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Operating Instructions

MOTOX

Input Units

BA 2019

Edition

3/2021



Input Units BA 2019

Operating Instructions

| | |
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Supplement to MOTOX gearbox operating instructions
BA 2010 and BA 2515

Translation of the original instructions
03/2021

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Steinlen products

Note the following:

WARNING

Steinlen products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Steinlen. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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General information and safety notes

1.1 General information



ATEX version gearboxes

Instructions and measures that apply in particular to ATEX version gearboxes.

Note

Steinlen Elektromaschinenbau GmbH does not accept any liability for damage and failures that result from the non-observance of these operating instructions.

These operating instructions are part of the gearbox delivery. Store the operating instructions near the gearbox.

These operating instructions supplement the BA 2010 and BA 2515 MOTOX gearbox operating instructions.

They apply to the input units of the standard version of the MOTOX gearbox:

- Input units A, A5 - input units with additional input shaft
- Input unit K2 - coupling lantern with coupling for connecting an IEC motor
- Input unit K2TC - coupling lantern with coupling for connecting a NEMA motor
- Input unit K4 - short coupling lantern with clamp connection for connecting an IEC motor
- Input unit K5TC - short coupling lantern with clamp connection for connecting a NEMA motor
- Input units KQ, KQS - lanterns for servomotor with zero-backlash coupling for connecting a servomotor
- Input unit P - input unit with free input shaft and piggy back for connecting an IEC motor, foot-mounted version

1.1 General information

Table 1- 1 Order number code

| Input unit for MOTOX gearbox | Order code |
|------------------------------|------------|
| Input unit A | A00 |
| Input unit A5 | A02 |
| Input unit K2 | A03 |
| Input unit K2TC | A05 |
| Input unit K4 | A04 |
| Input unit K5TC | A06 |
| Input unit KQ | A07 |
| Input unit KQS | A08 |
| Input unit P | A09 |

Note

In addition to these operating instructions, special contractual agreements and technical documentation apply to special gearbox designs and the associated supplementary equipment.

Please read these operating instructions and the operating instructions for the MOTOX gearboxes BA 2010 or BA 2515 before working with the gearbox.

Please refer to the other operating instructions supplied with the product.

The described gearboxes correspond to the state-of-the-art at the time these operating instructions were printed.

Steinlen Elektromaschinenbau GmbH reserves the right to change individual components and accessory parts in the interest of further development. The changes serve to improve the performance and safety. The significant features are retained. The operating instructions are updated regularly with new contents.

For the latest version of the operating instructions, technical configuration data, spare parts lists and factory certificates, the declaration of incorporation and declarations of conformity, please contact us (info@steinlen.de).

Valid operating instructions for MOTOX

- BA 2010 - operating instructions for MOTOX gearboxes
- BA 2011 - operating instructions for MOTOX worm gearbox SC
- BA 2012 - operating instructions for MOTOX worm gearbox S
- BA 2019 - operating instructions for MOTOX input units
- BA 2310 - operating instructions for three-phase and single-phase AC motors and motors equipped with brake with accessories
- BA 2320 - operating instructions for LA/LG and LAI/LGI motors
- BA 2330 - operating instructions for LA/LE/LES motors
- BA 2510 - operating instructions for MOTOX optional add-on units
- BA 2515 - operating instructions for MOTOX gearboxes for overhead conveyors

1.2 Copyright

The copyright to these operating instructions is held by Steinlen Elektromaschinenbau GmbH.

These operating instructions must not be wholly or partly reproduced for competitive purposes, used in any unauthorized way or made available to third parties without agreement of Steinlen Elektromaschinenbau GmbH.

1.3 Intended use



ATEX version gearboxes

The ATEX gearbox satisfies the requirements of the Explosion Protection Directive 2014/34/EU.

In the case of ATEX version gearboxes, please observe instructions marked with this symbol.

The MOTOX gearboxes described in these operating instructions have been designed for stationary use in general engineering applications.

Unless otherwise agreed, the gearboxes have been designed for use in machinery and plants in industrial environments.

1.4 Obligations of the user

The gearboxes have been built using state-of-the-art technology and are shipped in an operationally reliable condition. Changes made by users could affect this operational reliability and are forbidden.

Note

The data on the rating plate assumes an installation altitude of up to 1 000 m above sea level.

The permissible ambient temperature is stamped on the rating plate.

For different installation altitudes and ambient temperatures, contact Technical Support.

The gearboxes are designed only for the area of application described in Chapter Technical data in the operating instructions BA 2010 or BA 2515 for MOTOX gearboxes. Do not operate the gearboxes outside the specified performance limits. Any different operating conditions require new contractual agreements.

Do not climb on the gearbox. Do not place any objects on the gearbox.

1.4 Obligations of the user

The operator must ensure that all persons assigned to work on the geared motor have read and understood these operating instructions and that they follow them in all points in order to:

- Eliminate the risk to life and limb of users and other persons.
- Ensure the operational safety of the geared motor.
- Avoid disruptions and environmental damage through incorrect use.

Note the following safety information:

Shut down the geared motors and disconnect the power before you carry out any work on them.

Make sure that the drive unit cannot be turned on accidentally, e.g. lock the key-operated switch. Place a warning notice at the drive connection point which clearly indicates that work is in progress on the geared motor.

Carry out all work with great care and with due regard to "safety".

For all work, observe the relevant regulations for work safety and environment protection.

Read the instructions on the rating plates attached to the geared motor. The rating plates must be kept free from paint and dirt at all times. Replace any missing rating plates.

In the event of changes during operation, switch off the drive unit immediately.

Take appropriate protective measures to prevent accidental contact with rotating drive parts, such as couplings, gear wheels or belt drives.

Take appropriate protective measures to prevent accidental contact with parts and equipment that heat up to over +70 °C during operation.

When removing protective equipment, keep fasteners in a safe place. Re-attach removed protective equipment before commissioning.

Collect and dispose of used oil in accordance with regulations. Remove oil spillages immediately with an oil-binding agent in compliance with environmental requirements.

Do not carry out any welding work on the geared motor. Do not use the geared motor as a grounding point for welding operations.

Carry out equipotential bonding in accordance with applicable regulations and directives by electro technology specialists.

Do not use high-pressure cleaning equipment or sharp-edged tools to clean the geared motor.

Observe the permissible tightening torque of the fastening bolts.

Replace damaged bolts with new bolts of the same type and strength class.

Steinlen Elektromaschinenbau GmbH accepts the warranty only for original spare parts.

The manufacturer who installs the geared motors in a plant must include the regulations contained in the operating instructions in its own operating instructions.

1.5 The five safety rules

For your own personal safety and to prevent material damage when carrying out any work, always observe the safety-relevant instructions and the following five safety rules according to EN 50110-1 Working in a voltage-free state. Apply the five safety rules in the sequence stated before starting work.

Five safety rules

1. Disconnect.
Also disconnect the auxiliary circuits, for example the anti-condensation heating.
2. Secure against reconnection.
3. Verify absence of operating voltage.
4. Ground and short circuit.
5. Cover or safeguard neighboring live parts.

After the work has been completed, undo the measures taken in the reverse order.

1.6 Particular types of hazards

| |
|--|
|  WARNING |
| Extreme surface temperatures Hot surfaces over +55 °C pose a burn risk. Cold surfaces below 0 °C pose a risk of damage due to freezing. Do not touch the gearbox without protection. |

| |
|--|
|  WARNING |
| Hot, escaping oil Before starting any work wait until the oil has cooled down to below +30 °C. |

| |
|---|
|  WARNING |
| Poisonous vapors when working with solvents Avoid breathing in vapors when working with solvents. Ensure adequate ventilation. |

| |
|--|
|  WARNING |
| Risk of explosion when working with solvents Ensure adequate ventilation. Do not smoke! |

| |
|---|
|  WARNING |
| Risk of eye injury Rotating parts can throw off small foreign particles such as sand or dust. Wear protective eyewear! |

In addition to the prescribed personal protection gear, also wear suitable protective gloves and safety glasses.

Technical description

2.1 Flexible coupling

| |
|---|
| NOTICE |
| A coupling with a peripheral speed of up to 30 m/s at the outer diameter must be statically balanced |
| A coupling with a peripheral speed of more than 30 m/s requires dynamic balancing. |

A flexible coupling is generally used for the gearbox input and output.

If a rigid coupling or other input or output elements are to be used that give rise to additional radial and / or axial forces (e.g. gear wheels, belt pulleys), this must be contractually agreed.

Please refer to the relevant operating instructions for details of how to use the coupling.

2.2 Backstop



ATEX version gearboxes

The drive speed in the table "Drive speed when using backstops" must be reached in continuous operation.

Starting and stopping operations ≤ 20 starts / stops per hour are permissible.

| |
|---|
| NOTICE |
| Replacing the backstop |
| Drive speeds below 1 000 rpm or frequent starting and stopping operations (≥ 20 starts / stops per hour) will limit service life. |
| Do not use the same backstop for prolonged periods; replace backstops regularly. |

| |
|--|
| NOTICE |
| Damaged or destroyed backstop |
| Do not run the motor against the backstop. |
| Note the directional arrow on the gearbox. |

2.2 Backstop

The gearbox can be fitted with a mechanical backstop. The backstop can be fitted either in the coupling lantern or in the 2nd stage of the bevel helical gearbox. It permits only the correct direction of rotation during operation. This is indicated by an arrow pointing in the corresponding direction.

The backstop is fitted with centrifugally operated sprags. When the gearbox is running in the specified direction, the inner ring and the cage with the sprags also rotate while the outer ring remains stationary.

Where the backstop is used in the coupling lantern, lifting of the sprags is ensured when the drive speed is above the speed listed in the table. The backstop is wear-free. It does not require maintenance.

