Rotary feed-through
DDF-V 31,5 - 50

Assembly and operating manual

Imprint

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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Reg. No. 003496 QM08

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Table of contents

1 About this manual

This instruction is an integral part of the product and contains important information for a safe and proper assembly, commissioning, operation, maintenance and help for easier trouble shooting.

Before using the product, read and note the instructions, especially the chapter "Basic safety notes".

1.1 Warnings

The following signal words and symbols are used to highlight dangers.

1.1.1 Key words

DANGER	Dangers for persons. Non-compliance will inevitably cause irreversible injury or death.
WARNING	Dangers for persons. Non-compliance may cause irreversible injury or death.
CAUTION	Dangers for persons. Non-observance may cause minor injuries.
NOTICE	Information about avoiding material damage

1.1.2 Symbols

Warning about a danger point

General mandatory sign to prevent material damage

1.2 Applicable documents

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

The documents listed here, can be downloaded on our homepage **www.schunk.com**

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 is intended for installation in a machine/system. The requirements of the applicable guidelines must be observed and complied with.

The product may be used only in the context of its defined application parameters (☞ 6, Page 10).

The product is designed for industrial use.

To use this unit as intended, it is also essential to observe the technical data and installation and operation notes in this manual and to comply with the maintenance intervals.

2.2 Not intended use

Use which is not specified as an intended use is for instance when the product is for example used as a pressing tool, stamping tool, lifting tool, guide for tools, cutting tool, tensioning mean, boring tool.

2.3 Environmental and operating conditions

- Make sure that the product has a sufficient size for the application.
- Observe Maintenance and lubrication intervals (☞ 10.1, Page 23).
- 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.

2.4 Product safety

Dangers arise from the product, if:

- the product is not used in accordance with its intended purpose.
- the product is not installed or maintained properly.
- the safety and installation notes are not observed.

Avoid any manner of working that may interfere with the function and operational safety of the product.

Wear protective equipment.

NOTE
More information are contained in the relevant chapters.

2.4.1 Protective equipment

Provide protective equipment per EC Machinery Directive.

2.4.2 Constructional changes, attachments, or modifications

Additional drill holes, threads, or attachments that are not offered as accessories by SCHUNK may be attached only with permission of SCHUNK.

2.5 Personnel qualification

The assembly, initial commissioning, maintenance, and repair of the product may be performed only by trained specialist personnel. Every person called upon by the operator to work on the product must have read and understood the complete assembly and operating manual, especially the chapter "Basic safety notes" (☞ 2, Page 6). This applies particularly to personnel only used occasionally, such as maintenance personnel.

2.6 Using personal protective equipment

When using this product, observe the relevant industrial safety regulations and use the personal protective equipment (PPE) required!

- Use protective gloves, safety shoes and safety goggles.
- Observe safe distances.
- Minimal safety requirements for the use of equipment.

2.7 Notes on particular risks

Generally valid:

- Remove the energy supplies before installation, modification, maintenance, or adjustment work.
- Make sure that no residual energy remains in the system.
- Do not move parts by hand when the energy supply is connected.
- Do not reach into the open mechanism or the movement area of the unit.
- Perform maintenance, modifications, and additions outside the danger zone.
- Secure the product during all operations against uncontrolled activation.
- Take a precautionary approach by maintenance and disassembly.
- Only specially trained staff should disassemble the product.

⚠ WARNING

Risk of injury from objects falling and being ejected

- The danger zone must be surrounded by a safety fence during operation.

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly due to failure of the energy supply or malfunction of the controller.

3 Warranty

The warranty is valid for 24 months from the delivery date to the production facility under the following conditions:

- Intended use in 1-shift operation
- Observe the mandatory maintenance and lubrication intervals
- Observe the environmental and operating conditions

Parts touching the work piece and wear parts are not part of the warranty.

4 Scope of delivery

The scope of delivery includes:

- Rotary feed-through DDF-V in the ordered model.
- Accessory pack

5 Accessories

A wide range of accessories are available for this module.

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

6 Technical data

Size	DDF-V-31.5	DDF-V-40	DDF-V-50
Weight [kg]	1.19	1.21	1.23
Max. rotation speed [min-1]	100		
Max. continuous torque [Nm]	0.35		
Max. starting torque [Nm] (after shutdown)	1.1		
Turn	Unlimited		
Round mechanical interface according to ISO 9409-1	A31.5	A40	A50
Noise emission [dB(A)]	≤ 70		
IP rating	50		
Energy transmission			
Number of compressed air guides	1		
Max. pressure [bar]	6		
Number of electrical signal through-feeds	14		
Max. voltage [V] per contact	60		
Max. current [A] per contact	1		
Pressure medium	Compressed air, compressed air quality according to ISO 8573-1:7 4 4		

NOTE
The max. pressure is 6 bar for the installation of the SWS-I-011 quick-change system.

Further technical data can be found in the catalog data sheet. The most recent version applies.

7 Assembly

7.1 Mechanical connection

Check the evenness of the bolting surface

The values relate to the entire bolting surface.

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

Diameter	Permissible unevenness
< 100	< 0.02
> 100	< 0.05

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly!
Switch off power supply.

