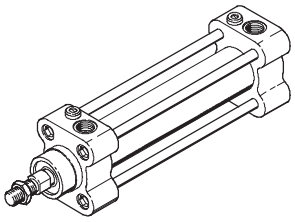
Cylinder with piston rod

Standard cylinder to ISO 15552, stainless steel

CRDNG / CRDNGS

FESTO

Repair instructions (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 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.

FESTO

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 CRDNG.

The cylinder with piston rod CRDNG 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 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 (➔ www.festo.com/spareparts).
- **Tools and repair accessories**

  Contain an overview of available assembly aids such as lubricating greases, screw locking agents, maintenance tools, etc. (aids for assembly and maintenance). Can be found in the online spare parts catalogue on the Festo website (➔ Tools and repair accessories.pdf).

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.

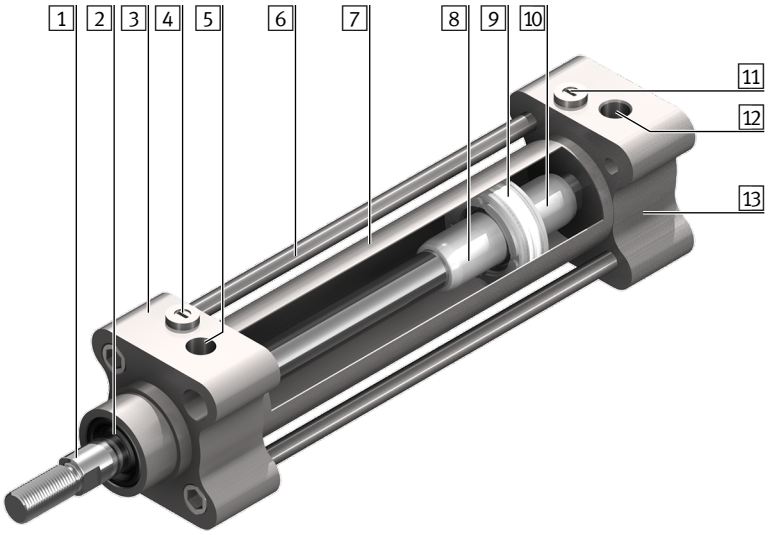
Environment

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.



1 Piston rod
2 Piston rod seal
3 Bearing cap
4 Front adjustable end-position cushioning
5 Front compressed air connection
6 Tie rod
7 Cylinder barrel
8 Cushioning boss
9 Piston (one-piece)
10 Cushioning boss
11 Rear adjustable end-position cushioning
12 Rear compressed air connection
13 End cap
(with S2 : Rear bearing cap)

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 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:

CRDNG	Cylinder of the type CRDNG
80	Piston diameter 80 mm
100	Stroke 100 mm
PPV	Adjustable end-position cushioning
A	Sensing option (magnetic piston)
S6	Heat-resistant seals (repair-relevant feature (see chapter 2.3 "Repair-relevant features"))

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).

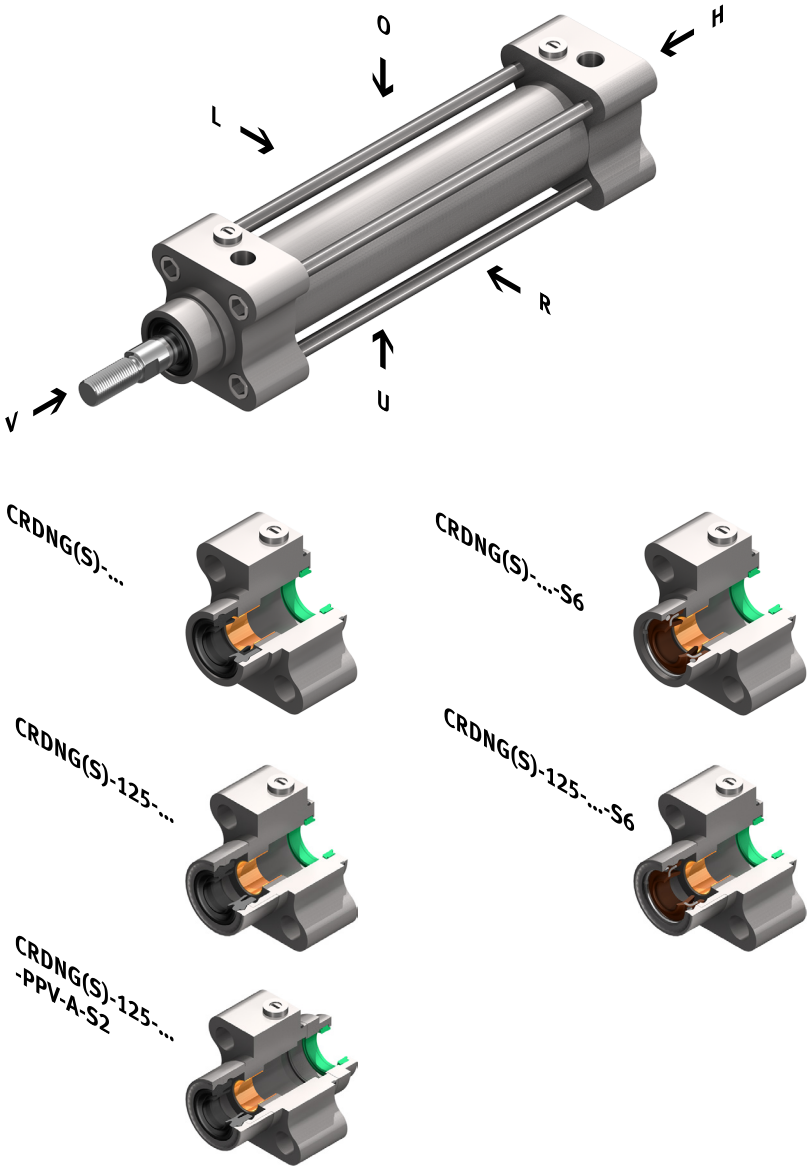
Cylinder and repair-relevant feature	Other features	Described from page
CRDNG-... without repair-relevant feature	PPV, A, S2	11
CRDNG-...-**S6** (heat-resistant seals up to max. 120°C)	PPV, A	17
CRDNGS-... without repair-relevant feature	PPV, A	11
CRDNGS-...-**S6** (heat-resistant seals up to max. 120°C)	PPV, A	17

