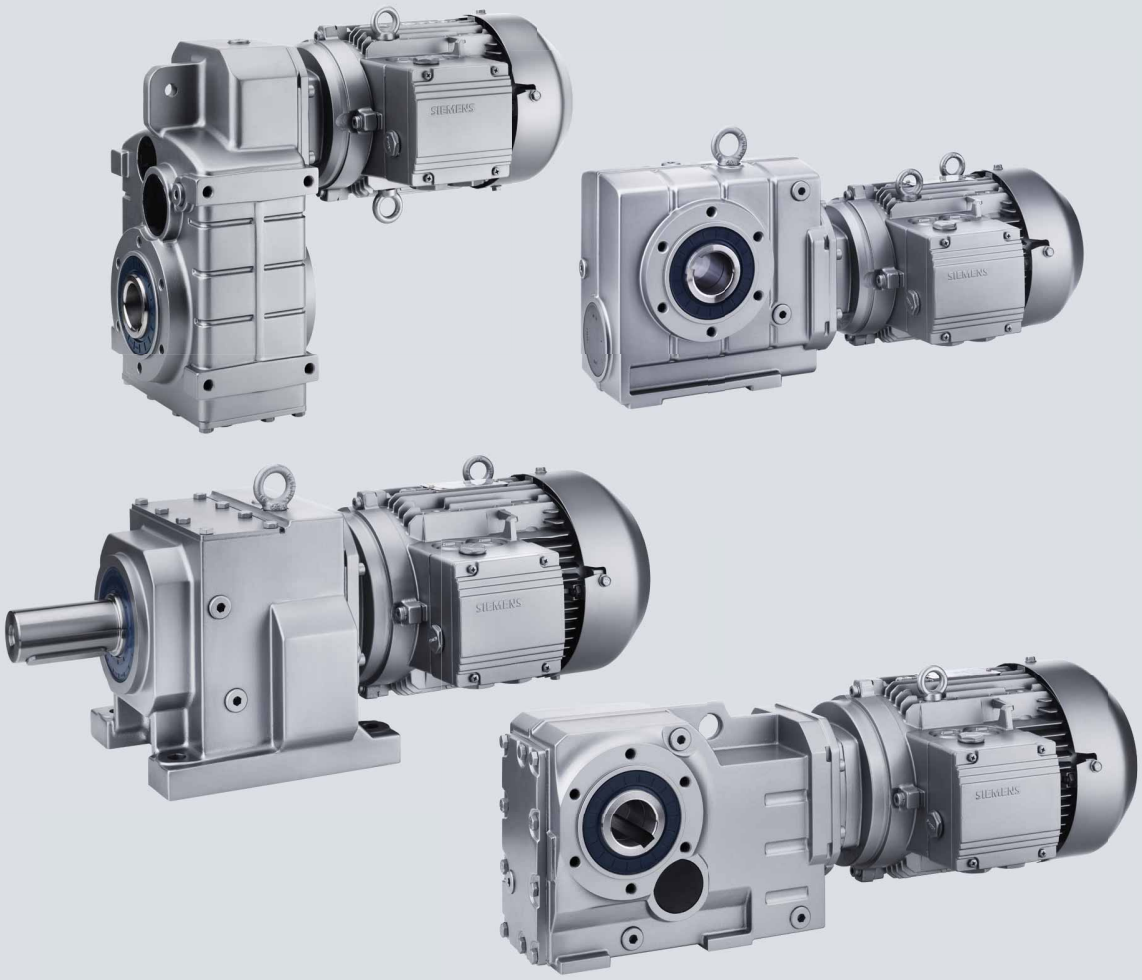
MOTOX gearbox

BA 2010

Operating Instructions · 05/2010



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Gearbox
BA 2010

Operating Instructions

05/2010

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.

CAUTION

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

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 for the specific task, 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 adhered to. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of the 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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℗ 06/2010

Table of contents

General information and safety notes

1

1.1 General information

ATEX version gearboxes

Instructions and measures applying in particular to ATEX version gearboxes.

⚠ CAUTION
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 the MOTOX gearboxes:

- E, Z, and D helical gearboxes, sizes 18 to 188
- EK cooling tower version helical gearboxes, sizes 88 to 148 and ZK sizes 68 to 188
- FZ and FD parallel shaft gearboxes, sizes 28, 38B to 188B, 208
- B, K bevel helical gearboxes, sizes 28 to 188
- C helical worm gearboxes, sizes 28 to 88

Table 1- 1 Order number code

MOTOX gearbox	Structure of the order number - Position				
	1	2	3	4	5
Helical gearbox E, EK	2	K	J	1	0
Helical gearbox Z, ZK	2	K	J	1	1
Helical gearbox D	2	K	J	1	2
Parallel shaft gearbox FZ	2	K	J	1	3
Parallel shaft gearbox FD	2	K	J	1	4
Bevel helical gearbox B, K	2	K	J	1	5
Helical worm gearbox C	2	K	J	1	6

Note

In addition to these operating instructions, special contractual agreements and technical documentation apply to these 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 English: http://www.siemens.com/automation/support-request

Applicable operating instructions

Table 1- 2 MOTOX gearbox operating instructions

Title	Product
BA 2010	MOTOX gearboxes
BA 2011	MOTOX helical worm gearboxes and geared motors
BA 2019	MOTOX input units
BA 2510	MOTOX optional add-on units
BA 2515	MOTOX gearboxes for overhead conveyors

Table 1- 3 Motor operating instructions

Title	Product
BA 2310	Three-phase and single-phase alternating current motors and brake motors with accessories
BA 2320	LA / LG and LAI / LGI motors for fitting to MOTOX and CAVEX gearboxes

Table 1- 4 CAVEX gearbox operating instructions

Title	Product
BA 6610TU	CAVEX worm gearboxes, type C.., size 63 to 630
BA 6611TU	CAVEX worm gearboxes, type CS.., size 63 to 630
BA 6612TU	CAVEX worm gearboxes, type CD.., size 100 to 630
BA 6800TU	CAVEX elevator drives, type CG 26, size 100, 112, 135, 170
BA 6801TU	CAVEX elevator drives, type CG 45, size 120
BA 6802TU	CAVEX escalator drives, type CG 26, size 100, 112, 135, 170

1.2 Copyright

1.3 Intended use

ATEX version gearboxes

The ATEX gearbox meets the requirements of the Explosion Protection Directive 94/9/EC.

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

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

Unless otherwise agreed, the gearboxes have been designed for use in 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 assume an ambient temperature of -20 °C to +40 °C and an installation altitude of up to 5,000 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 81). Do not operate the gearboxes outside the specified power limits. Other operating conditions must be contractually agreed.

Do not stand or walk on the gearboxes.

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.

Replace damaged screws with new screws 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 type of risk and personal protective equipment

⚠ DANGER

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.

⚠ DANGER

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.

⚠ DANGER

Avoid breathing vapors when working with solvents.

Ensure adequate ventilation.

⚠ DANGER

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.

Technical description 2

2.1 General description

The gearbox is supplied with one, two or three transmission stages.

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

2.2 Housing

The housings for sizes 18 and 28 are made of die-cast aluminum. The housings for sizes 38 to 208 are made of grey cast iron.

2.3 Geared components

The geared components of the gearboxes are hardened. In the case of helical worm gearboxes the worm is hardened and ground, and the gear is manufactured from bronze. The bevel gear stage of the bevel helical gearbox is lapped in pairs.

2.4 Lubrication

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

2.5 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.

2.6 Shaft seals

The radial shaft sealing ring, combination shaft sealing ring, labyrinth seal, and slide ring seal at the shaft outlet prevent lubricant from escaping from the housing and impurities from entering it.

2.6.1 Radial shaft sealing ring

The radial shaft sealing ring is used as the standard type of seal. It is provided with an additional dust lip to protect against contaminants from outside.

At higher ambient temperatures over +40 °C to +80 °C, shaft sealing rings of temperature-resistant material are used, subject to contractual agreement.

2.6.2 Combination shaft sealing ring (optional)

The combination shaft sealing ring offers an improved oil seal, for example, additional sealing lips prevent the ingress of dirt. The separate sealing system prevents shaft shrinkage due to corrosion or dirt. The grease packing prevents the sealing lips from running dry.

When carrying out repairs, e.g., if the shaft has shrunk, you can replace the standard seal with a combination shaft sealing ring.

2.7 Cooling

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

2.8 Backstop

ATEX version gearboxes

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

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

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

CAUTION
Damage or destruction of the backstop due to incorrect direction of rotation. Do not run the motor against the backstop. Note the directional arrow on the gearbox.

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

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

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

Table 2- 1 Drive speed when using backstops

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

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

2.9 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.

In special cases, riveted or bolted metal plates are used.

2.10 Surface treatment

2.10.1 General information on surface treatment

All paint finishes are sprayed on.

ATEX version gearboxes

The gearbox is delivered complete with primer and paint finish.

The conductivity requirement and the limit on the thickness of the applied coat of paint correspond to DIN EN 13463-1. The maximum permissible coat thickness results from explosion group IIA, IIB or IIC and according to the ignition energy. No electrostatic charge is expected for coating thicknesses below 200 µm.

ATEX version gearboxes

If the gearbox is delivered with primer only, a paint finish must be applied which meets the applicable guidelines for the specific application. The primer does not provide adequate corrosion protection.

An excessively high electrostatic charge must be avoided.
Ensure that highly active mechanisms that cause the paint finish to generate a charge are avoided.
Highly active mechanisms of charge generation can be:

- fast air with high dust content directed past the gearbox
- sudden escape of compressed gases containing particulates
- harsh abrasive processes (not referring to manual cleaning / wiping with cleaning rags).

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

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.

2.10.2 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 paint for normal environmental stress	
Dip primer 1-component hydro paint	• Indoor installation • Heated buildings with neutral atmospheres • Resistance to greases and some resistance to mineral oils, aliphatic solvents • Standard paint
Corrosiveness category C2 paint for low environmental stress	
Dip primer 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
Corrosiveness category C3 paint for medium environmental stress	
Dip primer 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 %)

Paint system	Description
Corrosiveness category C4 paint for high environmental stress	
Dip primer 2-component epoxy zinc phosphate 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 paint for very high environmental stress	
Dip primer 2-component epoxy zinc phosphate 2-component epoxy iron mica 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 (10 %)

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

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

2.10.3 Primed version

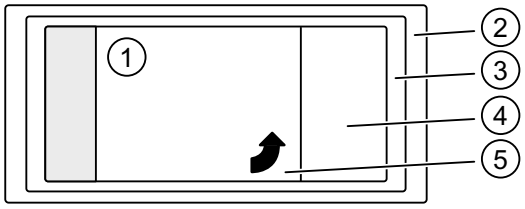
Table 2- 3 Primer according to corrosiveness categories

Paint system	Can be overpainted with
Unpainted (corrosiveness category C1 G)	
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
Primer 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
Primer according to corrosiveness category C4 G	
2-component epoxide 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

CAUTION
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 Geared Motors GmbH 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.

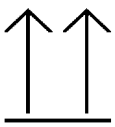
3.2 Transport

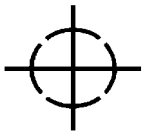
3.2.1 General information on transport

CAUTION
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. For further transports reuse or reactivate 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 packaging complies with the HPE Packaging Guidelines (Bundesverband Holzpackmittel Paletten Exportverpackungen e.V., the German Federal Association for wooden packaging means, pallets and export packaging).

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


This way up

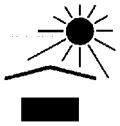

Center of gravity


Fragile


Do not use hand hook


Keep dry


Attach here


Keep cool

3.2.2 Fastening for suspended transport

⚠ DANGER

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

Observe the maximum load for the transport eye ③ of the bevel helical gearbox or the eyebolt axis ④.

Use only the transport eye ③ or eyebolt ④ of the gearbox to transport the gearbox or geared motor.

Do not use the integrally cast lifting eyes ① on the motor for transport because of the risk of breaking. Only use the eyebolt ② on the motor to transport the motor prior to mounting or following removal.

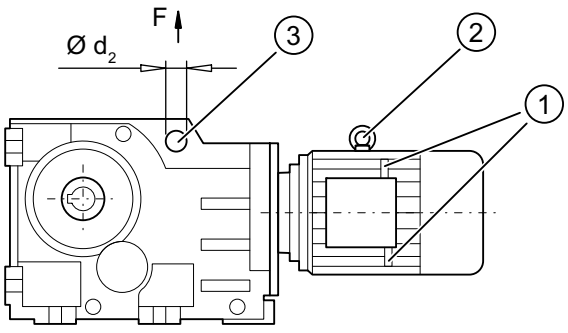
If necessary, use additional, suitable lifting accessories for transport or on installation.

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.

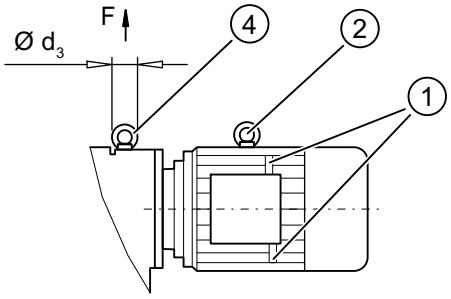
CAUTION

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

Transport eye on the bevel helical gearbox



Eyebolt on the helical gearbox, parallel shaft gearbox, helical worm gearbox



① Integrally cast eye on the motor
② Eyebolt on the motor
③ Transport eye on the bevel helical gearbox
④ Eyebolt on the gearbox

Figure 3-1 Fastening the gearbox or geared motor for suspended transport

The maximum load m in kg generated by the geared motor to be attached, with pull ↑ in direction F is listed in the following tables:

Table 3- 1 Maximum load of the transport eye on the bevel helical gearbox

Size	m	d_2	Size	m	d_2
	[kg]	[mm]		[kg]	[mm]
K.38	200	22	K.128	800	40
K.48	250	22	K.148	1,300	44
K.68	350	26	K.168	1,800	55
K.88	600	30	K.188	2,300	55
K.108	750	35			

Table 3- 2 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	3,600	108
M16	700	63			

Procedure

1. Mount the geared motor on the transport device by the heaviest permissible weight to be attached. This will normally be on the main gearbox.
2. Check that the eyebolt is firmly seated.

