

Tolerance Compensation Unit TCU-Z

Assembly and Operating Manual



Imprint

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Technical changes:

We reserve the right to make alterations for the purpose of technical improvement.

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Dear customer,

congratulations on choosing a SCHUNK product. By choosing SCHUNK, you have opted for the highest precision, top quality and best service.

You are going to increase the process reliability of your production and achieve best machining results – to the customer's complete satisfaction.

SCHUNK products are inspiring.

Our detailed assembly and operation manual will support you.

Do you have further questions? You may contact us at any time – even after purchase.

Kindest Regards

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1 General

1.1 About this manual

This manual contains important information for a safe and appropriate use of the product.

This manual is an integral part of the product and must be kept accessible for the personnel at all times.





Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

Illustrations in this manual are provided for basic understanding and may differ from the actual product design.

In addition to these instructions, the documents listed under [\(☞ 1.1.2, Page 6\)](#) are applicable.

1.1.1 Presentation of Warning Labels

To make risks clear, the following signal words and symbols are used for safety notes.

	<p>⚠ DANGER</p> <p>Danger for persons! Non-observance will inevitably cause irreversible injury or death.</p>
	<p>⚠ WARNING</p> <p>Dangers for persons! Non-observance can lead to irreversible injury and even death.</p>
	<p>⚠ CAUTION</p> <p>Dangers for persons! Non-observance can cause minor injuries.</p>
	<p>NOTICE</p> <p>Material damage! Information about avoiding material damage.</p>

1.1.2 Applicable documents

- General terms of business *
- Catalog data sheet of the purchased product *
- Assembly and Operating manuals of the accessories *

The documents marked with an asterisk (*) can be downloaded on our homepage www.schunk.com.

1.1.3 Sizes

This operating manual applies to the following sizes:

- TCU-Z 50
- TCU-Z 64
- TCU-Z 80
- TCU-Z 100
- TCU-Z 125
- TCU-Z 160
- TCU-Z 200

1.1.4 Variants

This operating manual applies to the following variations:

- TCU-Z Without "locking"
- TCU-Z With "locking"

1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the ex-works delivery date under the following conditions:

- Observe the applicable documents ([👉 1.1.2, Page 6](#))
- Observe the ambient conditions and operating conditions ([👉 2.5, Page 9](#))
- Observe the specified maintenance intervals, ([👉 6, Page 19](#))

Parts touching the workpiece and wearing parts are not included in the warranty.

1.3 Scope of delivery

The scope of delivery includes

- Tolerance Compensation Unit TCU-Z in the version ordered

1.4 Accessories

The following accessories, which must be ordered separately, are required for the product:

- Sensors, plus extension cables as an option

A wide range of accessories are available for this product

For information about which accessories can be used with the appropriate product version see catalog.

2 Basic safety notes

2.1 Intended use

This product is designed for compensating tolerances and positioning inaccuracies in handling workpieces.

- The product may only be used within the scope of its technical data, ([↩ 3, Page 12](#)).
- The product is intended for installation in a machine/system. The applicable guidelines must be observed and complied with.
- The product is intended for industrial use.
- Appropriate use of the product includes compliance with all instructions in this manual.

2.2 Not intended use

It is not intended use if the product is used, for example, as a pressing tool, stamping tool, lifting gear, guide for tools, cutting tool, clamping device or a drilling tool.

- Any utilization that exceeds or differs from the appropriate use is regarded as misuse.

2.3 Constructional changes

Making constructional changes

Modifications, constructional changes and subsequent work, e.g. additional threads, drill holes and safety devices may impair the operation and safety or damage the product.

- Constructional changes may only be done with SCHUNK's permission.

2.4 Spare parts

Use of unauthorised spare parts

Using unauthorised spare parts can endanger personnel and damage the product or cause it to malfunction.

- Use only original spare parts or spares authorised by SCHUNK.

2.5 Environmental and operating conditions

Requirements for the ambient and operating conditions

Due to incorrect ambient and operating conditions, dangers may arise from the product, which can cause serious injuries and substantial property damage.

