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TRANSLATION OF ORIGINAL - en

Overhaul instructions

Keep for future use!

Version: 1.0

LM 250

Air motor 250



Date: 2019-02-22

Version: 1.0

Overhaul instructions

Air motor 250

Scope



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Scope

Assembly: Air motor 250

Product Version: LM 250

Item Number: 3HDAK0100064500

Drawing Number: 3HDAK0100064500

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1 General information

1.1 Purpose of these instructions

These instructions describe the repair of the 250 air motor.

IMPORTANT

Follow these instructions!



- These instructions must be assessable to everybody that handles this module in any way.
- The operating company must ensure that these instructions are read and understood by everybody that handles this module in any way.

The components connected to this module are covered in separate instruction manuals.

DOCUMENTS REFERENCE

Observe reference documents!



- Read the instruction manual for the module in its entirety before operating the equipment for the first time!
- Also note the corresponding chapter of the provided sub-contractor documentation of purchased parts! If you have any questions please contact our Customer Service or the manufacturers directly.

1.2 Target readership of these instructions

These instructions must be observed and used by maintenance and repair personnel.

Persons working with the assembly must have been suitably trained by the manufacturer or plant owner.

The repair personnel must be suitably trained.

Personnel	Prerequisites
Briefed personnel	Operating personnel are people who have been instructed by the plant owner or trained persons to carry out tasks relating to the operation of the plant. They must provide instruction about possible dangers arising from incorrect behaviour and about the required protective equipment and safety measures.
Trained personnel	Has received in-depth subject education and training, is cable to assess the plant's safety status and is familiar with the applicable accident prevention and health and safety regulations and with the acknowledged rules of technology.

Table 1: Personnel skills requirements

The table below outlines what work each of these user groups is authorised to perform:

Activity	Briefed personnel	Trained personnel
Operating the plant	X	X
Perform maintenance and repair work and tooling		X

Table 2: Personnel and their activities

1.3 Legal Notice / Liability

The manufacturer assumes warranty and liability claims only under the conditions specified in the contract and in compliance with the warranty periods.

The warranty expires:

- In the event of errors and damages that can be attributed to the fact that instructions in the manual have not been observed,
- In the event of complaints that can be attributed to the fact that others than the original parts specified in the documentation were used when replacing components,
- When changing the module (function, operating parameters) disregarding the conditions specified in the order and without prior consent of the manufacturer.

The content of the technical documentation has been prepared with the utmost care. However no liability is assumed for possible errors or incompleteness. This also applies to the content of the technical documentation of all sub-contractors.

The documentation contains information that is protected by copyright. All rights reserved. This documentation may not be reproduced without the expressed written permission of the manufacturer. It may not be electronically or mechanically reproduced, distributed, modified, surrendered to third parties, translated or otherwise used - not even excerpts.

Technical changes and errors are not impossible.

1.4 Co-Applicable Documents

This manual refers to drawings and parts lists with drawing number of

Assembly: Air motor 250

Product Version: LM 250

Item Number: 3HDAK0100064500

Drawing Number: 3HDAK0100064500

1.5 Information symbols used in these instructions

The entire documentation contains notes about workplace safety that are intended to prevent injury.

These notes are labelled with the following signs and symbols:

DANGER



This box indicates an immediate danger.

Unless prevented, this situation can lead to severe injury or death.

WARNING



This box indicates a potentially dangerous situation.

Unless prevented, this situation can lead to severe injury or death.

CAUTION



This box indicates a potentially dangerous situation.

Unless prevented, this situation can cause minor injury or material damage.

IMPORTANT



This box indicates a potentially dangerous situation.

Unless avoided, this situation can lead to material or product damage.

NOTE



This box contains important notes that require special attention.

Notes without a specific sequence are given with bullet points. If a specific order is necessary, these notes are numbered.

DOCUMENTS REFERENCE



This box contains cross-references to associated documents.

References without a specific sequence are given with bullet points. If a specific order is necessary, these references are numbered.