Table 2- 1 Drive speed when using backstops

| Motor size | Backstop | Minimum speed |
|-------------------|------------|---------------|
| | | [rpm] |
| 80/90 | FXM-46 DX | > 820 |
| 100 | FXM-51 DX | > 750 |
| 112 | FXM-61 DX | > 750 |
| 132, 160 | FXM-76 DX | > 670 |
| 180/200, 225, 250 | FXM-101 DX | > 610 |
| 280 | FXM-100 SX | > 400 |

When used in the bevel helical gearbox (gearbox intermediate shaft), the backstop operates at speeds below the lift-off speed of the sprags in a separate oil chamber. The oil must be changed at the same intervals as the gearbox.

Installation

3.1 Unpacking

| |
|--|
| NOTICE |
| Transport damage impairs the correct function of the geared motor |
| Never commission faulty or defective motors. |

Check the motor for completeness and damage. Report any missing parts or damage immediately.

Remove and dispose of the packaging material and transport equipment in compliance with regulations.

3.2 General information on installation



ATEX version gearboxes

Effect on bearings of stray electric currents from electrical equipment.

When mounting the gearbox on or connecting it to the machine, take care to ensure potential equalization. The information on grounding and equipotential bonding provided by the motor supplier must be observed.

| |
|--|
|  WARNING |
| Operating under load |
| Under load, the system can start or reverse in an uncontrolled fashion. |
| The entire system must be load-free so that there is no danger during this work. |

| |
|---|
| NOTICE |
| Destruction caused by welding |
| Welding destroys the geared parts and bearings. |
| Do not weld on the gearbox. The gearbox must not be used as a grounding point for welding operations. |

| |
|---|
| NOTICE |
| Overheating caused by solar radiation |
| Overheating of the gearbox due to exposure to direct sunlight. Provide suitable protective equipment such as covers or roofs. Prevent heat accumulation. |

| |
|--|
| NOTICE |
| Malfunction resulting from foreign objects |
| The operator must ensure that no foreign objects impair the function of the gearbox. |

| |
|---|
| NOTICE |
| Damaged components impair the correct function of the gearbox |
| If any components are damaged, the correct function of the gearbox will no longer be ensured. Do not install any damaged gearbox components. |

| |
|--|
| NOTICE |
| Violation of the maximum permissible oil sump temperature |
| The oil sump temperature may be exceeded if the temperature monitoring equipment is incorrectly set. An alarm must be output when the maximum permissible oil sump temperature is reached. The geared motor must be switched off when the maximum permissible temperature is exceeded. If the geared motor is shut down, then this can cause the machine to come to a stop. |

Exercise particular care during mounting and installation. The manufacturer cannot be held liable for damage caused by incorrect mounting and installation.

Make sure that there is sufficient space around the gearbox or geared motor for mounting, maintenance and repair.

On geared motors with a fan, leave sufficient free space for the entry of air. Observe the installation conditions for the geared motor.

Provide sufficient lifting gear at the start of mounting and fitting work.

Observe the mounting position specified on the rating plate. This ensures that the correct quantity of lubricant is provided.

Use all the fastening means that have been assigned to the particular mounting position and mounting type.

Cap bolts cannot be used in some cases due to a lack of space. In such cases, please contact Technical Support quoting the type of gearbox.

3.3 Thread sizes and tightening torques for fastening bolts

The general tolerance for the tightening torque is 10 %. The tightening torque is based on a friction coefficient of $\mu = 0.14$.

Table 3- 1 Tightening torques for fastening bolts

| Thread size | Tightening torque for strength class | | |
|-------------|--------------------------------------|-------|-------|
| | 8.8 | 10.9 | 12.9 |
| | [Nm] | [Nm] | [Nm] |
| M4 | 3 | 4 | 5 |
| M5 | 6 | 9 | 10 |
| M6 | 10 | 15 | 18 |
| M8 | 25 | 35 | 41 |
| M10 | 50 | 70 | 85 |
| M12 | 90 | 120 | 145 |
| M16 | 210 | 295 | 355 |
| M20 | 450 | 580 | 690 |
| M24 | 750 | 1 000 | 1 200 |
| M30 | 1 500 | 2 000 | 2 400 |
| M36 | 2 500 | 3 600 | 4 200 |

3.4 Mounting an input or output element on the gearbox shaft

 **WARNING**

Risk of burns caused by hot parts

Do not touch the gearbox without protection.

NOTICE

Damage to shaft sealing rings caused by solvent

Avoid any contact of solvent or benzine with the shaft sealing rings.

NOTICE

Damage to shaft sealing rings caused by heating

Use thermal shields to protect shaft sealing rings from heating above 100 °C due to radiant heat.

| |
|---|
| NOTICE |
| Premature wear or material damage due to misalignment |
| Misalignment caused by excessive angular or axis displacement to the connecting shaft ends. |
| Ensure precise alignment of the individual components. |

| |
|---|
| NOTICE |
| Damage caused by improper handling |
| Bearings, housing, shaft and locking rings are damaged due to improper handling. |
| Do not use impacts or knocks to force the input and output elements to be mounted onto the shaft. |

Note

Deburr the parts of elements to be fitted in the area of the hole or keyways.

Recommendation: 0.2 x 45°

Where couplings are to be fitted in a heated condition, observe the specific operating instructions for the coupling. Unless otherwise specified, apply the heat inductively using a torch or in a furnace.

Use the center holes in the shaft end faces.

Use a fitting device to fit the input or output elements.

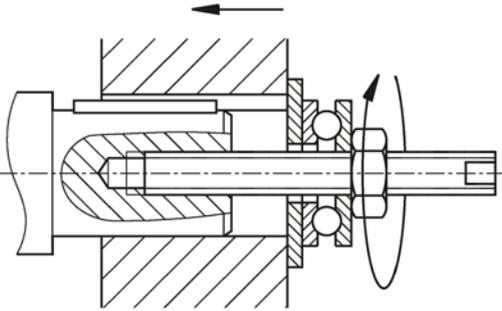


Figure 3-1 Example of a fitting device

Observe the correct mounting arrangement to minimize stress on shafts and bearings due to lateral forces.

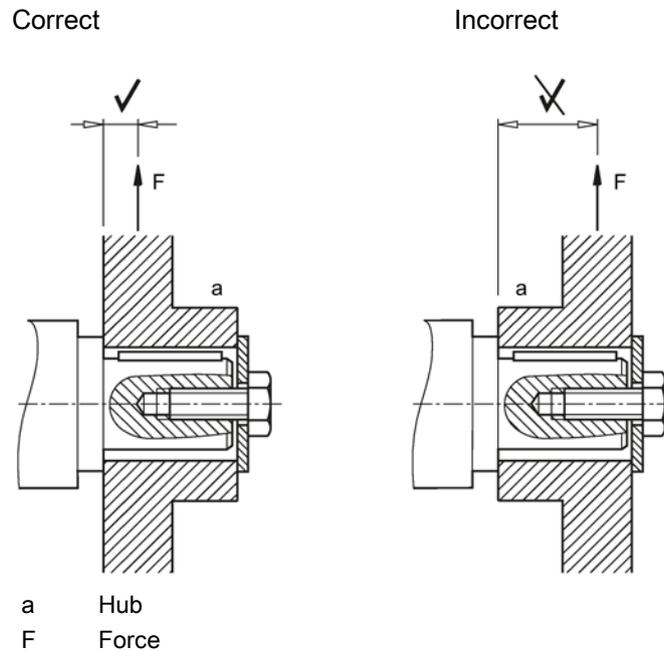


Figure 3-2 Mounting arrangement for low stress on shafts and bearings

Procedure

1. Use either benzene or solvent to remove the anti-corrosion protection from the shaft ends and flanges or remove the applied protective skin.
2. Fit the drive input and output elements to the shafts. Fasten the elements when necessary.

You have now fitted the input or output element.

3.5 Mounting the motor

NOTICE

Moisture penetrates an inadequately sealed geared motor

If the geared motor is to be installed outdoors or for an installation requiring a high degree of protection (\geq IP55):

- Seal the flange, screws 505 and any screw plugs 502 or 503 or integrated elements such as proximity switches, using an appropriate sealing compound.
- The flange-mounted motor must be sealed across the entire contact surface.
- Seal the geared motor in outside areas.

3.5.1 Mounting a standard motor on a coupling lantern with a flexible coupling (K2, K2TC)



ATEX version gearboxes

Impact can cause sparks.

Apply adhesive (medium strength, e.g. Loctite 243) to the grub screw 564 and screws 505.



