the different variants of the bearing cap and seals for repair-relevant features.



Orientation:

Festo=product identification
(rating plate) as reference point

O = top

U = underneath

R = right

L = left

V = front

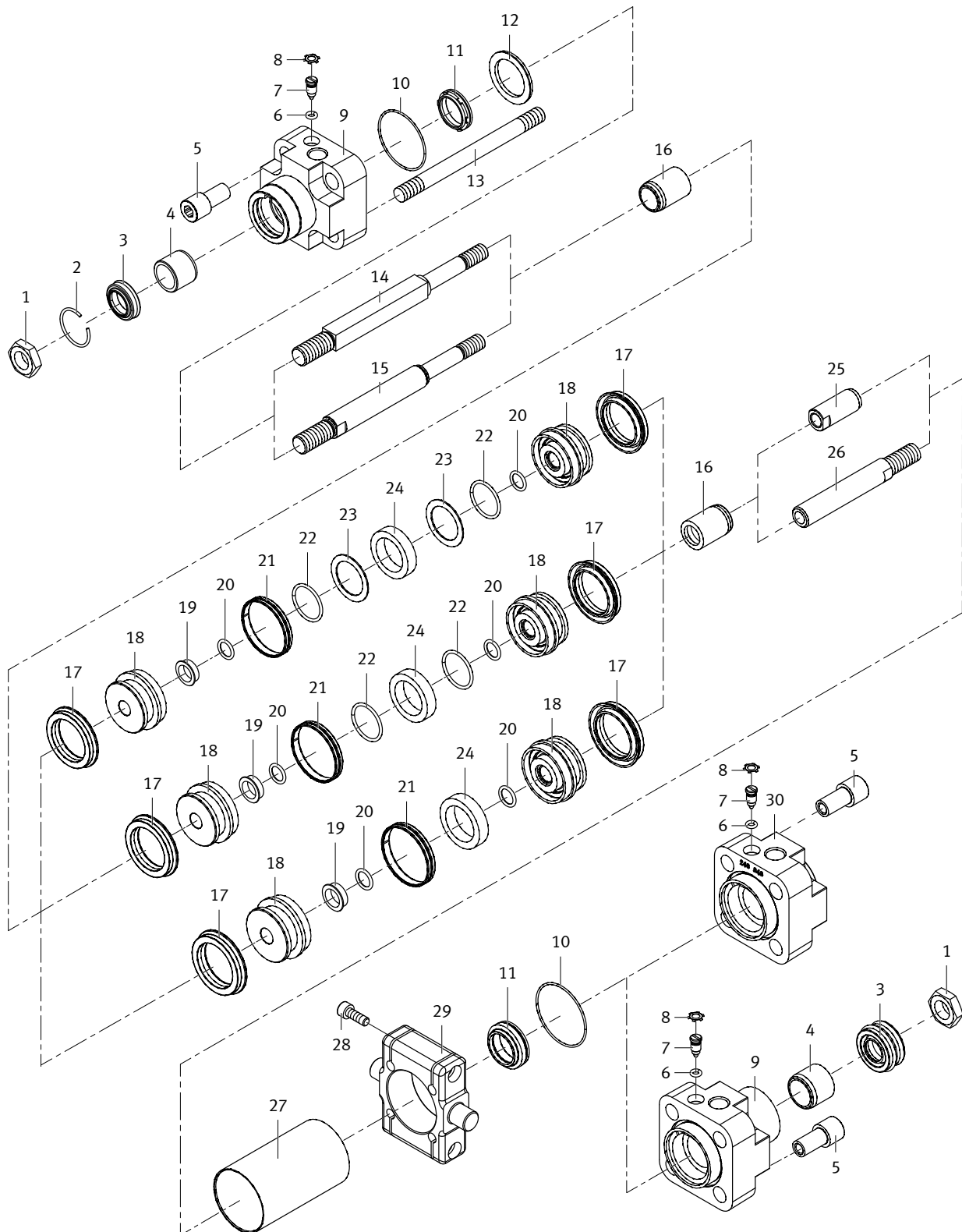
H = rear

Key features:

S6 = Heat-resistant seals

3 Component overview

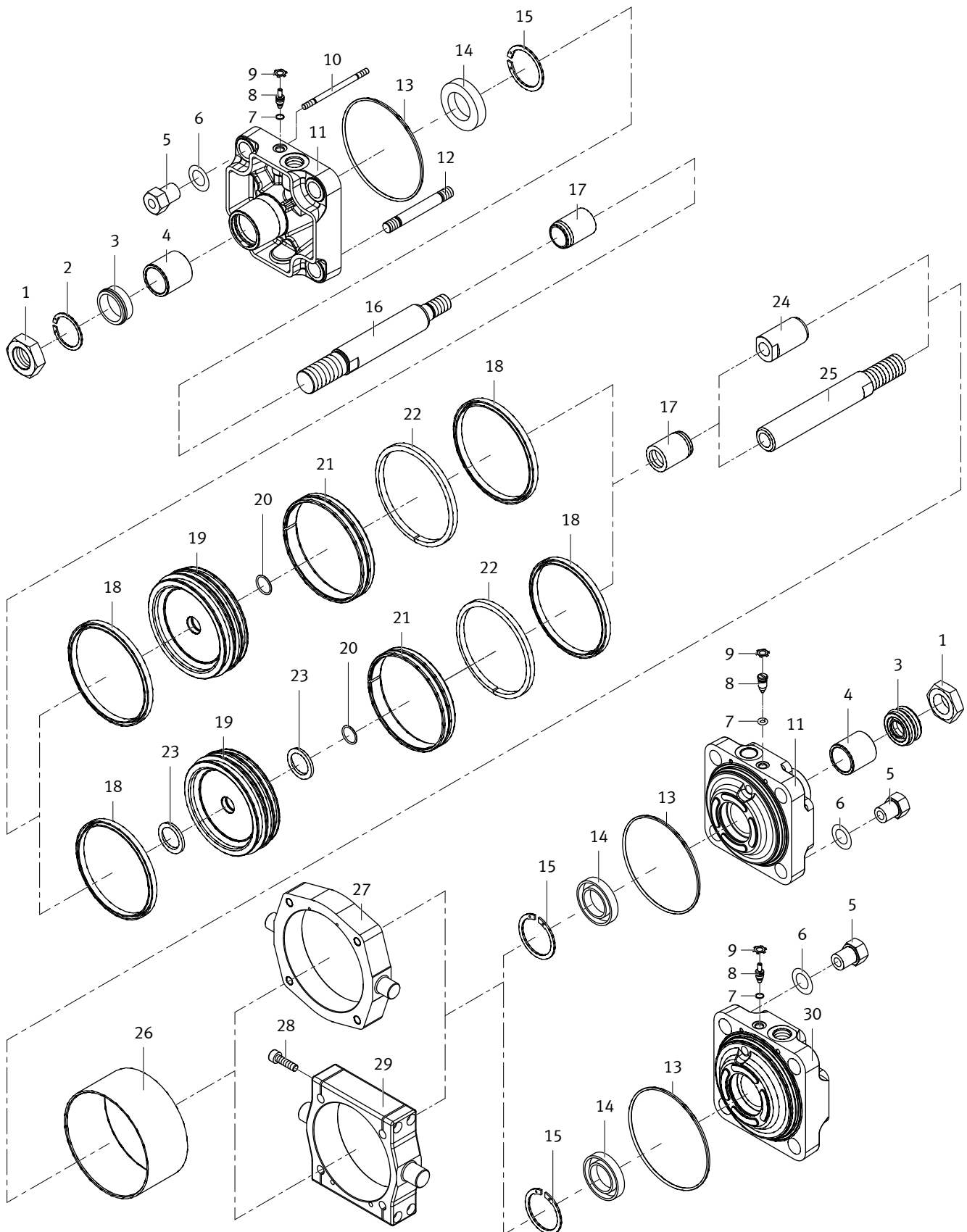
3.1 Component overview up to a piston diameter of 100 mm



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	
2	Retaining ring	Only with -S6
3	Piston rod seal	
4	Bearing	
5	Collar nut	Use screw locking agent
6	O-ring	
7	Regulating screw	
8	Serrated ring	
9	Bearing cap	
10	Sealing ring	
11	Cushioning seal	
12	Washer	
13	Tie rod	
14	Piston rod, secured against rotating	DNGLZ and DNGLZ only
15	Piston rod	
16	Cushioning boss	
17	Lip ring (piston seal)	
18	Piston, two-piece	
19	Socket	DNGLZ and DNGLZ only (piston rod, secured against rotating)
20	O-ring	
21	Slip ring	
22	O-ring	Only at a piston diameter of 32 mm and 40 mm
23	Washer	Only at a piston diameter of 32 mm
24	Ring magnet	
25	Threaded coupling	Not S2, use screw locking agent
26	Piston rod	Only S2, use screw locking agent?
27	Cylinder barrel	
28	Socket head screw	DNGLZ and DNGZK only
29	Trunnion mounting	DNGLZ and DNGZK only
30	End cap	

3.2 Component overview from a piston diameter of 125 mm



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	
2	Retaining ring	Only with -S6
3	Piston rod seal	
4	Bearing	
5	Collar nut	Use screw locking agent
6	Washer	Only at a piston diameter of 250 mm and 320 mm
7	O-ring	
8	Regulating screw	
9	Serrated ring	
10	Rod	Only at a piston diameter of ≥ 125 mm
11	Bearing cap	
12	Tie rod	
13	O-ring	
14	Cushioning seal	
15	Retaining ring	Only at a piston diameter of 125 mm, 160 mm and 200 mm
16	Piston rod	
17	Cushioning boss	
18	Lip ring (piston seal)	
19	Piston	
20	O-ring	
21	Guiding band	
22	Magnetic strip	
23	Washer	Only at a piston diameter of 250 mm and 320 mm
24	Threaded coupling	Not S2, use screw locking agent
25	Piston rod	Only S2, use screw locking agent?
26	Cylinder barrel	
27	Trunnion mounting	DNGZS only
28	Socket head screw	DNGLZ and DNGZK only
29	Trunnion mounting	DNGLZ and DNGZK only
30	End cap	

4 Repair steps

4.1 Preparation

- Before starting the repair, remove any attachments in accordance with the instructions in 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 Repairing the cylinders DNG / DNGL / DNGLZ / DNGZK and DNGLZS-...

The cylinders type DNG / DNGL / DNGLZ / DNGZK and DNGLZS-... with the following features can be repaired using the description in this chapter:

Code	Description
PPV	Adjustable pneumatic cushioning
A	External position sensing
S2	Through piston rod
S3	Stainless steel piston rod
S8	Piston rod with high corrosion protection

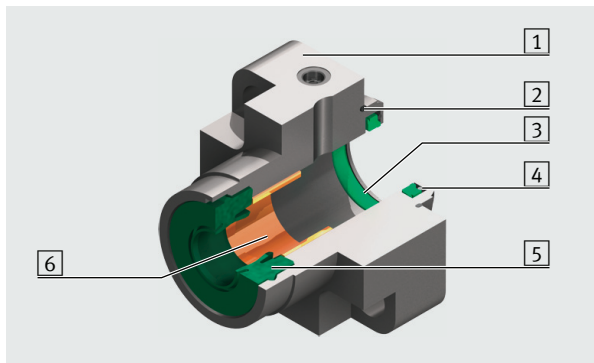
4.3.1 Structure of the bearing cap



Note

In some series and variants the bearing and end caps may differ from the versions shown here. The precise design of the bearing and end caps must be determined before each repair using the parts lists in the online spare parts catalogue on the Festo website (spareparts.festo.com) and taken into consideration during the repair.