ENVIRONMENTAL PROTECTION



This box contains information about environment-conscious procedures and behaviour.

It may indicate environment protection measures.

1.6 Safety Notes

When working on or with the assembly, observe the following general safety instructions:

1. The safety instructions must be observed at all times to prevent accidents.

2. The regulations and information in the operating instructions and in the user documentation of third-party products as well as all safety instructions must be observed to ensure safe and reliable operation of the assembly.
 - ▶ Observing this information helps identify hazards and prevent dangerous situations.
 - ▶ Observing these safety instructions is a precondition for workplace design.
 - ▶ They must be made available to all users before performing any action on the plant and the plant components and must, in part, be contained in the personnel briefing and training.
3. The Occupational Safety Provisions and Accident Prevention Regulations of the relevant country are applicable in which the component is operated.
 - ▶ The operating company of the system is responsible for implementing these provisions.
4. Only trained and instructed expert staff may undertake conversion of the component.
5. For work on the assembly, the personnel has to have access to personal protective equipment such as protective work wear, safety gloves, helmet and safety goggles.
6. In the event of a fault, the assembly has to be switched off and a fault message has to be displayed.
 - ▶ Please inform the manufacturer about the fault if the fault cannot be eliminated easily.
 - ▶ If necessary, it has to be ensured that the master switch and the shut-off valves on the maintenance units are switched off and secured against accidental start before any work on the assembly is carried out.
 - ▶ Troubleshooting and elimination of faults may only be carried out by trained expert staff.
7. Persons can be injured severely, even die, due to moving plant parts (e.g. robot) and components (e.g. gripper).
 - ▶ Working in the cell (protected area) is only allowed with secured lockout bar/padlocks.
 - ▶ All work within the cell must be performed only by trained, briefed specialists.

DANGER



Never override the safety devices! They are intended to protect your life.

IMPORTANT



The work described here must be carried out only with the plant depressurized and isolated from mains power.

1.7 Risks in Using the Module

WARNING

Risk of injury through sudden plant startup!



When re-establishing the energy supply after an interruption, the plant can unexpectedly restart. This can cause severe injuries.

During maintenance work, switch off the plant and secure it against restarting (main switches and shut-off valves). Observe the safety instructions in the plant documentation. The plant operating personnel must receive regular training in operation and handling of the plant and its components.

WARNING

Danger through pneumatic and hydraulic components!



Incorrect installation, wear or whipping of burst compressed fluid lines can cause injury!

Regularly inspect the pneumatic and hydraulic system. Replace heavily loaded components as specified in the maintenance schedule. All work must be carried out by trained, briefed specialists. Work on the pneumatic and electrical systems must be carried out by specialists.

WARNING

Heavy weight of the module!



Improper handling can cause physical injuries of the worker!

For handling the module use suitable transport and lifting equipment!

WARNING

Caution when operating the barrel pump!



Incorrect handling can result in crushing or tearing off of body parts through the movement of the material pump.

Do not touch the pump components when the plant is switched on.

Observe the notes in the operating instructions for the barrel pump. All work on the pump must be carried out only by trained, briefed specialists.

WARNING

Danger through incorrect behaviour when troubleshooting!

Incorrect user action during troubleshooting can result in uncontrolled movement, which, in turn, can cause injuries.



Use the operating instructions in the technical documentation for troubleshooting and fault rectification. The maintenance personnel must be suitably trained. Troubleshooting and fault rectification work on the assembly must be carried out by trained, briefed specialists. If the fault cannot be rectified easily, notify the manufacturer about the fault.

NOTE



The plant must be entered for repair and maintenance work only when it is at a standstill.

1.8 Safety Measures

When working within the machine, the following protective equipment must be provide:

- ▶ Always wear protective clothing and safety shoes according to accident prevention and industrial safety regulations.



- ▶ If necessary, use protective gloves or disposable gloves when working on the material and hydraulic system.



- ▶ When working on the material, compressed air and hydraulic system also wear protective goggles.



