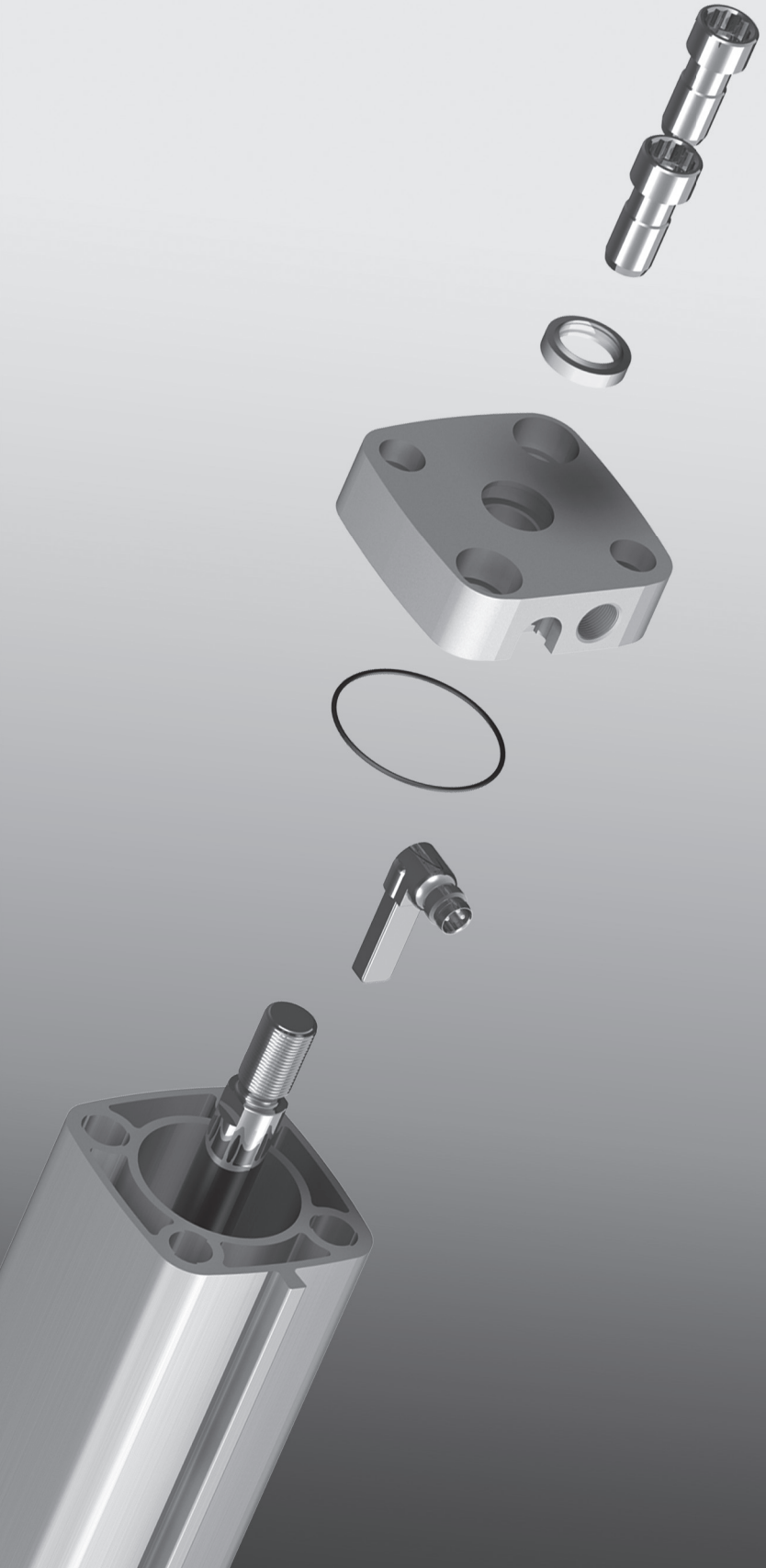
Cylinder with piston rod

Compact cylinder to ISO 21287

CDC



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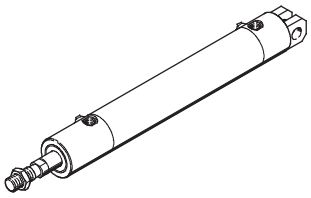
Repair instructions (en)



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Postfach
73726 Esslingen
Germany

Editorial team:
SC-S

Tel.:
+49 (0) 711 / 347-0

Fax:
+49 (0) 711 / 347-2144

E-mail:
service_international@festo.com

Internet:
http://www.festo.com

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.

