# Assembly and Operating Manual

# FWS

## Flat change system

Superior Clamping and Gripping

SCHUNK®

# Imprint



**Technical changes:**

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

**Document number:** 389088

**Version:** 02.00 | 26/06/2019 | en



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**

### 1.1.3 Variants

This operating manual applies to the following variations:

- FWS without feed-throughs
- FWS with 2 pneumatic feed-throughs and 8 electrical feed-throughs
- FWS with 4 pneumatic feed-throughs

## 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

- Flat change system FWS in the version ordered
- Assembly and Operating Manual
- Accessory pack

# 2 Basic safety notes

## 2.1 Intended use

The product was constructed for manual tool change.

- The product is intended for installation in a machine/system. The applicable guidelines must be observed and complied with.
- The product may only be used within the scope of its technical data, Technical data [▶ 15].
- 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 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.

### 2.12.2 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.

### 2.12.3 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.

### 2.12.4 Protection against electric shock

**Possible electrostatic energy**

Components or assembly groups may become electrostatically charged. When the electrostatic charge is touched, the discharge may trigger a shock reaction leading to injuries.

- The operator must ensure that all components and assembly groups are included in the local potential equalisation in accordance with the applicable regulations.
- While paying attention to the actual conditions of the working environment, the potential equalisation must be implemented by a specialist electrician according to the applicable regulations.
- The effectiveness of the potential equalisation must be verified by executing regular safety measurements.

## 2.13 Notes on particular risks

**⚠ DANGER**

**Risk of fatal injury from suspended loads!**

Falling loads can cause serious injuries and even death.

- Stand clear of suspended loads and do not step within their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.
- Wear suitable protective equipment.

**⚠ 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 movements!**

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

**⚠ WARNING**

**Risk of injury from sharp edges and corners!**

Sharp edges and corners can cause cuts.

- Use suitable protective equipment.

# 3 Technical data

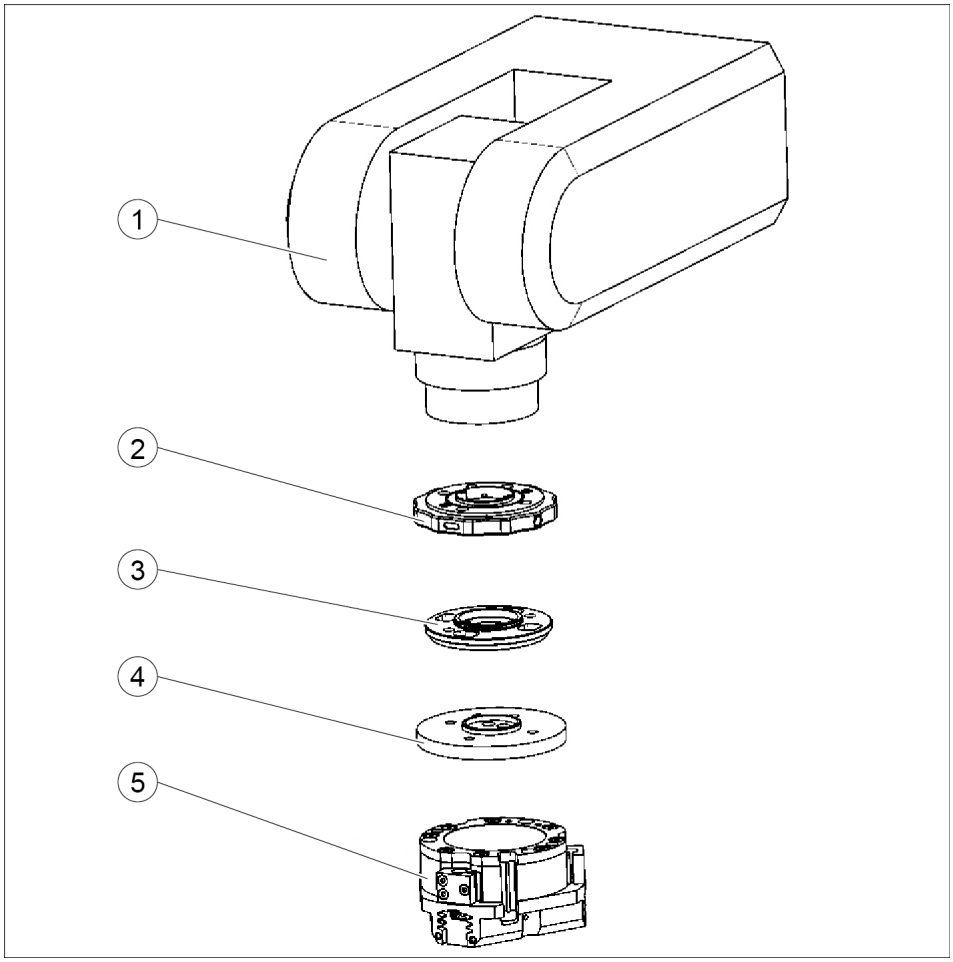
| Designation | FWK-050-0-0 | FWA-050-0-0 | FWK-050-2-8 | FWA-050-2-8 | FWK-050-4-0 | FWA-050-4-0 |
|---|---|---|---|---|---|---|
| Max. payload [kg] | 6 | | | | | |
| Weight [kg] | 0.085 | 0.045 | 0.094 | 0.052 | 0.098 | 0.060 |
| pneumatic feed-through | - | - | 2 | 2 | 4 | 4 |
| electrical feed-through | - | - | 8 | 8 | - | - |