- Make sure that the product is used only in the context of its defined application parameters, ([☞ 3, Page 12](#)).
- Make sure that the product has a sufficient size for the application.
- Observe maintenance and lubrication intervals, ([☞ 6.2, Page 19](#)).
- Make sure that the environment is free from splash water and vapors as well as from abrasion or processing dust. Exceptions are products that are designed especially for contaminated environments.

2.6 Personnel qualification

Inadequate qualifications of the personnel

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to the product:

- Trained electrician** Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations.
- Pneumatics specialist** Pneumatics specialists have been trained for this particular area of responsibility and know the relevant standards and regulations.
- Hydraulic specialist** Hydraulic specialists have been trained for this particular area of responsibility and knows the relevant standards and regulations.
- Qualified personnel** Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations.

- Instructed person** Instructed persons were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour.
- Service personnel of the manufacturer** Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers.

2.7 Personal protective equipment

Using personal protective equipment

Not wearing personal protective equipment while working with the product, may result in dangers that impact the personnel's safety and health.

- While working with the product, observe the health and safety regulations and wear the required personal safety equipment.
- Observe the valid safety and accident prevention regulations.
- In case of sharp edges and corners and rough surfaces, wear protection gloves.
- In case of hot surfaces, wear heat-resistant protection gloves.
- When dealing with hazardous substances, wear protection gloves and goggles.
- In case of moving parts, wear tight protection clothes.

2.8 Notes on safe operation

Incorrect handling of the personnel

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. This does not apply to products that are designed for special environments.
- Eliminate any malfunction immediately.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention and environmental protection regulations regarding the product's application field.

2.9 Transport

Handling during transport

Incorrect handling during transport may impair the product's safety and cause serious injuries and considerable material damage.

- When handling heavy weights, use lifting equipment to lift the product and transport it by appropriate means.
- Secure the product against falling during transportation and handling.
- Stand clear of suspended loads.

2.10 Disposal

Handling of disposal

The incorrect handling of disposal may impair the product's safety and cause serious injuries as well as considerable material and environmental harm.



- Follow local regulations on dispatching product components for recycling or proper disposal.

2.11 Fundamental dangers

General

- Observe safety distances.
- Never deactivate safety installations.
- Install the provided protective product in the danger zone before switching on the product.
- Remove energy supplies before the installation, modification, maintenance or adjustment work. Make sure that no residual energy is remaining in the system.
- Do not move parts by hand while the energy supply is connected.
- Do not reach into the open mechanism or movement area of the product during operation.

2.11.1 Notes on particular risks

	 WARNING
	<p>Risk of injury due to spring forces! Parts are under spring tension on products which clamp using spring force or which have a gripping force maintenance.</p> <ul style="list-style-type: none"> • Only specially trained staff should disassemble the product.

3 Technical data

More technical data are included in the catalog data sheet. Which ever is the latest version.