The geared motor is slung for transport.

3.3 Storage

3.3.1 General information for storage

⚠ DANGER

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

CAUTION

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.

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.

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

The free shaft ends and flange surface are painted for protection.

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

⚠ CAUTION

The gearbox is completely filled with operating oil and closed airtight with a plug or by pressure venting with transport fixture.

Check the oil level before commissioning.

Store the gearbox or geared motor in dry, dust-free, and temperate locations. 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 sun and rain.

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

The free shaft ends, sealing elements and flanges must be coated with a protective layer of grease.

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

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

Carry out the following precautionary measures after every period of 6 months in storage:

Table 3- 3 Preventive action

Action	Storage period in months					
	6	12	18	24	30	36
Checking the insulation resistance	-	-	x	x	x	x
Short-time startup: no-load operation, approximately 10 minutes at rated voltage	-	-	x	x	x	x
Touch up / re-apply the protective layer of grease	-	-	x	x	x	x
Check the cover and preservation	x	x	x	x	x	x

Installation 4

4.1 Unpacking

CAUTION
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

ATEX version gearboxes

Effect on bearings of stray electric currents from electrical equipment.

When mounting the gearbox on or connecting it to the machine, take care to ensure potential equalization.

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

CAUTION
Overheating of the gearbox due to exposure to direct sunlight. Provide suitable protective equipment such as covers or roofs. Prevent heat accumulation.

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

CAUTION
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.

CAUTION
Irreparable damage to geared 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.

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 type of construction specified on the rating plate. This ensures that the correct quantity of lubricant is provided.

Use all the fastening means which have been assigned to the relevant type of construction.

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 Tightening torque for fastening bolts on the gearbox

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

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.

CAUTION
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

CAUTION
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 88: 0.1 mm
For gearboxes from size 108: 0.2 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 structures on which the gearbox is to be mounted must be rigid. They must be designed 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 concrete foundations, 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 the elastic deformation due to operating forces into account.

Prevent displacement from external forces due to lateral impacts.

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

4.6 Gearboxes in foot or flange version

CAUTION
Do not subject gearbox housings to overstress from add-on elements on the foot or flange.
Add-on elements must not transmit forces, torques and vibration to the gearbox.

The gearbox must be fastened for force and torque transmission only to either the flange or the foot mounting to prevent overstress on the gearbox housing, see Gearbox with foot mounting (Page 32).

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 Gearbox with C-type housing flange

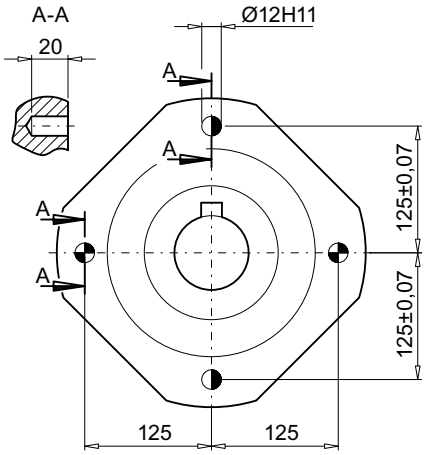
In the case of sizes 108 to 188, the customer's interface can be pinned on the C-type housing flange. The output flange has been designed to ensure the reliable transmission of the permissible torque and radial force by the bolt connections.

For additional fastening, e.g., in the case of high shock loads, the existing drilled pin holes can be used.

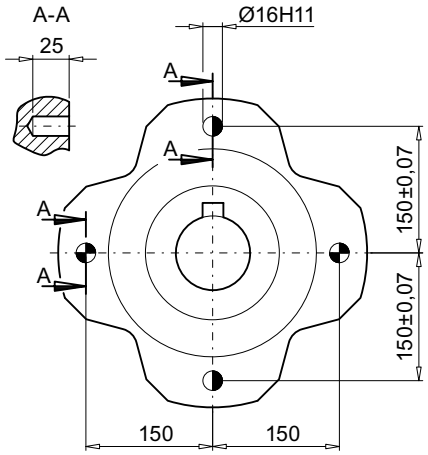
The gearboxes can also be drilled and pinned together with the machine. Compliance with the listed dimensions is mandatory in this case.

CAUTION
Observe the maximum drilling depth (A-A).

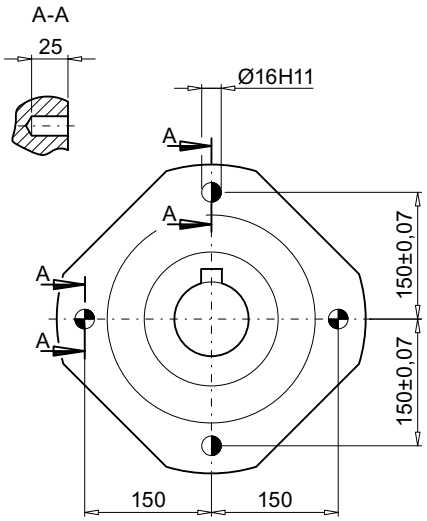
EZ128, DZ/ZZ108



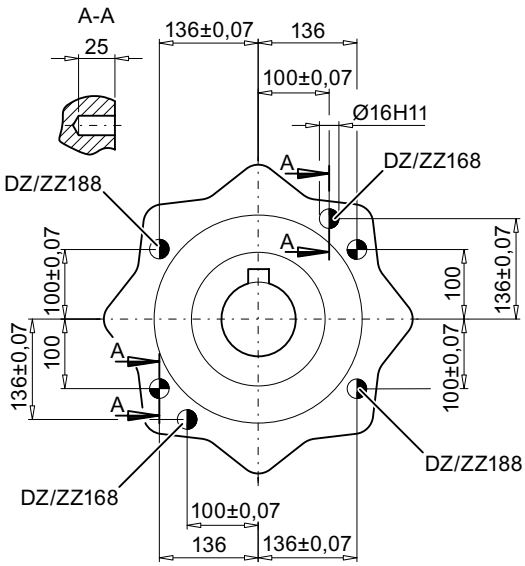
EZ148, DZ/ZZ128



DZ/ZZ148



DZ/ZZ168, DZ/ZZ188



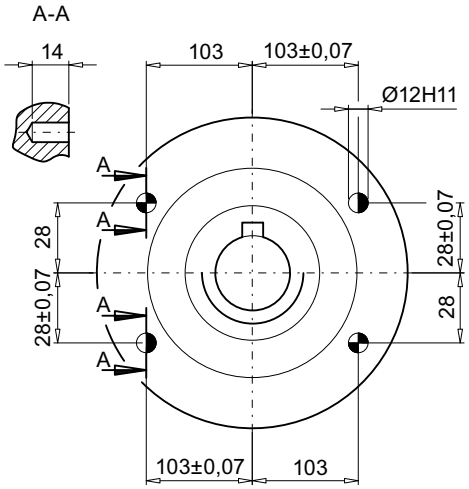
◑ Spring pins, heavy-duty design, to DIN 1481:
Use pin holes provided in the housing flange.

◒ Cylindrical grooved pin with chamfer to DIN EN 28740 / ISO 8740:
Drill connecting component together with housing.

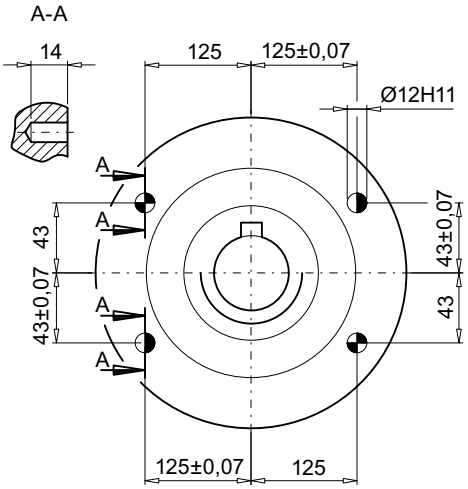
Figure 4-1 C-type case flange helical gearbox

CAUTION
Observe the maximum drilling depth (A-A).

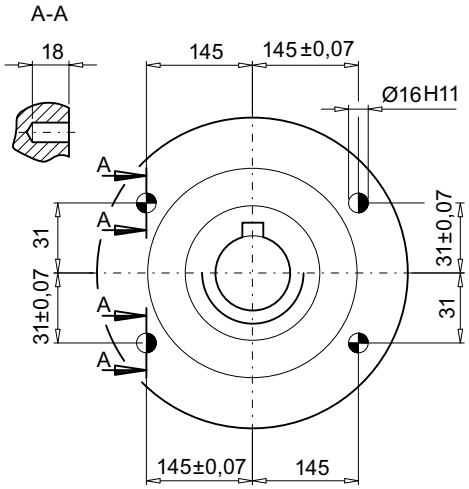
F.Z.108B, K.Z.108



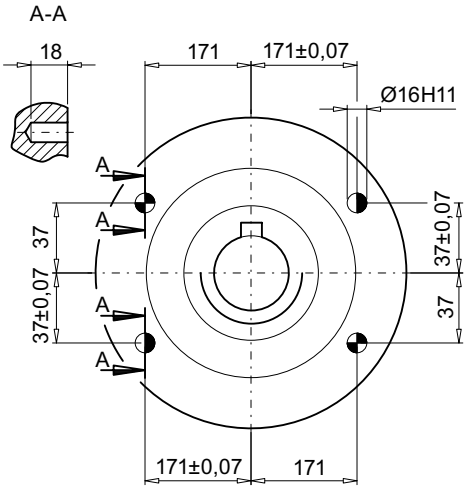
F.Z.128B, K.Z.128



F.Z.148B, K.Z.148



F.Z.168B, F.Z.188B, K.Z.168, K.Z.188



◑ Spring pins, heavy-duty design, to DIN 1481:
Use pin holes provided in the housing flange.

◕ Cylindrical grooved pin with chamfer to DIN EN 28740 / ISO 8740:
Drill connecting component together with housing.

Figure 4-2 C-type housing flange parallel shaft gearbox and bevel helical gearbox

4.8 Mounting the input or output element on the gearbox

⚠ DANGER

Danger of burns due to hot parts.

Do not touch the gearbox without protection.

CAUTION

Damage to shaft sealing rings caused by solvent or benzine.

Avoid contact at all times.

CAUTION

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.

CAUTION

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.

CAUTION

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 centering holes in the shaft end faces.

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

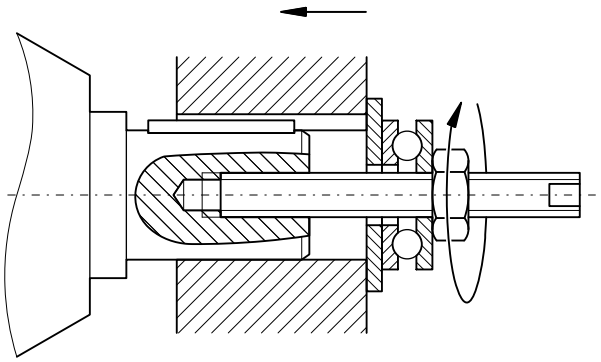
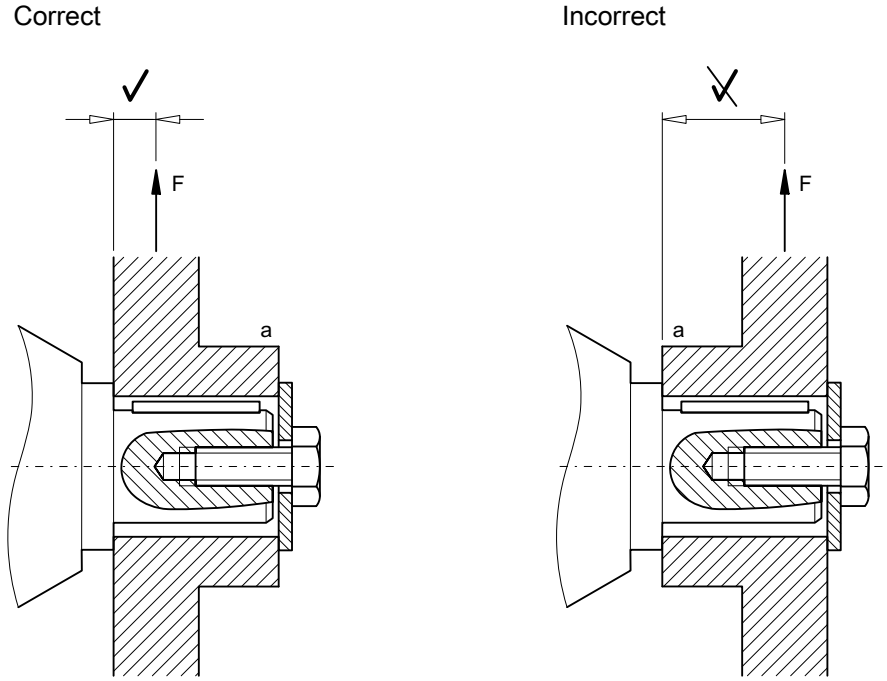


Figure 4-3 Example of a fitting device

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



a Hub

F Force

Figure 4-4 Mounting arrangement for minimum 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.