Bearing cap DNG



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

4.3.2 Removing the bearing and end caps

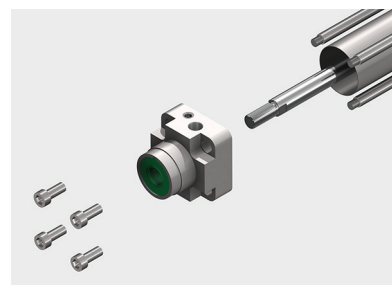
- Loosen the collar nuts in the bearing cap from the tie rods, while holding the collar nuts in the end cap (in the second bearing cap of cylinders with a through piston rod (S2)).



Note

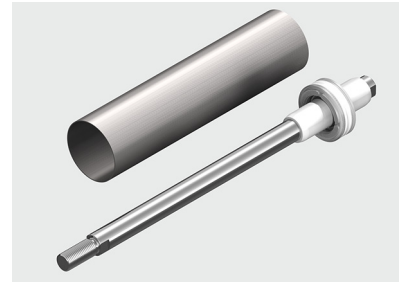
Only cylinders with a piston diameter of **250 mm** and **320 mm** have washers between the collar nut and the bearing or end cap.

- Unscrew and remove the collar nuts and washers.
- Pull the bearing cap away from the cylinder barrel and piston rod.
- **Only applies to cylinders with a piston diameter ≥ 125 mm**
 - Remove the rod from the end cap (from the second bearing cap on cylinders with a through piston rod (S2)).
- **Only applies to DNGLZS**
 - Remove the trunnion mounting from the cylinder barrel and the tie rods.
- **Only applies to DNGLZ and DNGZK**
 - Loosen the socket head screw in the trunnion mounting.
 - Remove the trunnion mounting from the cylinder barrel and the tie rods.
- Remove the end cap from the cylinder barrel and piston rod (the second bearing cap on cylinders with a through piston rod (S2)).
- Remove the tie rods including the collar nuts and washers (if present, see **note** above) from the end cap (from the second bearing cap on cylinders with a through piston rod (S2)) and unscrew the collar nuts from the tie rods.
- Remove any residue of the screw locking agent from the thread of the collar nuts and tie rods.

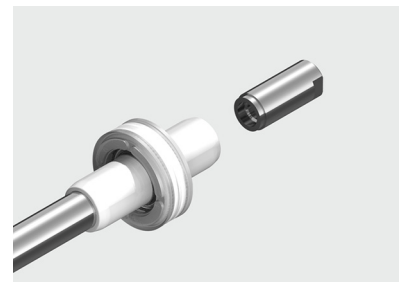
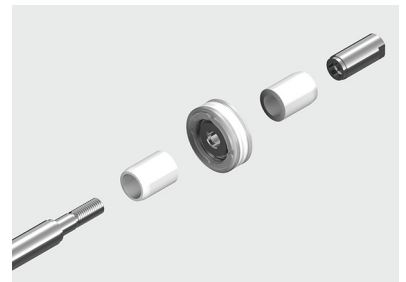


4.3.3 Replacing the piston components

- 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 (the rear part of the piston rod on cylinders with through piston rod (S2)) from the piston rod.
- Remove the piston components from the piston rod, noting the sequence and alignment.
- Remove any residue of the screw locking agent from the threads of the piston rod and threaded coupling (the thread on the rear part of the piston rod on cylinders with through piston rod (S2)).
- 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 inside of the threaded coupling (the rear part of the piston rod on cylinders with through piston rod (S2)) and screw it onto the piston rod with the corresponding torque (see table).



Type	Torque
DNG / DNGL / DNGLZ / DNGZK-32	10 Nm
DNG / DNGL / DNGLZ / DNGZK-40	20 Nm
DNG / DNGL / DNGLZ / DNGZK-50	25 Nm
DNG / DNGL / DNGLZ / DNGZK-63	40 Nm
DNG / DNGL / DNGLZ / DNGZK-80	60 Nm
DNG / DNGL / DNGLZ / DNGZK-100	30 Nm
DNG / DNGZK-125	160 Nm
DNG / DNGZK-160	330 Nm
DNG / DNGZK-200	330 Nm
DNG-250	700 Nm
DNG-250-...-S2	700 Nm
DNGZS-250	700 Nm
DNG-320	1300 Nm
DNG-320-...-S2	1200 Nm
DNGZS-320	1200 Nm

4.3.4 Inserting the piston rod into the cylinder barrel

- Clean the inner surface of the cylinder barrel as described in chapter [5.1 "Cleaning"](#).
- Apply the grease included in the set of wearing parts to the following parts:

Component	Greasing
Inner 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
Cushioning boss	Thin film ¹⁾ on outside

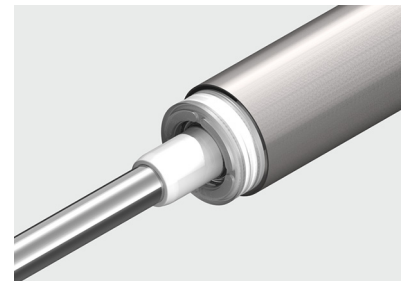
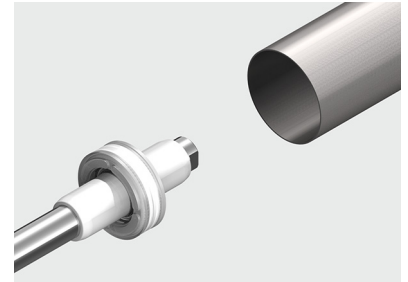
¹⁾ See chapter [5.2.2 "Thin grease film"](#)

²⁾ See chapter [5.2.3 "Grease reservoir"](#)

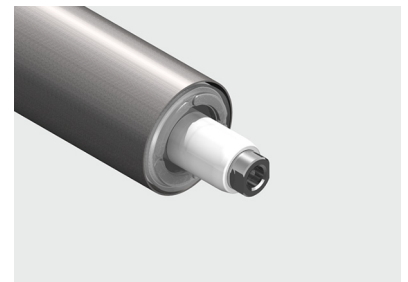
- Place the piston flat on the front side of the cylinder barrel and insert the lip ring into the cylinder barrel by tilting and turning it slightly.