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 cylinder CRDNG(S)-...-S6" on page 17 must therefore be used to repair this cylinder with piston rod.

2.4 Orientation designations 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.



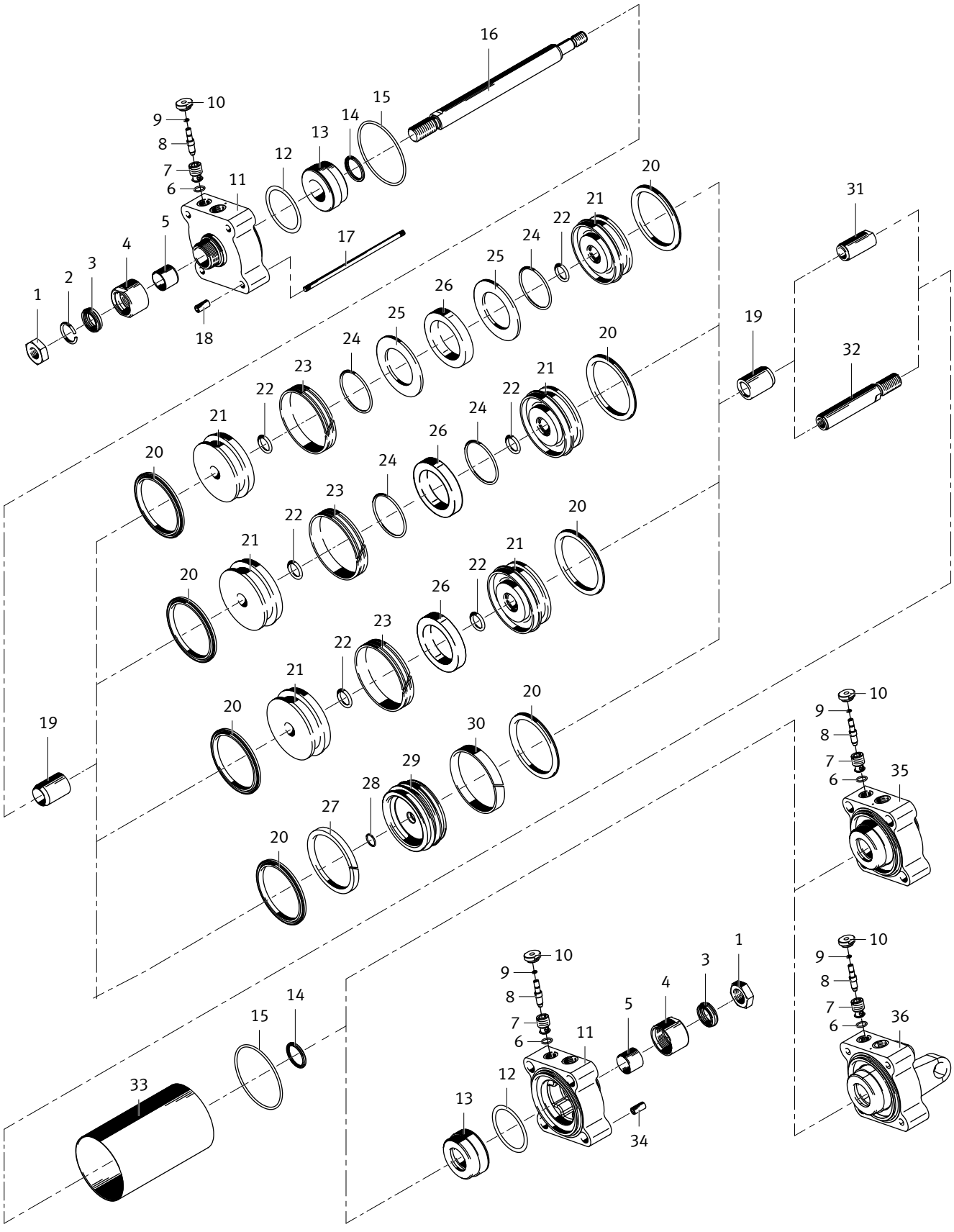
Orientation:

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
S2 = Through piston rod

3 Component overview



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 (➔ www.festo.com/spareparts).

