Assembly and Operating Manual

DDF-S/-KS

Rotary feed-through

Superior Clamping and Gripping

SCHUNK®

Imprint

Technical changes:

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

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Dear Customer,

thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

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Table of contents

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 Applicable documents [▶ 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.

⚠ DANGER

Danger for persons!

Non-observance will inevitably cause irreversible injury or death.

⚠ WARNING

Dangers for persons!

Non-observance can lead to irreversible injury and even death.

⚠ CAUTION

Dangers for persons!

Non-observance can cause minor injuries.

NOTICE

Material damage!

Information about avoiding material damage.

1.1.2 Applicable documents

- General terms of business*
- Catalog data sheet of the purchased product *

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

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 specified maintenance and lubrication intervals
- Observe the ambient conditions and operating conditions

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

1.3 Scope of delivery

The scope of delivery includes

- Rotary feed-through DDF-S/-KS in the version ordered
- Assembly and Operating Manual
- Accessory pack

1.3.1 Enclosed Pack

ID.-No. of the accessory pack

Accessory pack for	ID number
DDF 31-S	5516043
DDF 40-S / 40-1-KS	5516044
DDF 50-S / 50-1-KS	5516045
DDF 63-KS	5516046
DDF 80-KS	5516047
DDF 80-1-KS	5516052
DDF 100-KS	5516048
DDF 100-1-KS	5516053
DDF 125-KS	5516049
DDF 125-1-KS	5516054
DDF 160-KS	5516050
DDF 160-1-KS	5516055
DDF 200-KS	5516051

Content of the accessories pack: Drawings [▶ 25].

1.4 Sealing Kit

ID.-No. of the seal kit

Seal kit for	ID number
DDF 31-S	0371032
DDF 40-S / 50-S	0371033
DDF 40-1-KS / 50-1-KS	0371034
DDF 63-KS	0371035
DDF 80-KS	5516845
DDF 80-1-KS / 100-1-KS	5516847
DDF 100-KS	5516846
DDF 125-KS	5516849
DDF 125-1-KS	5516851
DDF 160-KS	5516850
DDF 160-1-KS	5516852
DDF 200-KS	5516854

Contents of the sealing kit, Drawings [▶ 25].

2 Basic safety notes

2.1 Intended use

The rotary feed-through was designed to transfer the energy (electrical signals and air) to the handling module in robotic applications with endless rotation.

- The product may only be used within the scope of its technical data, Technical data [▶ 15].
- When implementing and operating components in safety-related parts of the control systems, the basic safety principles in accordance with DIN EN ISO 13849-2 apply. The proven safety principles in accordance with DIN EN ISO 13849-2 also apply to categories 1, 2, 3 and 4.
- 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 and industry-oriented 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

Implementation of structural changes

By conversions, changes, and reworking, e.g. additional threads, holes, or safety devices can impair the functioning or safety of the product or damage it.

- Structural changes should only be made with the written approval of SCHUNK.

2.4 Spare parts

Use of unauthorized spare parts

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

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

2.5 Ambient conditions and operating conditions

Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

- Make sure that the product is used only in the context of its defined application parameters, Technical data [▶ 15].
- Make sure that the product is a sufficient size for the application.
- 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.
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

Use of personal protective equipment

Personal protective equipment serves to protect staff against danger which may interfere with their health or safety at work.

- When working on and with the product, observe the occupational health and safety regulations and wear the required personal protective equipment.
- Observe the valid safety and accident prevention regulations.
- Wear protective gloves to guard against sharp edges and corners or rough surfaces.
- Wear heat-resistant protective gloves when handling hot surfaces.
- Wear protective gloves and safety goggles when handling hazardous substances.
- Wear close-fitting protective clothing and also wear long hair in a hairnet when dealing with moving components.

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 Malfunctions

Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

2.11 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.

2.12 Fundamental dangers

General

- Observe safety distances.
- Never deactivate safety devices.
- Before commissioning the product, take appropriate protective measures to secure the danger zone.
- Disconnect power sources before installation, modification, maintenance, or calibration. Ensure that no residual energy remains in the system.
- If the energy supply is connected, do not move any parts by hand.
- Do not reach into the open mechanism or movement area of the product during operation.

2.12.1 Protection during commissioning and operation

Falling or violently ejected components

Falling and violently ejected components can cause serious injuries and even death.

- Take appropriate protective measures to secure the danger zone.
- Never step into the danger zone during operation.

2.12.2 Protection during handling and assembly

Incorrect handling and assembly

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

- Have all work carried out by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

Incorrect lifting of loads

Falling loads may cause serious injuries and even death.

- Stand clear of suspended loads and do not step into their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.

2.12.3 Protection against dangerous movements

Unexpected movements

Residual energy in the system may cause serious injuries while working with the product.