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

- 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.

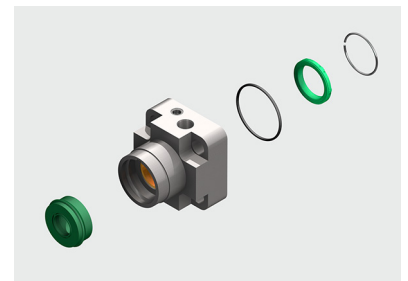


Note

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

4.3.5 Repairing and attaching the bearing and end caps

- Remove the piston rod seal from the bearing cap (from the front and rear bearing caps on cylinders with through piston rod (S2)).
- Remove the O-ring from the groove of the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2)).
- **Only on cylinders with a piston diameter of 125 mm to 200 mm**
 - Remove the retaining ring upstream of the cushioning seal from the bearing cap and end cap (from the front and rear bearing cap on cylinders with a through piston rod (S2)).
- Remove the cushioning seal from the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2)).





Warning

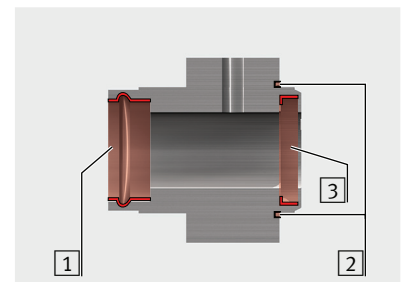
Check the plain bearing in the bearing cap (in the front and rear bearing caps on cylinders with through piston rod (S2)) for visible damage that might impair its function, such as deposits and scoring. The entire bearing cap must be replaced if the plain bearing is showing significant damage.



Note

Proceed as described in chapter [4.5 "Repairing the adjustable end-position cushioning \(PPV\)"](#) to repair the adjustable end-position cushioning.

- Clean the seat of the piston rod seal [1].
- Clean the seat of the O-ring [2].
- Clean the seat of the cushioning seal [3].
See chapter [5.1 "Cleaning"](#)

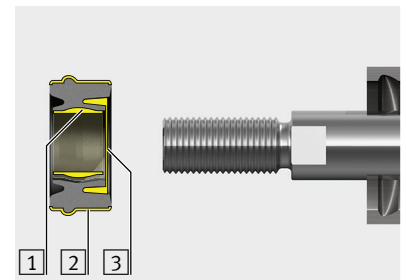


- Grease the new piston rod seal (one per bearing cap on cylinders with through piston rod (S2)) as follows:

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 [5.2.3 "Grease reservoir"](#)

²⁾ See chapter [5.2.2 "Thin grease film"](#)

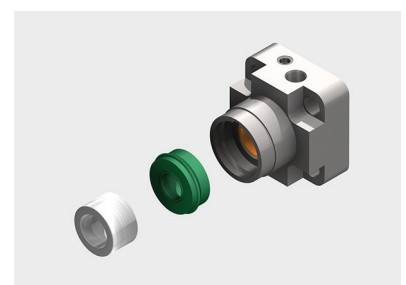


- Insert the piston rod seal into the bearing cap (in both bearing caps on cylinders with through piston rod (S2)) using an appropriate pressure piece.

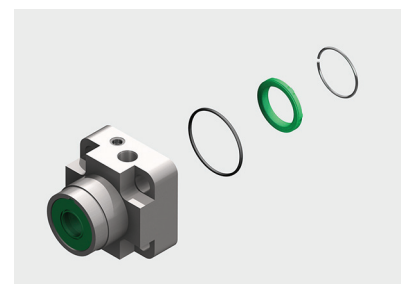


Note

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



- Grease the new O-rings and insert them into the grooves in the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2)).
- Apply a thin film of grease to the new cushioning seals on the front side of the sealing surface and insert them into the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2)).
- **Only on cylinders with a piston diameter of 125 mm to 200 mm**
 - Insert the new retaining ring upstream of the new cushioning seal in the bearing cap and end cap (in the front and rear bearing cap on cylinders with a through piston rod (S2)).

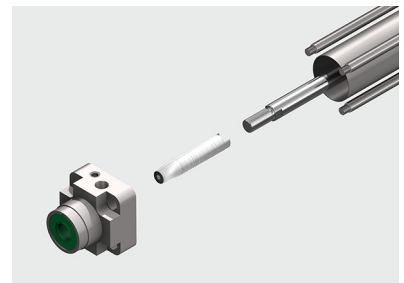
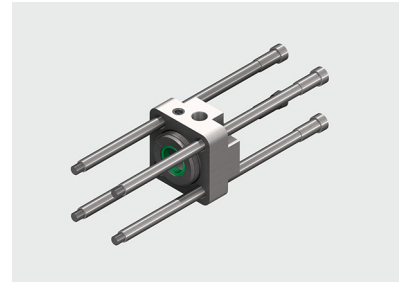


- Apply the screw locking agent included in the set of wearing parts to the thread of the tie rods.

Note

Only cylinders with a piston diameter of **250 mm** and **320 mm** have washers between the collar nut and the bearing or end cap.