Item	Designation	Note
1	Hex nut	
2	Retaining ring	Only with -S6
3	Piston rod seal	
4	Adapter	Only with CRDNG(S)-125-...
5	Bearing	
6	O-ring	Not with CRDNG(S)-32-...
7	Threaded insert	Not with CRDNG(S)-32-...
8	Regulating screw	Not with CRDNG(S)-32-...
9	O-ring	Not with CRDNG(S)-32-...
10	Threaded insert	Not with CRDNG(S)-32-...
11	Bearing cap	
12	O-ring	Only with CRDNG-125-...-PPV-A-S2
13	Sleeve	Only with CRDNG-125-...-PPV-A-S2
14	Cushioning seal	
15	O-ring	
16	Piston rod	
17	Tie rod	
18	Collar nut	
19	Cushioning boss	
20	Lip ring (piston seal)	
21	Piston, two-piece	Not with CRDNG(S)-125-...
22	O-ring	Not with CRDNG(S)-125-...
23	Slip ring	
24	O-ring	With CRDNG(S)-32 / 40 / 50 / 63 / 80 / 100-...
25	Washer	Only with CRDNG(S)-32-...
26	Ring magnet	Not with CRDNG(S)-125-...
27	Magnetic strip	Only with CRDNG(S)-125-...
28	O-ring	Only with CRDNG(S)-125-...
29	Piston, one-piece	Only with CRDNG(S)-125-...
30	Guiding band	Only with CRDNG(S)-125-...
31	Threaded coupling	Not with -S2
32	Piston rod	Only with CRDNG-...-S2
33	Cylinder barrel	
34	Collar nut	Only with CRDNG-...-S2
35	End cap	Not with CRDNG-...-S2
36	End cap	Only with CRDNGS

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 significant damage.

4.3 Repairing the cylinder CRDNG(S)-...

The description in this chapter can be used to repair cylinders of the type CRDNG(S)-... with the following features:

CRDNG

Code	Description
PPV	Adjustable pneumatic cushioning
A	External position sensing
S2	Through piston rod

CRDNGS (with swivel flange)

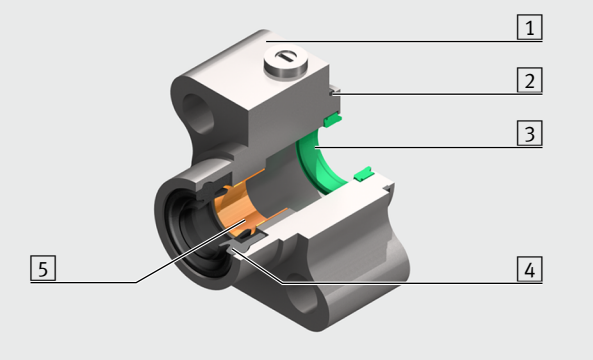
Code	Description
PPV	Adjustable pneumatic cushioning
A	External position sensing

4.3.1 Structure of the bearing cap

Note

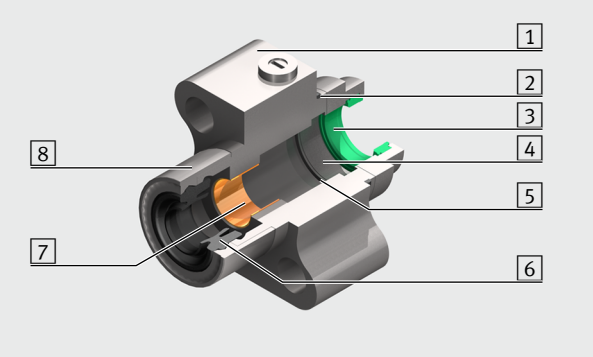
In some series and variants the bearing and end caps may differ from the versions shown here. The precise design of the bearing and end caps must be determined before each repair using the parts lists in the online spare parts catalogue on the Festo website (➔ www.festo.com/spareparts) and taken into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

Bearing cap CRDNG(S)-...



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

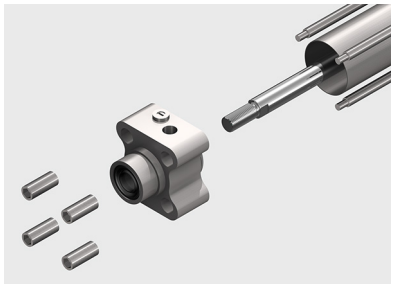
Bearing cap CRDNG-125-...-PPV-A-S2



1 Bearing cap
2 O-ring
3 Cushioning seal
4 Sleeve
5 O-ring
6 Piston rod seal
7 Bearing
8 Adapter

4.3.2 Removing the bearing and end caps

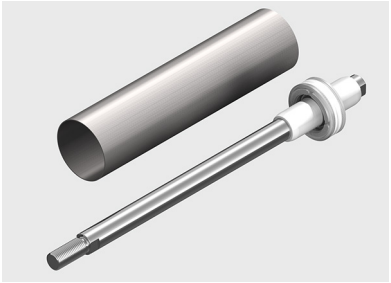
- Loosen the screws in the bearing cap from the tie rods (hold the screws in the second bearing cap in place on cylinders with through piston rod (S2)) and remove them.
- Remove the bearing and end caps (both bearing caps on cylinders with through piston rod (S2)) from the cylinder barrel and piston rod.
- Loosen the tie rods in the end cap and remove them (on cylinders with through piston rod (S2), pull the tie rod with the screws out of the second bearing cap and unscrew the screws from the tie rod).
- Remove any residue of the screw locking agent from the threads of the screws and tie rods.