4.9 Removing and installing the protection cover

ATEX version gearbox
with shrink disk

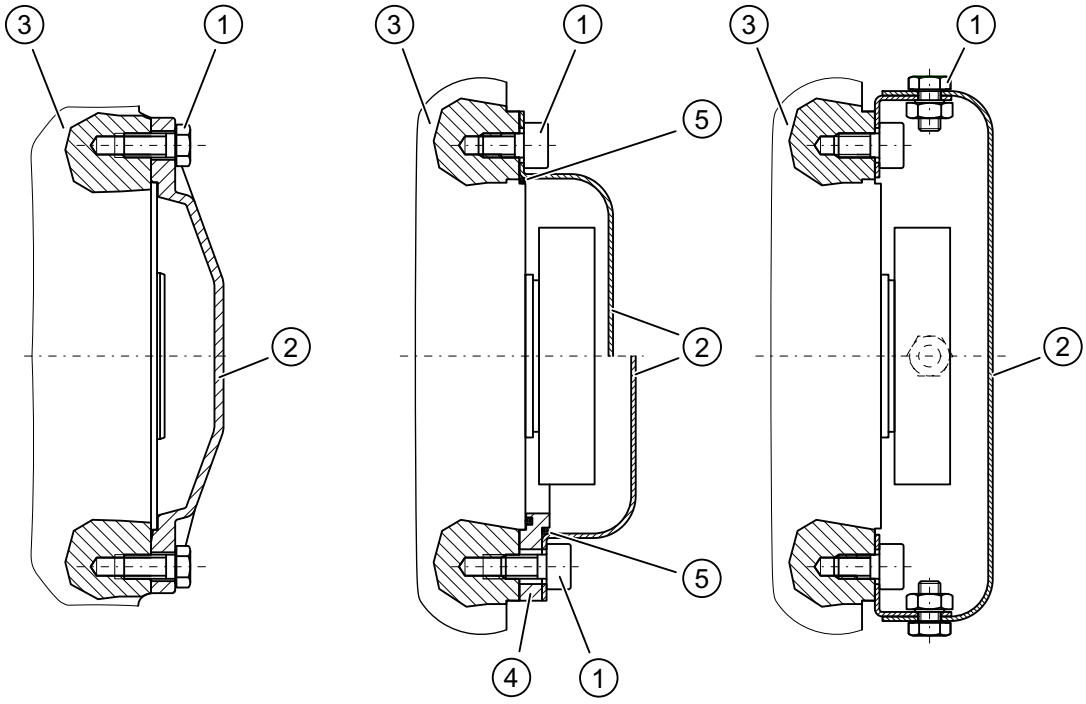
Sparks may be caused by a damaged protection cover.

Replace damaged protection covers immediately.

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

Protection cover for hollow shaft Protection cover for hollow shaft with shrink disk

F.AS208



① Screw
② Protection cover
③ Gearbox housing
④ Intermediate ring
⑤ O-ring

Figure 4-5 Protection covers

The O-ring ⑤ is only present with the ATEX version.

The intermediate ring ④ is only supplied on the foot version of the bevel helical gearbox in sizes 68, 108 to 168.

Procedure

1. Undo the screws ① and remove the protection cover ②.
2. Fit the output shaft.
3. Using a suitable cleaning agent, clean the support surface of the protection cover ② on the gearbox.
4. With the protection cover for shrink disk in the ATEX version, ensure that the O-ring ⑤ is correctly seated.
5. Coat the supporting surface of the protection cover ② with a suitable sealing agent.
6. Screw on the protection cover ②.
7. Protect all remaining bare areas with a suitable permanent anti-corrosive agent.

You have now installed the protection cover for operation.

4.10 Removing and installing the shaft-mounted gearbox

4.10.1 General information on installing the shaft-mounted gearbox

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

CAUTION
Misalignment of and stress on the hollow shaft can lead to increased 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.

CAUTION
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 end of the machine shaft to the housing axle according to DIN 42955.

4.10.2 Removing and installing the hollow shaft

4.10.2.1 Mounting the hollow shaft

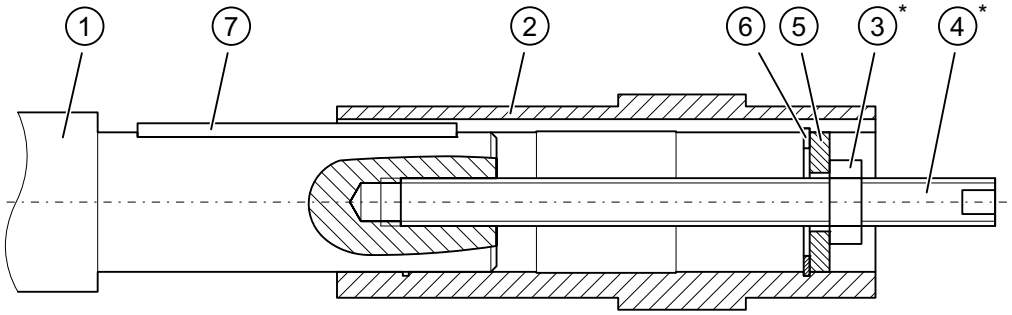


Figure 4-6 Installing the hollow shaft with parallel key

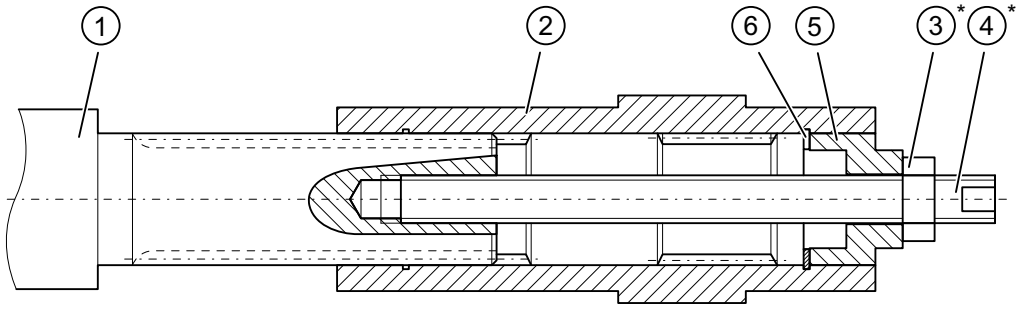
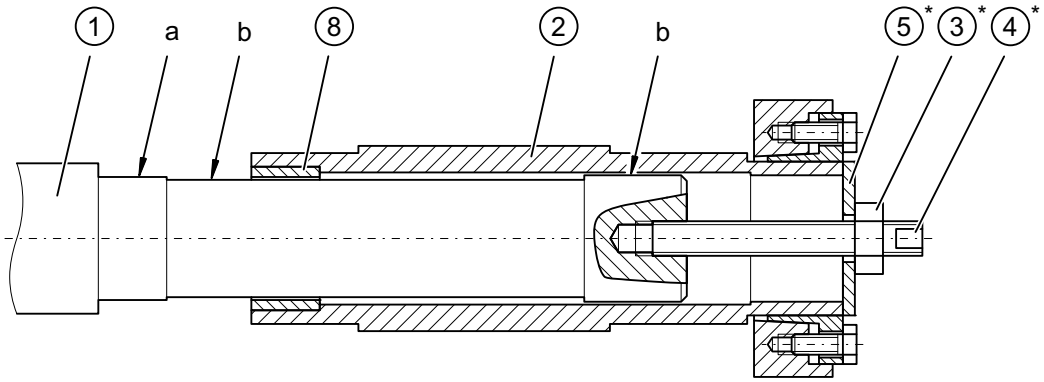


Figure 4-7 Installing the hollow shaft with splines



a Greased

b Absolutely grease-free

Figure 4-8 Installing the hollow shaft with shrink disk

* 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 Bronze bush

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 a disk ⑤, threaded spindle ④ and nut ③. The counterforce is provided by the hollow shaft ②.
4. For hollow shaft with parallel key and hollow shaft with splines:
   Replace the nut ③ and threaded spindle ④ with a setscrew and tighten it with the specified torque.
   For hollow shaft with shrink disk:
   Remove the disk ⑤, threaded spindle ④ and nut ③.

You have now installed the hollow shaft.

Table 4- 2 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

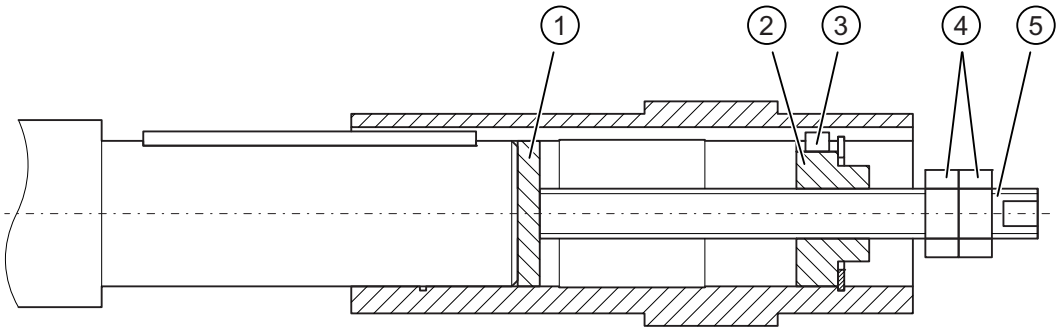
4.10.2.2 Removing the hollow shaft with parallel key

CAUTION
Before driving out the machine shaft, fasten a suitably dimensioned means of absorbing load to the gearbox. Slightly pretension the drive element so that the gearbox does not drop into the drive element when the insert shaft is released.

CAUTION
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 the rust solvent to work in sufficiently.



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

Figure 4-9 Removing the hollow shaft with parallel key

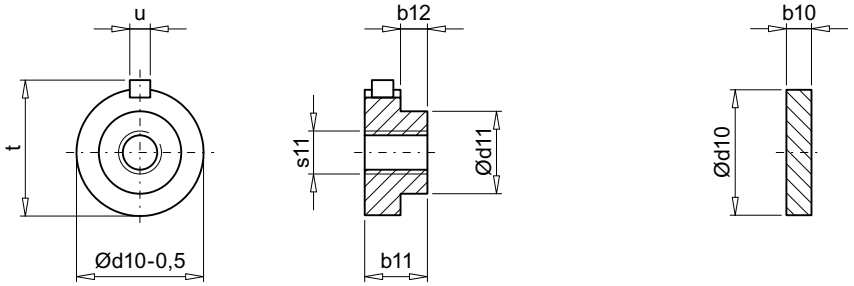
Item ① to item ⑤ are not included in the scope of supply.

Procedure

1. Remove the axial fastening 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]
28	3	15	10	19.9	10	M6	22.5	6
				24.9	14	M8	28	8
38	-	15	10	-	14	M8	28	8
	6			29.9	18	M10	33	
							38	10
48	6	15	5	34.9	24	M12	43	10
				39.9	28			12
68	7	20	7	39.9	28	M16	48.5	12
				44.9	33			14
88	7	20	10	49.9	36	M16	64	14
				59.9	45			18
108	10	24	10	59.9	45	M20	74.5	18
				69.9	54			20
128	10	24	5	69.9	54	M20	85	20
				79.9	62			22
148	10	24	7	79.9	62	M20	95	22
				89.9	72			25
168	10	30	8	99.9	80	M24	106	28
				109.9	90		116	
188	10	30	11	119.9	95	M24	127	32

4.10.3 Shrink disk

4.10.3.1 Mounting the shrink disk

⚠ DANGER

Risk of injury due to freely rotating parts.

Fit a cover cap or protection cover.

CAUTION

The shrink disk is delivered ready for installation.

Do not dismantle the shrink disk before initial fitting.

CAUTION

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.

CAUTION

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.

CAUTION

Avoid overloading the individual bolts.

Do not exceed the maximum tightening torque for tightening bolt.

Size 28:
Tighten tightening bolts ③.

Sizes 38 - 208:
The alignment of the end faces of outer ring ① and inner ring ② has priority. If this alignment is not achieved when tensioning, the tolerance of the insert shaft must be checked.

Note

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

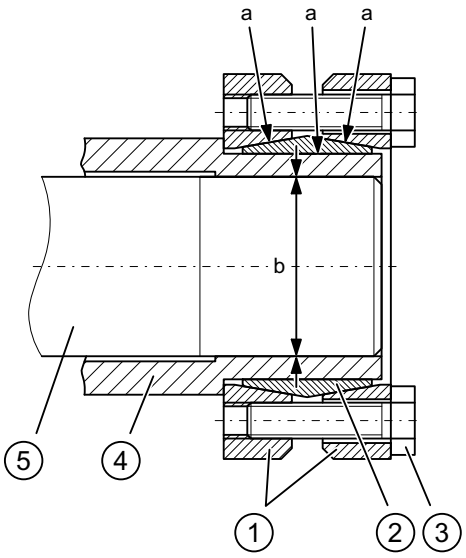
Note

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

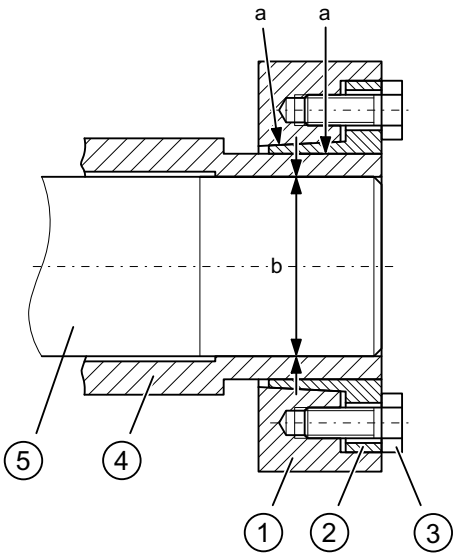
Note

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

Size 28, 208 reinforced



Sizes 38 - 208



a Greased
b Absolutely grease-free
① Outer ring
② Inner ring
③ Tightening bolt
④ Hollow shaft
⑤ Machine shaft

Figure 4-10 Mounting the shrink disk

Procedure

1. Tighten the tightening bolts ③ handtight initially.
2. Working round several times, evenly tighten the tightening bolts ③ by a 1/4 turn each time (not crosswise).
3. Fit the rubber cover cap or protection cover included in the scope of delivery, see Removing and installing the protection cover (Page 38).