- ▶ When working within the machine wearing a head protection (protection against bumping) is required.



NOTE



Check your protective clothing before each use!

2 Tools and accessories

The following tools and accessories are required for assembly and disassembly of the module:

Tools

- ▶ Set of Allen keys
- ▶ Hydraulic press
- ▶ Set of open-end spanners
- ▶ Socket spanner a/f 30 mm ½" actuator

Operating and auxiliary substances

- ▶ Multipurpose grease LGEP 2
for high loads
- ▶ Fine Grease MP 2/3
- ▶ White special Vaseline

Manufacturer

- SKF (www.skf.com)
- SKF (www.skf.com)
- Reiff (www.reiff-tp.de)

3 Removing

3.1 Notes

The prerequisite for the revision is a removed assembly.

- ▶ The work described here must be carried out only with the assembly depressurized and isolated from mains power.
- ▶ The safety and accident prevention regulations given in these documentations must also be observed.
- ▶ Assembly work must be carried out by the manufacturer, by specially briefed personnel or by trained personnel.

NOTE

If you have any questions, contact our customer service.

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For further information, see our website

www.abb.com/robotics



3.2 Disassembling the assembly

Disassembling the valve unit

- Release the M6x60 hexagon socket screws and take off the valve block.

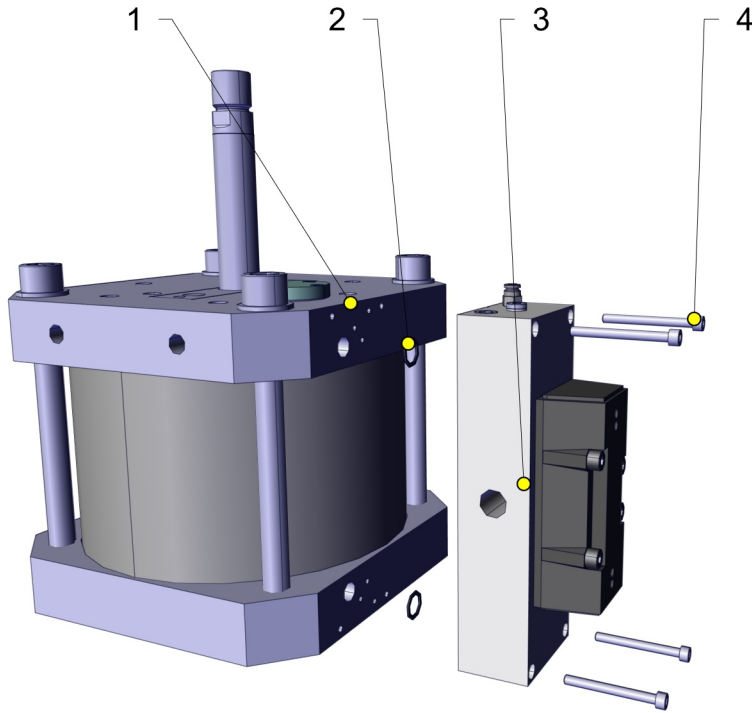


Figure 1: Disassembling the valve unit

No.	Designation
1	Air motor
2	O-ring
3	Valve block
4	M6x60 socket head screw

Disassembling the cylinder

- Release the M20x240 socket head screws.
- Pull the base with integrated reversing unit and piston rod with piston out of the cylinder barrel.
- Remove the cylinder barrel from the cover; this exposes the O-rings.