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

# 4 Assembly

## 4.1 Assembly example

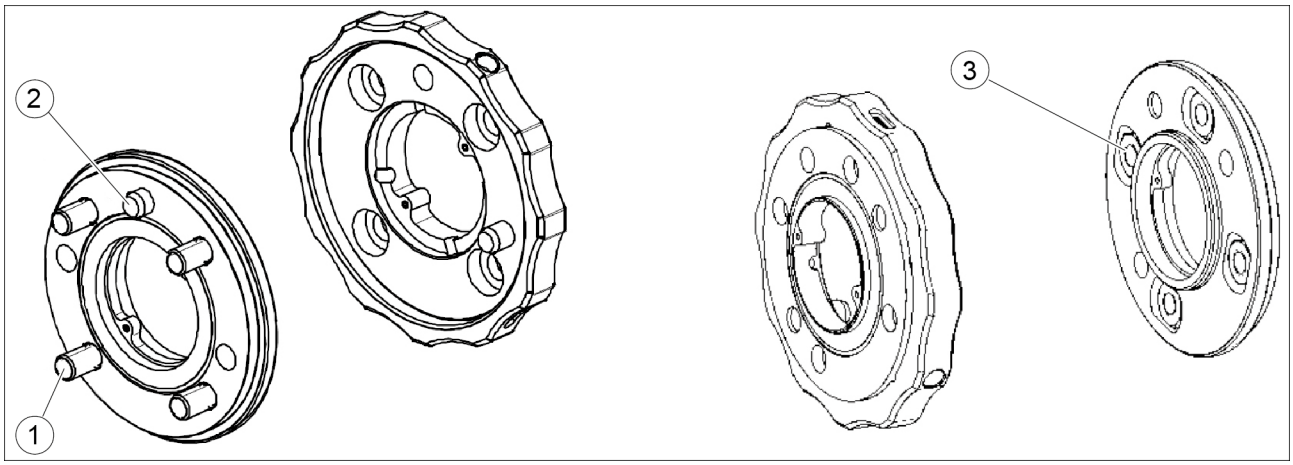
The example shows the adaptation of the FWS manual change system consisting of the FWK manual change head and the FWA manual change adapter to a standard ISO 9409-1-A50 flange. The handling device is typically fastened to the manual change adapter by using an interface plate. The pneumatic connection and electric cables are fastened, bundled, and mounted with strain relief so that the greatest possible freedom of movement is available during use.




*Assembly example*

| | |
|---|---|
| 1 | robot arm |
| 2 | FWK manual change head |
| 3 | FWA manual change adapter |
| 4 | interface plate for handling device (supplied by the customer) |
| 5 | handling device, e.g. gripper |

## 4.2 Mounting the manual change adapter (FWA)




*Mounting the FWA*

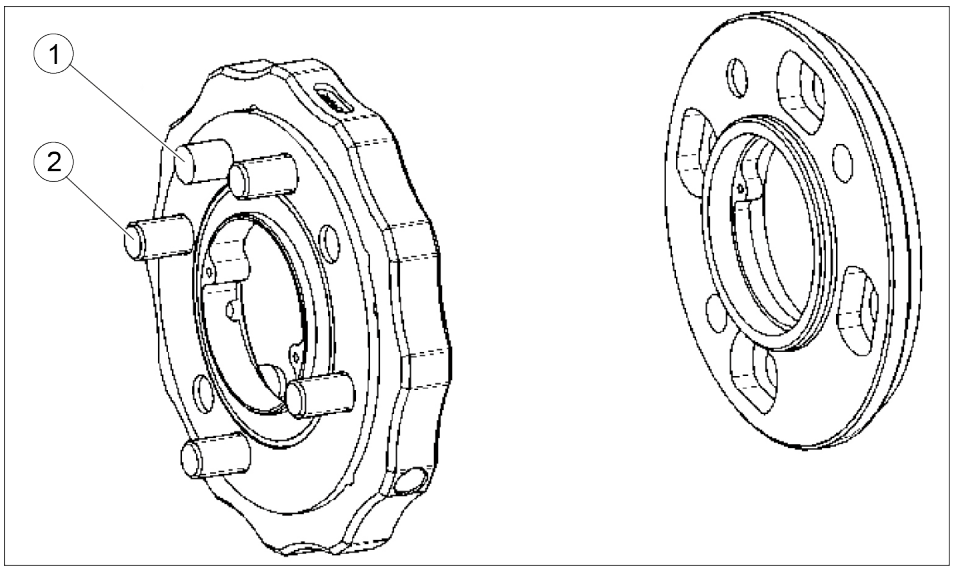
| | |
|---|---|
| 1 | Mounting screws DIN 7984 M6 x 12 |
| 2 | Cylindrical pin for centering DIN 6325 6m6 x 12 |
| 3 | Nut DIN EN ISO 4035 M6 |

The FWA manual change adapter can be mounted with the screws (1) or the nuts (3). Use the cylindrical pin for centering (2).

## 4.3 Mounting the manual change head (FWK)

**NOTE**

Using the SCHUNK Dexterous Hand (SDH) requires no separate FWK, since it is integrated in the SDH.




*Mounting the FWK*

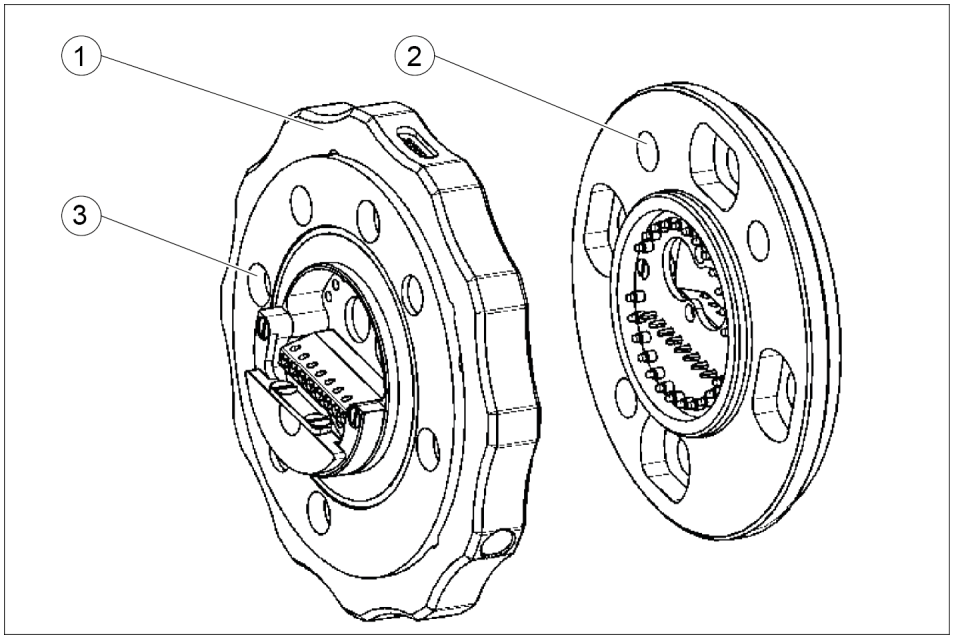
| | |
|---|---|
| 1 | Cylindrical pin for centering DIN 6325 6m6 x 14 |
| 2 | Fastening screws |

The FWK manual change head can be mounted with the screws (2). Use the cylindrical pin for centering (1).