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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 CDC.

The cylinder with piston rod CDC 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 (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 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.

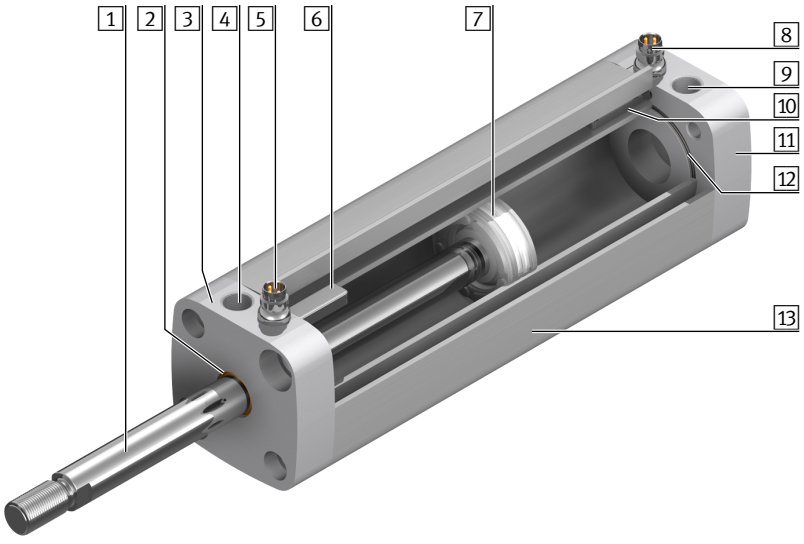
Environment

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 compressed air connection
5 Front proximity sensor connection (only with ...-AI...-...)
6 Front proximity sensor (only with ...-AI...-...)
7 Piston (one-piece)
8 Rear proximity sensor connection (only with ...-AI...-...)
9 Rear compressed air connection
10 Rear proximity sensor (only with ...-AI...-...)
11 End cap with S2 : rear bearing cap
12 O-ring
13 Cylinder barrel

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:

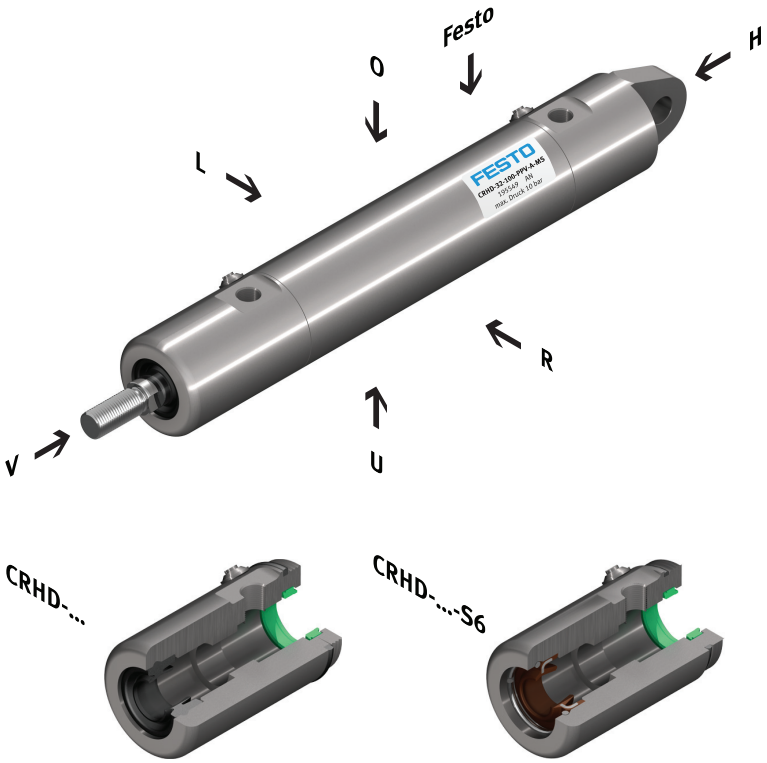
CDC Cylinder of the type CDC
32 Piston diameter 32 mm
100 Stroke 100 mm
A Male thread
P Elastic cushioning rings/pads at both ends
AIB Proximity sensor integrated at both ends
R External position sensing