You have now installed the shrink disk.

Table 4- 3 Tightening torque for tightening bolt

Gearbox size	Thread size	Strength class	Tightening torque [Nm]
28	M5	8.8	5
38, 48, 68	M8	12.9	35
88, 108, 128	M10	12.9	70
148	M12	12.9	121
168, 188	M14	12.9	193
208	M16	12.9	295
	M20	12.9	570

4.10.3.2 Pulling off the shrink disk

1. Working round several times, loosen the tightening bolts ③ one after the other, by a 1/4 turn each time.
2. Pull the shrink disk off the hollow shaft.

Sizes 38 - 208:
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.

4.10.3.3 Cleaning and lubricating shrink disks

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

Loosened shrink disks need not be dismantled and regreased before being retensioned.

Procedure

1. Only grease the inner friction surfaces of the shrink disks. Use for this 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- 4 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

4.10.4 Torque arms with shaft-mounted gearboxes

4.10.4.1 General information for torque arms with shaft-mounted gearboxes

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

ATEX version gearboxes

Worn or irreparably damaged rubber elements will not function properly.

Impact can cause sparks.

Damaged rubber elements must be replaced immediately.

CAUTION
Dangerously high transient torques due to excess backlash. Take care to prevent the torque arm causing excessive constraining forces, e.g., due to the driven shaft running out-of-true.

CAUTION
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.

4.10.4.2 Mounting torque arms on parallel shaft gearboxes

We recommend using pretensioned, damping rubber elements.

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

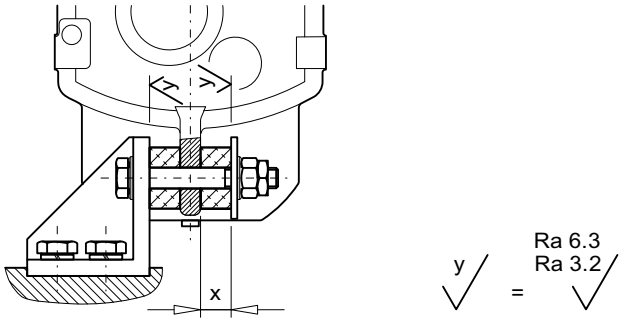


Figure 4-11 Mounting suggestion for torque arm on F.28, 38B - 188B

Size	28	38B	48B	68B	88B	108B	128B	148B	168B	188B
x [mm]	14	13.1	18.2	17	27.2	26	35.8	34.8	46.2	45.1

Size 208

DANGER

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

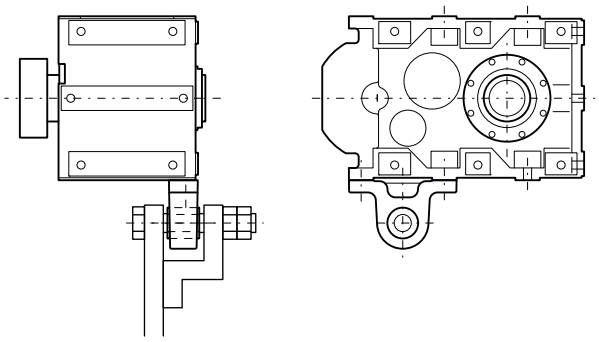


Figure 4-12 Mounting suggestion for torque arms on F.208

Procedure

1. Clean the contact surfaces between the housing and the torque arm.
2. Tighten the M30 bolts, strength class 8.8 with 1,500 Nm tightening torque.

You have now mounted the torque arm.

4.10.4.3 Mounting torque arms on bevel helical gearboxes and helical worm gearboxes

⚠ DANGER

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

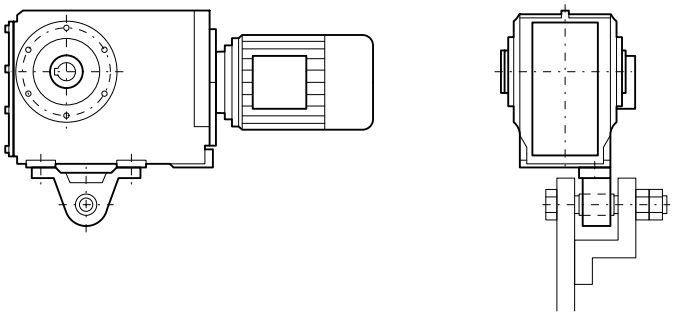


Figure 4-13 Mounting suggestion for torque arm on foot

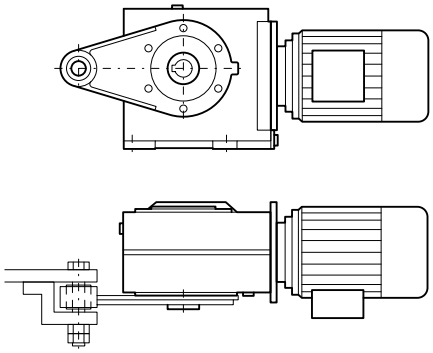


Figure 4-14 Mounting suggestion for torque arm on flange

The torque arm can be fitted 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 bolts with the specified torque.

You have now mounted the torque arm.

Table 4- 5 Tightening torque for bolt of strength class 8.8 if torque arm is mounted

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.

CAUTION
On cylindrical-roller bearings in the input unit, undershooting the minimum radial force can damage bearings. Prolonged test runs when off-load must be kept to a minimum.

5.2 Checking the oil level prior to commissioning

Check the oil level before commissioning and correct it if necessary, see Checking and changing lubricants (Page 61).

Gearboxes with long-term preservation are delivered with a full tank of oil. We recommend a complete oil change if your unit is left in storage for more than 24 months, see Checking and changing lubricants (Page 61).

5.3 Fitting the gearbox ventilation

5.3.1 Screwing in the vent filter or pressure breather valve without securing clip

In the case of gearboxes with housing ventilation, the necessary vent filter or pressure breather valve without a securing clip is delivered separately. They must be replaced with the appropriate vent plug before starting up the gearbox.

Observe the symbol in the type of construction diagrams, see Types of construction (Page 87):

Ventilation

Procedure

1. Unscrew the vent plug.
2. Seal the gearbox with the vent filter or the pressure breather valve without securing clip.

You have now replaced the vent filter or pressure breather valve with the vent plug without the securing clip.

5.3.2 Installing the pressure breather valve with securing clip (optional)

The pressure breather valve with securing clip ① is fitted to gearboxes which require housing ventilation.

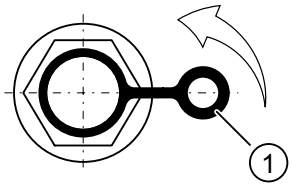


Figure 5-1 Pressure breather valve with securing clip

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

5.4 Gearbox with backstop (optional)

⚠ CAUTION

Running in the wrong direction of rotation can damage the geared motor.

Check the direction of rotation before starting up.

Turn the input side or motor over manually.

Use the phase sequence to check the direction of motor rotation and swap the two external conductors if necessary.

Operation 6

ATEX version gearboxes

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

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

Changes are an indication of possible incipient damage.

⚠ CAUTION

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

Use the fault table in the section titled "Faults, causes, and remedies" to determine the cause of the fault.

Remedy faults or have faults remedied.

CAUTION

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

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 our 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 61)
	Foreign bodies in oil (irregular noise)	Check the oil quality, see Checking the oil quality (Page 66). Clean the gearbox. Change the oil, see Checking and changing lubricants (Page 61)
	Excessive bearing play and / or bearing defective	Check bearing and replace if necessary
	Teeth defective	Check teeth and replace if necessary
	Fastening bolts loose	Tighten bolts / nuts, see Checking tightness of fastening bolts (Page 77)
	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 blocking during commissioning	Call Technical Support

Faults	Causes	Remedy
Unusual noises from drive unit	Drive unit bearing not lubricated (motor size 160 and higher)	Regrease the bearing, see Changing the roller bearing grease (Page 71)
	Excessive bearing play and / or bearing defective	Check bearing and replace if necessary
	Fastening bolts loose	Tighten bolts / nuts, see Checking tightness of fastening bolts (Page 77)
Unusual noises on the motor	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 type of construction used	Check type of construction, see Types of construction (Page 87). Check the oil level, see Checking and changing lubricants (Page 61)
	Overpressure due to lack of ventilation	Mount the ventilation as appropriate for the type of construction, see Fitting the gearbox ventilation (Page 51).
	Overpressure due to soiled ventilation	Clean the ventilation, see Cleaning the vent filter (Page 76)
	Shaft sealing rings defective	Replace the shaft sealing rings
	Cover / flange bolts loose	Tighten the bolts / nuts, see Checking tightness of fastening bolts (Page 77). 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

Faults	Causes	Remedy
Oil leakage on gearbox ventilation	Incorrect oil level for the type of construction used and / or incorrect ventilation position	Check ventilation position and type of construction, see Types of construction (Page 87). Check the oil level, see Checking and changing lubricants (Page 61)
	Frequent cold starts, during which the oil foams up	Call Technical Support
Gearbox overheating	Motor fan cover and / or gearbox heavily soiled	Clean the fan cover and surface of the geared motor, see Cleaning the gearbox (Page 76)
	Incorrect oil level for type of construction used	Check type of construction, see Types of construction (Page 87). Check the oil level, see Checking and changing lubricants (Page 61)
	Incorrect oil being used (e.g., incorrect viscosity)	Check the oil in the tank, see Checking the oil quality (Page 66)
	Oil beyond expiry date	Check date of last oil change and change oil if necessary, see Checking and changing lubricants (Page 61)
	Excessive bearing play and / or bearing defective	Check bearing and replace if necessary
	Backstop not running freely	Replace backstop
Output shaft does not turn when motor is running	Force flow interrupted by breakage in gearbox	Call Technical Support

Faults	Causes	Remedy
Geared motor starting up with difficulty or not at all	Incorrect oil level for type of construction used	Check type of construction, see Types of construction (Page 87). Check the oil level, see Checking and changing lubricants (Page 61)
	Incorrect oil being used (e.g., incorrect viscosity)	Check the oil in the tank, see Checking the oil quality (Page 66)
	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 not releasing	Check switching / connection of brake. Check brake for wear and readjust if necessary
	Geared motor runs against backstop	Change direction of motor or backstop rotation
Excessive play on 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

ATEX version gearboxes

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

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

CAUTION
Service and maintenance must only be carried out by properly trained and authorized personnel. Only genuine parts supplied by Siemens Geared Motors GmbH 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 9).

Table 8- 1 Maintenance measures

Remedy	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 53)
Check housing temperature	After 3 h, on the first day, thereafter monthly	
Check the oil level	After the first day, thereafter monthly	See Checking and changing lubricants (Page 61)
Check the oil level sensor	Regularly and after oil changes	See Checking the oil level sensor (optional) (Page 76)

Remedy	Interval	Description of work
Check the oil quality	Every 6 months	See Checking the oil quality (Page 66)
First oil change after commissioning	After approximately 10,000 operating hours or at the latest after 2 years	See Checking and changing lubricants (Page 61)
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 75)
Clean the gearbox ventilation or replace if necessary	Depending on degree of soiling, at least every 6 months	See Cleaning the vent filter (Page 76)
Clean the gearbox		See Cleaning the gearbox (Page 76)
Check the friction clutch and adjust if necessary	After 500 h, thereafter once a year and after every blockage	See Maintenance of the friction clutch (Page 78)
Check the coupling	For the first time after 3 months	Please refer to the separate operating instructions
Carry out a complete inspection of the geared motor	Every 12 months	See Inspecting the gearbox or geared motor (Page 78)
Check that fastening bolts on gearboxes and built-on accessories are securely tightened. Check that covers and plugs are securely fastened	After 3 h, regularly thereafter	See Checking tightness of fastening bolts (Page 77)
Change the roller bearing grease	When the oil is changed	See Changing the roller bearing grease (Page 71)
Replace bearings	-	See Replacing bearings (Page 75)
Check rubber buffers on torque arms	Every 6 months	See Torque arms with shaft-mounted gearboxes (Page 48)
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

⚠ DANGER

After removing the oil level screw, up to and including gearbox size 128, the oil level may not be more than 3 mm and from gearbox size 148, not more than 5 mm below the recommended filling level.

⚠ DANGER

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.

⚠ CAUTION

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

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 74).

Note

Gearbox sizes 18 and 28 are lubricated for life.

No oil changes are required.

Note

Where tandem gearboxes are concerned, each individual gearbox is to be considered separately.

Gearbox sizes 28 and 38 on the 2nd gearbox are lubricated for life. An oil change is not required.

8.2.2 Checking the oil level

⚠ CAUTION

The volume of gear 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.

