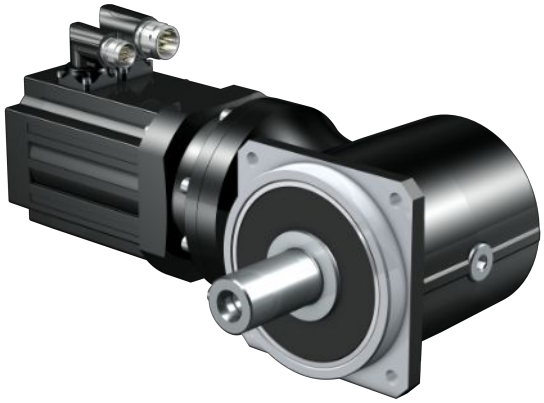

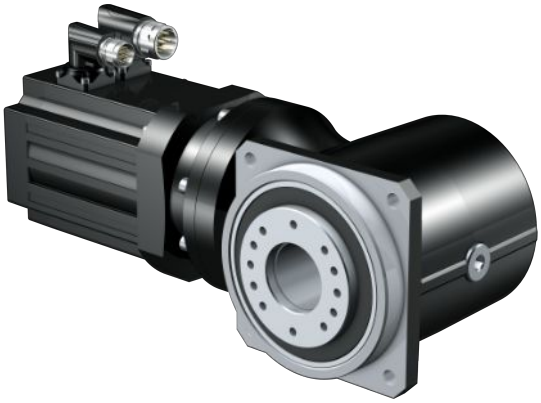

KS31 – KS71 gearboxes, geared motors
Operating manual

en-US
06/2025
ID 443506_en.00

STÖBER

Table of contents

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1 Foreword

This operating manual helps you use the KS right-angle servo gearbox safely and properly – from installation and commissioning to servicing and disassembly.

The KS series features robust bearing technology and high-quality gearing technology. It enables high output speeds, offers a wide gear ratio range and ensures precise and low-backlash solutions – ideal for highly dynamic applications.

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2 User information

This documentation is a part of the product. It applies to products in the standard design according to the corresponding STOBER catalog.

2.1 Storage and transfer

As this documentation contains important information for handling the product safely and efficiently, it must be stored in the immediate vicinity of the product until product disposal and be accessible to qualified personnel at all times.

Also pass on this documentation if the product is transferred or sold to a third party.

2.2 Timeliness

Check whether this document is the latest version of the documentation. We make the latest document versions for our products available for download on our website:
http://www.stoeber.de/en/downloads/.

2.3 Original language

The original language of this documentation is German; all other language versions are derived from the original language.

2.4 Limitation of liability

This documentation was created taking into account the applicable standards and regulations as well as the current state of technology.

No warranty or liability claims for damage shall result from failure to comply with the documentation or from use that deviates from the intended use of the product. This is especially true for damage caused by individual technical modifications to the product or the project configuration and operation of the product by unqualified personnel.

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2.5 Formatting conventions

Orientation guides in the form of signal words, symbols and special text markups are used to emphasize specific information so that you are able identify it in this documentation quickly.

2.5.1 Display of warning messages and information

Warning messages are identified with symbols. They indicate special risks when handling the product and are accompanied by relevant signal words that express the extent of the risk. Furthermore, useful tips and recommendations for efficient, error-free operation are specially highlighted.

ATTENTION!

Attention

This indicates that damage to property may occur

- if the stated precautionary measures are not taken.

⚠ CAUTION!

Caution

This word with a warning triangle indicates that minor personal injury may occur

- if the stated precautionary measures are not taken.

⚠ WARNING!

Warning

This word with a warning triangle means there may be a considerable risk of fatal injury

- if the stated precautionary measures are not taken.

⚠ DANGER!

Danger

This word with a warning triangle indicates that there is a considerable risk of fatal injury

- if the stated precautionary measures are not taken.

Information

Information indicates important information about the product or serves to emphasize a section in the documentation that deserves special attention from the reader.

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2.5.2 Distinction of text elements

Certain elements of the continuous text are distinguished as follows.

Important information	Words or expressions with a special meaning
Interpolated position mode	Optional: File or product name or other name
Detailed information	Internal cross-reference
http://www.samplelink.com	External cross-reference

2.6 Definition of the term

This documentation refers to STOBER gearboxes and STOBER geared motors. For better readability, the superordinate term **"drives"** is used.

If necessary for reasons of clarity or due to technical circumstances, a distinction is made between gearboxes and geared motors.

2.7 Note on trademark and property rights

Product names protected by trademark law are not marked separately in this documentation.

All applicable property rights (patents, trademarks, utility models, etc.) remain unaffected and must be observed.

2.8 Copyright notice

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3 Safety notes

There are risks associated with the product described in this documentation that can be prevented by complying with the following basic safety notes as well as the included technical rules and regulations.

3.1 Intended use

The drives described in this documentation are intended for installation in industrial machines or systems.

The following situations are considered improper use:

- Overloading of the drives.
- Operation under ambient conditions that deviate from the defined values or value ranges.
- Modifying or converting the drives.
- Use of the drives for purposes other than those specified in the project configuration.

Commissioning of the machine in which the drives are installed is prohibited, unless it is ensured that it complies with the applicable local laws and regulations. Pay particular attention to the (Machinery) Directive 2006/42/EC in the respective valid scope of application.

Operation of the drives in potentially explosive atmospheres is prohibited, unless they are expressly designed for this.

3.2 Qualified personnel

In order to be able to perform the tasks described in this documentation, the persons instructed to perform them must have the appropriate professional qualification and be able to assess the risks and residual hazards when handling the products. For this reason, all work on the products as well as their operation and disposal may be performed only by professionally qualified personnel.

Qualified personnel are persons who have acquired the authorization to perform these activities either through training to become a specialist and/or instruction by specialists.

Furthermore, valid regulations, legal requirements, applicable basic rules, this documentation and the safety notes included in it must be carefully read, understood and observed.

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3.3 Prevention of personal injury

3.3.1 Mechanical hazards

⚠ WARNING!

Dangerous movements of machine parts!

Moving machine parts can cause serious injuries or even death!

✓ Before starting the drive:

- Install all protective devices necessary for operation.
- Make sure that no one is standing in the danger area or able to enter it unchecked.
- Leave the danger area.

⚠ WARNING!

Sinking or falling of gravity-loaded axes or vertical axes after switching off the motor due to gravity!

Falling gravity-loaded axes or vertical axes can cause serious injuries or even death!

- Be aware that the holding brake of the motor does not offer sufficient safety for persons that are in the hazard area of gravity-loaded axes or vertical axes.
- Move gravity-loaded axes or vertical axes to their lowest position and lock or brace them mechanically before allowing people to enter the danger area.

⚠ WARNING!

Unsecured feather keys or drive elements can be thrown due to the rotation of the input shaft!

Flying metal parts can cause serious injuries!

- Mount the provided drive elements properly or remove them before a test run.

3.3.2 Thermal hazards

⚠ CAUTION!

The surface of the drive can reach temperatures over 65 °C during operation!

Touching the hot surface of the drive can cause severe skin burns!

- Do not touch the drive during operation or immediately afterward.
- Allow the drive to cool sufficiently before carrying out work on the drive.
- Wear protective gloves when working on the drive.

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3.4 Prevention of property damage

ATTENTION!

Damage to the bearing and shaft due to improper assembly!

Always avoid using force when installing drive elements with fits. Striking power transmission elements, shafts or the motor or gear housing with a hammer can cause considerable damage.

- Only install the gearboxes in accordance with the installation instructions.

ATTENTION!

Damage to shaft seal rings due to solvents!

Prevent shaft seal rings from coming into contact with solvents when cleaning and degreasing unpainted surfaces.