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 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

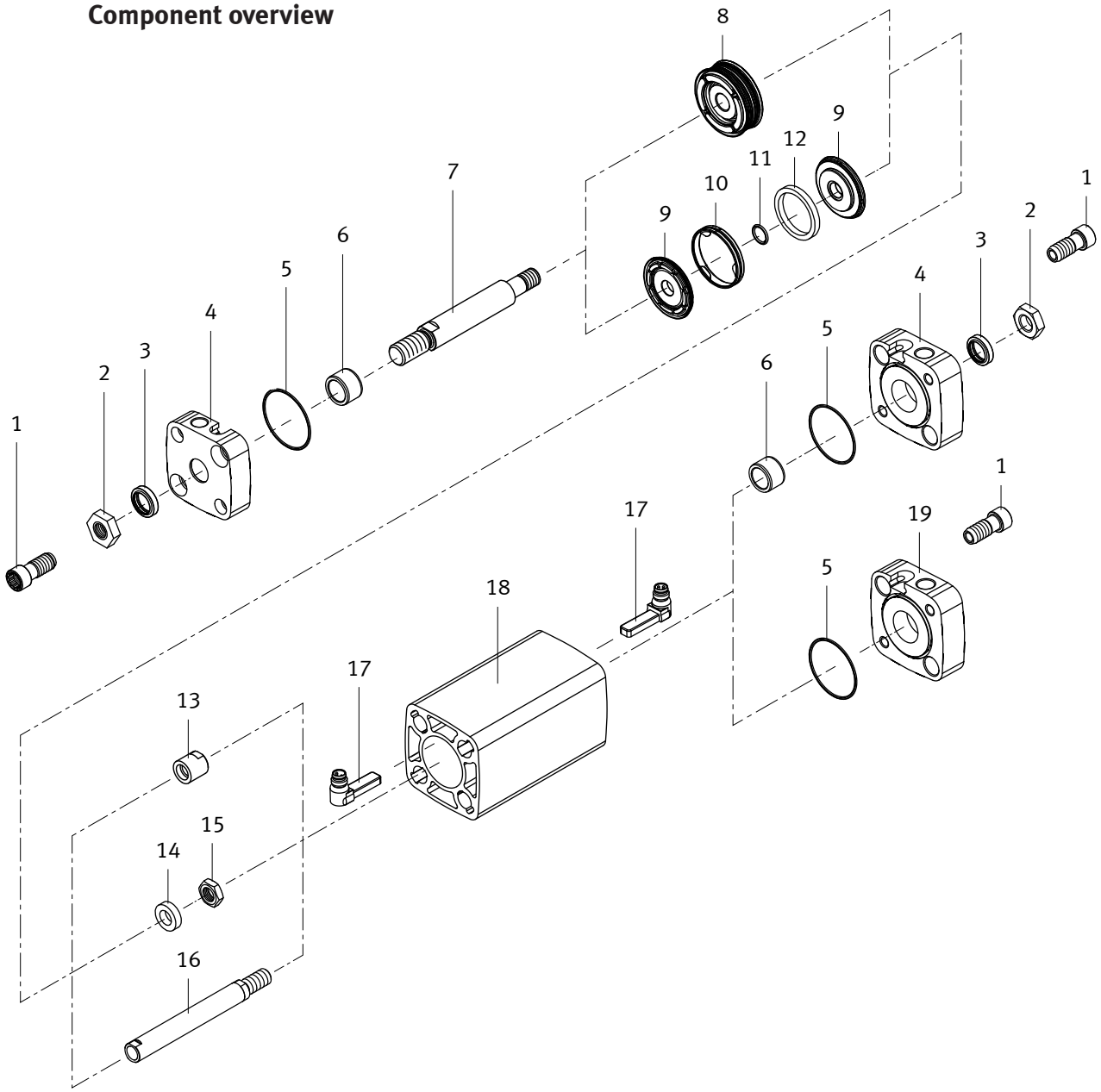
R = right

L = left

V = front

H = rear

3 Component overview



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	Use screw locking agent (set of wearing parts)
2	Hex nut	
3	Piston rod seal	
4	Bearing cap	
5	O-ring	
6	Bearing	
7	Piston rod	
8	Piston	Only with CDC-20 / 25 / 32-...
9	Piston washer	Only with CDC-40 / 50 / 63 /80-...
10	Guiding band	Only with CDC-40 / 50 / 63 /80-...
11	O-ring	Only with CDC-40 / 50 / 63 /80-...-A...
12	Magnet	Only with CDC-40 / 50 / 63 /80-...
13	Nut	Only with CDC-20 / 25-...
14	Washer	Only with CDC-32 / 40 / 50 / 63 /80-...
15	Hex nut	Only with CDC-32 / 40 / 50 / 63 /80-...
16	Piston rod	Only with -S2
17	Proximity sensor	Only with -AI...-
18	Cylinder barrel	
19	End cap	

4 Repair steps

4.1 Preparation

- Before starting the repair, remove any attachments (clamping device, end-position lock, etc.) 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.

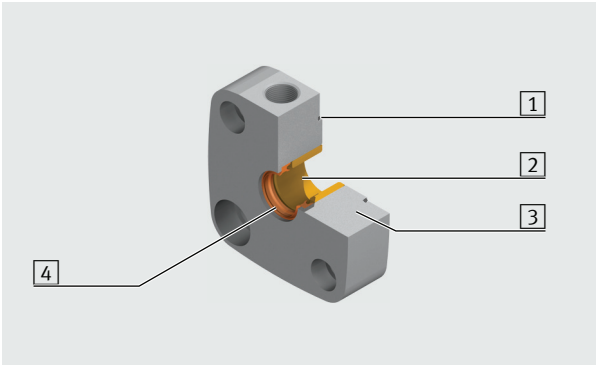
4.3 Repairing the cylinder CDC-...

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

Code	Description
A	Male thread
I	Female thread
P	Elastic cushioning rings/pads at both ends
