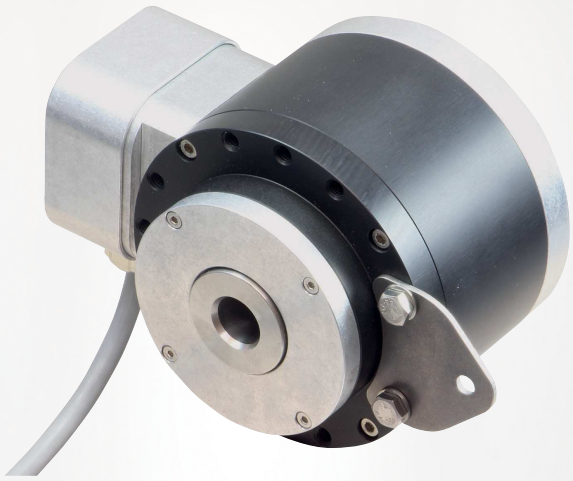
ENI11HD

Heavy-Duty Incremental Rotary Encoder

Manual



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1 Introduction

Congratulations

You have chosen a device manufactured by Pepperl+Fuchs. Pepperl+Fuchs develops, produces and distributes electronic sensors and interface modules for the market of automation technology on a worldwide scale.

Contact

If you have any questions about the device, its functions, or accessories, please contact us at:

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2 Declaration of Conformity

This product was developed and manufactured in line with the applicable European standards and directives.

Note

A declaration of conformity can be requested from the manufacturer.

The product manufacturer, Pepperl+Fuchs Group, 68307 Mannheim, Germany, has a certified quality assurance system that conforms to ISO 9001.

ISO**9001**

3 Safety

3.1 Symbols Used

Safety-Relevant Symbols

Danger!

This symbol indicates an imminent danger.

Non-observance will result in personal injury or death.

Warning!

This symbol indicates a possible fault or danger.

Non-observance may cause personal injury or serious property damage.

Caution!

This symbol indicates a possible fault.

Non-observance could interrupt the device and any connected systems and plants, or result in their complete failure.

Informative Symbols

Note

This symbol brings important information to your attention.

Action

This symbol indicates a paragraph with instructions. You are prompted to perform an action or a sequence of actions.

3.2 Intended Use

The ENI11HD incremental rotary encoder is used to record rotations though a direct mechanical coupling with a rotating drive shaft. Internally, the rotation is converted into a sequence of electrical pulses which are provided by the rotary encoder on several output channels. With its robust design, the rotary encoder is particularly suitable for applications in which strong external mechanical loads can affect the rotary encoder.

Danger!

The ENI11HD incremental rotary encoder is not a safety component.

This incremental rotary encoder must not be used in applications in which the safety of persons or system parts depends on the flawless functioning of the rotary encoder.

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3.3 General Safety Information

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismounting lies with the plant operator.

Installation and commissioning of all devices may be performed only by trained and qualified personnel.

Protection of operating personnel and the system is not ensured if the product is not used in accordance with its intended use.

Laws and regulations applicable to usage or the intended purpose must be observed. Devices are approved only for proper usage in accordance with intended use. Ignoring these instructions will void any warranty and absolve the manufacturer from any liability.

It is dangerous for the user to carry out modifications and/or repairs and doing so will void the warranty and exclude the manufacturer from any liability. In the event of any serious errors, stop using the device. Secure the device against unintended operation. To have the device repaired, return it to your local Pepperl+Fuchs representative or your sales center.

Additional documents relating to this device, such as the data sheet, declarations of conformity, certificates, etc. are an integral part of this document. They must be taken note of before using or carrying out any work on this device.

These documents can be found at www.pepperl-fuchs.com or contact your local Pepperl+Fuchs representative.

4 Product Description

4.1 Use and Application

The ENI11HD incremental rotary encoder records the rotation of a drive shaft and converts this internally into a sequence of pulses. Due to the nature of the code wheel, two pulse sequences that are out of phase by 90° are available on signal channels A and B. This enables the direction of rotation to be analyzed. In addition, one reference pulse per revolution is output on signal channel Z. To suppress electrical mains-borne disturbance, the inverted signals A/, B/ and Z/ are additionally available.

Figure 4.1 Example: rotary encoder with continuous hollow shaft with mounted ground strap and torque rest

Series ENI11HD includes rotary encoders with a hollow shaft or recessed hollow shaft. This means that the rotary encoders in this series are mounted directly on the drive shaft present on the system side. The type of shaft assembly varies according to the types of shaft available:

1. **Rotary encoder with continuous hollow shaft**
   Mounting to the drive shaft is via a shaft clamping ring.
2. **Rotary encoder with recessed hollow shaft**
   Mounting to the cylindrical drive shaft is via a central mounting screw that grips the M6 threaded hole on the face side of the drive shaft.
3. **Rotary encoder with tapered shaft**
   Mounting to the tapered drive shaft is via a central mounting screw that grips the M6 threaded hole on the face side of the drive shaft.

ENI11HD rotary encoders are particularly suitable for use in harsh ambient conditions. They have:

- A high degree of shock and vibration resistance.
- Protection against shaft currents.
- High degree of protection: IP66/IP67 or IP69k.
- A high level of immunity to electromagnetic interference.
- A high dielectric strength of 2.5 kV (optional)

This ensures a long service life. ENI11HD rotary encoders offer a high level of process safety and thus minimize the risk of failure.

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Operation of the electrical connection is very simple. The connection box, which can be rotated in 4 x 90° increments, enables quick and flexible installation and maintenance in the field.

Turning of the rotary encoder with the drive shaft is prevented by a torque rest made from a support plate and extension arm.

4.2 Included in Delivery

The scope of supply of rotary encoders in this series differs depending on the design ordered. Regardless of the design of rotary encoder ordered, the following are always included in delivery:

- ENI11HD incremental rotary encoder
- Grounding set, consisting of a ground strap, contact disk, screw, grounding label
- Torque rest ENI11 070 M6, consisting of one 70 mm support plate, two M6 x 12 hexagon screws (DIN 933), two washers (DIN 125A)
- Instruction leaflets

Regardless of the design of rotary encoder ordered, the following are additionally included in delivery:

- Mounting set (depending on the rotary encoder shaft type)
- 70 mm extension arm (depending on the order option)

Note

If the incremental rotary encoder was ordered with an extension arm, then one of the swivel heads is already pre-assembled on the support plate.

4.3 Accessories

Note

Various accessories are available. Find accessory products can be found online on the product page for the ENI11HD incremental rotary encoder at **www.pepperl-fuchs.com**.

5 Installation

5.1 Safety Information

Danger!

Risk of injury

Injury due to unexpected startup of the drive shaft.

- Stop the drive before carrying out any work on the device.
- Secure the drive in an appropriate manner against unexpected restart, in particular against recommissioning by another person.
- Do not enable a restart of the drive until all work on the device has been completed in full.

Warning!

Risk of short circuit

Working on live parts can cause injuries and can compromise the function and the electrical safety of the device.

- Before working on the device, always disconnect the supply voltage.
- Connect the device to the supply voltage only after completion of the work.

Caution!

Thread damage

Thread damage caused by tilting.

When tightening screws or other design elements with a thread, make sure that they can be screwed without tilting into the receiving thread.

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5.2 Designations of the Rotary Encoder Parts

In the following diagram, you will find the designations of the most important components of the rotary encoder. To avoid misunderstandings, these designations will be used in the following sections.

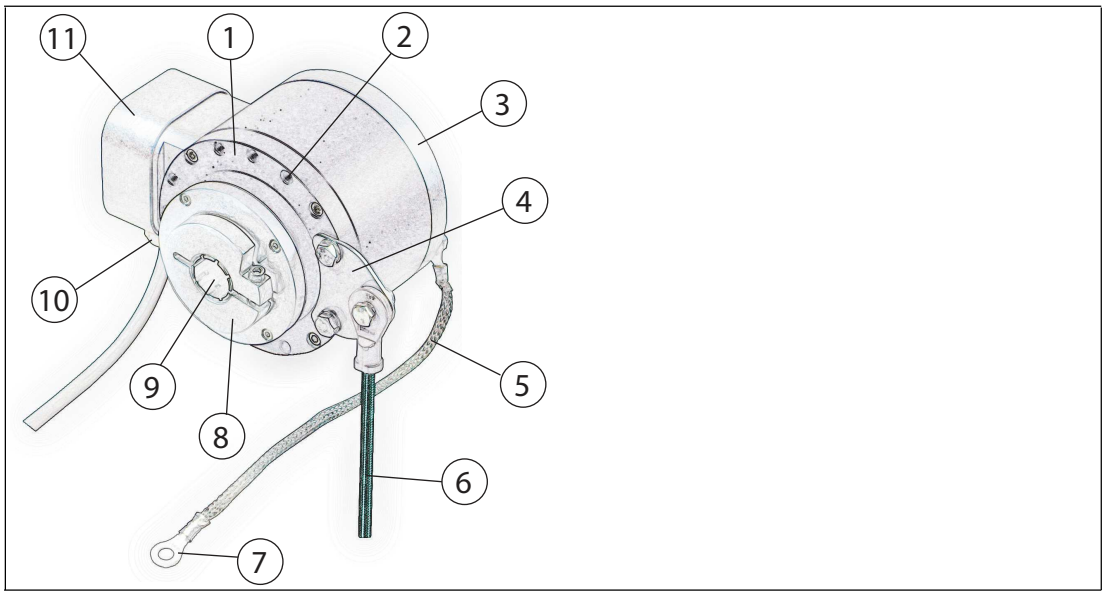

Figure 5.1 Designation of the rotary encoder parts

Item	Name
1	Rotary encoder flange
2	Threaded holes (M12 x M6, depth 16)
3	Rotary encoder cover
4	Support plate
5	Ground strap
6	Extension arm (consisting of threaded rod, swivel heads and lock nuts)
7	Eyelet of the ground strap
8	Shaft clamping ring (only for the design with continuous hollow shaft)
9	Rotary encoder shaft
10	Connector plug or cable duct
11	Connection box (rotatable in 90° increments)

5.3 Assembling Hollow Shaft Rotary Encoders (General)

Preventing Malfunctions

Correct mounting of the rotary encoder on the drive shaft, as well as the torque rest, is required for the rotary encoder to function correctly. When assembling a hollow shaft rotary encoder, observe in particular the following points:

- Do not apply force when attaching the hollow shaft rotary encoder to the drive shaft. Do not attempt to bring the rotary encoder into position by hitting it with a hammer or other tool. Ensure that the diameters of the drive shaft and rotary encoder shaft match. Remove any flash rust from the drive shaft and grease the shaft a little.
- Mount the torque rest so that it is free from play. Any play in the torque rest can result in an increased angle error and wear in operation.
- Radial deviations of the motor shaft lead to radial movement of the rotary encoder during operation. As the rotary encoder is fixed mechanically in the direction of the mounted extension arm, radial deviations of the drive shaft inevitably lead to rotations of the rotary encoder and thus to an angle error.