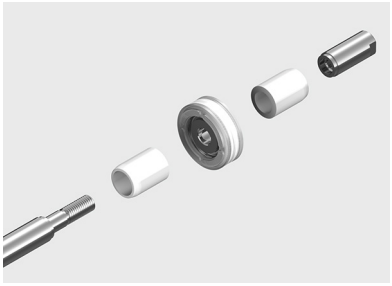
4.3.3 Replacing the piston components

- Pull the piston rod out of the cylinder barrel.
- Check the cylinder barrel and piston rod for damage.

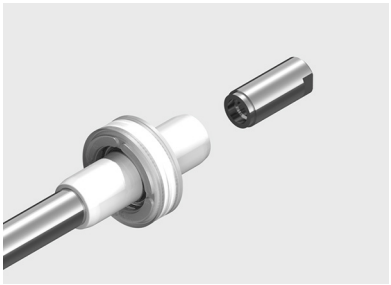
  The entire cylinder must be replaced if the cylinder barrel (particularly the bearing surface) is showing significant damage.



- 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 order and orientation.
- 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.



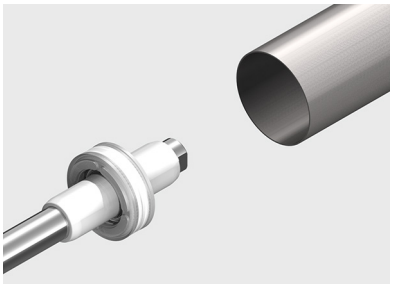
- Apply the screw locking agent included in the set of wearing parts to the inside of the threaded coupling (the rear part of the piston rod on cylinders with through piston rod (S2)) and screw it onto the piston rod with the corresponding torque (see table).



Type	Torque
CRDNG(S)-32 / CRDNG-32-...-S2	10 Nm
CRDNG(S)-40 / CRDNG-40-...-S2	20 Nm
CRDNG(S)-50 / CRDNG-50-...-S2	30 Nm
CRDNG(S)-63 / CRDNG-63-...-S2	30 Nm
CRDNG(S)-80 / CRDNG-80-...-S2	40 Nm
CRDNG(S)-100 / CRDNG-100-...-S2	60 Nm
CRDNG(S)-125 / CRDNG-125-...-S2	160 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:



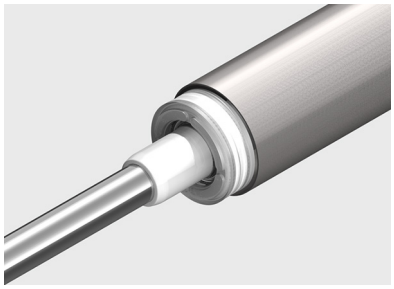
Component	Greasing
Inner surface of cylinder barrel	Thin film[1)]
Surface of piston rod	Thin film[1)]
Piston seal lip rings	Thin film[1)] on outside
Piston surface between lip rings (grease reservoir[2)])	Fill 2/3 with grease
Cushioning boss	Thin film[1)] on outside

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

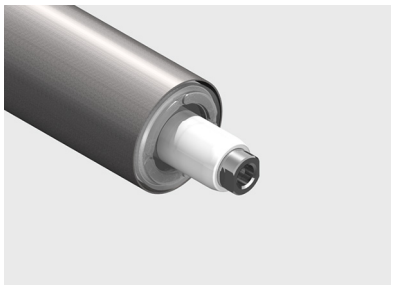
[2)] See chapter 5.2.3 "Grease reservoir"

- Place the piston flat 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.
- 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.

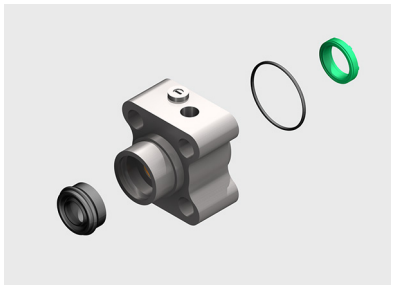


Note

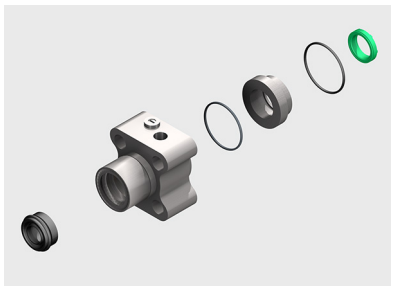
This approach ensures that the sealing lips of the two lip rings sit correctly in the cylinder barrel.

4.3.5 Repairing and attaching the bearing and end caps

- Remove the O-ring from the groove of the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2)).
- Remove the piston rod seal from the bearing cap (the front and rear bearing caps on cylinders with 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)).