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3.5 Transport and storage

The packaging type of the STOBER products depends on the size and the respective transport method.

Inspect the delivery for any transport damage immediately after you receive it. Notify the transport company of any damage immediately. Do not put a damaged product into operation.

Store the products in a dry and dust-free room if you do not install them immediately.

Transport and store the products in the original packaging and protect the products from mechanical impacts and vibrations. Observe the transport and storage conditions recommended in the technical data.

3.5.1 Transport

⚠ WARNING!

Suspended loads!

Loads that become loose and fall during the lifting process can cause serious injuries or even death!

- Observe the following instructions.
- Cordon off the danger zone and ensure that no one stands under the suspended loads.
- Wear safety shoes.

Lifting and transporting the drive may require lifting gear (e.g. a crane), depending on the weight. The weight of your drive is specified in the accompanying delivery documents.

Lift and transport the drive as follows:

- Use lifting gear with a sufficient lifting capacity for the weight of the drive.
- Run hoist slings directly around the drive housing and secure the hoist slings from slipping.

To prevent the drive from falling or being damaged during transportation, observe the following instructions:

- Do not lift or attach the drive to the output shaft or attached components.
- Additionally secure the motor with suitable fastening elements and ensure that the pulling direction is straight.

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3.5.2 Storage

Store the drive in a dry, dust-free environment in the original packaging at a storage temperature between −10 °C and +50 °C.

3.5.2.1 Long-term storage

If you would like to store the drive for longer than six months, then take the following steps to prevent corrosion damage:

1. Apply a suitable corrosion protection agent to unpainted surfaces, such as shaft ends or flange contact surfaces.
2. Completely fill the gearbox with lubricant. You can obtain a specific lubricant recommendation by entering the serial number of the gearbox under https://id.stober.com or scan the respective QR code on the nameplate.

Information

Reduce the lubricant quantity to the value specified on the nameplate before commissioning.

3.5.3 Ambient conditions

Please refer to the corresponding order confirmations for environmental conditions that deviate from the standard for special versions. The conditions in the respective technical documentation apply to attached motors

Feature	Description
Surrounding temperature – transport/storage	−10 °C to +50 °C
Surrounding temperature – operation	0 °C to +40 °C
Installation altitude	≤ 1000 m above sea level

Tab. 1: Technical characteristics – Ambient conditions

In order to prevent corrosion damage and damage to the shaft seal rings, protect the drive from the following influences:

- Environments with harmful oils, acids, gases, vapors, dust or radiation
- Extreme temperature fluctuations with high humidity
- Condensation or icing
- Strong UV radiation (e.g. direct sunlight)
- Presence of salt spray
- Sparks

Information

In potentially explosive atmospheres, only gearboxes in an explosion-proof design in accordance with (ATEX) Directive 2014/34/EU may be used. The associated documentation is available separately.

3.6 Ensuring traceability

The traceability of the STOBER products via their serial number must be ensured.

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4 Gearbox design and technical features

For technical data on your drive, please refer to the corresponding order confirmation. The specifications in the relevant technical documentation apply to attached motors.

4.1 Basic structure

The figures show the basic structure of STOBER right-angle servo gearboxes using the example of types KS512SF and KS412SS.

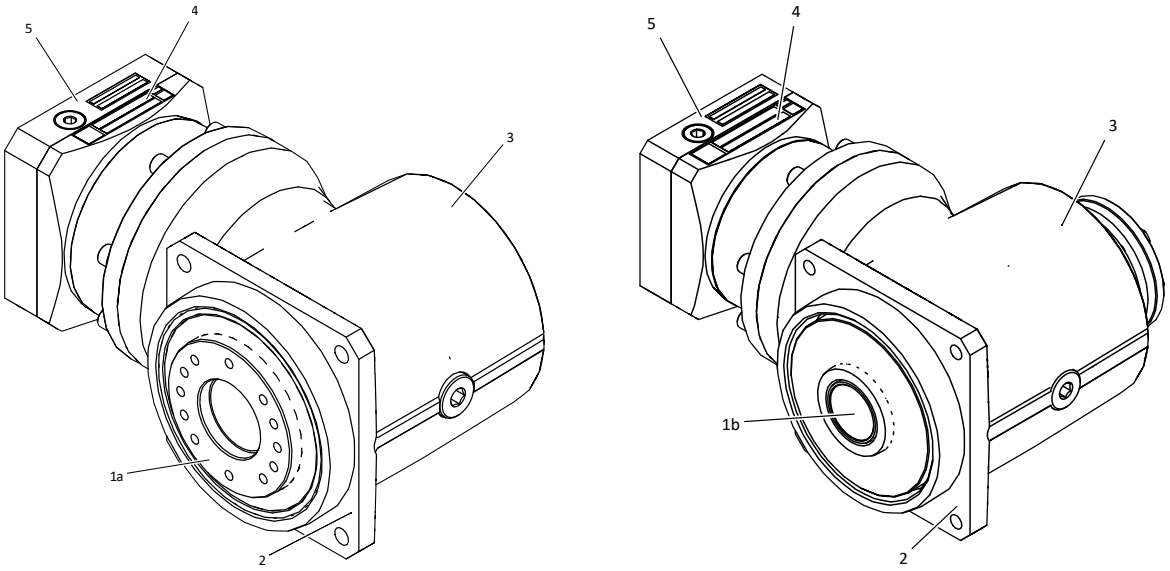

Fig. 1: Right-angle servo gearbox KS512SF and KS412SS – structure

1a	Flange hollow shaft
1b	Hollow shaft with shrink ring
2	Output flange
3	Gear housing
4	Nameplate
5	ME motor adapter

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4.2 Type designation

This chapter explains the type designation system of a gearbox using an example code.

KS	5	1	2	S	G	S	R	0200	ME

Code	Designation	Design
KS	Type	Right-angle servo gearbox
5	Size	5 (example)
1	Generation	Generation 1
1	Stages	Single-stage
2		Two-stage
3		Three-stage
S	Housing	Standard
F	Shaft	Flange hollow shaft
S		Hollow shaft with shrink ring
G		Solid shaft without feather key
P		Solid shaft with feather key
S	Bearing	Standard bearing
R	Backlash	Reduced
0200	Transmission ratio (i x 10)	i = 20 (example)
ME	Motor adapters	Motor adapter with EasyAdapt coupling
MEL		Motor adapter with EasyAdapt coupling for large motors
MF		Motor adapter with FlexiAdapt coupling

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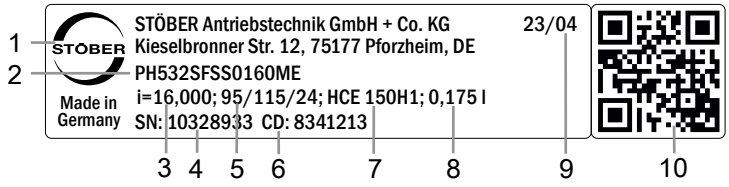
4.3 Nameplate

The following figure illustrates and explains the nameplate of a gearbox.