  An angle error caused in this way can be reduced by increasing the radius R, where R is the radial distance of the attachment point of the extension arm on the rotary encoder side from the rotational axis. The dimension R is specified by the dimensions of the support plate.

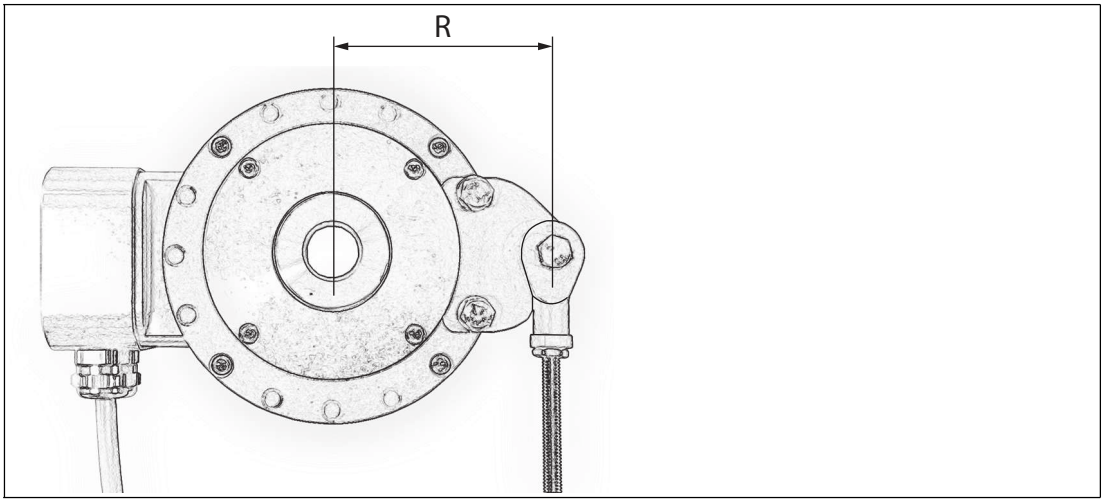

Figure 5.2 Shaft concentricity

The angle error is calculated as follows:

Angle error = ±90°/π * run-out error [mm]/R [mm]

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5.3.1 Preparation of the Rotary Encoder for Shaft Mounting (All Types)

The instructions show the preparatory steps using the example of a rotary encoder with continuous hollow shaft. Preparation is identical for all types of rotary encoders described here. Prepare the rotary encoder for shaft mounting as follows:

Grounding

1. Connect the ground strap to the bare metal rotary encoder cover. Select any M6 threaded hole.

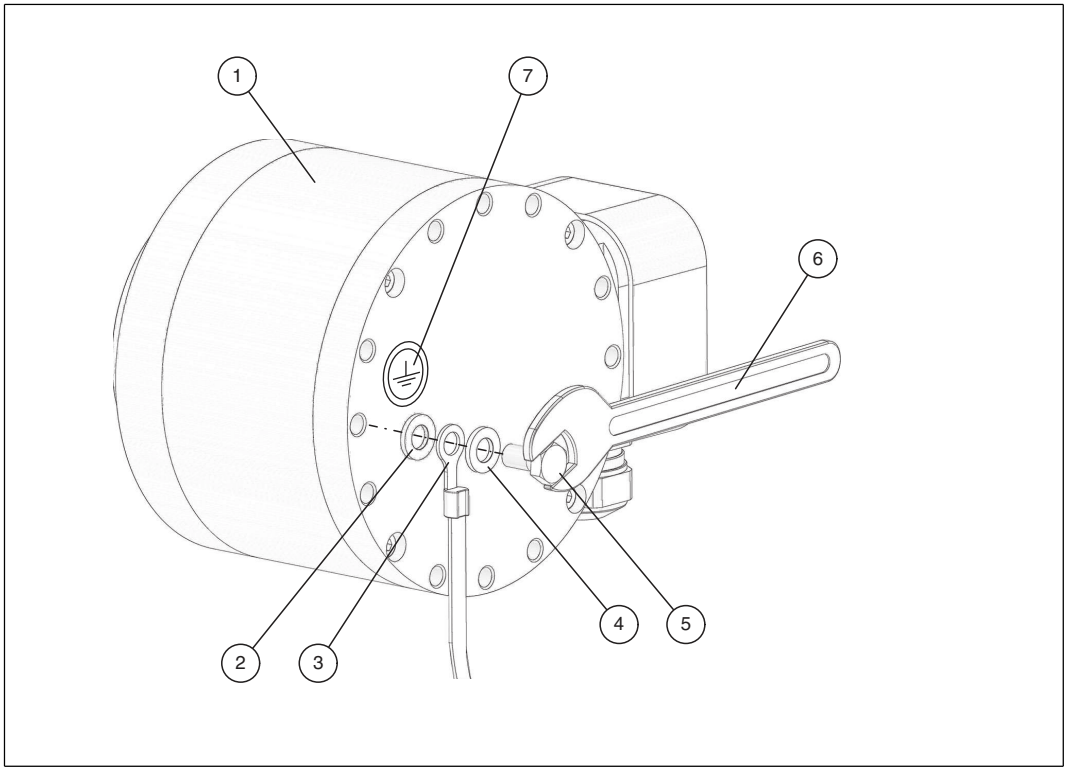

Figure 5.3 Connecting the ground strap to the rotary encoder

Item	Name
1	Rotary encoder
2	Contact disk for M6 (DIN 25511)
3	Ground strap with eyelet
4	Washer for M6 (DIN 125A)
5	M6 x 12 screw (DIN 933)
6	Size 10 open-end wrench (not included in the scope of delivery)
7	Grounding label

2. Attach the grounding label next to the connection point of the ground strap on the rotary encoder cover.

Mounting the Torque Rest

Warning!

Damage to the swivel head

When mounting the extension arm, tighten the self-locking nut on the screw that leads through the socket of the swivel head to a torque of 1 Nm ... 2 Nm. This will prevent the plastic socket of the swivel head from being crushed. Tightening the nuts to a torque exceeding this amount may damage the swivel head.

The torque rest consists of the support plate and extension arm.
Note:
Depending on the customer's requirements, the support plate can be mounted on the front rotary encoder flange or on the rear rotary encoder cover.

1. Determine the best arrangement for the support plate and the tie rod. The arrangement must be chosen such that, when the rotary encoder is later mounted on the drive shaft, the tie rod and the center axis of the support plate form a right angle, or as close as you can get to a right angle. The deviation from the right angle (α) should be less than 15°, see chapter 5.3.5.

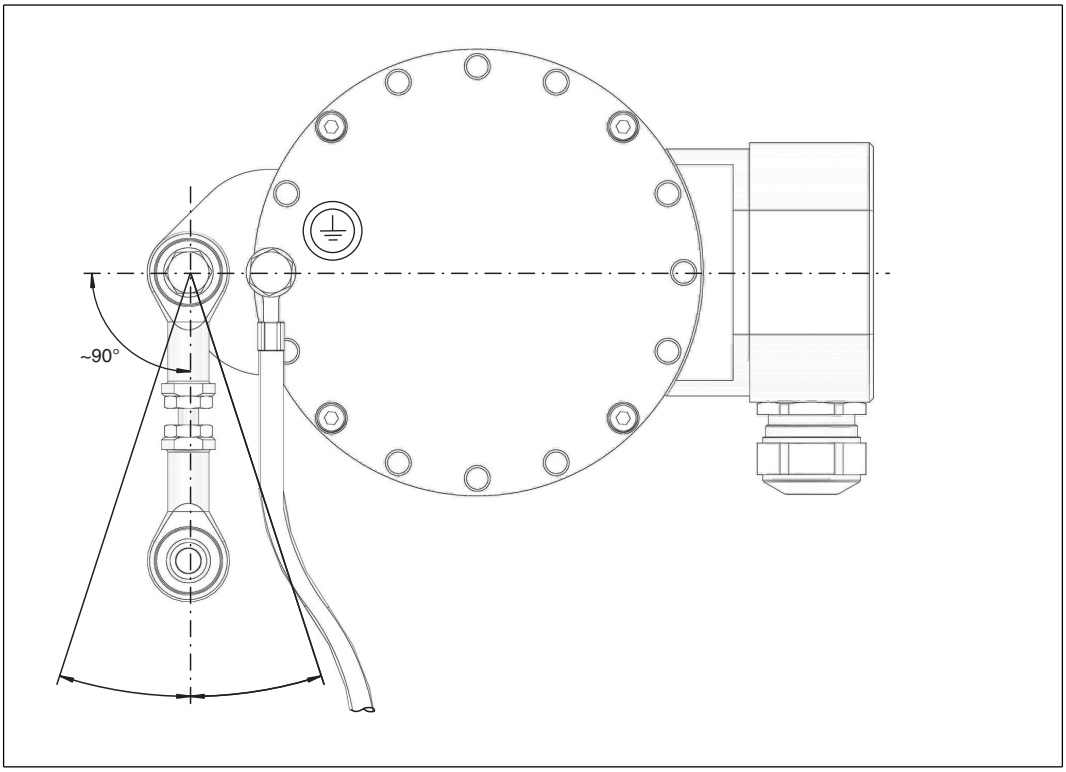

Figure 5.4 The angle between the support plate and the tie rod should be about 90°.

2. Mount the support plate on the rotary encoder flange at the point corresponding to the most favorable position of the torque rest determined previously.
3. Mount the extension arm on the support plate, → see Figure 5.5 on page 14.