Mounting

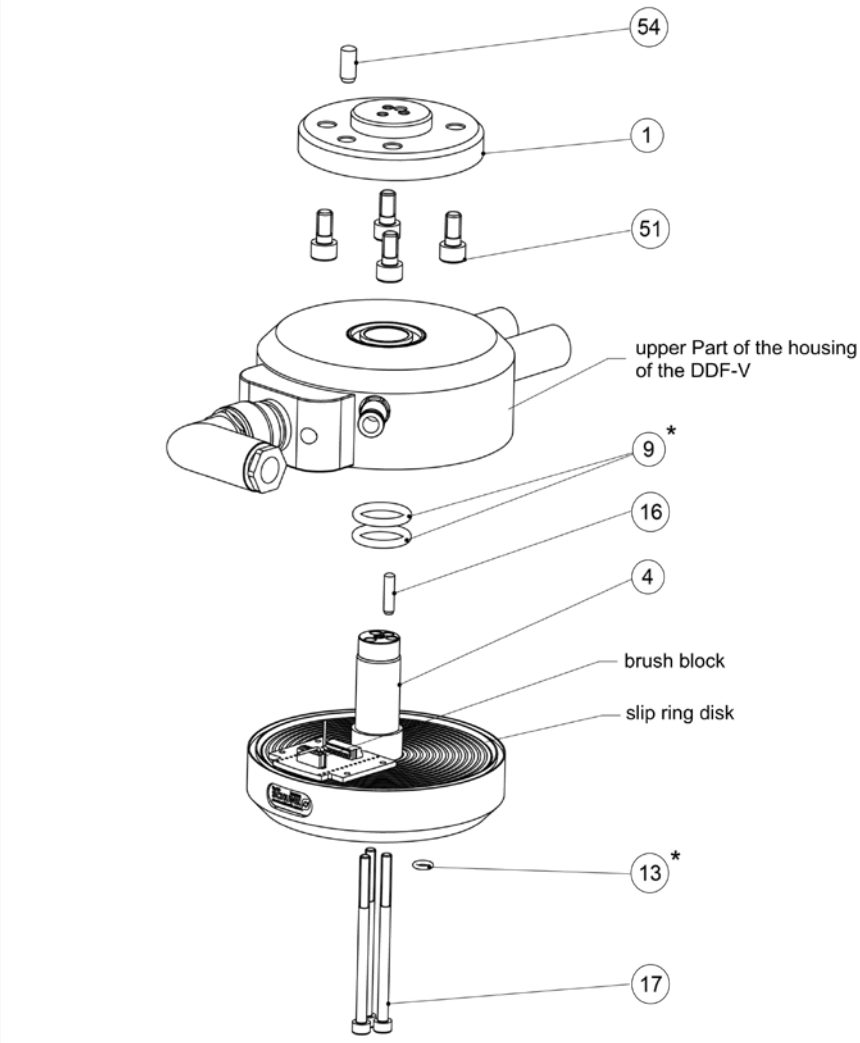

Fig. 1 Mounting of the DDF-V

Mounting material

Item	Designation	DDF-V-31.5	DDF-V-40	DDF-V-50
13	O-ring	5 x 1.5		
16	Cylindrical pin for centering DIN 6325	4m6 x 16		
17	Mounting screws ISO 4762	M4 x 65		
51	Mounting screws ISO 4762	M5 x 14	M6 x 12	

NOTE
Centering is performed between the adapter plate (1) and shaft (4) of the module.

1 Use the cylindrical pin (54) (accessory pack) to center the adapter plate (1) to the robot interface. Insert the cylindrical pin (54) in the adapter plate (1).

2 Position the adapter plate on the robot interface and fasten it to the robot with the four screws (51) (accessory pack).

3 Use the cylindrical pin (16) (accessory pack) to center the module to the adapter plate (1). Insert the cylindrical pin (16) in the adapter plate (1).