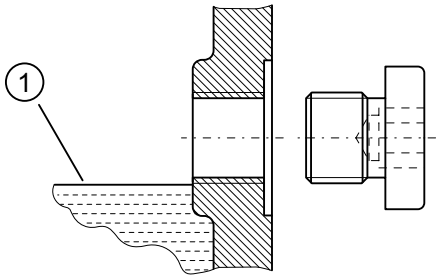


Figure 8-1 Oil level in the gearbox housing

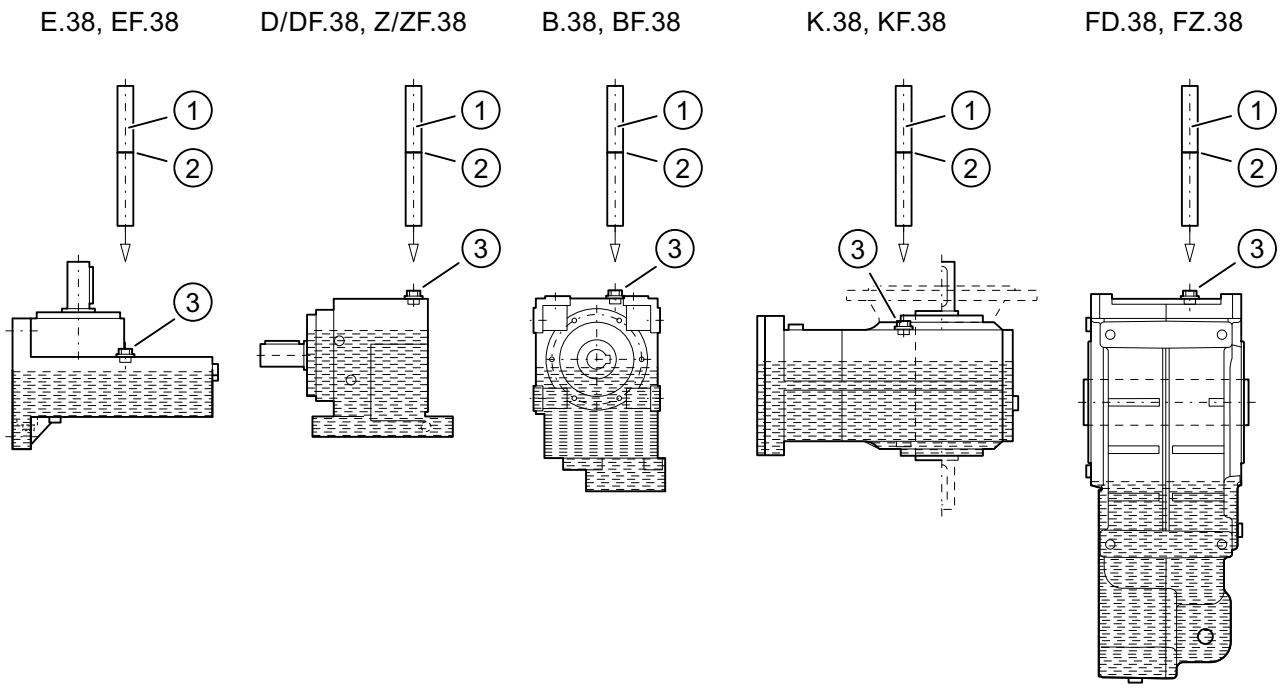
Procedure

1. Switch off the power supply to the drive unit.
2. Unscrew the oil level screw, see Types of construction (Page 87).
3. Check the oil level ①.
4. Rectify the oil level ① if necessary and check it again.
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.

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

Checking the oil level on size 38 gearbox housings with no screw plug for checking the oil level

Size 38 gearboxes have no screw for checking the oil level.
In some versions of the B 38 and BF 38 bevel helical gearbox, there is an additional screw plug so that the oil level can be checked as described above.



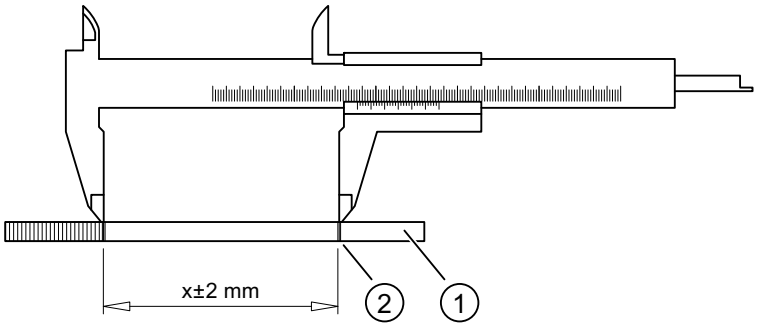
① Dipstick
② Mark
③ Screw plug

Figure 8-2 Checking the oil level on size 38 gearbox

Procedure

1. Switch off the power supply to the drive unit.
2. Remove the geared motor and set it down as illustrated in the figure. The screw plug ③ must be on the top.
3. Remove the screw plug ③.
4. Make a mark ② on a suitable dipstick ①.
5. Insert the dipstick ① vertically into the opening until the mark ② is level with the surface of the gearbox.
6. Pull the dipstick ① out vertically.
7. Measure the distance "x" on the dipstick ①.
8. Compare the value "x" with the value for distance "x".
9. Rectify the oil level if necessary and check it again.
10. Check the condition of the sealing ring on the screw plug ③ and replace the sealing ring if necessary.
11. Seal the gearbox using the screw plug ③.
12. Mount the geared motor.

You have now checked the oil level in the size 38 gearbox housing.



① Dipstick
② Mark

Figure 8-3 Distance "x"

Table 8- 2 Values for max. distance "x"

Gearbox type	**Distance "x"**					
	[mm]					
	B5 B14	V1 V18	V3 V19			
E.38	44	24	18			
Z.38	87	56	33			
D.38	81	31	26			
	B3	B6	B7	B8	V5	V6
E38	43	37	37	31	23	19
Z38	93	83	83	83	75	32
D38	89	82	82	82	52	35
	B3-00 H-01	B8-00 H-02	B7-00 H-03	B6-00 H-04	V5-00 H-05	V6-00 H6
B, BA, BAS, BAT38	126	74	30	89	95	112
K, KA, KAS, KAT38	64	35	21	52	40	46
	B5-01 H-01	B5-03 H-02	B5-02 H-03	B5-00 H-04	V1-00 H-05	V3-00 H-06
B.38	126	74	30	89	95	112
K.38	66	40	20	54	45	50
FZ.38B	137	152	137	137	87	73
FD.38B	110	147	132	132	110	65

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

If you are using an oil sight glass to check the oil level ①, the oil must be visible in the center of the sight glass if the oil is cool. If 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.

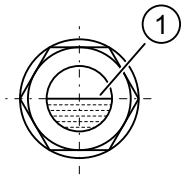


Figure 8-4 Oil level in the oil sight glass

Rectify the oil level ① if necessary and check it again.

8.2.4 Checking the oil level using the oil dipstick (optional)

To measure the oil level, push the oil dipstick into the hole but do not screw it in.

The oil level must be between the lower and upper min.-max. marks on the oil dipstick.

If you are using the electric oil level monitoring system, the oil must be level with the upper max. mark on the oil dipstick.

Rectify the oil level if necessary and check it again.

8.2.5 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 type of construction diagrams, see Types of construction (Page 87):

Ventilation

Oil filling

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. Remove 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.
8. Check the oil level.
9. Rectify the oil level if necessary and check it again.

You have now checked the oil quality.

8.2.6 Changing the oil

8.2.6.1 General safety notes for changing the oil

CAUTION

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.

CAUTION

Gear 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.

8.2.6.2 Draining the oil

Observe the symbols in the type of construction diagrams, see Types of construction (Page 87):


Ventilation


Oil filling


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. Remove 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 replace the sealing ring if necessary.
7. Seal the gearbox using the sealing elements.

You have now drained the oil from the gearbox.

Draining the oil from B38 with no additional screw plug type V5-00/V1-00/H-05 and V6-00/V3-00/H-06

Procedure

1. Switch off the power supply to the drive unit.
2. Place a suitable and sufficiently large receptacle underneath the gearbox.
3. Unscrew the oil filler screw.
4. Using a length of hose, siphon off all the oil into the receptacle.
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.

Or:

1. Switch off the power supply to the drive unit.
2. Unscrew the cover
3. Drain all the oil into the receptacle.
4. Change the seal in the cover.
5. Seal the gearbox with the cover.

You have now drained the oil from the B38 gearbox.

8.2.6.3 Flushing the gearbox when changing between incompatible oils

CAUTION
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.

CAUTION
A flushing process is required with biodegradable and physiologically safe oils. The residual corrosion protection oil must amount to no more than 1 % of the operating oil volume.

Note

We recommend that, after the second flush, the quality of the rinse is checked by an expert analyzer.

Observe the symbols in the type of construction diagrams, see Types of construction (Page 87):

Ventilation

Oil filling

Oil drain

Procedure

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

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

8.2.6.4 Filling in oil

Observe the symbols in the type of construction diagrams, see Types of construction (Page 87):

Ventilation

Oil filling

Procedure

1. Remove the vent plug or oil filler screw.
2. Fill the gearbox with fresh oil, using a filter (filter mesh max. 25 µm).
   When refilling, use the same type of oil with the same viscosity. If changing mutually incompatible oils, flushing cycles are required, see Flushing the gearbox when changing between incompatible oils (Page 69).
3. Rectify the oil level if necessary and check it again.
4. Check the condition of the sealing ring on the sealing element and replace the sealing ring if necessary.
5. Seal the gearbox with the sealing element.

You have now filled up the gearbox with oil.

8.2.7 Topping up with oil

You may need to top the gearbox up with oil if the gearbox type of construction changes or if oil is lost due to a leak. If you notice oil escaping, locate the leak and seal the affected area. Check and correct the oil level.

At the time of going to print, the following types of oil are being used for initial filing of the gearbox:

CLP ISO VG220: ARAL Degol BG 220

CLP ISO PG VG220: Castrol Tribol 800/220

CLP ISO PG VG460: Castrol Tribol 800/460

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.

8.2.8 Changing the roller bearing grease

The roller bearings are filled with a lithium-saponified roller bearing grease at the factory prior to delivery.

Clean the bearing before filling it with fresh lubricant.

In the case of the bearings of 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 bearing bodies.

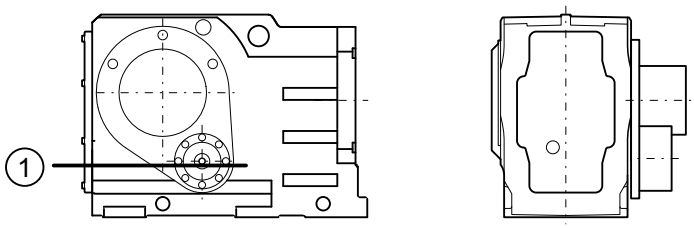
8.2.9 Changing the oil when using backstops in bevel helical gearboxes

The oil must be changed at the same intervals as the gearbox.

Table 8- 3 Oil quantity for backstop

Size	K.88	K.108	K.128	K.148	K.168
Oil quantity [l]	0.04	0.06	0.09	0.104	0.44

This oil quantity is valid for all gearbox types of construction.



① Oil level

Figure 8-5 Oil level when using backstops in bevel helical gearboxes

For the standard temperature range from 0 °C to +60 °C, the backstops are filled with Klüber-Summit HYSYN FG68.

In the case of ambient temperatures of less than -20 °C and greater than +60 °C, please contact Technical Support.

The backstop can also be filled with the oil used in the gearbox.

8.2.10 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".

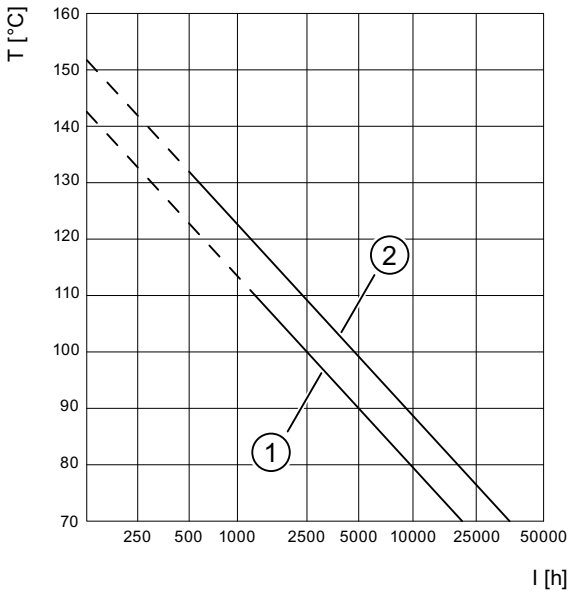
Note

In the case of roller bearings with grease filling, we recommend changing the grease at the same time as the oil.

At an oil sump temperature of +80 °C the following service life can be expected subject to compliance with the properties required by Siemens Geared Motors GmbH:

Table 8- 4 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 long-term temperature [°C]
I Oil change interval in operating hours [h]

Figure 8-6 Guide values for oil change intervals

Grease service life of roller bearing greases

The service life of the grease is approximately 4,000 operating hours. This is based on a maximum ambient temperature of +40 °C or a maximum temperature in the grease chamber of +80 °C. Grease service life is reduced by a factor of 0.7 for every increase in temperature of 10 K.

8.2.11 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 foodstuffs or pharmaceutical industry. If lubricants with USDA -H1/-H2 approval are required, please contact Technical Support.

CAUTION

If you are working outside the temperature range specified in the Flender Operating Instructions BA 7300, 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.

Note

The lubricants used are not or are only conditionally biodegradable. If lubricants classified as biodegradable are required, please contact Technical Support.

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.

