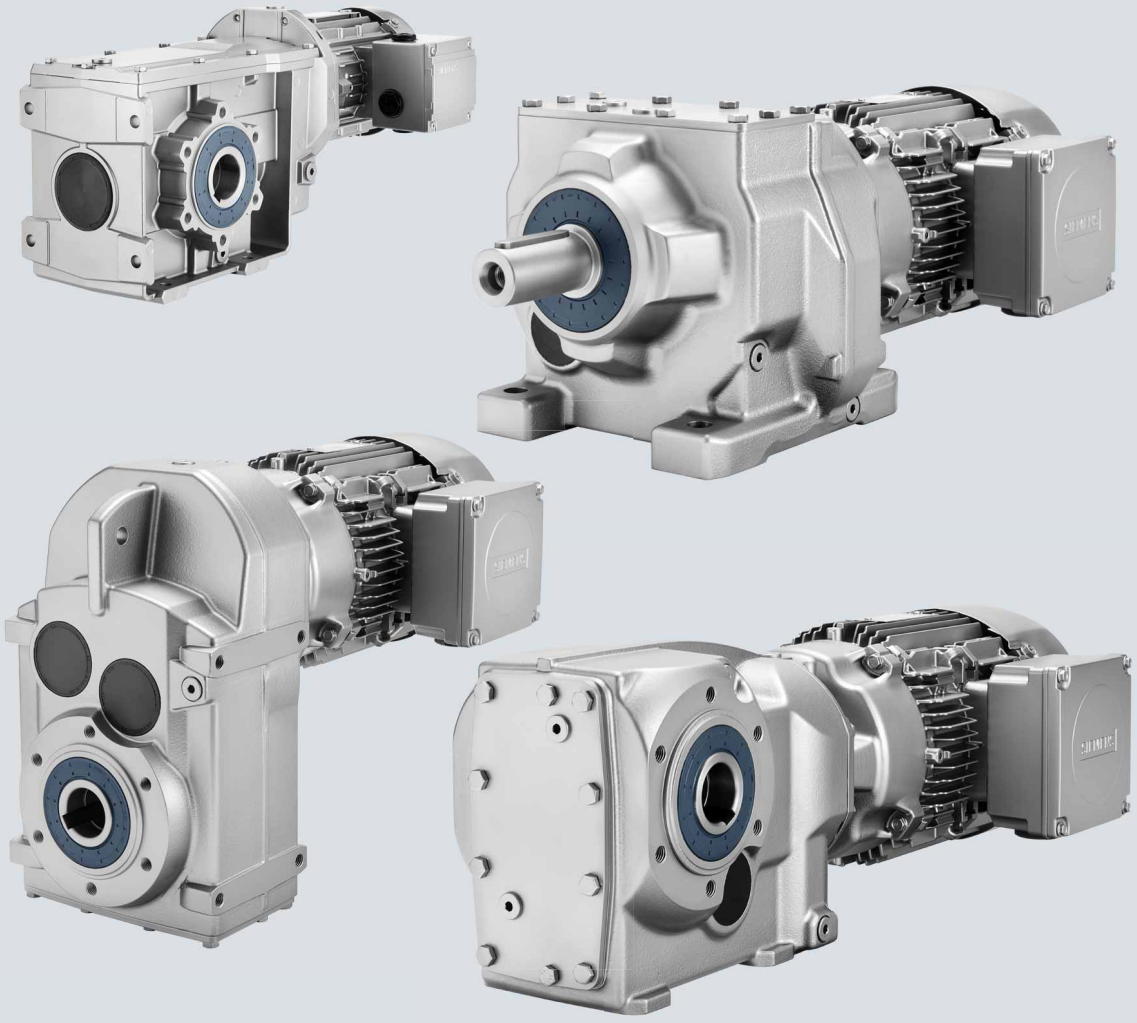
SIMOGEAR gearbox

BA 2030

Operating Instructions · 06/2012



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SIMOGEAR

Gearbox
BA 2030

Operating Instructions

Original Operating Instructions

06/12

70000004040207

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

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

without a safety alert symbol, 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 Siemens products

Note the following:

⚠ WARNING

Siemens 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 Siemens. 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.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

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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70000004040207
℗ 07/2012 Technical data subject to change

Table of contents

General information and safety notes

1

1.1 General information

NOTICE
Siemens does not accept liability for any damage or outages resulting from non-compliance with these operating instructions.

These operating instructions are an integral part of the gearbox supplied and must be kept in its vicinity for reference at all times.

These operating instructions apply to the standard version of SIMOGEAR gearboxes:

- Helical gearboxes Z and D, sizes 19 to 89
- Parallel shaft gearboxes FZ and FD, sizes 29 to 89
- Bevel gearboxes B, K, sizes 29 to 89

The precise type designation is described in Section Type designation (Page 75).

Table 1- 1 Order number code

SIMOGEAR gearbox	Structure of the order number - Position				
	1	2	3	4	5
Helical gearbox Z	2	K	J	3	1
Helical gearbox D	2	K	J	3	2
Parallel shaft gearbox FZ	2	K	J	3	3
Parallel shaft gearbox FD	2	K	J	3	4
Bevel gearbox B, K	2	K	J	3	5

Note

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

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

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

In the interest of technical progress we reserve the right to make changes to the individual assemblies and accessories which we regard as necessary to preserve their essential characteristics and improve their efficiency and safety.

If you have any technical questions, please contact Technical Support.

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Internet German: http://www.siemens.de/automation/support-request

Internet English: http://www.siemens.com/automation/support-request

Applicable operating instructions

BA 2030 operating instructions for SIMOGEAR gearboxes.

BA 2330 operating instructions for LA / LE motors for mounting on SIMOGEAR gearboxes.

1.2 Copyright

1.3 Intended use

The SIMOGEAR 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 plants and equipment in industrial environments.

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 performance data assumes an ambient temperature of -20 °C to +40 °C and an installation altitude of up to 2 000 m above sea level.

In the case of other ambient temperatures and installation altitudes, please contact Technical Support.

The gearboxes have been designed solely for the application described in Technical data (Page 75). Do not operate the gearboxes outside the specified power limits. Other operating conditions must be contractually agreed.

Do not stand or walk on the gearbox or place objects on the gearbox.

1.4 Obligations of the user

The operator must ensure that all persons assigned to work on the gearbox 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 others
- Ensure the safety and reliability of the gearbox
- 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.

Ensure compliance with the relevant safety and environmental regulations during transport, mounting and dismantling, operation, and care and maintenance of the unit.

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, immediately switch off the drive unit.

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

Take appropriate 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 gearbox. Do not use the gearbox as a grounding point for welding operations.

Carry out equipotential bonding in accordance with applicable regulations and directives. Such work must be carried out by qualified electrical personnel only.

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

Observe the permissible tightening torque of the fastening bolts.

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

We will only accept liability for original spare parts supplied by Siemens AG.

If the geared motor is being installed in a plant or equipment, the manufacturers of such plant or equipment must ensure that the contents of these operating instructions are incorporated into their own instructions, information, and descriptions.

1.5 Particular types of hazards

⚠ WARNING

Depending on operating conditions, the gearbox may exhibit 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

Danger of scalding caused by hot oil emerging from the unit.

Before starting any work wait until the oil has cooled down to below +30 °C.

⚠ WARNING

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 required personal protective equipment, wear suitable protective gloves and eyewear when working with the gearbox or the geared motor.

Technical description 2

2.1 General technical description

The gearbox is supplied with two or three transmission stages.

The gearbox is suitable for various mounting positions. Observe the correct oil level.

Housing

The housings for sizes 19 and 29 are made of die-cast aluminum.

Depending on the gearbox type, the housings of sizes 39 and 49 are made of die-cast aluminum or cast iron.

Table 2- 1 Housing material

Gearbox type	Size	
	39	49
Helical gearbox	Aluminum	Cast iron
Parallel shaft gearbox	Cast iron	Cast iron
Bevel gearbox B	Aluminum	Aluminum
Bevel gearbox K	Cast iron	Cast iron

From size 59, the gearbox housings are made of cast iron.

Geared components

The geared components are hardened and ground.

The bevel gear stage is lapped in pairs.

Lubrication

The geared components are supplied with adequate lubricant by means of dip lubrication.

Shaft bearings

All shafts are mounted in roller bearings. The roller bearings are lubricated by means of dip lubrication or oil spray lubrication. Bearings that are not supplied with lubricant are closed and grease-lubricated.

2.2 Shaft seals

The shaft seals on the output side prevent lubricant from escaping from the housing at the shaft outlet and prevent pollution from entering the housing.

The optimum use of the seals depends on the ambient conditions and the lubricant being used.

Radial shaft sealing ring

A high-quality radial shaft sealing ring is used as standard seal. It is provided with an additional dust lip to protect against contaminants from outside.

Seal for a longer service life (optional)

The radial shaft sealing ring with dust lip has an additional buffer axial seal towards the inside of the gearbox. This has a sinusoidally shaped sealing lip to protect against the ingress of pollution in the oil in the sealing ring.

Seal to handle increased environmental stress (optional)

This seal is equipped with an additional fiber washer. In addition to a longer service life, it also provides higher protection against increased environmental stress as a result of humidity and dust.

2.3 Cooling

NOTICE
Dust deposits prevent heat radiation and cause high housing temperatures.
Keep the gearbox free from dirt, dust, etc.

The gearbox does not normally require additional cooling. The generously dimensioned housing surface is sufficient for dissipating heat losses where there is free convection. If the housing temperature exceeds a value of +80 °C, please contact Technical Support.

2.4 Rating plate

The rating plate on the gearbox or geared motor is of coated aluminum foil. It is covered with a special masking film which ensures permanent resistance to UV radiation and media of all kinds, such as oils, greases, salt water and cleaning agents.

The adhesive and the material ensure firm adhesion and long-term legibility within the operating temperature range from -40 °C to +155 °C.

The edges of the rating plate are paint-finished to match the color of the gearbox or motor to which it is affixed.

2.5 Surface treatment

2.5.1 General information on surface treatment

All paint finishes are sprayed on.

NOTICE
Any damage to the paint finish will destroy the exterior protection and cause corrosion.
Do not damage the paint finish.

Note

Information about repaintability is not a guarantee of the quality of the paint product purchased from your supplier.

Only the paint manufacturer is liable for the quality and compatibility.

2.5.2 Painted version

The corrosion protection system is classified according to the corrosiveness categories in DIN EN ISO 12944-2.

Table 2- 2 Paint according to corrosiveness categories

Paint system	Description
Corrosiveness category C1, unpainted for gearbox housings made of aluminum	
	• Indoor installation • Heated buildings with neutral atmospheres • Resistance to greases and some resistance to mineral oils, aliphatic solvents • Standard
Corrosiveness category C1 for normal environmental stress	
1-component hydro paint, top coat	• Indoor installation • Heated buildings with neutral atmospheres • Resistance to greases and some resistance to mineral oils, aliphatic solvents • Standard paint for gearbox casings made of cast iron
Corrosiveness category C2 for low environmental stress	
2-component polyurethane base coat 2-component, polyurethane top coat	• Indoor and outdoor installation • Unheated buildings with condensation, production areas with low humidity, e.g. warehouses and sports facilities • Atmospheres with little contamination, mostly rural areas • Resistance to greases, mineral oils and sulfuric acid (10 %), caustic soda (10 %) and some resistance to aliphatic solvents

Paint system	Description
Corrosiveness category C3 for medium environmental stress	
2-component polyurethane base coat 2-component, polyurethane top coat	• Indoor and outdoor installation • Production areas with high humidity and some air contamination, e.g. food production areas, dairies, breweries and laundries • Urban and industrial atmospheres, moderate contamination from sulfur dioxide, coastal areas with low salt levels • Resistance to greases, mineral oils, aliphatic solvents, sulfuric acid (10 %), caustic soda (10 %)
Corrosiveness category C4 for high environmental stress	
2-component epoxy zinc phosphate base coat 2-component polyurethane top coat	• Indoor and outdoor installation • Chemical plants, swimming pools, wastewater treatment plants, electroplating shops, and boathouses above seawater • Industrial areas and coastal areas with moderate salt levels • Resistance to greases, mineral oils, aliphatic solvents, sulfuric acid (10 %), caustic soda (10 %)
Corrosiveness category C5 for very high environmental stress	
2-component epoxy zinc phosphate base coat 2-component epoxy iron mica intermediate coat 2-component polyurethane top coat	• Indoor and outdoor installation • Buildings and areas with almost constant condensation and high contamination, e.g. malt factories and aseptic areas • Industrial areas with high humidity and aggressive atmosphere, coastal areas and offshore environments with high salt levels • Resistance to greases, mineral oils, aliphatic solvents, sulfuric acid (10 %), caustic soda (20 %)

In case of corrosiveness category C1, can be overpainted with 1-component hydrosystem after prior rubbing down.

In case of corrosiveness categories C2 to C5, can be overpainted with 2-component polyurethane paint, 2-component epoxide paint and 2-component acrylic paint after prior rubbing down.

2.5.3 Primed version

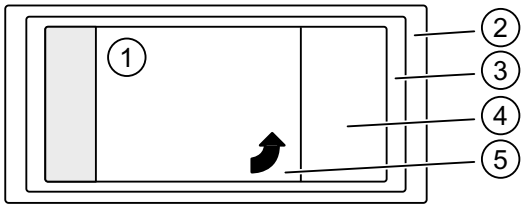
Table 2- 3 Primer according to corrosiveness category

Paint system	Can be overpainted with
Unpainted corrosiveness category C1	
Cast iron parts immersion primed, steel parts primed or zinc-plated, aluminum and plastic parts untreated	Plastic paint, synthetic resin paint, oil paint, 2-component polyurethane paint, 2-component epoxide paint
Primed according to corrosiveness category C2 G	
2-component metal primer, desired coat thickness 60 µm	2-component polyurethane paint, 2-component epoxide paint and acid-hardening paint, 2-component acrylic paint
Primed according to corrosiveness category C4 G	
2-component epoxy zinc phosphate, desired coat thickness 120 µm	2-component polyurethane paint, 2-component epoxide paint and acid-hardening paint, 2-component acrylic paint

On gearbox or geared motor versions which are primed or unpainted the rating plate and the masking film are covered with a paint-protective film. These facilitate repainting without further preparation, e.g., masking with adhesive tape.

Peeling off the paint-protective film

The paint coat must have fully hardened before the paint-protective film is peeled off (be at least "touch-proof").



① Company logo
② Masking film
③ Rating plate
④ Paint-protective film
⑤ Peeling tab

Figure 2-1 Rating plate with paint-protective film

Procedure

1. Pull the peeling tab ⑤ up.
2. Carefully peel the paint-protective film ④ off diagonally from one corner (not parallel to the plate).
3. Blow any paint fragments away or wipe them off with a clean cloth.

You have now removed the paint-protective film.

Incoming goods, transport, and storage 3

3.1 Incoming goods

NOTICE
Make sure that damaged gearboxes or geared motors are not put into operation.

Note

Do not open or damage parts of the packaging that preserve the product.

Note

Check that the technical specifications are in accordance with the purchase order.

Inspect the delivery immediately on arrival for completeness and any transport damage.

Notify the freight company of any damage caused during transport immediately (this is the only way to have damage rectified free of charge). Siemens AG will not accept any claims relating to items missing from the delivery and which are submitted at a later date.

The gearbox or geared motor is delivered in a fully assembled condition. Additional items may be delivered packaged separately.

The products supplied are listed in the dispatch papers.

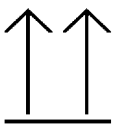
3.2 Transport

3.2.1 General information on transport

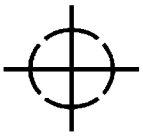
NOTICE
The use of force will damage the gearbox or geared motor.
Transport the gearbox or geared motor carefully. Avoid knocks.
Before putting the drive into operation, remove any transport fixtures and keep them safe or render them ineffective. You can then use them again for transporting further items or you can apply them again.

Different forms of packaging may be used, depending on the size of the gearbox or geared motor and the method of transport. Notwithstanding contractual agreements to the contrary, the seaworthy packaging complies with HPE Packaging Guidelines (Bundesverband Holzpackmittel Paletten Exportverpackungen e.V., the German Federal Association for wooden packaging, pallets, and export packaging).

Note the symbols which appear on the packaging. These have the following meanings:



This way up



Center of gravity

Fragile

Do not use hand hook

Keep dry

Attach here

Keep cool

3.2.2 Fastening for suspended transport

⚠ WARNING

Gearboxes or geared motors may come loose and fall down during transport if not secured sufficiently.

Use only the transport eye or eyebolt of the gearbox to transport the gearbox or geared motor. This is only designed for the weight of the gearbox or geared motor, and it is not permissible to add additional loads.

Do not use the integrally cast lifting eyes on the motor for transport because of the risk of breaking.

If necessary, use additional, suitable lifting accessories for transport or during installation.

When attaching by a number of chains and ropes just two strands must be sufficient to bear the entire load. Secure lifting accessories against slipping.

CAUTION

Do not rig eyebolts to the front threads at the shaft ends for transportation purposes.

Table 3- 1 Maximum load of the eyebolt on the gearbox

Thread size	m	d_3	Thread size	m	d_3
	[kg]	[mm]		[kg]	[mm]
M8	140	36	M20	1 200	72
M10	230	45	M24	1 800	90
M12	340	54	M30	3 200	108
M16	700	63			

The eyebolt corresponds to DIN 580.

3.3 Storage

3.3.1 General information for storage

⚠ WARNING

Do not stack gearboxes or geared motors one on top of another.

NOTICE

Mechanical damage (scratches), chemical damage (acids, alkalis) and thermal damage (sparks, welding beads, heat) cause corrosion which may render the external protective coating ineffective.

Do not damage the paint finish.

Note

Notwithstanding contractual agreements to the contrary, the guarantee period for the standard preservative lasts 6 months from the date of delivery.

In the case of storage in transit over 6 months, special arrangements must be made for preservation. Please contact Technical Support.

Store the gearbox or geared motor in dry, dust-free rooms that are maintained at a constant temperature.

The storage location must be vibration- and shock-free.

The free shaft ends, sealing elements and flange surfaces must have a protective coating.

3.3.2 Storage up to 6 months

The gearbox or geared motor must be covered and stored in its position of use on a horizontal wooden support in a dry place not subject to significant temperature fluctuations.

3.3.3 Storage up to 36 months with long-term preservation (optional)

3.3.3.1 Notes for storage up to 36 months

Store the gearbox or geared motor in dry, dust-free rooms that are maintained at a constant temperature. Special packing is then not necessary.

Otherwise, the gearbox or geared motor must be packed in plastic film or packed in airtight sealed film and water absorbing agents. Cover them to provide protection against heat, direct sunlight and rain.

The permissible ambient temperature range is -25 °C to +50 °C.

The life of the corrosion protection is 36 months from delivery.

3.3.3.2 Gearbox filled with operating oil and anti-corrosive agent

NOTICE
Check the oil level before commissioning.
Observe the information and procedures in Section Checking the oil level (Page 58).

The gearbox is filled with oil corresponding to the mounting position so that it is ready for operation, and is sealed airtight using a screw plug or with a pressure breather valve with transport fixture.

For storage up to 36 months, a VCI anti-corrosion agent (**V**olatile **C**orrosion **I**nhibitor) is added.

3.3.3.3 Gearbox completely filled with oil

NOTICE
The gearbox is completely filled with operating oil.
Check the oil level before commissioning.
Observe the information and procedures in Section Checking the oil level (Page 58).

When using biologically degradable oils or oils for the foodstuff area, the gearboxes are completely filled with operating oil and sealed airtight using a screw plug or with a pressure breather valve with transport fixture.

Do not lower the oil level during short-time commissioning for 10 minutes in no-load operation.

Installation 4

4.1 Unpacking

NOTICE
Make sure that damaged gearboxes or geared motors are not put into operation.

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

Remove packaging and transport fixtures and dispose of them properly.

4.2 General information on installation

⚠ WARNING
The entire system must be load-free so that there is no danger during this work.

NOTICE
Irreparable damage to toothed components and bearings due to welding. Do not carry out any welding work on the gearbox. The gearbox must not be used as a grounding point for welding operations.

NOTICE
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

Exceeding the permissible oil sump temperature due to incorrect settings of temperature monitoring equipment.

A warning must be given when the maximum permissible oil sump temperature is reached. The geared motor must be switched off when the maximum permissible oil sump temperature is exceeded. This switching off can cause plant shutdown.

Note

Use headless screws of strength class 8.8 or higher to fasten the gearbox.

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

4.3 Thread sizes and tightening torques for fastening bolts

The general tolerance for the tightening torque in Nm is 10 %. The friction coefficient is 0.14 µ.

Table 4- 1 Tightening torques for fastening bolts

Thread size	Tightening torque at 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

Table 4- 2 Thread size of fastening bolts for gearboxes in a foot-mounted design

Thread size	Helical gearbox	Parallel shaft gearbox	Bevel gearbox
	Size	Size	Size
M8	29, 39	29, 39	B29, B39
M10		49	B49, K39, K49
M12	49, 59, 69	69, 79	K69, K79
M16	79, 89	89	K89

Table 4- 3 Thread size of fastening bolts for gearboxes in a flange-mounted design

Thread size	Flange	Helical gearbox	Parallel shaft gearbox	Bevel gearbox
		Size	Size	Size
M6	A120	19, 29, 39	29	B29
M8	A140, A160	19, 29, 39, 49, 59	29, 39	B29, B39, K39
M10	A200	39, 49, 59, 69	49	B39, B49, K49
M12	A250, A300	59, 69, 79, 89	69, 79, 89	K69, K79, K89
M16	A350	89		

4.4 Fastening in the case of high shock loads

In the case of high shock loads provide additional suitable positive fastenings such as cylindrical taper pins or spring pins.

NOTICE
Do not use spring washers, serrated lock washers, spring or toothed lock washers, cup washers or conical spring washers as a substitute for the above positive fastenings.
Do not subject the housing to excessive stress when tightening the fastening bolts.