- **Only with CRDNG-125-...-PPV-A-S2**
  - Remove the sleeves with the cushioning seals from the bearing caps.
  - Remove the O-rings behind the sleeves from the bearing caps.
  - Remove the cushioning seals from the sleeves.



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.

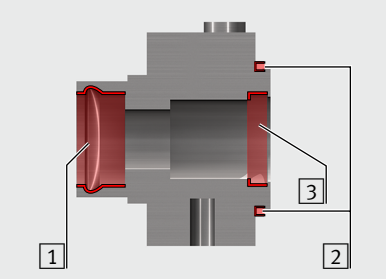
- **Only when repairing the adjustable cushioning (PPV)**

Note

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

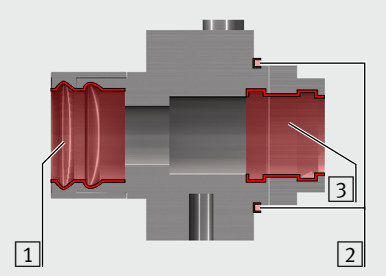
- Clean the seat of the piston rod seal 1.
- Clean the seat of the O-ring 2.
- Clean the seat of the cushioning seal 3.

  See chapter 5.1 "Cleaning"



- **Only with CRDNG-125-...-PPV-A-S2**
  - Clean the seat of the piston rod seal 1.
  - Clean the seat of the O-ring 2.
  - Clean the seat of the cushioning seal and sleeve 3.

    See chapter 5.1 "Cleaning"

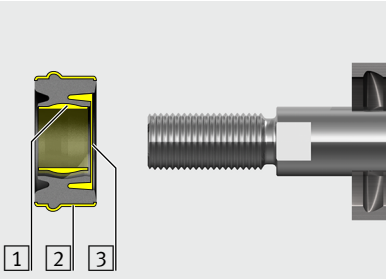


- Grease the new piston rod seal (one per bearing cap on cylinders with through piston rod (S2)) as follows:

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"

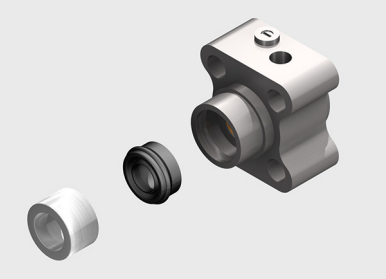
[2] See chapter 5.2.2 "Thin grease film"



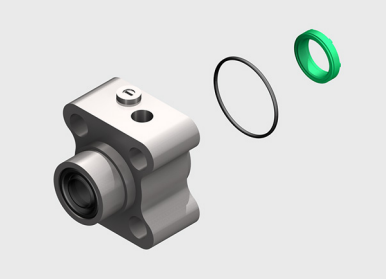
- Insert the piston rod seal into the bearing cap (in both bearing caps on cylinders with through piston rod (S2)) using an appropriate thrust piece.

Note

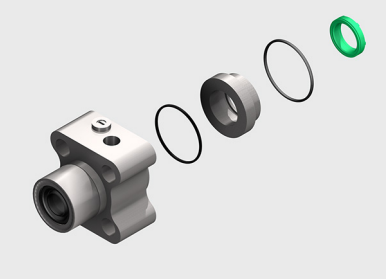
Note the mounting direction (individual sealing lips facing out).



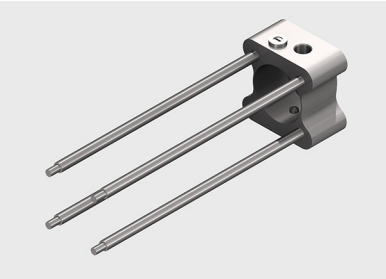
- Grease the new O-rings and insert them into the grooves in the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2)).
- Apply a thin film of grease to the new cushioning seals on the front side of the sealing surface and insert them into the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2)).



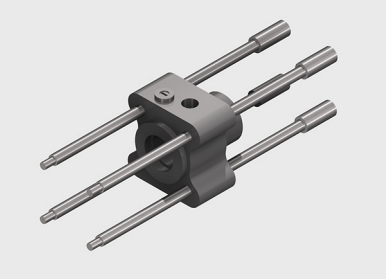
- **Only with CRDNG-125-...-PPV-A-S2**
  - Grease the new O-rings and insert them into the bearing caps.
  - Insert the sleeves into the bearing caps.
  - Apply a thin film of grease to the new cushioning seals on the front side of the sealing surface and insert them into the bearing caps.



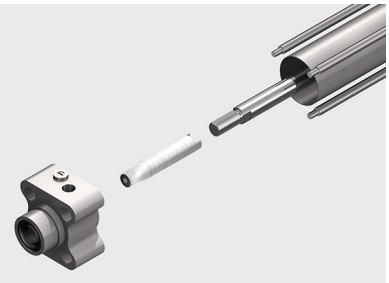
- Apply the screw locking agent included in the set of wearing parts to the thread of the tie rods.
- Lightly screw the tie rods into the end cap.



- **Only on cylinders with through piston rod (S2)**
  - Lightly tighten the screws on one side onto the tie rods.
  - Insert the tie rods with the screws through the holes in the bearing caps from one side.