- Switch off the energy supply, ensure that no residual energy remains and secure against inadvertent reactivation.
- Never rely solely on the response of the monitoring function to avert danger. Until the installed monitors become effective, it must be assumed that the drive movement is faulty, with its action being dependent on the control unit and the current operating condition of the drive. Perform maintenance work, modifications, and attachments outside the danger zone defined by the movement range.
- To avoid accidents and/or material damage, human access to the movement range of the machine must be restricted. Limit/prevent accidental access for people in this area due through technical safety measures. The protective cover and protective fence must be rigid enough to withstand the maximum possible movement energy. EMERGENCY STOP switches must be easily and quickly accessible. Before starting up the machine or automated system, check that the EMERGENCY STOP system is working. Prevent operation of the machine if this protective equipment does not function correctly.

2.13 Notes on particular risks

⚠ WARNING

Risk of injury from objects falling and being ejected!

Falling and ejected objects during operation can lead to serious injury or death.

- Take appropriate protective measures to secure the danger zone.

⚠ WARNING

Risk of injury due to unexpected movement of the machine/ system!

- Switch off the energy supply.

3 Technical data

More technical data is included in the catalog data sheet.
Whichever is the latest version.

DDF	31-S	40-S	50-S	63-KS	80-KS	100-KS	125-KS	160-KS
Weight [kg]	0.5	0.9	0.95	2.2	5.4	5.6	13.5	14
Max. rotation speed [min-1]	120	120	120	110	100	100	90	90
Max. rotational speed [°/s]	720	720	720	660	600	600	540	540
Continuous torque [Nm]	1.0	1.5	1.5	6.0	20.0	20.0	42.0	42.0
Starting torque [Nm] (after standstill)	1.5	2.5	2.5	8.0	32.0	32.0	60.0	60.0
Rotation	unlimited							
Energy transmission								
Air (air pressure up to 10 bar)	2x	2x	2x	4x	4x	4x	4x	4x
Electrical Energy electrical signals; with max. 60V; 1A	4x	4x	4x	6x	6x	6x	10x	10x
Noise emission [dB(A)]	≤ 70	≤ 70	≤ 70	≤ 70	≤ 70	≤ 70	≤ 70	≤ 70

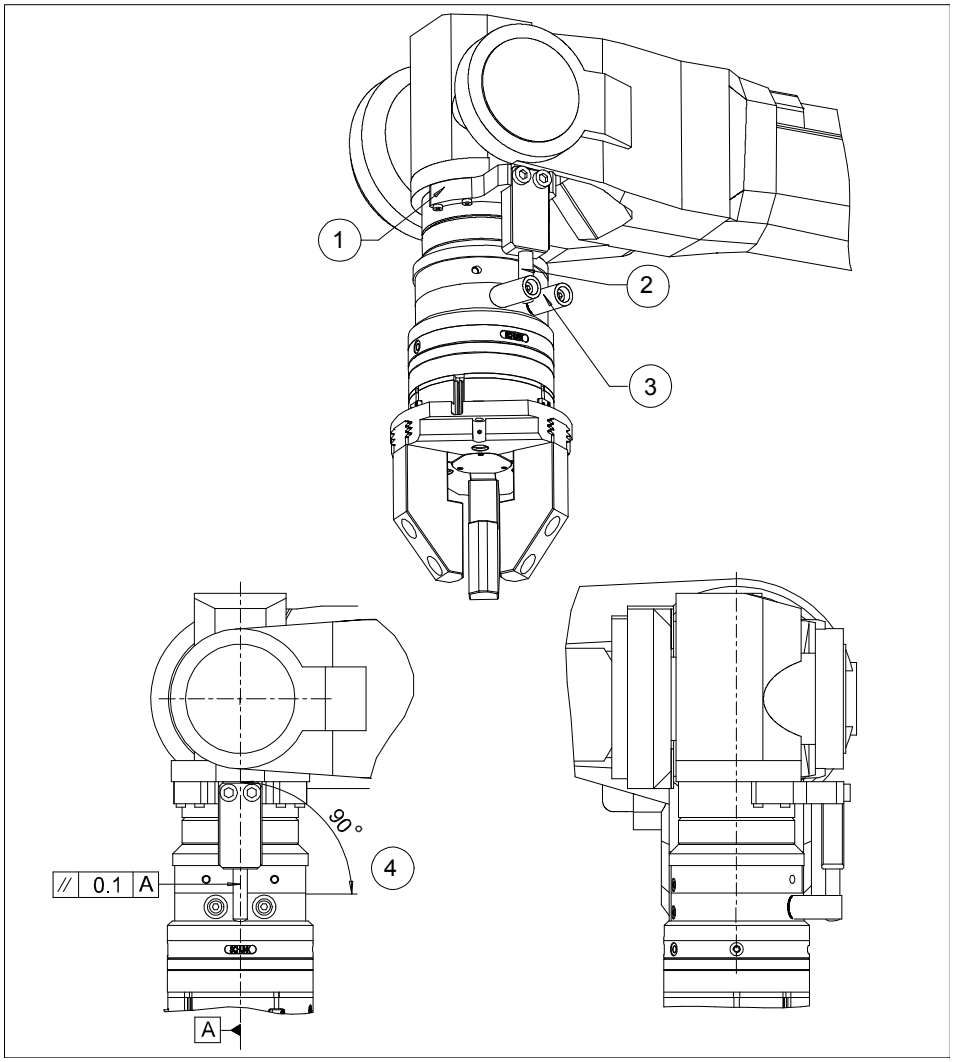
DDF	40-1-KS	50-1-KS	80-1-KS	100-1-KS	125-1-KS	160-1-KS
Weight [kg]	2.0	2.1	11.0	11.3	21.0	22.0
Max. rotation speed [min-1]	110	110	90	90	70	70
Max. rotational speed [°/s]	660	660	540	540	420	420
Continuous torque [Nm]	6.0	6.0	42.0	42.0	65.0	65.0
Starting torque [Nm] (after standstill)	8.0	8.0	60.0	60.0	95.0	95.0
Rotation	unlimited					
Energy transmission						
Air (air pressure up to 10 bar)	4x	4x	4x	4x	4x	4x
Electrical Energy electrical signals; with max. 60V; 1A	6x	6x	10x	10x	10x	10x
Noise emission [dB(A)]	≤ 70	≤ 70	≤ 70	≤ 70	≤ 70	≤ 70