# 5 Start-up

For the connection dimensions, see the relevant drawings in the latest catalog or our CAD data service in the Internet (www.schunk.com).

## 5.1 Mounting the FWA manual change adapter to the FWK manual change head




*Tightening the coupling ring*

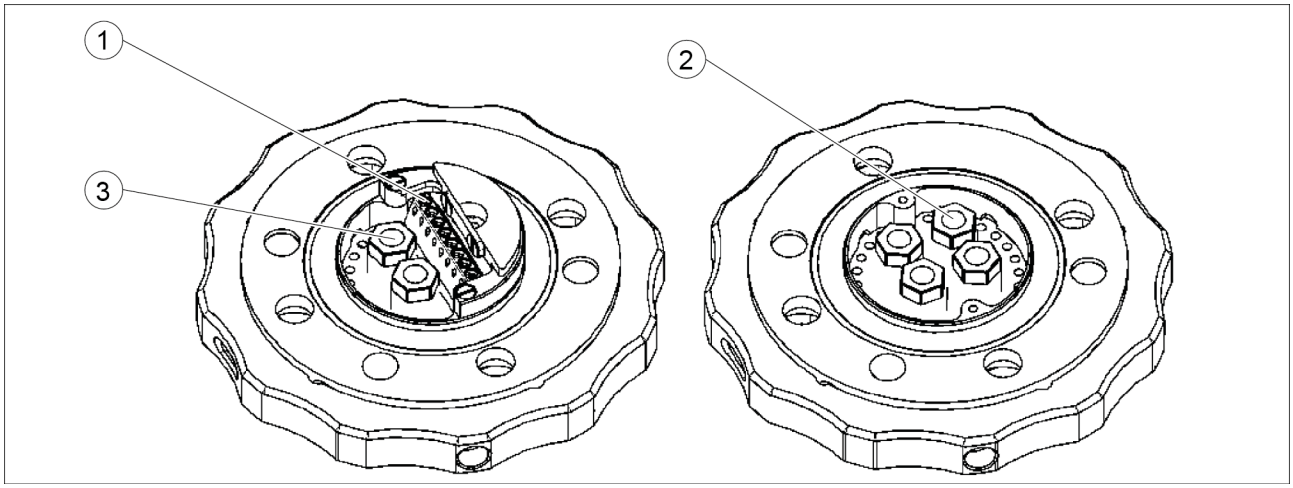
| | | | |
|---|---|---|---|
| 1 | Coupling ring | 2 | FWA manual change adapter |
| 3 | FWK manual change head | | |

Position the coupling ring (1) on the FWA manual change adapter (2) and tighten by hand. Ensure that the coupling ring (1) is positioned straight and does not get wedged.
Use a 60 - 90 mm spanner wrench (5 mm journal diameter) to tighten the coupling ring (1), firmly connecting the FWA manual change adapter with the FWK manual change head.

## 5.2 Media feed-through

The manual change system is available in three variants.

| Type | Description |
|---|---|
| FWA-050-0-0 und FWK-050-0-0 | without feed-through |
| FWA-050-2-8 und FWK-050-2-8 | 2-fold pneumatic feed-through and<br>8-fold electrical (signal) feed-through |
| FWA-050-4-0 und FWK-050-4-0 | 4-fold pneumatic feed-through |




*Media feed-through*

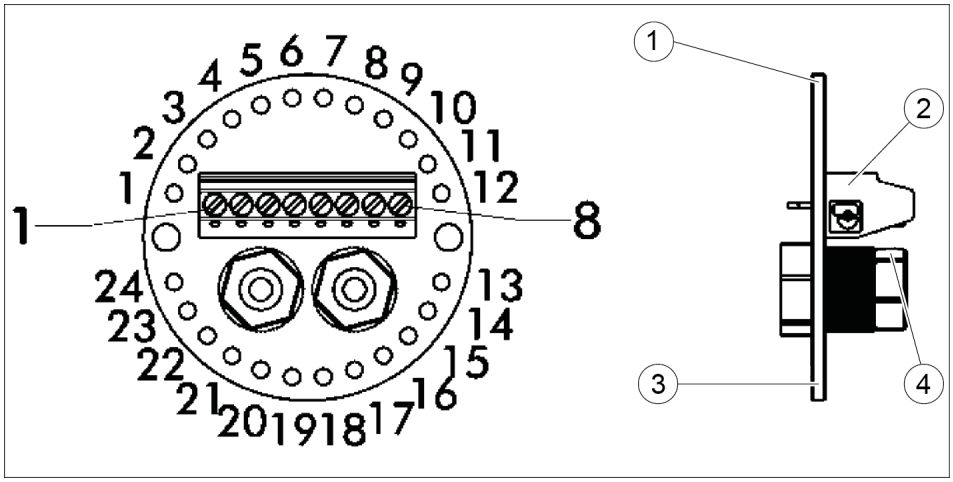
| | |
|---|---|
| 1 | 8-fold electrical feed-through |
| 2 | 4-fold pneumatic feed-through |
| 3 | 2-fold pneumatic feed-through |

## 5.3 Pin allocation of the electrical signal feed-through

**NOTE**

Up to 16 additional signal lines can be fitted directly onto the soldering pads, should more than 8 electrical signals be required. For this end the wire strand must be soldered onto the soldering pads directly. Max. current carrying capacity 1A per pin (24 VDC).