ATEX version gearboxes

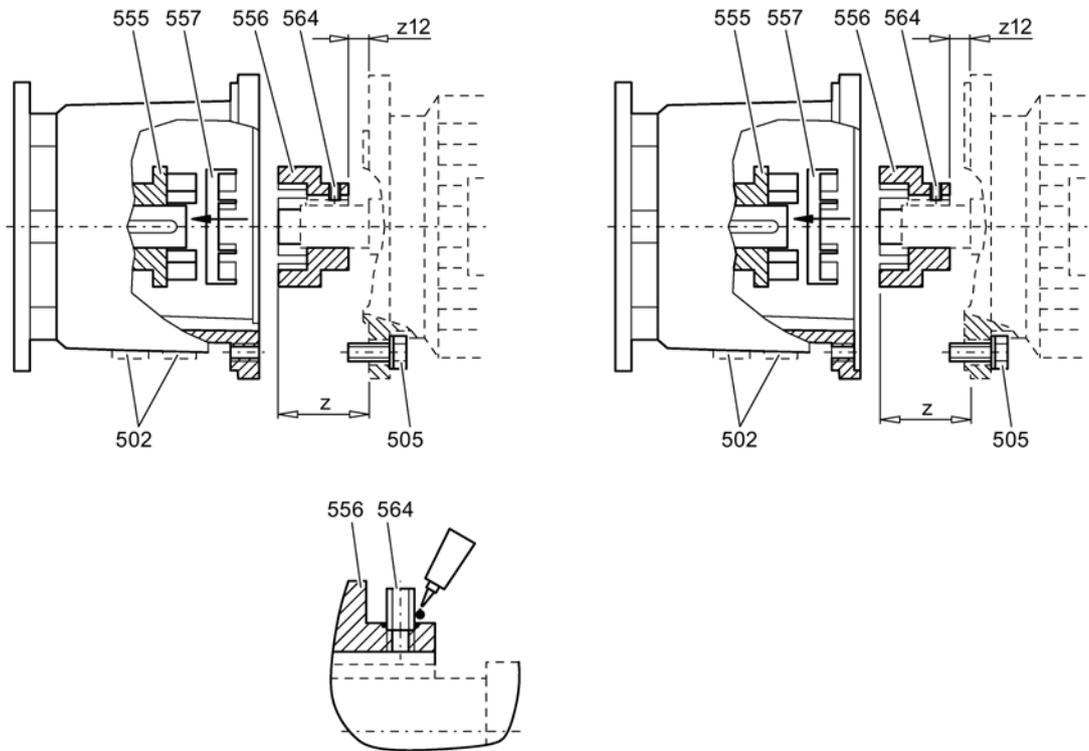
The flange-mounted motor must be sealed across the entire contact surface in order to prevent the penetration of a potentially explosive atmosphere.

Note

Dimension z12 applies for standard assignment of the coupling. If a special assignment is required, consult the appropriate special dimension drawing.

IEC B5 80 - 315, NEMA TC 56 - 145

NEMA TC 182 - 365



| | | | |
|-----|---------------|-----|------------------|
| 502 | Screw plug | 556 | Coupling half |
| 505 | Bolt | 557 | Flexible element |
| 555 | Coupling half | 564 | Grub screw |

Figure 3-3 Coupling lantern with flexible coupling

Procedure

1. Fit the coupling half 556 onto the motor shaft end, see Mounting an input or output element on the gearbox shaft (Page 15).
2. Maintain the clearances z_{12} and z .
3. Apply adhesive (medium strength, e.g. Loctite 243) to the grub screw 564.
4. Tighten the grub screw 564 with the specified torque T_{ASW} and width across flats SW .
5. On motors balanced with half a parallel key (code "H"), remove projecting, visible parts of the parallel key.
6. Place the flexible element 557 inside the coupling half 555.
7. Apply adhesive (medium strength, e.g. Loctite 243) to the bolts 505.
8. Fasten the motor with the screws 505 with the specified torque. See Section Thread sizes and tightening torques for fastening bolts (Page 15).

You have now mounted the standard motor on the coupling lantern with a flexible coupling.

Table 3- 2 Coupling lantern K2

| IEC B5 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 |
|----------------------|------------------|------------------|------------------|------------------|----------------------|--------------------|---------------------|---------------------|-----------------------|---------------------|-------------------|---------------------|
| Coupling size | 19 | 19 | 24 | 24 | 28 | 38 | 42 | 42 | 48 | 55 | 75 | 90 |
| z_{12} [mm] | 15 | 26 | 30 | 30 | 45 | 66 | 59 | 60 | 90 | 75 | 51 | 33 |
| z [mm] | 54 ⁻¹ | 65 ⁻¹ | 76 ⁻¹ | 76 ⁻¹ | 97.5 ^{-1.5} | 132 ^{1.5} | 132 ^{-1.5} | 133 ^{-1.5} | 170.5 ^{-1.5} | 166 ^{-1.5} | 171 ⁻² | 172.5 ⁻² |
| Grub screw 564 | M5 | M5 | M5 | M5 | M8 | M8 | M8 | M8 | M8 | M10 | M10 | M12 |
| T_{ASW} [Nm] | 2 | 2 | 2 | 2 | 10 | 10 | 10 | 10 | 10 | 17 | 17 | 40 |
| SW [mm] | 2.5 | 2.5 | 2.5 | 2.5 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 6 |

Table 3- 3 Coupling lantern K2TC

| NEMA TC | 56C | 143TC / 145TC | 182TC / 184TC | 213TC / 215TC | 254TC / 256TC | 284TC / 286TC | 324TC / 326TC | 364TC / 365TC |
|----------------------|--------------------|------------------|--------------------|------------------|---------------------|-----------------------|-----------------------|---------------------|
| Coupling size | 19 | 19 | 24 | 28 | 38 | 42 | 48 | 55 |
| z_{12} [mm] | 27.5 | 28 | 36.5 | 45.5 | 50 | 60.5 | 71 | 78 |
| z [mm] | 66.5 ⁻¹ | 67 ⁻¹ | 82.5 ⁻¹ | 98 ⁻¹ | 116 ^{-1.5} | 133.5 ^{-1.5} | 151.5 ^{-1.5} | 169 ^{-1.5} |
| Grub screw 564 | M5 | M5 | M5 | M8 | M8 | M8 | M8 | M10 |
| T_{ASW} [Nm] | 2 | 2 | 2 | 10 | 10 | 10 | 10 | 17 |
| SW [mm] | 2.5 | 2.5 | 2.5 | 4 | 4 | 4 | 4 | 5 |

3.5.2 Mounting a standard motor on a short coupling lantern with a clamp connection (K4, K5TC)



ATEX version gearboxes

Impact can cause sparks.

Secure the grub screw 564, hexagon socket-head screw 561 and screws 505 with medium strength adhesive, e.g. Loctite 243.



ATEX version gearboxes

The flange-mounted motor must be sealed across the entire contact surface in order to prevent the penetration of a potentially explosive atmosphere.

NOTICE

The grub screw 564 must not butt against the hexagon socket-head screw 561 when it is tightened

NOTICE

Do not axially distort the motor shaft

Be careful not to axially distort the motor shaft when flange-mounting the motor.

Keep the motor shaft completely free from grease in the vicinity of the clamping ring.

In the case of brake motors, release the brake before mounting the motor.

NOTICE

Do not axially distort the motor bearing

The ventilation-side motor bearing can become distorted when pushing the motor onto the drive shaft of the input unit.

Above size 100, if the motor is mounted in a vertical position the weight of the rotor shaft prevents the bearing from being distorted.

When mounting the motor in a horizontal position and in a vertical position up to motor size 90, please observe steps 6 to 8.

Note

The connection between the shafts is rigid and without axial compensation. Therefore we recommend using motors with a fixed bearing on the drive side for optimum service life.

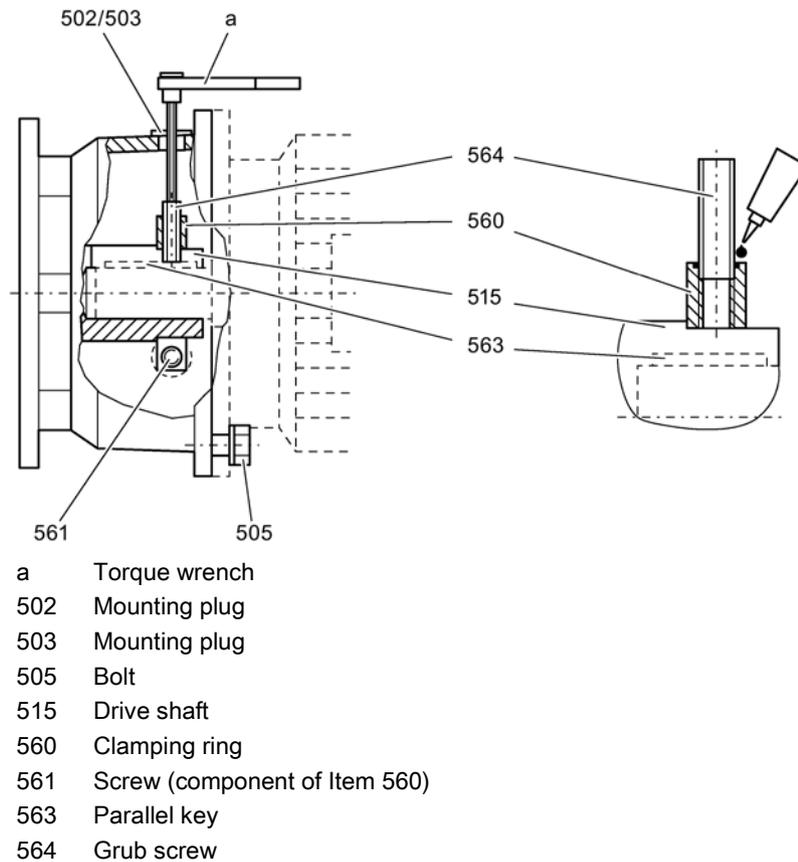


Figure 3-4 Short coupling lantern with clamp connection

Procedure

1. Remove the mounting plugs 502 and 503.
2. Turn the drive shaft 515 and clamping ring 560 of the gearbox to align them with the mounting holes for the mounting plugs 502 and 503.
3. Apply adhesive (medium strength, e.g. Loctite 243) to the grub screw 564, screw 561 and screws 505.
4. Secure the clamping ring 560.
5. Fasten the motor with the bolts 505 with the specified torque. See Section Thread sizes and tightening torques for fastening bolts (Page 15).
6. Remove the fan cover.