The lubricants suitable for use in the gearbox are listed in the Flender Operating Instructions BA 7300. We are familiar with the composition of these lubricants and, as far as we are currently aware, they possess state-of-the-art properties with regard to load-bearing capacity, corrosion resistance (FZG test DIN 51354 = force level > 12), resistance to gray staining and compatibility with seals and interior paint finishes as necessary for the type of gearbox concerned. Therefore, we advise our customers to select one of the lubricants listed in this table, taking into account the VG class specified on the rating plate.

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 warranty conditions are valid only for the lubricants listed in the Flender Operating Instructions BA 7300 . If you decide to use a different oil, you are responsible for the technical suitability of the lubricant.

8.3 Replacing bearings

ATEX version gearboxes

Bearing life depends very much on operating conditions. It is, therefore, very difficult to calculate it reliably. In the operating conditions specified by the operator, bearing life can be calculated and indicated on the rating plate. If no information is given, changes in vibration and noise pattern can serve as an indicator that an immediate bearing replacement is necessary.

8.4 Checking the gearbox for leaks

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 running 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. Service life depends on operating conditions. We recommend that shaft sealing rings are included in periodic maintenance and servicing work on the system.

8.5 Cleaning the vent filter

Clean the vent filter at least every 6 months, or more regularly depending on the degree of soiling.

Procedure

1. Unscrew the vent filter.
2. Flush out the vent filter with benzine or a similar cleaning agent.
3. Blow the vent filter out with compressed air.
4. Seal the gearbox with the vent filter.

You have now cleaned the vent filter.

8.6 Checking the oil level sensor (optional)

ATEX version gearboxes

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.

8.7 Cleaning the gearbox

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

CAUTION
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.

8.8 Checking tightness of fastening bolts

ATEX version gearboxes

Loose parts can cause sparks through impact.

Entry of foreign bodies can cause sparks.

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 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

8.9 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 55).

Check the geared motor in accordance with the criteria set out in Section General information and safety notes (Page 9).

Touch up damaged paintwork carefully.

8.10 Maintenance of the friction clutch

Note

Check the condition of the friction clutch initially after 500 operating hours and then at least once yearly and after every blockage of the machine.

If necessary, readjust the friction torque or replace the wearing parts, e.g., friction lining and bushes. Friction linings must always be replaced in pairs. We recommend replacing worn bushes in sets.

Please refer to the relevant operating instructions for the clutch.

Disposal

9

⚠ DANGER

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 material 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 grey cast iron parts, if no separate collection is made.

The worm wheels are made partly from non-ferrous metal. Dispose of them accordingly.

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

Table 9- 1 Disposal codes for gear oils

Type of oil	Name	Disposal code
Mineral oil	CLP ISO VG220	13 02 05
Polyglycols	CLP ISO PG VG220 CLP ISO PG VG460	13 02 08
Polyalphaolefins	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

	Main gearbox					Intermediate helical gearbox		Input unit	
Example:	**F**	**D**	**F**	**108**	**B**	**- Z**	**38 -**	**K4**	**(100)**
Gearbox type	F								
Transmission stage		D							
Type			F						
Size				108					
Revision marks					B				
Transmission stage						Z			
Size							38		
Input unit								K4	
(for motor size)									(100)

Table 10- 2 Type designation code

Gearbox type	
(-)	Helical gearbox
B	Bevel helical gearbox, two-stage
K	Bevel helical gearbox, three-stage
F	Parallel shaft gearbox
C	Helical worm gearbox
Transmission stage	
(-)	
E	Single-stage
Z	Two-stage
D	Three-stage

Type		
	Shaft	
	(-)	Solid shaft
	A	Hollow shaft
	Mounting	
	(-)	Foot-mounted version
	F	Flange version (A type)
	Z	Housing flange (C type)
	D	Torque arm
	G	Flange (A type) opposite output shaft
	R	Agitator flange
	K	Cooling tower version
	M	Mixer flange
	E	Extruder flange
	U	Underwater version (slide ring seal)
	Connection	
	(-)	Parallel key
	S	Shrink disk
	T	Hollow shaft with splines
	Backstop	
	X	Backstop in intermediate stage
Intermediate helical gearbox Transmission stage		
Z		Two-stage
D		Three-stage
Input unit		
A / A5		Input unit with free input shaft
K2		Coupling lantern with coupling for connecting an IEC motor
K2TC		Coupling lantern with coupling for connecting a NEMA motor
K4		Short lantern with clamp connection for connecting an IEC motor
K5TC		Short coupling with clamp connection for connecting a NEMA motor
KQ(S)		Lantern for servo motor with zero-backlash coupling for connecting a servo motor
P		Input unit with free input shaft and piggy back for connecting an IEC motor
P5		Input unit with free input shaft and piggy back for connecting a NEMA motor

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.

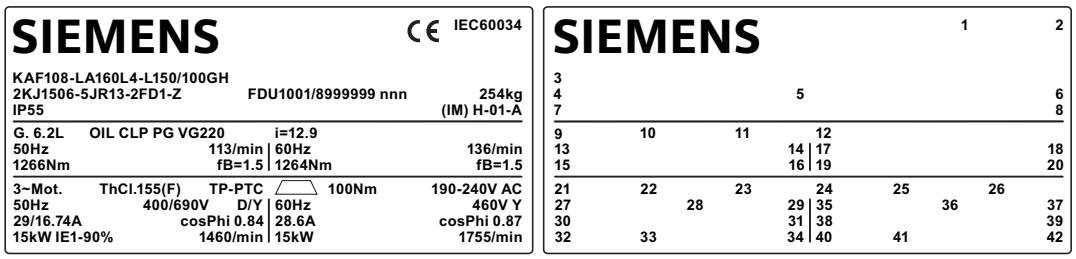


Figure 10-1 Rating plate example

1 CE marking or other marking, if required
2 Applied standard
3 Model - Type - Size
4 Order No.
5 Serial No.
6 Weight m [kg]
7 IEC 60034-5 or IEC 60529 protection
8 Type of construction (IM)
9 Oil quantity [l] main gearbox / intermediate gearbox + extruder flange
10 Type of oil
11 Oil viscosity ISO VG class to DIN 51519 / ISO 3448
12 Total transmission ratio i

Frequency 1

13 Rated frequency f [Hz]
14 Speed at output n_2 [rpm]
15 Torque at output T_2 [Nm]
16 Service factor f_B

Frequency 2

17 Rated frequency f [Hz]
18 Speed at output n_2 [rpm]
19 Torque at output T_2 [Nm]
20 Service factor f_B

Motor data

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

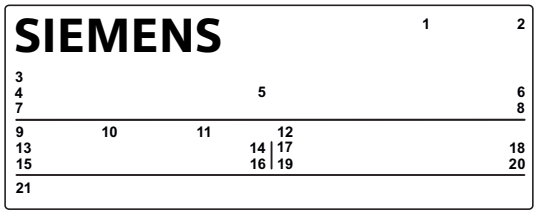
Frequency 1

27 Rated frequency f [Hz]
28 Rated voltage / range U [V]
29 Circuit, graphical symbols as per DIN EN 60617 T6 / IEC 60617-6
30 Rated current I [A]
31 Power factor cos φ
32 Rated output P [kW], mode (if ≠ S1)
33 Efficiency class designation
34 Rated speed n_1 [rpm]

Frequency 2

35 Rated frequency f [Hz]
36 Rated voltage / range U [V]
37 Rated current I [A]
38 Power factor cos φ
39 Circuit, graphical symbols as per DIN EN 60617 T6 / IEC 60617-6
40 Rated output P [kW], mode (if ≠ S1)
41 Efficiency class designation
42 Rated speed n_1 [rpm]

Rating plate for ATEX version gearboxes



1 CE marking or other marking, if required
2 Applied standard
3 Model - Type - Size
4 Order No.
5 Serial No.

6 Weight m [kg]
7 IEC 60034-5 or IEC 60529 protection
8 Type of construction (IM)
9 Oil quantity [l] main gearbox / intermediate gearbox + extruder flange
10 Type of oil
11 Oil viscosity ISO VG class to DIN 51519 / ISO 3448
12 Total transmission ratio i

Frequency 1

13 Rated frequency f [Hz]
14 Speed at output n_2 [rpm]
15 Torque at output T_2 [Nm]
16 Service factor f_B

Frequency 2

17 Rated frequency f [Hz]
18 Speed at output n_2 [rpm]
19 Torque at output T_2 [Nm]
20 Service factor f_B

21 Explosion-hazard symbol and explosion-hazard marking

Figure 10-2 ATEX rating plate

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 condition of the product on delivery.

10.4 Sound-pressure level

The A rated sound-pressure level L_{WA} of a selection of gearboxes in the following figure has been measured to DIN EN ISO 1680 with meters to DIN IEC 60651.

The noise depends mainly on speed, output, and transmission ratio.

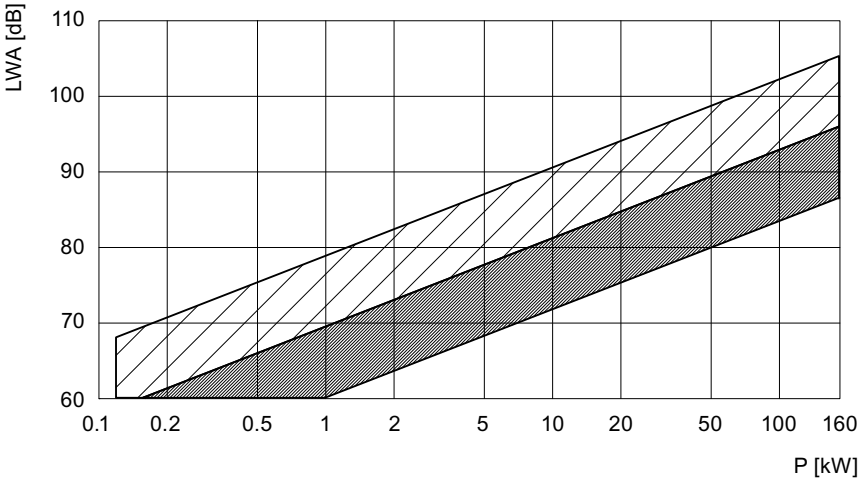


Figure 10-3 MOTOX geared motors sound-pressure level

The sound-pressure levels of MOTOX geared motors fall mainly in the dark-colored part of the range. Gearboxes with very small transmission ratios, high output, and high input speed may fall into the cross-hatched part.

If repeat measurements on site do not produce conclusive results which can be verified by measuring technology, the measurement obtained on the Siemens Geared Motors GmbH test benches will apply.

External noises

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 Types of construction

The type of construction designations are compliant with IEC 60034-7 (Code I).

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

Note

Gearbox sizes 18 and 28 are lubricated for life.

Screw plugs are not provided.

Explanation of symbols in type of construction diagrams:


Ventilation


Oil filling


Oil level

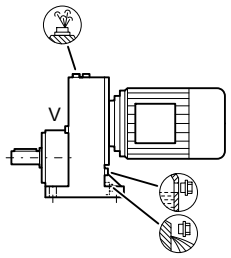

Oil dipstick


Oil drain

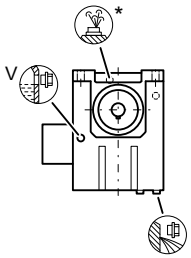
A, B	Position of insert shaft / solid shaft
V	Gearboxes of size 38 are fitted as standard with a screw plug at point "V"; ventilation is not required.
*	On opposite side
②	Two-stage gearbox
③	Three-stage gearbox
④	Tandem gearbox
⑤	Optional oil hole facing output side
- - -	Alternatively

10.5.1 Single-stage helical gearboxes

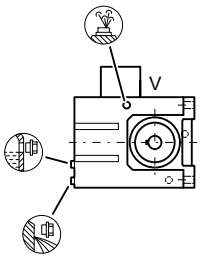
E B3 (IM B3)



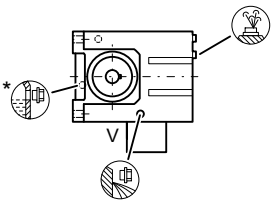
E B8 (IM B8)



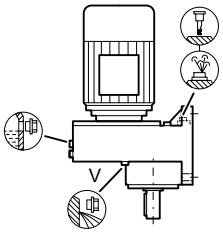
E B7 (IM B7)



E B6 (IM B6)



E V5 (IM V5)



E V6 (IM V6)

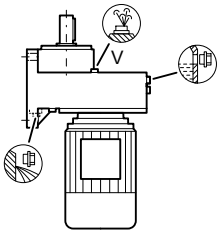
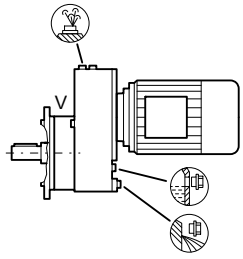
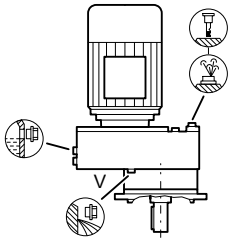


Figure 10-4 Type of construction options for E sizes 38 - 148

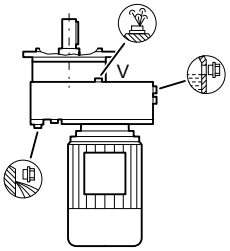
EF, EK B5 (IM B5)
EZ B14 (IM B14)



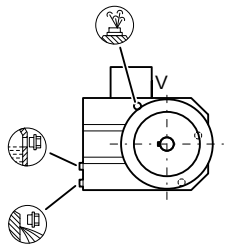
EF, EK V1 (IM V1)
EZ V18 (IM V18)