4 Place the completely pre-assembled module on the adapter plate and fasten it with the three screws (17).

5 Insert the seal (13) used to seal the air duct. Mount the handling module (e.g. quick-change system or gripper).

7.2 Assembly example

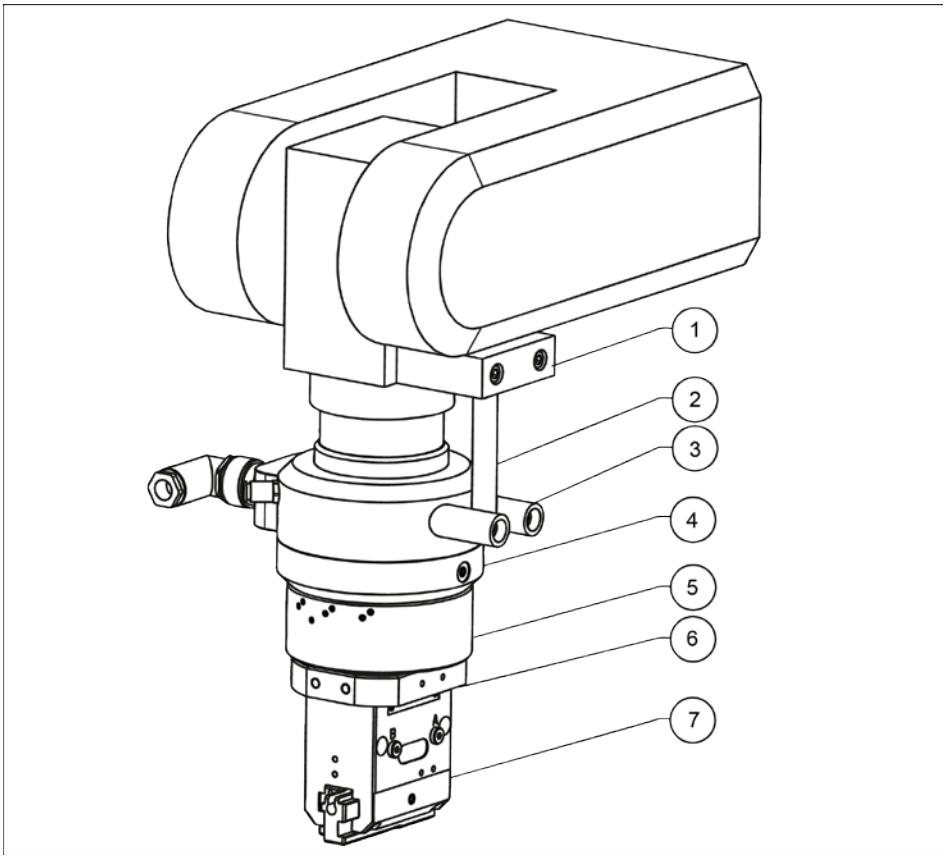

Fig. 2 Assembly on the robot arm

Item	Description
1	Torque support
2	Shaft Ø12
3	Bracket (pre-assembled)
4	DDF-V rotary feed-through
5	Handling module (SWS-I-011)
6	Adapter plate
7	Handling module (2-finger parallel gripper)

The torque support (1) must be fastened to the non-movable housing of the robot.

The bracket (3) is pre-assembled on the DDF-V (4).

1 Mount the shaft (2) on the bracket (3) of the DDF-V (4).

2 Fasten the DDF-V (4) to the robot (☞ 7.1, Page 11).

Alignment of the torque support

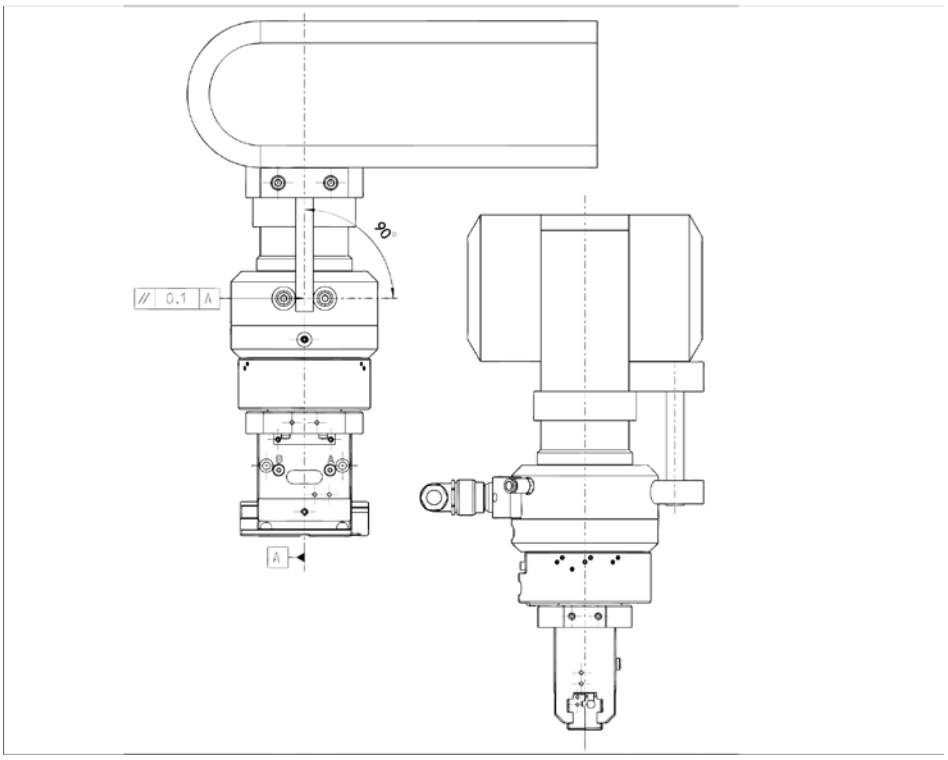

Fig. 3 Torque support

Mounting

The shaft (2) for the torque support should run parallel to the "middle axis" of the DDF-V rotary feed-through (4) and at a "right angle" (90°) to the bracket (3).

1. Screw the SWS-I-011 quick-change system (5) together with the DDF-V (4).
2. Fasten the adapter plate (6) to the changing head of the SWS-I-011 (5).
3. Screw a handling module (7) (in this case a 2-finger parallel gripper) together with the adapter plate (6).
4. Fasten and bundle the pneumatic connection and electrical cables and mount them with strain relief to enable the greatest possible freedom of movement during use.