### Design of the board in the FWK




*Board in the FWK*

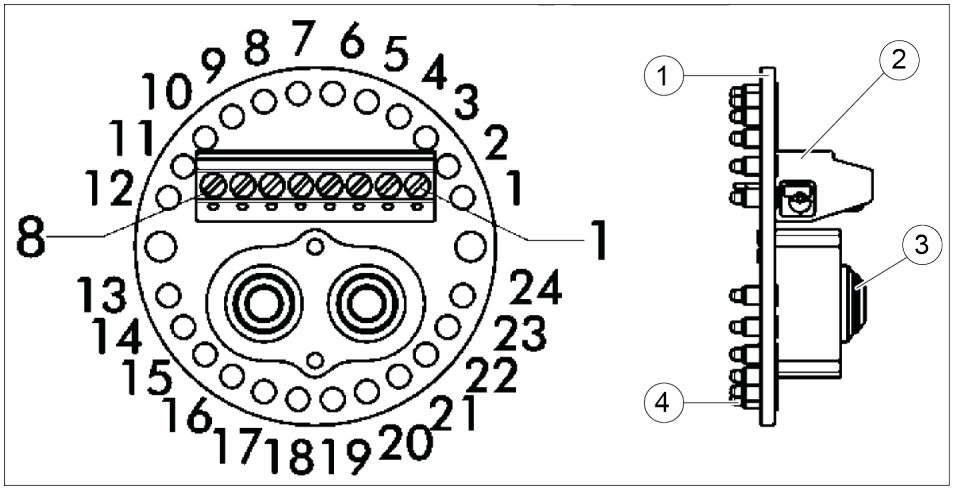
| | | | |
|---|---|---|---|
| 1 | FWK board | 2 | 8-pin terminal |
| 3 | soldering pad | 4 | hose connection |

Allocation of the soldering pads to the 8-pin terminal is as follows:

*Allocation of the pins for FWK*

| Soldering pads | 8-pin terminal |
|---|---|
| 1 | Pin 1 |
| 2 | Pin 2 |
| 3 | Pin 3 |
| 4 | n.c. |
| 5 | Pin 4 |
| 6 | Pin 5 |
| 7 | n.c. |
| 8 | Pin 6 |
| 9 | Pin 7 |
| 10 | n.c. |
| 11 | n.c. |
| 12 | Pin 8 |
| 13 - 24 | n.c. |

### Design of the board in the FWA




*Board in the FWA*

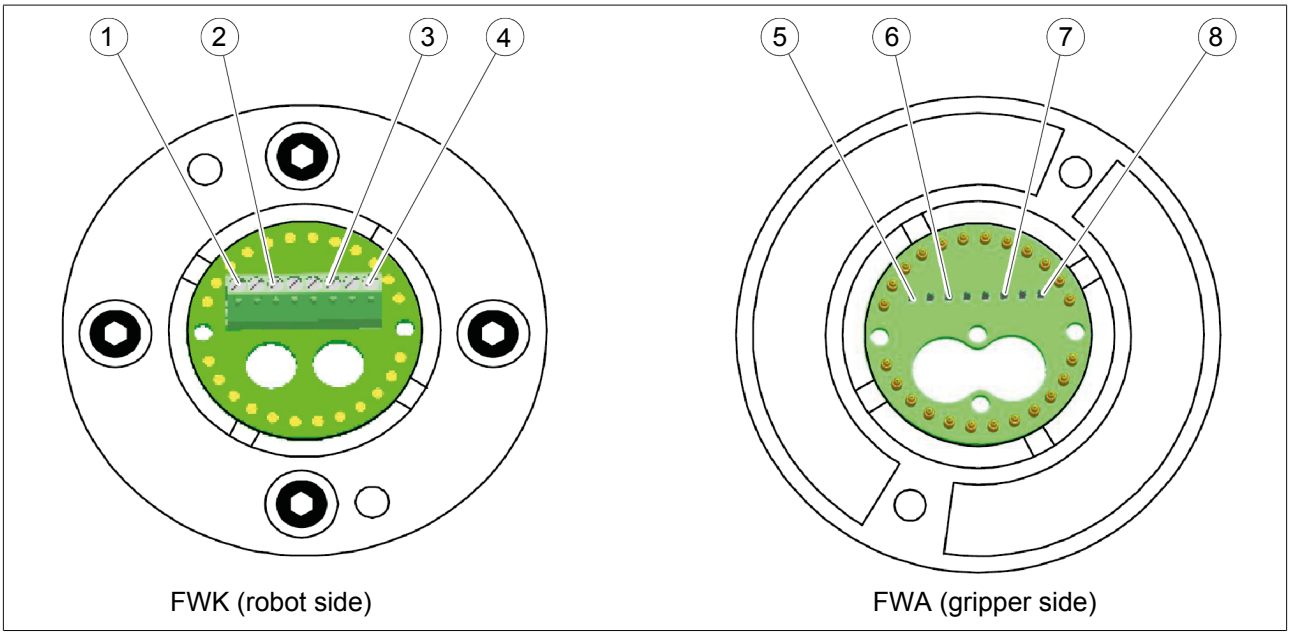
| | | | |
|---|---|---|---|
| 1 | FWA board | 2 | 8-pin terminal |
| 3 | sealing plug for air feed-through | 4 | soldering pad with spring contact |

Allocation of the soldering pads to the 8-pin terminal is as follows:

*Allocation of the pins for FWA*

| Soldering pads | 8-pin terminal |
|---|---|
| 1 | Pin 1 |
| 2 | n.c. |
| 3 | n.c. |
| 4 | Pin 2 |
| 5 | Pin 3 |
| 6 | n.c. |
| 7 | Pin 4 |
| 8 | Pin 5 |
| 9 | n.c. |
| 10 | Pin 6 |
| 11 | Pin 7 |
| 12 | Pin 8 |
| 13 - 24 | n.c. |