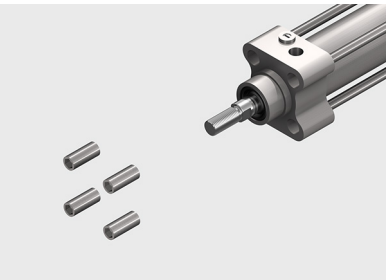


- Push the cylinder barrel with the piston onto the end cap.
- To protect the bearing and seals, place the appropriate mounting sleeve (see chapter 7.2 "Special tools") on the thread of the piston rod to prevent damage.
- Guide the bearing cap (both bearing caps on cylinders with through piston rod (S2)) over the mounting sleeve onto the piston rod as far as the cylinder barrel.



- Screw the screws in the bearing cap onto the tie rods (hold the screws in the second bearing cap in place on cylinders with through piston rod (S2)).
- Tighten the screws with the appropriate torque (see table).

Type	Torque
CRDNG(S)-32	6 Nm
CRDNG(S)-40	6 Nm
CRDNG(S)-50	10 Nm
CRDNG(S)-63	14 Nm
CRDNG(S)-80	19 Nm
CRDNG(S)-100	30 Nm
CRDNG(S)-125	70 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 cylinder CRDNG(S)-...-S6

The description in this chapter can be used to repair cylinders of the type CRDNG(S)-...-S6 with the following features:

CRDNG	
Code	Description
PPV	Adjustable pneumatic cushioning
A	External position sensing

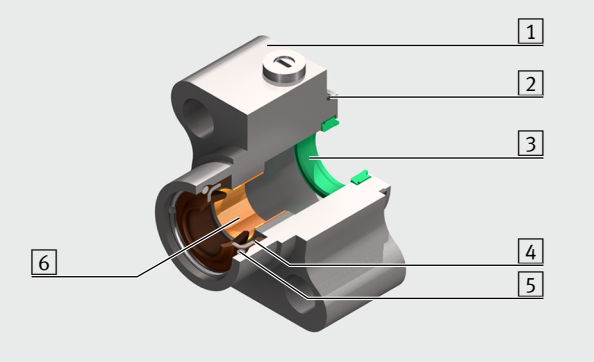
CRDNGS (with swivel flange)	
Code	Description
PPV	Adjustable pneumatic cushioning
A	External position sensing

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 (➔ www.festo.com/spareparts) and taken into consideration during the repair.

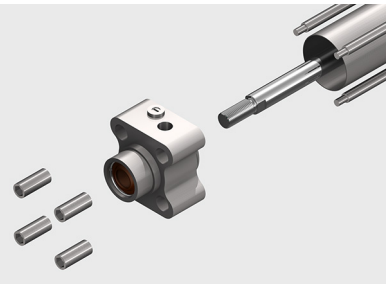
Bearing cap CRDNG(S)-...-S6



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

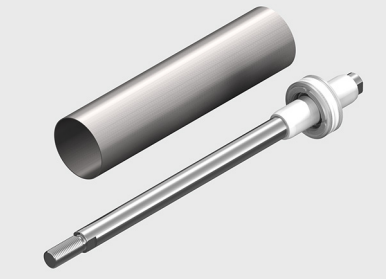
- Loosen the screws in the bearing cap from the tie rods and remove them.
- Remove the bearing and end caps from the cylinder barrel and piston rod.
- Loosen the tie rods in the end cap and remove them.
- Remove any residue of the screw locking agent from the threads of the screws and tie rods.



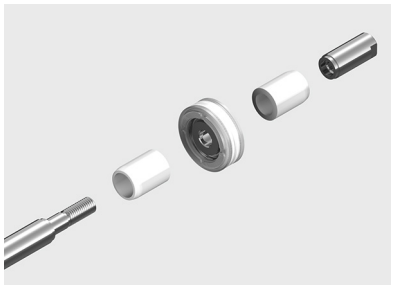
4.4.3 Replacing the piston components

- Pull the piston rod out of the cylinder barrel.
- Check the cylinder barrel and piston rod for damage.

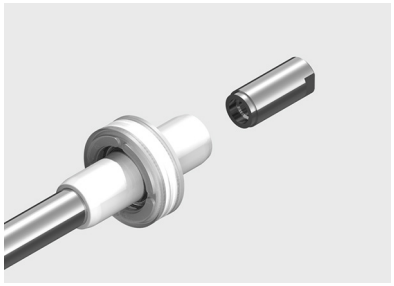
  The entire cylinder must be replaced if the cylinder barrel (particularly the bearing surface) is showing significant damage.



- Unscrew the threaded coupling from the piston rod.
- Remove the piston components from the piston rod, noting the order and orientation.
- 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.



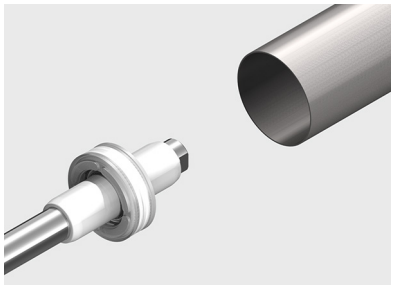
- Apply the screw locking agent included in the set of wearing parts to the inside of the threaded coupling and screw it onto the piston rod with the corresponding torque (see table).