4 Assembly

⚠ WARNING

Risk of injury during assembly!

- Switch off the energy supply.



1	The torque support (shaft) must be mounted on the non-moving housing of the robot.
2	Shaft with shaft-Ø Mounting the DDF on the robot [▶ 17]
3	Bracket on the DDF (included in the DDF scope of delivery)
4	The shaft for the torque support (torque pin) should run precisely parallel to the »middle axis« of the DDF and at a »right angle« (90°) to the bracket.

4.1 Mounting the DDF on the robot

Evenness of the mounting surface

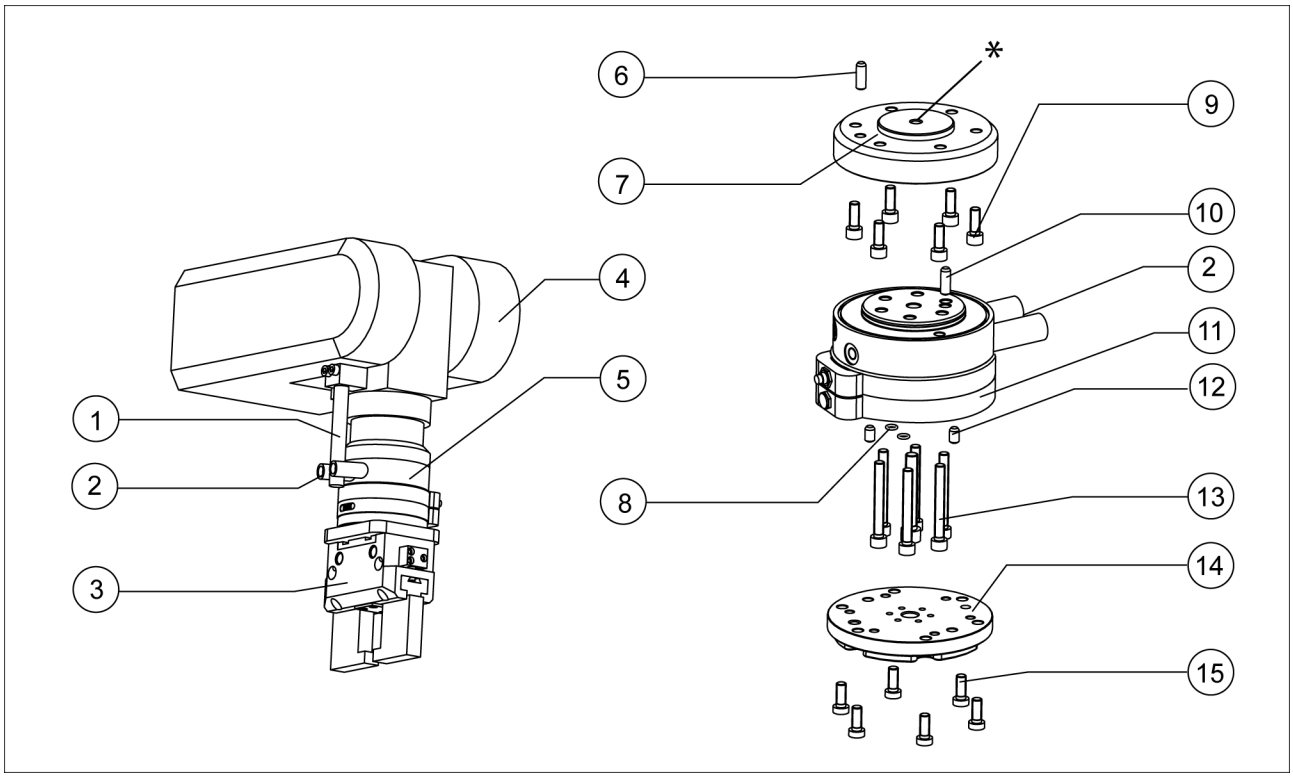
The values apply to the whole mounting surface to which the product is mounted.