7.3 Compressed air connection

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly!
Switch off power supply.

NOTICE

Observe the requirements for the air supply.
(☞ 6, Page 10) "Technical Data"

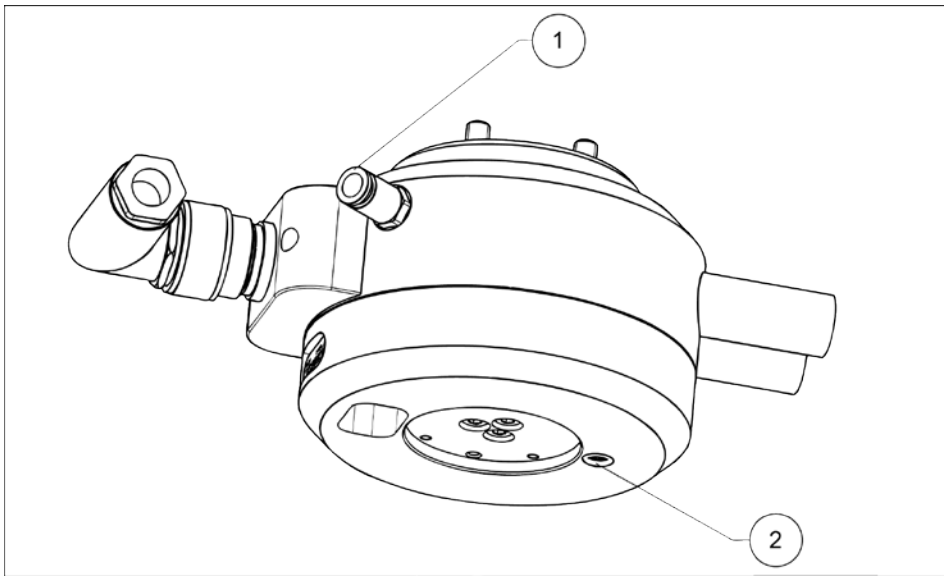

Fig. 4 Air connections

Item	Designation
1	M5 air connection
2	Hose-free direct connection (O-ring 5x1.5)

1 Connect the robot-side compressed air line to the mounted air connection (1).

2 The mounted handling module is supplied with compressed air via the hose-free direct connection (2).

7.4 Electrical connection

WARNING

Risk of injury when the machine/system moves unexpectedly!
Switch off power supply.

NOTE

Overserve the maximum electrical energy values(☞ 6, Page 10).
Transmission of bus signals is not possible!

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- Transmission of bus signals is not possible!

7.4.1 Connector

Position of the plug connectors

The DDF-V rotary feed-through has a flanged panel plug (2) on the robot side to which the angle junction box (1), provided by the customer is attached. There are two miniature blade connectors (3) and (4) on the tool side that can be led out in axial direction.

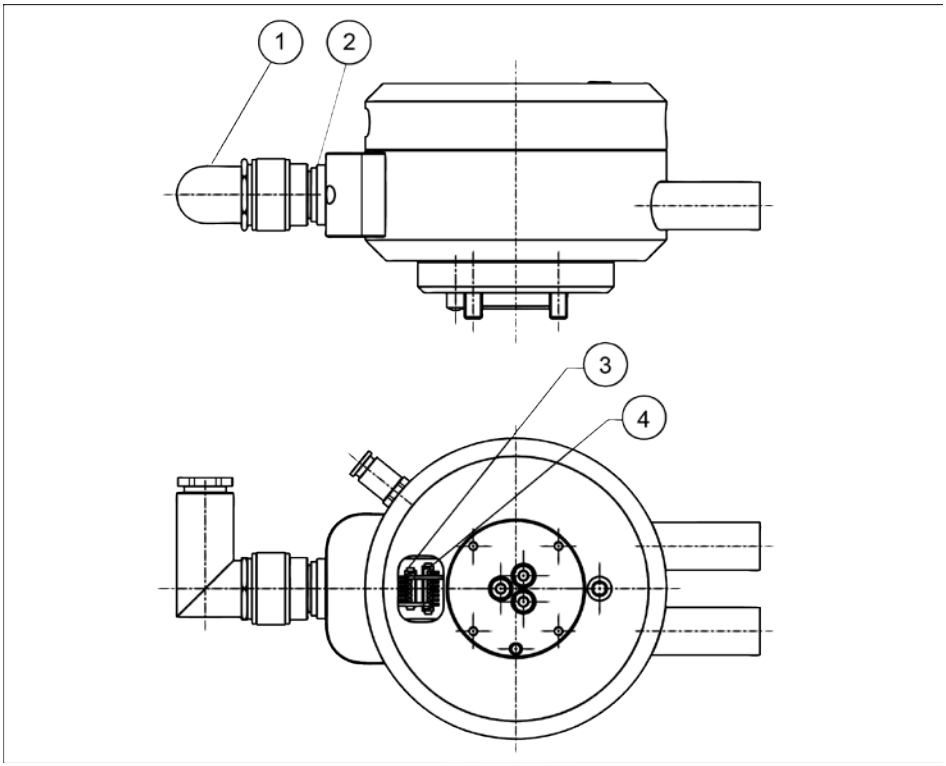

Fig. 5 Assignment of the plug connectors

Components of the electrical connection

Item	Designation	Plug connector on the DDF	Plug connector provided by the customer
1, 2	Pin terminal 14-pin	Binder series 723 flanged panel plug 09-0453-80-14	Binder series 723 angle junction box 99-0452-75-14
3	Miniature blade connector 6-pin	JST series ZH Type B6B-ZR-ABG	JST series ZR Type 06ZR-8M
4	Miniature blade connector 8-pin	JST series ZH Type B6B-ZR-ABG	JST series ZR Type 08ZR-8M