## 5.4 Pin allocation when using the MEG gripper



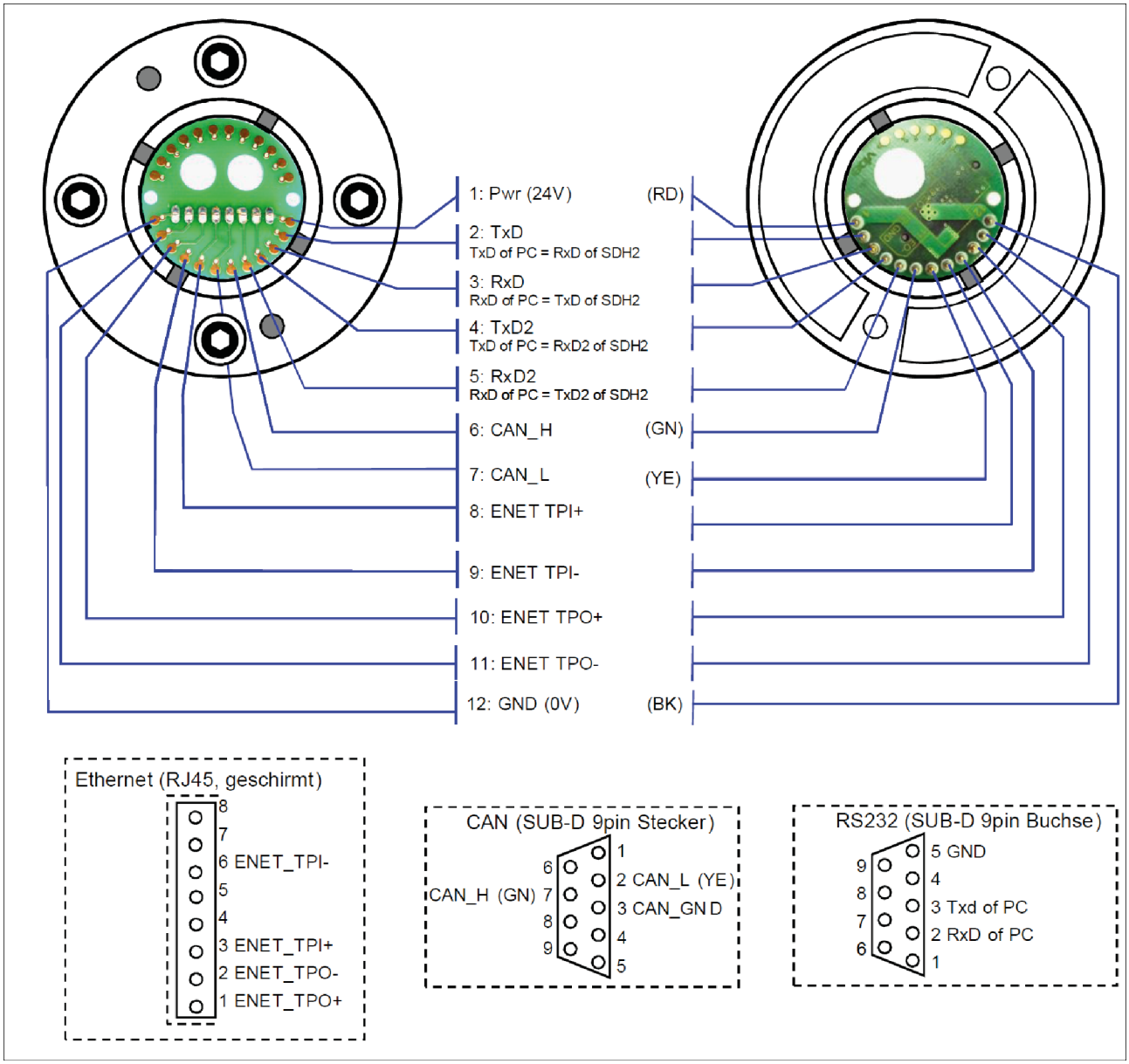

*FWS pin allocation with MEG*

| | | | |
|---|---|---|---|
| 1 | M1 to MEG C50 Cl. 1 controller | 2 | M1 to MEG C50 Cl. 3 controller |
| 3 | M2 to MEG C50 Cl. 9 controller | 4 | M2 to MEG C50 Cl. 7 controller |
| 5 | M1 (red) | 6 | M1 (red/white) |
| 7 | M2 (green/white) | 8 | M2 (green) |

The image shows the contact sides of the FWS and the connection plugs and sockets, i.e. **not** the sides to which the cables are soldered.