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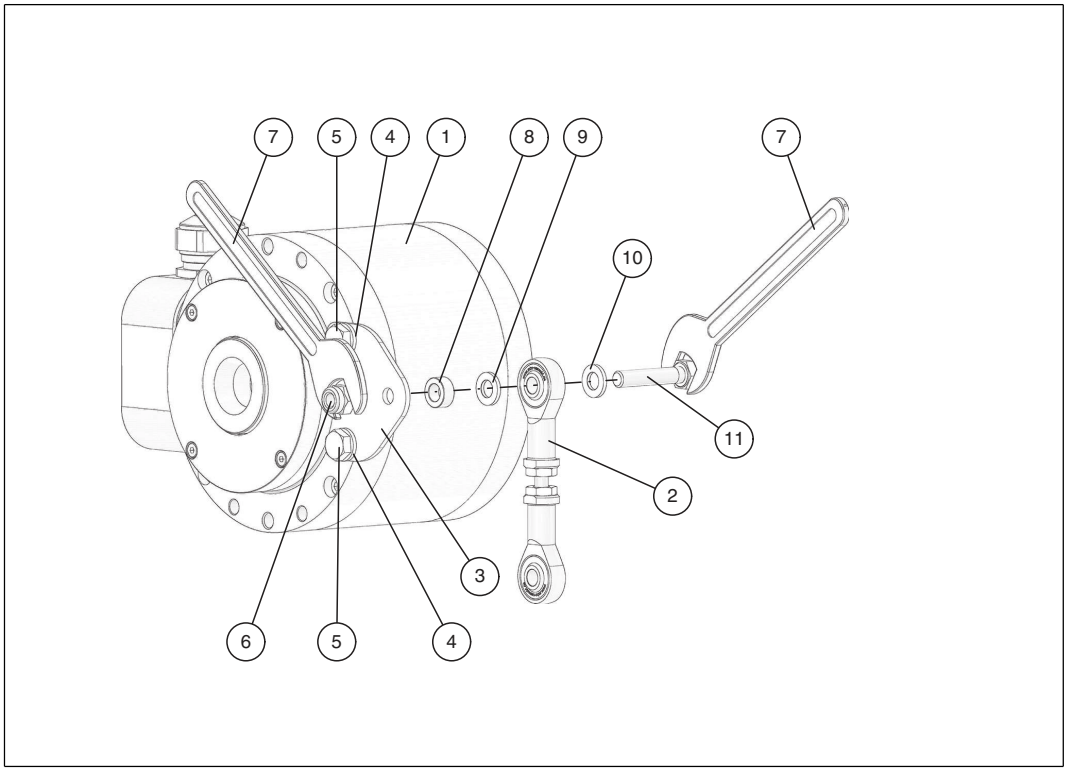

Figure 5.5 Mounting of the support plate and extension arm on the rotary encoder

Item	Name
1	Rotary encoder
2	Extension arm
3	Support plate
4	Washer for M6 (DIN 125A), 2 units
5	M6 x 12 hexagon head screw (DIN 933), 2 units
6	M6 nut, self-locking (DIN 982)
7	Size 10 open-end wrench (not included in the scope of delivery)
8	Spacer
9, 10	Washer for M6 (DIN 125A)
11	M6 x 25 hexagon head screw (DIN 933)

↳ The rotary encoder is now ready to be mounted on the drive shaft.

5.3.2 Shaft Mounting (Rotary Encoder with Continuous Hollow Shaft)

When assembling a rotary encoder with continuous hollow shaft, proceed as follows:

1. Loosen the screw on the shaft clamping ring of the rotary encoder.
2. Slide the rotary encoder onto the drive shaft.
3. Tighten the screw on the shaft clamping ring of the rotary encoder to a torque of 2 Nm ... 2.5 Nm.

↳ The rotary encoder is now fixed on the drive shaft.

5.3.3 Shaft Mounting (Rotary Encoder with Recessed Hollow Shaft)

Note

Rotary encoders with a recessed hollow shaft do not have a shaft clamping ring. Mounting to the drive shaft is through a central mounting screw. The drive shaft must have an M6 threaded hole on the face side for this purpose. The drive shaft must have a shoulder on which the conical centering ring is supported.

Specification of the drive shaft

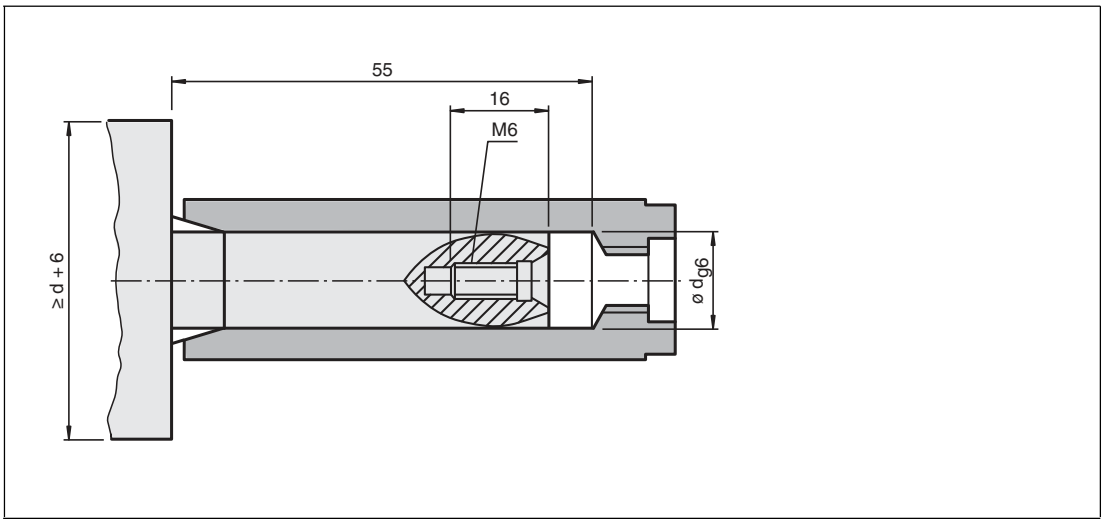

Figure 5.6 Drive shaft specification

When mounting a rotary encoder with recessed hollow shaft, proceed as follows:

Note

The mounting set included in the scope of delivery with the rotary encoder contains several mounting screws (M6 with hexagon socket, DIN 912) in graduated lengths. Select the appropriate mounting screw depending on the length of the drive shaft. To determine the appropriate screw length see → see Figure 5.6 on page 16.

1. Lightly lubricate the O-ring on the inside of the rotary encoder shaft.
2. Loosen the rotary encoder cover (four captive screws). Make sure that the inserted O-ring does not become damaged or lost.

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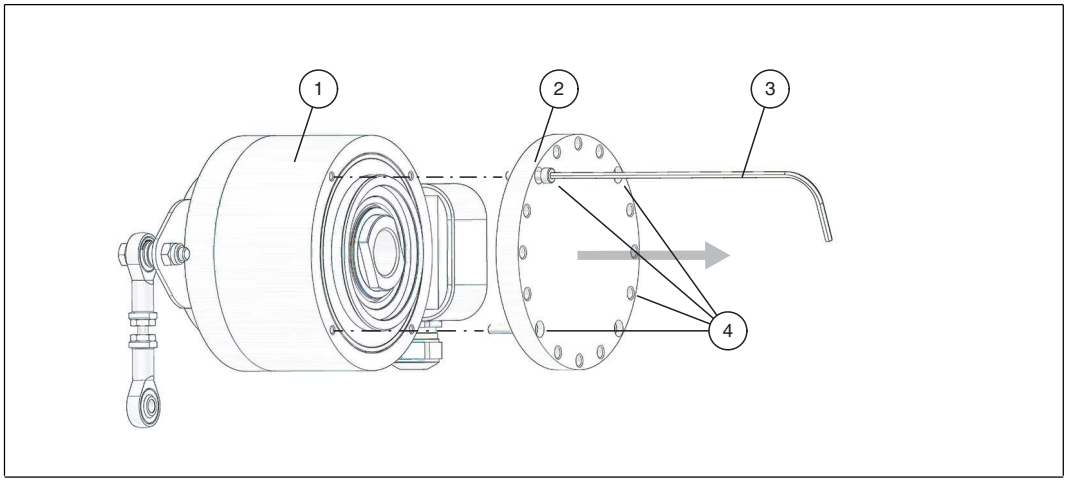

Figure 5.7 Dismounting the rotary encoder cover

Item	Name
1	Rotary encoder
2	Rotary encoder cover
3	3 mm hexagon wrench (not included in the scope of delivery)
4	Four captive M4 hexagon socket cap head screws (DIN 912)

3. Check the drive shaft. The drive shaft must be clean and free from grease, rust, and burrs.
4. Slide the tapered mounting adapter onto the drive shaft. The taper points to the rotary encoder, and the flat area is located on the shaft collar.
5. Carefully slide the rotary encoder over the drive shaft until you feel slight resistance through the inner O-ring in the rotary encoder. Now carefully slide the rotary encoder over the drive shaft as far as it will go.
6. Place a washer over the selected mounting screw of suitable length.
7. Insert the mounting screw into the central hole on the back of the rotary encoder.

8. Secure the rotary encoder shaft with a size 27 open-end wrench. Now turn the mounting screw into the thread on the face side of the drive shaft and tighten to a torque of 6 Nm.

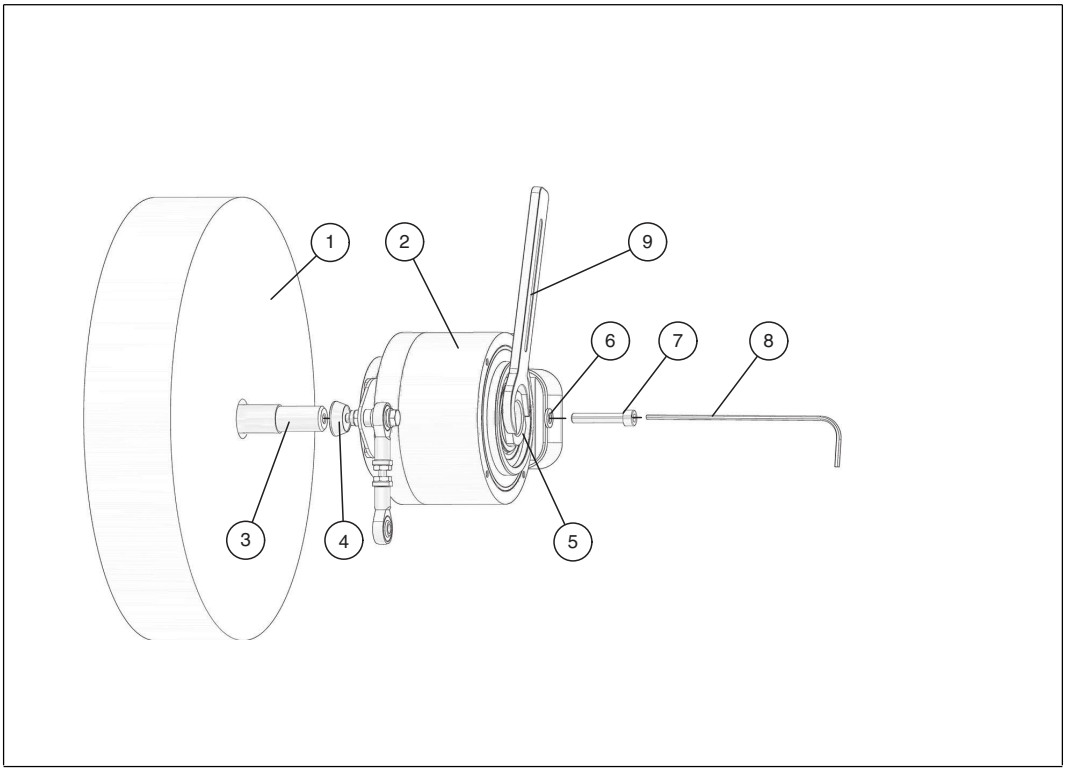

Figure 5.8 Mounting of a rotary encoder with recessed hollow shaft (the rear rotary encoder cover is already removed in the illustration)

Item	Name
1	Drive
2	Rotary encoder with recessed hollow shaft
3	Drive shaft with shoulder
4	Mounting adapter
5	Recessed hollow shaft
6	Washer for M6 (DIN 125A)
7	Mounting screw of suitable length, hexagon socket (DIN 912)
8	4 mm hexagon wrench
9	Size 27 open-end wrench

↳ The rotary encoder is now bolted to the drive shaft.