7.4.2 Pin assignment of the plug connectors

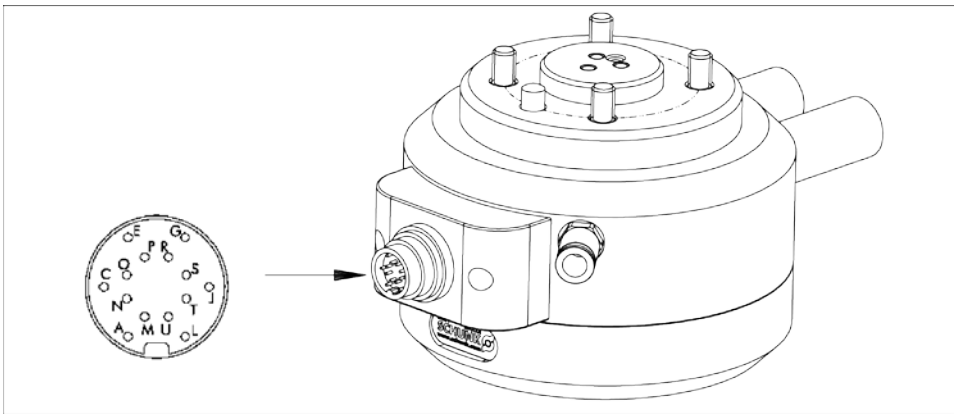

Fig. 6 Pin arrangement, pin terminal, 14-pin

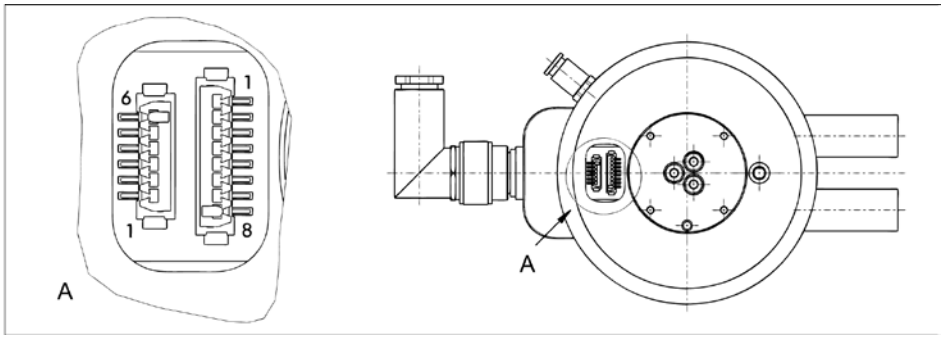

Fig. 7 Pin arrangement of the miniature blade connectors (6-pin and 8-pin)

Slip ring	Pin terminal, 14-pin	Cable color, pin terminal	Cable color, pin terminal	Miniature blade connector, 8-pin	Function with handling module (in this case SWS-I-011) attached
1	A	wh	-	Pin 1	Signal, valve 1, switches L1 air feed-through
2	C	bn	-	Pin 2	Signal, valve 2, lock
3	E	gn	-	Pin 3	Signal, valve 3, switches L3 air feed-through
4	G	ye	-	Pin 4	GND valve 1-3
5	J	bu	-	Pin 5	Signal, valve 4, switches L4 air feed-through
6	L	rd	-	Pin 6	Signal, valve 5, unlock
7	M	bk	-	Pin 7	Signal, valve 6, switches L6 air feed-through
8	N	pr	-	Pin 8	GND valve 4-6
9	O	wh	Pin 1	-	El. feed-through 1
10	P	bn	Pin 2	-	El. feed-through 2
11	R	gn	Pin 3	-	El. feed-through 3
12	S	ye	Pin 4	-	El. feed-through 4
13	T	bu	Pin 5	-	El. feed-through 5
14	U	rd	Pin 6	-	El. feed-through 6

8 Coupling the DDF-V to a quick-change system

⚠ CAUTION

Risk of injury due to faulty signal transmission!
This may cause a short-circuit or unexpected movement of the machine/automated system.

- Observe the number of pins when connecting the (6-pin and 8-pin) blade connectors.
- Observe the positional orientation and pin assignment of the plug connectors (☞ 7.4.2, Page 18).

NOTE

Overserve the maximum electrical energy values(☞ 6, Page 10).
Transmission of bus signals is not possible!