Type	Torque
CRDNG(S)-32	10 Nm
CRDNG(S)-40	20 Nm
CRDNG(S)-50	30 Nm
CRDNG(S)-63	30 Nm
CRDNG(S)-80	40 Nm
CRDNG(S)-100	60 Nm
CRDNG(S)-125	160 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:



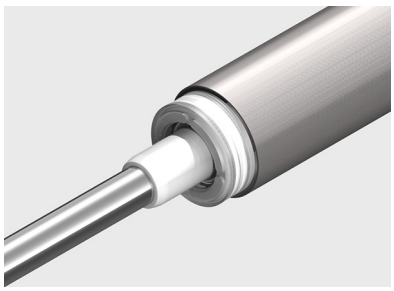
Component	Greasing
Inner surface of cylinder barrel	Thin film[1)]
Surface of piston rod	Thin film[1)]
Piston seal lip rings	Thin film[1)] on outside
Piston surface between lip rings (grease reservoir[2)])	Fill 2/3 with grease
Cushioning boss	Thin film[1)] on outside

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

[2)] See chapter 5.2.3 "Grease reservoir"

- Place the piston flat 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.

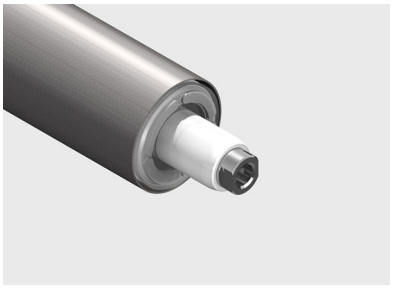


Note

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.

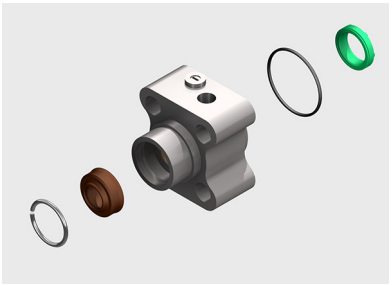


Note

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

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.
- 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.

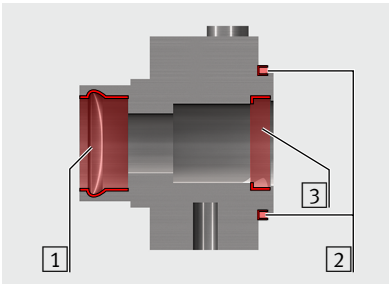
- **Only when repairing the adjustable cushioning (PPV)**

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"

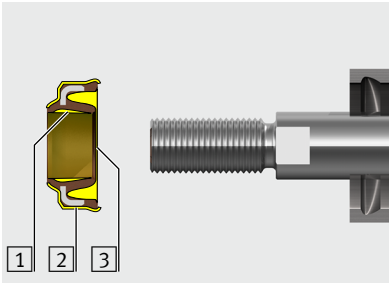


- Grease the new piston rod seal as follows:

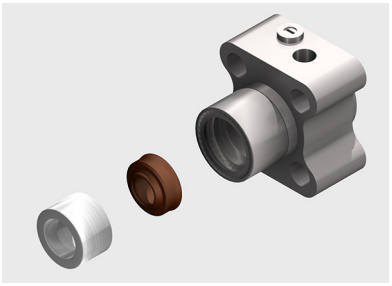
Area	Greasing
1 Grease reservoir[1] for piston rod	Fill 2/3 with grease
2 External surface for bearing cap	Thin film[2]
3 Grease reservoir[1] for bearing	Fill 2/3 with grease

[1] See chapter 5.2.3 "Grease reservoir"

[2] See chapter 5.2.2 "Thin grease film"



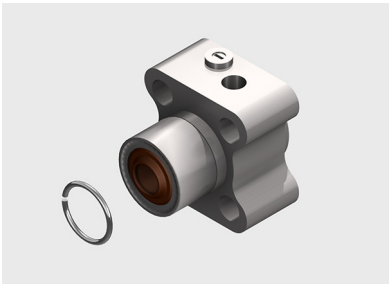
- Insert the piston rod seal into the bearing cap using an appropriate thrust piece.



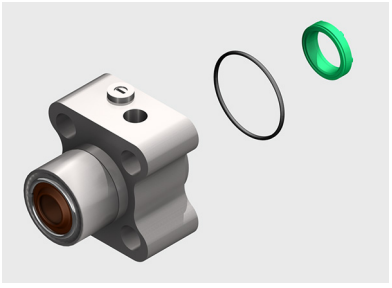
Note

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

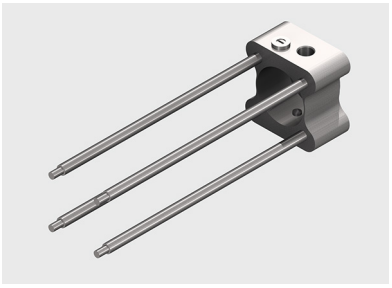
- Compress the retaining ring (e.g. using pliers) and place it on the piston rod seal.