3.5 Mounting the motor

7. Release the tension on the bearing by lightly pressing ① your hand on the end of the shaft.

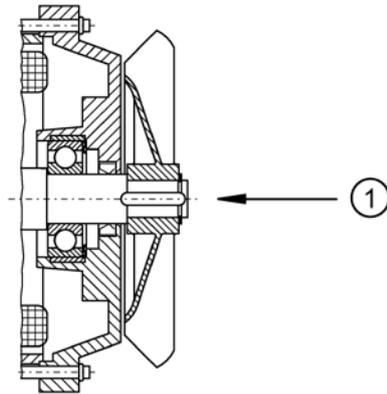


Figure 3-5 Pressure on motor shaft

8. Mount the fan cover.
9. Screw the grub screw 564 to the parallel key 563 until a slight resistance is felt, then turn the grub screw 564 half a turn back.
10. Insert the socket wrench into the grub screw 564 through the hole for the mounting plugs 503. This prevents the shaft from twisting.
11. Tighten the screw 561 with torque T_A SW2 and width across flats SW2.
12. Tighten the grub screw 564 with torque T_A SW1 and width across flats SW1.
13. Seal the mounting holes with the mounting plugs 502 and 503.

You have now mounted the standard motor on the short coupling lantern with a clamp connection.

Table 3- 4 Torque and width across flats for K4

| IEC B5 | 63 | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Grub screw 564 | M4 | M4 | M4 | M6 | M6 | M6 | M8 | M10 | M10 | M10 | M10 | M10 | M16 |
| T_A SW1 [Nm] | 1.3 | 1.3 | 1.3 | 2.9 | 2.9 | 2.9 | 5.8 | 9.9 | 9.9 | 9.9 | 9.9 | 9.9 | 48 |
| SW1 [mm] | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 5 | 5 | 8 |
| Screw 561 | M6 | M6 | M6 | M8 | M8 | M8 | M10 | M12 | M12 | M16 | M16 | M16 | M20 |
| T_A SW2 [Nm] | 15 | 15 | 15 | 35 | 35 | 35 | 70 | 120 | 120 | 295 | 295 | 295 | 580 |
| SW2 [mm] | 5 | 5 | 5 | 6 | 6 | 6 | 8 | 10 | 10 | 14 | 14 | 14 | 17 |

Table 3- 5 Torque and width across flats for K5TC

| NEMA TC | 56C | 143TC / 145TC | 182TC / 184TC | 213TC / 215TC |
|-------------------------|-----|---------------|---------------|---------------|
| Grub screw 564 | M4 | M4 | M6 | M8 |
| T _A SW1 [Nm] | 1.3 | 2.9 | 2.9 | 5.8 |
| SW1 [mm] | 2 | 3 | 3 | 4 |
| Screw 561 | M6 | M6 | M8 | M10 |
| T _A SW2 [Nm] | 15 | 15 | 35 | 70 |
| SW2 [mm] | 5 | 5 | 6 | 8 |

3.5.3 Mounting a servomotor on lanterns with a zero-backlash coupling (KQ, KQS)



ATEX version gearboxes

Impact can cause sparks.

Apply adhesive (medium strength, e.g. Loctite 243) to the grub screw 564 and bolts 505.



ATEX version gearboxes

The flange-mounted motor must be sealed across the entire contact surface in order to prevent the penetration of a potentially explosive atmosphere.

Note

Dimension z12 applies for standard assignment of the coupling. If a special assignment is required, consult the appropriate special dimension drawing.

Note

Reduce assembling force

Lightly grease or oil the gear ring tooth flanks of the flexible element Item 557 or the hub.

The following are permitted:

- Mineral-oil based oils or greases
 - Silicon-based lubricants
 - Petroleum jelly.
-

Note

The force required to join the coupling halves is released after mounting, meaning that there is no danger of excessive axial load on the bearings.

Mounting version KQ - for motor shaft with parallel key

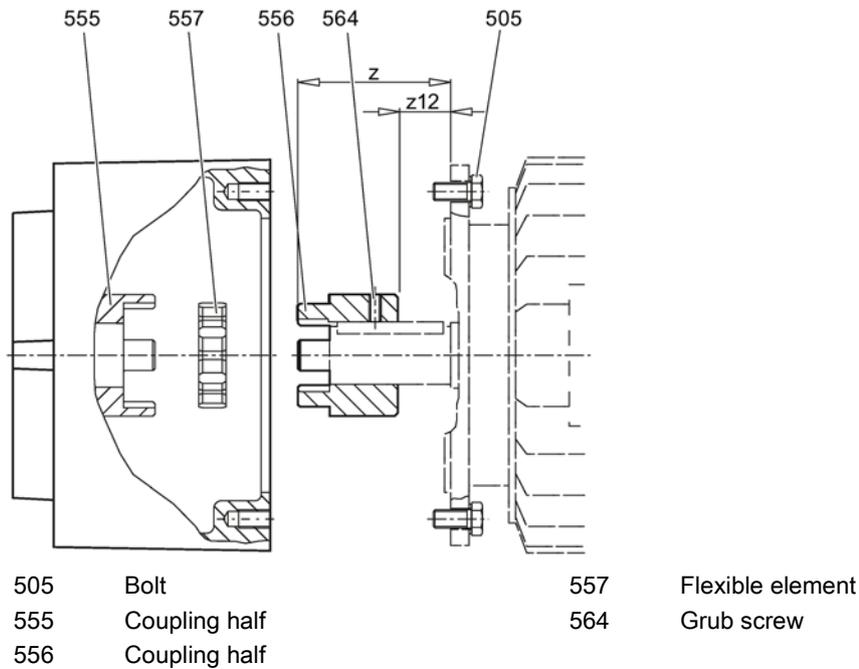


Figure 3-6 Lantern for servomotor KQ

Procedure

1. Fit the coupling half 556 onto the motor shaft end. See Mounting an input or output element on the gearbox shaft (Page 15).
2. Maintain the clearances $z12$ and z .
3. Apply adhesive (medium strength, e.g. Loctite 243) to the grub screw 564.
4. Tighten the grub screw 564 to the specified torque T_A SW and across-flats dimension SW.
5. On motors balanced with half a parallel key (code "H"), remove projecting, visible parts of the parallel key.
6. Place the flexible element 557 inside the coupling half 555.
7. Lightly grease or oil the tooth flanks to reduce the mounting force.
8. Apply adhesive (medium strength, e.g. Loctite 243) to the bolts 505.
9. Fasten the motor with the bolts 505 with the specified torque. See Thread sizes and tightening torques for fastening bolts (Page 15).

You have now mounted the servomotor on the KQ lantern with a zero-backlash coupling.

Table 3- 6 Lantern for servomotor KQ

| Size | 71.1 | 71.2/3 | 80.1/2 | 80.3/4 | 90.1/2/3 | 90.4/5 | 112.1/2 | 112.3 | 132.1/2 | 132.3 |
|-----------------------|----------------------|--------------------|------------------|------------------|------------------|------------------|--------------------|--------------------|--------------------|--------------------|
| Coupling size | 14 | 14 | 19 | 19 | 24 | 24 | 28 | 28 | 38 | 38 |
| z12 [mm] | 12 | 19 | 0 | 15 | 4 | 15 | 10 | 25 | 10 | 30 |
| z [mm] | 34.5 ^{-0.5} | 41.5 ⁻¹ | 39 ⁻¹ | 54 ⁻¹ | 50 ⁻¹ | 61 ⁻¹ | 62.5 ⁻¹ | 77.5 ⁻¹ | 76 ^{-1.5} | 96 ^{-1.5} |
| Grub screw 564 | M4 | M4 | M5 | M5 | M5 | M5 | M8 | M8 | M8 | M8 |
| T _{ASW} [Nm] | 1.5 | 1.5 | 2 | 2 | 2 | 2 | 10 | 10 | 10 | 10 |
| SW [mm] | 2 | 2 | 2.5 | 2.5 | 2.5 | 2.5 | 4 | 4 | 4 | 4 |
| Bolt 505 | M5 | M5 | M6 | M6 | M8 | M8 | M10 | M10 | M12 | M12 |

Mounting version KQS - for motor shaft without parallel key

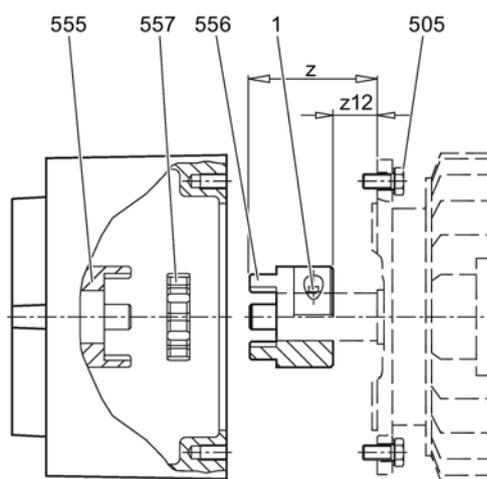
NOTICE

Any impurities in the vicinity of the shaft / hub connection will have a detrimental effect on the torque transmission

Keep the drill hole and motor shaft completely free from grease.

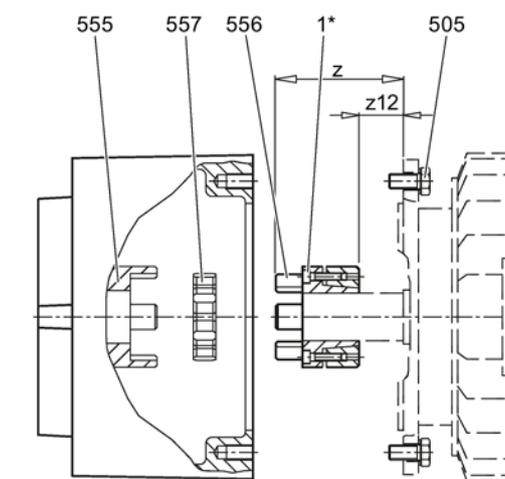
Do not use soiled cleaning cloths or contaminated solvents.