- Place the washers on the collar nuts.
- **Screw the collar nuts on one side of on the tie rods.**
- Insert the tie rods including the collar nuts and washers (if present, see **note** above) through the holes of the end cap (through the second bearing cap on cylinders with a through piston rod (S2)).
- **Only applies to cylinders with a piston diameter ≥ 125 mm**
 - Insert the rod into the end cap (in the second bearing cap on cylinders with a through piston rod (S2)).
- Push the cylinder barrel with the piston onto the end cap.
- **Only applies to DNGLZS**
 - Push the trunnion mounting onto the cylinder barrel and the tie rods.
- **Only applies to DNGLZ and DNGZK**
 - Push the trunnion mounting onto the cylinder barrel and the tie rods.
- To protect the bearing and seals, place the appropriate mounting sleeve (see chapter [7.2 "Special tools"](#)) on the thread of the piston rod to prevent damage.
- Guide the bearing cap (both bearing caps on cylinders with through piston rod (S2)) over the mounting sleeve onto the piston rod as far as the cylinder barrel.

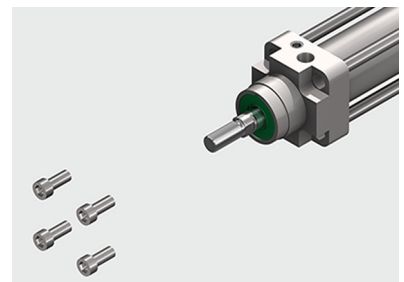


Note

Only cylinders with a piston diameter of **250 mm** and **320 mm** have washers between the collar nut and the bearing or end cap.

- Screw the collar nuts and washers in the bearing cap onto the tie rods, while holding the collar nuts in the end cap (in the second bearing cap of cylinders with a through piston rod (S2)).
- Tighten the collar nuts with the appropriate torque (see table).

Type	Torque
DNG / DNGL / DNGLZ / DNGZK-32	6 Nm
DNG / DNGL / DNGLZ / DNGZK-40	6 Nm
DNG / DNGL / DNGLZ / DNGZK-50	14 Nm
DNG / DNGL / DNGLZ / DNGZK-63	14 Nm
DNG / DNGL / DNGLZ / DNGZK-80	30 Nm
DNG / DNGL / DNGLZ / DNGZK-100	30 Nm
DNG / DNGZK-125	70 Nm
DNG / DNGZK-160	100 Nm
DNG / DNGZK-200	100 Nm
DNG-250	90 Nm
DNG-250-...-S2	140 Nm
DNGZS-250	140 Nm
DNG / DNGZS-320	280 Nm



- **Only applies to DNGLZS**
 - Push the trunnion mounting onto the cylinder barrel and the tie rods.
- **Only applies to DNGLZ and DNGZK**
 - Push the trunnion mounting onto the cylinder barrel and the tie rods.
 - Tighten the socket head screw in the trunnion mounting using the appropriate torque (see table).

Type	Torque
DNGLZ / DNGZK-32	4 Nm
DNGLZ / DNGZK-40	6 Nm
DNGLZ-50	9 Nm
DNGZK-50	8 Nm
DNGLZ / DNGZK-63	12 Nm
DNGLZ / DNGZK-80	8 Nm
DNGLZ / DNGZK-100	8 Nm
DNGZK-125	14 Nm
DNGZK-160	15 Nm
DNGZK-200	22 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.

4.4 Repairing the cylinders DNG / DNGL / DNGLZ / DNGZK / DNGLZS-...-S6

Cylinders type DNG / DNGL / DNGLZ / DNGZK / DNGLZS-...-S6 with the following features can be repaired by following the description in this chapter:

DNG / DNGL / DNGLZ / DNGZK / DNGLZS	
Code	Description
PPV	Adjustable pneumatic cushioning
A	External position sensing
S3	Stainless steel piston rod
S8	Piston rod with high-level of corrosion protection

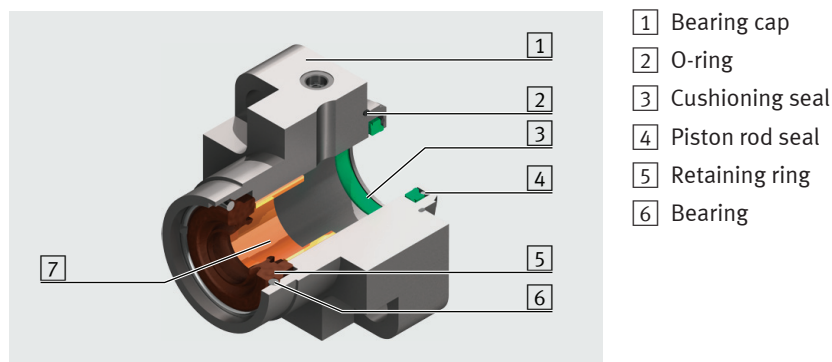
4.4.1 Structure of the bearing cap



Note

In some series and variants the bearing and end caps may differ from the versions shown here. The precise design of the bearing and end caps must be determined before each repair using the parts lists in the online spare parts catalogue on the Festo website (spareparts.festo.com) and taken into consideration during the repair.

Bearing cap DNG-...-S6



- 1 Bearing cap
- 2 O-ring
- 3 Cushioning seal
- 4 Piston rod seal
- 5 Retaining ring
- 6 Bearing

4.4.2 Removing the bearing and end caps

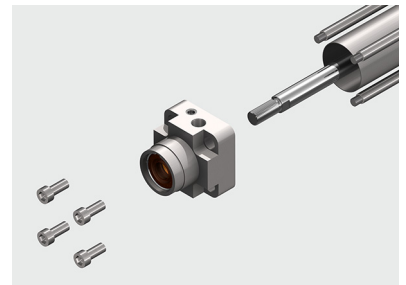
- Loosen the collar nuts in the bearing cap from the tie rods, while holding the collar nut in the end cap.