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

Edge length	Permissible unevenness
< 100	< 0.02
> 100	< 0.05

The following figure is an example image.
It serves for illustration and assignment of the spare parts.
Variations are possible depending on size and variant.

Assembly of the DDF



* deduction thread

1	Shaft for torque support
2	DDF bracket
3	Tool, e.g. PGN gripper type from SCHUNK
4	Robot with interface according to DIN ISO 9409
5	Rotary feed-through from SCHUNK
6	Cylindrical pin (in accessory pack)
7	Base with interface according to DIN ISO 9409 for connecting to robot
8	Seals for sealing air ducts between shaft and flange (in accessory pack)
9	Screws for mounting the base on the robot flange (in accessory pack)(number varies depending on the size)
10	Cylindrical pin for positioning the base with shaft
11	Shaft completely pre-assembled
12	Cylindrical pins for positioning the shaft and flange (only in connection with flange (14))
13	Screws for fastening the shaft onto the base (number varies depending on the size)
14	Flange with interface DIN ISO 9409 for tool-mounting (e.g. gripper) (only optional - on special order)
15	Screws for assembly of shaft and flange (only in connection with flange (14))

Shaft-Ø of the torque support

Type	Shaft-Ø of the torque support
DDF-S/-KS 25 and 31	Ø 9 mm
DDF-S/-KS 40 and 50	Ø 11 mm
DDF-S/-KS 40-1 and 50-1	Ø 11 mm
DDF-S/-KS 63	Ø 11 mm
DDF-S/-KS 80 and 100	Ø 17 mm
DDF-S/-KS 80-1 and 100-1	Ø 23 mm
DDF-S/-KS 125 and 160	Ø 23 mm
DDF-S/-KS 125-1 and 160-1	Ø 29 mm

Shaft-Ø of the torque support

Type	Shaft-Ø of the torque support
DDF-S/-KS 31	Ø 9 mm
DDF-S/-KS 40 and 50	Ø 11 mm
DDF-S/-KS 40-1 and 50-1	Ø 11 mm
DDF-S/-KS 63	Ø 11 mm
DDF-S/-KS 80 and 100	Ø 17 mm
DDF-S/-KS 80-1 and 100-1	Ø 23 mm
DDF-S/-KS 125 and 160	Ø 23 mm

- Fasten the base (7) on the robot interface with the screws (9) from the accessory pack.The cylindrical pin (6) from the accessory pack can be used for centering the base (7).
- Insert the cylindrical pin (10) into the base.
- Place the completely assembled shaft (11) onto the base. **NOTICE! This pre-assembled unit must not be separated**
- Screw together the shaft (11) and the base (7) with the screws (13).
- Insert the seals (8 – for sealing the air ducts) and insert the cylindrical pins (12) into the shaft.
- Fasten the flange (optional, on special order) with the screws (15) onto the shaft (11).

Screw tightening torques

Screw	M5	M6	M8	M10	M12
Tightening torque [Nm]	10 Nm	17 Nm	40 Nm	80 Nm	140 Nm

4.2 Connections

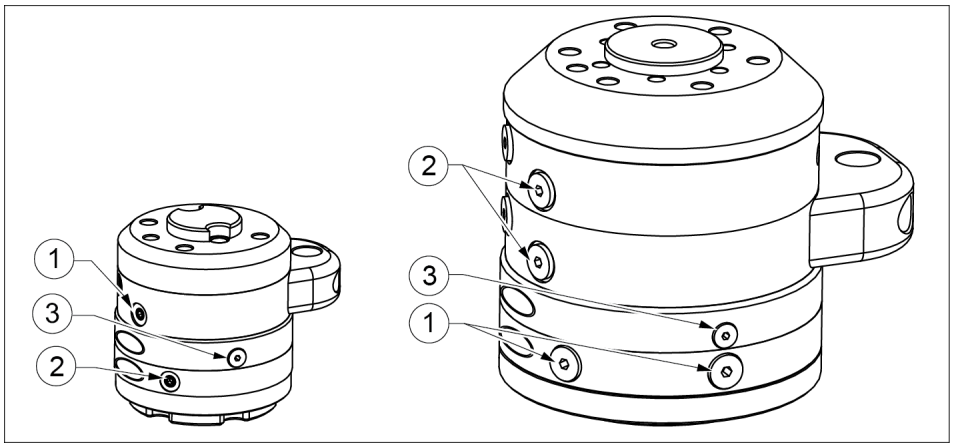
4.2.1 Pneumatic connection

⚠ WARNING

Risk of injury during connection!