3.1 With "Locking" (MV)

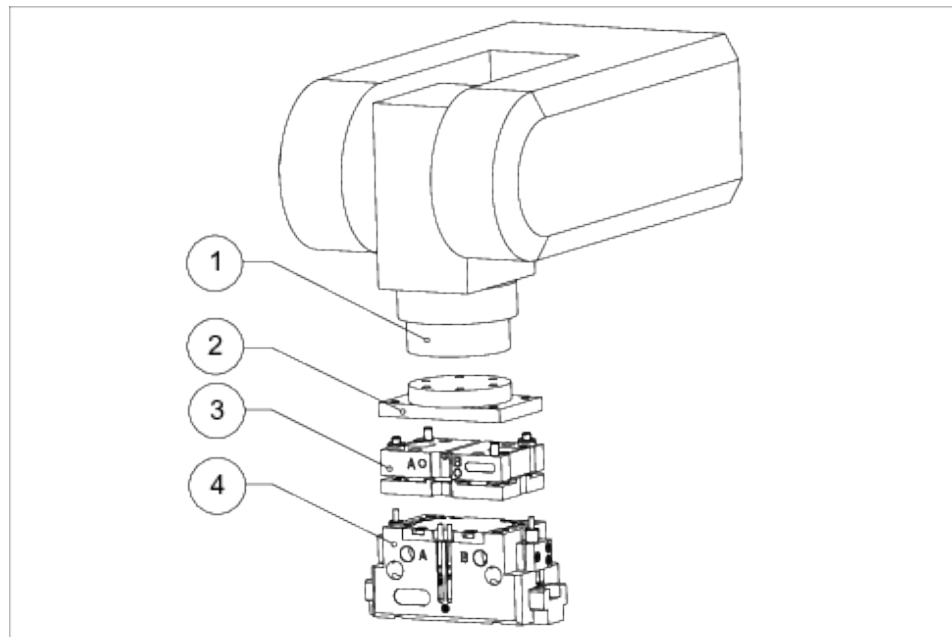
	TCU-Z					
	64	80	100	125	160	200
Weight [kg]	0.18	0.25	0.48	0.85	1.63	2.75
permissible operating temperature [°C]	- 10 to + 90					
Pressure medium	Compressed air, compressed air quality according to ISO 8573-1:7 4					
Min. pressure [bar]	4					
Max. pressure [bar]	8					
Noise emission [dB(A)]	≤ 70					

3.2 Without "Locking" (OV)

	TCU-Z						
	50	64	80	100	125	160	200
Weight [kg]	0.09	0.15	0.3	0.47	0.65	1.35	2.45
permissible operating temperature [°C]	- 10 to + 90						
Noise emission [dB(A)]	≤ 10						

4 Assembly

4.1 Assembly example



Assembly example at robot

1	robot or gantry axis
2	adapter plate (optional from SCHUNK or provided by customer)
3	tolerance compensation unit
4	handling device e.g. Gripper

Optional, SCHUNK can provide an adapter plate with hole pattern for mounting holes.

The adapter plate (2) is mounted to the robot (1) and to the TCU-Z (3) (see our catalog for mounting data).

SCHUNK gripper types PGN-plus, DPG, PGB and JPG are attached directly to the TCU-Z.

For all other handling devices (4) is an adapter plate required.

Air connection and electrical cables must be fixed and bundled with cable clamp, in order that during use the greatest possible freedom of movement is possible.

4.2 Mechanical connection



NOTICE

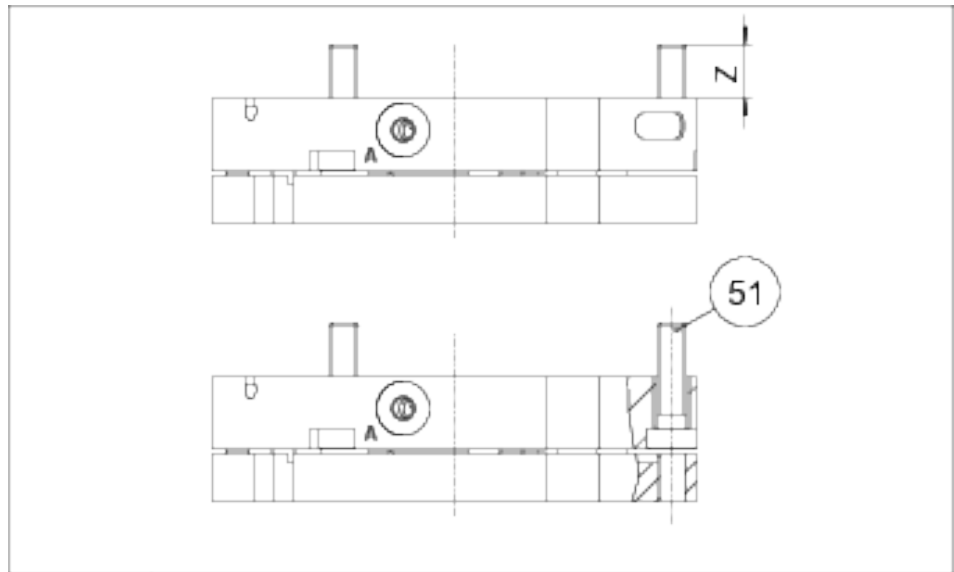
Break of the product because of faulty installation is possible!
Observe maximum depth of engagement at robot side and handling device.