Code	Designation
1	Manufacturer
2	Gearbox type
3	Ratio
4	Serial number
5	Dimensions of the motor adapter (diameter: pilot/bolt circle/motor shaft)
6	Customer-specific data
7	Lubricant specification
8	Lubricant fill volume
9	Date of manufacture (year/calendar week)
10	QR code (links to further product information)

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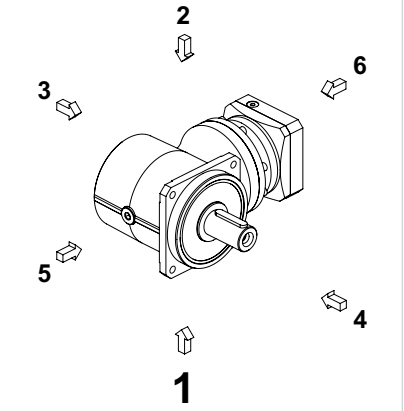
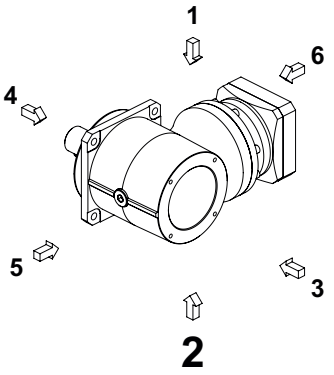
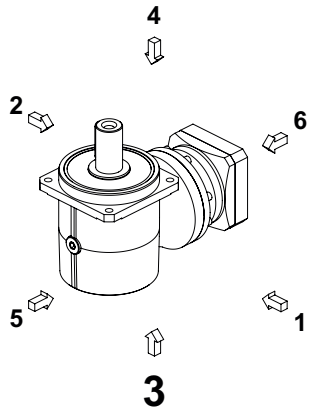
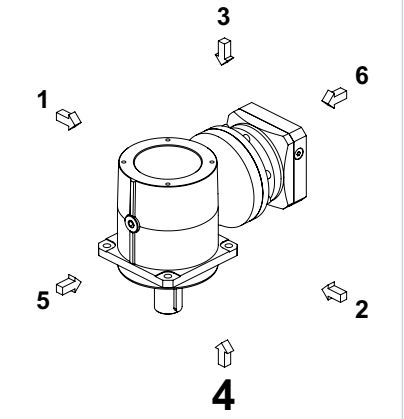
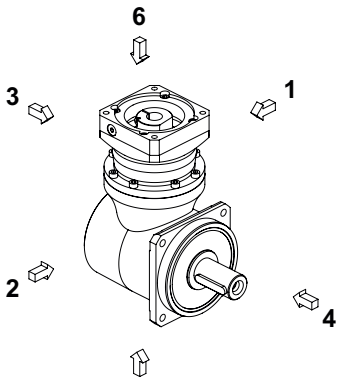
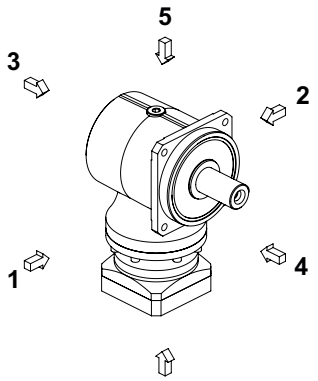
4.4 Mounting positions

The following table shows the standard mounting positions for two- and three-stage gearboxes. Single-stage gearboxes can be used in any mounting position.

The numbers identify the gearbox sides. The mounting position is defined by the gearbox side facing downwards.

EL1	EL2	EL3
		

EL4	EL5	EL6
		

The lubricant fill volume is already filled at the factory in accordance with the respective mounting position.

An adhesive label on the gearbox marks the intended mounting position. The arrow shows the side that needs to be mounted downwards.

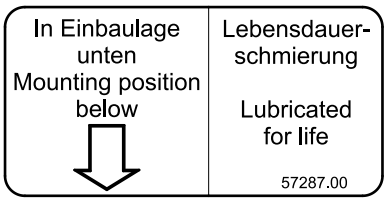


Fig. 2: Adhesive label – Mounting position

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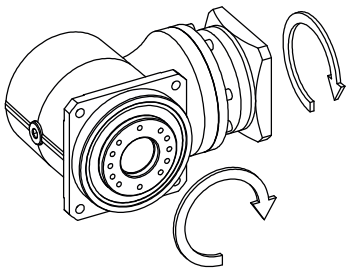
4.5 Direction of rotation



The figure shows the EL1 mounting position.

4.6 Technical characteristics

Feature	Description
Maximum permitted gearbox temperature (on the surface of the gearbox)	≤ 90 °C
Paint	Black RAL 9005
Lubricant	Synthetic; for specification and quantity, see nameplate
Ventilation	Gear housing closed on all sides, no ventilation provided
Weight	See order documents
Protection class	IP65

Tab. 2: Technical characteristics – Ambient conditions

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5 Installation

This chapter contains instructions for the professional installation of STOBER drives in a standard design and to prevent personal injury and damage to property. Deviations in customized designs are documented in the respective order documents.

The specifications in the relevant technical documentation apply to the installation and electrical connection of attached motors.

Inspect the drive for transport or storage damage. If you notice any damage, do not install the drive. Instead, contact STOBER.

5.1 Cleaning agent and solvent

Upon delivery, unpainted surfaces of the drive are protected by a corrosion protection agent. The corrosion protection agent must be removed from contact surfaces such as shaft ends and flange contact surfaces before assembly.
We recommend using a suitable cold cleaner for cleaning (e.g. Carlofon Autocleaner), which, unlike highly volatile solvents, is virtually odorless and does not attack the seal lips of the shaft seal rings. Alternatively, commercially available solvents can be used.

To ensure perfect torque transmission, all contact surfaces of the clamp connection must be thoroughly degreased with a cold cleaner or suitable solvent.

ATTENTION!

Damage to shaft seal rings due to solvents!

Prevent shaft seal rings from coming into contact with solvents when cleaning and degreasing unpainted surfaces.

5.2 Mounting the motor on a gearbox

Information

This chapter is not relevant when using a geared motor fromSTOBER .

This chapter applies to attaching motor to a gearbox from STOBER using a motor adapter. As a rule, this applies to motors from third-party manufacturers.

For the best smooth operation, we recommend using motor shafts without feather keys, as keyways can have a negative effect on smooth operation.

Information

To make it easier to fit the motor to the gearbox, first fit the motor to the gearbox and then the geared motor to the machine.

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5.2.1 Permitted tilting torques at the gearbox input

If you have mounted a STOBERgearbox on a machine in a horizontal mounting position, check that the permitted breakdown torque is not exceeded on the gearbox input before mounting the corresponding motor.

Type	M_{1k}
	[Nm]
KS311_MF	20
KS312_ME	10
KS313_ME	10
KS411_MF	40
KS412_ME	20
KS413_ME	10
KS511_MF	80
KS512_ME	40
KS513_ME	20
KS711_MF	200
KS712_ME	80
KS713_ME	40

The values for the ME motor adapter also apply to the MEL adapter.

5.2.2 Tolerances of the motor

For safe installation of the motor via a motor adapter, the tolerances of the motor must meet the following requirements.

Tolerances for solid shafts in accordance with DIN 748-1

Diameter [mm]	Tolerance
≤ 50	ISO k6
> 50	ISO m6

Tab. 3: Tolerances – Solid shafts

Tolerances for the centering diameter on the motor flange in accordance with EN 50347

Centering diameter [mm]	Flange size [mm]	Tolerance
≤ 230	65 – 300	ISO j6
> 230	350 – 500	ISO h6

Tab. 4: Tolerances – Motor flange

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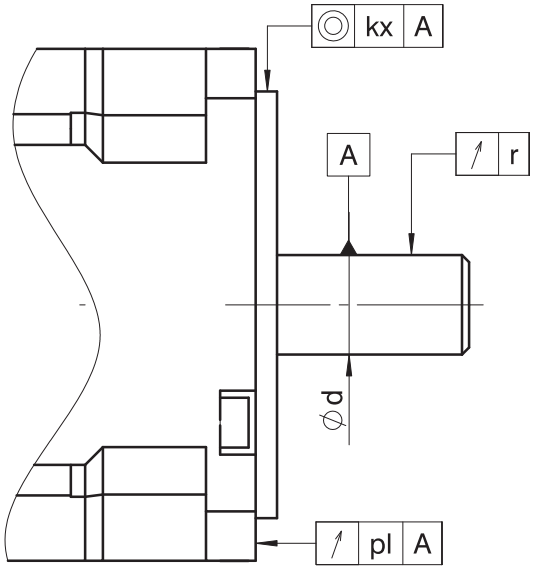
Tolerances for radial runout, axial runout and concentricity in accordance with IEC 60072-1 (normal class)