- Switch off the energy supply.

The precise positions and options for the pneumatic connections are shown in the SCHUNK catalog.



Pneumatic connections

1	Pneumatic connections on the robot side
2	Pneumatic connections on the tool side
3	Air purge connection

4.2.2 Electrical connection

⚠ WARNING

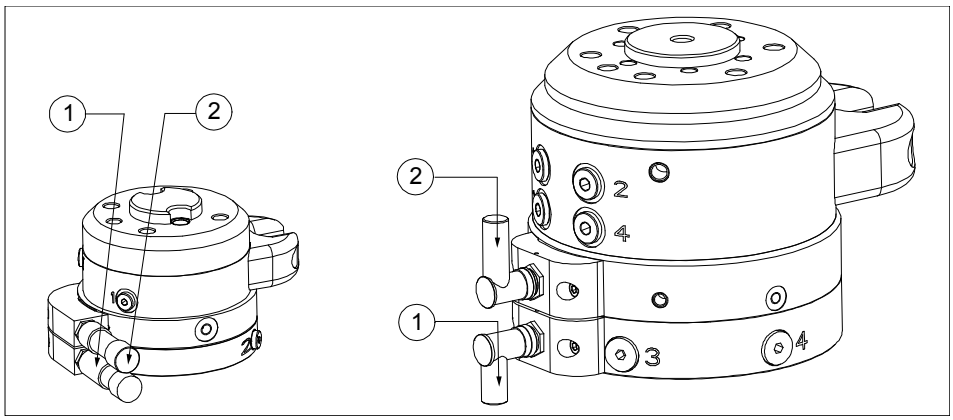
Risk of injury when the machine/system moves unexpectedly!

Switch off power supply.

NOTE

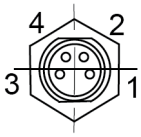
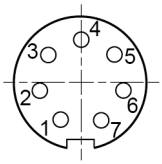
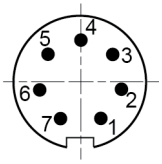
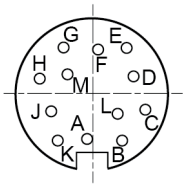
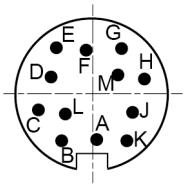
Electrical energy: – max. 60 volts, 1 amp

Pin assignments



1	Tool-side: Flange receptacle
2	Robot-side: Flanged panel plug

Pin assignments

Size	Flange receptacle	Flanged panel plug	Notes
DDF-S/-KS 25 / 31 / 40 / 50			
DDF-S/-KS 40-1 / 50-1 / 63 / 80 / 100			PIN 7 not connected
DDF-S/-KS 80-1 / 100-1 / 125 / 125-1 / 160 / 160-1 / 200			PIN L and M not connected

5 Troubleshooting

5.1 The DDF lets out air when stopped

Possible cause	Corrective action
Air connection not installed correctly.	Tighten air connection. Pneumatic connection [▶ 21]
Unused air connections open.	Close unused air connections.

5.2 Does the DDF let out air when in operation?

Possible cause	Corrective action
Components have come loose e.g. due to overloading.	Send product with a SCHUNK repair order or dismantle product.

5.3 Electric signals are not transmitted

Possible cause	Corrective action
Cable connected incorrectly.	Check circular connections and both miniature flat connections on the right seat.
Strands swapped.	Check pin allocation.
Bus signals should be transmitted.	Bus signals can not be transmitted.
Slip ring defective.	Send the product to SCHUNK with a repair order.

6 Maintenance

6.1 Maintenance interval

NOTICE

Material damage due to hardening lubricants!

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

- Reduce the lubricant intervals accordingly.

Interval [Mio. cycles]	13

6.2 Lubricants/Lubrication points

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	Fin Assembly Grease (Interflon)
All seals	Renolit HLT 2

6.3 Disassembly of the module

Position of the item numbers Drawings [▶ 25]

⚠ WARNING

Risk of injury due to spring forces!

The cover is under spring tension.

- Carefully disassemble the product.

NOTICE

Do not damage any seals during assembly! Treat the slip ring contacts of the electrical feed-through with the greatest possible care and do not touch them.