## 5.5 Pin allocation and wiring when using the Schunk Dextrous Hand (SDH)

### Pin allocation

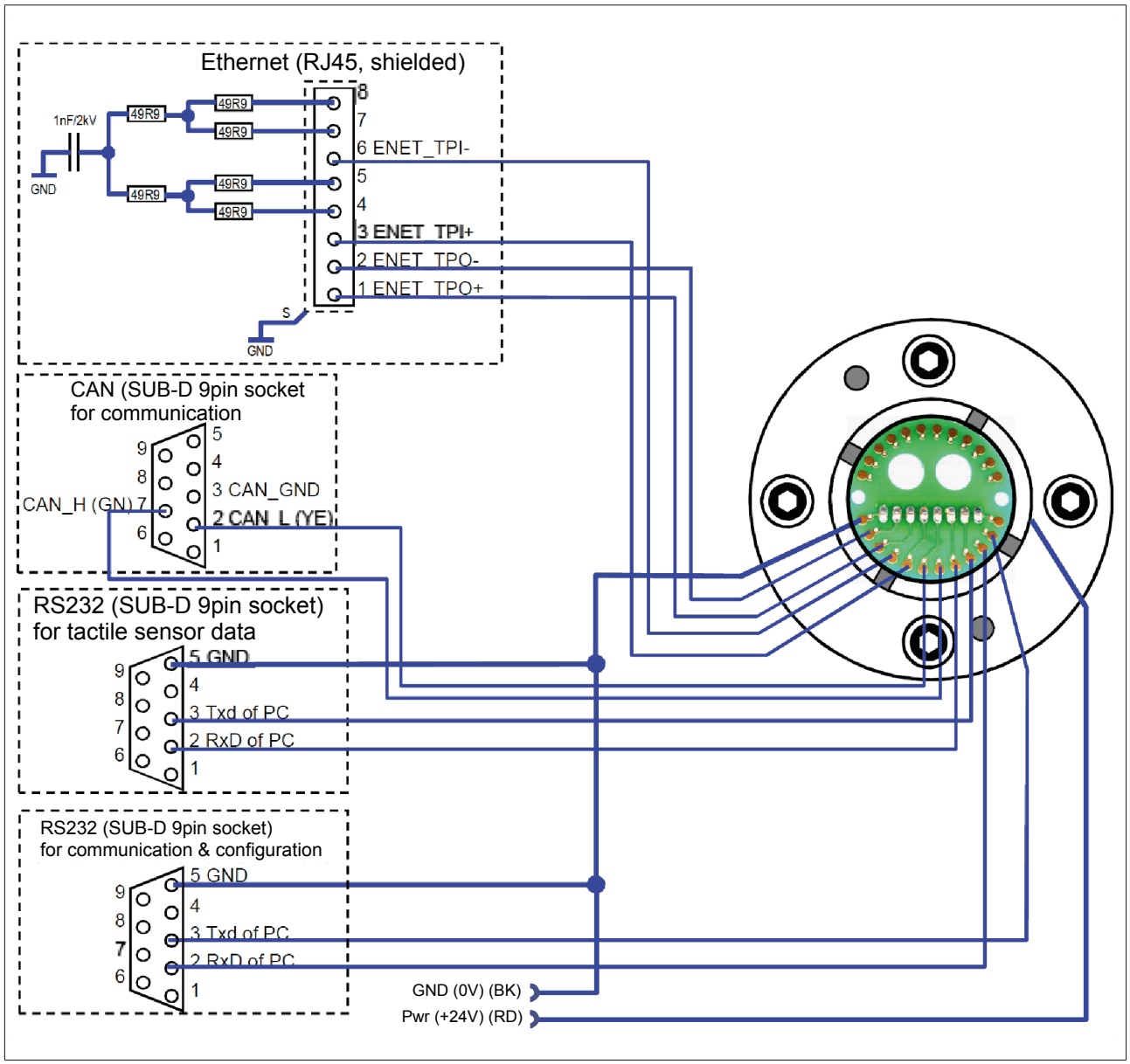



*FWS pin allocation with SDH*

| | | | |
|---|---|---|---|
| RD = red | GN = green | YE = yellow | BK = black |

The image shows the contact sides of the FWS and the connection plugs and sockets, i.e. **not** the sides to which the cables are soldered.

## Wiring when connecting the SDH




*FWS pin allocation*

| | | | |
|---|---|---|---|
| RD = red | GN = green | YE = yellow | BK = black |

The image shows the two contact sides of the FWS, i.e. **not** the sides to which the cables are soldered.

*Allocation of the pins for FWA*

| Standard parameters | RS232 | CAN |
|---|---|---|
| Baud rate | 115200 bit/s | 1000000 bit/s |
| Data bits | 8 | - |
| Parity | none | - |
| Stop bits | 1 | - |
| Flow control | none | - |

*Configured parameters*

| | RS232 | CAN |
|---|---|---|
| Normal communication | Baud rate can be configured | Baud rate can be configured |
| Configuration and tactile sensor data | Baud rate cannot be configured | - |

# 6 Disassembling the manual change system

Position of the item numbersAssembly drawing [▶ 30]

## 6.1 Disassembling the FWK-050-0-0 with FWA-050-0-0

- Switch off the energy supply.
- Undo the coupling ring (3) and disconnect the manual change adapter (7) from the manual change head (8).
- Undo manual change adapter (7) from the handling module and remove O-ring (24).
- Undo manual change head (8) from the robot flange and remove O-ring (25).
- Remove O-ring (26).

**To assemble the module, complete the procedure above in reverse.**

## 6.2 Disassembling the FWK-050-2-8 with FWA-050-2-8

- Switch off the energy supply.
- Undo the coupling ring (3) and disconnect the manual change adapter (7) from the manual change head (8).
- Undo manual change adapter (7) from the handling module and remove O-ring (24).
- Undo manual change head (8) from the robot flange and remove O-ring (25).
- Remove O-ring (26).
- Undo the screws (23) and take out the board on the gripper side 2 (5).
- Undo screws (27) and take out the 2-fold air -feed-through bracket (6).
- Push out the sealing plug (20).
- Undo hose from the screw-in union (12) and remove the hose.
- Undo all wire strands from terminal (31) and remove screws (28) with bridge (2).
- Remove cable and undo screws (22) in order to remove the strain relief (1).
- Now take out the board on the robot side 2 (4) by undoing the screws (29).
- Coupling ring (3) can be separated from the manual change head (8) by pushing it.