Symbol	Unit	Explanation
kx	µm	Concentricity of the flange centering in relation to the shaft
pl	µm	Axial runout of the flange mounting surface in relation to the shaft
r	µm	Radial runout of the shaft end



∅d [mm]	r [µm]
d ≤ 10	30
10 < d ≤ 18	35
18 < d ≤ 30	40
30 < d ≤ 50	50
50 < d ≤ 80	60

Tab. 5: Tolerances – Radial runout of shaft end

Centering diameter [mm]	Flange size	kx [µm]	pl [µm]
50 – 95	65 – 115	80	80
110 – 130	130 – 165	100	100
250 – 450	300 – 500	125	125

Tab. 6: Tolerances – Axial runout, concentricity

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5.2.3 Mounting the motor on a gearbox

This chapter describes the proper installation of a motor on a gearbox using a motor adapter.

Tools and material

You will need:

- Lifting gear with suitable fastening elements and sufficient lifting capacity (for high total weight).
- 4 screws of strength class 8.8; the screw-in depth must be at least 1.6 times the nominal diameter.
- Open-end wrenches in the appropriate sizes
- Matching socket wrench
- Long hexagonal inserts
- Torque wrench in accordance with the tightening specifications
- Grease
- Suitable cleaning agents or solvents
- Suitable sealing compound

Prerequisites

Make sure that the following conditions are met.

- The dimensional tolerances of the motor correspond to the required specifications.
- The permitted breakdown torque on the gearbox input is not exceeded.

Installation

Perform the following steps in the specified order.

Information

To avoid shifting or tilting of the shaft, mount the motor with the motor shaft pointing down vertically.

Observe the defined values in chapter Tightening torques [▶ 32] .

✓ The transport cover of the motor adapter has been removed.

✓ If a feather key is installed on the motor shaft, it is removed.

✓ The inner hole of the clamping hub has been thoroughly degreased. If an adapter bushing is used, its outer and inner surfaces are also prepared without leaving any residue.

✓ If the motor flange does not fully cover the bores or openings of the motor adapter, seal off the remaining openings with a sealant.

✓ The corrosion protection is removed from the motor shaft and from the contact surfaces between the motor and adapter.

1. Position the gearbox (5) on a suitable support (1) so that the motor can be mounted vertically (motor shaft pointing downwards).
2. Unscrew the screw plug (13).
3. Turn the clamping hub so that the locking screw (11) is accessible via the bore in the previously removed screw plug (13).

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4. Guide the hexagonal insert (3) through the bore and insert it into the hexagon socket of the locking screw.
5. If an adapter bushing (6) is necessary, insert it into the inner hole of the clamping hub (15) as far as it will go and align the clamping hub so that the slot of the bush coincides with the slot of the clamping hub (10).
6. If necessary, use suitable lifting gear to attach the motor to two designated lifting positions so that the motor shaft is pointing down vertically.
7. Align the motor axially with the gearbox so that the nameplates are on the same side if possible and can be easily read even after installation in the machine.
8. If the motor shaft has a keyway, position the shaft so that the groove is opposite the slot of the clamping hub (10).
9. Carefully place the motor on the motor adapter (4). Make sure that the motor shaft (7) is guided into the clamping hub (15) so that it is centered, and make sure it is not at an angle.
10. Make sure that the contact surfaces of the motor and motor adapter flanges lie against each other without any gaps. If this is not the case, do not use force. Instead, check the dimensions of the motor (see Further information [▶ 41]).
11. Mount the motor on the motor adapter using screws (9). Tighten the screws evenly with increasing torque and in a criss-cross pattern.
12. Insert the torque wrench (2) into the hexagon insert (3) and tighten the locking screw (11). The required tightening torque for locking screws can be found on the adhesive label on the motor adapter.
13. If the motor flange does not completely cover the holes or openings of the motor adapter, seal off the remaining openings with a suitable sealant to prevent dust and water from entering the adapter.
14. Plug the access hole with the screw plug (13) by screwing it in until it is flush with the surface of the motor adapter.

⇨ The motor is mounted on the gearbox.

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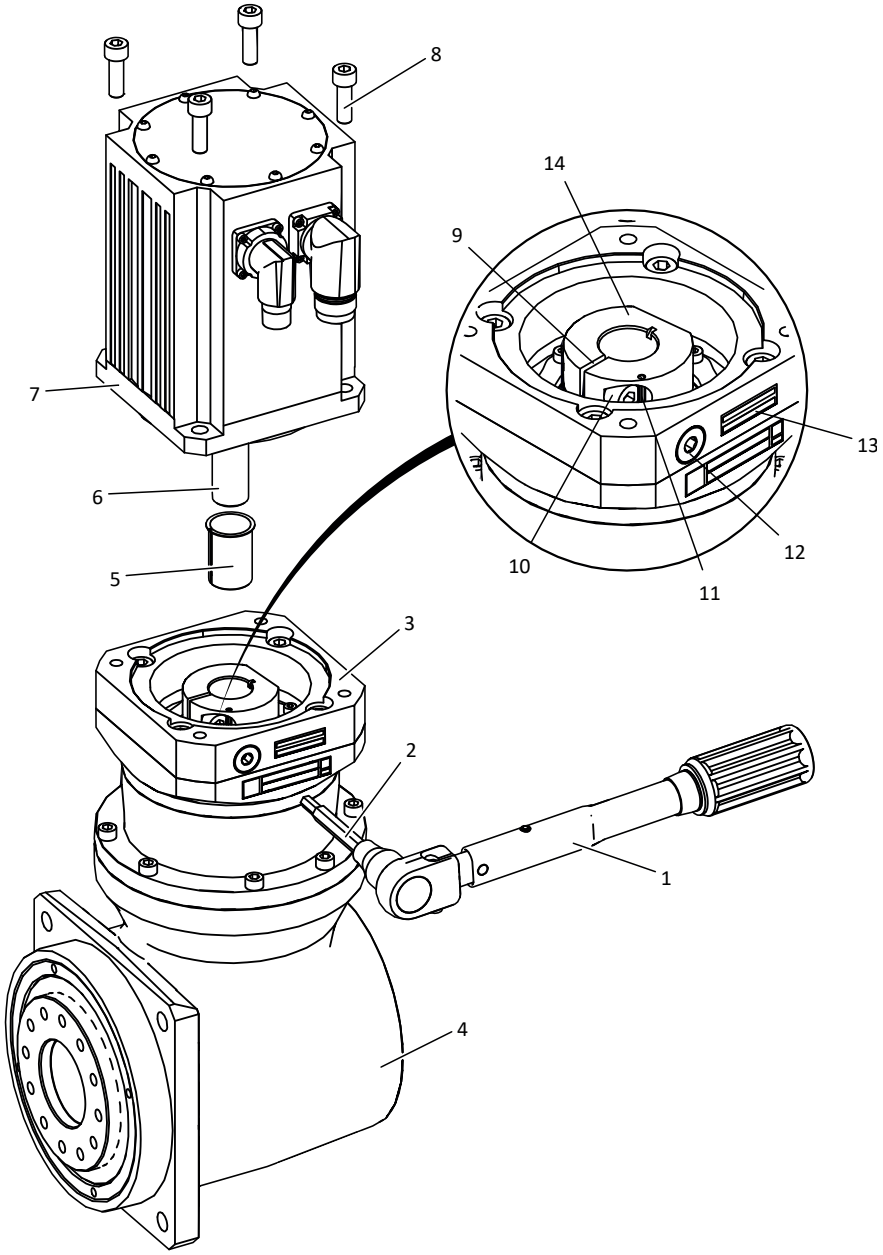

Fig. 3: Mounting a motor on a KS right-angle servo gearbox with flanged shaft and motor adapter

1	Torque wrench	2	Hexagon insert
3	Motor adapters	4	Planetary gearbox
5	Adapter bushing (if present)	6	Motor shaft
7	Motor	8	Screw
9	Slot of the clamping hub	10	Locking screw
11	Grooved pin	12	Screw plug
13	Adhesive label	14	Clamping hub

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5.3 Mounting drive elements

The following chapters contain instructions for mounting drive elements on solid, flanged and machine shafts.