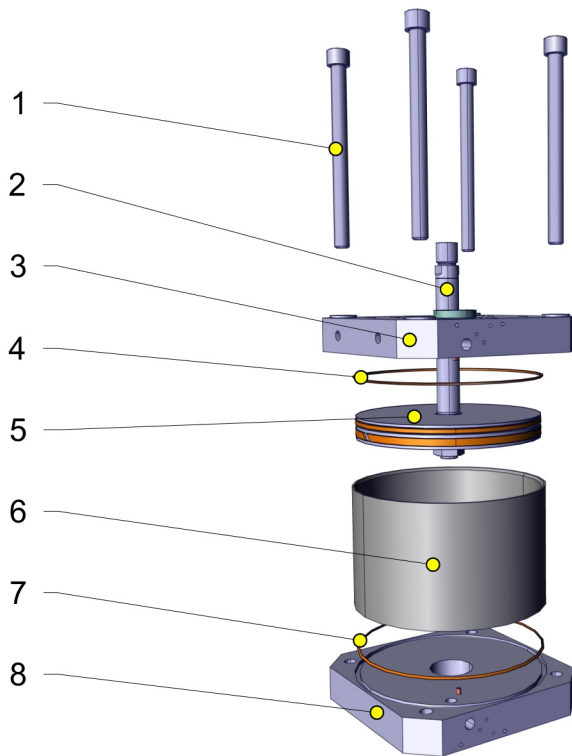


Figure 2: Disassembling the cylinder – part 1

No.	Designation
1	M20x240 socket head screw
2	Piston rod
3	Base
4	O-ring
5	Piston
6	Cylinder barrel
7	O-ring
8	Cover

- Release the rod seal and bushing from the piston rod.
- Release the hexagon nut and remove the piston rod from the piston.
- Release the sealing ring from the piston.
- Remove the reversing units from base and cover.

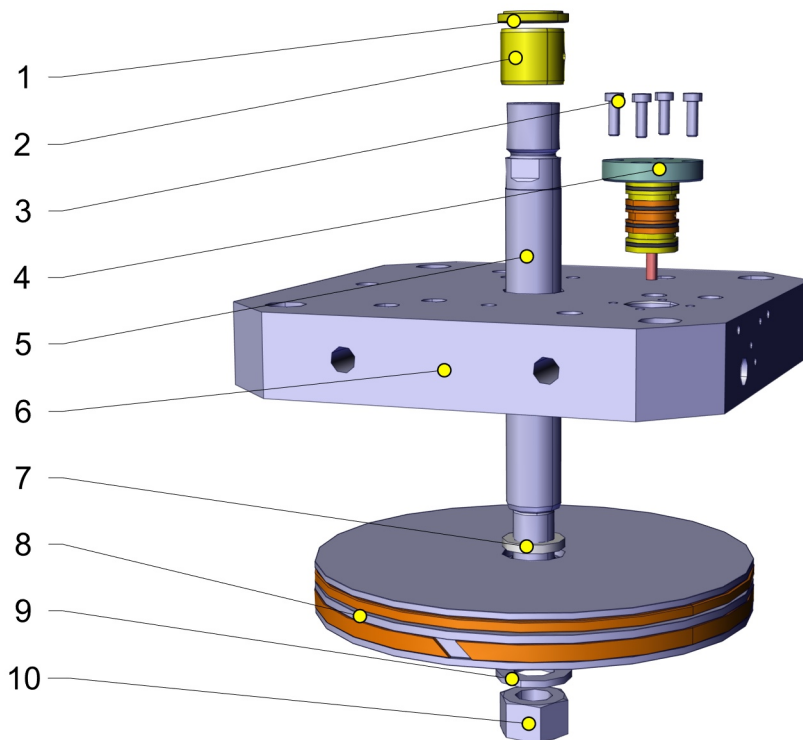


Figure 3: Disassembling the cylinder – part 2

No.	Designation
1	Rod seal
2	Bush
3	M6x18 socket head screw
4	Reversing unit
5	Piston rod
6	Base
7	Piston sealing ring
8	Piston
9	Glass
10	Hexagon nut

Disassembling the reversing unit

- Release the M6x18 hexagon socket screws and take off the cover.
- Remove the spring and O-ring.
- Pull the liners out of the bore using M3 screws. Take the piston and O-rings out of the liners.