Levelness of the mounting surface The values apply to the whole mounting surface to which the product is mounted .

Requirements for levelness of the mounting surface (Dimensions in mm)

Diameter	Permissible unevenness
< 100	< 0.02
> 100	< 0.05

4.2.1 Assembly at the robot



Mounting possibilities

The cylindrical pin, needed to fix the product, is not included in the delivery. The mounting screws (51) are pre-assembled in the product.

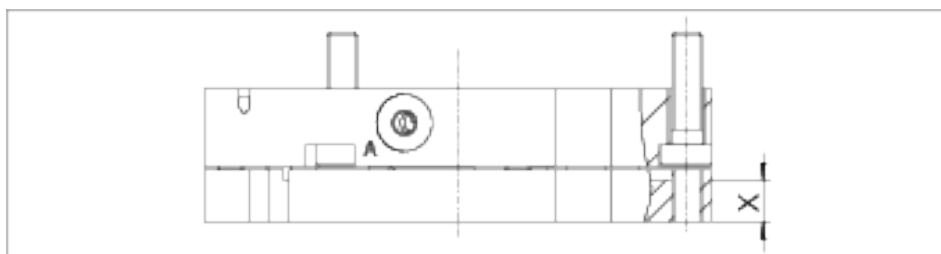
- 1 Fix the product on the fixing bore, using the cylindrical pin.
- 2 Tighten mounting screws (51) with a hexagon screwdriver.

NOTICE! Observe tightening torque

Data for mounting at the robot-side adapter plate

Item	Mounting	TCU-Z						
		50	64	80	100	125	160	200
51	pan screw DIN 7984	M3	M4	M6	M6	M8	M8	M10
	Tightening torque [Nm]	1.27	3.0	10.1	10.1	24.6	24.6	48
	maximum screw-in depth Z [mm]	3.2	6.5	6.5	11.5	13.5	10.5	14.5
	cylindrical pin fit diameter	Ø3 h6	Ø4 h6	Ø5 h6	Ø5 h6	Ø6 h6	Ø6 h6	Ø8 h6
	max.fitting depth [mm]		6	6	6	8		12


4.2.2 Mounting at the handling device

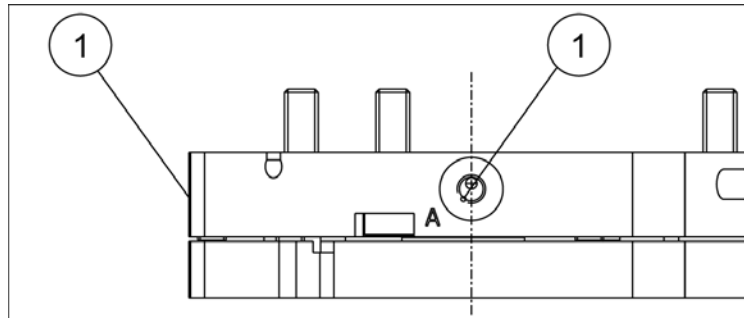


Data for mounting at the adapter plate / at the handling device

Item	Mounting	TCU-Z						
		50	64	80	100	125	160	200
X	thread diameter	M3	M5	M6	M6	M8	M8	M10
	Max. screw-in depth [mm]	7	8	8	8	9	10	10

4.3 Air connection

	NOTICE
	Observe the requirements for the air supply (☞ 3, Page 12).



1	Main connections (Hose connection) A = locked, B= unlocked
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Designation	TCU-Z					
	64	80	100	125	160	200
Thread in the main air connections	M5	M6	M6	M8	G 1/8	G 1/8

4.4 Mounting the sensor

NOTE

Observe the assembly and operating manual of the sensor for mounting and connecting.