**To assemble the module, complete the procedure above in reverse.**

## 6.3 Disassembling the FWK-050-4-0 with FWA-050-4-0

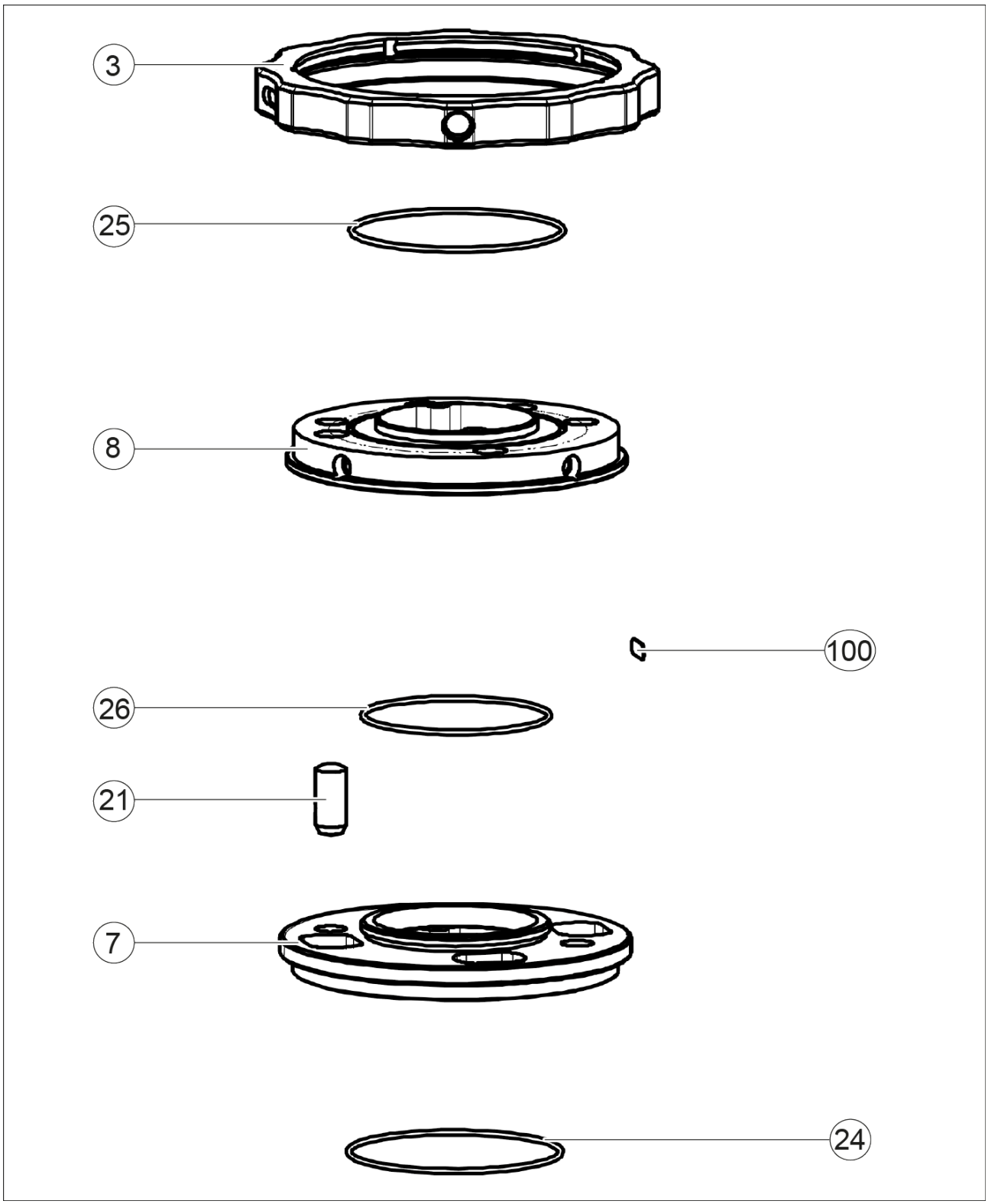
- Switch off the energy supply.

- Undo the coupling ring (3) and disconnect the manual change adapter (7) from the manual change head (8).
- Undo manual change adapter (7) from the handling module and remove O-ring (24).
- Undo manual change head (8) from the robot flange and remove O-ring (25).
- Remove O-ring (26).
- Undo the screws (23) and take out the board on the gripper side 2 (5).
- Undo screws (27) and take out the 4-fold air -feed-through bracket (13).
- Push out the sealing plug (20).
- Undo hose from the screw-in union (12) and remove the hose.
- Now take out the board on the robot side 3 (4) by undoing the screws (29).
- Coupling ring (3) can be separated from the manual change head (8) by pushing it.