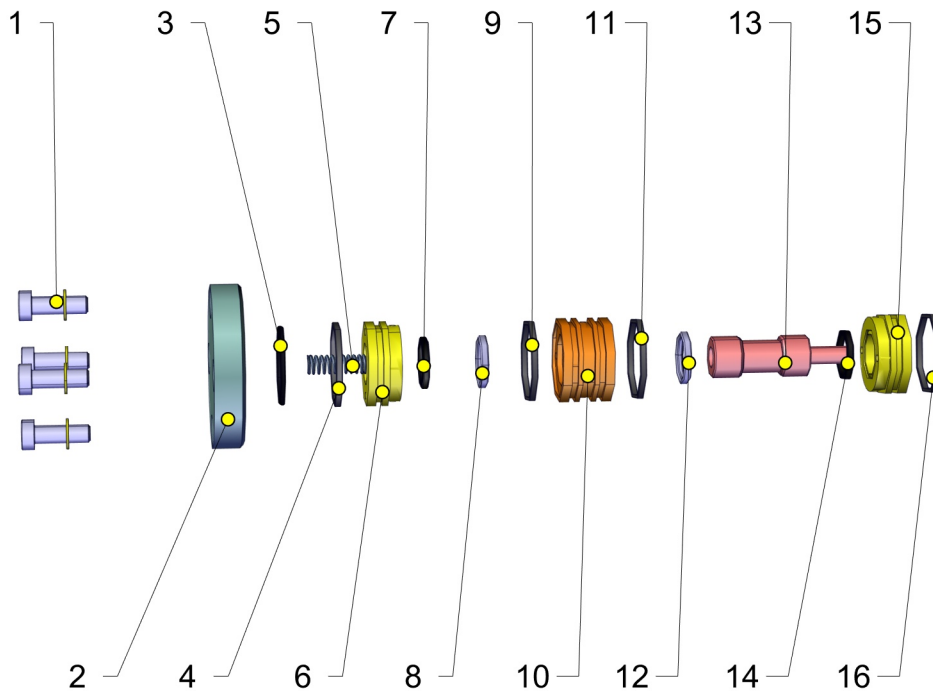


Figure 4: Disassembling the reversing unit

No.	Designation	No.	Designation
1	M6x18 socket head screw	9	O-ring
2	Reversing unit cover	10	Liner middle section
3	O-ring	11	O-ring
4	O-ring	12	O-ring
5	Pressure spring	13	Piston
6	Liner end piece	14	O-ring
7	O-ring	15	Liner end piece
8	O-ring	16	O-ring

NOTE



The reversing units in the cover and base are identical.

4 Cleaning and assembly preparation

All parts are cleaned with commercially available industrial cleaners and checked for wear. Only new wear parts are installed.

Seals and bearing surfaces must be lubricated with petroleum jelly or a high-quality rolling bearing grease before assembly.

IMPORTANT



Use Vaseline to lubricate the seals and running surfaces.
Recommended: White special-purpose Vaseline from Reiff
You can replace this with a higher-grade bearing grease (e.g. SKF LGEP 2).

The bearing surfaces of the screw heads and threads are treated as well.

The following tightening torques must be observed:

M1,7 (SMC SYJ3...)	0,12 Nm	M8-12.9	25 Nm
M3 (SMC SYJ7...)	0,8 Nm	M10	40 Nm
M4	2,1 Nm	M10-12.9	45 Nm
M5	4,3 Nm	M12	45 Nm
M6	8,6 Nm	M12-12.9	50 Nm
M8	21 Nm	M16-10.9	60 Nm

Table 3: Tightening torques

5 Installation

Fitting the reversing unit

- Insert the O-rings into the liner parts.