Note

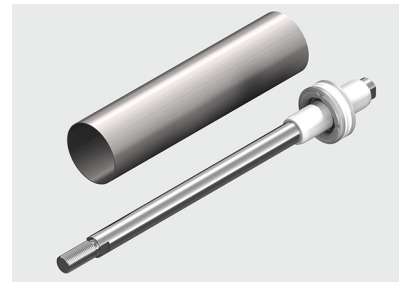
Only cylinders with a piston diameter of **250 mm** and **320 mm** have washers between the collar nut and the bearing or end cap.

- Unscrew and remove the collar nuts and washers.
- Pull the bearing cap away from the cylinder barrel and piston rod.
- Only applies to cylinders with a piston diameter ≥ 125 mm**
 - Remove the rod from the end cap.
- Only applies to DNGLZS**
 - Remove the trunnion mounting from the cylinder barrel and the tie rods.
- Only applies to DNGLZ and DNGZK**
 - Loosen the socket head screw in the trunnion mounting.
 - Remove the trunnion mounting from the cylinder barrel and the tie rods.
- Remove the end cap from the cylinder barrel and the piston rod.
- Remove the tie rods including the collar nuts and washers (if present, see **note** above) from the end cap and unscrew the collar nuts from the tie rods.
- Remove any residue of the screw locking agent from the thread of the collar nuts and tie rods.

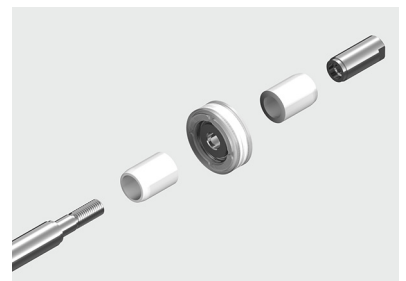


4.4.3 Replacing the piston components

- 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.

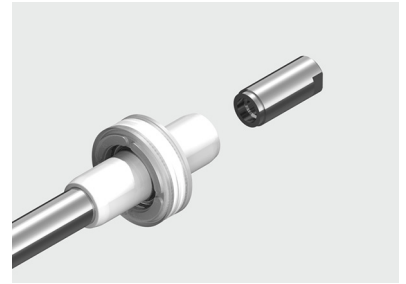


- Unscrew the threaded coupling from the piston rod.
- Remove the piston components from the piston rod, noting the sequence and alignment.
- Remove any residue of the screw locking agent from the threads of the piston rod and threaded coupling.
- Replace the components with those included in the set 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 inside of the threaded coupling and screw it onto the piston rod with the corresponding torque (see table).

Type	Torque
DNG / DNGL / DNGLZ / DNGZK-32	10 Nm
DNG / DNGL / DNGLZ / DNGZK-40	20 Nm
DNG / DNGL / DNGLZ / DNGZK-50	25 Nm
DNG / DNGL / DNGLZ / DNGZK-63	40 Nm
DNG / DNGL / DNGLZ / DNGZK-80	60 Nm
DNG / DNGL / DNGLZ / DNGZK-100	30 Nm
DNG / DNGZK-125	160 Nm
DNG / DNGZK-160	330 Nm
DNG / DNGZK-200	330 Nm
DNG-250	700 Nm
DNGZS-250	700 Nm
DNG-320	1300 Nm
DNGZS-320	1200 Nm



4.4.4 Inserting the piston rod into the cylinder barrel

- Clean the inner surface of the cylinder barrel as described in chapter [5.1 "Cleaning"](#).
- Apply the grease included in the set of wearing parts to the following parts:

Component	Greasing
Inner 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
Cushioning boss	Thin film ¹⁾ on outside

¹⁾ See chapter [5.2.2 "Thin grease film"](#)

²⁾ See chapter [5.2.3 "Grease reservoir"](#)

- Place the piston flat on 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

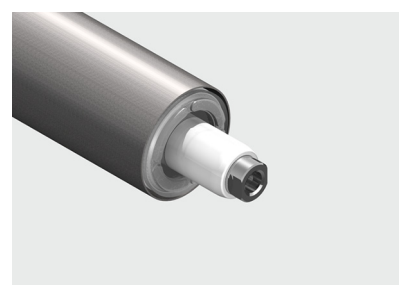
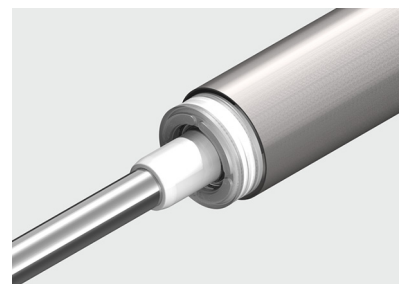
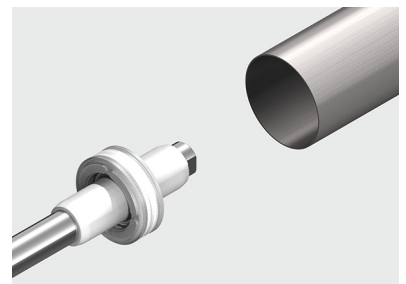
If necessary use a flat and blunt-edged object to insert the lip ring into the cylinder barrel.

- 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.



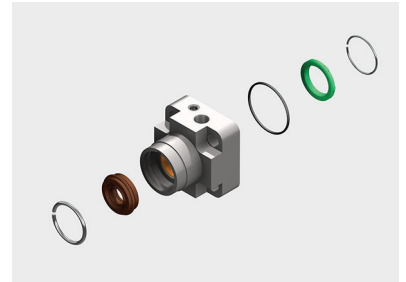
Note

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



4.4.5 Repairing and attaching the bearing and end caps

- Remove the retaining ring and piston rod seal from the bearing cap.
- Remove the O-ring from the groove of the bearing cap and end cap.
- **Only on cylinders with a piston diameter of 125 mm to 200 mm**
 - Remove the retaining clip upstream of the cushioning seal from the bearing cap and end cap.
- Remove the cushioning seal from the bearing cap and end cap.