4.5 Gearbox with foot mounting

NOTICE
Do not subject the gearbox to excessive stress when tightening the fastening bolts.
The foundation must be level and free from dirt.
The levelness deviation of the gearbox support must not exceed the following values:
For gearboxes up to size 89: 0.1 mm

The foundation should be designed in such a way that no resonance vibrations are created and no vibrations are transmitted from adjacent foundations.

The foundation structure on which the gearbox is to be mounted must be torsionally rigid. It must be dimensioned according to the weight and torque, taking into account the forces acting on the gearbox. If the substructure is too weak, it will cause radial or axial displacement, which cannot be measured at a standstill.

When using foundation blocks to fasten the gearbox to a concrete foundation, suitable recesses should be made in the foundation.

Align and grout the slide rails into the foundation.

Align the gearbox carefully with the units on the input and output side. Take into account the elastic deformation due to operating forces.

Prevent displacement from external forces due to lateral impacts.

Use stud bolts or headless screws of strength class 8.8 or higher for the mounting foot. Observe the tightening torque.

4.6 Gearboxes in foot or flange version

NOTICE
Do not subject the gearbox housing to excessive stress by adding add-on elements to the foot or flange. Add-on elements must not transmit forces, torques, and vibrations to the gearbox.

The gearbox must only be mounted at either the flange or the foot to transmit force and torque in order to prevent excessive stress to the gearbox housing, see Gearbox with foot mounting (Page 28).

The second mounting option (foot or flange) is intended for add-on elements, e.g. protection covers with an intrinsic weight of up to max. 30 % of the weight of the gearbox.

4.7 Mounting an input or output element on the gearbox shaft

⚠ WARNING
Risk of burns due to hot parts. Do not touch the gearbox without protection.

NOTICE
Damage to shaft sealing rings caused by solvent or benzine. Avoid contact at all times.

NOTICE
Damage to shaft sealing rings caused by heating over 100 °C. Protect shaft sealing rings from heating up due to radiant heat using thermal shields.

NOTICE
Alignment errors caused by excessive angle or axial displacement of the shaft ends to be joined lead to premature wear or material damage. Ensure precise alignment of the individual components.

NOTICE
Damage to bearings, housing, shaft, and locking rings 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, the heat can be applied 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.

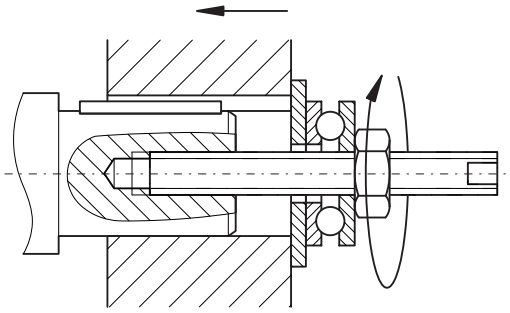
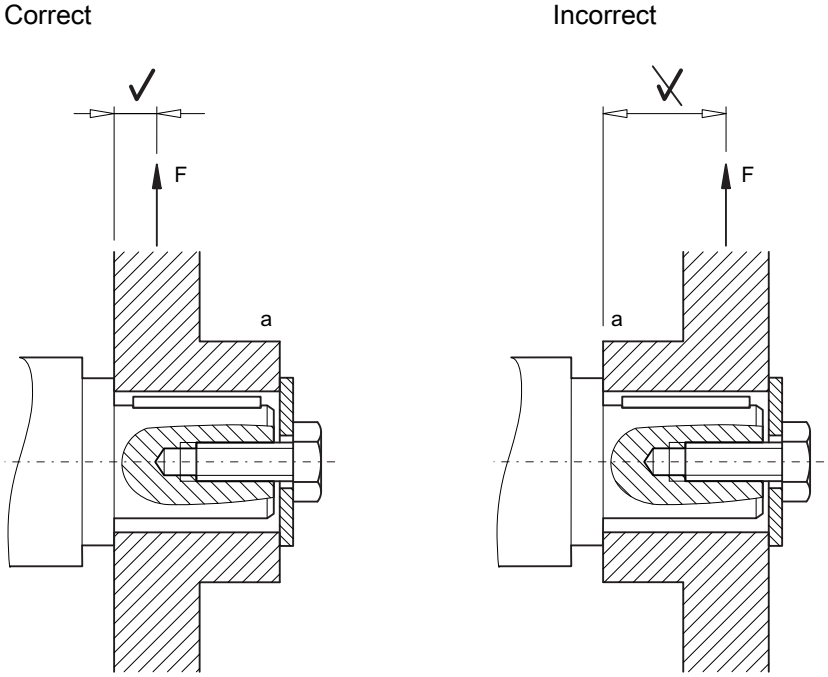


Figure 4-1 Example of a fitting device

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



a Hub
F Force

Figure 4-2 Mounting arrangement for the lowest possible stress on shafts and bearings

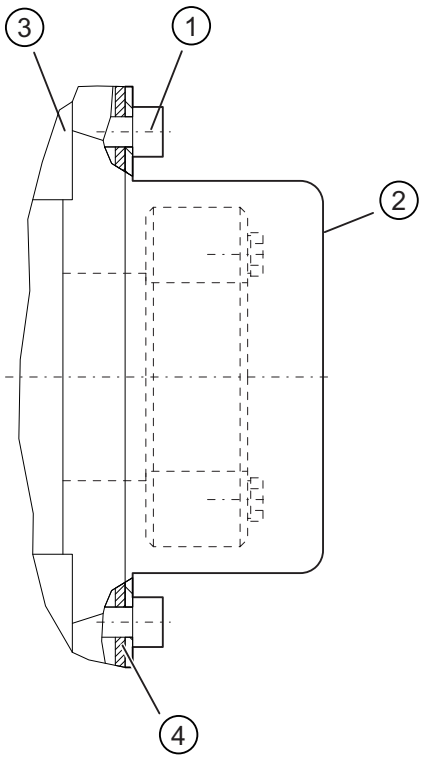
Procedure

1. Using either benzine or solvent, remove the anti-corrosion protection from the shaft ends and flanges and remove the protective skin provided.
2. Fit the input and output elements onto the shafts and secure them if necessary.

You have now fitted the input or output element.

4.8 Removing and installing the protection cover

The protection cover is delivered ready-fitted to the gearbox flange. The protection cover must be removed in order to fit the output shaft.



① Bolt
② Protection cover
③ Gearbox housing
④ Flat seal

Figure 4-3 Protection cover for hollow shaft and hollow shaft with shrink disk

Procedure

1. Release the screws ① and remove the protection cover ② and the flat seal ④.
2. Fit the output shaft.
3. Using a suitable cleaning agent, clean the contact surface of the protection cover ② on the gearbox.
4. Ensure that the flat seal ④ is correctly seated.
5. Screw on the protection cover ②.
6. Protect all remaining bare areas with a suitable permanent anti-corrosive agent.

You have now installed the protection cover for operation.

4.9 Installing and removing the shaft-mounted gearbox

4.9.1 General information on installing the shaft-mounted gearbox

NOTICE
Damage to shaft sealing rings caused by solvent or benzine.
Avoid contact at all times.

NOTICE
Misalignment of and stress on the hollow shaft can lead to excessive load and cause the bearings to fail.
The hollow shaft must be flush with the machine shaft to avoid misalignment.
Do not subject the hollow shaft to axial and radial stress.

NOTICE
For shrink disks:
Lubricants in the area between the hollow shaft and machine shaft impair torque transmission.
Keep the bore in the hollow shaft and the machine shaft completely grease-free.
Do not use impure solvents and soiled cleaning cloths.

Note

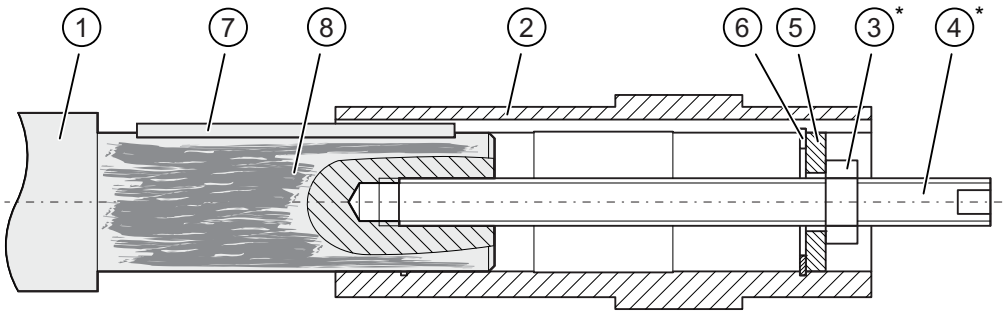
Coat the contact surfaces with the mounting paste supplied with the product or any suitable lubricant to prevent frictional corrosion.

Note

Observe the permissible concentricity tolerance of the cylindrical shaft extension of the machine shaft to the housing axle according to DIN 42955.

4.9.2 Mounting and removing the hollow shaft with feather key

4.9.2.1 Mounting the hollow shaft with parallel key



* Not included in scope of supply
① Machine shaft
② Hollow shaft
③ Hexagon nut
④ Threaded spindle
⑤ Disk
⑥ Locking ring
⑦ Parallel key
⑧ Mounting paste

Figure 4-4 Mounting the hollow shaft with parallel key

Instead of the nut and threaded spindle shown in the diagram, other types of equipment such as hydraulic lifting equipment may be used.

Procedure

1. Using benzine or a solvent, remove the anti-corrosion protection from the shaft ends and flanges.
2. Check the seats or edges of the hollow and machine shafts for damage. Please contact Technical Support if you notice any damage.
3. Evenly apply the mounting paste ⑧ to the machine shaft ①.
4. Fit the gearbox using the disk ⑤, threaded spindle ④ and nut ③. Support is provided by the hollow shaft ②.
5. Replace the nut ③ and threaded spindle ④ with a setscrew and tighten them to the specified torque.

You have now mounted the hollow shaft.

Table 4- 4 Tightening torque for setscrews

Thread size	M5	M6	M8	M10	M12	M16	M20	M24	M30
Tightening torque [Nm]	5	8	8	14	24	60	120	200	400

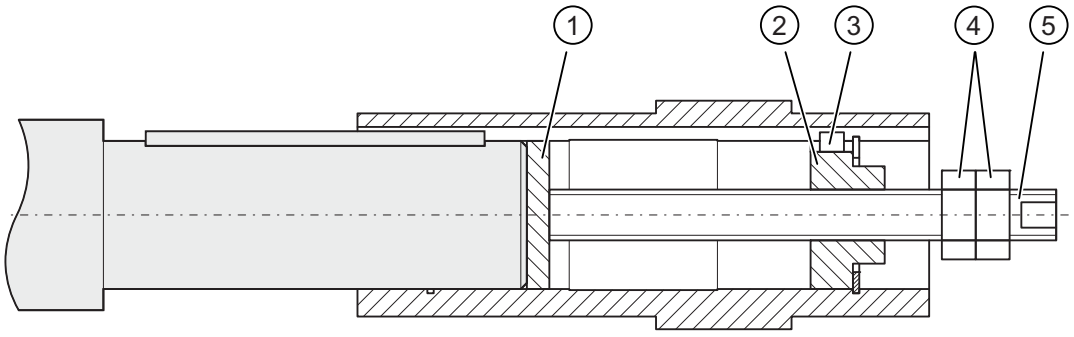
4.9.2.2 Removing the hollow shaft with parallel key

NOTICE
Before driving out the machine shaft, fasten a suitably dimensioned means of absorbing the load at the gearbox. Slightly pretension the pulling equipment so that the gearbox does not drop onto it when the insert shaft is released.

NOTICE
It is essential to prevent misalignment when removing the unit.

Note

If frictional corrosion has occurred on the seat surfaces, use rust solvent to facilitate the removal of the gearbox. Allow an adequately long time for the rust solvent to take effect.



① Disk
② Threaded block
③ Parallel key
④ Hexagon nut
⑤ Threaded spindle

Figure 4-5 Removing the hollow shaft with parallel key

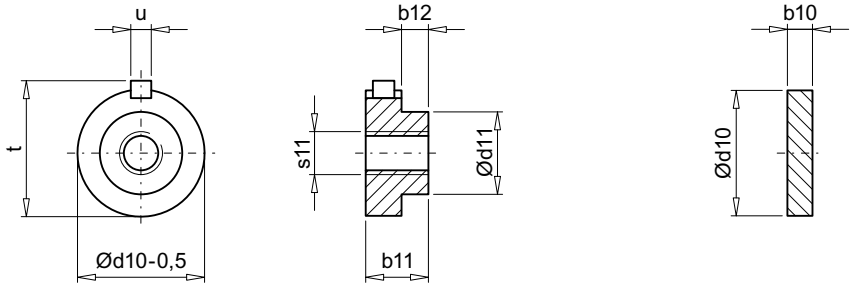
Items ① to ⑤ are not included in the scope of delivery.

Procedure

1. Remove the axial locking element from the hollow shaft.
2. Drive out the machine shaft using the disk ①, threaded block ②, parallel key ③, threaded spindle ⑤, and hexagon nuts ④.

You have now removed the hollow shaft with parallel key.

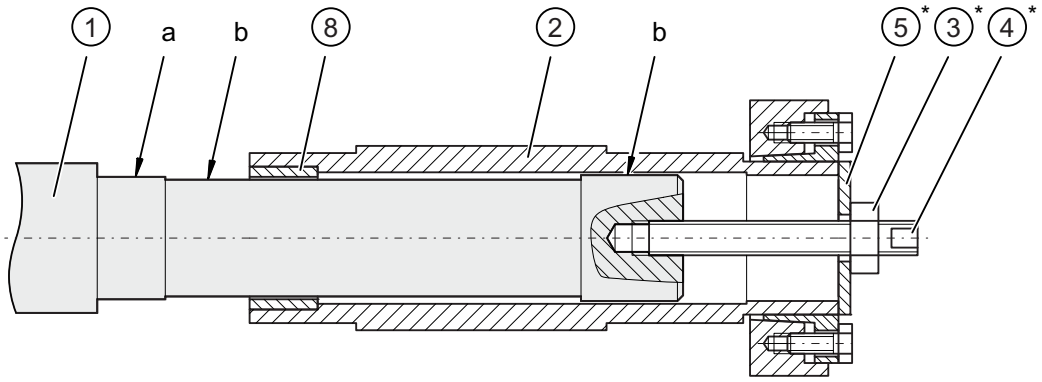
Design suggestion for threaded block and disk



Size	b10	b11	b12	d10	d11	s11	t_{max}	u
	[mm]	[mm]	[mm]	[mm]	[mm]		[mm]	[mm]
29	3	15	10	19.9	10	M6	22.5	6
				24.9	14	M8	28	8
39	-	15	10	-	14	M8	28	8
	6			29.9	18	M10	33	
							38	10
49	6	15	5	34.9	24	M12	43	10
				39.9	28			12
69	6	20	9	39.9	28	M16	48.5	12
				44.9	33			14
79	6	20	9	39.9	28	M16	48.5	12
89	7	20	10	49.9	36	M16	64	14
				59.9	45			18

4.9.3 Mounting the hollow shaft with shrink disk

4.9.3.1 Mounting the hollow shaft with shrink disk



a Greased
b Absolutely grease-free
* Not included in scope of supply
① Machine shaft
② Hollow shaft
③ Hexagon nut
④ Threaded spindle
⑤ Disk
⑧ Bronze bushing

Figure 4-6 Mounting the hollow shaft with shrink disk

Instead of the nut and threaded spindle shown in the diagram, other types of equipment such as hydraulic lifting equipment may be used.

Procedure

1. Using benzine or a solvent, remove the anti-corrosion protection from the shaft ends and flanges.
2. Check the seats or edges of the hollow and machine shafts for damage. Please contact Technical Support if you notice any damage.
3. Fit the gearbox using the disk ⑤, threaded spindle ④ and nut ③. Support is provided by the hollow shaft ②.
4. Remove the disk ⑤, threaded spindle ④ and nut ③.

You have now mounted the hollow shaft.

4.9.3.2 Mounting the shrink disk

⚠ WARNING

Risk of injury due to freely rotating parts.

Fit a cover cap or protection cover.

NOTICE

The shrink disk is delivered ready for installation.

Do not dismantle it before the initial fitting.

NOTICE

Lubricants in the area of the shrink disk seat impair torque transmission.

Keep the bore in the hollow shaft and the machine shaft completely grease-free.

Do not use impure solvents and soiled cleaning cloths.

NOTICE

Plastic deformation of the hollow shaft when tightening the tightening bolts before fitting the machine shaft.

First fit machine shaft. Then tighten the tightening bolts.

NOTICE

Avoid overloading the individual bolts.

Do not exceed the maximum tightening torque for tightening bolt.

Sizes 29 - 69:
Tighten the tightening bolts ③.

Sizes 79 - 89:
What is of prime importance is that the end faces of the outer ring ① and inner ring ② are flush with one another. If they are not flush with one another when tensioning, the tolerance of the insert shaft must be checked.

Note

The machine shaft material must comply with the following criteria in order to safely and reliably transfer the forces and torques.

Yield point, Re >= 360 Nm / mm^2

Modulus of elasticity: approx. 206 kN / mm^{-2}

Note

The hollow shaft is axially secured on the machine shaft by means of a shrink disk connection.

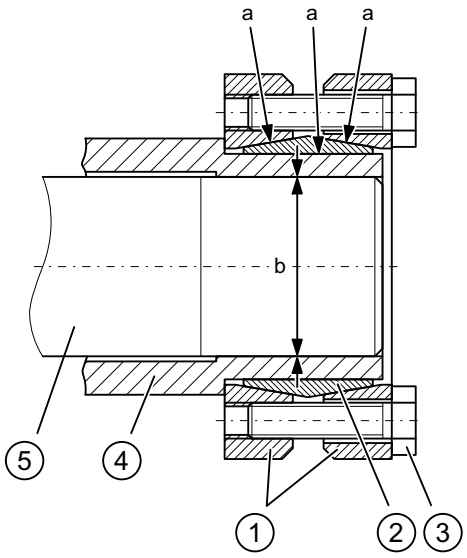
Note

Apply a thin layer of grease to the shrink disk seat on the hollow shaft.

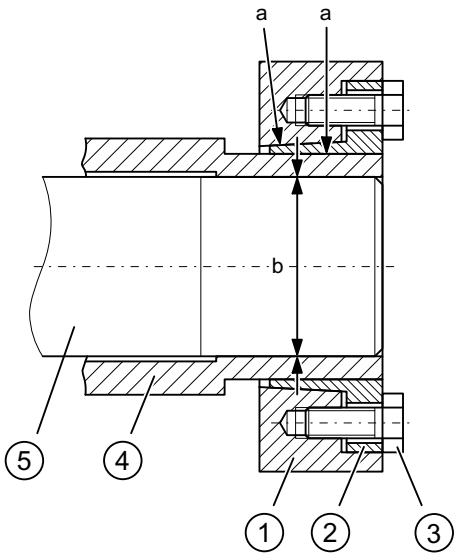
Note

Coat with a suitable lubricant to prevent frictional corrosion of the contact surface on the customer's machine shaft in the vicinity of the bush.

Sizes 29 - 69



Sizes 79 - 89



a Greased

b Absolutely grease-free

① Outer ring
② Inner ring
③ Tightening bolt
④ Hollow shaft
⑤ Machine shaft

Figure 4-7 Mounting the shrink disk

Procedure

1. Locate the shrink disk on the hollow shaft:
   3-section (sizes 29-69) up to the endstop.
   2-section (sizes 79-89) flush with the shaft end.
2. To start, tighten the tightening bolts ③ by hand, and then align the shrink disk so that the clamping flanges are coplanar with one another.
3. To do this, turn each of the tightening bolts ③ equally by 1/6 revolution (not diagonally opposite) using a torque wrench, repeating this procedure several times, until the screw tightening torque is reached.
4. Attach the rubber cover or protection cover included in the scope of delivery, see Removing and installing the protection cover (Page 32).

You have now installed the shrink disk.

Table 4- 5 Tightening torque for tightening bolt

Gearbox size	Thread size	Strength class	Tightening torque [Nm]
29	M5	8.8	5
39 - 69	M6	8.8	12
79 - 89	M10	12.9	35

4.9.3.3 Pulling off the shrink disk

Procedure

1. Going around several times, release the tightening bolts ③ one after the other by a ¼ turn each time using a wrench. Do not completely remove the screws.
2. Pull the shrink disk off the hollow shaft.

Sizes 79 - 89:
If the outer ring does not come away from the inner ring, remove some of the tightening bolts and insert them into neighboring forcing threads.

You will then be able to release the rings without difficulty.

4.9.3.4 Cleaning and lubricating shrink disks

Soiled shrink disks must be cleaned and regreased prior to fitting.

Shrink disks that have been released need not be disassembled and regreased before being retensioned.

Procedure

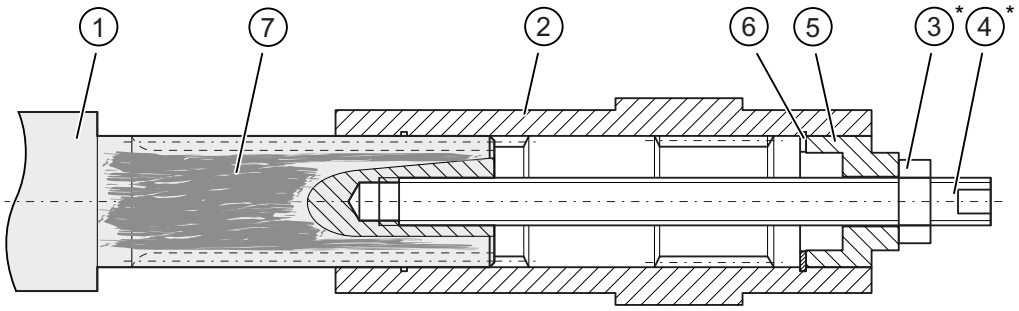
1. Only grease the inner friction surfaces of the shrink disks. To do this, use a solid lubricant with a friction coefficient of μ = 0.04.
2. Use a paste containing MoS_2 to grease the bolts, applying the paste to the thread and underneath the head.