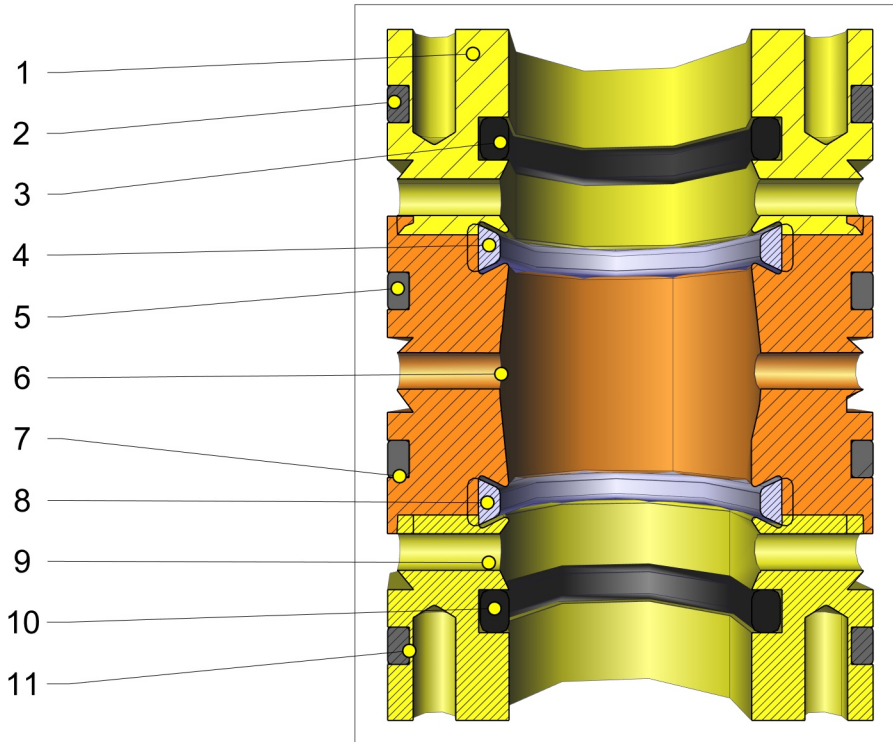


Figure 5: Sectional view of liner parts

No.	Designation
1	Liner end piece (6)*
2	O-ting (30)*
3	O-ting (31)*
4	O-ting (31)*
5	O-ting (30)*
6	Liner middle section (5)*

No.	Designation
7	O-ting (30)*
8	O-ting (31)*
9	Liner end piece (6)*
10	O-ting (31)*
11	O-ting (30)*

DOCUMENTS REFERENCE



*The **item numbers** refer to the items in the technical drawing:
3HDAK0100064500 air motor 250

- Press the liner parts into the bores of the cover and base as shown. Note the position of the extraction hole in the centre section of the liner.
- Insert the piston and compression spring.
- Insert the O-ring into the cover of the reversing unit and screw it on with the screws.