A	External position sensing
AIB	Internal position sensing at both ends
AIV	Internal position sensing at the front
AIH	Internal position sensing at the rear
SME	Contacting proximity sensor
SMT	Proximity sensor, contactless

Code	Description
R	Sensor mounting rail
S2	Through piston rod
...K2	Extended male piston rod thread
k3	Female piston rod thread
...K8	Extended piston rod
S6	Heat-resistant seal max. 120 °C

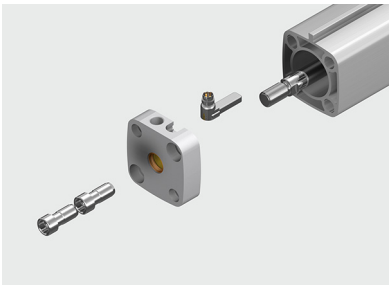
4.3.1 Structure of the bearing cap



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

4.3.2 Removing the bearing and end caps

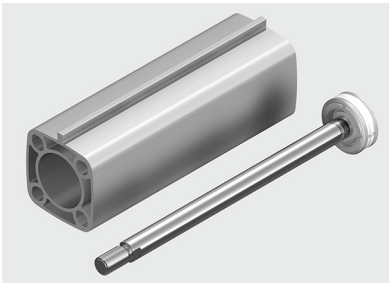
- Loosen the flange screws in the bearing and end caps (the rear bearing cap on cylinders with through piston rod (S2)) and remove them.
- Remove the bearing and end caps from the cylinder barrel and piston rod.
- Remove the proximity sensors, if present, from the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2)).



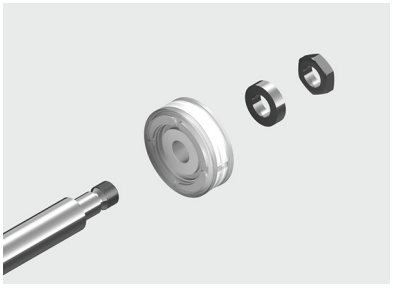
4.3.3 Replacing the piston components

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

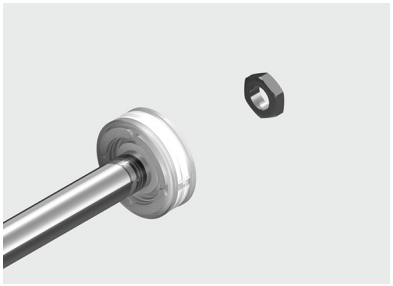
  The entire cylinder must be replaced if the cylinder barrel (particularly the bearing surface) is showing significant damage.