Sizes 71 to 112



- 1, 1* Bolt
- 505 Bolt
- 555 Coupling half

Size 132



- 556 Coupling half
- 557 Flexible element

Figure 3-7 Lantern for servomotor KQS

Procedure

1. Loosen the bolt 1 or 1* slightly.
2. Fit the coupling half 556 onto the motor shaft end. See Mounting an input or output element on the gearbox shaft (Page 15).

3.5 Mounting the motor

3. Maintain the clearances z12 and z.
4. Apply adhesive (medium strength, e.g. Loctite 243) to the bolts 1 or 1*.
5. KQS 71 - 112:
Tighten bolt 1 with the specified torque.
KQS 132:
Tighten the bolt 1* evenly and gradually in a crossways pattern. Repeat the procedure until the specified to torque has been reached.
6. Place the flexible element 557 inside the coupling half 555.
7. Lightly grease or oil the tooth flanks to reduce the mounting force.
8. Apply adhesive (medium strength, e.g. Loctite 243) to the bolts 505.
9. Fasten the motor with the bolts 505 with the specified torque. See Thread sizes and tightening torques for fastening bolts (Page 15).

You have now mounted the servomotor on the KQS lantern with a zero-backlash coupling.

Table 3- 7 Lantern for servomotor KQS

| Size | 71.1 | 71.2/3 | 80.1/2 | 80.3/4 | 90.1/2/3 | 90.4/5 | 112.1/2 | 112.3 | 132.1/2 | 132.3 |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Coupling size | 14 | 14 | 19 | 19 | 24 | 24 | 28 | 28 | 38 | 38 |
| z12 [mm] | 12 | 19 | 0 | 15 | 4 | 15 | 10 | 25 | 10 | 30 |
| z [mm] | 34.5-0.5 | 41.5-1 | 39-1 | 54-1 | 50-1 | 61-1 | 62.5-1 | 77.5-1 | 76-1.5 | 96-1.5 |
| Bolt 1, 1* | M4 | M4 | M5 | M5 | M5 | M5 | M8 | M8 | M6 | M6 |
| T _{ASW} [Nm] | 1.5 | 1.5 | 2 | 2 | 2 | 2 | 10 | 10 | 10 | 10 |
| SW [mm] | 2 | 2 | 2.5 | 2.5 | 2.5 | 2.5 | 4 | 4 | 4 | 4 |
| Bolt 505 | M5 | M5 | M6 | M6 | M8 | M8 | M10 | M10 | M12 | M12 |

3.6 Adjusting the height of the piggy back

3.6.1 General information on adjusting the piggy back



ATEX version gearboxes

The piggyback version is supplied without belt, belt pulley or guard.

Friction linings or impact can cause sparks.

The operator must ensure by means of a protective system that

- the belt cannot slip and cause a spark
- no foreign bodies can enter the vicinity of the belt drive.

WARNING

Rotating drive parts

Always attach appropriate guards to cover the belt drive, chain drive or other open drive components.

CAUTION

Incorrect belt tension can cause the belt to break and damage the bearings

Refer to the operating instructions for V belt drives.

Fit the belt pulley onto the drive shaft 515 as described in "Mounting the input or output element on the gear shaft".

CAUTION

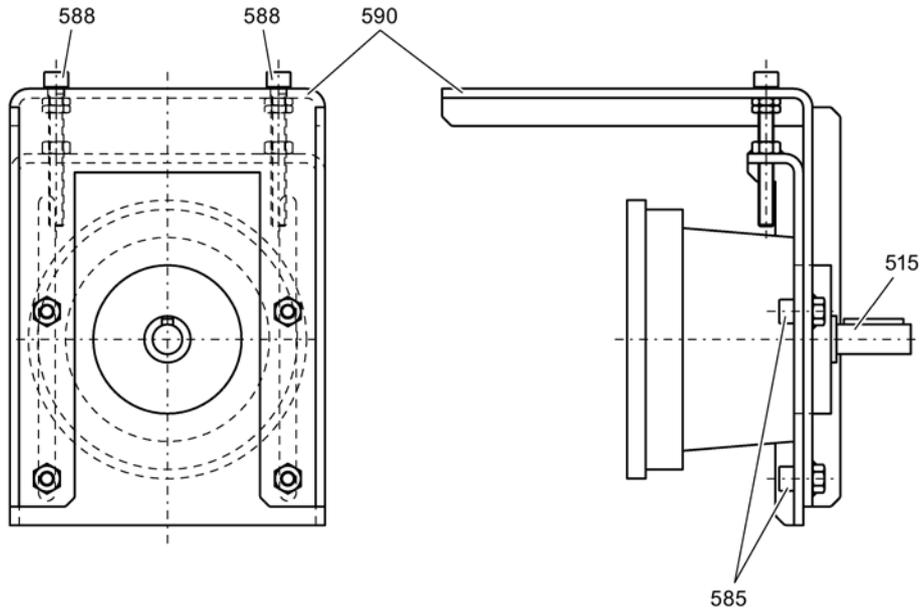
After mounting or adjusting the piggy back protect unpainted areas against corrosion

Use a suitable, long-lasting anti-corrosion agent.

The piggy back holds a conventional IEC motor, which is primarily used for driving a V belt drive. Install the motor in accordance with the manufacturer's operating instructions.

For other drive types, such as chain drives, please refer to the corresponding operating instructions or manufacturer's information.

3.6.2 Piggy back for IEC motor up to size 112



- 515 Drive shaft
- 585 Bolt
- 588 Bolt
- 590 Motor plate

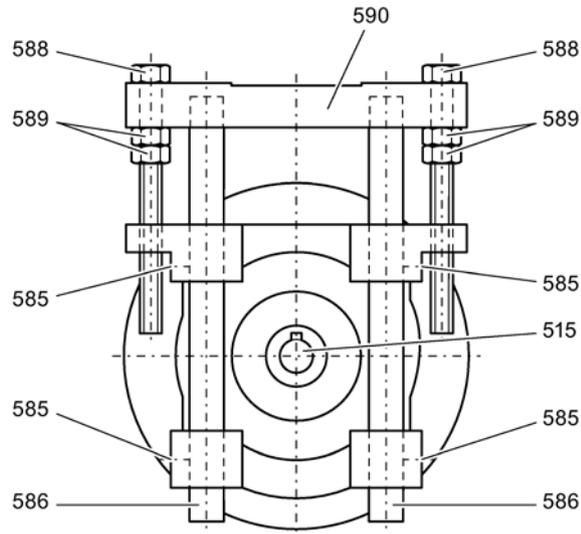
Figure 3-8 Piggy back for IEC motor up to size 112

Procedure

1. Loosen the bolts 585.
 2. Adjust the height of the motor plate 590 by evenly turning the bolt 588.
 3. After setting the correct height, tighten the bolts 585 using the specified torque.
- You have now mounted the piggy back for IEC motors up to size 112.

3.6.3 Piggy back for IEC motor sizes 132 to 200

| |
|---|
|  WARNING |
| <p>The piggy back can slip out of the support</p> <p>Do not move to a downward facing mounting position.</p> |



- 515 Drive shaft
- 585 Grub screw
- 586 Column
- 588 Screw
- 589 Hexagon nut
- 590 Motor plate

Figure 3-9 Piggy back for IEC motor sizes 132 to 200

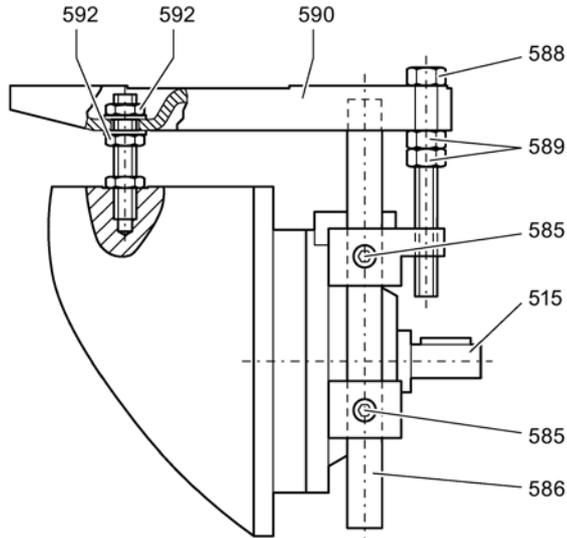
Procedure

1. Loosen the grub screws 585.
2. Adjust the height of the motor plate 590 by evenly turning the bolt 588.
3. After setting the correct height, tighten the grub screws 585.

You have now mounted the piggy back for IEC motors sizes 132 to 200.

3.6.4 Piggy back for IEC motor size 225 and above

NOTICE
When tightening the hexagon nuts 592, do not distort or force the motor plate 590 into a different position



- 515 Drive shaft
- 585 Grub screw
- 586 Column
- 588 Screw
- 589 Hexagon nut
- 590 Motor plate
- 592 Hexagon nut

Figure 3-10 Piggy back for IEC motor size 225 and above

Procedure

1. Loosen the grub screws 585.
 2. Loosen the hexagon nuts 592 on the support.
 3. Adjust the height of the motor plate 590 by evenly turning the bolt 588.
 4. After setting the correct height, tighten the grub screws 585.
 5. Tighten the hexagon nuts 592 on the support.
- You have now mounted the piggy back for IEC motors size 225 and above.



ATEX version gearboxes

The difference between the temperature of the housing and the ambient temperature of max. +40° C must not exceed 70 K.