- Overserve the maximum electrical energy values.
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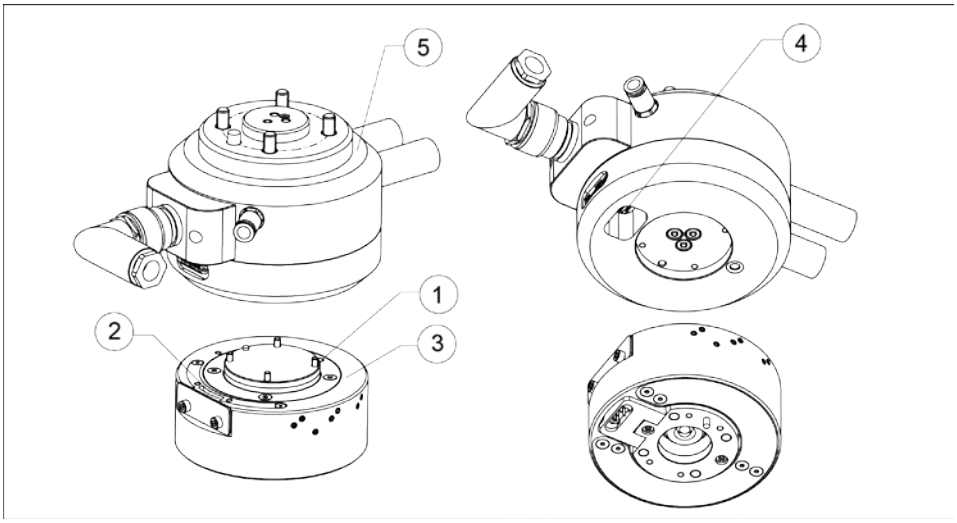

Fig. 8 Variant DDF-V with SWS-I-011

Components of the variant

Item	Designation
1	SWS-I-011 axial air connection
2	SWS-I-011 axial cable outlet
3	SWS-I-011 quick-change system
4	Miniature blade connector
5	DDF-V rotary feed-through

- Air transmission takes place via the hose-free direct connection (1).
- For the energy transmission, the axial cable outlet (2) of the quick-change system (3) is plugged onto the two miniature blade connectors (4) of the rotary feed-through (5).

9 Troubleshooting

9.1 DDF-V releases air when shut down?

Possible cause	Corrective action
Air connection not installed correctly	Tighten air connection. (☞ 7.3, Page 15)

9.2 DDF-V releases air in operating condition?

Possible cause	Corrective action
O-ring defective	Replace O-ring.

9.3 Electric signals are not transmitted?

Possible cause	Corrective action
Cable is not connected correctly	Check if the circular connectors and the miniature flat connectors are plugged in correctly.
Strands swapped	Check, if strands are swapped. Observe Pin-assignment. (☞ 7.4.2, Page 18)
Bussignals are to be transmitted	Bus signals can not be transferred..
Collector ring defect	Send the module to SCHUNK with a repair order.

9.4 DDF-V and SWS-I-011 variants release air when shut down?

Possible cause	Corrective action
Air connection not installed correctly	Tighten air connection. (☞ 7.3, Page 15)
O-rings missing at quick-change system	Insert O-rings (13 and 26). (☞ 11, Page 27)
Cover missing at quick-change system	Insert the cover (50). (☞ 11, Page 27)
Pressure above 6 bar too high	Reduce pressure to max. 6 bar.

10 Maintenance and Care

10.1 Maintenance and lubrication intervals

NOTICE

At ambient temperature above 60°C the lubricants can harden faster.

- Interval decrease accordingly.

Maintenance- and lubrication interval

Size	31.5	40	50
Operating hours	6000		

10.2 Lubricants/Lubrication points (basic lubrication)

We recommend the lubricants listed.

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

Lubricant point	Lubricant
Bare outside steel parts	Fin Assembly Grease (Interflon)
All seals (O-rings)	FIN - assembly grease with Teflon
Slip ring tracks	LTN oil (item no. 4605575)

10.3 Disassembly of the module

10.3.1 Standard variant DDF-V

Position of the position numbers (☞ 11, Page 27)

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly!
Remove the energy supplies.
Make sure that no residual energy remains in the system.

NOTICE

Risk of damage to the slip ring contacts in the event of inappropriate cleaning!
Clean the brush block (17) and slip ring disk (18) very carefully without water.
Slightly oil the slip ring tracks.

NOTICE

Risk of damage to the individual components in the event of inappropriate assembly!
Prevent damage to the seals and plug connectors.
Avoid touching the slip ring contacts of the electrical feed-through.

1 Remove the compressed air line.
2 Disconnect the cable connections.
3 Unscrew the screws (17).

NOTE
The adapter plate (1) and shaft (4) are bolted together (16).

4 Pull the shaft (4) off the adapter plate (1).
5 Replace all seals (9).
6 Check all parts for defects and wear.
7 Clean all parts thoroughly with a damp cloth, apart from the brush block (17) and slip ring disk (18).

8 Clean the slip ring tracks in the shaft (4) very carefully with a clean, dry cloth. Oil the tracks slightly (☞ 10.2, Page 23).

10.3.2 Disconnecting and connecting the DDF-V and SWS-I-011 combination variant

Position of the position numbers (☞ 11, Page 27)

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly!
Remove the energy supplies.
Make sure that no residual energy remains in the system.