- Unscrew the nut (for CDC-20/25- ...), the hex nut and washer (for CDC-32/40/50/63/80-...) or 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.
- 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 nut (CDC-20 / 25-...), the hex nut and washer (CDC-32 / 40 / 50 / 63 /80-...) or 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
CDC-20	2.7 Nm
CDC-25	20 Nm
CDC-32	9.1 Nm
CDC-40	9 Nm
CDC-50	23.3 Nm
CDC-50-...-SME / SMT	9 Nm
CDC-63	23.3 Nm
CDC-63-...-SME / SMT	9 Nm
CDC-80	45.5 Nm
CDC-80-...-SME / SMT	9 Nm

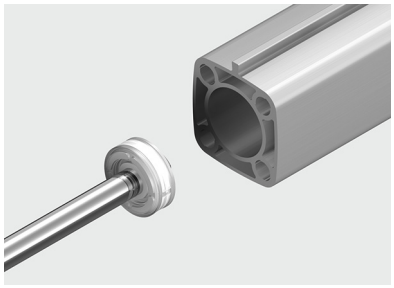
4.3.4 Inserting the piston rod into the cylinder barrel

- 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

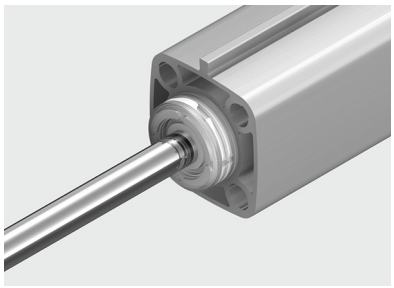
[1)] See chapter 5.2.2 "Thin grease film"

[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.

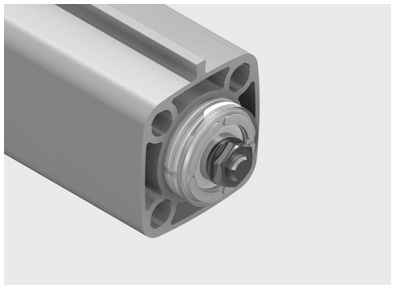
  The sealing lip must not fold back against the inside of the piston.



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.

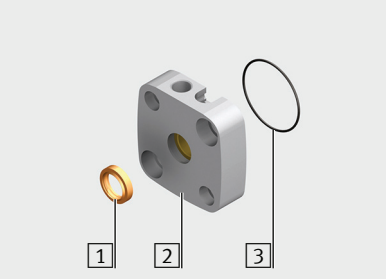


Note

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

4.3.5 Repairing and attaching the bearing and end caps

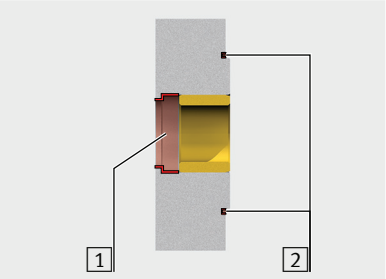
- Remove the piston rod seal [1] from the bearing cap [2] (the front and rear bearing caps on cylinders with through piston rod (S2)).
- Remove the O-ring [3] from the groove of the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2)).



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.

- Clean the seat of the piston rod seal [1].
- Clean the seat of the O-ring [2].