The shrink disk is now ready for fitting.

Table 4- 6 Lubricants for shrink disks

Lubricant	Sold as	Manufacturer
Molykote 321 R (lubricant paint)	Spray	DOW Corning
Molykote spray (powder spray)		
Molykote G Rapid	Spray or paste	
Molykombin UMFT 1	Spray	Klüber Lubrication
Unimily P5	Powder	
Aemasol MO 19 P	Spray or paste	A. C. Matthes

4.9.4 Mounting the hollow shaft with splines



* Not included in scope of supply
① Machine shaft
② Hollow shaft
③ Hexagon nut
④ Threaded spindle
⑤ Disk
⑥ Locking ring
⑦ Mounting paste

Figure 4-8 Mounting the hollow shaft with splines

Instead of the nut and threaded spindle shown in the diagram, other types of equipment such as hydraulic lifting equipment may be used.

Procedure

1. Using benzine or a solvent, remove the anti-corrosion protection from the shaft ends and flanges.
2. Check the seats or edges of the hollow and machine shafts for damage. Please contact Technical Support if you notice any damage.
3. Evenly apply the assembly paste ⑦ to the machine shaft ①.
4. Fit the gearbox using the disk ⑤, threaded spindle ④ and nut ③. Support is provided by the hollow shaft ②.
5. Replace the nut ③ and threaded spindle ④ with a setscrew and tighten them to the specified torque.

You have now mounted the hollow shaft.

Table 4- 7 Tightening torque for setscrews

Thread size	M5	M6	M8	M10	M12	M16	M20	M24	M30
Tightening torque [Nm]	5	8	8	14	24	60	120	200	400

4.9.5 Torque arms with shaft-mounted gearboxes

4.9.5.1 General information regarding torque arms

Torque arms can absorb the reaction torque and the weight force of the gearbox.

NOTICE
Dangerously high transient torques due to excess backlash. Ensure that the torque arm does not result in excessive constraining forces (e.g. due to the driven shaft running out-of-true).

NOTICE
Do not tension torque arms when mounting.

NOTICE
Worn or irreparably damaged rubber elements will not function properly. Solvents, oils, greases, and fuels damage rubber elements. Keep them away from the rubber elements.

4.9.5.2 Mounting torque arms on parallel shaft gearboxes

We recommend using pretensioned, damping rubber elements.

Fixing accessories such as brackets, bolts, nuts, etc., are not included in the scope of delivery.

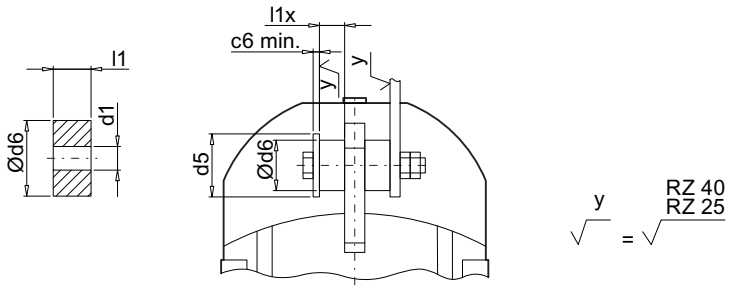


Figure 4-9 Mounting suggestion for torque arms on F.29 - F.89

Size	Rubber buffer				Washer	
	untensioned	tensioned				
	l1	l1x	d6	d1	d5	$c6_{min}$
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
29	15	14.0	30	10.5	40	4
39	15	13.5	30	10.5	40	4
49	20	18.5	40	12.5	50	6
69	20	18.5	40	12.5	50	6
79	20	17.5	40	12.5	50	6
89	30	28	60	21	75	8

Procedure

1. Use the washers according to the table above.
2. Use 2 nuts to secure the screw connection (lock nuts).
3. Tighten the screws until the rubber buffers are pretensioned to the dimension l1x.

You have now mounted the torque arm.

4.9.5.3 Mounting torque arms on bevel gearboxes

NOTICE
The torque arm bush must be supported by bearings on both sides.

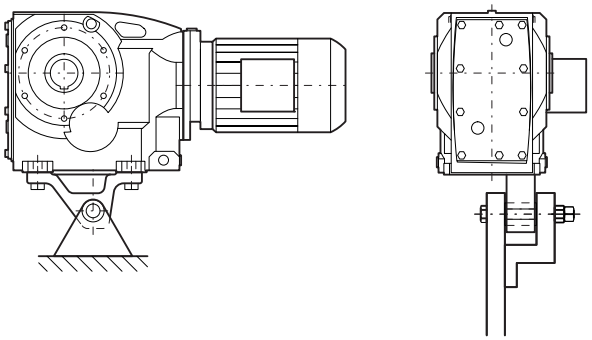


Figure 4-10 Mounting suggestion for torque arms on bevel gearbox K

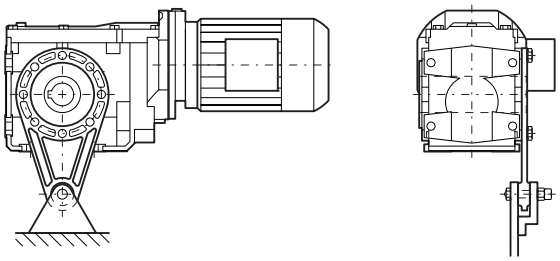


Figure 4-11 Mounting suggestion for torque arms on bevel gearbox B

The torque arm can be mounted in various positions, depending on the hole circle pitch.

Procedure

1. Clean the contact surfaces between the housing and the torque arm.
2. Tighten the screws to the specified torque.

You have now mounted the torque arm.

Table 4- 8 Tightening torque for screws of strength class 8.8 when mounting the torque arm

Thread size	M8	M10	M12	M16	M20	M24	M30
Tightening torque [Nm]	25	50	90	210	450	750	1 500

Commissioning 5

5.1 General information for commissioning

⚠ WARNING
Secure the drive unit to prevent it from being started up unintentionally. Attach a warning notice to the start switch.

⚠ WARNING
Remove any oil spillage immediately with an oil-binding agent in compliance with environmental requirements.

Checking the pressure breather valve

Check that the pressure breather valve is activated.

If the pressure breather valve has a transport fixture, then this must be removed before commissioning.

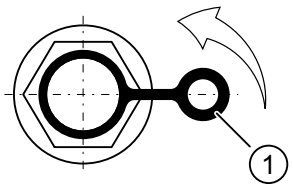


Figure 5-1 Pressure breather valve with securing clip

Remove the transport fixture by pulling the securing clip ① in the direction of the arrow.

5.2 Checking the oil level prior to commissioning

Check the oil level before commissioning and top up if necessary, see Checking and changing lubricants (Page 57).

For gearboxes with long-term preservation that are shipped completely filled with oil, we recommend that for storage times exceeding 24 months, the oil is completely replaced Checking and changing lubricants (Page 57).

5.3 Mounting the oil expansion unit

An oil expansion unit can be used depending on the power, drive speed, type of construction and transmission ratio. This is used to equalize changes in the oil volume caused by temperature fluctuations in operation.

The oil expansion unit is supplied as mounting set, and can either be mounted vertically on the geared motor or at an angle.

The oil expansion unit for sizes 39 to 89 is mounted using a screw connection at the highest hole on the gearbox housing or motor bearing shield.

Before commissioning the gearbox, replace the pressure breather valve that is already installed by the oil expansion unit provided.

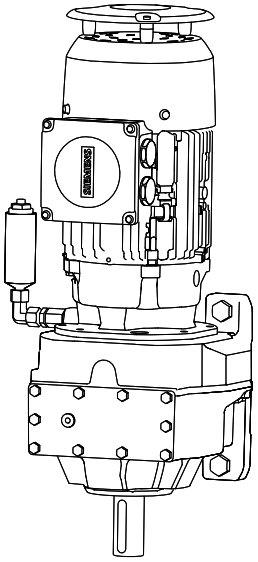


Figure 5-2 Example of an oil expansion unit

Procedure:

1. Completely unscrew the pressure breather valve with transport fixture.
2. Screw in the completely preassembled oil equalization unit.
3. Align the oil equalization unit so that it is in a vertical position.

The vent valve must be replaced every year to ensure perfect functioning. When replacing, prevent dirt and damaging atmospheres from entering the gearbox.

Operation 6

⚠ CAUTION
In the event of changes during operation, the drive unit must be switched off immediately. Determine the cause of the fault using the fault table in Section Faults, causes and remedies (Page 51). Remedy faults or have faults remedied.

Check the gearbox during operation for:

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

Faults, causes and remedies

7

Note

Faults and malfunctions occurring during the warranty period and requiring repair work on the gearbox must be remedied only by Technical Support. In the case of faults and malfunctions occurring after the warranty period, the cause of which cannot be precisely identified, we advise our customers to contact our Technical Support.

If you need the help of Technical Support, please provide the following information:

- Data on the rating plate
- Nature and extent of the fault
- Suspected cause.

Table 7- 1 Faults, causes and remedies

Faults	Causes	Remedy
Unusual noises on the gearbox	Oil level too low	Check the oil level, see Checking and changing lubricants (Page 57)
	Foreign bodies in oil (irregular noise)	Check the oil quality, see Checking the oil quality (Page 59). Clean the gearbox. Change the oil, see Checking and changing lubricants (Page 57)
	Excessive bearing play and / or bearing defective	Check bearing and replace if necessary
	Defective gearing	Check the gearing and replace if necessary
	Fastening bolts loose	Tighten bolts / nuts; see Checking tightness of fastening bolts (Page 71)
	Excessive external load on drive input and output	Check load against rated data (you might need to correct the belt tension, for example)
	Damage in transit	Check the gearbox for damage in transit
	Damage due to blockage during commissioning	Call Technical Support

Faults	Causes	Remedy
Unusual motor noises	Excessive bearing play and / or bearing defective	Check bearing and replace if necessary
	Motor brake rubbing	Check air gap and adjust if necessary
	Inverter parameterization	Correct parameterization
Oil leak	Incorrect oil level for the mounting position being used	Check the mounting position, see Mounting positions (Page 79). Check the oil level, see Checking and changing lubricants (Page 57)
	Overpressure due to lack of venting	Mount the venting as appropriate for the mounting position, see Mounting positions (Page 79).
	Overpressure due to soiled venting	Clean the venting, see Replacing the vent valve (Page 69).
	Shaft sealing rings defective	Replace the shaft sealing rings
	Cover / flange bolts loose	Tighten bolts / nuts, see Checking tightness of fastening bolts (Page 71). Continue to monitor the gearbox
	Surface sealing defective (e.g. on cover, flange)	Reseal
	Damage in transit (e.g. hairline cracks)	Check the gearbox for damage in transit
Oil leak at the gearbox vent	Incorrect oil level for the mounting position used and / or incorrect venting position	Check the venting and mounting position, see Mounting positions (Page 79). Check the oil level, see Checking and changing lubricants (Page 57)
	Frequent cold starts, during which the oil foams up	Call Technical Support

Faults	Causes	Remedy
Gearbox overheating	Motor fan cover and / or gearbox very dirty	Clean the fan cover and surface of the geared motor, see Cleaning the gearbox (Page 70)
	Incorrect oil level for the mounting position being used	Check the mounting position, see Mounting positions (Page 79). Check the oil level, see Checking and changing lubricants (Page 57)
	Incorrect oil being used (e.g. incorrect viscosity)	Check the oil in the gearbox, see Checking the oil quality (Page 59).
	Oil is out of date	Check date of last oil change and change oil if necessary, see Checking and changing lubricants (Page 57)
	Excessive bearing play and / or bearing defective	Check bearing and replace if necessary
Output shaft does not turn when motor is running	Force flow interrupted by breakage in gearbox	Call Technical Support
Geared motor only starts with difficulty or not at all	Incorrect oil level for the mounting position being used	Check the mounting position, see Mounting positions (Page 79). Check the oil level, see Checking and changing lubricants (Page 57)
	Incorrect oil being used (e.g. incorrect viscosity)	Check the oil in the gearbox, see Checking the oil quality (Page 59).
	Excessive external load on drive input and output	Check load against rated data (you might need to correct the belt tension, for example)
	Motor brake is not released	Check circuit / connection of brake. Check brake for wear and readjust if necessary
	Geared motor runs against backstop	Change direction of motor or backstop rotation

Faults	Causes	Remedy
Excessive play at drive input and output	Flexible elements worn (e.g. on couplings)	Replace flexible elements.
	Positive connection disrupted by overload	Call Technical Support
Drop in speed / torque	Belt tension too low (in case of belt drive)	Check belt tension and replace belt if necessary

Service and maintenance

8

8.1 General notes about maintenance work

⚠ WARNING
Secure the drive unit to prevent it from being started up unintentionally. Attach a warning notice to the start switch.

NOTICE
Service and maintenance must only be carried out by properly trained and authorized personnel. Only original parts supplied by Siemens AG can be used for servicing and maintenance.

All inspection, maintenance, and repair work must be carried out with care by trained personnel only. Observe the information in Section General information and safety notes (Page 7).

Table 8- 1 Maintenance measures

Measure	Time interval	Description of work
Monitor and check the geared motor for unusual noises, vibrations, and changes	Daily; if possible, more frequently during operation	See Operation (Page 49)
Check housing temperature	After 3 hours, on the first day, thereafter monthly	
Check the oil level	After the first day, and then every 3 000 operating hours, or at the latest after 6 months	See Checking and changing lubricants (Page 57)
Check the oil level sensor	Regularly and after oil changes	See Checking the oil level sensor (optional) (Page 70)
Check the oil quality	Every 6 months	See Checking the oil quality (Page 59)

Measure	Time interval	Description of work
First oil change after commissioning	After approximately 10 000 operating hours or at the latest after 2 years	See Checking and changing lubricants (Page 57)
Subsequent oil changes	Every 2 years or 10 000 operating hours [1)]	
Check gearbox for leaks	After the first day, thereafter monthly	See Checking the gearbox for leaks (Page 69)
When required, replace the gearbox breather valve	Once a year	See Replacing the vent valve (Page 69)
Clean the gearbox	Depending on degree of soiling, at least every 6 months	See Cleaning the gearbox (Page 70)
Carry out a complete inspection of the geared motor	Every 12 months	See Inspecting the gearbox or geared motor (Page 71)
Check that fastening bolts on gearboxes and built-on accessories are securely tightened. Check that covers and plugs are securely fastened.	After 3 h, and then every 2 years	See Checking tightness of fastening bolts (Page 71)
Change the roller bearing grease	When the oil is changed	See Changing the roller bearing grease (Page 64)
Check rubber buffers on torque arms	Every 6 months	See Torque arms with shaft-mounted gearboxes (Page 43)
1) When using synthetic oils, the intervals can be doubled. The data specified is valid for an oil temperature of +80 °C. See the figure titled "Guide values for oil change intervals" for oil change intervals for other temperatures.		

8.2 Checking and changing lubricants

8.2.1 General safety notes for checking and changing lubricants

⚠ WARNING

Danger of scalding from the hot oil emerging from the unit.

Before starting any work wait until the oil has cooled down to below +30 °C.

⚠ WARNING

Remove any oil spillage immediately with an oil-binding agent in compliance with environmental requirements.

NOTICE

Incorrect oil quantities can damage the gearbox.

The oil quantity and the position of the sealing elements are determined by the mounting position.

After removing the oil level screw, up to and including gearbox size 89, the oil level may not be more than 3 mm below the recommended filling level.

NOTICE

Dirt and damaging atmospheres can penetrate into the gearbox through open holes used to check or drain the oil.

Immediately close the gearbox after checking the oil level or changing the oil.

Note

For data such as type of oil, oil viscosity, and oil quantity required, refer to the rating plate.

For oil compatibility see Recommended lubricants (Page 67).

Note

Gearbox sizes 19 and 29 are lubricated for life:

No oil changes are required.

8.2.2 Checking the oil level

NOTICE
The volume of gearbox oils changes with temperature. If the temperature rises, the volume increases. Where temperature differences and filling quantities are significant, the increase can amount to several liters. The oil level must therefore be checked while still slightly warm, approximately 30 minutes after switching off the drive unit.

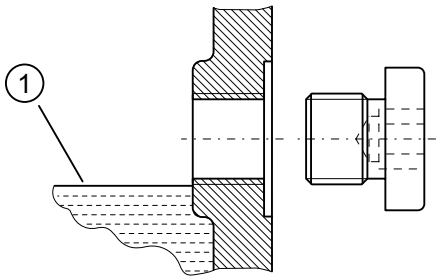


Figure 8-1 Oil level in the gearbox housing

Procedure

1. Switch off the power supply to the drive unit.
2. Unscrew the oil level screw, see Mounting positions (Page 79).
3. Check the oil level ①.
4. Top up the oil level ① if necessary, and check it again.
5. Check the condition of the sealing ring on the sealing element and if the sealing ring is damaged, replace the sealing element with a new one.
6. After checking the oil level, immediately seal the gearbox using the sealing element.

You have now checked the oil level in the gearbox housing.

8.2.3 Checking the oil level using the oil sight glass (optional)

If there is an oil sight glass to check the oil level ①, the oil must be visible in the center of the sight glass when the oil is cool. When the oil is hot, the oil level ① is above the center of the sight glass. The oil level ① of cold oil is below the center of the sight glass.

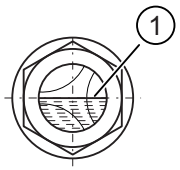


Figure 8-2 Oil level in the oil sight glass

Top up the oil level ① if necessary, and check it again.

8.2.4 Checking the oil quality

Signs of changes in the oil can be seen with the naked eye. Fresh oil is clear to the eye, and has a typical smell and a specific product color. Clouding or a flocculent appearance indicates water and / or contamination. A dark or black color indicates residue, serious thermal decomposition or contamination.

Observe the symbols in the diagrams of the mounting positions, see Mounting positions (Page 79):

Venting

Oil level

Procedure

1. Allow the geared motor to run for a short time. Wear and contaminant particles are visible in the oil shortly after shutting down.
2. Switch off the power supply to the drive unit.
3. Unscrew the sealing element at one of the points marked with the symbols listed above.
4. Remove some oil, using a suction pump and a flexible hose, for example.
5. Check the condition of the sealing ring on the sealing element and replace the sealing ring if necessary.
6. Seal the gearbox with the sealing element.
7. Check the oil for abnormalities. If you detect any abnormalities, change the oil immediately.

You have now checked the oil quality.

8.2.5 Changing the oil

8.2.5.1 General safety notes for changing the oil

NOTICE

An impermissible mixture of oils will lead to clouding, depositing, foam formation, changes to the viscosity or reduced protection against corrosion and wear.

When changing oil of the same type, the residual volume of oil in the gearbox should be kept as low as possible. Generally speaking, a small residual volume will cause no particular problems.

Gear oils of different types and by different manufacturers must not be mixed. Have the manufacturer confirm that the new oil is compatible with the remaining volume of used oil.

If changing very different types of oil or oils with very different additives, always flush out the gearbox with the new oil. When changing from mineral oil to polyglycol oil (PG) or vice versa, it is vital to flush the gearbox twice. All traces of old oil must be completely removed from the gearbox.

NOTICE

Gearbox oils must never be mixed with other substances. Do not flush with paraffin or other solvents, as traces of these substances will always be left behind inside the gearbox.

Note

The oil must be warm. If it is too cold, it will flow too sluggishly to drain properly. If necessary, run the gearbox for 15 to 30 minutes to warm it up.

8.2.5.2 Draining the oil

Observe the symbols in the diagrams of the mounting positions, see Mounting positions (Page 79):

Venting

Oil level

Oil drain

Procedure

1. Switch off the power supply to the drive unit.
2. Unscrew the vent plug.
3. Unscrew the oil level screw.
4. Place a suitable and sufficiently large receptacle underneath the oil drain plug.
5. Unscrew the oil drain plug and drain all the oil into the receptacle.
6. Check the condition of the sealing ring on the sealing element and if the sealing ring is damaged, replace the sealing element with a new one.
7. After draining the oil, immediately seal the gearbox using the sealing element.

You have now drained the oil from the gearbox.

8.2.5.3 Flushing the gearbox when changing between incompatible oils

NOTICE
Polyglycol oil has a higher density than mineral oil. Therefore, it sinks down towards the oil drain and the mineral oil floats on top. This makes the required complete draining of mineral oil from the gearbox extremely difficult.

NOTICE
A flushing process is required with biodegradable and physiologically safe oils.

Note

After the second flush, we recommend that an an appropriate analysis institute checks the quality of the flushed fluid.

Observe the symbols in the diagrams of the mounting positions, see Mounting positions (Page 79):

Venting

Oil drain

Procedure

1. After the oil has been drained, wipe the gearbox clean of any remaining mineral oil using a cloth.
2. Unscrew the vent plug.
3. Fill the gearbox with a flushing oil, using a filter (filter mesh max. 25 µm). For the flushing oil, use either the new oil or one that is compatible with the new oil and is less expensive.
4. Operate the gearbox for 15 to 30 minutes under a low load.
5. Place a suitable and sufficiently large receptacle underneath the oil drain plug.
6. Unscrew the oil drain plug and drain all the oil into the receptacle.
7. After flushing, immediately seal the gearbox using the sealing element.
8. Repeat this step for the second flushing.

You have now flushed the gearbox twice and can pour in the new oil.

8.2.5.4 Filling in oil

NOTICE
When adding oil, use the same oil type and viscosity. If changing mutually incompatible oils, flushing cycles are required, see Flushing the gearbox when changing between incompatible oils (Page 62).