9. Fit the rotary encoder cover with four screws. Make sure that the O-ring is correctly positioned in the groove provided.

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5.3.4 Shaft Mounting (Rotary Encoder with Tapered Shaft)

Note

Rotary encoders with a tapered shaft do not have a shaft clamping ring. Mounting to the drive shaft is through a central mounting screw. The drive shaft must have an M6 threaded hole on the face side for this purpose. The drive shaft must have a tapered end. The slope of the taper must be 1:10.

Specification of the drive shaft

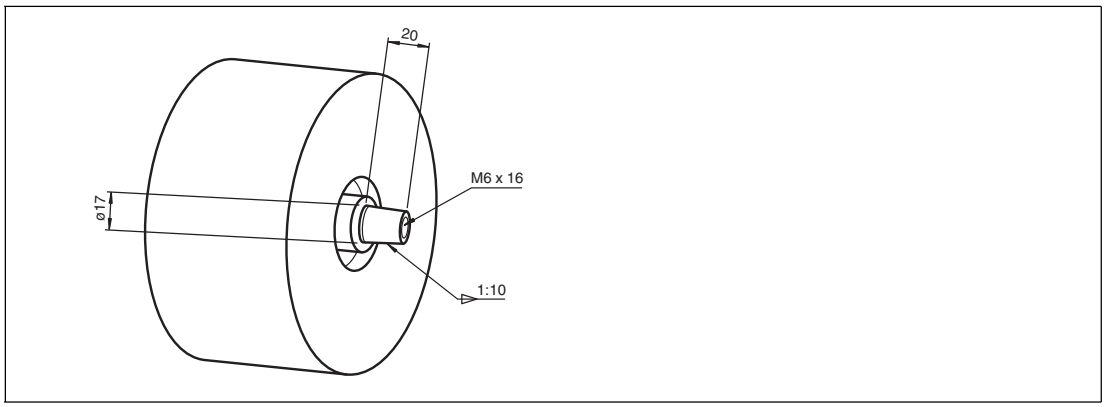

Figure 5.9 Specification of the drive shaft

When mounting a rotary encoder with tapered shaft, proceed as follows:

1. Loosen the rotary encoder cover (four captive screws). The inserted O-ring must not become damaged or lost.

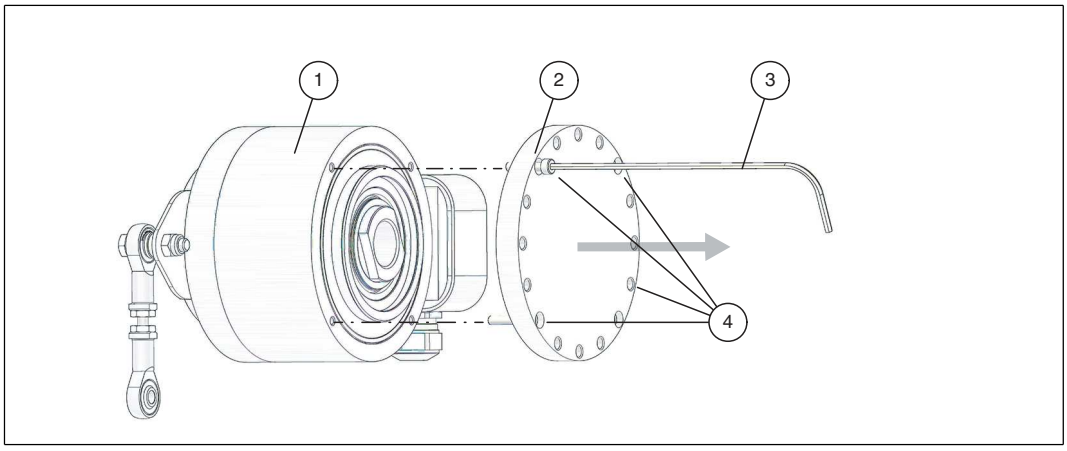

Figure 5.10 Dismounting the rotary encoder cover

Item	Name
1	Rotary encoder
2	Rotary encoder cover
3	3 mm hexagon wrench (not included in the scope of delivery)
4	Four captive M4 hexagon socket cap head screws (DIN 912)

2. Slide the rotary encoder over the tapered drive shaft as far as it will go.

3. Slide a washer for M6 over the M6 x 30 screw.
4. Insert the M6 x 30 screw through the central hole on the back of the rotary encoder.
5. Secure the rotary encoder shaft with a size 27 open-end wrench. Now turn the M6 x 30 screw into the thread on the face side of the tapered drive shaft and tighten to a torque of 3 Nm ... 4 Nm.

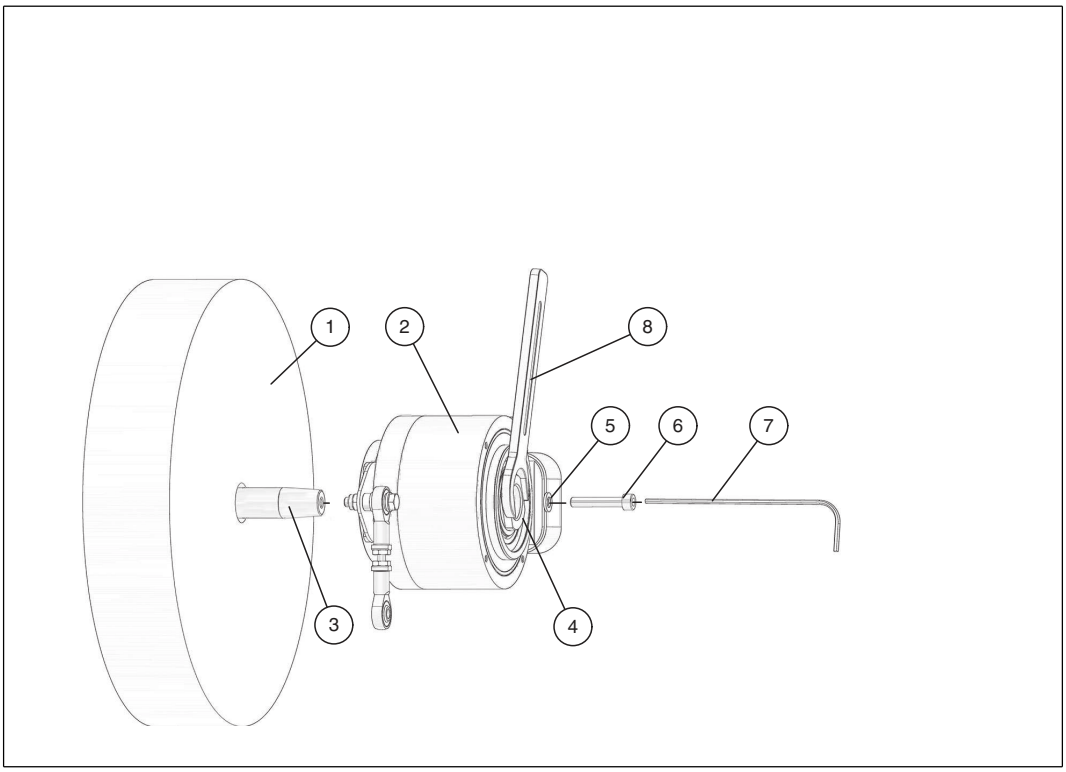

Figure 5.11 Mounting a rotary encoder with tapered shaft

Item	Name
1	Drive
2	Rotary encoder with tapered shaft
3	Tapered drive shaft
4	Tapered shaft
5	Washer for M6 (DIN 125A)
6	M6 x 30 hexagon socket cap head screw (DIN 912)
7	4 mm hexagon wrench (not included in the scope of delivery)
8	Size 27 open-end wrench (not included in the scope of delivery)

↳ The rotary encoder is now bolted to the tapered drive shaft.

6. Fit the rotary encoder cover with four screws. Make sure that the O-ring is correctly positioned in the groove provided.

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5.3.5 Assembling the Extension Arm (All Types)

Observe the general assembly instructions, see chapter 5.3.

Warning!

Damage to the swivel head

When assembling the extension arm, tighten the self-locking nut on the bolt that leads through the socket of the swivel head to a torque of 1 Nm ... 2 Nm. This will prevent the plastic socket of the swivel head from being crushed. Tightening the nuts to a torque exceeding this amount may damage the swivel head.

Note

If necessary, the threaded rod of the extension arm can be shortened to the required length. Extension arms are available in different lengths . The required length of the extension arm can also be achieved by using its own M6 threaded rod.