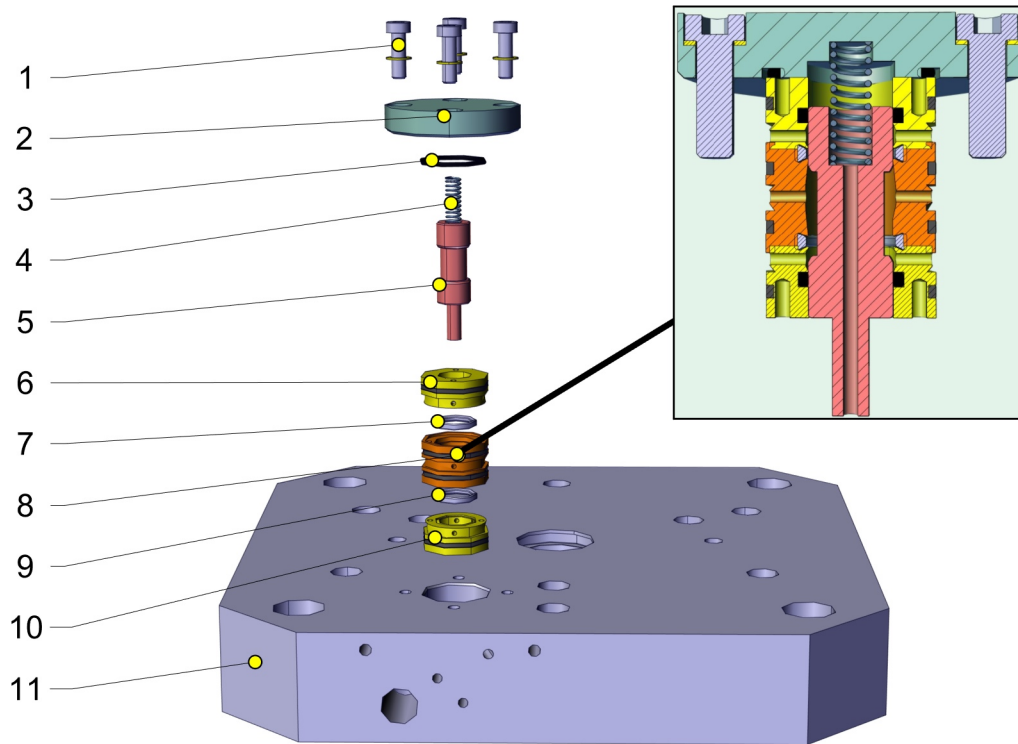


Figure 6: Assembling the reversing unit

No.	Designation
1	M6x18 socket head screw
2	Reversing unit cover
3	O-ring
4	Pressure spring
5	Piston
6	Liner end piece incl. O-ring

No.	Designation
7	O-ring
8	Liner centre section incl. O-ring
9	O-ring
10	Liner end piece incl. O-ring
11	Base

Assembling the cylinder

- Push the liner into the base and insert the rod seal.
- Fit the sealing ring and O-ring as well as the piston with washer onto the piston rod and tighten with the hexagon nut.
- Fit the Glyd Ring and Slydring to the piston.
- Slide the piston unit into the cylinder barrel.
- Place the base on the piston rod.

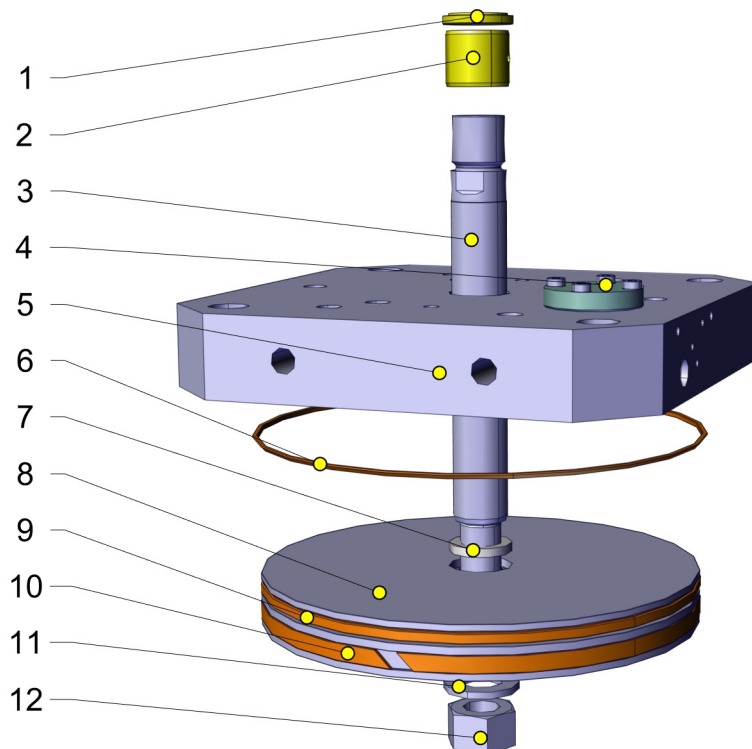


Figure 7: Assembling the cylinder – part 1

No.	Designation	No.	Designation
1	Rod seal	7	Piston sealing ring
2	Bush	8	Piston
3	Piston rod	9	Glyd Ring
4	Reversing unit	10	Slydring (guide ring)
5	Base	11	Glass
6	O-ring	12	Hexagon nut

- Insert the O-ring into the cover and fit the cylinder barrel.
- Align the connection surfaces of the valve unit in the cover and base.
- Connect cover and base with M20x240 socket head screws and tighten crosswise in 3 steps (50, 80 and 120 Nm tightening torque).