5.3.1 Mounting drive elements on a solid shaft

This chapter describes the proper assembly of drive elements, such as hubs, belt drives, couplings, pinions or sprockets, on the output of a gearbox with a solid shaft and feather key.

When mounting on a solid shaft without a feather key, observe the technical documentation of the respective drive element.

ATTENTION!

Damage to bearing, shaft and encoder due to improper mounting!

Always avoid using force when installing drive elements with fits. Striking power transmission elements, shafts or the motor or gear housing with a hammer can cause considerable damage.

- Only install the gearboxes in accordance with the installation instructions.

Tools and material

You will need:

- Suitable cleaning agents or solvents
- Mounting device suitable for the drive element

Prerequisites

Make sure that the following conditions are met.

- The drive element does not cause any impermissible shaft loads (e.g. due to excessive belt tensioning on belt drives); the permissible shaft loads can be found in the corresponding catalog (see Further information [▶ 41]).
- The drive element is balanced.
- The tolerance of the inner hole of the drive element corresponds to ISO h7.
- The keyway of the drive element complies with the standard DIN 6885-1unless otherwise specified.

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Installation

Perform the following steps in the specified order.

✓ The corrosion protection is removed from the contact surfaces of the solid shaft and the drive element.

✓ The inner holes of the drive element have been degreased.

1. Pull the drive element onto the solid shaft with the aid of a suitable mounting device. Make sure that the mounting device is positioned on the centering hole of the shaft.
2. If the solid shaft is longer than the drive element, insert a suitable spacer bushing between the washer (1) and the drive element (5).

⇨ The drive element is mounted on the solid shaft.

Information

If the drive element is difficult to wind up, heat the drive element evenly to approx. 80 °C.

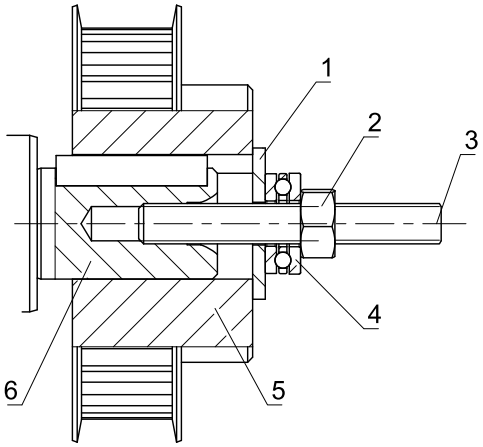

Fig. 4: Mounting device for a belt drive (example)

1	Washer	2	Nut
3	Set screw	4	Axial bearing
5	Belt drive (example)	6	Solid shaft

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5.3.2 Mounting drive elements on a flanged shaft

This chapter describes the proper installation of drive elements such as pulleys or pinions on the output of a gearbox with flanged shaft.

ATTENTION!

Damage to bearing, shaft and encoder due to improper mounting!

Always avoid using force when installing drive elements with fits. Striking power transmission elements, shafts or the motor or gear housing with a hammer can cause considerable damage.

- Only install the gearboxes in accordance with the installation instructions.

Tools and material

You will need:

- Screws of strength class 12.9
- Suitable cleaning agents or solvents

Prerequisites

Make sure that the following conditions are met.

- The drive element does not cause any impermissible shaft loads (e.g. due to excessive belt tensioning on belt drives); the permissible shaft loads can be found in the corresponding catalog (see Further information [▶ 41]).
- The inner pilot has a fit in accordance with ISO h6, the outer pilot has a fit in accordance with ISO h7.

Installation

Perform the following steps in the specified order.

Observe the defined values in chapter Tightening torques [▶ 32] .

✓ The corrosion protection is removed from the contact surfaces of the flange shaft and the drive element.

1. Center the drive element over the inner or outer pilot of the flange shaft, depending on the intended fit.
2. Fit the drive element to the flange shaft using the screws provided.
3. Tighten the screws evenly in multiple passes with increasing torque and in a criss-cross pattern.

⇨ The drive element is mounted on the flange shaft.

Associated screws

Gearbox type	Number of screws	Screw size	Min. screw-in depth [mm]
KS3	8	M5	7
KS4	8	M6	11
KS5	12	M6	11
KS7	12	M8	14

Tab. 7: Technical characteristics – Screws for mounting drive elements on the flange shaft

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5.3.3 Mounting a machine shaft on a hollow shaft with shrink ring

This chapter describes the proper installation of a gearbox with hollow shaft and shrink ring on a machine shaft.

Tools and material

You will need:

- Suitable cleaning agents or solvents

Prerequisites

Make sure that the following conditions are met.

- If the machine shaft is a solid shaft, the material must have a permissible surface pressure of $p \geq 325$ N/mm².
- If the machine shaft is a hollow shaft, consult the manufacturer to avoid deformation caused by the shrink ring.
- The machine shaft has the tolerance ISO h6 (the inner hole of the hollow shaft has the tolerance ISO h7).

Installation

Perform the following steps in the specified order.

ATTENTION!

Material damage

Only tighten the clamping screws of the shrink ring after the gearbox has been fully fitted onto the machine shaft. Premature tightening can lead to plastic deformation of the hollow shaft.

✓ The sealing and cover caps of the motor adapter have been removed.

✓ The corrosion protection is removed from all contact surfaces, in particular from the machine shaft (2), the bore of the hollow shaft (3) and the shrink ring (4).

✓ The machine shaft in the pressing area of the shrink ring (7) and the inner and outer surface of the hollow shaft in the press area (8) are carefully degreased.

✓ Assembly grease is applied to the machine shaft in the contact area (6) to the bush.

1. Insert the gearbox with the hollow shaft onto the machine shaft.
2. If the hollow shaft is slitted in the press area of the shrink ring, position the shrink ring at a defined distance **fs** to the end of the hollow shaft.
   If the hollow shaft is not slitted, position the shrink ring to the stop on the collar of the hollow shaft.
3. Tighten the clamping screws of the shrink ring evenly in sequence (not in a criss-cross pattern) in several turns by a ¼ rotation in each turn until the specified tightening torque is reached.
   In the process, make sure that the clamping plates of the shrink ring remain coplanar to each other and do not touch.

⇨ The gearbox is mounted on the machine shaft.