- ➢ Remove compressed air lines.
- ➢ Detach cable connections.
- ➢ Completely unscrew the screws (30 and 34).
- ➢ Pull shaft (1) from robot flange (3). **NOTICE! Robot flange (3) and shaft (1) are bolted together (20).**
- ➢ Unscrew the screws (44).
- ➢ Pull the ring (4) carefully from the shaft (81).
- ➢ Pull the protective housing (6) carefully from the shaft (1).

NOTICE

The contacts of the slip ring unit must not come into contact with the shaft (1) or be touched.

- ➢ Remove all seals according to sealing kit list Sealing Kit [▶ 7].
- ➢ Thoroughly clean all parts (except for slip-ring contacts in the cover housing (6)) and check all parts for any defects and wear.
- ➢ Carefully clean the slip ring tracks in the shaft (1) with a clean cloth and lightly lubricate the tracks with a clean cloth and oil.
- ➢ Replace all seals according to sealing kit list Sealing Kit [▶ 7].

6.4 Servicing and assembling the module

Maintenance

- Clean all parts thoroughly and check for damage and wear.
- Replace all wear parts / seals.
- The seals are in the enclosed sealing kit. Sealing Kit [▶ 7]
- Treat all greased areas with lubricant. Lubricants/Lubrication points [▶ 23]
- Oil or grease bare external steel parts.

Assembly

Assembly takes place in the opposite order to disassembly.
Observe the following:

- Unless otherwise specified, secure all screws and nuts with Loctite no. 30243 and tighten with the appropriate tightening torque.