Observe the symbols in the type of construction diagrams, see Mounting positions (Page 79):

Venting

Procedure

1. Unscrew the vent plug.
2. Fill the gearbox with fresh oil, using a filter (filter mesh, max. 25 µm).
3. Check the oil level.
4. Top up the oil level if necessary and check it again.
5. Check the condition of the sealing ring on the sealing element and if the sealing ring is damaged, replace the sealing element with a new one.
6. After filling the oil, immediately seal the gearbox using the sealing element.

You have now filled up the gearbox with oil.

8.2.6 Topping up with oil

You may need to top the gearbox up with oil if the gearbox mounting position changes or if oil is lost due to a leak. If you notice oil escaping, locate the leak and seal the affected area. Top up and check the oil level.

At the time of going to print, the following types of oil are being used when the gearbox is filled for the first time:

CLP ISO VG220: ARAL Degol BG 220

CLP ISO PG VG220: Castrol Tribol 1300 / 220

CLP ISO PG VG460: Castrol Tribol 1300 / 460

CLP ISO PAO VG68: Addinol Eco Gear 68S-T

CLP ISO PAO VG220: Addinol Eco Gear 220S

CLP ISO E VG220: Fuchs Plantogear Bio 220S

CLP ISO H1 VG460: Klüber Klüberoil 4 UH1 460 N

If, following agreement, gearboxes are filled at the factory with special lubricants for the special applications referred to above, this is shown on the rating plate.

8.2.7 Changing the roller bearing grease

The roller bearings are lubricated in the factory with the greases listed in the table.

When changing the oil, the specified grease quantity of grease-lubricated bearings should also be replaced.

Clean the bearing before filling it with fresh lubricant.

In the case of bearings on the output shaft or intermediate shafts, the grease quantity must fill 2/3, and in the case of bearings on the input side, 1/3 of the space between the rolling elements.

Table 8- 2 Roller bearing and shaft sealing ring grease

Fields of application	Ambient temperature	Manufacturer	Type
Standard	-40 °C to +80 °C	Klüber	Petamo GHY 133 N
Foodstuff-compatible for the food industry	-30 °C to +40 °C	Castrol	Obeen UF F2 NSF H1
Biologically degradable, for agriculture, forestry and water industries	-35 °C to +40 °C	BP	Biogrease EP 2

8.2.8 Service life of the lubricants

Note

In case of ambient conditions deviating from normal conditions, e.g. high ambient temperatures, high relative humidity, aggressive ambient media, the intervals between changes should be shorter. In such cases please contact Technical Support for assistance in determining the individual lubricant change intervals.

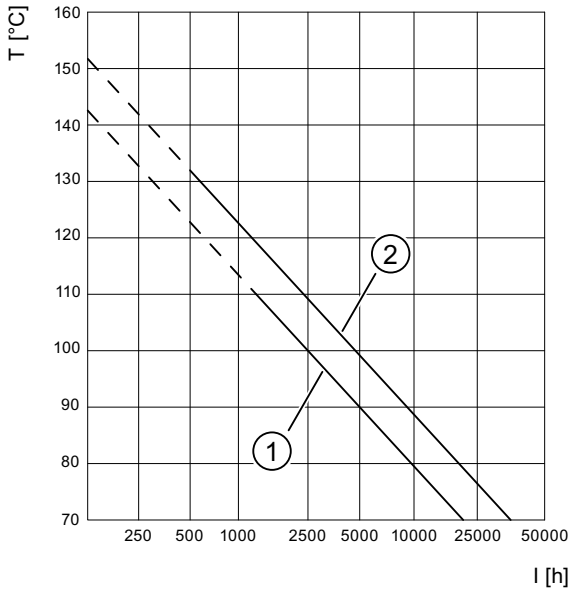
Note

Oil sump temperatures above +80 °C can reduce service life. In this context, the rule is that increasing the temperature by 10 K will approximately halve the service life, as illustrated in the figure titled "Guide values for oil change intervals".

For a +80 °C oil sump temperature, the following service life can be expected when observing the properties specified by Siemens AG:

Table 8- 3 Service life of the oils

Type of oil	Service life
Mineral oil	10 000 operating hours or 2 years
Biodegradable oil	
Physiologically safe oil according to USDA-H1/-H2	
Synthetic oil	20 000 operating hours or 4 years



① Mineral oil
② Synthetic oil
T Oil-bath steady-state temperature [°C]
I Oil change interval in operating hours [h]

Figure 8-3 Guide values for oil change intervals

Grease service life of roller bearing greases

Roller bearings and the clearance in front are filled with sufficient grease.

Under approved operating conditions and ambient temperatures, no regreasing is required.

We recommend that the grease in the bearings is also renewed when the oil or shaft sealing rings are replaced.

8.2.9 Recommended lubricants

⚠ DANGER

The lubricants used have not been approved to USDA -H1/-H2 (United States Department of Agriculture). They are not or only conditionally approved for use in the foodstuff or pharmaceutical industry.

For applications in the food or pharmaceutical industry, only use the lubricants with USDA -H1/-H2 approval listed in the released and recommended gearbox lubricants T 7300.

NOTICE

For applications outside the temperature range specified in the BA 7300 Operating Instructions, please contact Technical Support for advice on which oil to use.

If the housing temperature exceeds a value of +80 °C, please contact Technical Support.

NOTICE

As standard, the lubricants and shaft seals are harmonized and coordinated with one another corresponding to the prevailing operating conditions. When the operating conditions change, the oil type changes or new shaft seals are inserted, please contact Technical Support.

Note

The lubricants used are not at all or only conditionally biodegradable. If biologically degradable lubricants are required, then only use the lubricants with the appropriate classifications, listed in the released and recommended gearbox lubricants T 7300.

Note

These recommendations are not a guarantee of the quality of the lubricant provided by your supplier. All lubricant manufacturers are responsible for the quality of their own products.

The oil selected for use in the gearbox must be of the viscosity stated on the rating plate (ISO VG class). The viscosity class indicated applies for the contractually agreed operating conditions.

In the case of different operating conditions, please contact Technical Support.

If, following agreement, gearboxes are filled at the factory with special lubricants for the special applications referred to above, this is shown on the rating plate.

The quality of the oil used must comply with the requirements laid down in the BA 7300 Operating Instructions; otherwise, the Siemens warranty is null and void. We urgently recommend using one of the oils listed in the released and recommended lubricants T 7300 (http://support.automation.siemens.com/WW/view/en/44231658), which were appropriately tested and comply with the requirements.

The oils listed there are subject to continuous testing. Under certain circumstances, it is therefore possible that the oils recommended there are at a later point in time removed or replaced by oils that have been further developed.

We recommend that you regularly check as to whether the selected lubricating oil is still recommended by Siemens. Otherwise, a different oil type should be selected.

8.3 Checking the gearbox for leaks

Note

From the inherent principle of operation, oil mist can escape from the vent valve or a labyrinth seal.

Oil or grease escaping in small quantities from the shaft sealing ring should be regarded as normal during the running-in phase of 24 hours operating time.

If the quantities escaping are significant or leaking continues after the running-in phase, the shaft sealing ring must be replaced to prevent consequential damage.

Shaft sealing rings are subject to natural wear. The service life depends on the operating conditions. We recommend that shaft sealing rings are included in periodic maintenance and servicing work on the system.

Leakage / tightness

Table 8- 4 Description and measures

Status	Description	Measures	Notes
Film of moisture on the shaft sealing ring	Film of moisture as a result of the inherent principle of operation (apparent leakage)	Remove using a clean cloth and continue to observe.	This does not represent a fault; frequently, in the course of operation, the sealing ring dries off.
Leakage at the shaft sealing ring	Identifiable small trickle, formation of drops, also after the running-in phase	Replace the sealing ring, determine the possible cause of the sealing ring failure and rectify.	During the run-in period, the shaft sealing ring beds into the shaft. A visible track can be seen on the shaft. Optimum preconditions for a perfect seal are obtained after the run-in period.

8.4 Replacing the vent valve

The vent valve must be replaced every year to ensure perfect functioning.

When replacing, prevent dirt and damaging atmospheres from entering the gearbox.

8.5 Checking the oil level sensor (optional)

The oil level sensor indicates the oil level only when the gearbox is shut down.

Lower the oil level and fill it up again until the oil level sensor gives a switching signal.

Please refer to the separate operating instructions for the oil level sensor.

8.6 Cleaning the gearbox

NOTICE
Dust deposits prevent heat radiation and cause high housing temperatures. Keep the gearbox free from dirt and dust.

NOTICE
Do not use a high-pressure cleaning appliance to clean the gearbox. Do not use tools with sharp edges.

Switch off the power supply to the drive unit before cleaning it.

8.7 Checking tightness of fastening bolts

Note

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

Switch off the power to the drive unit and use a torque wrench to check the seating of all fastening bolts.

The general tolerance for the tightening torque in Nm is 10 %. The friction coefficient is 0.14 µ.

Table 8- 5 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

8.8 Inspecting the gearbox or geared motor

Carry out a scheduled inspection of the geared motor once a year in accordance with the possible criteria listed in Section Faults, causes and remedies (Page 51).

Check the geared motor in accordance with the criteria set out in Section General information and safety notes (Page 7).

Touch up damaged paintwork carefully.

Disposal

9

⚠ WARNING
Incorrect disposal of used oil is a threat to the environment and health. After use, oil must be taken to a used oil collection point. The addition of foreign substances such as solvents and brake and cooling fluid is prohibited. Avoid prolonged contact with the skin.

Empty the used oil from the gearbox. The used oil must be collected, stored, transported and disposed of in accordance with regulations. Do not mix polyglycols with mineral oil. Polyglycols must be disposed of separately.

Please observe country-specific laws. Under German law, oils with different disposal codes may not be mixed with one another to allow optimal treatment of the oil (§4 VI Used Oil).

Collect and dispose of used oil in accordance with regulations.

Remove oil spillages immediately with an oil-binding agent in compliance with environmental requirements.

Dispose of the housing parts, gears, shafts, and roller bearings of the geared motor as steel scrap. The same applies to cast iron parts, if not separately collected.

Dispose of the packing material according to regulations or recycle it.

Table 9- 1 Disposal codes for gear oils

Type of oil	Designation	Disposal code
Mineral oil	CLP ISO VG220	13 02 05
Polyglycols	CLP ISO PG VG220 CLP ISO PG VG460	13 02 08
Poly-Alpha-Olefines	CLP ISO PAO VG68 CLP ISO PAO VG220 CLP ISO H1 VG460	13 02 06
Biologically degradable oils	CLP ISO E VG220	13 02 07

Technical data

10

10.1 Type designation

Table 10- 1 Example of the type designation structure

Example	F	D	F	89
Gearbox type	F			
Transmission stage		D		
Type			F	
Size				89

Table 10- 2 Type designation code

Gearbox type		
(-)		Helical gearbox
B		Bevel gearbox, two-stage
K		Bevel gearbox, three-stage
F		Parallel shaft gearbox
Transmission stage		
(-)		
Z		Two-stage
D		Three-stage
Type		
	Shaft	
	(-)	Solid shaft
	A	Hollow shaft
	Mounting	
	(-)	Foot-mounted design
	B	Foot / flange-mounted design
	F	Flange-mounted design (A type)
	Z	Housing flange (C type)
	D	Torque arm
	G	Flange (A type) opposite output shaft
	Connection	
	(-)	Parallel key
	S	Shrink disk
	T	Hollow shaft with splines

10.2 General technical data

The most important technical data appears on the rating plate of the gearboxes and geared motors.

This data, together with the contractual agreements for the geared motors, determines the limits of intended use.

In the case of geared motors, a rating plate attached to the motor usually indicates the data for the entire drive.

In certain cases separate rating plates are mounted on the gearbox and the motor.

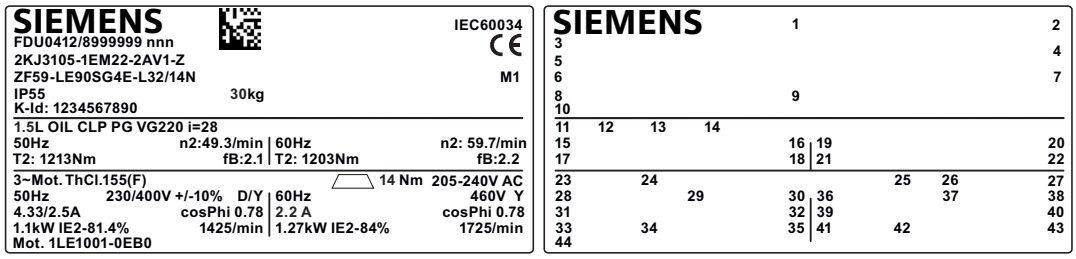


Figure 10-1 Rating plate example for Simogear

1 Matrix code
2 Applied standard
3 Serial No.
FDU = Siemens AG, Bahnhofstr. 40, 72072 Tübingen, Germany
4 CE marking or other marking, if required
5 Order No.
6 Model - Type - Size
7 Mounting position
8 Degree of protection to IEC 60034-5 or IEC 60529
9 Weight m [kg]
10 Customer ID
11 Oil quantity [l] main gearbox / intermediate gearbox
12 Type of oil
13 Oil viscosity ISO VG class to DIN 51519 / ISO 3448
14 Total transmission ratio i

Frequency 1

15 Rated frequency f [Hz]
16 Gearbox output speed n_2 [rpm]
17 Geared motor output torque T_2 [Nm]
18 Service factor f_B

Frequency 2

19 Rated frequency f [Hz]
20 Gearbox output speed n_2 [rpm]
21 Geared motor output torque T_2 [Nm]
22 Service factor f_B

Motor data

23 Phase number and type of current for the motor
24 Temperature class Th.Cl.
25 Symbols (IEC 60617-2): ⏢ = brake
26 Rated braking torque T_{Br} [Nm]
27 Brake supply voltage U [V]

Frequency 1

28 Rated frequency f [Hz]
29 Rated voltage / range U [V]
30 Circuit, graphical symbols as per DIN EN 60617 Part 6 / IEC 60617-6
31 Rated current I_N [A]
32 Power factor cos φ
33 Rated power P_N [kW], duty type (if ≠ S1)
34 Efficiency class marking acc. to IEC 60034-30
35 Rated speed n_N [rpm]

Frequency 2

36 Rated frequency f [Hz]
37 Rated voltage / range U [V]
38 Rated current I_N [A]
39 Power factor cos φ
40 Circuit, graphical symbols as per DIN EN 60617 Part 6 / IEC 60617-6
41 Rated power P_N [kW], duty type (if ≠ S1)
42 Efficiency class marking
43 Rated speed n_N [rpm]
44 Motor designation, active part

10.3 Weight

The weight of the entire geared motor is given in the shipping papers.

If the weight exceeds 30 kg, the weight of the entire geared motor is indicated on the rating plate of the gearbox or geared motor.

Where there are several rating plates on one geared motor, the specification on the main gearbox is decisive.

The weight specification refers only to the product in the delivery state.

10.4 Sound energy level

SIMOGEAR geared motors have noise levels below the permissible noise levels defined for gearboxes in VDI guideline 2159 and for motors in IEC 60034-9. In conjunction with gearboxes, the motor noise values L_{pfA} or L_{WA} increase on average by 3 dB (A).

The circumferential velocity of the motor pinion has a significant influence on the additional gearbox noise. As a consequence, higher speeds or lower ratios result in higher noise.

External noise

Noises not generated by the gearbox but emitted from it are not taken into consideration here.

Similarly, noises emitted from the input and output machines and from the foundation are not taken into consideration here, even if transmitted to these by the gearbox.

10.5 Mounting positions

10.5.1 General notes on mounting positions

The gearbox must be operated only in the mounting position specified on the rating plate. This ensures that the correct quantity of lubricant is provided.

Note

Gearbox sizes 19 and 29 are lubricated for life.

There are no openings to check the oil level. Mounting positions M2 and M4 are equipped with a vent valve.

Description of the symbols:

Venting

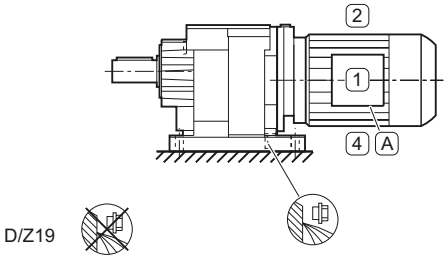
Oil level

Oil drain

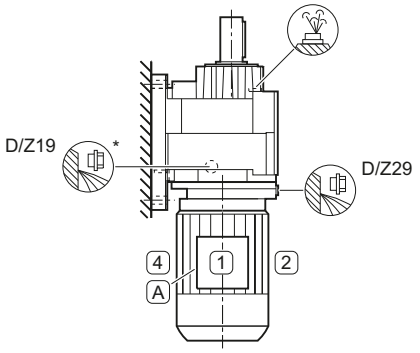
A, B	Position of insert shaft / solid shaft
*	On opposite side
②	Two-stage gearbox
③	Three-stage gearbox
④	Tandem gearbox
⑤	Optional oil hole facing output side
- - -	Alternatively

10.5.2 Two- and three-stage helical gearboxes

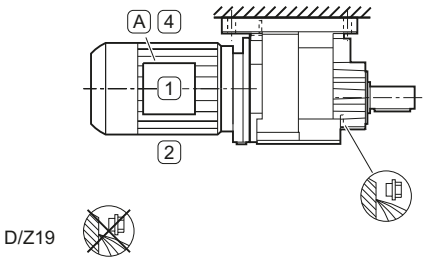
M1



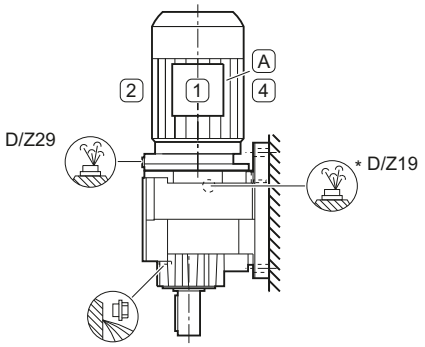
M2



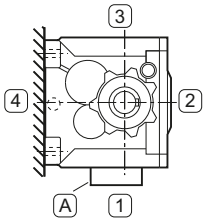
M3



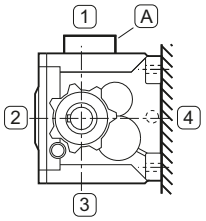
M4



M5

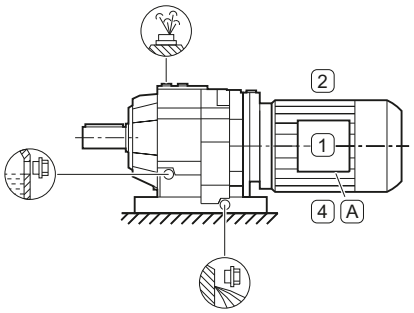


M6

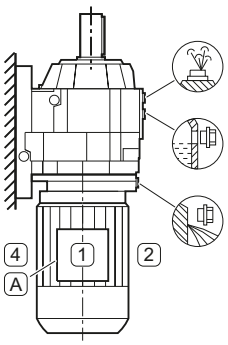


Mounting position for helical gearboxes D / Z in a foot-mounted design, sizes 19 - 29

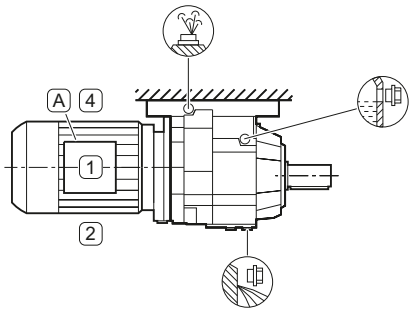
M1



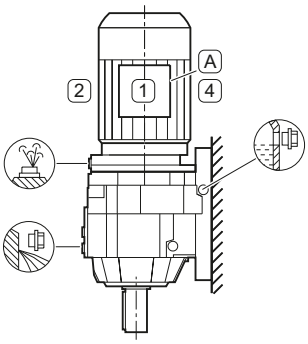
M2



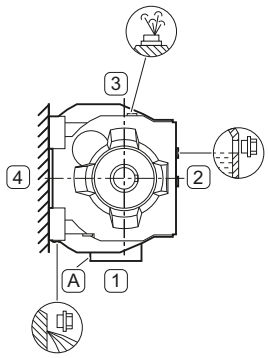
M3



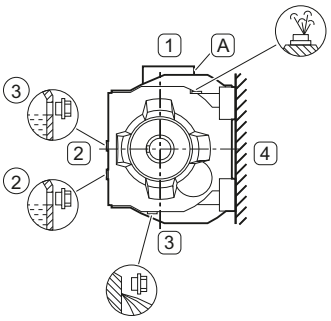
M4



M5

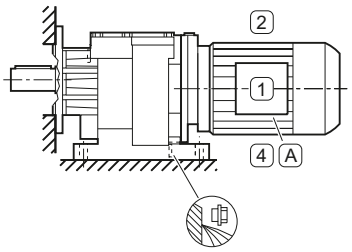


M6

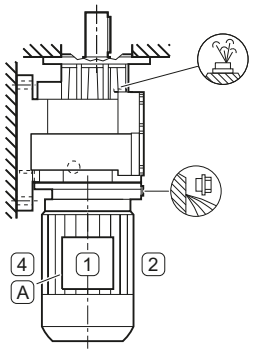


Mounting position for helical gearboxes D / Z in a foot-mounted design, sizes 39 - 89