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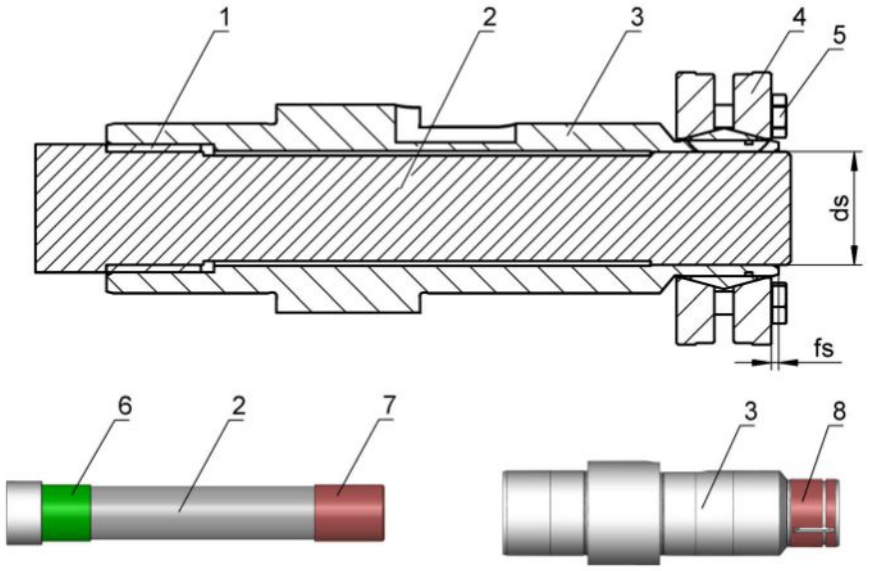

Fig. 5: Assembly – Machine shaft on hollow shaft with shrink ring

1	Bush	2	Machine shaft
3	Hollow shaft	4	Shrink ring
5	Clamping screw	6	Surface, greased
7	Surface, free of grease	8	Inner an outer surface, free of grease

Technical characteristics – Mounting the shrink ring

Gearbox type	fs	ds [mm]	M_A [Nm]	Width across flats [mm]
KS3	3	20	4	8
KS4	3	25	5	8
KS5	3	35	12	10
KS7	3	45	12	10

Tab. 8: Technical characteristics – Mounting the shrink ring

Abbreviations used:

- ds = Inner diameter of the shrink ring
- fs = Distance between end of hollow shaft and shrink ring
- M_ATightening torque of the clamping screws

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5.4 Mounting the gearbox on the machine

This chapter describes the proper installation of a gearbox on a machine.

Prerequisites

Make sure that the following conditions are met.

- The connecting structure for the drive in the machine is dimensioned according to the weight and torque and takes forces that act on the drive into account.
- The connecting structure is flat, vibration-reducing and torsion-resistant.
- The perpendicularity deviation of the flange contact surface to the gearbox shaft axis does not exceed 0.03 mm per 100 mm.
- The gear housing is grounded via the connecting structure or attached motor.
- The centering diameter of the connecting structure has the tolerance ISO h7.
- Sufficient ventilation for the mounted drive is ensured.

Installation

Perform the following steps in the specified order.

Observe the defined values in chapter Tightening torques [▶ 32] .

✓ The corrosion protection is removed from the contact surfaces of the output flange and the connecting structure.

1. Gearbox with hollow shaft and shrink ring:
   Mount the hollow shaft on the machine shaft as described, but do not tighten the clamping screws of the shrink ring at this time.
2. Position the gearbox in accordance with the specified mounting position.
3. Center the gearbox in the connecting structure using the pilot of the gear housing.
4. Mount the output flange of the gearbox on the connecting structure using screws.
5. Tighten the screws evenly in multiple passes with increasing torque and in a criss-cross pattern.

⇨ The gearbox is mounted on the machine.

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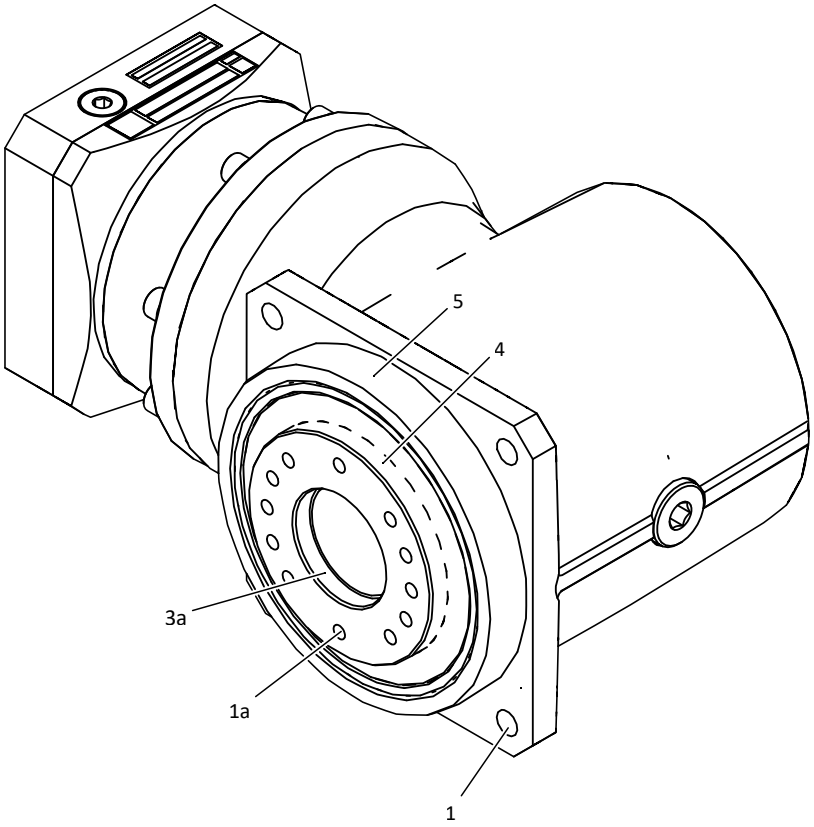

Fig. 6: Mounting the KS512F on the machine

1	Bore of the housing
3a	Inner pilot of the flange shaft
4	Outer pilot of the flange shaft
5	Housing pilot

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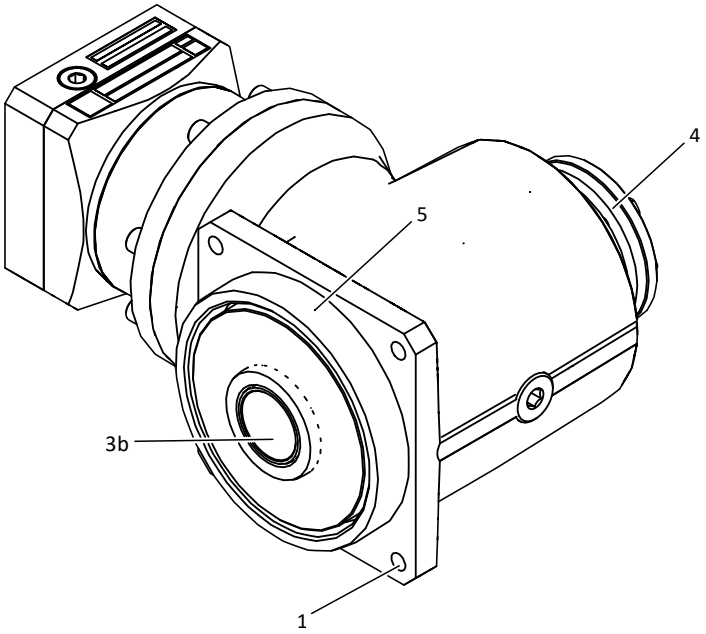

Fig. 7: Mounting the KS412S on the machine

1	Bore of the housing
3b	Hollow shaft bush
4	Shrink ring
5	Housing pilot

Associated screws

Gearbox type	Number of screws	Screw size	Strength class
KS3	4	M6	12.9
KS4	4	M6	12.9
KS5	4	M8	12.9
KS7	4	M10	12.9

Tab. 9: Technical characteristics – Screws for mounting the gear housing on a machine

5.5 Tightening torques

This chapter contains all the tightening torques that are used in this documentation – for example, for fastening screws, locking screws or other connecting elements.

Tightening torques for mounting screws or fastening screws

The following tightening torques apply only to screws that are used for mounting the motor on the gearbox or fastening the gearbox on the machine.