Using a suitable temperature sensor, measure the temperature at the lowest point of the housing (oil sump) or at the mounting surface in the case of output units.

Changes are an indication of possible incipient damage.

CAUTION

Malfunctions can cause injuries or gearbox damage

In the event of changes during operation, the drive unit must be switched off immediately.

Determine the fault as described in Section "Faults, causes and remedies" in the gearbox operating instructions. Remedy faults or have faults remedied.

NOTICE

Undershooting the minimum radial force can damage the bearings

On cylindrical-roller bearings in the input unit, undershooting the minimum radial force damages the bearings.

Prolonged test runs when off-load must be kept to a minimum.

Check the gearbox during operation for:

- Excessive operating temperature
- Changes in gear noise
- Possible oil leakage at the housing and shaft seals

Service and maintenance

5.1 General notes about maintenance



ATEX version gearboxes

All measures, checks, and their results must be documented by the operator and records kept in a safe place for 10 years.



ATEX version gearboxes

Maintenance work only by Steinlen

Measures and work have to be performed during the repairs and servicing of ATEX gearboxes that may pose a potential ignition hazard if such work is not carried out properly.

We ensure that our gearboxes meet specifications by monitoring the internal production and logging measures at the manufacturer's factory and at trained partners.

Maintenance work on an ATEX-stamped product is only allowed to be performed by Steinlen Elektromaschinenbau GmbH or authorized partners.



WARNING

Unintentional starting of the drive unit

Secure the drive unit to prevent it from being started up unintentionally.

Attach a warning notice to the start switch.

NOTICE

Improper maintenance

Only authorized qualified personnel may perform the maintenance and servicing. Only original parts supplied by Steinlen Elektromaschinenbau GmbH may be installed.

Only qualified personnel may perform the inspection, maintenance and servicing work. Please observe the General information and safety notes (Page 5).

5.2 Regreasing the roller bearing

NOTICE

When regreasing do not mix greases with different soap bases

Drive units of motor size 160 and above need to be regreased for K2, A and P and drive units of motor size 225 and above need to be regreased for K4. The input units in these sizes are equipped with a grease nipple.

Regrease at least every 12 months or every 4 000 operating hours.

The bearings are supplied greased.

The standard lubricating grease used is a mineral-oil-based lithium-saponified grease of NLGI class 3/2.

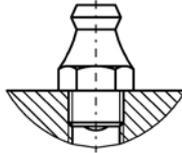


Figure 5-1 Grease nipple

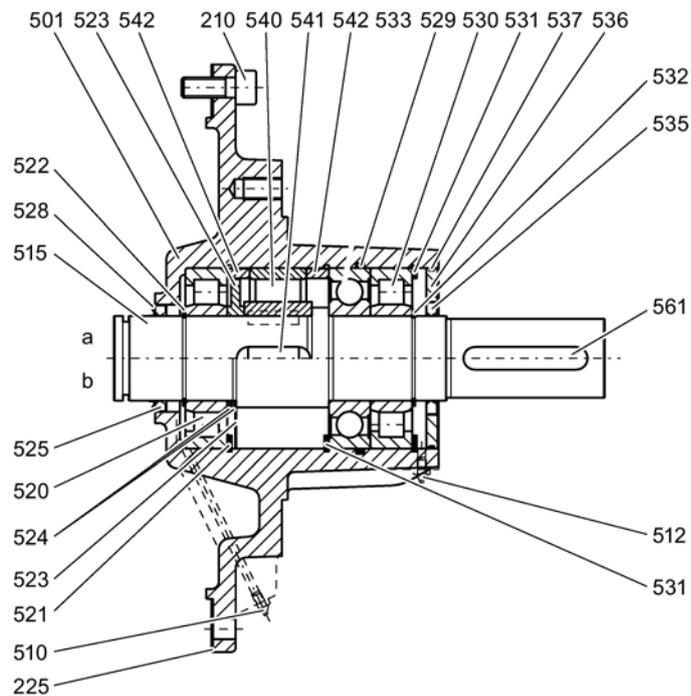
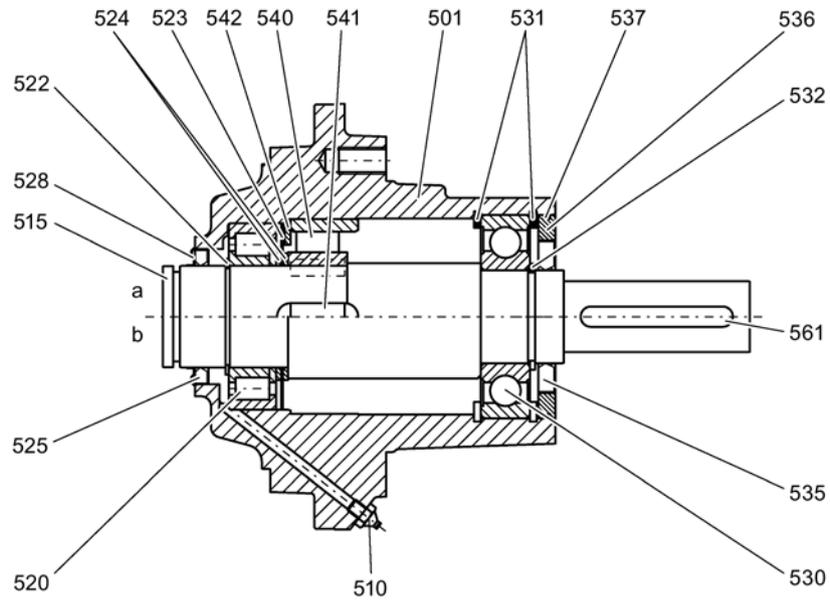
Using a grease gun, inject the grease into the bearing point via the lubricating nipples provided. Inject 50 g grease per lubricating point, unless otherwise specified in the vicinity of the lubricating point.

6.1 Stocking of spare parts

For motors with their own rating plate, the spare parts documentation in the original operating instructions applies.