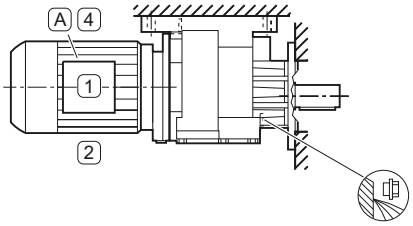
M1



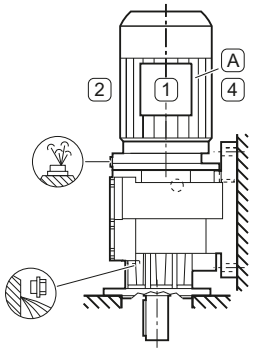
M2



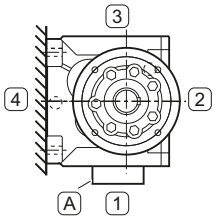
M3



M4



M5



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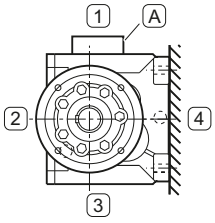
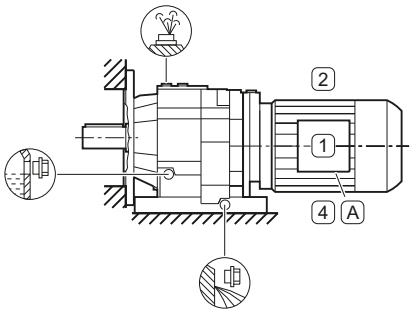
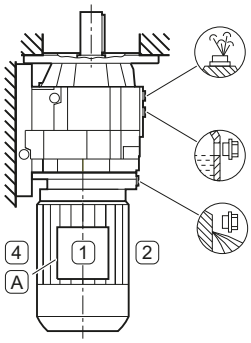


Mounting position for helical gearboxes DB / ZB in a foot / flange-mounted design, size 29

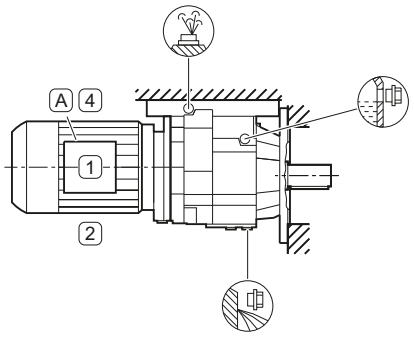
M1



M2



M3



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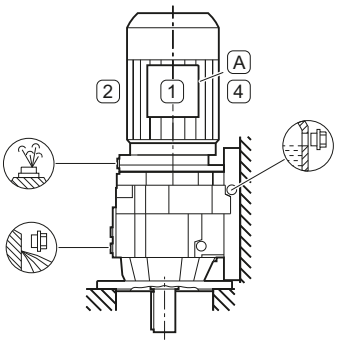
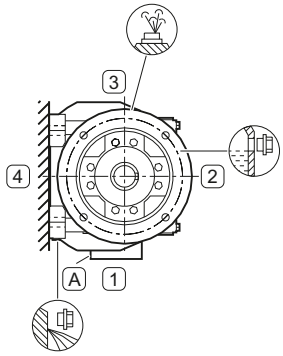
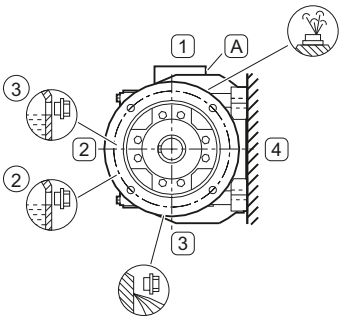


M5

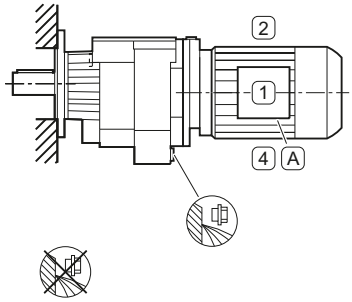


M6

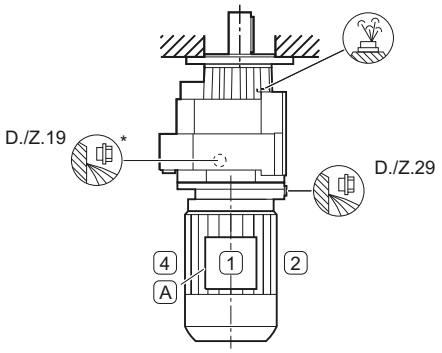


Mounting position for helical gearboxes DB / ZB in a foot / flange-mounted design, sizes 39 - 89

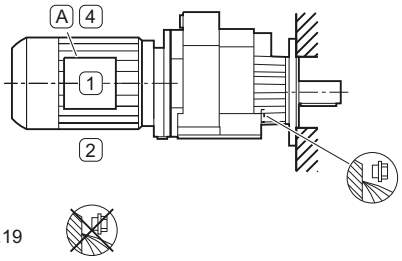
M1



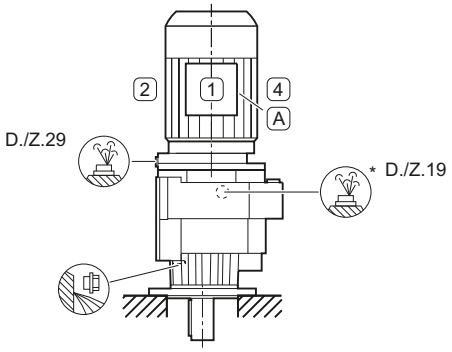
M2



M3

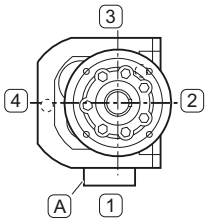


M4

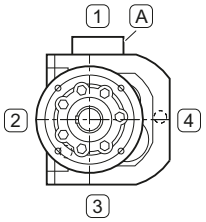


29

M5

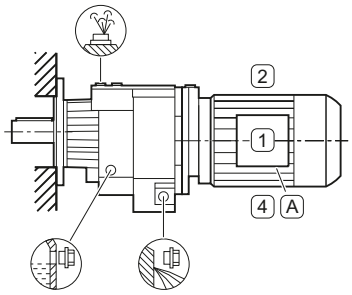


M6

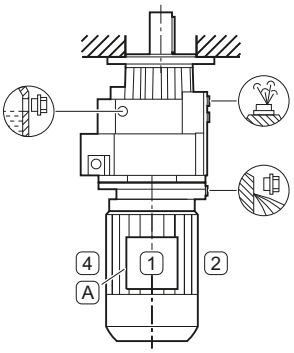


Mounting position for helical gearboxes DF / ZF in a flange-mounted design and DZ / ZZ in a housing flange-mounted design, sizes 19 - 29

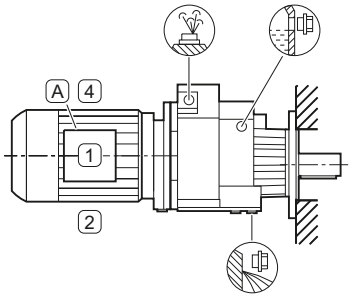
M1



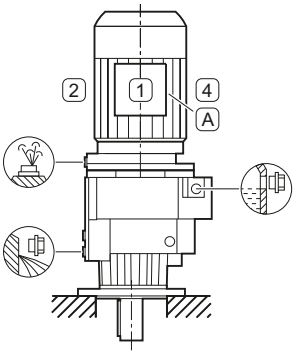
M2



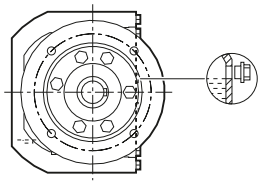
M3



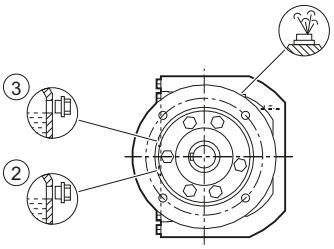
M4



M5

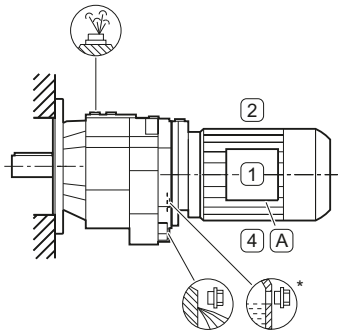


M6

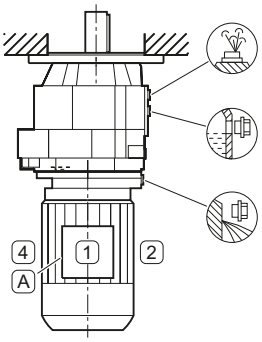


Mounting position for helical gearboxes DF / ZF in a flange design and DZ / ZZ in a housing flange design, size 39

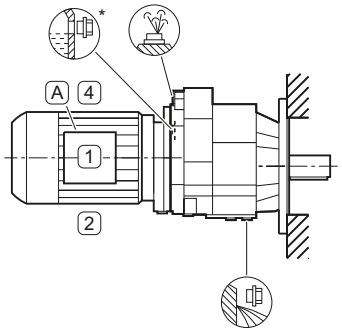
M1



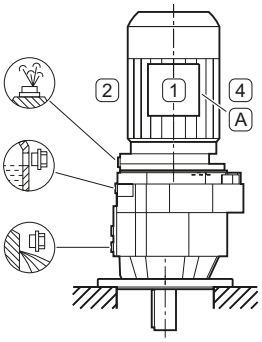
M2



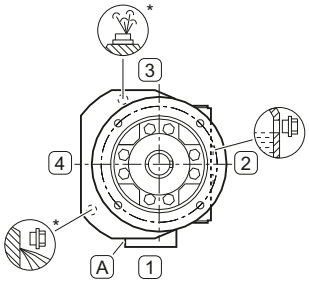
M3



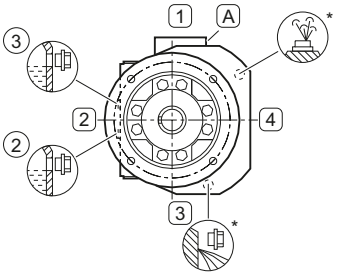
M4



M5



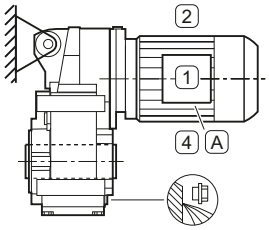
M6



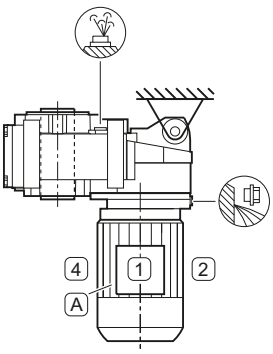
Mounting position for helical gearboxes DF / ZF in a flange-mounted design and DZ / ZZ in a housing flange-mounted design, sizes 49 - 89

10.5.3 Parallel shaft gearbox

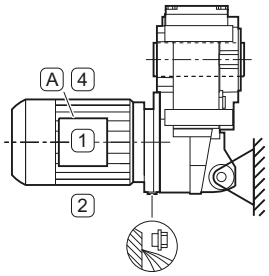
M1



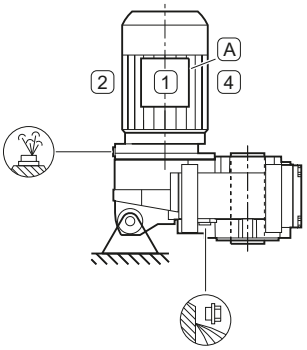
M2



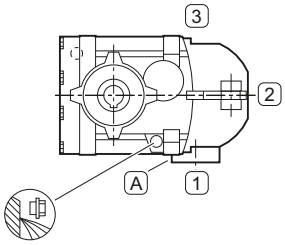
M3



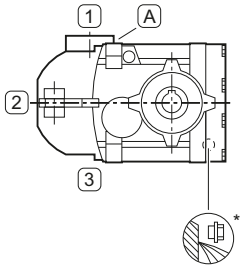
M4



M5

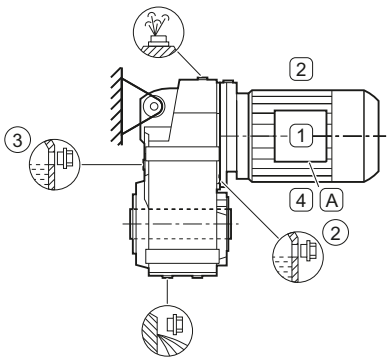


M6

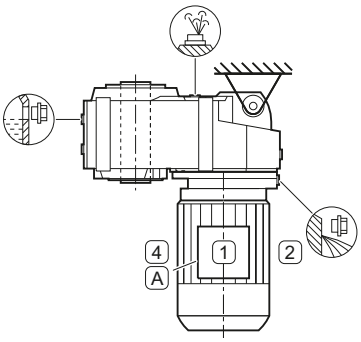


Mounting position for parallel shaft gearboxes F.AD in a shaft-mounted design, size 29

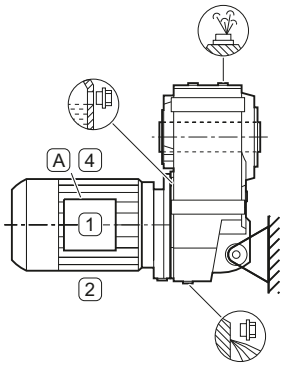
M1



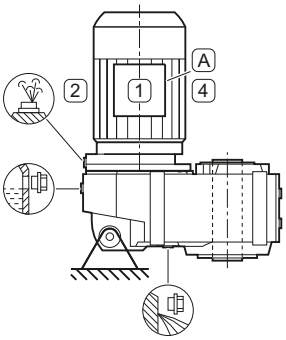
M2



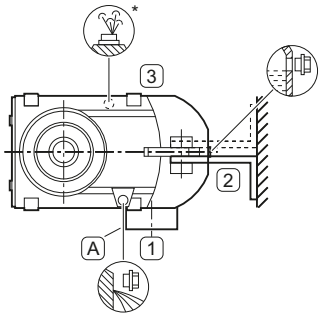
M3



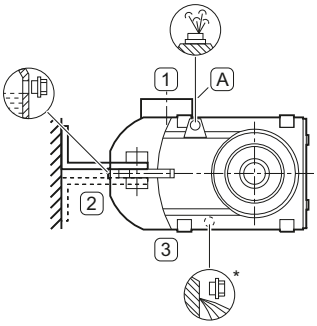
M4



M5

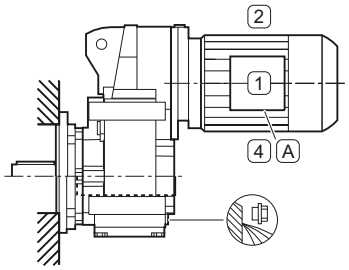


M6

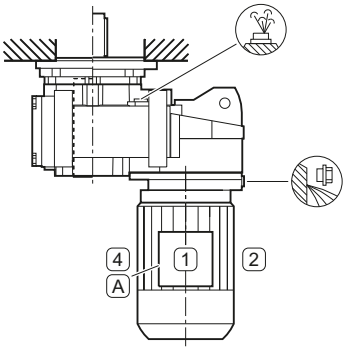


Mounting position for parallel shaft gearboxes F.AD in a shaft-mounted design, sizes 39 - 89

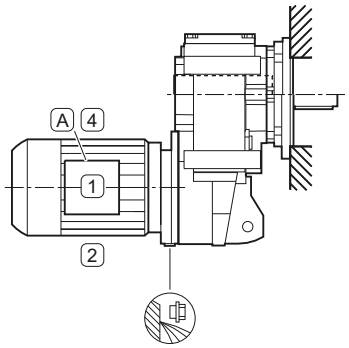
M1



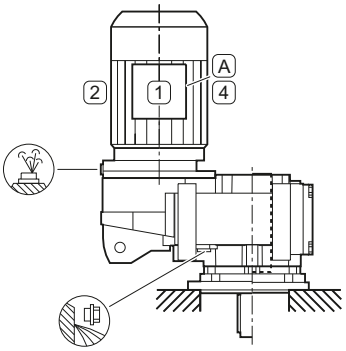
M2



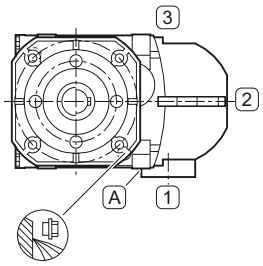
M3



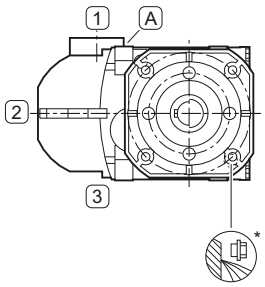
M4



M5

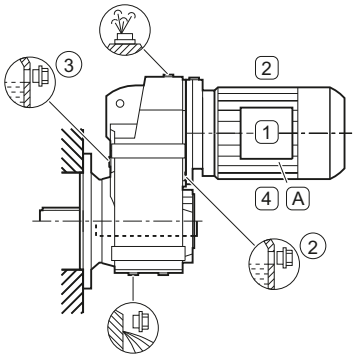


M6

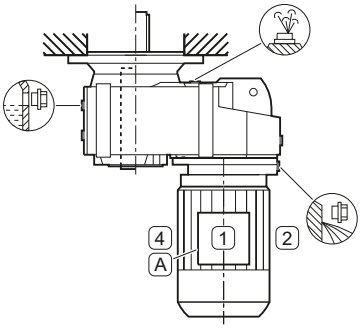


Mounting position for parallel shaft gearbox F.F in a flange-mounted design and F.Z in a housing flange-mounted design, size 29

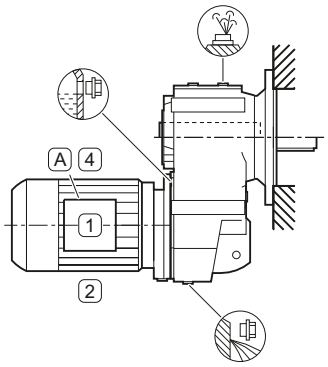
M1



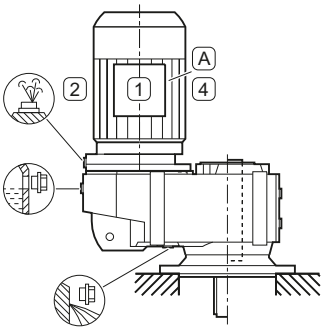
M2



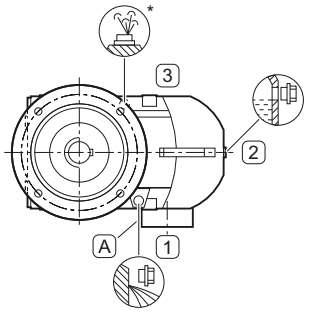
M3



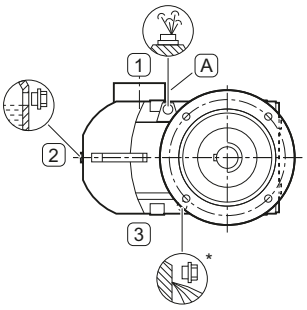
M4



M5

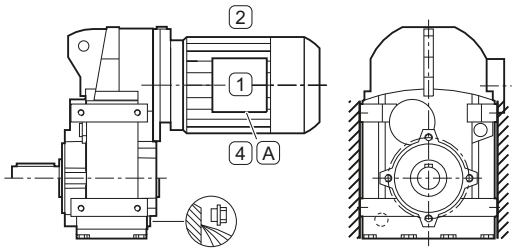


M6

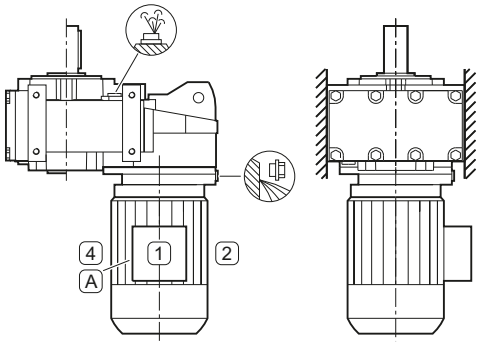


Mounting position for parallel shaft gearbox F.F in a flange-mounted design and F.Z in a housing flange-mounted design, sizes 39 - 89