	Tightening torque M_A [Nm]		
Thread	Strength class 8.8	Strength class 10.9	Strength class 12.9
M4	3.3	4.8	5.6
M5	6.5	9.5	11.2
M6	11.3	16.5	19.3
M8	27.3	40.1	46.9
M10	54	79	93
M12	93	137	160
M14	148	218	255
M16	230	338	395
M18	329	469	549
M20	464	661	773
M22	634	904	1057
M24	798	1136	1329
M27	1176	1674	1959
M30	1597	2274	2662
M36	2778	3957	4631

Tab. 10: Tightening torques for screws with metric standard thread in accordance with DIN 13-1 (coefficient of friction μ_{ges} = 0.14).

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Tightening torques for locking screws

The following tightening torques apply to locking screws used when mounting the motor on the gearbox. The corresponding values are also specified on the adhesive label of the motor adapter.

Type	ME/MF			MEL		
	KS	s	M_A	KS	s	M_A
		[mm]	[Nm]		[mm]	[Nm]
KS311	M5	4	10	–	–	–
KS312	M4	3	4.5	–	–	–
KS313	M4	3	4.5	–	–	–
KS411	M6	5	14	–	–	–
KS412	M5	4	9.0	M6	5	16
KS413	M4	3	4.5	–	–	–
KS511	M6	5	17	–	–	–
KS512	M6	5	16	M8	6	40
KS513	M5	4	9.0	M6	5	16
KS711	M8	6	41	–	–	–
KS712	M8	6	40	M10	8	75
KS713	M6	5	16	M8	6	40

Abbreviations used:

- KS = Nominal diameter of the locking screw (11)
- M_A = Tightening torque for the locking screw (11)
- s = Size of the hexagon insert (3)

Tightening torques for shrink ring clamping screws

Gearbox type	M_A [Nm]
KS3	4
KS4	5
KS5	12
KS7	12

Tab. 11: Tightening torques for shrink ring clamping screws

6 Commissioning

Observe the following measures before and during commissioning of the drive.

6.1 Before commissioning

⚠ WARNING!

Moving machine parts can cause serious injuries or even death!

Before beginning work, switch off the machine with the main switch and secure it from being turned on again.

Prerequisites

Make sure that the following conditions are met.

- The drive is undamaged.
- The mechanical assembly and electrical connection of the drive have been completed.
- The drive is not blocked.
- Any present feather keys are secured against being thrown during a test run without drive elements.
- All protective devices have been properly mounted.
- All monitoring equipment is activated.
- The drive controller is set to prevent the gearbox from being overloaded by the torque generated by the motor.
- The ambient conditions are maintained in accordance with the technical specifications.

6.2 During commissioning

⚠ WARNING!

Moving machine parts can cause serious injuries or even death!

Make sure that no one is standing in the danger area and that no one can enter it unchecked.

⚠ WARNING!

Falling gravity-loaded axes or vertical axes – especially vertical axes – can cause serious injuries or even death!

Move gravity-loaded axes or vertical axes to their lowest position and lock or brace them mechanically before entering the danger area.

⚠ WARNING!

Disconnecting plug connectors during motor operation can cause electric arcs, which can lead to serious injuries or fatal accidents!

Do not connect or disconnect the plug connectors until after the motor is de-energized.

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⚠ WARNING!

Flying metal parts can cause serious injuries!

Assemble the provided power transmission elements properly. If no drive element is mounted, remove the feather key before a test run.

⚠ CAUTION!

The surface of the drive can reach temperatures over 65 °C during operation! Risk of burns!

Allow the drive to cool down sufficiently before working on it and wear suitable protective gloves when touching the drive.

Commissioning

During commissioning, check whether ...

- the existing brakes are released properly before starting up the drive.
- the direction of rotation of the drive is correct.
- no overloading, unwanted speed fluctuations, unusual noises or vibrations occur during operation.

Measurement of the surface temperature

To ensure safe operation, the surface temperature of the gearbox must not exceed the permissible limit value. Carry out temperature measurements with a commercially available measuring device. Measure at a suitable point – preferably at the transition between the gearbox and motor adapter or between the gearbox and motor.

The maximum surface temperature is reached after approximately three hours of operation, depending on the utilization of the drive. 90 °C must not be exceeded at the maximum surrounding temperature. If this value is exceeded, switch off the drive immediately and contact STOBER Service.

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7 Servicing

7.1 Cleaning

If the surface of the drive is dirty, heat dissipation through the ambient air is no longer ensured. As a result, impermissibly high operating temperatures that reduce the lubricating effect of the lubricant and accelerate its aging could occur.
This can considerably shorten the service life of the drive.
In addition, the thermal winding protection can switch off the drive even before it reaches its rated data.

Determine the cleaning interval depending on the expected operating conditions, but it should be every 12 months at the latest.

⚠ WARNING!

Moving machine parts can cause serious injuries or even death!

Before beginning work, switch off the machine with the main switch and secure it from being turned on again.

⚠ WARNING!

Falling gravity-loaded axes or vertical axes – especially vertical axes – can cause serious injuries or even death!

Move gravity-loaded axes or vertical axes to their lowest position and lock or brace them mechanically before entering the danger area.

⚠ CAUTION!

The surface of the drive can reach temperatures over 65 °C during operation! Risk of burns!

Allow the drive to cool down sufficiently before working on it and wear suitable protective gloves when touching the drive.

ATTENTION!

Improper cleaning procedures can damage the gearbox or geared motor.

Do not use a steam jet, high-pressure cleaner or compressed air to clean the gearbox or geared motor. These cleaning procedures can allow water and dirt to penetrate the inside of the appliance via the seals and cause damage.
In addition, do not use solvents, as these can damage the seals and the nameplate.

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7.2 Inspection

Carry out regular inspections on the gearbox in accordance with the following specifications. The motor is inspected in accordance with the motor manufacturer's documentation.

⚠ WARNING!

Moving machine parts can cause serious injuries or even death!

Before beginning work, switch off the machine with the main switch and secure it from being turned on again.

⚠ WARNING!

Falling gravity-loaded axes or vertical axes – especially vertical axes – can cause serious injuries or even death!

Move gravity-loaded axes or vertical axes to their lowest position and lock or brace them mechanically before entering the danger area.

⚠ CAUTION!

The surface of the drive can reach temperatures over 65 °C during operation! Risk of burns!

Allow the drive to cool down sufficiently before working on it and wear suitable protective gloves when touching the drive.

The gearboxes are filled with a synthetic lubricant ex works. If used as intended, no lubricant change is required during the entire service life of the gearbox. You can find the specification and fill volume of the lubricant on the nameplate of the respective gearbox.

Interval	Actions
Every 3000 operating hours or every 6 months	Check the shaft seal rings for external damage and leaks.
Annually	Check the paint for damage and touch up if necessary.
	Check the tightening torques of the screw connections between gearbox/machine and between gearbox shaft/drive elements.

Tab. 12: Inspection – Intervals and measures

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7.3 Faults

⚠ WARNING!

Moving machine parts can cause serious injuries or even death!

Before beginning work, switch off the machine with the main switch and secure it from being turned on again.

Notify all personnel working on the machine or the drive of deviations from normal operation. Such changes indicate a possible impairment of the drive function.

Typical signs are ...

- higher operating temperatures or increased vibrations.
- unusual noises or smells.
- triggering of monitoring systems.
- Leaks in the housing of the gearbox.

In such cases, stop the drive immediately and inform the responsible service personnel without delay.

7.3.1 Troubleshooting faults

The following table contains faults that can occur during the operation of the gearbox. Read through the table from top to bottom when troubleshooting faults.