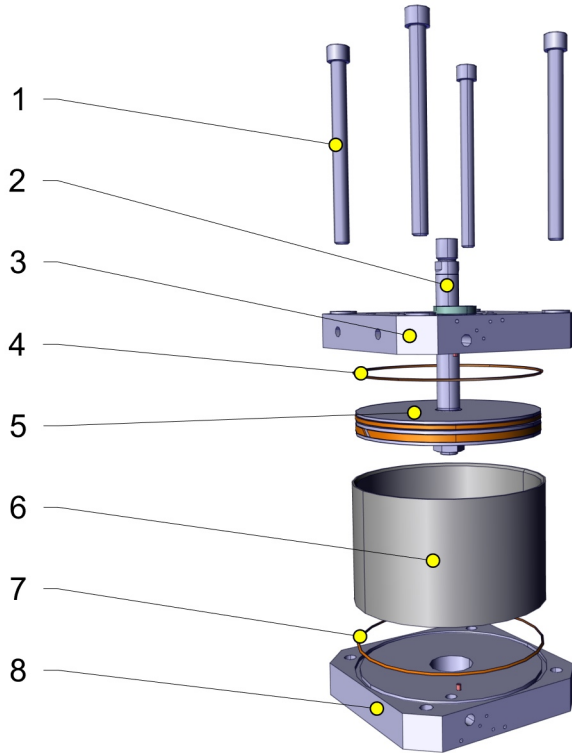


Figure 8: Assembling the cylinder – part 2

No.	Designation
1	M20x240 socket head screw
2	Piston rod
3	Base
4	O-ring

No.	Designation
5	Piston
6	Cylinder barrel
7	O-ring
8	Cover

Assembling the valve unit

- Insert the O-rings into valve block.
- Screw the valve block onto the cover and base using the screws according to the drilling patterns.

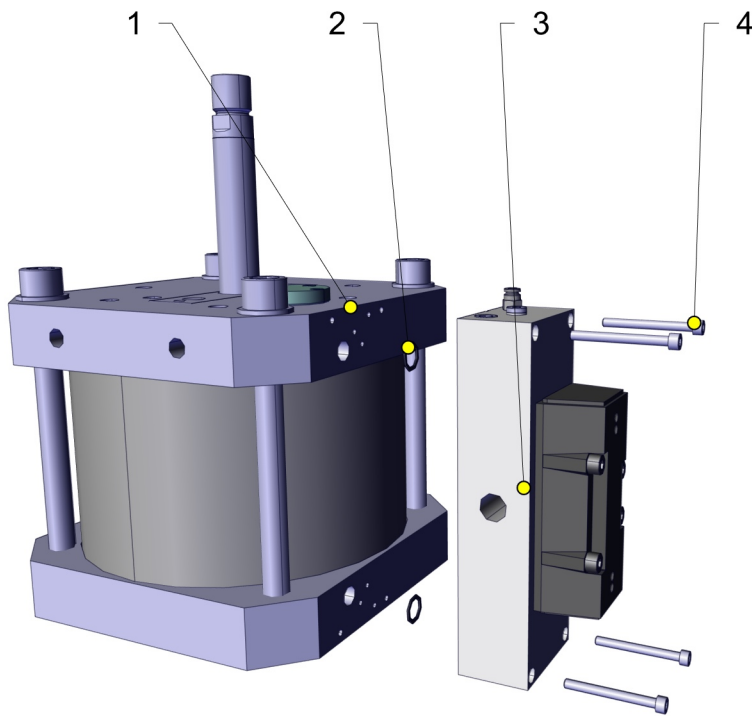


Figure 9: Assembling the valve unit

No.	Designation
1	Air motor
2	O-ring
3	Valve block
4	M6x60 socket head screw