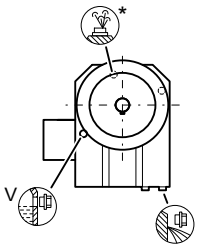
EF, EK V3 (IM V3)
EZ V19 (IM V19)



EF, EK B5-02 (IM B5-02)
EZ B14-02 (IM B14-02)



EF, EK B5-03 (IM B5-03)
EZ B14-03 (IM B14-03)



EF, EK B5-00 (IM B5-00)
EZ B14-00 (IM B14-00)

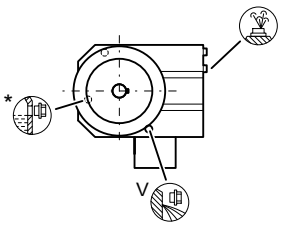


Figure 10-5 Type of construction options for E. sizes 38 - 148

10.5.2 Two- and three-stage helical gearboxes

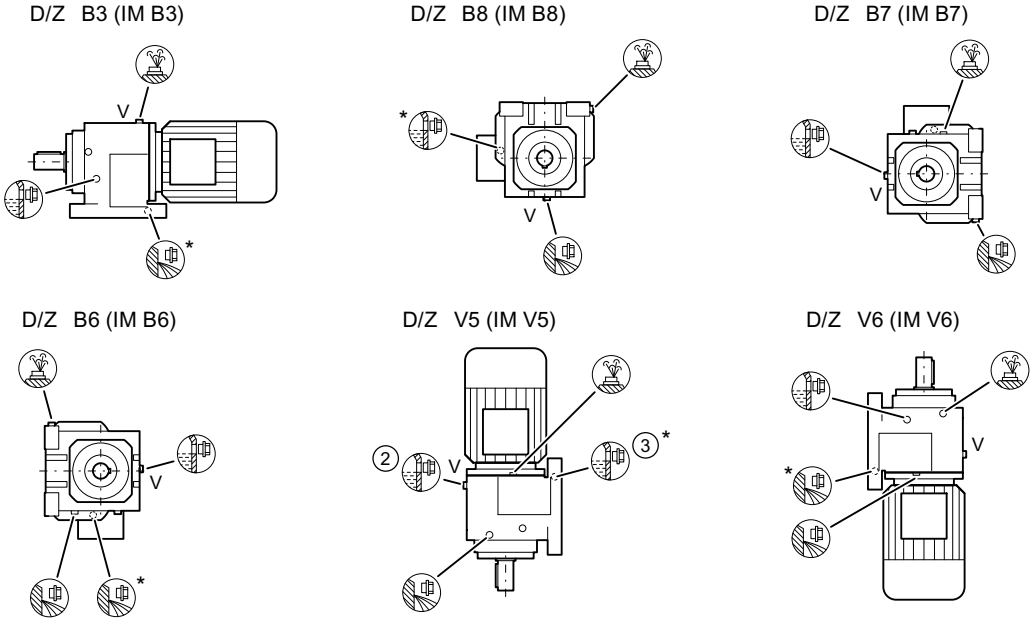


Figure 10-6 Type of construction options for D/Z sizes 18 - 88

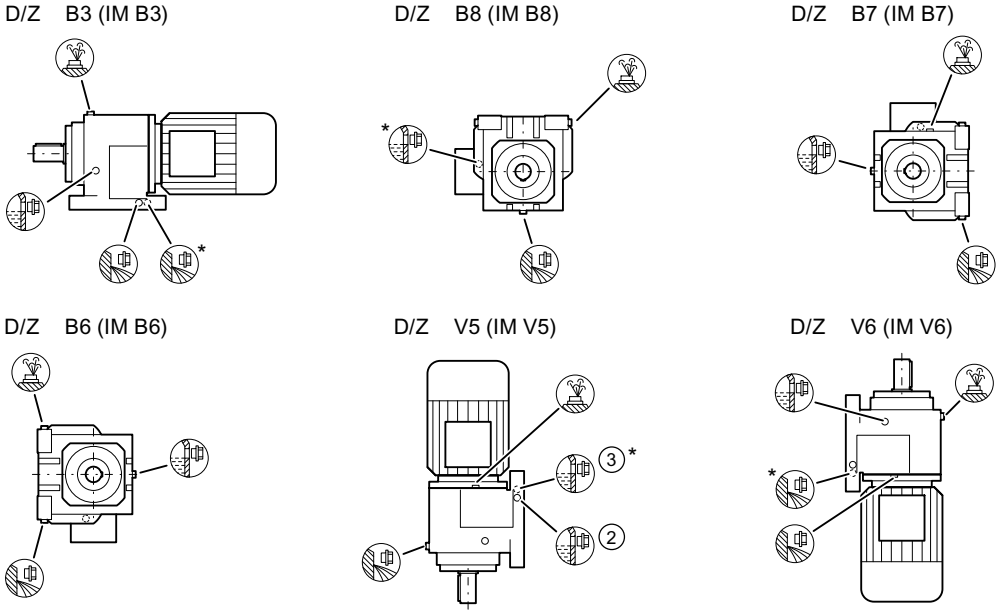
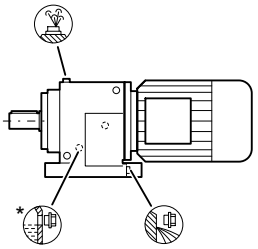
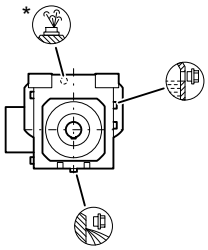


Figure 10-7 Type of construction options for D/Z sizes 108 - 168

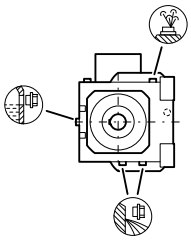
D/Z B3 (IM B3)



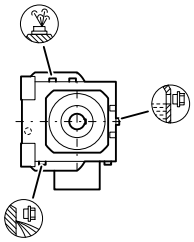
D/Z B8 (IM B8)



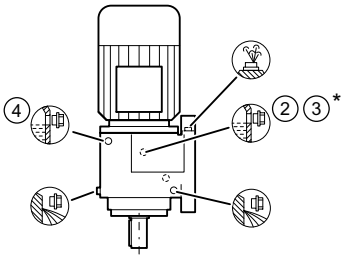
D/Z B7 (IM B7)



D/Z B6 (IM B6)



D/Z V5 (IM V5)



D/Z V6 (IM V6)

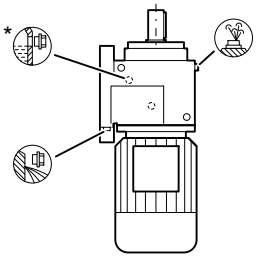
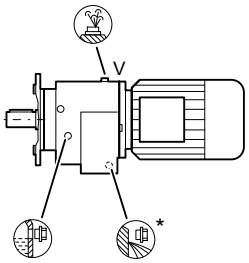
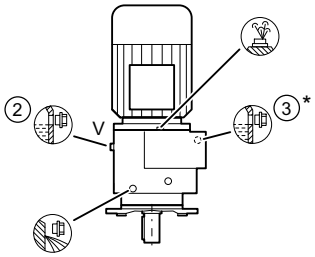


Figure 10-8 Type of construction options for D/Z size 188

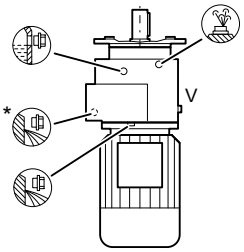
ZK, DF/ZF, DR/ZR B5 (IM B5)
DZ/ZZ B14 (IM B14)



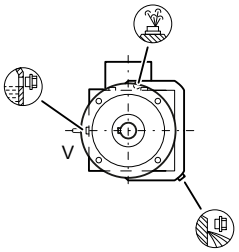
V1 (IM V1)
V18 (IM V18)



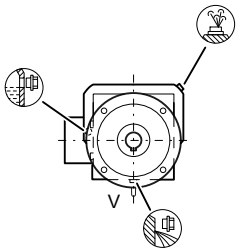
V3 (IM V3)
V19 (IM V19)



ZK, DF/ZF, DR/ZR B5-02 (IM B5-02)
DZ/ZZ B14-0 (IM B14-02)



B5-03 (IM B5-03)
B14-03 (IM B14-03)



B5-00 (IM B5-00)
B14-00 (IM B14-00)

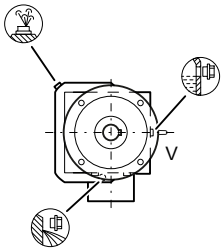


Figure 10-9 Type of construction options for DF/ZF, DZ/ZZ sizes 18 - 88, DR/ZR sizes 68 - 88

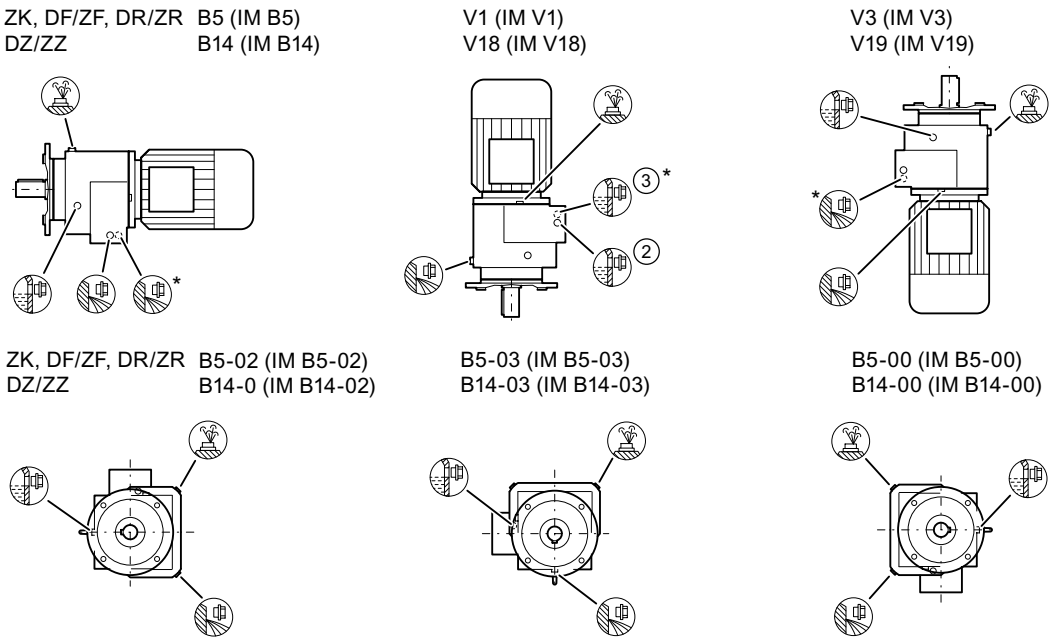


Figure 10-10 Type of construction options for D./Z. sizes 108 - 168

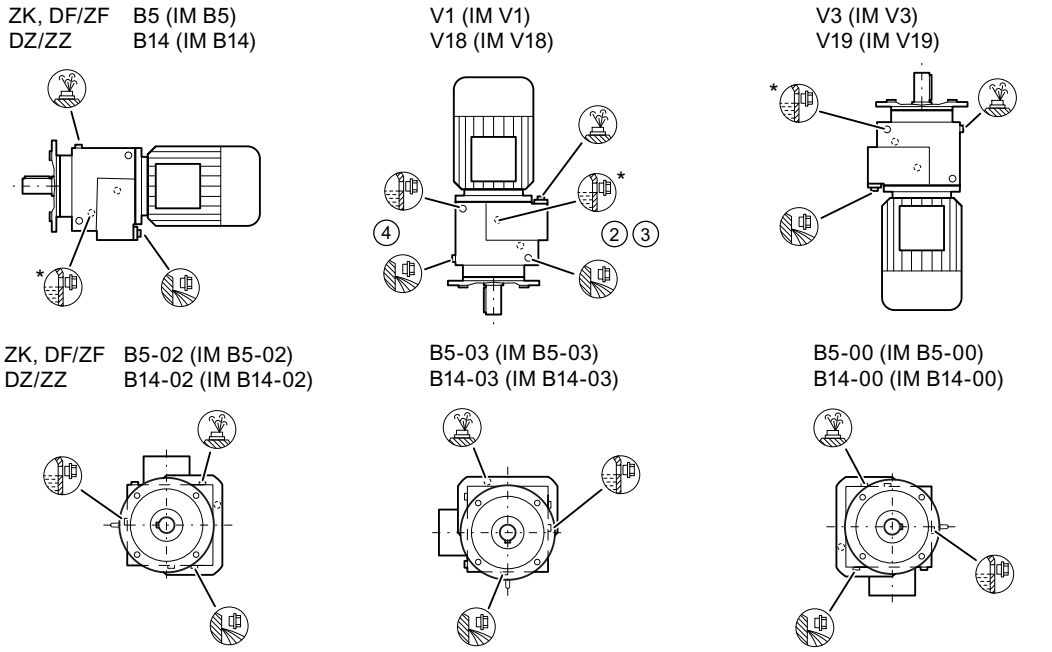


Figure 10-11 Type of construction options for D./Z. size 188

10.5.3 Parallel shaft gearboxes

Note

On types of construction V3-00/H-06, use the opening marked "F" to check the oil level.