Warning

Check the plain bearing in the bearing cap for visible damage that might impair its function, such as deposits and scoring. The entire bearing cap must be replaced if the plain bearing is showing significant damage.

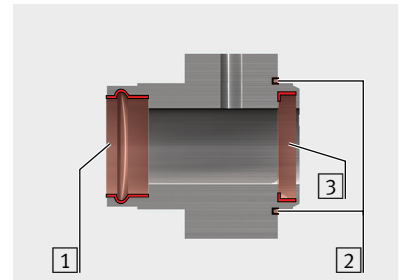
- **Only when repairing the adjustable cushioning (PPV)**



Note

Proceed as described in chapter [4.5 “Repairing the adjustable end-position cushioning \(PPV\)”](#) to repair the adjustable end-position cushioning.

- Clean the seat of the piston rod seal [1].
 - Clean the seat of the O-ring [2].
 - Clean the seat of the cushioning seal [3].
- See chapter [5.1 “Cleaning”](#)

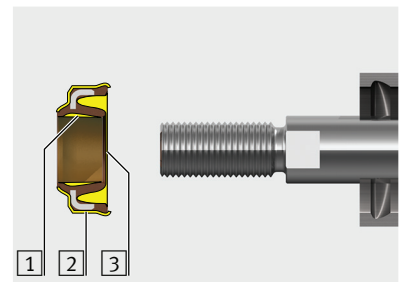


- Grease the new piston rod seal as follows:

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 [5.2.3 “Grease reservoir”](#)

²⁾ See chapter [5.2.2 “Thin grease film”](#)

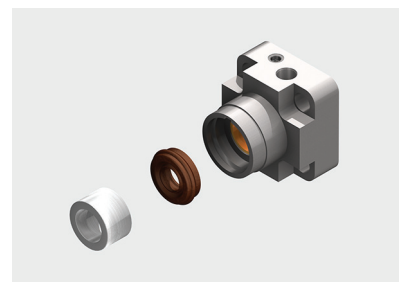


- Insert the piston rod seal into the bearing cap using an appropriate pressure piece.

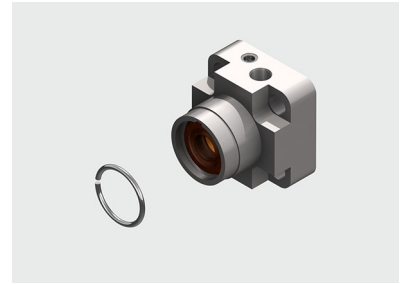


Note

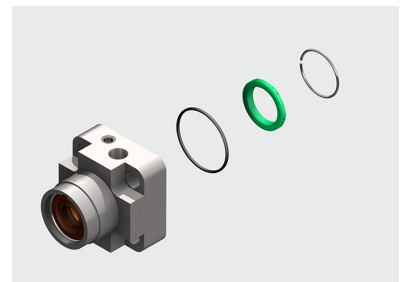
Note the mounting direction (individual sealing lips facing out).



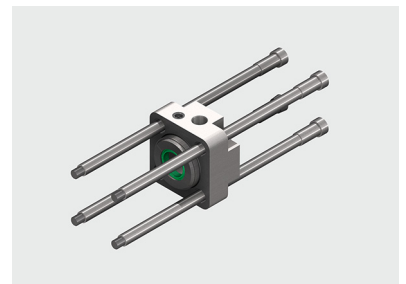
- Compress the retaining ring (e.g. using pliers) and place it on the piston rod seal.



- Grease the new O-rings and insert them into the grooves in the bearing cap and end cap.
- Apply a thin film of grease to the new cushioning seals on the front side of the sealing surface and insert them into the bearing cap and end cap.
- **Only on cylinders with a piston diameter of 125 mm to 200 mm**
 - Insert the retaining ring upstream of the new cushioning seal in the bearing cap and end cap.



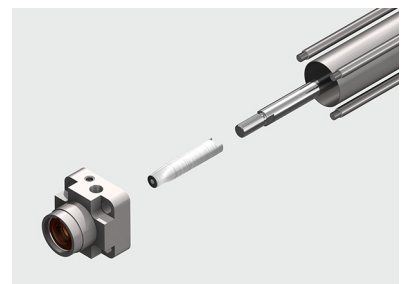
- **Apply the screw locking agent included in the set of wearing parts to the thread of the tie rods.**



Note

Only cylinders with a piston diameter of **250 mm** and **320 mm** have washers between the collar nut and the bearing or end cap.

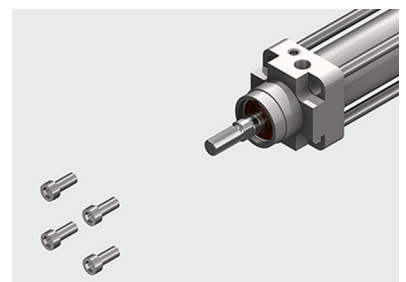
- Place the washers on the collar nuts.
- **Screw the collar nuts on one side of on the tie rods.**
- Insert the tie rods including the collar nuts and washers (if present, see **note** above) through the holes of the end cap.
- **Only applies to cylinders with a piston diameter ≥ 125 mm**
 - Insert the rod in the end cap.
- Push the cylinder barrel with the piston onto the end cap.
- **Only applies to DNGLZS**
 - Push the trunnion mounting onto the cylinder barrel and the tie rods.
- **Only applies to DNGLZ and DNGZK**
 - Push the trunnion mounting onto the cylinder barrel and the tie rods.
- To protect the bearing and seals, place the appropriate mounting sleeve (see chapter [7.2 "Special tools"](#)) on the thread of the piston rod to prevent damage.
- Guide the bearing cap over the mounting sleeve onto the piston rod as far as the cylinder barrel.