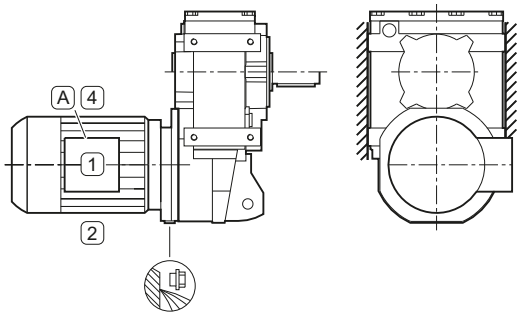
M1



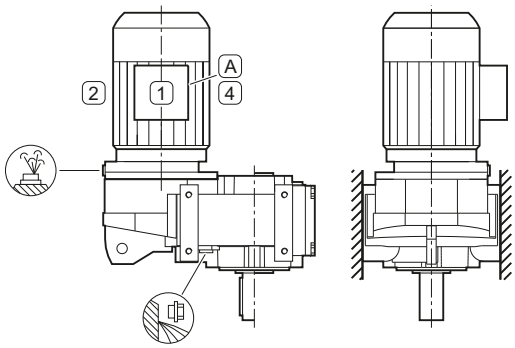
M2



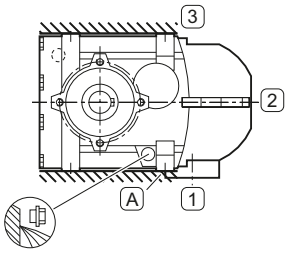
M3



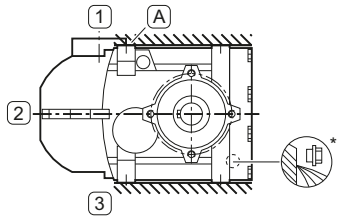
M4



M5

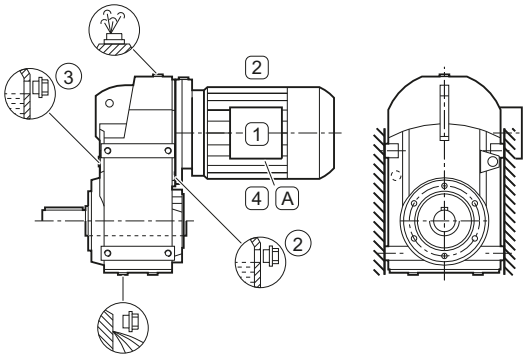


M6

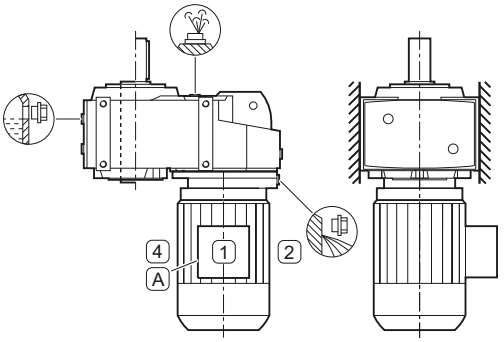


Mounting position for parallel shaft gearbox F in a foot-mounted design, size 29

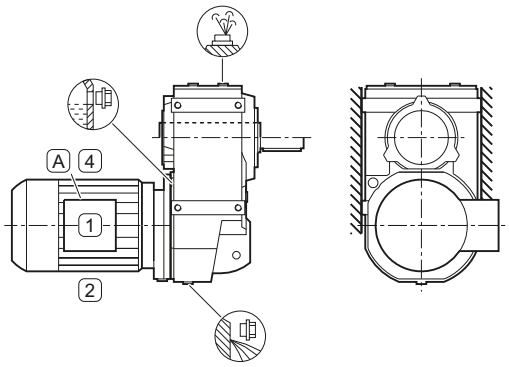
M1



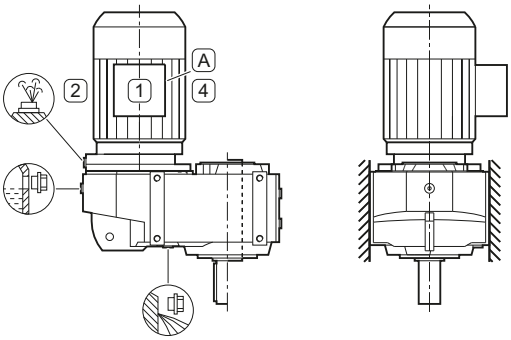
M2



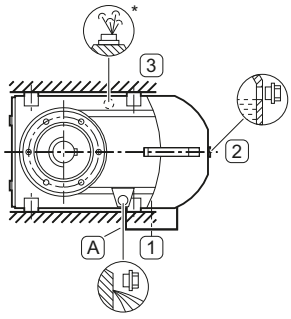
M3



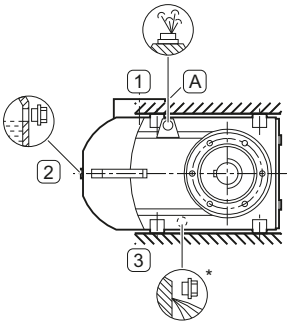
M4



M5



M6



Mounting position for parallel shaft gearbox F in a foot-mounted design, sizes 39 - 89

10.5.4 Bevel gearboxes

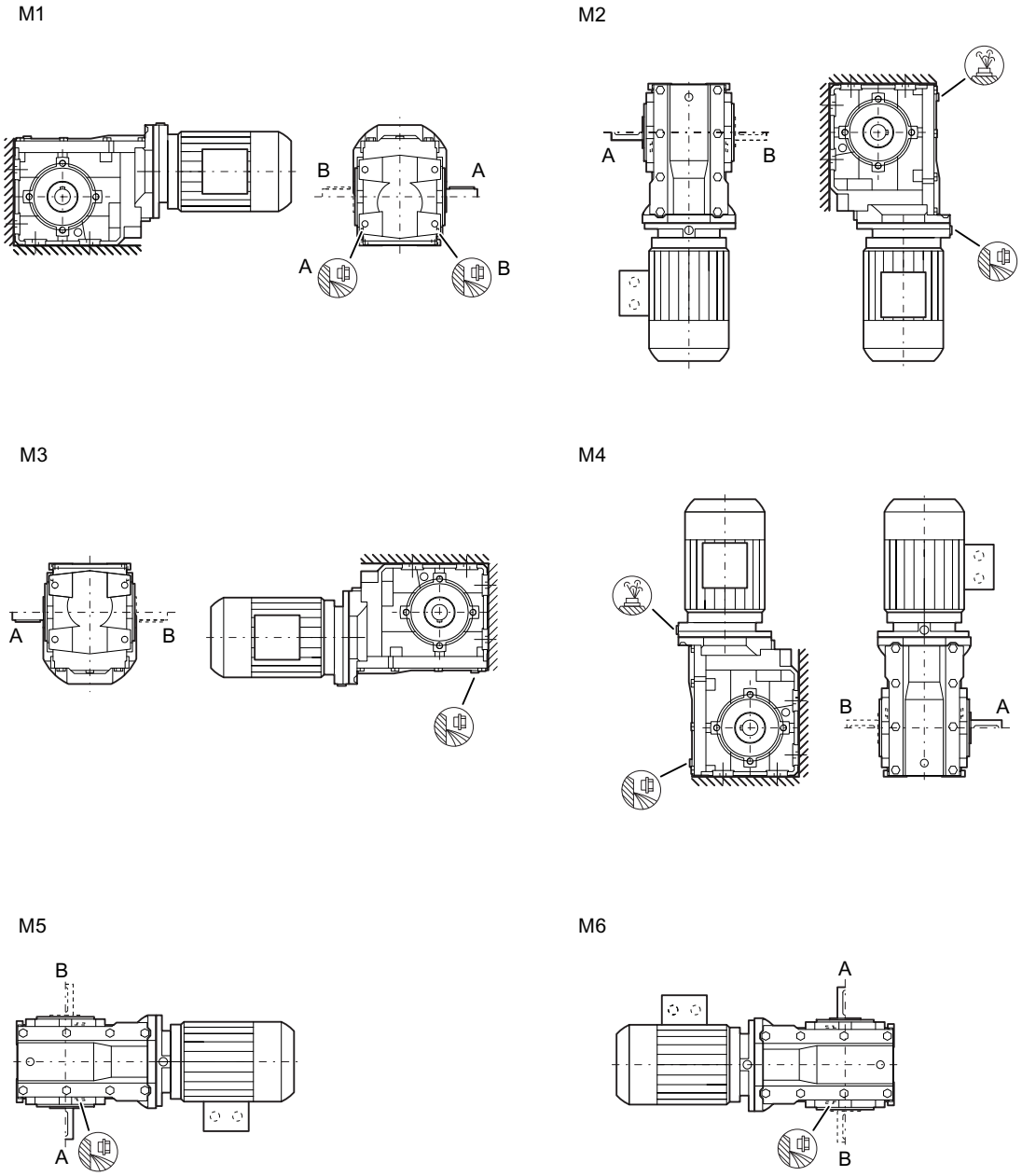


Figure 10-2 Mounting position for bevel gearbox B foot-mounted design, size 29

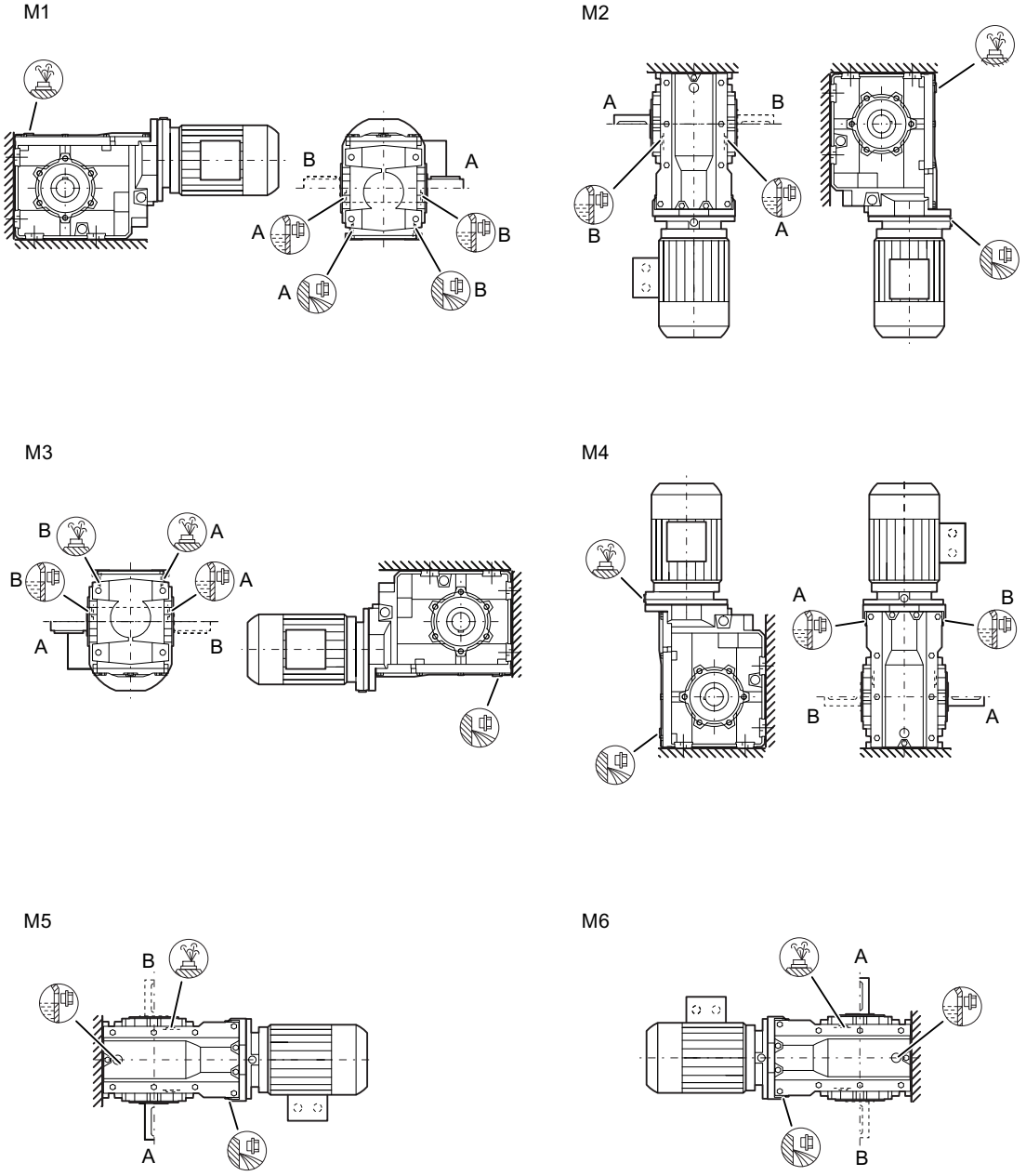


Figure 10-3 Mounting position for bevel gearbox B foot-mounted design, sizes 39 - 49

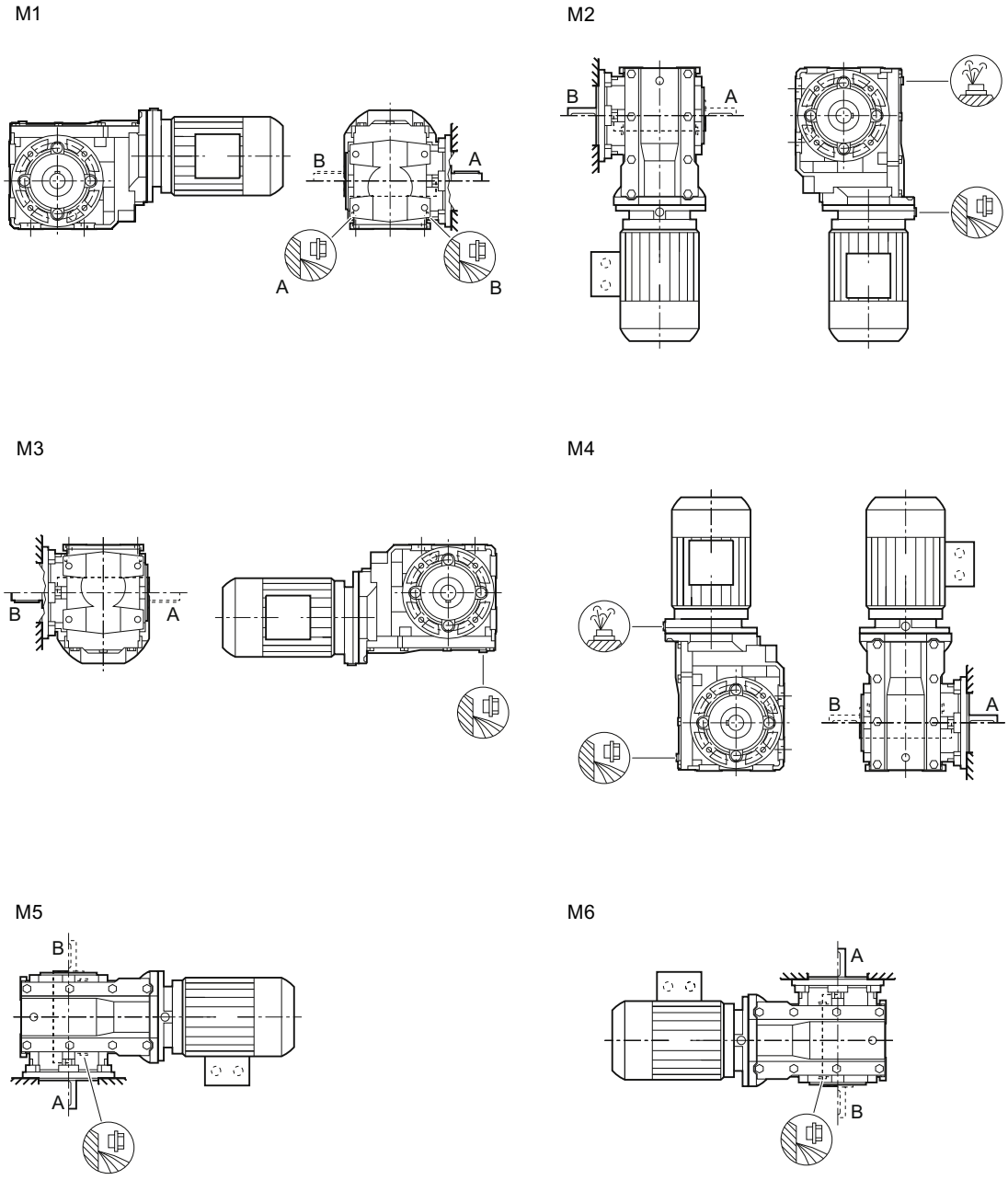


Figure 10-4 Mounting position for bevel gearbox B.Z housing flange design and B.F flange design, size 29

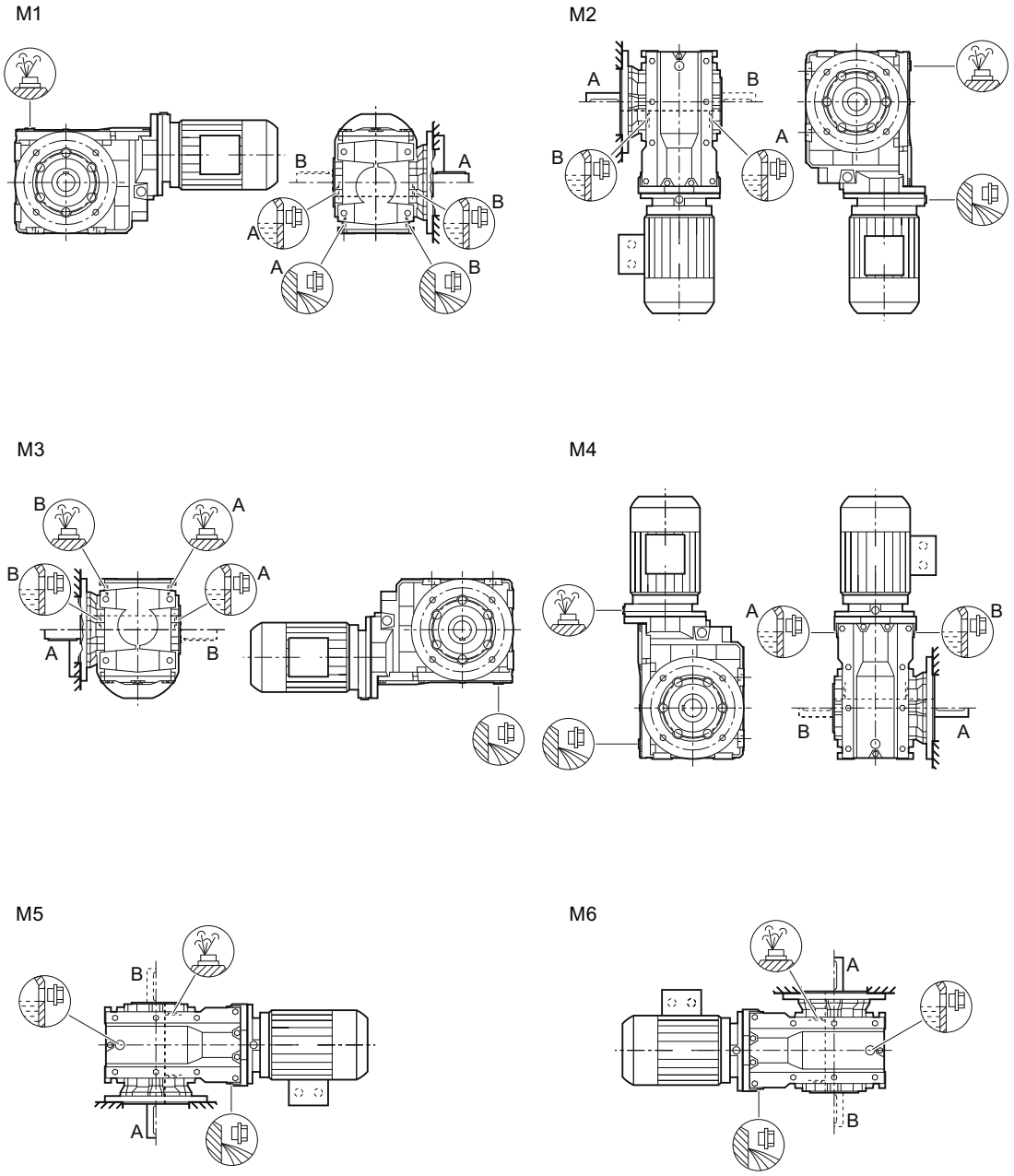


Figure 10-5 Mounting position for bevel gearbox B.Z housing flange design and B.F flange design, sizes 39 and 49

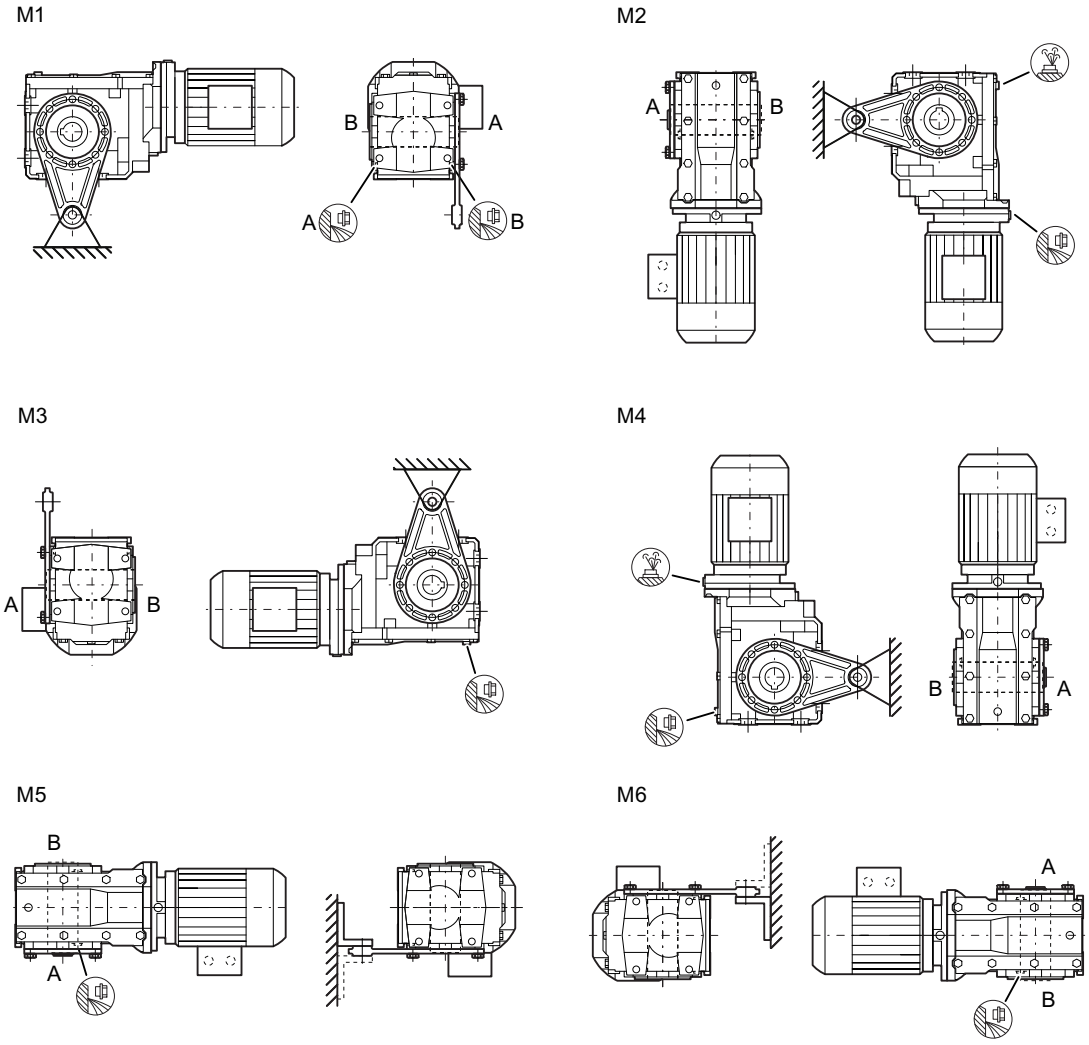


Figure 10-6 Mounting position for bevel gearbox BAD shaft-mounted design, size 29