Assemble the extension arm as follows:

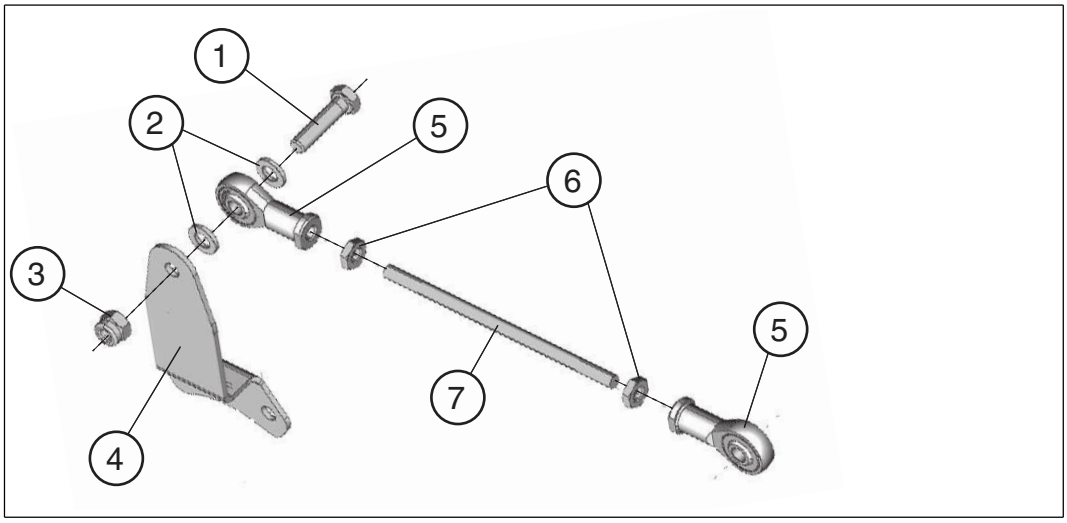

Figure 5.12 Assembly of the extension arm and mounting on the support plate

Item	Description
1	M6 hexagon screw
2	Washers for M6 (DIN 125A), 2 units
3	M6 nut, self-locking (DIN 982)
4	Support plate
5	Swivel heads, 2 units
6	M6 lock nuts (DIN 439)
7	M6 threaded rod

7. Turn the rotary encoder housing to the required position. Ensure that the cable gland or the connector plug on the connection box points downwards as far as possible. If necessary, the orientation of the connection box can be turned in 90° steps.
8. Determine the optimal length of the extension arm. To do so, measure the distance between the bore of the support plate and the mounting location on the drive.

9. Adjust the length of the extension arm by turning the swivel heads to the calculated dimension.
Note:
Both ends of the threaded rod should grip at least 5 mm deep into the threads of the swivel heads.

10. Secure the swivel heads with the lock nuts on the threaded rod of the extension arm to a torque of maximum 1.5 Nm.

11. Now mount the extension arm so that there is no play on the drive side.
Note:
Make sure that the angle between the extension arm and the longitudinal axis of the rotary encoder is approximately 90°. The deviation from the right angle (β) should not exceed 5°.

To make sure this is the case, use the mounting set (accessories) or equivalent mounting elements. To ensure compliance with the recommended angle, an angled support plate or an M6 threaded rod of the appropriate length can be used if necessary.

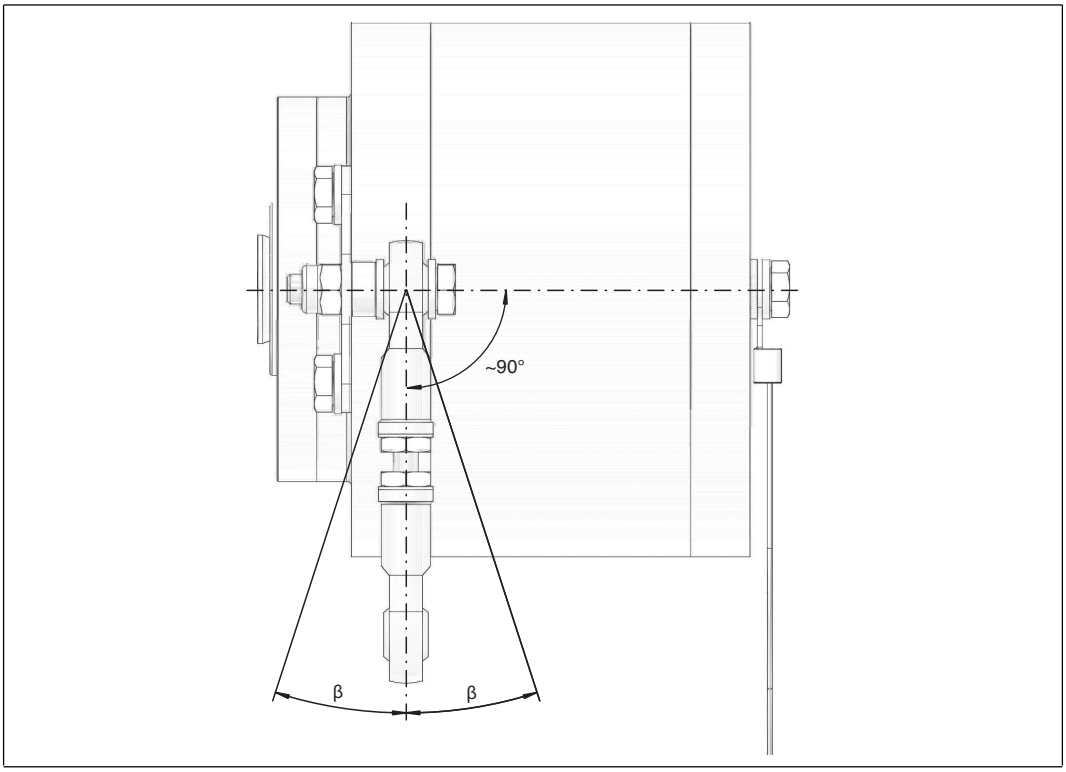

Figure 5.13 The angle of the extension arm should be approximately 90°.

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Assembling the Extension Arm with M6 Mounting Screw

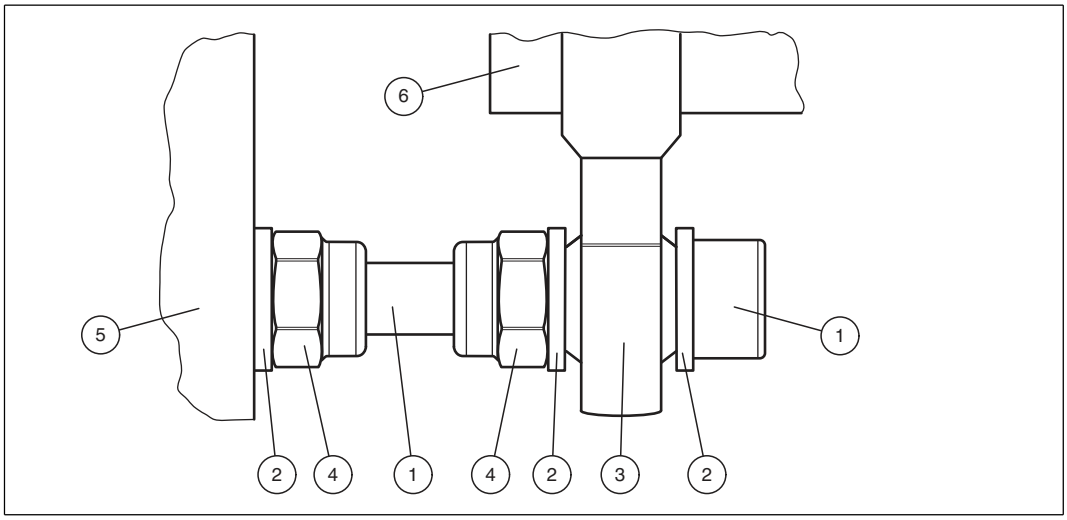

Figure 5.14 Recommended assembly of the extension arm, on the drive side when using a mounting screw

Item	Description
1	M6 mounting screw
2	Washer for M6 (DIN 125A)
3	Swivel head
4	Self-locking nut
5	Drive
6	Rotary encoder

12.

Assembling the Extension Arm with M6 Threaded Rod

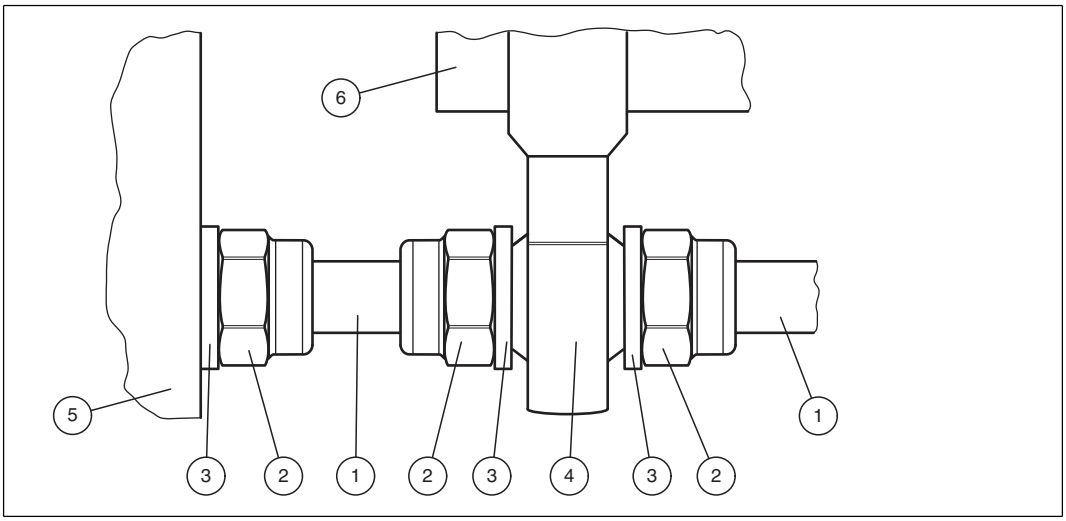

Figure 5.15 Recommended assembly of the extension arm, on the drive side when using a threaded rod

Item	Description
1	M6 threaded rod
2	Self-locking nut
3	Washer for M6 (DIN 125A)
4	Swivel head
5	Drive
6	Rotary encoder

↳ The extension arm for supporting the torque is now mounted.

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5.4 Electrical Connection

For your safety and for reliable operation, observe the following notes:

Warning!

Risk of short circuit

Working on live parts can cause injuries and can compromise the function and the electrical safety of the device.

- Before working on the device, always disconnect the supply voltage.
- Connect the device to the supply voltage only after completion of the work.

Warning!

Damage to the spur

There is a risk of short circuit or malfunction.

- Use only connection lines that are suitable for the application in terms of their technical specifications.
- When laying the electric cables, make sure they are protected sufficiently against mechanical loads.

Warning!

Electrical interference

There is a risk of short circuits and/or coupling of electrical interfering signals

- Make sure that cables are routed at a sufficient distance from other current-carrying system components. This is the only way to guarantee adequate protection from short circuits and/or coupling of interfering signals.