The product is prepared for using sensors

- Exact type designation of the compatible sensors, see catalog.
- Technical data of the matching sensors, see assembly and operating manual and data sheet.
 - The assembly and operating manual and the catalogue data sheet are included in the scope of delivery and can be downloaded from www.schunk.com.
- If you require further information on sensor operation, contact your SCHUNK contact person or download information from our homepage.

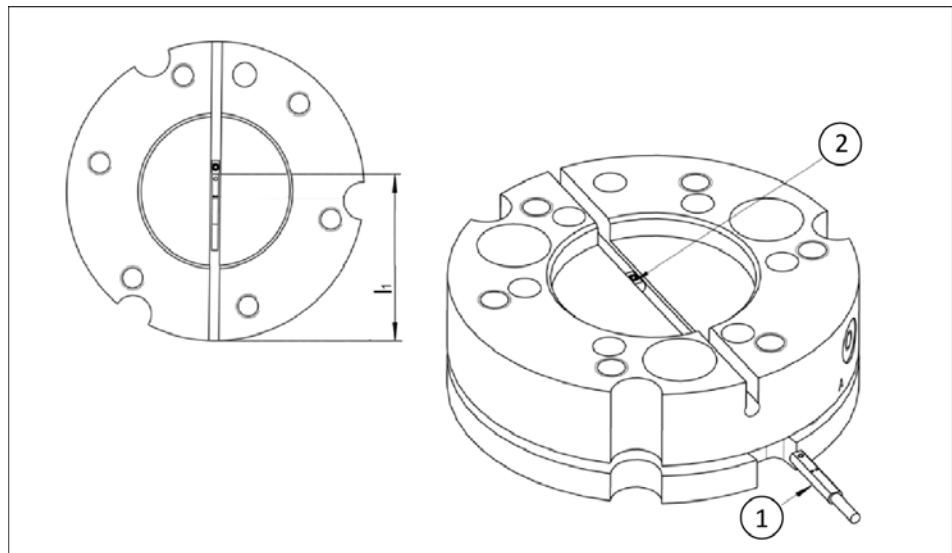
4.4.1 Programmable magnetic switch (MMS-P)



NOTICE

Risk of damage to the sensor during assembly!

- Observe a maximum tightening torque of 10 Ncm for the set-screws.



NOTE

If there is no T-nut available, slide the sensor according to dimension l_1 into the groove (2), (see table *setting dimensions*).

- 1 Turn the sensor (1) into the groove (2).
OR: Slide the sensor (1) into the groove (2) until the sensor (1) stops at the T-nut (3).
- 2 Secure the sensor (1) using the set-screw (4).
Tightening torque: 10 Ncm
- 3 Adjust sensor (1), see Sensor Assembly and Operating Manual.

setting dimensions

	TCU-Z						
	50	64	80	100	125	160	200
dimension l_1 [mm]	-	40.9	48.9	58.9	71.4	88.9	108.9

5 Troubleshooting

5.1 Product is not moving

Possible cause	Corrective action
Incorrect air supply.	Check air supply.

5.2 Product does not lock itself?

Possible cause	Corrective action
Proximity switch defective or set incorrect.	Disassemble and clean the product.
Pressure drops below minimum.	Readjust or change sensor.

5.3 Product does not execute the full stroke for the locking?

Possible cause	Corrective action
Dirt between cylinder and cylinder cover.	Disassemble and clean the product.
Pressure drops below minimum.	Check air supply., (🔗 4.3, Page 16)

5.4 Locking force decreases during locking

Possible cause	Corrective action
Compressed air can escape.	Check seals, if necessary, disassemble the product and replace seals.
To much grease in the mechanical movement space.	Clean and lubricate product.
Pressure drops below minimum.	Check air supply.

6 Maintenance

6.1 Notes

original spare parts

Use only original spare parts of SCHUNK when replacing spare and wear parts.

6.2 Maintenance and lubrication intervals



NOTICE

Damage caused by insufficient lubricant!

Lubricants harden more quickly at temperatures above 60°C, leading to possible product damage.