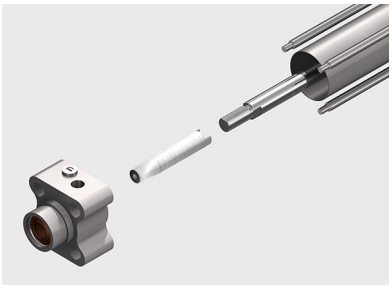
- Grease the new O-rings and insert them into the grooves in the bearing cap and end cap.
- Apply a thin film of grease to the new cushioning seals on the front side of the sealing surface and insert them into the bearing cap and end cap.



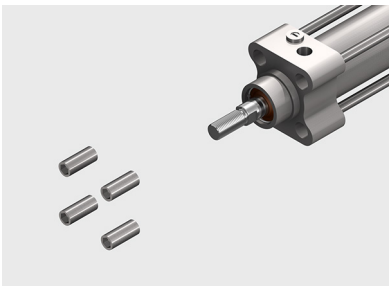
- Apply the screw locking agent included in the set of wearing parts to the thread of the tie rods.
- Lightly screw the tie rods into the end cap.



- Push the cylinder barrel with the piston onto the end cap.
- 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.



- Screw the screws in the bearing cap onto the tie rods.
- Tighten the screws with the appropriate torque (see table).



Type	Torque
CRDNG(S)-32	6 Nm
CRDNG(S)-40	6 Nm
CRDNG(S)-50	10 Nm
CRDNG(S)-63	14 Nm
CRDNG(S)-80	19 Nm
CRDNG(S)-100	30 Nm
CRDNG(S)-125	70 Nm

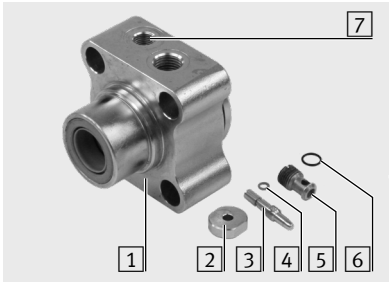
- Perform a functional test as per the operating instructions (enclosed with the cylinder or can be called up on the Festo website (➔ www.festo.com)) and commission the repaired cylinder.

4.5 Repairing the adjustable end-position cushioning (PPV)

Note

The end-position cushioning (PPV) **cannot** be disassembled on cylinders with a piston diameter of 32 mm.

Components of the end-position cushioning (PPV):



1 Bearing cap
2 Outer threaded insert
3 Egulating screw
4 O-ring of the regulating screw
5 Inner threaded insert
6 O-ring from the threaded hole of the bearing cap
7 Location hole for the PPV in the bearing cap or end cap

4.5.1 Disassembling the adjustable end-position cushioning (PPV)

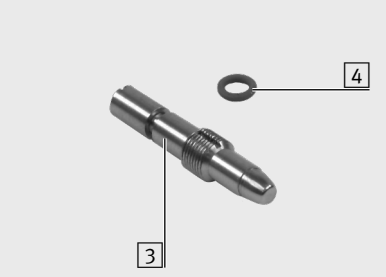
- Unscrew the outer threaded insert 2 all the way out of the bearing cap or end cap.
- Remove any residue of the screw locking agent from the thread of the outer threaded insert 2.

- Unscrew the regulating screw [3] fully.

- Unscrew the inner threaded insert [5] from the bearing cap or end cap using an appropriate screwdriver.
- Remove any residue of the screw locking agent from the thread of the inner threaded insert [5].

- Remove the O-ring [6] (not visible here) from the location hole for the PPV in the bearing or end cap.
- Clean the female thread and the location hole for the PPV.

- Remove the O-ring [4] from the regulating screw [3].



4.5.2 Assembling the adjustable end-position cushioning (PPV)

The adjustable end-position cushioning (PPV) is mounted in the reverse order:

- Grease the new O-ring [4] with LUB-E1 and insert it into the groove of the regulating screws [3].
- Grease the new O-ring [6] with LUB-E1 and insert it into the location hole for the PPV in the bearing cap or end cap.
- Apply screw locking agent to the thread of the inner threaded insert [5].
- Screw the inner threaded insert [5] into the bearing cap or end cap using an appropriate screwdriver and make sure that the inner threaded insert [5] is fitting securely.

- Screw the regulating screw [3] all the way in.
- Apply screw locking agent to the thread of the outer threaded insert [2].
- Screw the outer threaded insert [2] into the bearing cap or end cap and make sure that the outer threaded insert [2] is fitting securely.

- 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.

5 Cleaning and greasing

5.1 Cleaning

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

All non-abrasive cleaning agents are permissible.

Note

Regular removal of the lubricant on the surface of the piston rod reduces its service life.

Note

- Clean with a soft, lint-free cloth and non-abrasive cleaning agents.
- Check the compatibility of the cleaning agent with the materials to be cleaned.

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.

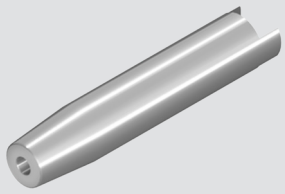
7.1 Standard tools

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 **“Tools and repair accessories”**.	

Documents

Further information on the special tools and schematic diagrams can be found in the information brochure **“Tools and repair accessories”**. It can be found in the online spare parts catalogue on the Festo website (➔ Tools and repair accessories.pdf).

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