The electrical connection of a rotary encoder in this series can be made, depending on the connection option chosen, with either a releasable single-ended cordset - female or fixed wiring.

5.4.1 Grounding of the Rotary Encoder

Connect the loose end of the ground strap to the grounding point on the drive and/or system.

↳ The rotary encoder is now grounded.

5.4.2 Connection Box with Cable Duct and Terminals

Note

Use a shielded connection cable for the electrical connection. For the required conductor cross section and diameter of the cable sheath, please see the technical data in the datasheet.

Different-colored seal inserts for the cable duct are included in the scope of delivery. They have holes of different sizes. This means that cables with a sheath diameter of 4 mm ... 13 mm can be used for connecting the rotary encoder. See corresponding datasheet for further information.

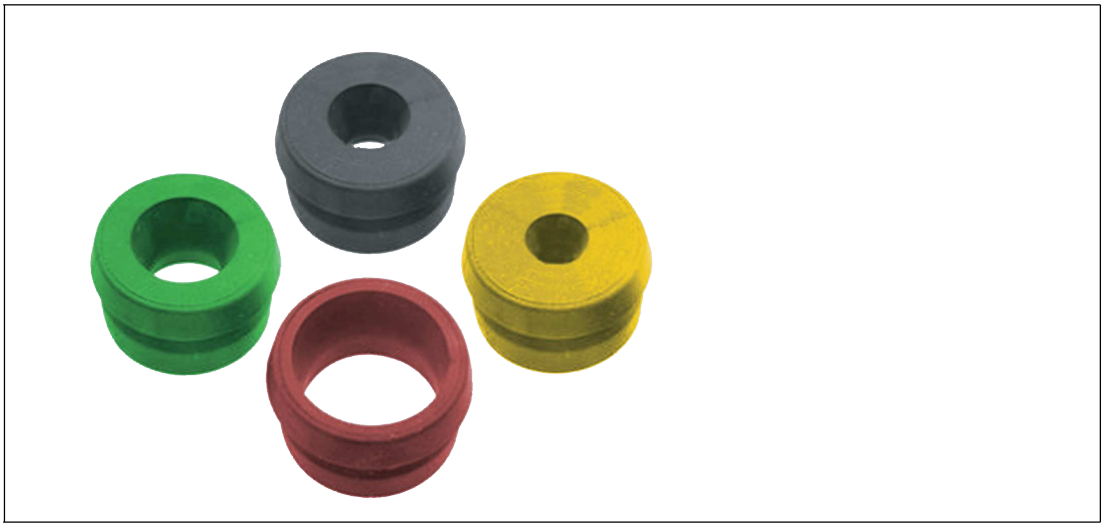

Figure 5.16 Seal inserts for different cable diameters

When making an electrical connection between a rotary encoder and the terminals, proceed as follows:

1. Strip the connection cable to a length of 70 mm ... 100 mm.
2. Strip 5 mm of insulation from the strands of the connection cable and fit wire end ferrules to the wire ends.
3. Shorten the cable shield to a length of 20 mm.

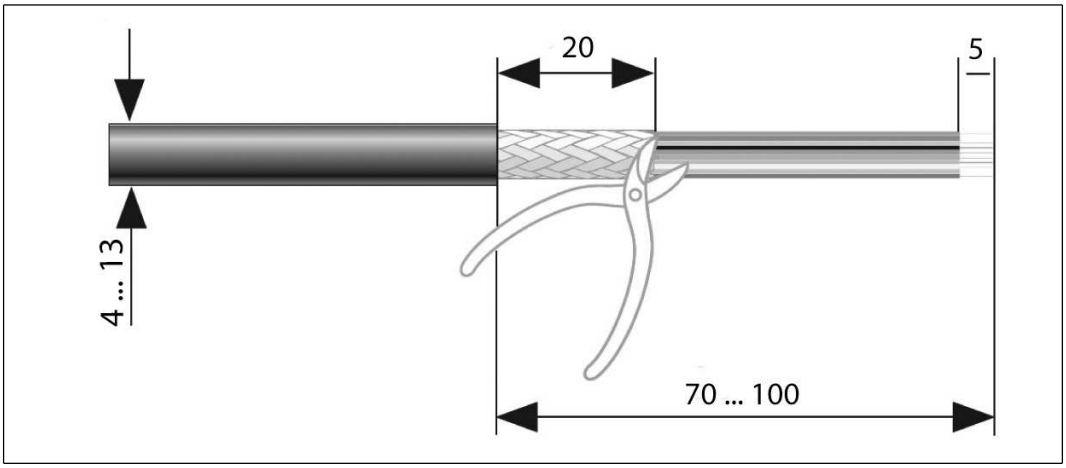

Figure 5.17 Stripping the cable insulation

4. Loosen the connection box cover (four screws). The screws are captive screws.

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5. Loosen the union nut of the cable duct.
6. From the seal inserts supplied, select the one that is appropriate for your cable diameter (see datasheet).
7. Run the stripped cable end through the union nut and the seal insert. Then pull the cable back until the end of the cable sheath is in line with the inner end of the seal insert. Now route the shortened cable shield toward the rear over the outer contour of the seal insert.

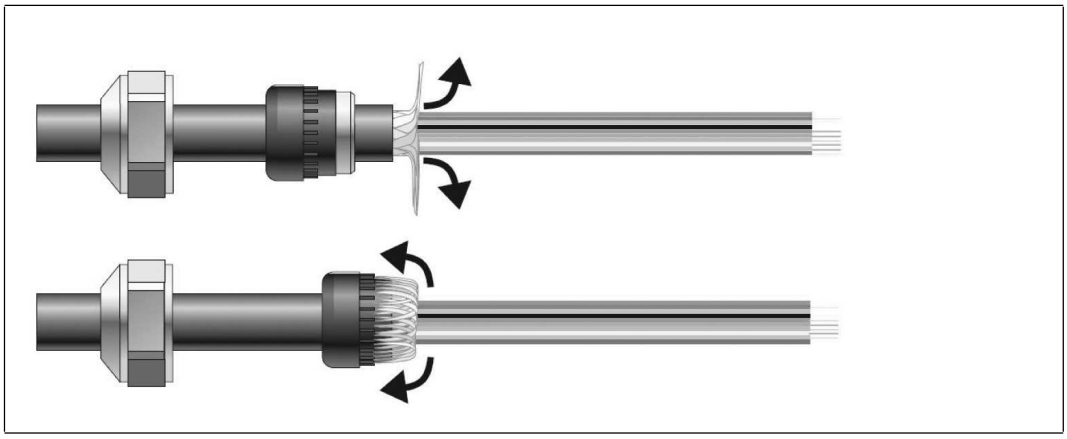

Figure 5.18 Inserting the cable

8. Insert the seal insert into the cable duct. The outer cable shield is pressed against the bare metal inside of the cable duct, creating the ground connection. Now tighten the union nut of the cable duct.
9. Loosen the four lock screws of the two screw terminals in the terminal compartment and remove the screw terminals from the sockets.

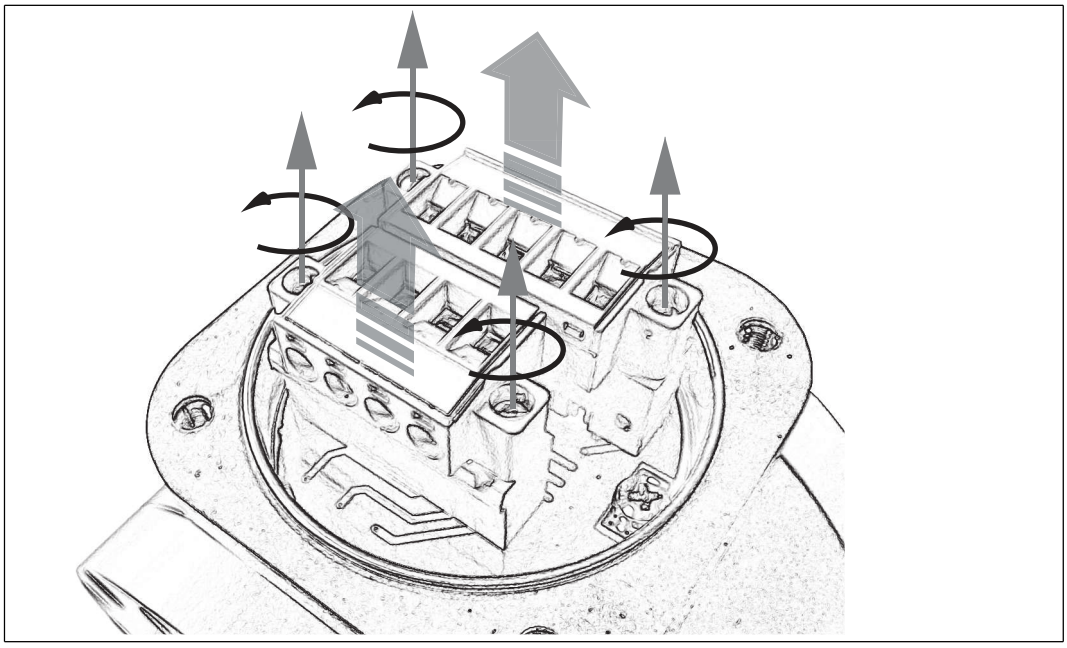

Figure 5.19 Loosening the lock screws and removing the screw terminals

10. Now create the electrical connection between the connection strands of your cable and the removable screw terminals.

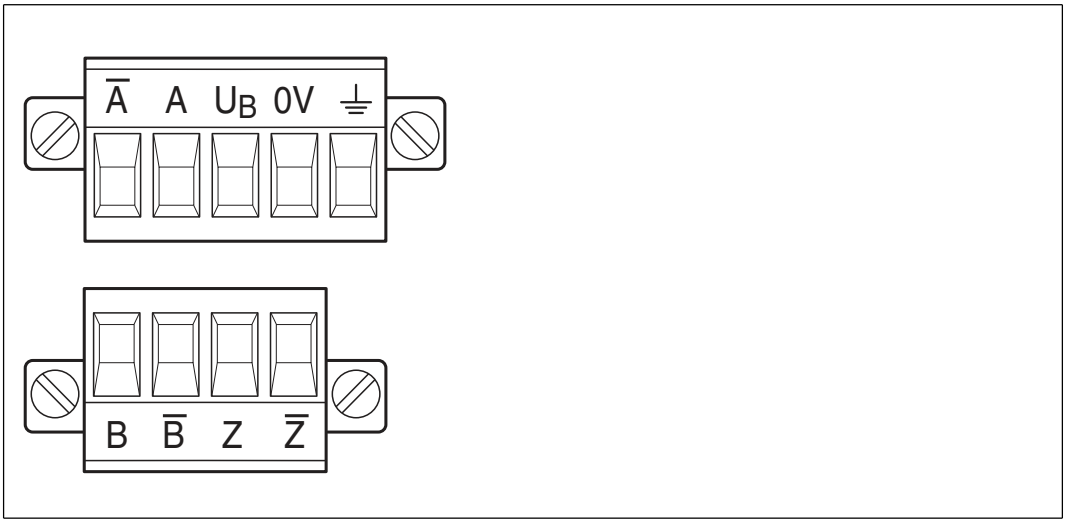

Figure 5.20 Assignment of the screw terminals in the connection box

11. Insert the removed screw terminals into the socket and tighten the lock screws.

12. Place the connection box cover on the connection box. The cover can be turned 4 x 90°. To prevent moisture getting into the connection box, select the orientation in which the electrical connection is pointing down.