NOTICE

Risk of damage to the individual components in the event of inappropriate assembly!
Prevent damage to the seals and plug connectors.

1 Unlock the SWK quick-change head (20).
2 Take off the SWA quick-change adapter (21) and place it in the storage rack or a safe place.
3 Remove the compressed air lines.
4 Disconnect the cable connections.
5 Unscrew the screws (18).

NOTE
The electrical connection connects the quick-change head (20) with the DDF-V rotary feed-through.

6 Carefully tip the quick-change head (20) to the side.
7 Remove the cover (50) and replace the O-ring (13).
8 Carefully detach the plug connector of the electrical feed-through from the DDF-V (19) and disconnect it from the quick-change head (20).
9 Completely unscrew the screws (17).
10 Disassemble (☞ 10.3.1, Page 24) and service the DDF-V (19).

10.4 Servicing and assembling the module

Maintenance

- Clean all parts thoroughly and check for damage and wear.
- Replace all wear parts / seals.
- Treat all greased areas with lubricant. (☞ 10.2, Page 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. 243 and tighten with the appropriate tightening torque.

11 Assembly drawing

11.1 DDF-V assembly drawing

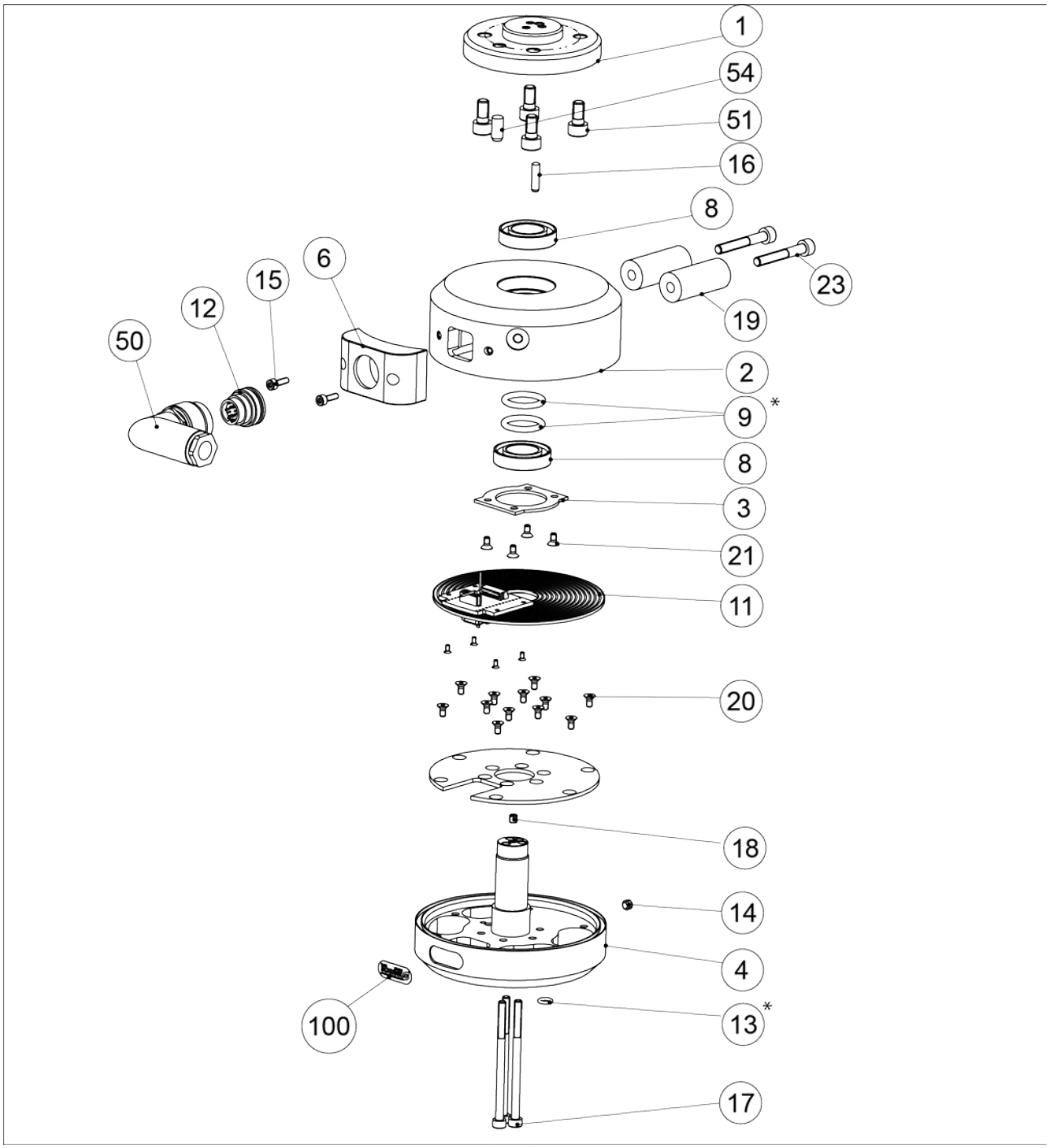

Fig. 9 DDF-V assembly drawing

* Wearing part, replace during maintenance.