6.2 Spare parts lists

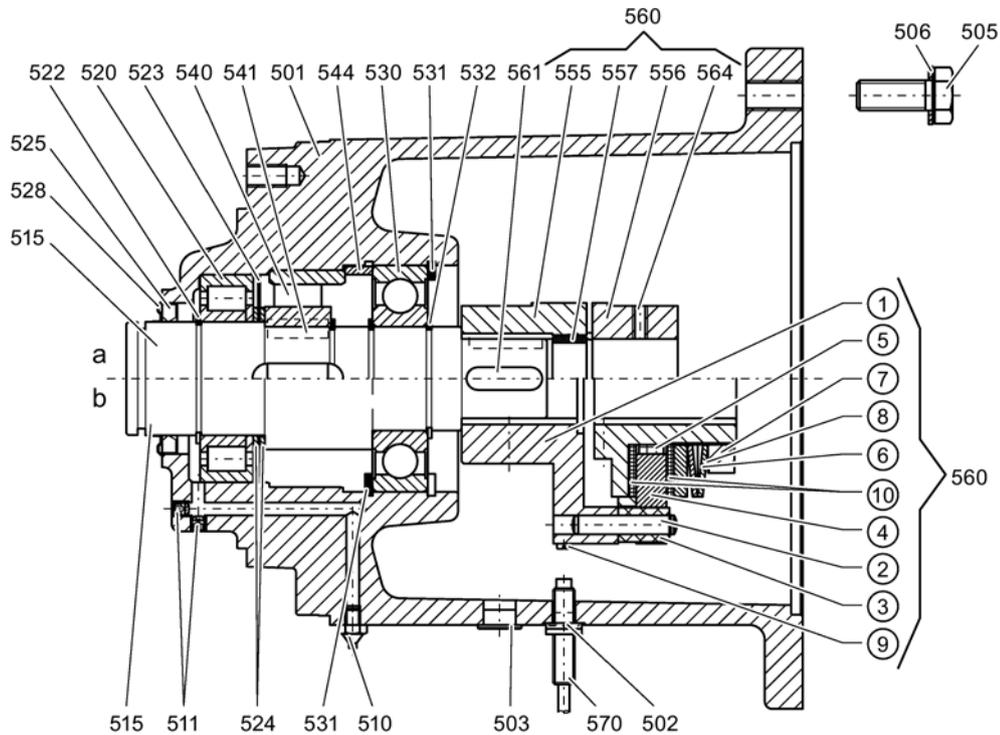
6.2.1 Input units A, A5

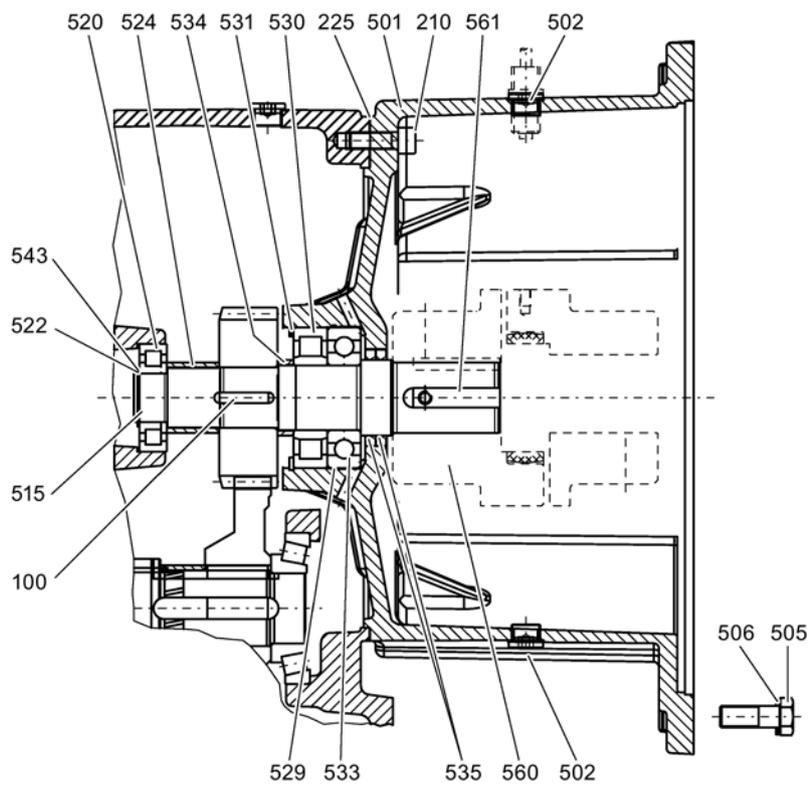
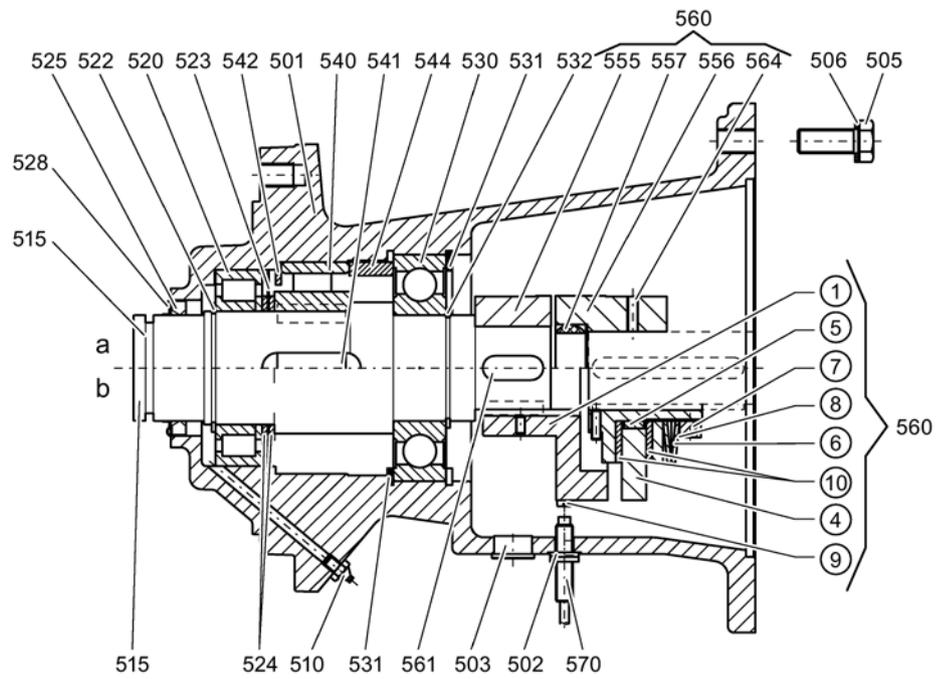


| | | | |
|-----|----------------------------|-----|---|
| a | with backstop | 528 | Oil splasher |
| b | without backstop | 529 | O ring |
| 210 | Screw | 530 | Deep-groove ball bearing / cylindrical-roller bearing |
| 225 | Seal | 531 | Locking ring |
| 501 | Cover | 532 | Locking ring |
| 510 | Tapered grease nipple | 533 | Deep-groove ball bearing |
| 512 | Tapered grease nipple | 535 | Shaft sealing ring |
| 515 | Drive shaft | 536 | Ring for shaft sealing ring |
| 520 | Cylindrical-roller bearing | 537 | O ring |
| 521 | Locking ring | 540 | Backstop |
| 522 | Locking ring | 541 | Parallel key |
| 523 | Sealing disk | 542 | Supporting disk |
| 524 | Supporting disk | 561 | Parallel key |
| 525 | Shaft sealing ring | | |

Figure 6-2 Input units A, A5

6.2.2 Input units K2, K2TC

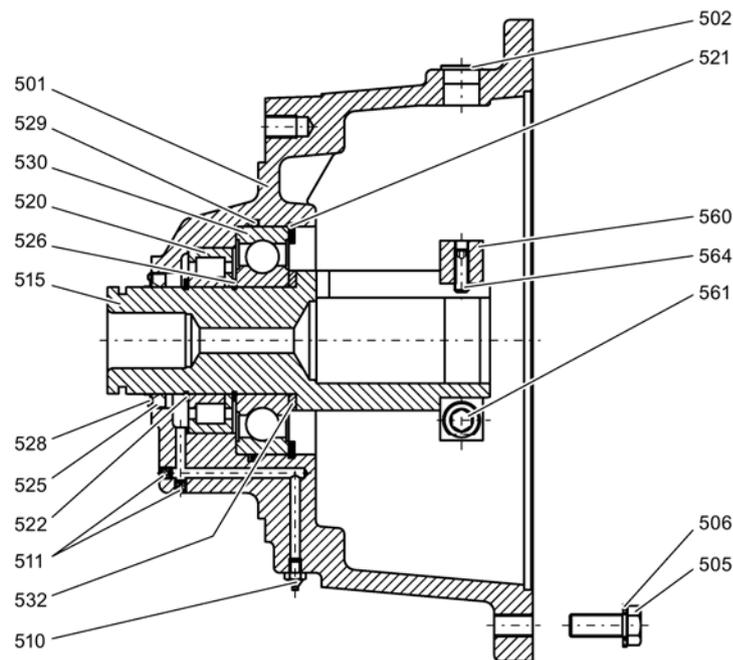
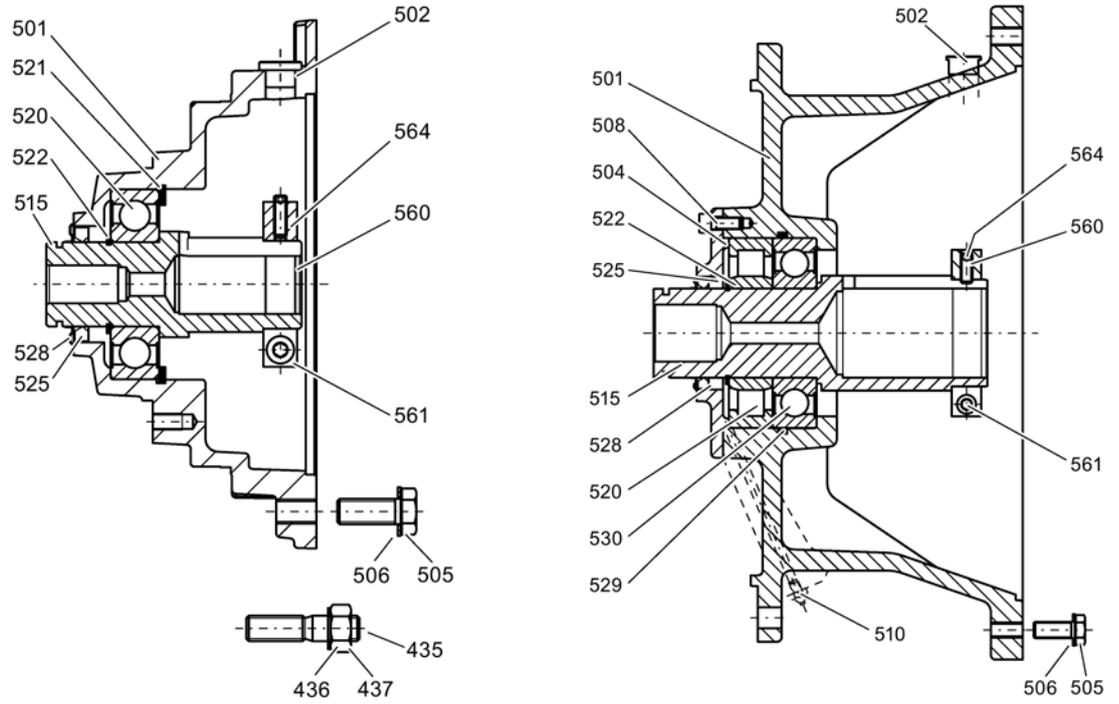




Spare parts list for input units K2, K2TC

- a with backstop
- b without backstop
- 100 Parallel key
- 210 Screw
- 225 Seal
- 501 Lantern
- 502 Plug
- 503 Plug
- 505 Screw
- 506 Locking ring
- 510 Tapered grease nipple
- 511 Grub screw
- 515 Drive shaft
- 520 Cylindrical-roller bearing
- 522 Locking ring
- 523 Sealing disk
- 524 Supporting disk / socket
- 525 Shaft sealing ring
- 528 Oil splasher
- 529 O ring
- 530 Deep-groove ball bearing / cylindrical-roller bearing
- 531 Locking ring
- 532 Locking ring
- 533 Four-point bearing
- 534 Bush
- 535 Shaft sealing ring
- 540 Backstop
- 541 Parallel key
- 542 Supporting disk
- 543 Shim
- 544 Bush
- 555 Coupling part 2
- 556 Coupling part 1
- 557 Gear ring
- 560 Coupling
- 561 Parallel key
- 564 Setscrew
- 570 Proximity switch