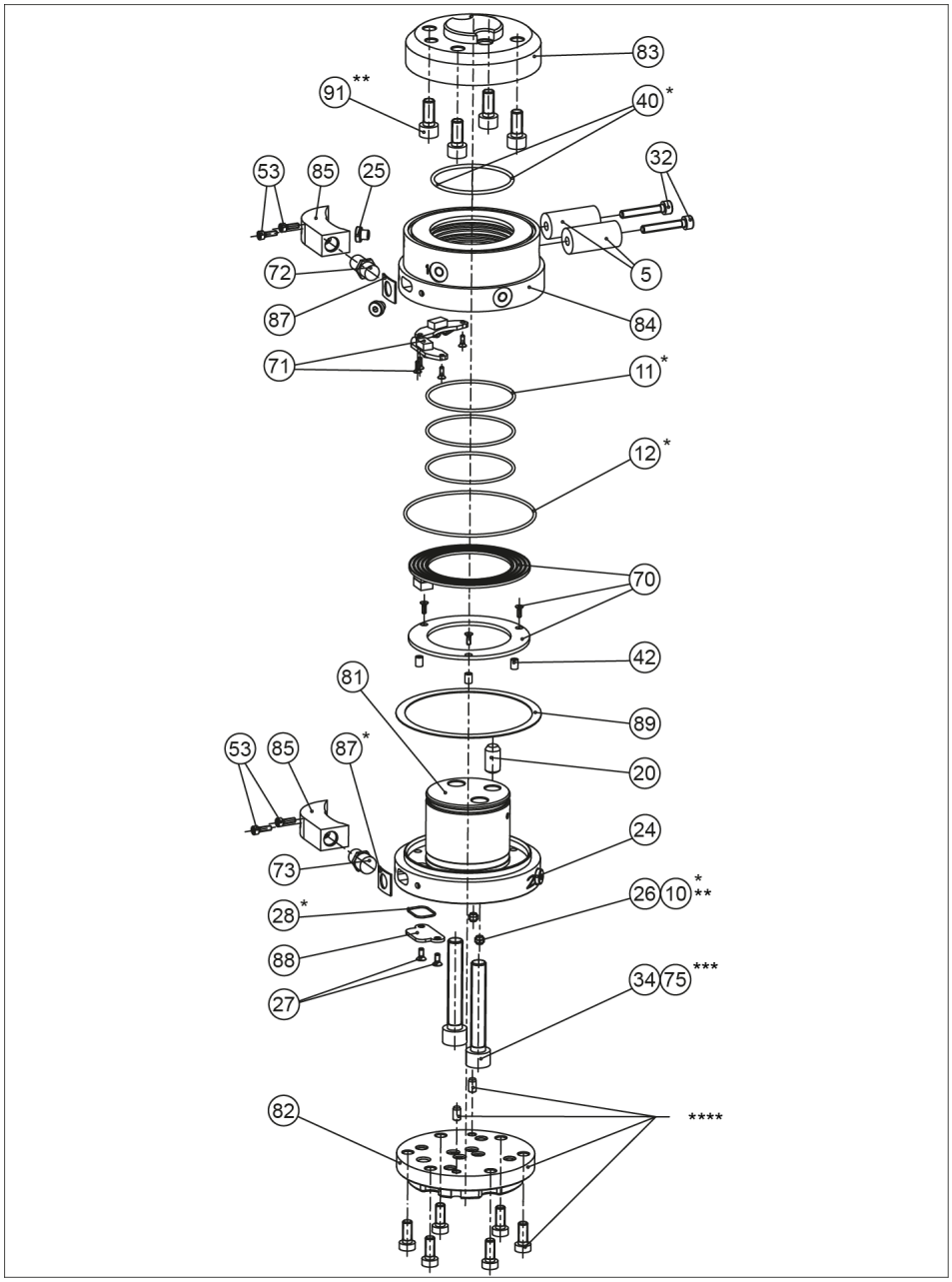
Screw tightening torques

Screw	M5	M6	M8	M10	M12
Tightening torque [Nm]	10 Nm	17 Nm	40 Nm	80 Nm	140 Nm

6.5 Drawings

The following figures are example images.
They serve for illustration and assignment of the spare parts.
Variations are possible depending on size and variant.

6.5.1 Assembly Drawing DDF 31 / 40 / 50



Assembly DDF 25 / 31 / 40 / 50

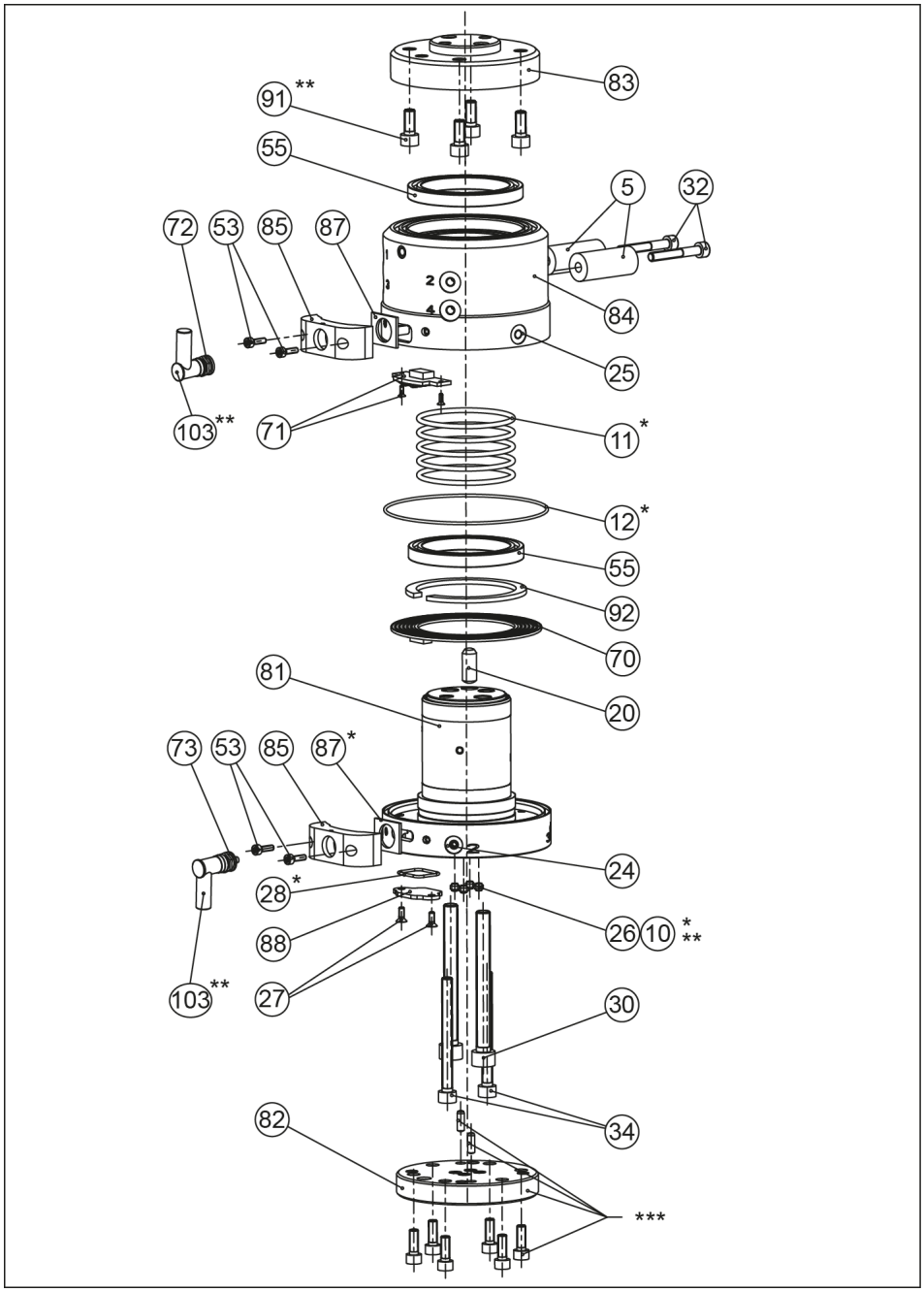
* Wearing part, replace during maintenance.
Included in the seal kit. Seal kit can only be ordered completely.