11.2 Assembly drawing of DDF-V with SWS-I-011

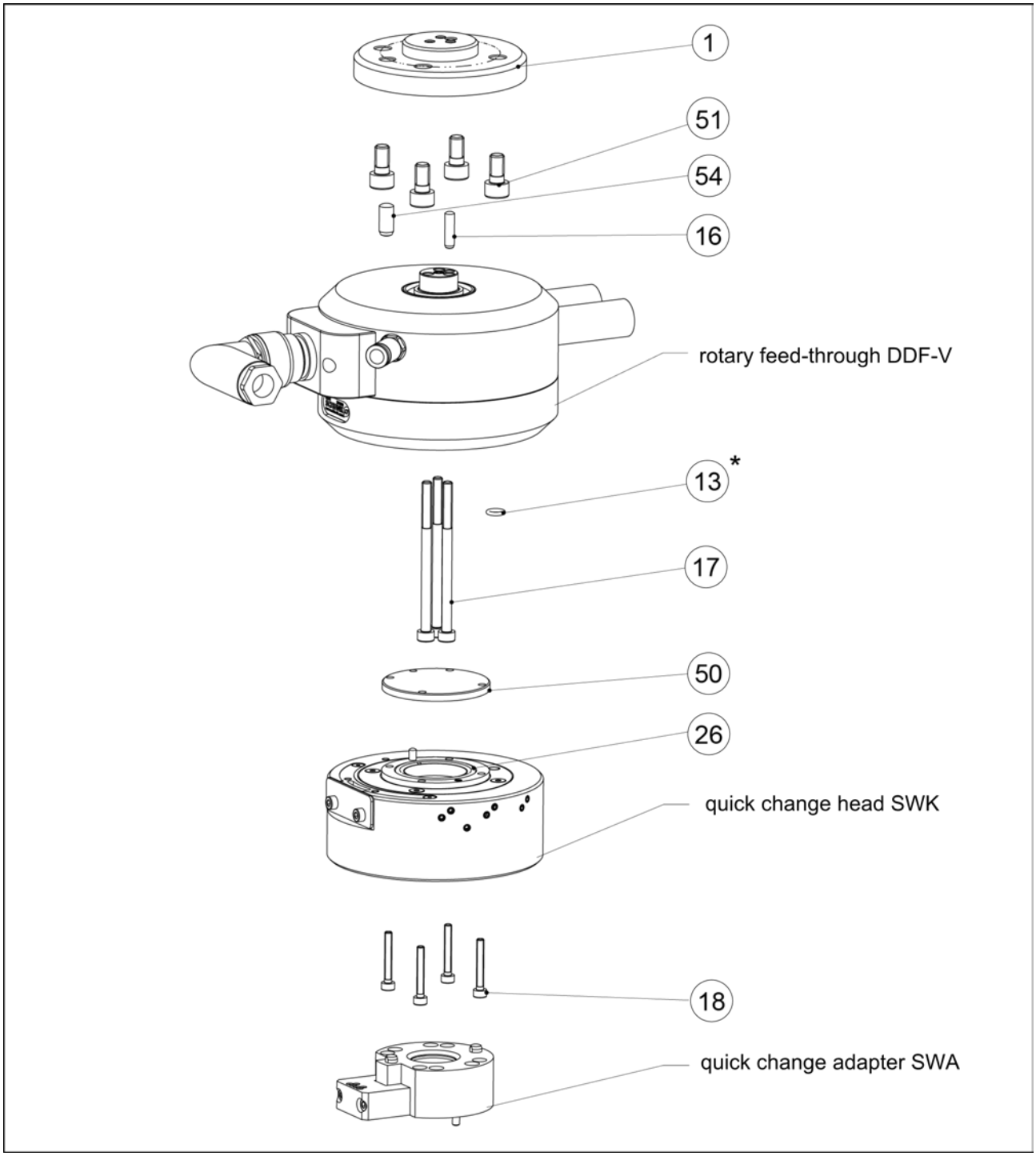

Fig. 10 Assembly drawing of DDF-V with SWS-I-011

* Wearing part, replace during maintenance.

12 Combination variants

Position of the position numbers (☞ 11, Page 27)

DDF-V-31.5 and SWS-I-011

ID number 0302816

Item	ID number	Quantity	Designation
1	5518056	1	DDF-V-31.5
2	5518059	1	SWK-I-011-4-6 for DDF-V

DDF-V-31.5 and SWS-I-011

ID number 0302817

Item	ID number	Quantity	Designation
1	5518057	1	DDF-V-40
2	5518059	1	SWK-I-011-4-6 for DDF-V

DDF-V-31.5 and SWS-I-011

ID number 0302818

Item	ID number	Quantity	Designation
1	5518058	1	DDF-V-50
2	5518059	1	SWK-I-011-4-6 for DDF-V

13 Accessories kit

Content of the accessories pack:

- KAS-SWK-I-011-90
- ZR connector type 06ZR-8M
- ZR connector type 08ZR-8M
- Cylindrical pin

Notes