6.2.3 Input units K4, K5TC



6.2 Spare parts lists

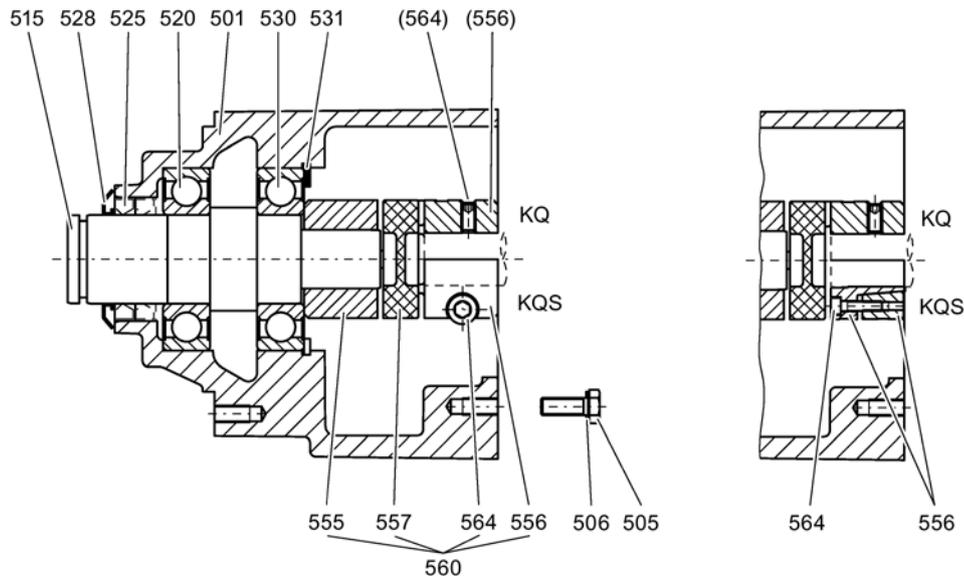
| | | | |
|-----|-----------------------|-----|---|
| 435 | Stud bolt | 520 | Deep-groove ball bearing / cylindrical-roller bearing |
| 436 | Locking ring | 521 | Locking ring |
| 437 | Hexagon nut | 522 | Locking ring |
| 501 | Lantern | 525 | Shaft sealing ring |
| 502 | Plug | 526 | Locking ring |
| 504 | Cover | 528 | Oil splasher |
| 505 | Screw | 529 | O ring |
| 506 | Locking ring | 530 | Deep-groove ball bearing |
| 508 | Screw | 532 | Shim |
| 510 | Tapered grease nipple | 560 | Clamping ring |
| 511 | Grub screw | 561 | Screw (component of item 560) |
| 515 | Drive shaft | 564 | Locking screw |

Figure 6-3 Input units K4, K5TC

6.2.4 Input units KQ, KQS

Sizes 71 – 112

Size 132



| | | | |
|-----|--------------------------|-----|--------------------------|
| 501 | Lantern | 530 | Deep-groove ball bearing |
| 505 | Screw | 531 | Locking ring |
| 506 | Locking ring | 555 | Coupling part 2 |
| 515 | Input shaft | 556 | Coupling part 1 |
| 520 | Deep-groove ball bearing | 557 | Gear ring |
| 525 | Shaft sealing ring | 560 | Coupling |
| 528 | Oil splasher | 564 | Setscrew |

Figure 6-4 Input units KQ, KQS

6.2.5 Input unit P

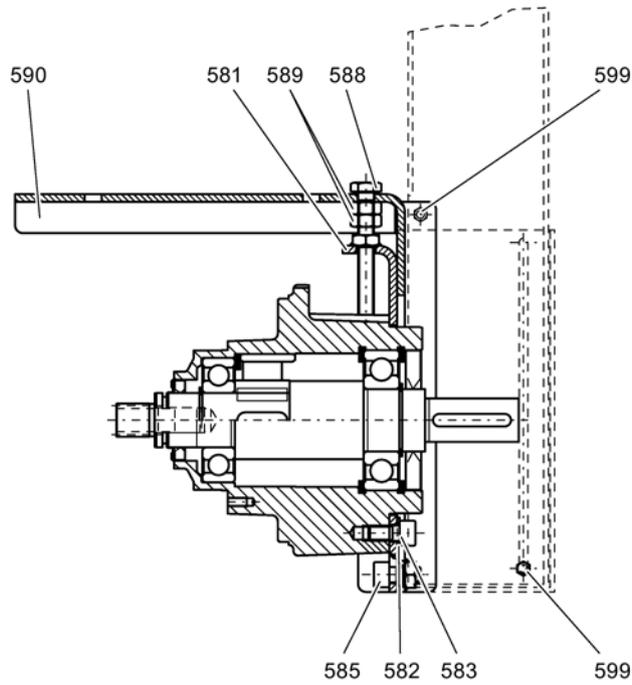


Figure 6-5 Input unit P for IEC motor up to size 112

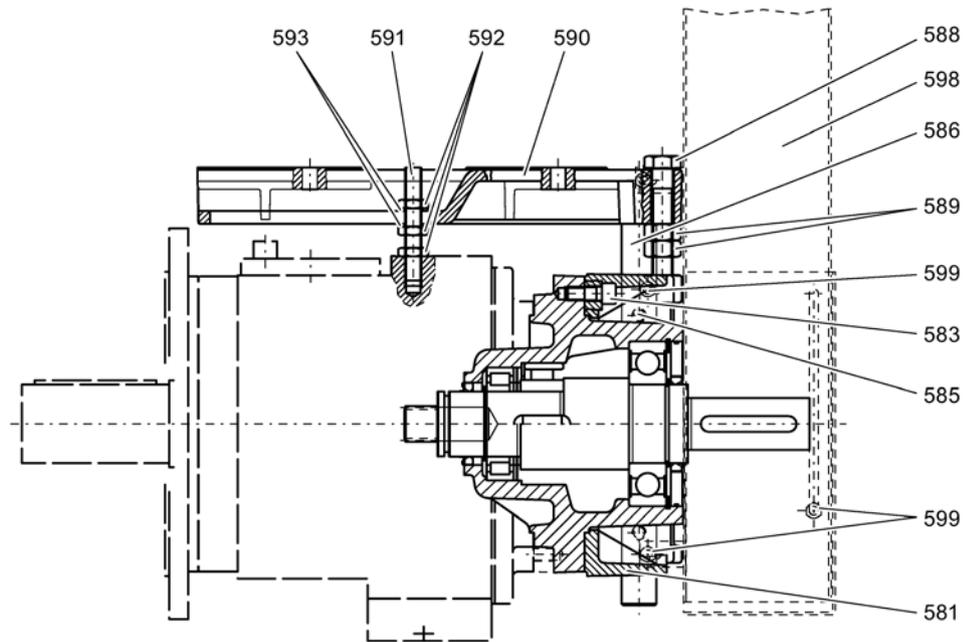


Figure 6-6 Input unit P for IEC motor up to sizes 132 to 280 on helical gearbox

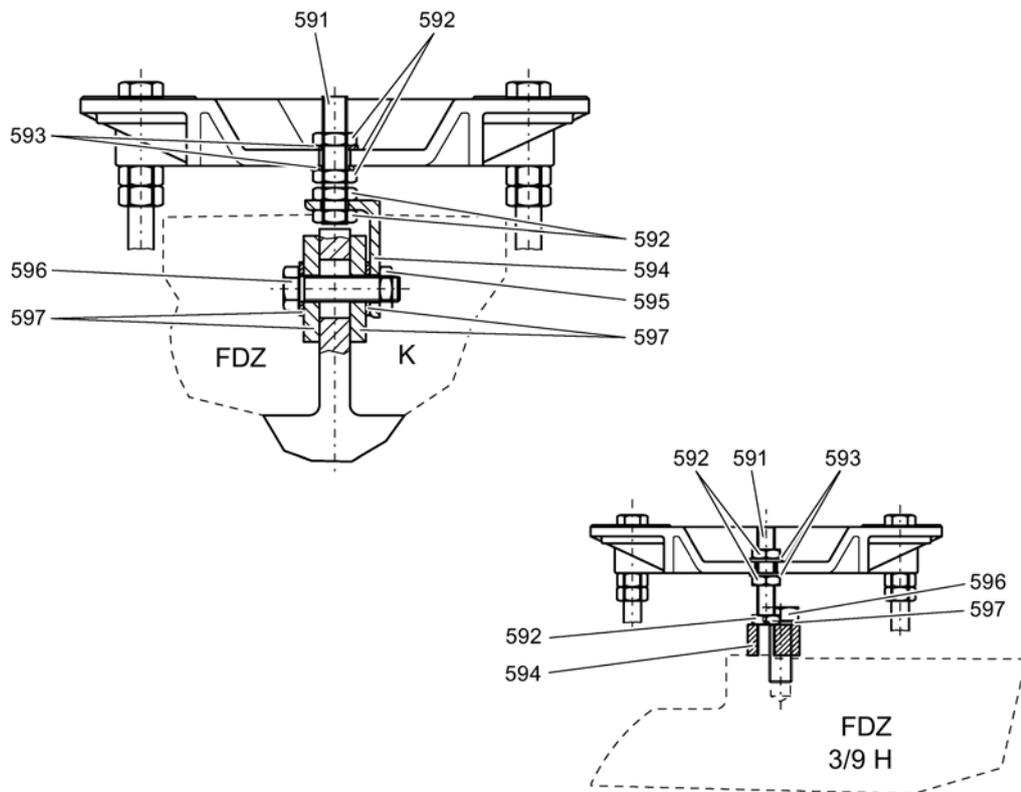


Figure 6-7 Input unit P for IEC motor up to sizes 132 to 280 on parallel shaft gearbox and bevel helical gearbox

Spare parts list for input unit P

- 581 Intermediate cover
- 582 Disk
- 583 Screw
- 585 Grub screw / screw
- 586 Column
- 588 Screw
- 589 Nut
- 590 Piggy back plate
- 591 Threaded rod
- 592 Nut
- 593 Disk
- 594 Bracket
- 595 Nut
- 596 Screw
- 597 Disk
- 598 Belt guard
- 599 Screw



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