**To assemble the module, complete the procedure above in reverse.**

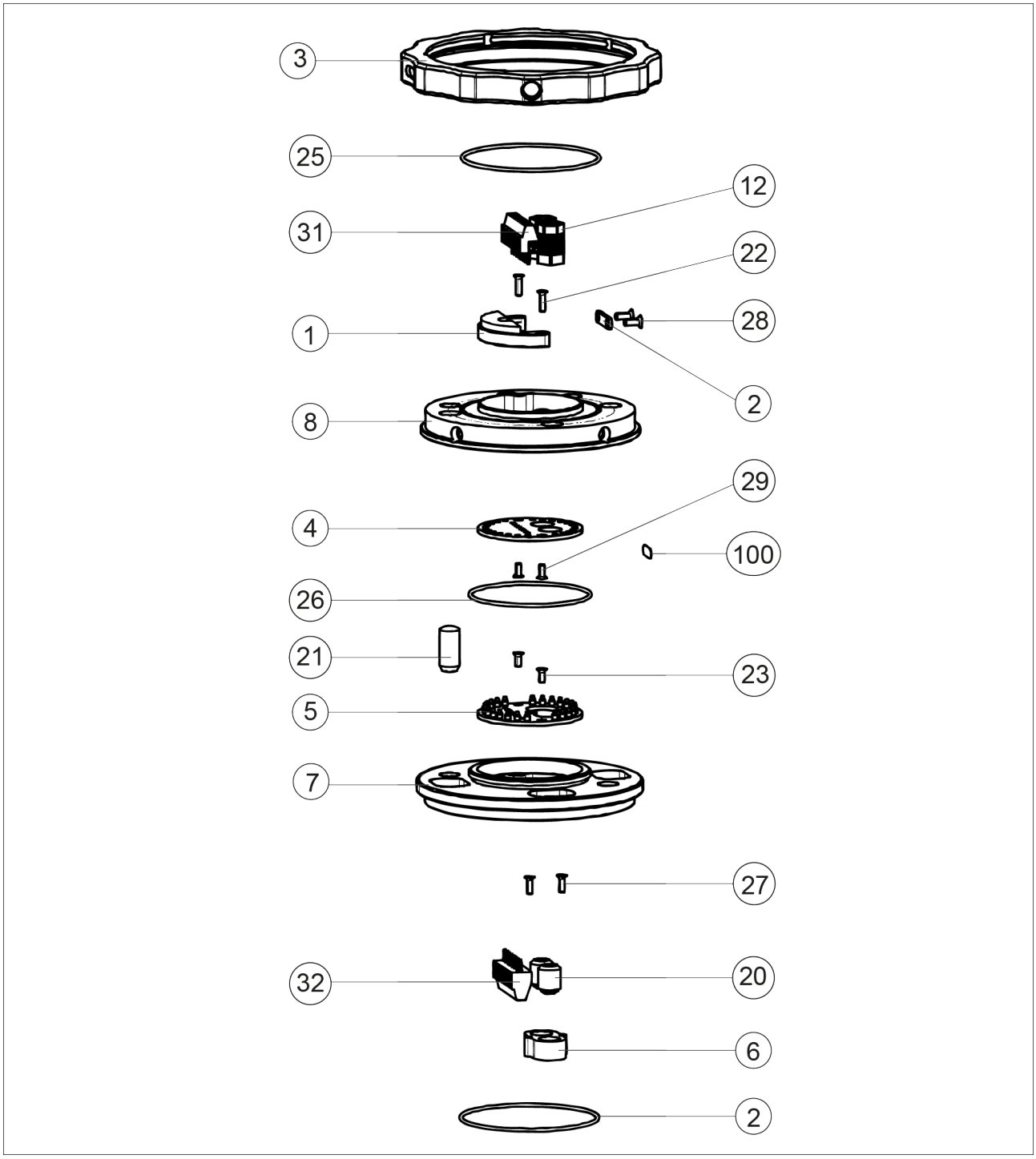
# 7 Assembly drawing

## 7.1 FWK-050-0-0 with FWA-050-0-0



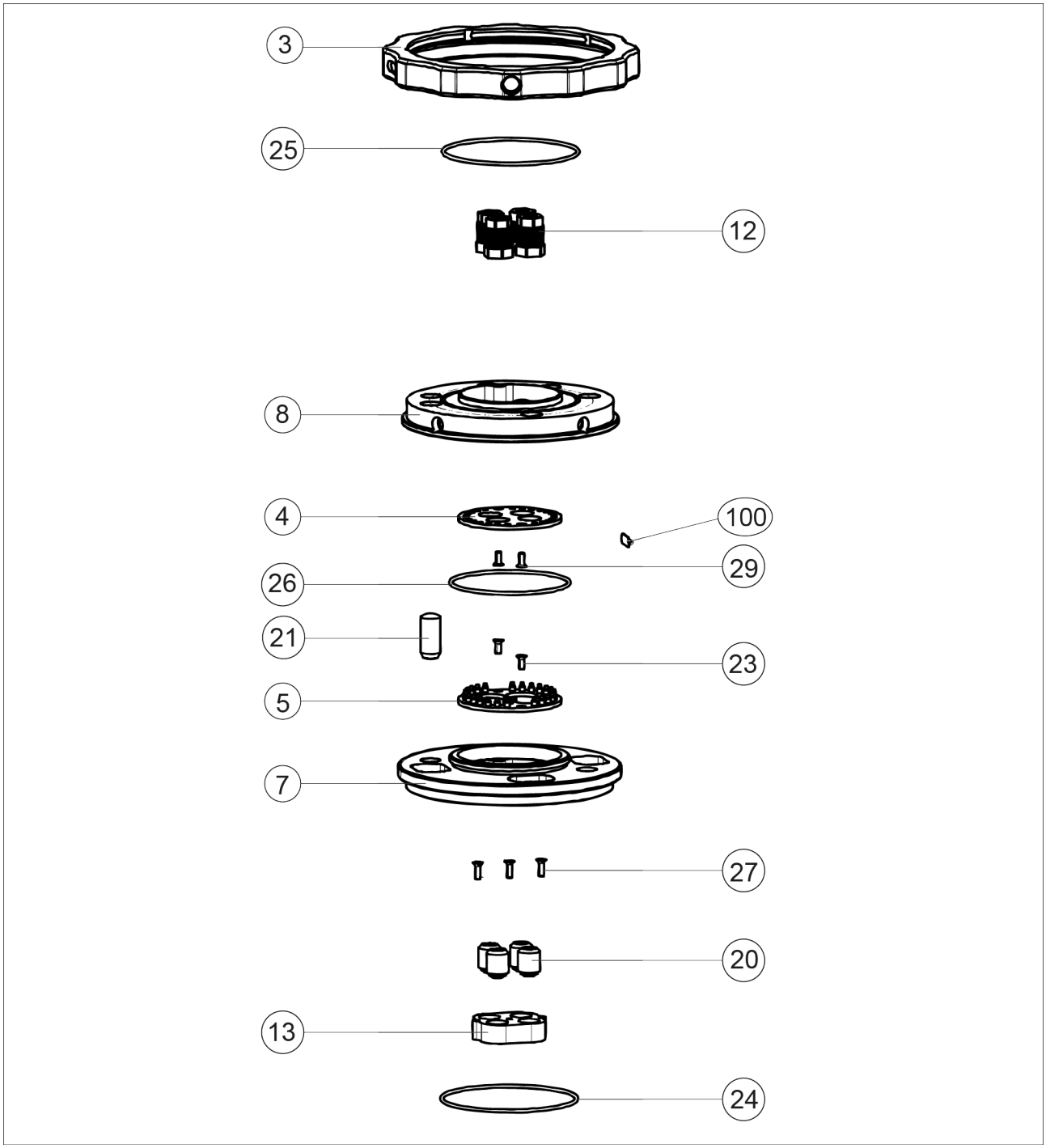

*Exploded view (without media feed-through)*

## 7.2 FWK-050-2-8 with FWA-050-2-8




*Exploded view (2-fold air feed-through / 8-fold electrical signal feed-through)*

## 7.3 Exploded view (4-fold air feed-through)




*Exploded view (4-fold air feed-through)*