Note

Only cylinders with a piston diameter of **250 mm** and **320 mm** have washers between the collar nut and the bearing or end cap.

- Screw the collar nuts and washers in the bearing cap onto the tie rods, while holding the collar nuts in the end cap.



- Tighten the collar nuts with the appropriate torque (see table).

Type	Torque
DNG / DNGL / DNGLZ / DNGZK-32	6 Nm
DNG / DNGL / DNGLZ / DNGZK-40	6 Nm
DNG / DNGL / DNGLZ / DNGZK-50	14 Nm
DNG / DNGL / DNGLZ / DNGZK-63	14 Nm
DNG / DNGL / DNGLZ / DNGZK-80	30 Nm
DNG / DNGL / DNGLZ / DNGZK-100	30 Nm
DNG / DNGZK-125	70 Nm
DNG / DNGZK-160	100 Nm
DNG / DNGZK-200	100 Nm
DNG-250	90 Nm
DNGZS-250	140 Nm
DNG / DNGZS-320	280 Nm

- **Only applies to DNGLZS**
 - Push the trunnion mounting onto the tie rods.
- **Only applies to DNGLZ and DNGZK**
 - Push the trunnion mounting onto the tie rods.
 - Tighten the socket head screw in the trunnion mounting using the appropriate torque (see table).

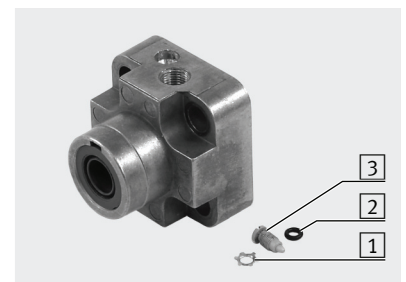
Type	Torque
DNGLZ / DNGZK-32	4 Nm
DNGLZ / DNGZK-40	6 Nm
DNGLZ-50	9 Nm
DNGZK-50	8 Nm
DNGLZ / DNGZK-63	12 Nm
DNGLZ / DNGZK-80	8 Nm
DNGLZ / DNGZK-100	8 Nm
DNGZK-125	14 Nm
DNGZK-160	15 Nm
DNGZK-200	22 Nm

- 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.

4.5 Repairing the adjustable end-position cushioning (PPV)

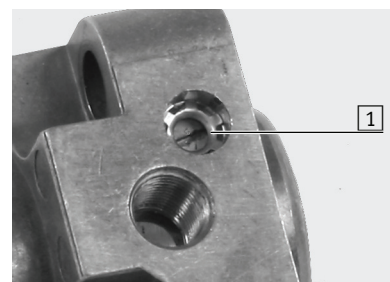
The cylinders are also maintenance-Components of the end-position cushioning (PPV):

- 1 Serrated ring
- 2 O-ring
- 3 Regulating screw

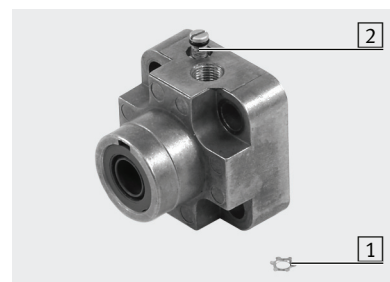


4.5.1 Disassembling the adjustable end-position cushioning (PPV)

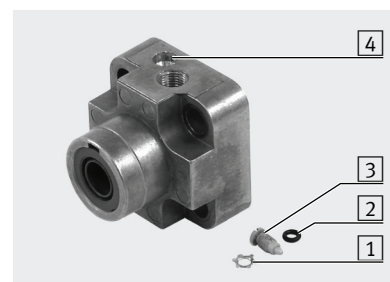
- Remove the serrated ring **1** from the bearing cap or end cap (from the front and rear bearing caps on cylinders with a through piston rod (S2)).



- Unscrew the regulating screw **2** fully.

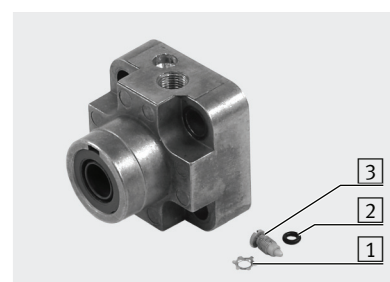


- Remove the O-ring **2** from the regulating screw **3**.
- Clean the thread and the hole **4** of the end-position cushioning in the bearing cap or end cap (in the front and rear bearing cap on cylinders with a through piston rod (S2)).



4.5.2 Assembling the adjustable end-position cushioning (PPV)

- Grease the new O-ring **2** and insert it in the groove in the regulating screw **3**.
- Screw in the regulating screw **3**.
- Insert the serrated ring **1** in the bearing cap or end cap using a suitable tool (in the front and rear bearing caps on cylinders with a through piston rod (S2)).



5 Cleaning and greasing

5.1 Cleaning

The seals are designed so that the lubricant film applied to them will be effective for the service life of the seal. 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).

5.2 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.

5.2.1 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.

5.2.2 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.

5.2.3 Grease reservoir

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

6 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.

7 Tools

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

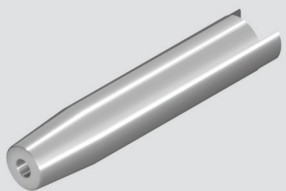
7.1 Standard tools

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)

7.2 Special tools

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

Designation	Additional information	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 can be found in the information brochure "Accessories, equipment and tools" (7Accessories_a_en).	



Documents

Further information on the special tools and schematic diagrams can be found in the information brochure **"Accessories, equipment and tools"** (7Accessories_a_en). It 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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