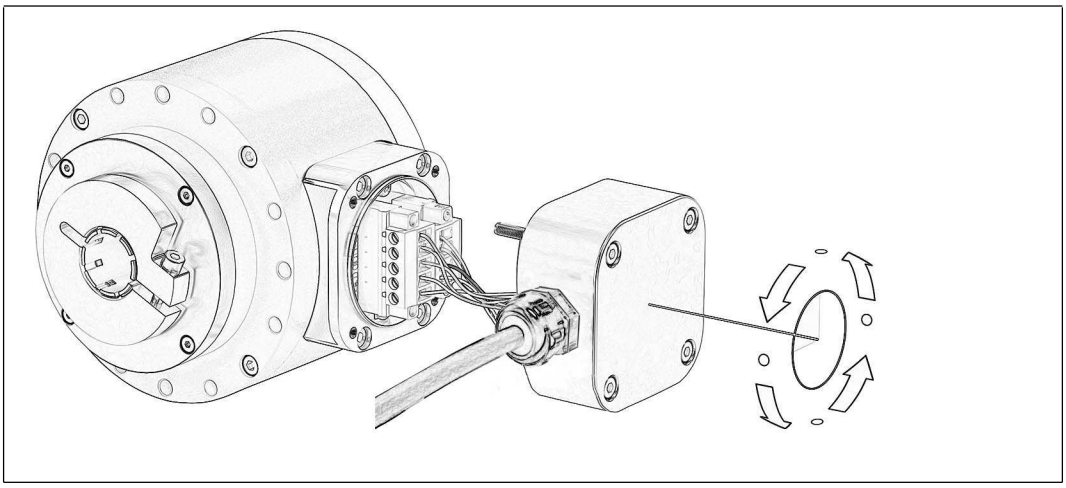

Figure 5.21 The cover of the connection box can be mounted in four positions (4 x 90°)

13. Screw down the cover of the connection box with four screws (torque: 2.2 Nm).

Finally, complete the electrical connection of the rotary encoder on the system side.

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5.4.3 Connection Box with Connection Cable

Check that the cable outlet is pointing down. If this is not the case, turn the connection box cover so that the cable outlet is pointing down. Proceed as follows:

1. Loosen the connection box cover (four screws). The screws are captive screws.
2. Place the connection box cover on the connection box. The cover can be turned 4 x 90°. Select the orientation in which the cable outlet is pointing down.

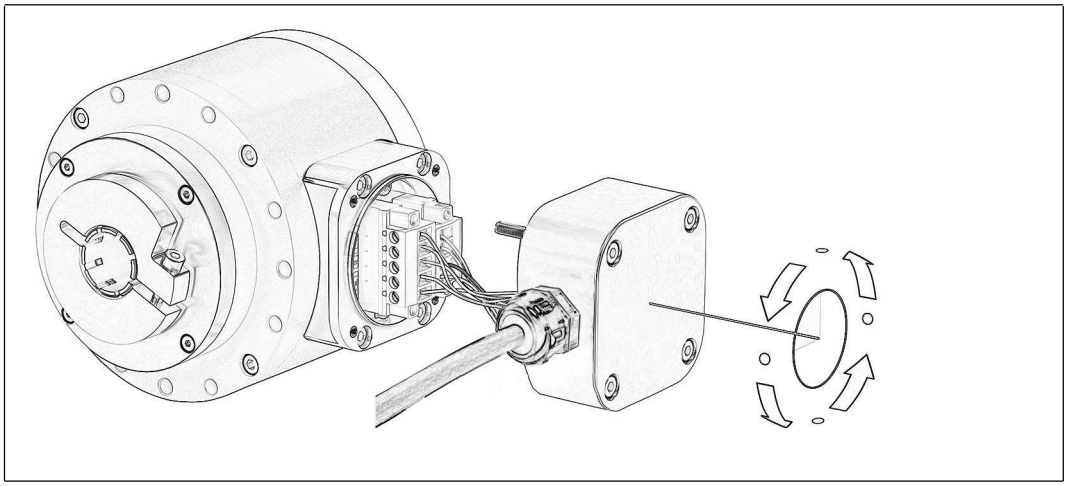

Figure 5.22 The cover of the connection box can be mounted in four positions (4 x 90°)

3. Screw down the cover of the connection box with four screws (torque: 2.2 Nm).

The electrical connection of the rotary encoder is made in accordance with the following assignment table:

Wire color	Signal	Description
White	GND	Supply voltage (-)
Brown	U_b	Supply voltage (+)
Green	A	Signal A
Gray	B	Signal B
Yellow	A/	Inverted signal A
Pink	B/	Inverted signal B
Blue	Z	Zero point signal
Red	Z/	Inverted zero point signal
Cable shield	-	Connected to the rotary encoder housing

Table 5.1 Assignment of the connection cable

5.4.4 Connection Box with Connector Plug

Note

Use a shielded connection cable with a suitable connector or a preconfigured shielded single-ended female cordset for the electrical connection .

Check that the connector outlet is pointing down. If this is not the case, turn the connection box cover so that the connector outlet is pointing down. Proceed as follows:

1. Loosen the connection box cover (four screws). The screws are captive screws.
2. Place the connection box cover on the connection box. The cover can be turned 4 x 90°. Select the orientation in which the plug outlet is pointing down.

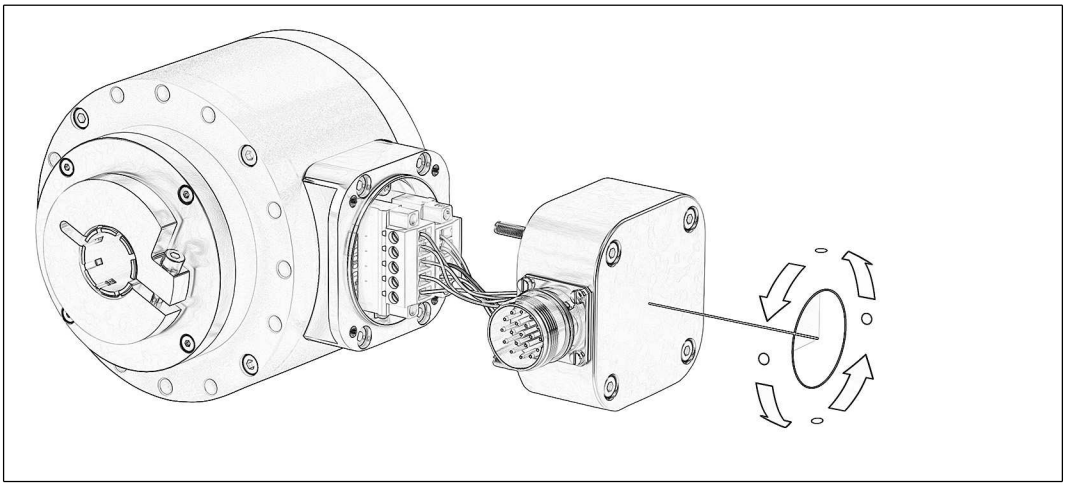

Figure 5.23 The cover of the connection box can be mounted in four positions (4 x 90°)

3. Screw down the cover of the connection box with four screws (torque: 2.2 Nm).

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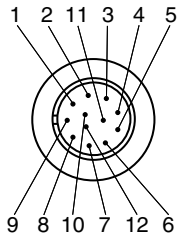
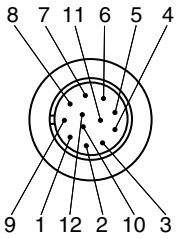
Rotary encoders in this series can be ordered with a right-rotating or left-rotating plug. The connector pins are arranged as follows:

Pinout of the Connector Plug

M23 connector plug, 12-pin, right-rotating	M23 connector plug, 12-pin, left-rotating
	

The electrical connection of the rotary encoder is made in accordance with the following assignment table:

Signal	Description	Pin no. (right-rotating plug)	Pin no. (left-rotating plug)
GND	Supply voltage (-)	10	10
U_b	Supply voltage (+)	12	12
A	Signal A	5	5
B	Signal B	8	8
A/	Inverted signal A	6	6
B/	Inverted signal B	1	1
Z	Zero point signal	3	3
Z/	Inverted zero point signal	4	4
Shielding	Connected to the rotary encoder housing	Plug housing	Plug housing

Table 5.2 Assignment of the connector plug for right- and left-rotating M23 plug, 12-pin

6 Dismounting, Storage, and Disposal

6.1 Dismounting the Rotary Encoder

Warning!
Risk of injury

To protect against injury when carrying out any work on the rotary encoder, observe the safety instructions, see chapter 5.1.

When dismounting the rotary encoder, proceed in the reverse order to that described in section see chapter 5.3.

Regardless of your rotary encoder's type of shaft, first loosen the torque rest on the drive side.

Rotary encoders with a continuous hollow shaft should be removed gently from the drive shaft after the clamping ring has been loosened. Rotary encoders with a recessed hollow shaft, in particular those with a tapered shaft, may be seated firmly on the drive shaft after the central screw has been loosened. In this case, use the dismounting kit (see). The dismounting kit consists of the following parts:

- One M8 x 70 hexagon socket cap head screw as the jack screw (DIN 912)
- One M6 x 10 hexagon socket threaded pin (DIN 913)

To lift off rotary encoders with a recessed hollow shaft, proceed as follows:

Tip

It is not essential to use the threaded pin with hexagon socket as mentioned in these instructions. The process of lifting off the rotary encoder from the drive shaft works even without it. Correct use of the threaded pin creates a pressure point that prevents the jack screw from pressing directly onto the drive shaft where the face side of the thread may become damaged.