- Reduce the lubricant intervals accordingly.

Interval [Mio. cycles] for TCU-Z			Maintenance work
50 - 100	125 - 160	200	
4	3	2	Clean all parts thoroughly, check for damage and wear, if necessary replace seals and wearing parts (☞ 6.5, Page 21)
4	3	2	Treat all grease areas with lubricant (☞ 6.3, Page 20)

For extreme ambient and application conditions, shortened maintenance cycles can ensure the lifespan is maintained.



NOTICE

Damage caused by insufficient lubricant!

Lubricants harden more quickly at temperatures above 60°C, leading to possible product damage.

- Reduce the lubricant intervals accordingly.

6.3 Lubricants/Lubrication points (basic lubrication)

SCHUNK recommends the lubricants listed.


During maintenance, treat all greased areas with lubricant. Thinly apply lubricant with a lint-free cloth.

Lubricant point	Lubricant
Metallic sliding surfaces	microGLEIT GP 360
All seals	Renolit HLT 2
Bores on the piston	Renolit HLT 2

6.4 Disassembling the product

6.4.1 Variant with locking (MV)


Position of the position numbers ([👉 6.7, Page 23](#))

	⚠️ WARNING
	<p>Risk of injury from uncontrolled movements! If the energy supply is switched on or residual energy remains in the system, parts may move unexpectedly and cause serious injuries.</p> <ul style="list-style-type: none"> • Switch off energy supply. • Make sure there is no residual energy in the system

- 1 Disconnect cable connections.
- 2 Remove compressed air lines.
- 3 Remove product from handling device.
- 4 Remove screws (51) and separate product from the adapter plate.
- 5 Remove screws (52) from the housing-top (02).
- 6 **WARNING! Danger of injury due to spring forces! The cylinder piston is under spring tension.** Remove screws (53) then remove bolt (09).
- 7 Separate housing top (02) from the flange bottom (01).
- 8 Unscrew screws (49) and remove cylinder cover (04).
- 9 Remove cylinder piston (03) from the housing-top (02)

6.4.2 Variant without locking (OV)


Position of the position numbers ([↗ 6.7, Page 23](#))

	⚠ WARNING
	<p>Risk of injury from uncontrolled movements! If the energy supply is switched on or residual energy remains in the system, parts may move unexpectedly and cause serious injuries.</p> <ul style="list-style-type: none"> • Switch off energy supply. • Make sure there is no residual energy in the system

- 1 Disconnect cable connections.
- 2 Remove compressed air lines.
- 3 Remove product from handling device.
- 4 Remove screws (51) and separate product from the adapter plate.
- 5 Remove screws (52) from the housing-top (02).
- 6 Remove screws (53) then remove bolt (09).
- 7 Separate housing top (22) from the flange bottom (01).

6.5 Servicing and assembling the product

Position of the position numbers ([↗ 6.7, Page 23](#))

	⚠ WARNING
	<p>Risk of injury due to spring forces! The lid is under spring tension.</p> <ul style="list-style-type: none"> • Carefully disassemble the product.

- Maintenance**
- Remove screws (52) from the flange-bottom (01) and replace shear-pads (15).
 - Clean all parts thoroughly and check for damage and wear.
 - Treat all greased areas with lubricant ([↗ 6.3, Page 20](#)).
 - Oil or grease bare external steel parts.
 - Replace all wear parts / seals.
 - Position of the wearing parts ([↗ 6.7, Page 23](#))
 - Seal kit ([↗ 6.6, Page 22](#))