Faults	Possible causes	Actions
Operating temperature is higher or exceeds the permitted temperature of the gearbox	Speed or torque is too high	Check the design of the gearbox
	Motor heats the gearbox (too much)	Cool the motor sufficiently
		Check the wiring of the motor
		Replace the motor
	Surrounding temperature is too high	Provide sufficient cooling for the gearbox
	Bearing damage	STOBER Contact Service
Increased or different noises or vibrations in operation	Motor is mounted with too much tension	Check the assembly of the motor
	Gearbox is mounted incorrectly or with too much tension	Check the assembly of the gearbox
	Bearing damage	STOBER Contact Service
	Gear damage	STOBER Contact Service
Leaks	Radial shaft seal ring leaks	STOBER Contact Service
	Output shaft damaged at the sealing point	STOBER Contact Service
	Increased inner pressure due to operating temperature that is too high	See actions in the event of a fault "Operating temperature is higher or exceeds the permitted temperature of the gearbox"
	Gear housing leaks	STOBER Contact Service
Output shaft does not turn although motor is running	Clamp coupling is defective or tightened incorrectly	Check the clamp coupling

Tab. 13: Faults – Possible causes

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7.4 Servicing

Have any necessary repair work on the drive unit carried out by the STOBER Service or from STOBER service partners. Be aware that improper servicing may cause material damage and may void the manufacturer's warranty.

Use only replacement parts supplied by STOBER . Specify the type designation and serial number of the drive when ordering replacement parts. These can be found on the nameplate of the drive.

Have any necessary repair work on the drive unit carried out exclusively by the STOBER Service or authorized service partners. Be aware that improper servicing may cause material damage and may void the manufacturer's warranty.

Only use original replacement parts from STOBER. Specify the type designation and serial number of the drive when ordering replacement parts. This information can be found on the nameplate.

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8 Removal and disposal

8.1 Remove gearbox

⚠ WARNING!

Risk of injury due to hot surface!

The surface temperature of a drive (motor, gearbox, brake, brake resistors) can significantly exceed 65 °C during operation. Skin contact with hot surfaces causes severe burns.

- Wear personal protective equipment, such as protective gloves.
- Take suitable protective measures against unintentional and intentional contact with the motor.

Removal

Perform the following steps in the specified order.

1. If the drive had been in operation immediately beforehand, allow it to cool.
2. Disconnect the connection cable and the grounding conductor from the motor.
3. If necessary, remove drive elements connected to the output shaft, such as belts, chains or couplings, with suitable removal devices.
4. Fasten the drive with suitable fastening elements (see the chapter Transport [▶ 11]).
5. Unscrew the screws used to mount the drive to the machine.
6. For gearboxes with a hollow shaft and shrink ring: Unscrew the clamping screws of the shrink ring in multiple cycles by one quarter rotation each in turn, but do not completely remove the clamping screws from the thread. Remove the gearbox from the machine shaft.
7. Pull the output flange of the gearbox off of the machine.
8. Detach the gearbox from the machine.
9. If necessary, remove the motor from the gearbox. To do so, first release the locking screw of the motor adapter by turning it counterclockwise approx. one quarter rotation. Then, unscrew the screws of the motor used to mount the motor on the gearbox.
10. Transport the drive according to the chapter Transport [▶ 11].

8.2 Dispose of gearbox

Dispose of the component parts of the gearbox according to applicable national regulations and observe the following information:

- If possible, separate the gearbox into component parts made of steel/cast iron, aluminum and plastic.
- The gearbox contains lubricants, such as oil or grease, that pose a danger to the environment and to health. Collect the used oil and grease without mixing them and dispose of them properly.

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9 Appendix

9.1 Further information

The documentation listed below provides you with further relevant information on the STOBERgearboxes and geared motors. The current status of the documentation can be found in our download center at:
http://www.stoeber.de/en/downloads/.
Enter the ID of the documentation in the search.

Alternatively, you can obtain valid documentation by going to https://id.stober.com that specify the serial, delivery note or invoice number of a gearbox or scan the QR code on the gearbox nameplate.

Title	Catalog	ID
Gearbox + ME/MEL/MF/MFL motor adapter	Servo gearboxes	443054_en
Gearbox + EZ synchronous servo motor	EZ synchronous servo geared motors	442437_en

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10 Contact

10.1 Consultation, service and address

We would be happy to help you!

We offer a wealth of information and services to go with our products on our website:
http://www.stoeber.de/en/service

For additional or personalized information, contact our consultation and support service:
http://www.stoeber.de/en/support

If you need our system support:
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systemsupport@stoeber.de

If you need a replacement device:
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replace@stoeber.de

Call our 24-hour service hotline:
Phone: +49 7231 582-3000

Our address is:
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75177 Pforzheim, Germany

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Your suggestions, opinions, wishes and constructive criticism help us to ensure and further develop the quality of our documentation.
If you want to contact us for a specific reason, we would be happy to receive an e-mail from you at:
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Thank you for your interest.
Your STOBER editorial team

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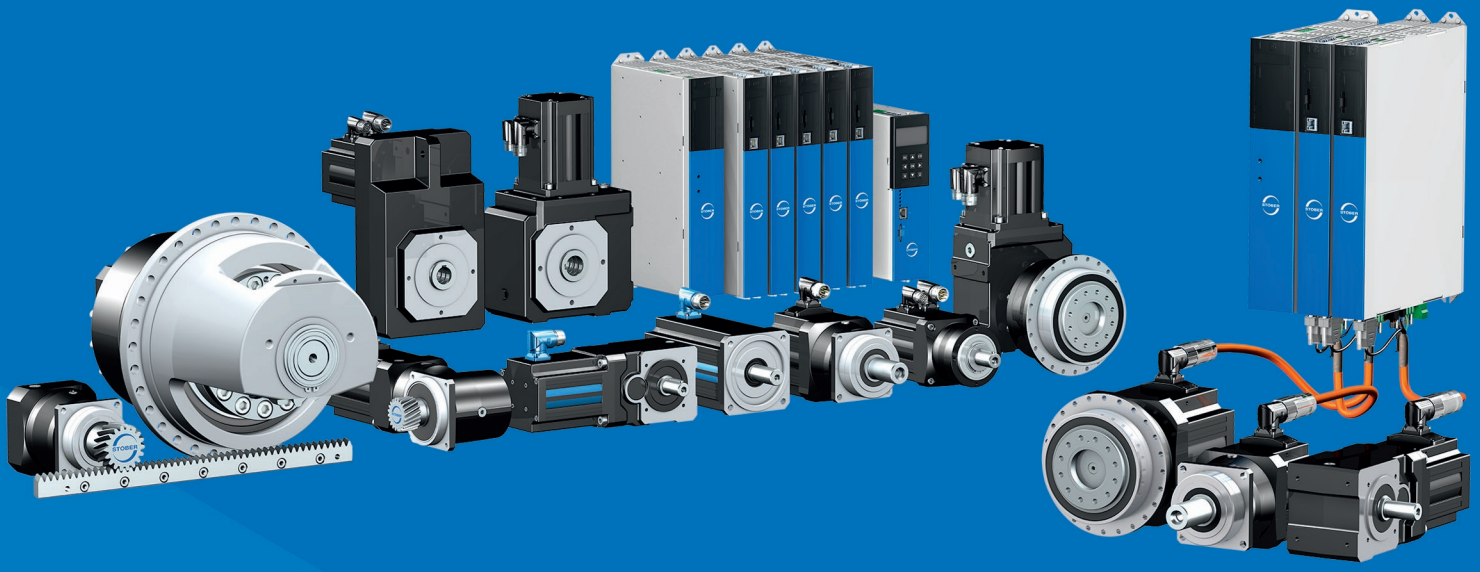

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