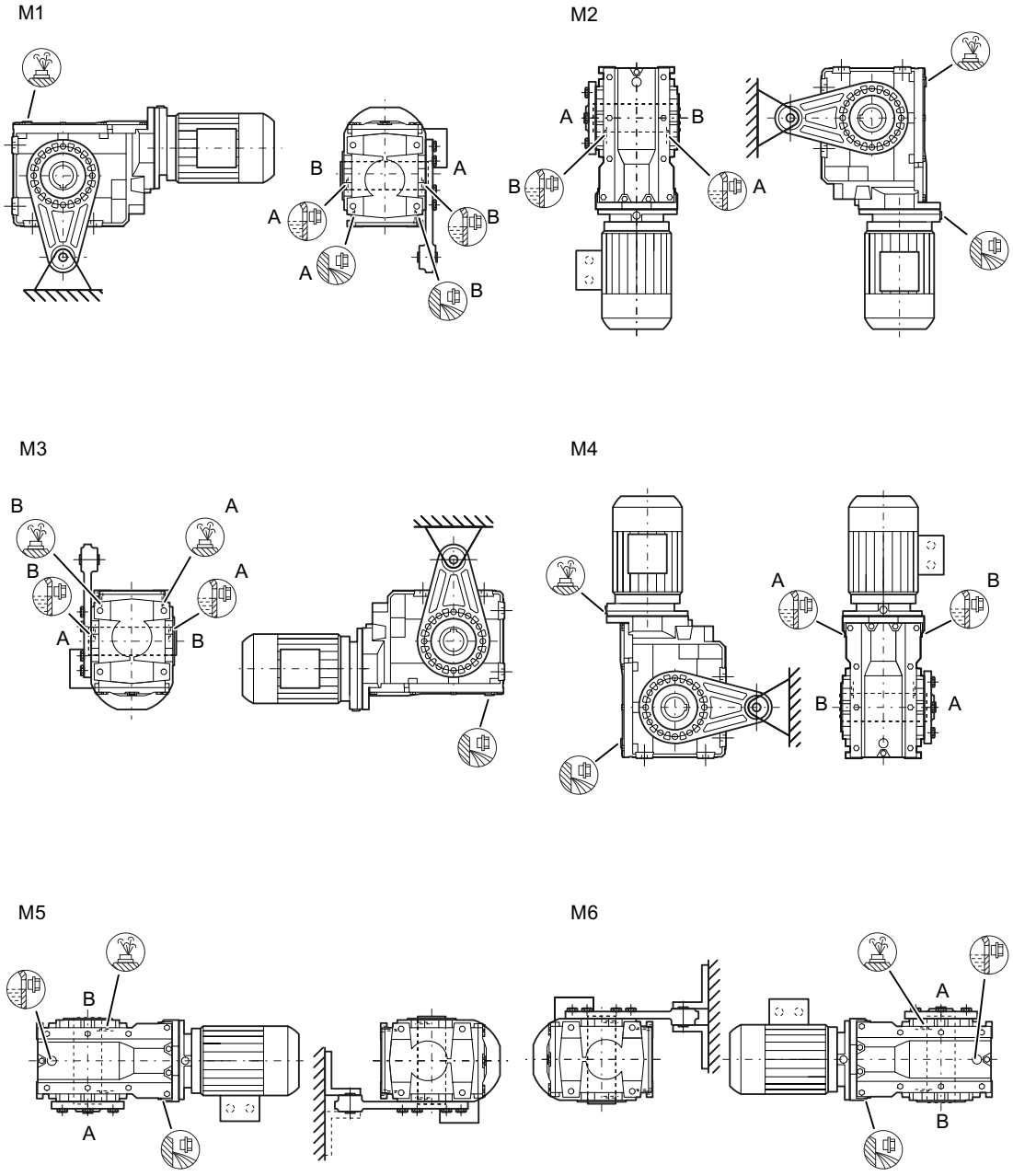
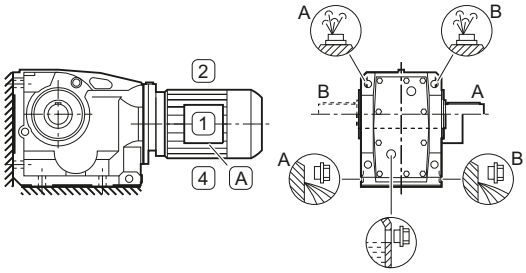
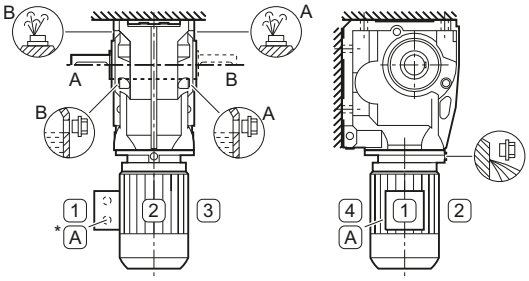


Figure 10-7 Mounting position for bevel gearbox BAD shaft-mounted design, sizes 39 - 49

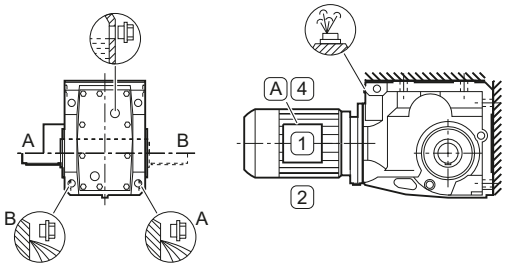
M1



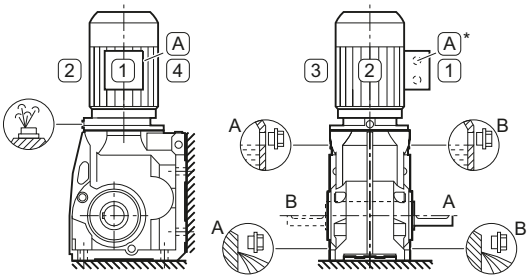
M2



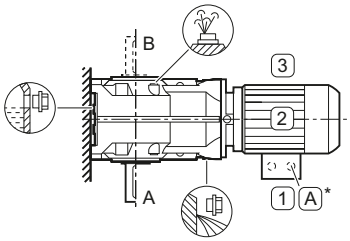
M3



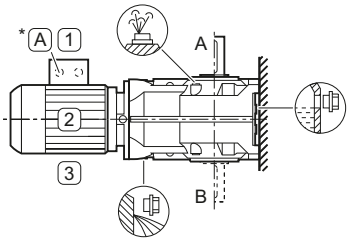
M4



M5

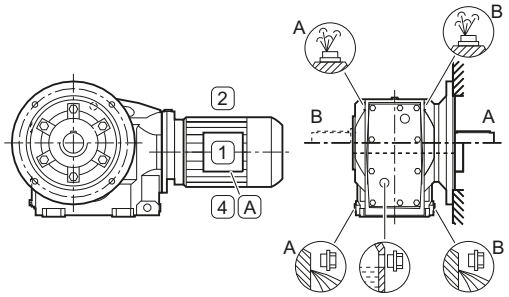


M6

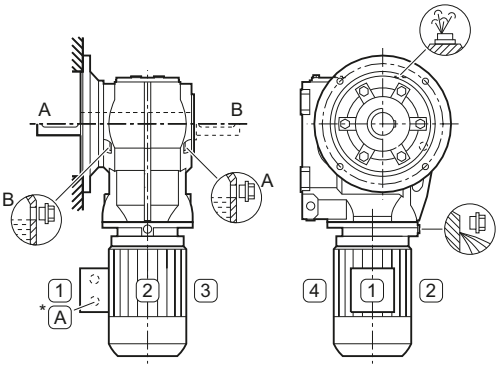


Mounting position for bevel gearbox K in a foot-mounted design, sizes 39 - 89

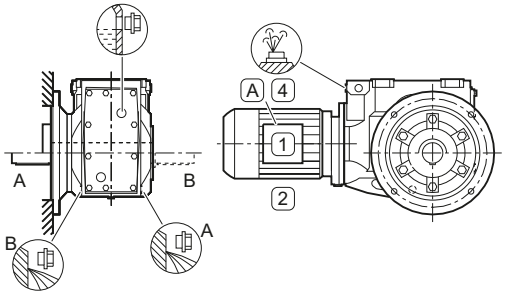
M1



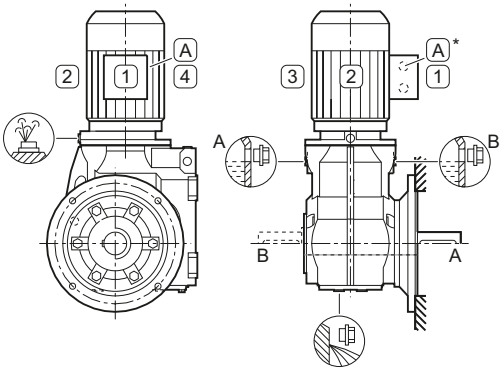
M2



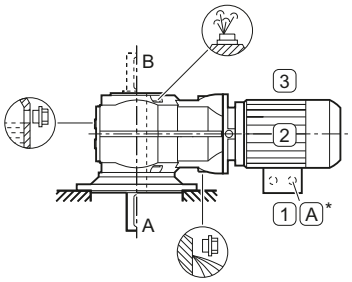
M3



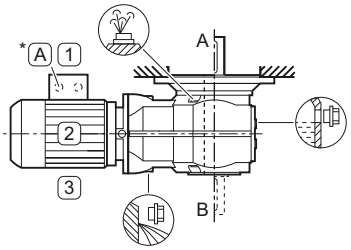
M4



M5

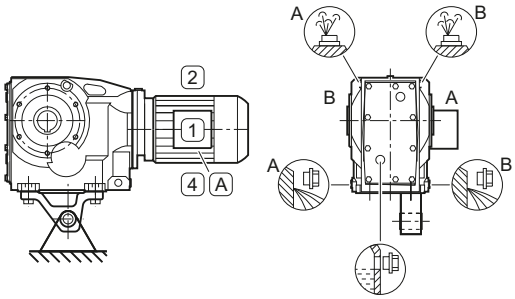


M6

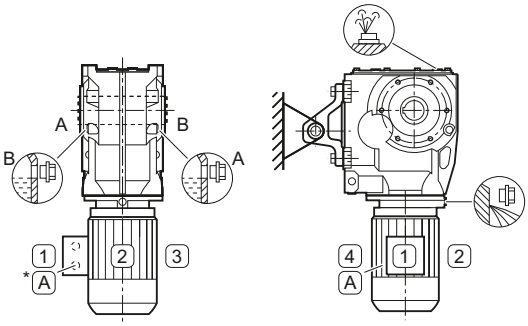


Mounting position for bevel gearbox KAZ in a housing flange-mounted design and K.F in a flange-mounted design, sizes 39 - 89

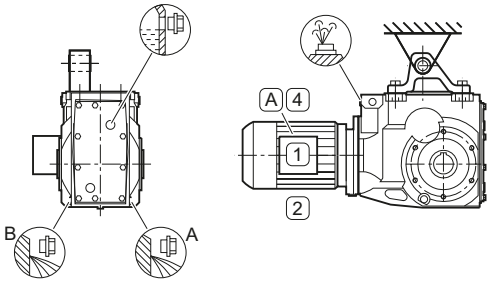
M1



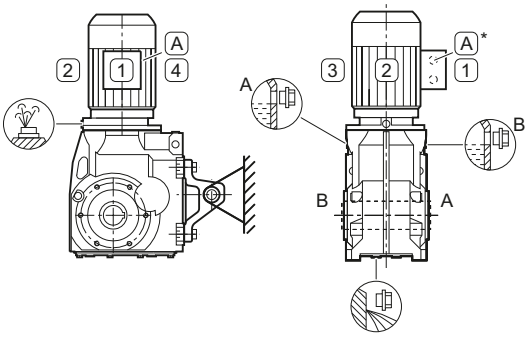
M2



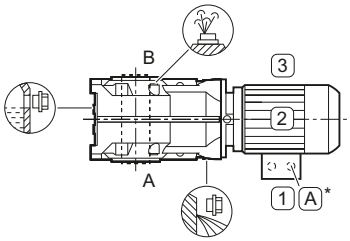
M3



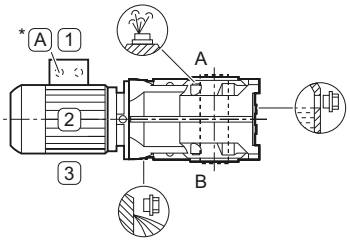
M4



M5



M6



Mounting position for bevel gearboxes KAD in a shaft-mounted design, sizes 39 - 89

10.6 Oil quantities

NOTICE
Incorrect oil quantities damage the gearbox. The oil quantities listed in the tables are guide values for changing the oil. They are used, for example, for lubricant storage and procurement. The precise values depend on the number of stages and transmission ratio of the gearbox. The oil level must be checked before commissioning.

10.6.1 Helical gearbox

Table 10- 3 Oil quantities [l] for D / Z and DB / ZB. Sizes 19 - 89

Type	Mounting position					
	M1	M2	M3	M4	M5	M6
Z.19	0.2	0.5	0.4	0.5	0.35	0.3
Z.29	0.2	0.7	0.45	0.6	0.55	0.3
Z.39	0.3	0.95	0.85	0.95	0.9	0.25
Z.49	0.55	1.9	1.9	1.9	1.8	0.65
Z.59	0.65	2	1.9	1.9	1.9	0.6
Z.69	0.65	2.1	2.6	2.6	2.3	0.85
Z.79	1.1	3.7	4	4	3.8	1.4
Z.89	2.2	6.9	6.7	6.7	6.6	2.4
D.19	0.2	0.5	0.4	0.5	0.35	0.3
D.29	0.15	0.65	0.45	0.5	0.55	0.4
D.39	0.25	0.9	0.8	0.85	0.8	0.7
D.49	0.55	1.8	1.8	1.7	1.7	1.2
D.59	0.45	1.9	1.9	1.8	1.8	1.2
D.69	0.6	2	2.4	2.3	2.2	1.5
D.79	0.9	3.5	3.9	3.7	3.5	2.4
D.89	2	6.5	6.2	6	6	4.2

Table 10- 4 Oil quantities [l] for DF / ZF and DZ / ZZ sizes 19 - 89

Type	Mounting position					
	M1	M2	M3	M4	M5	M6
Z.19	0.2	0.5	0.4	0.5	0.35	0.3
Z.29	0.2	0.7	0.45	0.6	0.55	0.3
Z.39	0.3	0.95	0.85	0.95	0.9	0.25
Z.49	0.55	1.9	19,	19,	1.8	0.65
Z.59	0.65	2	1.9	1.9	1.9	0.6
Z.69	0.65	2.1	2.6	2.6	2.3	0.85
Z.79	1	3.6	3.8	3.8	3.6	1.3
Z.89	2.2	6.9	6.7	6.7	6.6	2.4
D.19	0.2	0.5	0.4	0.5	0.35	0.3
D.29	0.15	0.65	0.45	0.5	0.55	0.4
D.39	0.25	0.9	0.8	0.85	0.8	0.7
D.49	0.55	1.8	1.8	1.7	1.7	1.2
D.59	0.45	1.9	1.9	1.8	1.8	1.2
D.69	0.6	2	2.4	2.3	2.2	1.5
D.79	0.9	3.5	3.9	3.7	3.5	2.4
D.89	2	6.5	6.2	6	6	4.2

10.6.2 Parallel shaft gearbox

Table 10- 5 Oil quantities [l] for F., F.Z and F.D sizes 29 - 89

Type	Mounting position					
	M1	M2	M3	M4	M5	M6
FZ.29	0.6	0.9	0.4	0.7	0.5	0.45
FZ.39	0.95	1.3	0.8	1.4	0.9	0.85
FZ.49	1.6	2.5	1.6	2.5	1.6	1.6
FZ.69	2.2	2.8	1.6	2.9	1.9	1.9
FZ.79	2.8	4.1	2.9	4.2	2.7	2.9
FZ.89	4.9	7.7	5.9	8.4	5.2	5.5
FD.29	0.6	0.8	0.35	0.6	0.45	0.45
FD.39	0.95	1.1	0.7	1.2	0.8	0.8
FD.49	2.1	2.3	1.5	2.3	1.5	1.5
FD.69	2.2	2.7	1.6	2.7	1.8	1.8
FD.79	3	3.8	2.7	3.9	2.6	2.7
FD.89	5.6	7.6	5.9	7.8	5.1	5.2

Table 10- 6 Oil quantities [l] for F.F sizes 29 - 89

Type	Mounting position					
	M1	M2	M3	M4	M5	M6
FZ.29	0.6	0.9	0.4	0.7	0.5	0.45
FZ.39	1	1.4	0.85	1.6	0.95	0.9
FZ.49	1.8	2.4	1.5	2.6	1.6	1.6
FZ.69	2.3	2.8	1.6	3	2	1.9
FZ.79	2.9	4.2	2.9	4.3	2.9	2.8
FZ.89	5.1	7.8	5.9	8.6	5.4	5.5
FD.29	0.6	0.8	0.35	0.6	0.45	0.45
FD.39	1	1.2	0.75	1.3	0.8	0.85
FD.49	2.2	2.3	1.5	2.4	1.6	1.5
FD.69	2.3	2.7	1.6	2.8	1.9	1.8
FD.79	3.1	3.9	2.7	4	2.7	2.6
FD.89	5.7	7.7	5.9	7.9	5.3	5.2

10.6.3 Bevel gearboxes

Table 10- 7 Oil quantities [l] for B sizes 29 - 49

Type	Mounting position					
	M1	M2	M3	M4	M5	M6
B.29	0.3	0.6	0.75	0.9	0.55	0.5
B.39	0.5	1	1.3	1.7	1	0.85
B.49	1.1	1.8	2.5	3.2	1.9	1.6

Table 10- 8 Oil quantities [l] for K. and KA sizes 39 - 89

Type	Mounting position					
	M1	M2	M3	M4	M5	M6
K.39	0.35	0.85	1.1	1.2	0.85	0.9
K.49	0.55	1.4	1.8	1.9	1.5	1.6
K.69	0.75	2	2.5	2.7	2.2	2.2
K.79	1	2.2	2.9	3.4	2.5	2.6
K.89	1.8	4.3	5.5	6.3	4.6	4.8

Table 10- 9 Oil quantities [l] for KAF, KAZ and KAD sizes 39 - 89

Type	Mounting position					
	M1	M2	M3	M4	M5	M6
KA.39	0.4	0.9	1.2	1.3	0.95	0.95
KA.49	0.65	1.5	1.9	2.2	1.6	1.6
KA.69	0.85	2.1	2.8	3.2	2.4	2.5
KA.79	1.2	2.5	3.4	4.1	2.9	3.2
KA.89	2.2	4.7	6.2	7.3	5.3	5.6

Table 10- 10 Oil quantities [l] for KF sizes 39 - 89

Type	Mounting position					
	M1	M2	M3	M4	M5	M6
KF39	0.35	0.9	1.2	1.3	0.95	1
KF49	0.6	1.4	2	2.2	1.6	1.7
KF69	0.85	2	2.8	3.1	2.4	2.4
KF79	1.2	2.5	3.4	4.1	2.9	3.2
KF89	2.2	4.7	6.2	7.3	5.3	5.6

Spare parts

11

11.1 Stocking of spare parts

By stocking the most important spare and wearing parts on site, you can ensure that the gearbox or geared motor is ready for use at any time.

NOTICE
Please note that spare parts and accessories not supplied by us have not been tested or approved by us. The installation and / or use of such products can therefore have a negative impact on the design characteristics of the geared motor and might consequently impair the active and / or passive safety features of the machine. Siemens AG will accept no liability or warranty whatsoever for damage occurring as a result of the use of non-original spare parts or accessories.

We can only accept liability for original spare parts supplied by us.

Please note that single components often have special production and supply specifications. We always supply spare parts which meet state-of-the-art technical standards and comply with the latest legal requirements.