Assembly Assembly takes place in the opposite order to disassembly

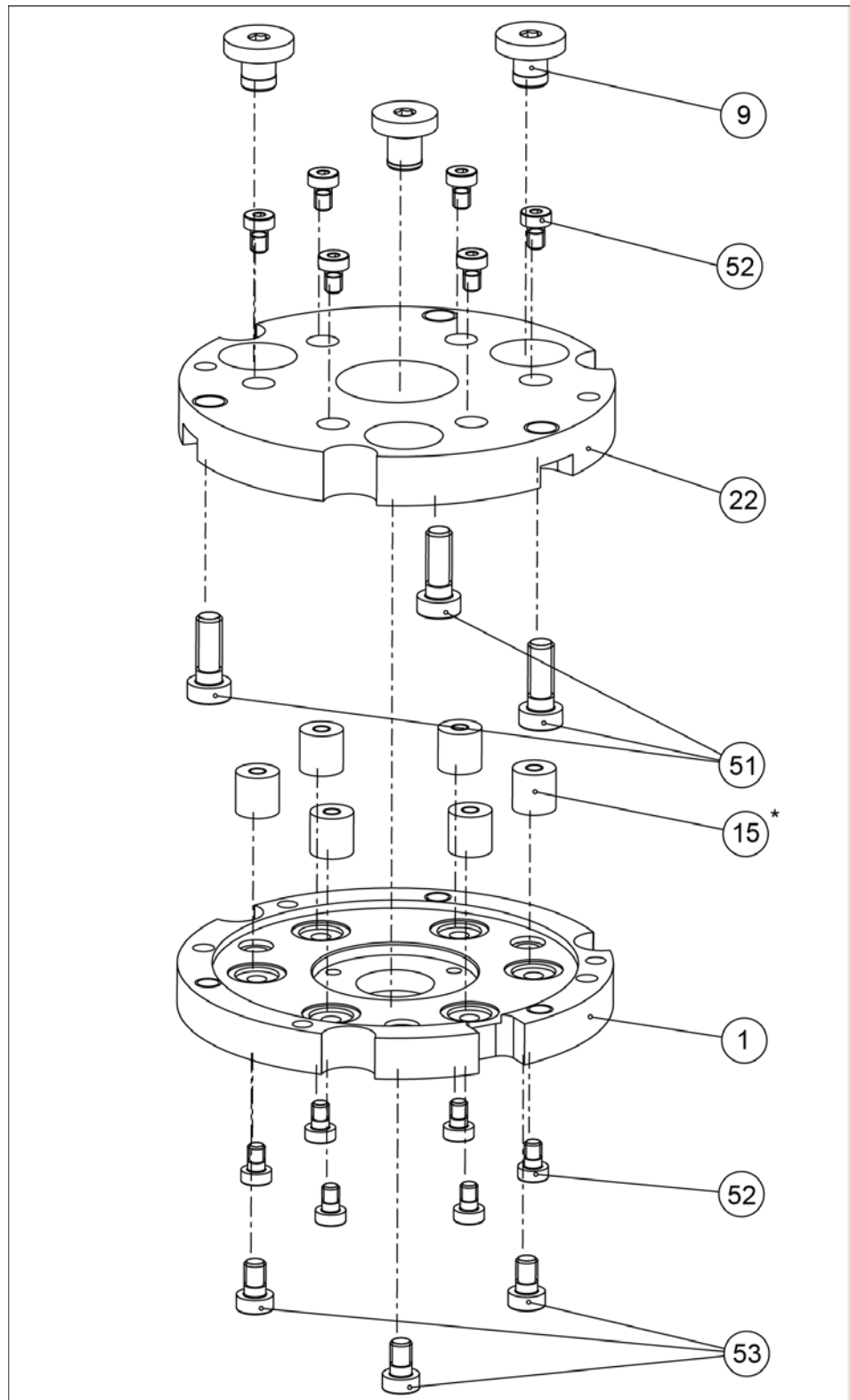
6.6 Seal kit

ID.-No. of the seal kit

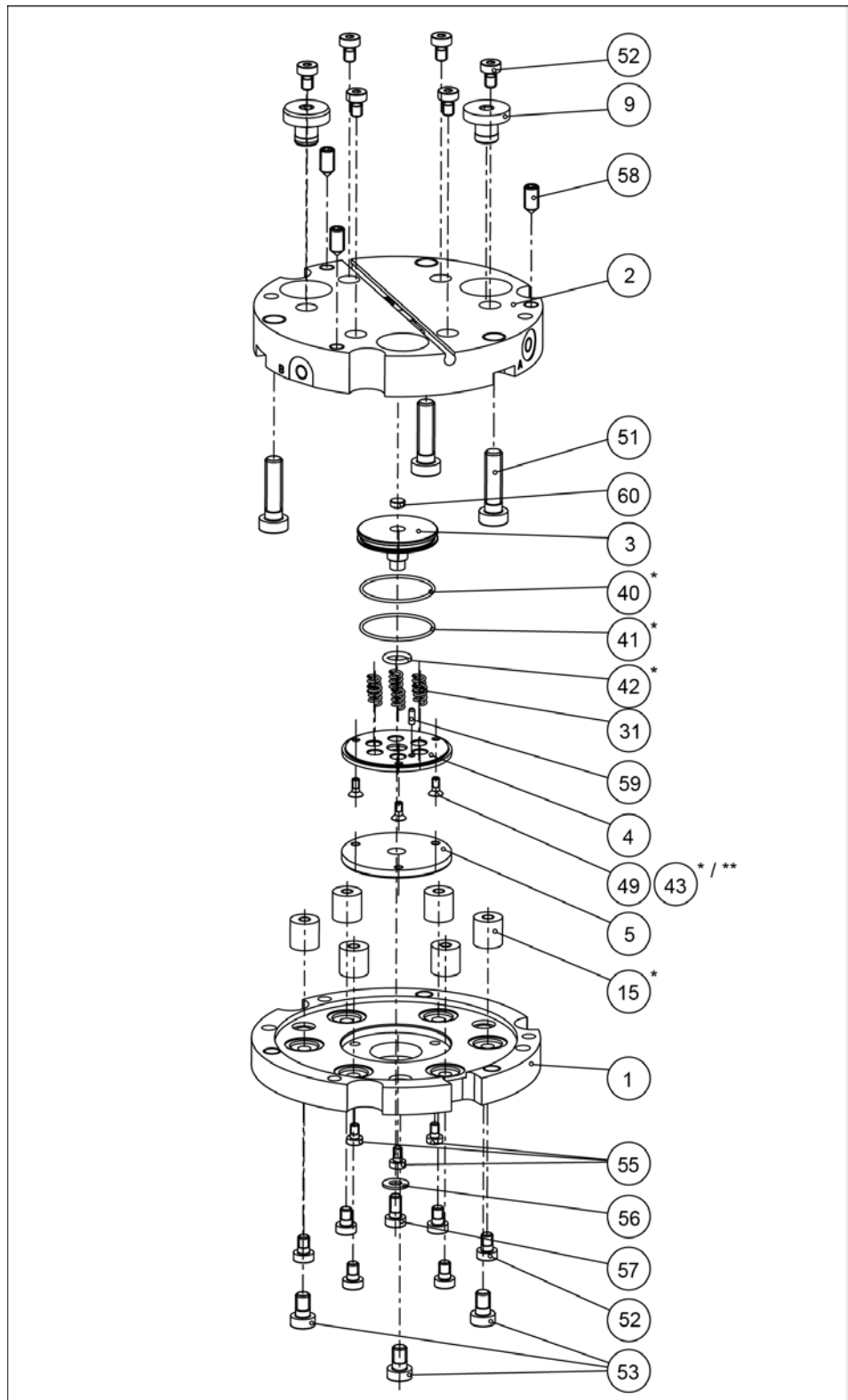
Seal kit for	ID number
TCU-Z 64-MV	0324871
TCU-Z 80-MV	0324873
TCU-Z 100-MV	0324875
TCU-Z 125-MV	0324877
TCU-Z 160-MV	0324879
TCU-Z 200-MV	0324881

Contents of the sealing kit, ([👉 6.7, Page 23](#)).

6.7 Assembly drawing



Assembling of the variant without locking (OV)



Assembling of the variant with locking (MV)

* Wearing part, replace during maintenance. Included in the seal kit. Seal kit can only be ordered completely.

** only for TCU-Z 64, TCU-Z 100. TCU-Z 160