** Contained in accessory pack.

*** Item 75 only for DDF 25 and 31

**** Optional - only in conjunction with item 82

6.5.2 Assembly Drawing DDF 40-1 / 50-1 / 63



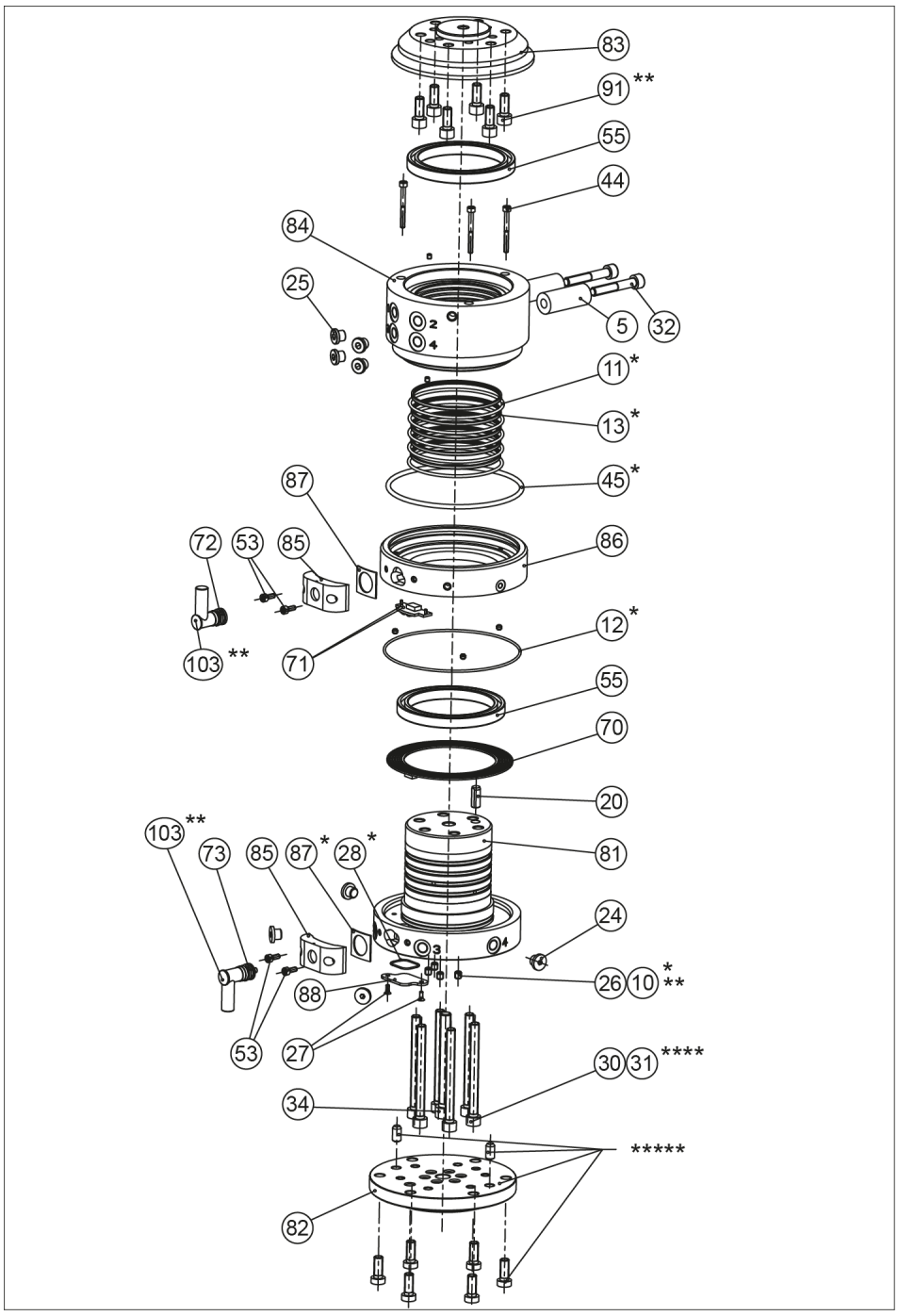
Assembly DDF 40-1 / 50-1 / 63

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

** Contained in accessory pack.

*** Optional - only in conjunction with item 82

6.5.3 Assembly Drawing 80 / 80-1 / 100 / 100-1 / 125 / 125-1 / 160 / 160-1 / 200



Assembly 80 / 80-1 / 100 / 100-1 / 125 / 125-1 / 160 / 160-1 / 200

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

** Contained in accessory pack.

*** Item 29 not with DDF 160

**** Item 31 only for DDF 125 / 125-1 / 160 / 160-1 / 200

***** Optional - only in conjunction with item 82