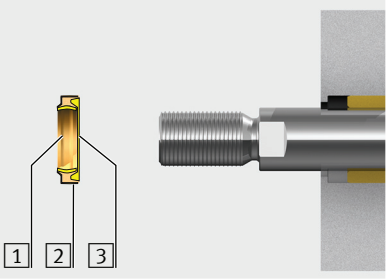


- Grease the new piston rod seal (one per bearing cap on cylinders with through piston rod (S2)) as follows:

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"

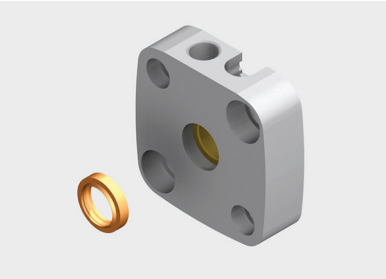
[2)] See chapter 5.2.2 "Thin grease film"



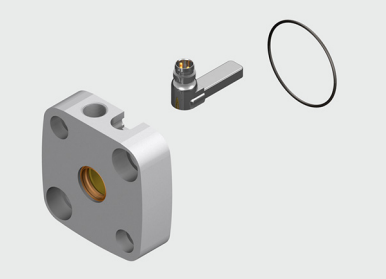
- Insert the piston rod seal into the bearing cap (in both bearing caps on cylinders with through piston rod (S2)).

Note

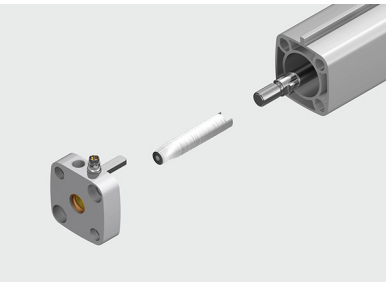
Note the mounting direction (individual sealing lips facing out).



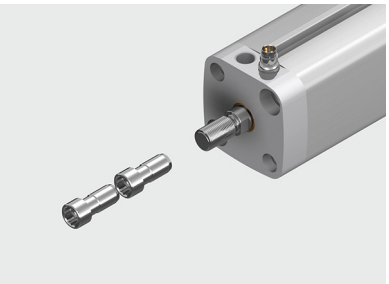
- Grease the new O-rings and insert them into the grooves in the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2)).
- Place the proximity sensors, if present, in the corresponding recess in the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2)).



- 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.
- 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.
- Fasten the screws through the bearing and end caps into the cylinder barrel.
- Align the bearing and end caps flush with the cylinder barrel.
- Tighten the screws with the appropriate torque (see table).



Type	Torque
CDC-20	9 Nm
CDC-25	9 Nm
CDC-32	27 Nm
CDC-40	27 Nm
CDC-50	35 Nm
CDC-50-...-SME / SMT	27 Nm
CDC-63	35 Nm
CDC-63-...-SME / SMT	27 Nm
CDC-80	35 Nm
CDC-80-...-SME / SMT	27 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.

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. The cylinders are also 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.

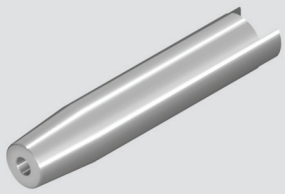
7.1 Standard tools

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).

8 Liability

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IV. Liability/Limitations of liability

1. Festo supplies this electronic documentation in order to assist the user in creating his machine and system documentation. In the case of electronic documentation that does not directly accompany a product in the form of portable data storage media (floppy disk, CD-Rom, removable disk), i. e. that is not supplied together with that product, Festo does not guarantee that the electronic documentation provided/supplied separately matches the product actually used by the user.

The latter applies particularly to extracts of the documents for the user’s own documentation. The guarantee and liability for separately provided/supplied data storage media, i. e. except for the electronic documentation provided/supplied via the Internet/Intranet, is limited exclusively to proper duplication of the software, whereby Festo guarantees that in each case the data storage medium or software contains the latest update of the documentation. Concerning electronic documentation available on the Internet/Intranet, there is no guarantee that it will have the same version status as the last typographically published edition.

2. Furthermore, Festo cannot be held liable for the lack of economic success or for damage or claims by third parties resulting from the use of the documentation by the user, with the exception of claims arising from infringement of the protection rights of third parties concerning the use of the electronic documentation.

3. The limitations of liability as per paragraphs 1 and 2 do not apply if, in cases of intent or gross negligence or the lack of warranted quality, liability is absolutely necessary. In such a case, Festo’s liability is limited to the damage discernable by Festo when the definitive circumstances are made known.

V. Safety guidelines/documentation

Warranty and liability claims in conformity with the aforementioned regulations (items III. and IV) may be raised only if the user has observed the safety guidelines of the documentation in conjunction with the use of the machine and its safety guidelines. The user himself is responsible for ensuring that the electronic documentation, when not supplied with the product, matches the product actually used by the user.