Please state the following data when ordering spare parts:

- Serial no., see rating plate ③
- Type designation, see rating plate ⑥
- Part no. (4-digit item no. from spare parts list, 6-digit code no., 7-digit article no. or 14-digit material no.)
- Quantity

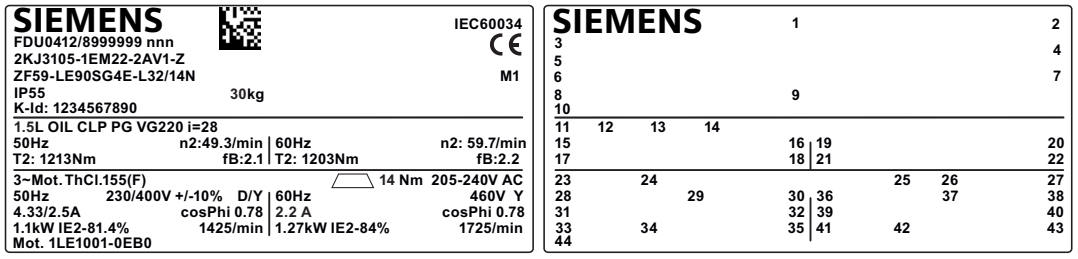


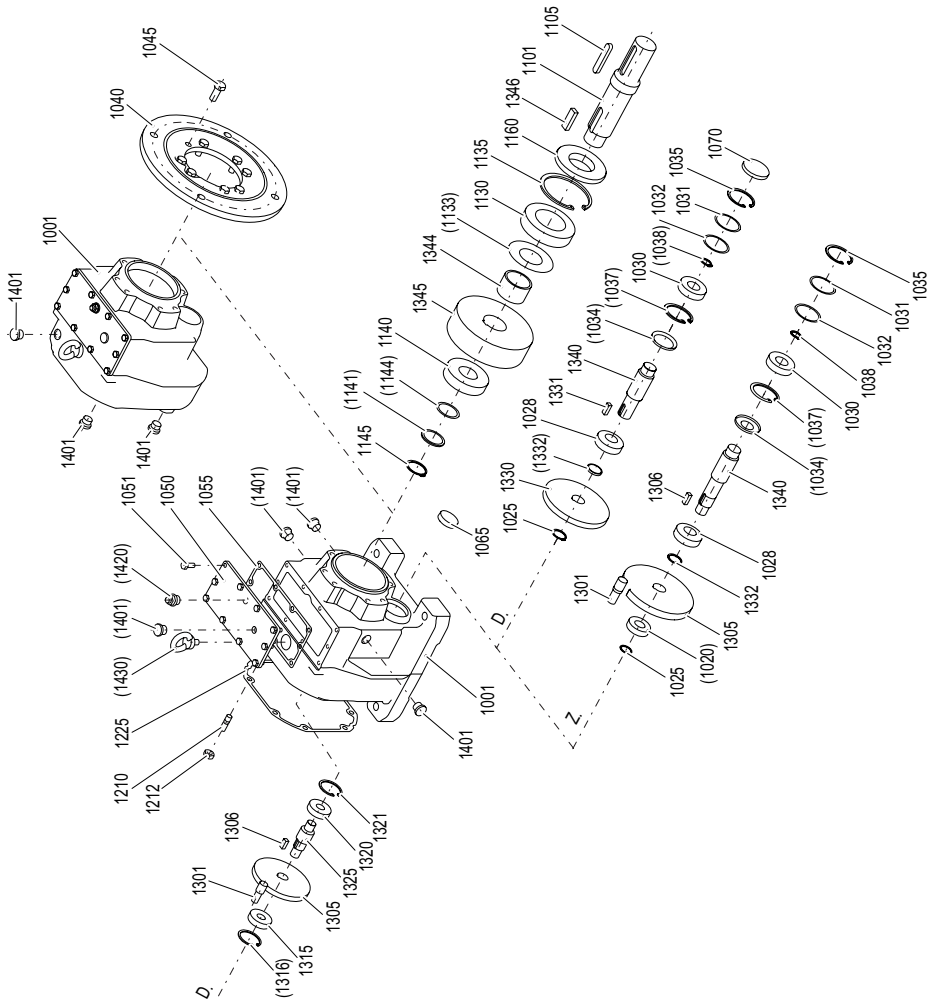
Figure 11-1 Rating plate example

11.2 Helical gearboxes D / Z, sizes 19 - 89

Note

For gearbox, sizes 19 and 29, we recommended that the gearbox is replaced if service is required.

Parts subject to wear are available on request.



1001 Gearbox housing
1020 Bearing
1025 Locking ring
1028 Bearing
1030 Bearing
1031 Supporting disk
1032 Shim
1034 NILOS ring

1035 Locking ring
1037 Locking ring
1038 Locking ring
1040 Output flange
1045 Bolt
1050 Housing cover
1051 Bolt
1055 Seal
1065 Sealing cap
1070 Sealing cap
1101 Output shaft
1105 Parallel key
1130 Bearing
1133 NILOS ring
1135 Locking ring
1140 Bearing
1141 Supporting disk / shim
1144 Supporting disk / shim
1145 Locking ring
1160 Shaft sealing ring
1210 Bolt
1212 Nut
1225 Seal
1301 Plug-in pinion
1305 Helical
1306 Parallel key
1315 Bearing
1316 Locking ring
1320 Bearing
1321 Locking ring
1325 Pinion shaft
1330 Helical
1331 Parallel key
1332 Bush / locking ring
1340 Pinion shaft
1344 Spacer / bush
1345 Helical
1346 Parallel key
1401 Screw plug
1420 Vent filter
1430 Eyebolt

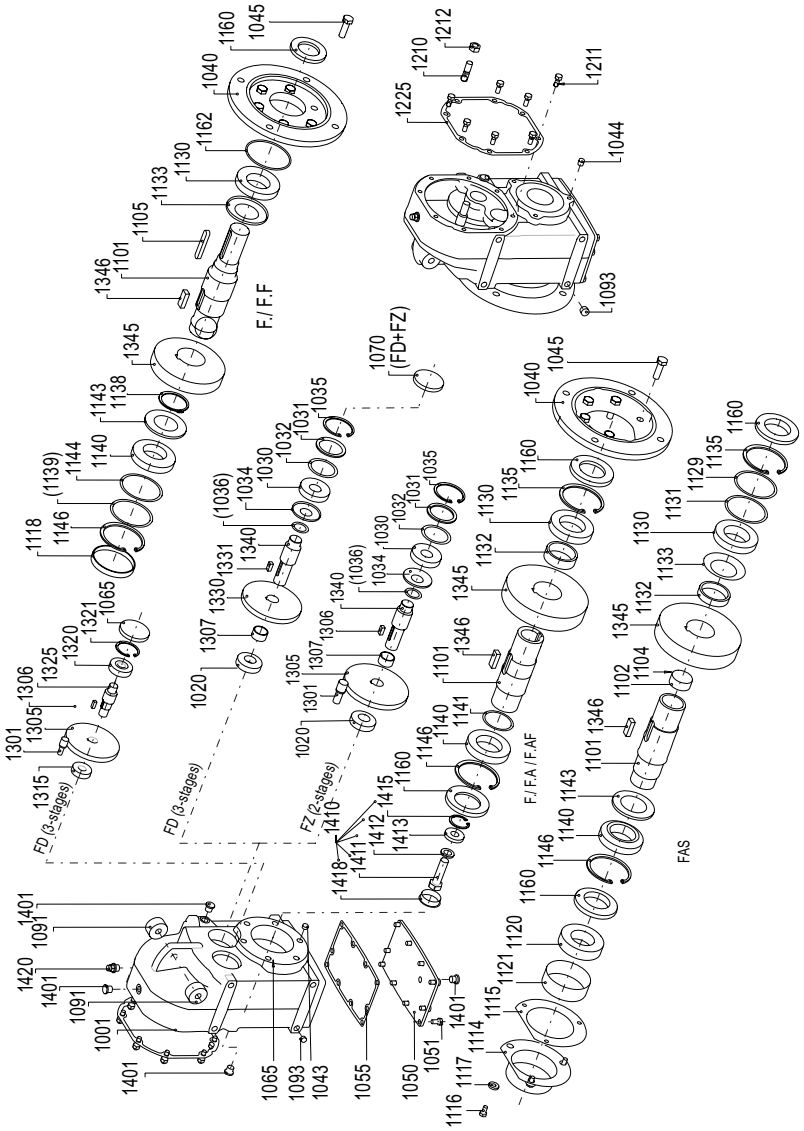
Figure 11-2 Helical gearboxes D. / Z., sizes 19 - 89

11.3 Parallel shaft gearboxes F sizes 29 - 89

Note

For gearbox, size 29, we recommended that the gearbox is replaced if service is required.

Parts subject to wear are available on request.



1001 Gearbox housing
1020 Bearing
1030 Bearing
1031 Supporting disk
1032 Shim
1034 NILOS ring

1035 Locking ring
1040 Output flange
1043 Plug
1044 Plug
1045 Bolt
1050 Housing cover
1051 Bolt
1055 Seal
1065 Sealing cap
1070 Sealing cap
1091 Rubber bush
1093 Plug
1101 Output shaft
1102 Bronze bushing
1104 Seal
1105 Parallel key
1114 Cover NDE
1115 Seal
1116 Bolt
1117 Screw lock
1118 Plug / sealing cap
1120 Shrink disk
1121 Shrink disk
1129 Supporting disk
1130 Bearing
1131 Shim
1132 Supporting disk / shim
1133 NILOS ring
1135 Locking ring
1138 Locking ring
1139 Supporting disk
1140 Bearing
1141 Supporting disk / shim
1143 NILOS ring
1144 Supporting disk / shim
1146 Locking ring
1160 Shaft sealing ring
1162 O ring
1210 Bolt
1211 Screw lock
1212 Nut
1225 Seal
1301 Plug-in pinion
1305 Helical
1306 Parallel key

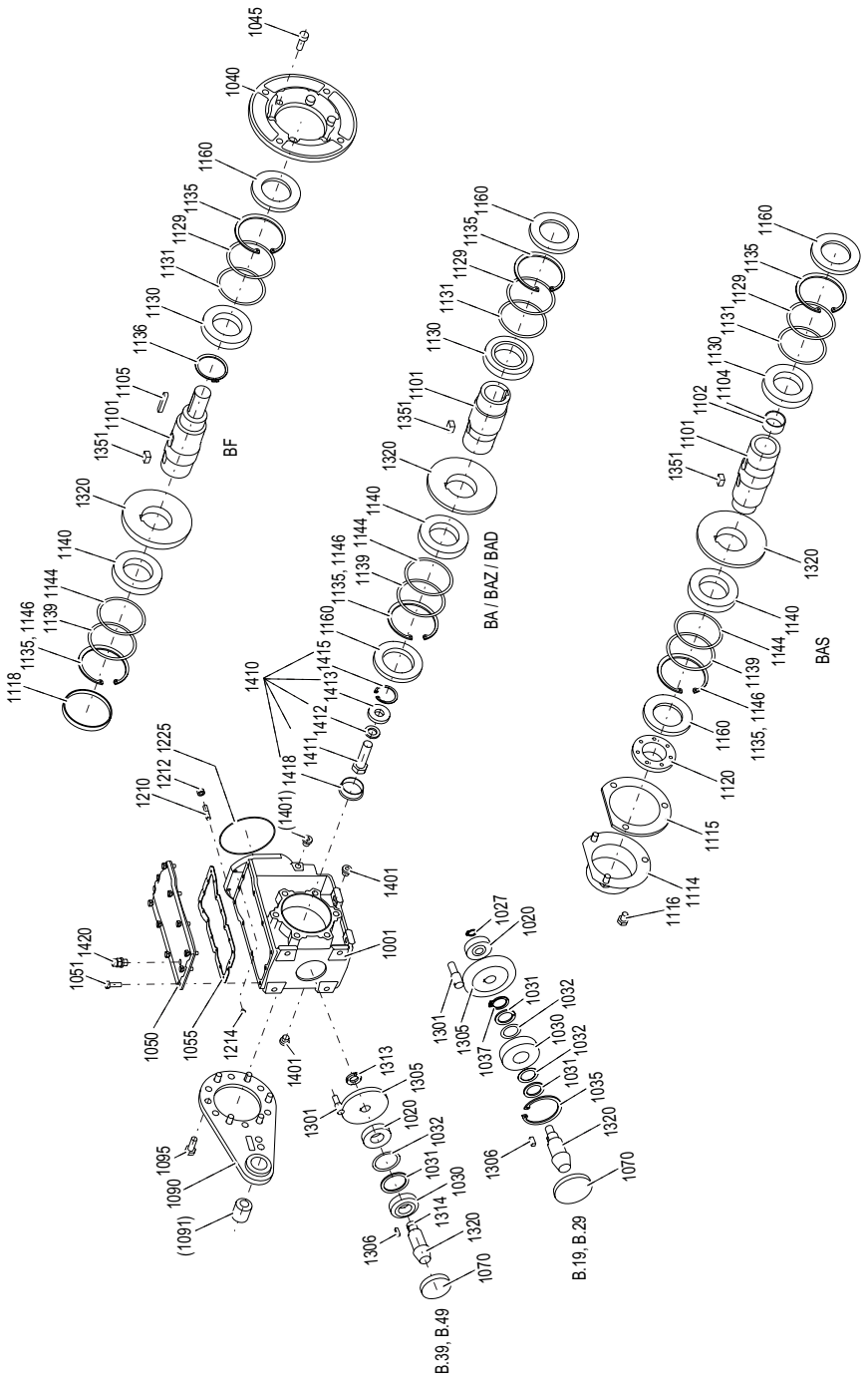
1307 Spacer / bush
1315 Bearing
1320 Bearing
1321 Locking ring
1325 Pinion shaft
1330 Helical
1331 Parallel key
1340 Pinion shaft
1345 Helical
1346 Parallel key
1401 Screw plug
1410 Mounting accessories
1411 Bolt
1412 Locking ring
1413 Disk
1415 Locking ring
1418 Sealing cap
1420 Vent filter
1430 Eyebolt

Figure 11-3 Parallel shaft gearboxes F sizes 29 - 89

11.4 Bevel gearbox B sizes 29 - 49

Note

For gearbox, size 29, we recommended that the gearbox is replaced if service is required. Parts subject to wear are available on request.

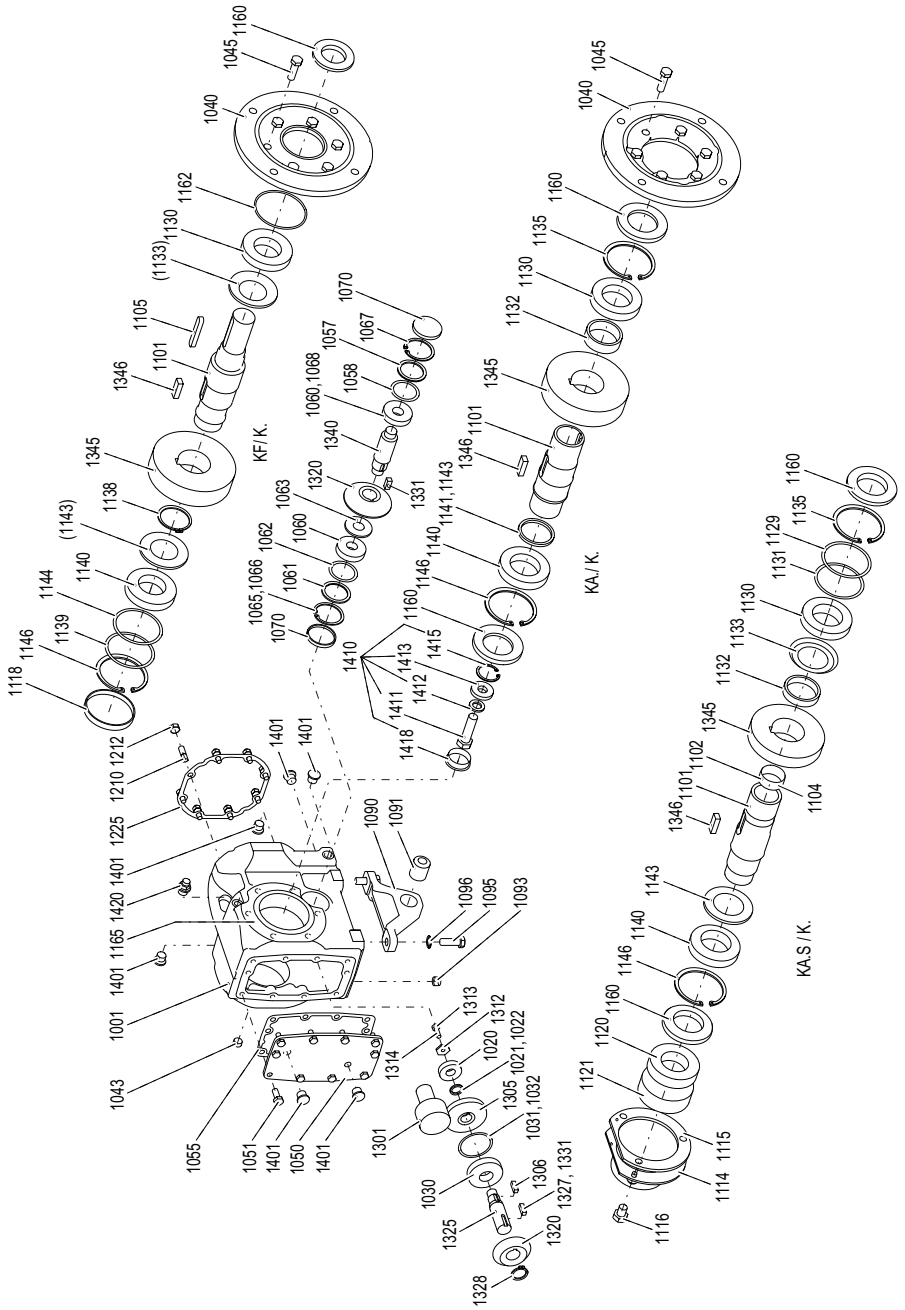


1001 Gearbox housing
1020 Bearing
1027 Locking ring
1030 Bearing
1031 Supporting disk
1032 Shim
1035 Locking ring
1037 Locking ring
1040 Output flange
1045 Bolt
1050 Housing cover
1051 Bolt
1055 Seal
1070 Sealing cap
1090 Torque arm
1091 Rubber bush
1095 Bolt
1096 Screw lock
1101 Output shaft
1102 Bronze bushing
1104 Seal
1105 Parallel key
1114 Cover NDE
1115 Seal
1116 Bolt
1118 Plug / sealing cap
1120 Shrink disk
1129 Supporting disk
1130 Bearing
1131 Shim
1135 Locking ring
1139 Supporting disk
1140 Bearing
1144 Supporting disk / shim
1146 Locking ring
1160 Shaft sealing ring
1210 Bolt
1212 Nut
1214 Plug
1225 Seal
1301 Plug-in pinion
1305 Helical
1306 Parallel key
1313 Bolt
1314 Screw lock

1320 Bearing
1351 Parallel key
1401 Screw plug
1410 Mounting accessories
1411 Bolt
1412 Locking ring
1413 Disk
1415 Locking ring
1418 Sealing cap
1420 Vent filter
1430 Eyebolt

Figure 11-4 Bevel gearbox B sizes 29 - 49

11.5 Bevel gearbox K sizes 39 - 89



1001 Gearbox housing
1020 Bearing
1021 Supporting disk / shim
1022 Supporting disk / shim

1030 Bearing
1031 Supporting disk
1032 Shim
1040 Output flange
1043 Plug
1045 Bolt
1050 Housing cover
1051 Bolt
1055 Seal
1057 Bolt
1058 Supporting disk
1060 Tapered roller bearing
1061 Supporting disk
1062 Shim
1063 NILOS ring
1065 Sealing cap
1066 Locking ring
1067 Locking ring
1068 Tapered roller bearing
1070 Sealing cap
1090 Torque arm
1091 Rubber bush
1093 Plug
1095 Bolt
1096 Screw lock
1101 Output shaft
1102 Bronze bushing
1104 Seal
1105 Parallel key
1114 Cover NDE
1115 Seal
1116 Bolt
1118 Plug / sealing cap
1120 Shrink disk
1121 Shrink disk
1129 Supporting disk
1130 Bearing
1131 Shim
1132 Supporting disk / shim
1133 NILOS ring
1135 Locking ring
1138 Locking ring
1139 Supporting disk
1140 Bearing
1141 Supporting disk / shim

1143 NILOS ring
1144 Supporting disk / shim
1146 Locking ring
1160 Shaft sealing ring
1162 O ring
1165 Seal
1210 Bolt
1212 Nut
1225 Seal
1301 Plug-in pinion
1305 Helical
1306 Parallel key
1312 Disk
1313 Bolt
1314 Screw lock
1320 Bearing
1325 Pinion shaft
1327 Parallel key
1328 Locking ring
1331 Parallel key
1340 Pinion shaft
1345 Helical
1346 Parallel key
1401 Screw plug
1410 Mounting accessories
1411 Bolt
1412 Locking ring
1413 Disk
1415 Locking ring
1418 Sealing cap
1420 Vent filter
1430 Eyebolt

Figure 11-5 Bevel gearbox K sizes 39 - 89

Declaration of Incorporation

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Declaration of Incorporation according to Directive 2006/42/EC Annex II 1 B.

Manufacturer:	Siemens AG
Address:	Bahnhofstraße, 72072 Tübingen, Germany
Product designation:	SIMOGEAR Types: • Two- and three-stage helical gearboxes, types D. / Z.19, D. / Z.29, D. / Z.39, D. / Z.49, D. / Z.59, D. / Z.69, D. / Z.79, D. / Z.89 • Parallel shaft gearboxes, types F.29, F.39, F.49, F.69, F.79, F.89 • Bevel gearboxes, types B.29, B.39, B.49, K.39, K.49, K.69, K.79, K.89

The designated product is an incomplete machine in the sense of Article 2 g of the directive 2006/42/EC. It is exclusively designed for incorporation into another machine or for assembly with one or several machines.

The following essential safety and health requirements of directive 2006/42/EC, Annex I are relevant for the incomplete machine specified above and are applied. The risks not relevant for the product are not listed.

- 1.1, 1.1.2, 1.1.3, 1.1.5
- 1.2.4.4, 1.2.6
- 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.6, 1.3.8.1
- 1.4.1, 1.4.2, 1.4.2.1
- 1.5.1, 1.5.2, 1.5.4, 1.5.5, 1.5.6, 1.5.8, 1.5.9, 1.5.10, 1.5.11, 1.5.13, 1.5.15
- 1.6.1, 1.6.2
- 1.7.1, 1.7.1.1, 1.7.2, 1.7.3, 1.7.4, 1.7.4.1, 1.7.4.2, 1.7.4.3

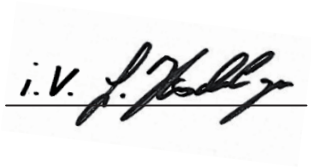
When developing and manufacturing the above designated products, the following standards and specifications were applied: EN ISO 12100-1:2011

The special technical documents according to Annex VII, B of the directive 2006/42/EC were generated and will be provided to the appropriate authorities when justifiably requested in an electronic form.

Nominated person for compiling the technical documentation:
Georg Böing, Head of Research and Development Gears.

Before the final product is commissioned, in which the incomplete machine described here should be incorporated, then it must be ensured that this is in conformance with directive 2006/42/EC.

Tübingen, May 1, 2012



Georg Böing
Head of Research & Development Gears

Lothar Hirschberger
Head of Quality Management

Futher information

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Subject to change

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