If you use the threaded pin, make sure that it does not fall from the hexagon wrench or get lost inside the rotary encoder during insertion. We recommend that the hexagon socket of the threaded pin be lubricated slightly so that the threaded pin clings slightly to the hexagon wrench.

1. Loosen the four screws on the back of the rotary encoder cover and remove the cover.
2. Secure the rotary encoder shaft with a size 27 open-end wrench. Now loosen and remove the central screw connecting the rotary encoder shaft to the drive shaft.
3. Apply a little grease to the hexagon socket of the threaded pin and then place the threaded pin on a hexagon wrench, 5 mm.
4. Check that the threaded pin clings slightly to the hexagon wrench.
5. Guide the threaded pin with the hexagon wrench through the central hole of the rotary encoder shaft and rotate it into the thread of the drive shaft on the face side.

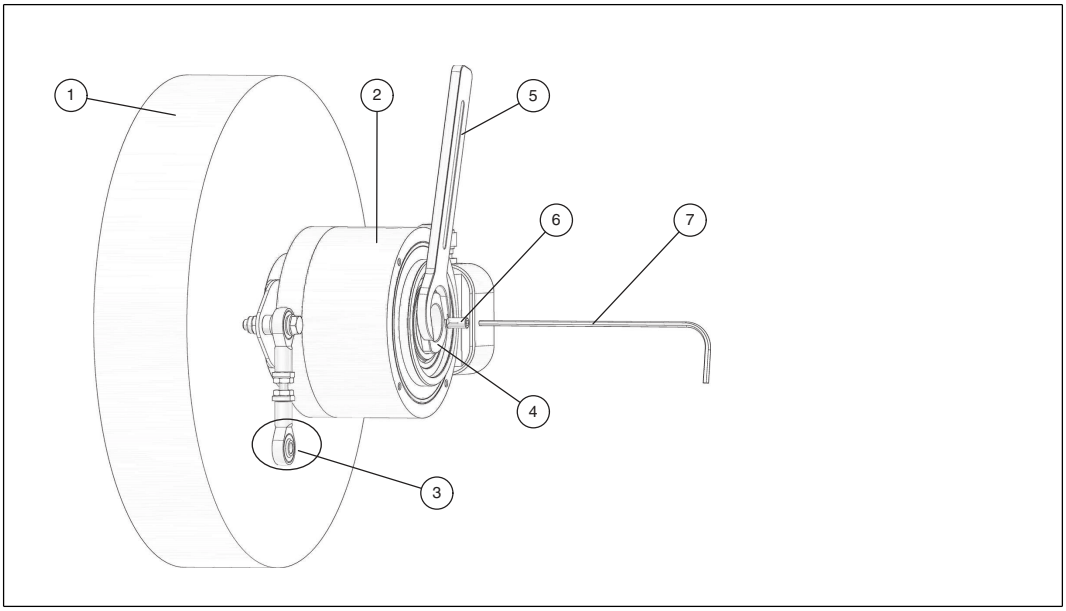


Figure 6.1 Preparation for dismounting

Item	Name
1	Drive
2	Rotary encoder
3	Torque rest (already loosened from the drive)
4	Rotary encoder shaft with flat area for open-end wrench
5	Size 27 open-end wrench (not included in the scope of delivery)
6	M6 x 10 threaded pin with hexagon socket (DIN 913)
7	5 mm hexagon wrench (not included in the scope of delivery)

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6. **Note:**
Do not turn the threaded pin fully into the thread of the drive shaft. The threaded pin should still protrude slightly from the drive shaft. This will prevent the thread of the drive shaft on the face side from being damaged by the jack screw when the rotary encoder is subsequently removed.

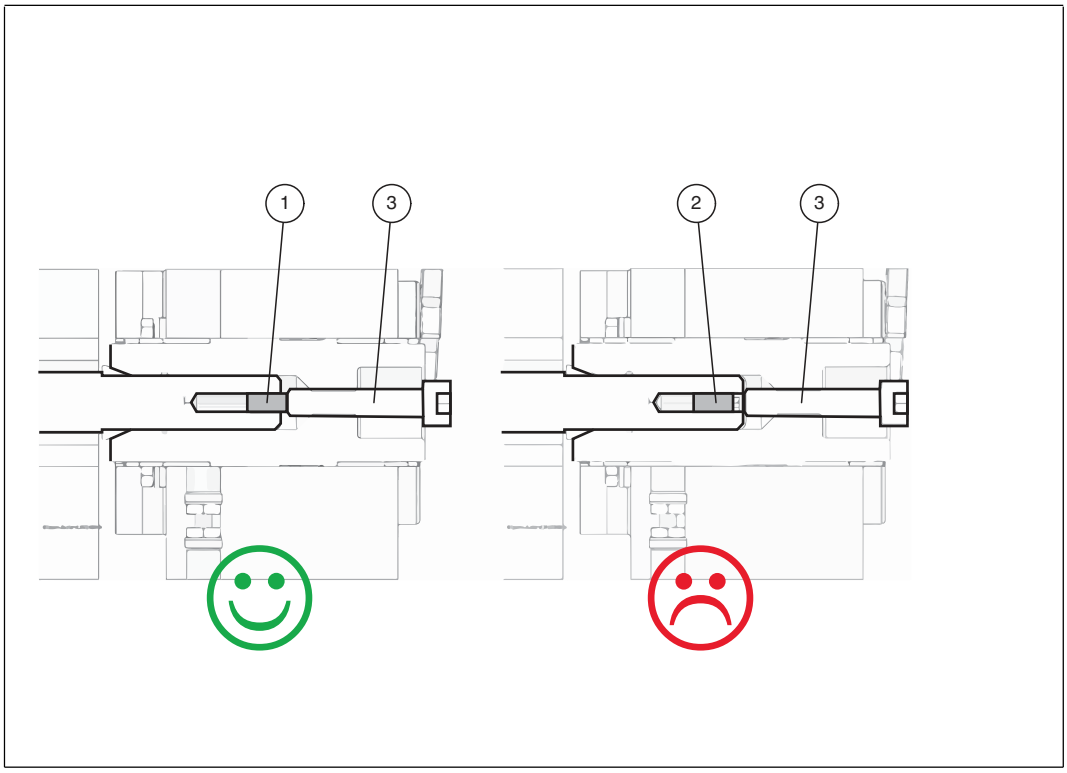

Figure 6.2 Do not screw in the threaded pin fully!

Item	Name
1	Threaded pin not fully screwed in (correct!)
2	Threaded pin fully screwed in (wrong!)
3	Jack screw (M8 x 70 hexagon socket cap head screw)

7. Turn the M8 x 70 jack screw by hand into the central M8 thread bore of the rotary encoder shaft until the screw is up against the previously fitted threaded pin.
8. Secure the rotary encoder shaft with a size 27 open-end wrench. Now continue turning the jack screw using a hexagon wrench until the rotary encoder is released from the drive shaft.

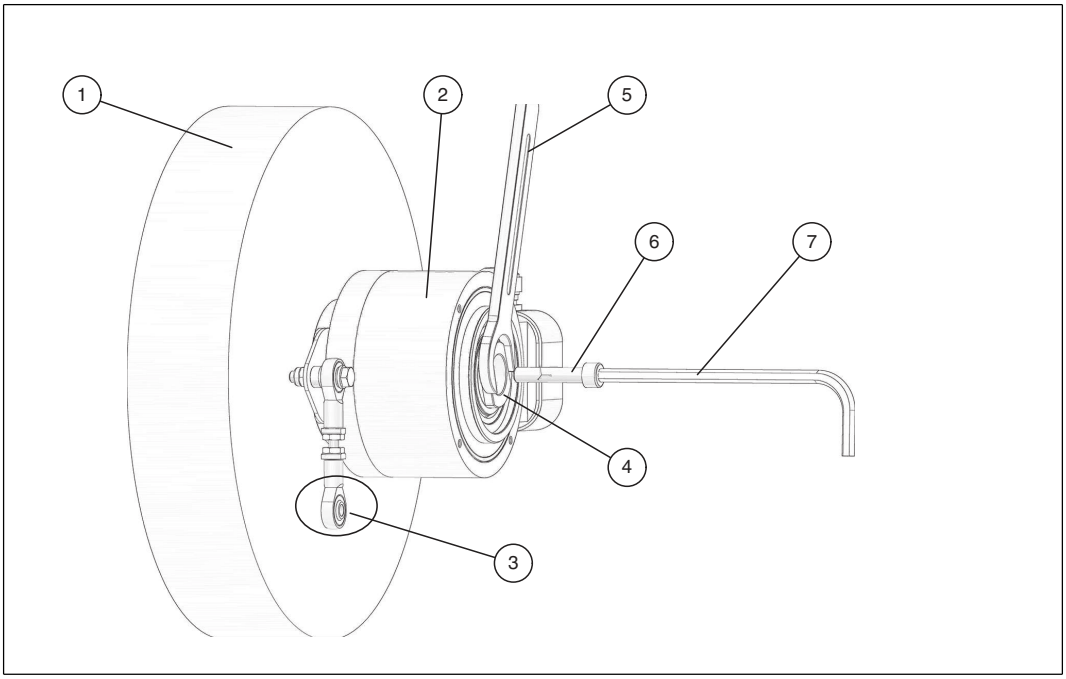

Figure 6.3 Lifting off the rotary encoder

Item	Name
1	Drive
2	Rotary encoder
3	Torque rest (already loosened from the drive)
4	Rotary encoder shaft with flat area for open-end wrench
5	Size 27 open-end wrench (not included in the scope of delivery)
6	M8 x 70 jack screw (DIN 912)
7	6 mm hexagon wrench (not included in the scope of delivery)

9. After removing the rotary encoder, remove the jack screw from the rotary encoder shaft and the threaded pin from the drive shaft.
10. Secure the rotary encoder cover with four screws. Make sure that the O-ring is correctly positioned in the groove provided.

↳ The rotary encoder with recessed hollow shaft is now dismounted.

6.2 Storage and Transportation

When packing the device for storage or transport, use materials that will protect the device from bumps and impacts and protect against moisture. The original packaging provides the best protection. Also take into account the permitted ambient conditions.

6.3 Disposal

Electronic waste is hazardous waste. When disposing of the equipment, observe the current statutory requirements in the respective country of use, as well as local regulations.

The device does not contain any batteries that require separate disposal.

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