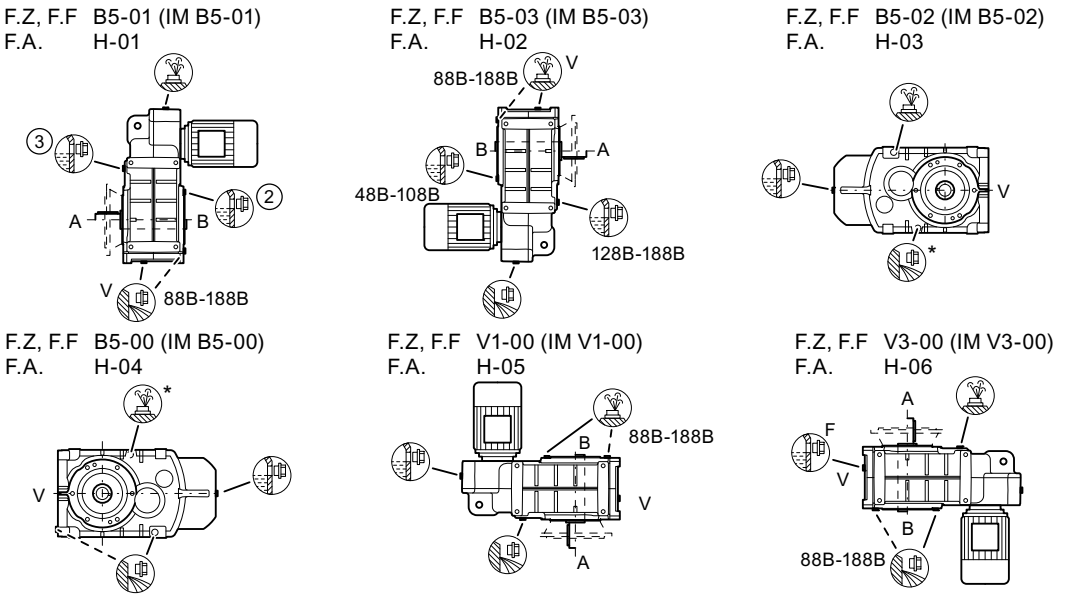


Figure 10-12 Type of construction options for F.28, F. sizes 38B - 188B

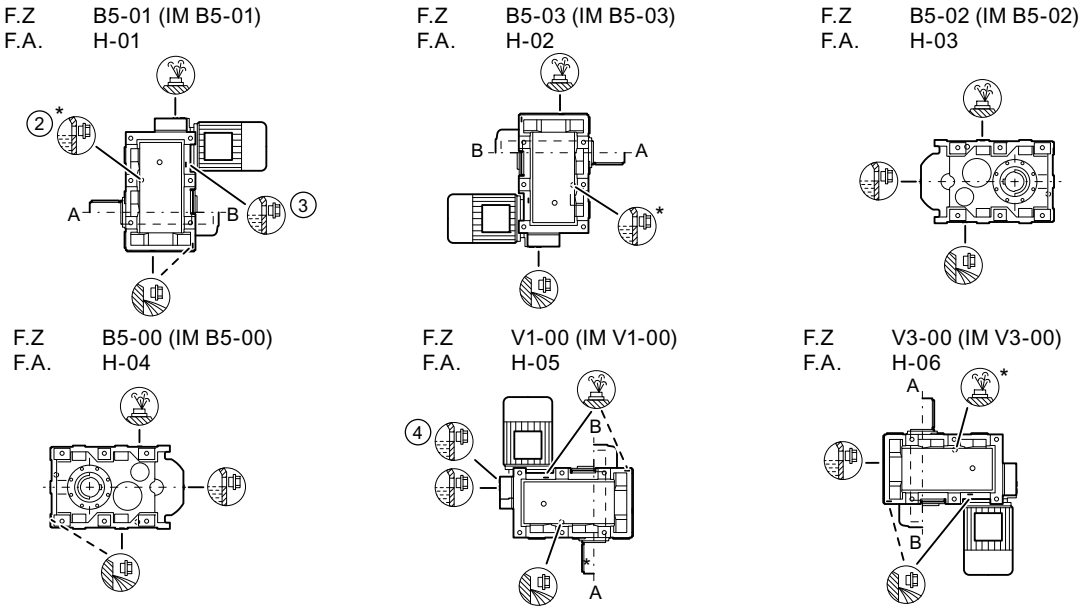
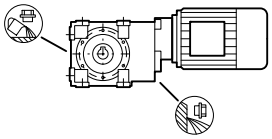


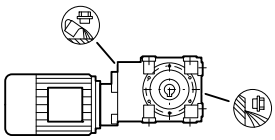
Figure 10-13 Type of construction options for F.208

10.5.4 Bevel helical gearboxes

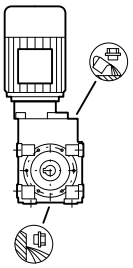
B B3-00 (IM B3-00)
BZ, BF B5-01 (IM B5-01)
BA. H-01



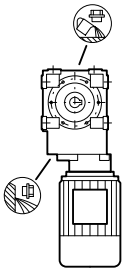
B B8-00 (IM B8-00)
BZ, BF B5-03 (IM B5-03)
BA. H-02



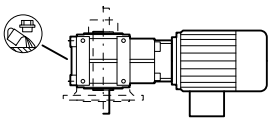
B B7-00 (IM B7-00)
BZ, BF B5-02 (IM B5-02)
BA. H-03



B B6-00 (IM B6-00)
BZ, BF B5-00 (IM B5-00)
BA. H-04



B V5-00 (IM V5-00)
BZ, BF V1-00 (IM V1-00)
BA. H-05



B V6-00 (IM V6-00)
BZ, BF V3-00 (IM V3-00)
BA. H-06

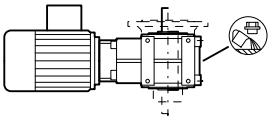
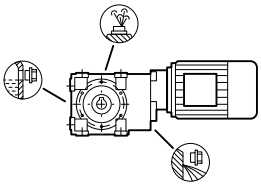
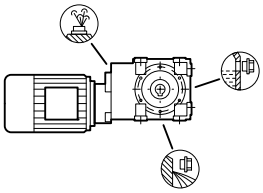


Figure 10-14 Type of construction options for B. sizes 28 - 38 without additional screw plug

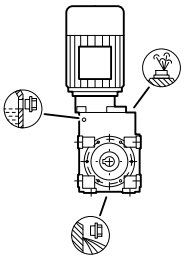
B B3-00 (IM B3-00)
BZ, BF B5-01 (IM B5-01)
BA. H-01



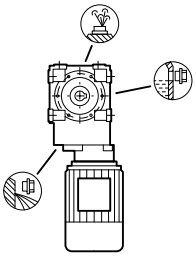
B B8-00 (IM B8-00)
BZ, BF B5-03 (IM B5-03)
BA. H-02



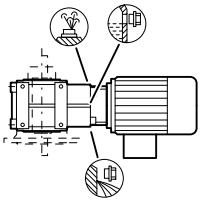
B B7-00 (IM B7-00)
BZ, BF B5-02 (IM B5-02)
BA. H-03



B B6-00 (IM B6-00)
BZ, BF B5-00 (IM B5-00)
BA. H-04



B V5-00 (IM V5-00)
BZ, BF V1-00 (IM V1-00)
BA. H-05



B V6-00 (IM V6-00)
BZ, BF V3-00 (IM V3-00)
BA. H-06

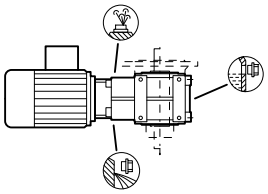


Figure 10-15 Type of construction options for B.38 with additional screw plug

The type of construction positions shown apply also to the foot- / flange-mounted housing in size 188.

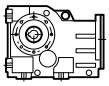
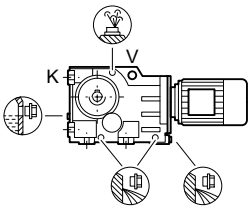


Figure 10-16 Image of foot- / flange-mounted housing K.188

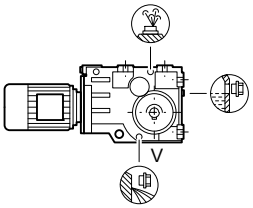
Note

On types of construction B3-00/H-01, use the opening marked "K" to check the oil level.

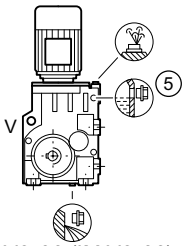
K B3-00 (IM B3-00)
KA. H-01



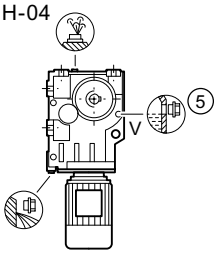
K B8-00 (IM B8-00)
KA. H-02



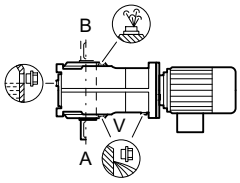
K B7-00 (IM B7-00)
KA. H-03



K B6-00 (IM B6-00)
KA. H-04



K V5-00 (IM V5-00)
KA. H-05



K V6-00 (IM V6-00)
KA. H-06

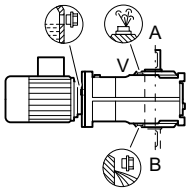
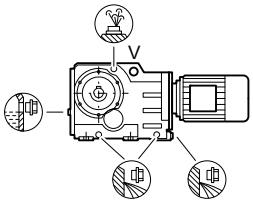
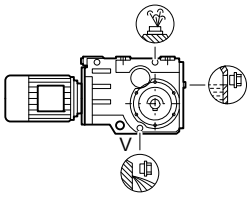


Figure 10-17 Type of construction options for K, KA, KAS, KAT sizes 38 - 188

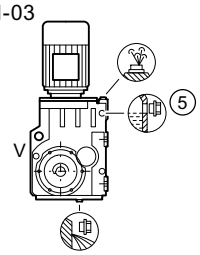
K. B5-01 (IM B5-01)
KA. H-01



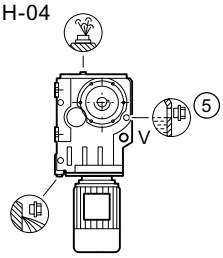
K. B5-03 (IM B5-03)
KA. H-02



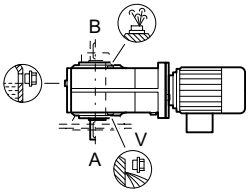
K. B5-02 (IM B5-02)
KA. H-03



K. B5-00 (IM B5-00)
KA. H-04



K. V1-00 (IM V1-00)
KA. H-05



K. V3-00 (IM V3-00)
KA. H-06

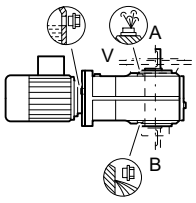
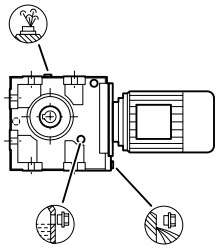


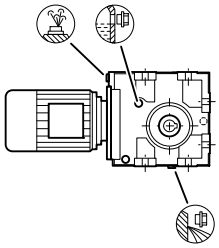
Figure 10-18 Type of construction options for KZ, KF, KM, KAD, KAZ, KAF, KAM, KADS, KAZS, KAFS, KADT, KAZT, KAFT sizes 38 - 188

10.5.5 Helical worm gearboxes

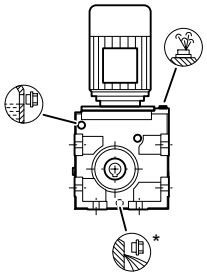
C B3-00 (IM B3-00)
CA. H-01



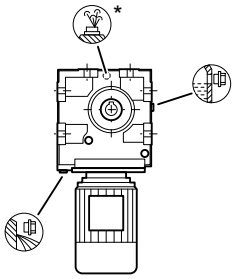
C B8-00 (IM B8-00)
CA. H-02



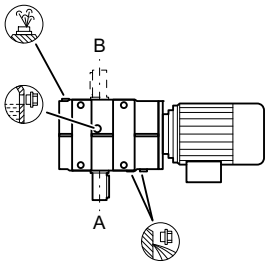
C B7-00 (IM B7-00)
CA. H-03



C B6-00 (IM B6-00)
CA. H-04



C V5-00 (IM V5-00)
CA. H-05



C V6-00 (IM V6-00)
CA. H-06

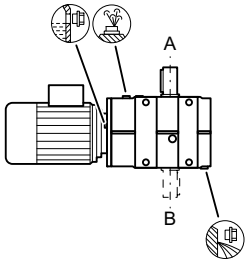
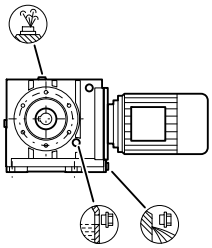
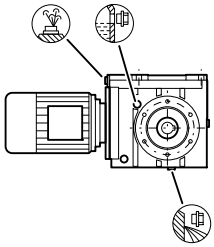


Figure 10-19 Type of construction options for C, CA, CAS, CAT sizes 28 - 88

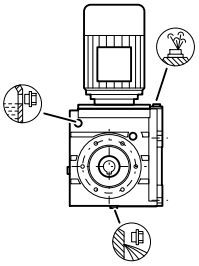
CZ, CF B5-01 (IM B5-01)
CA. H-01



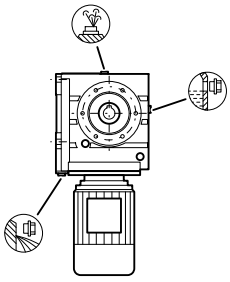
CZ, CF B5-03 (IM B5-03)
CA. H-02



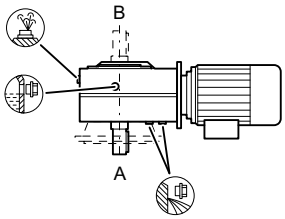
CZ, CF B5-02 (IM B5-02)
CA. H-03



CZ, CF B5-00 (IM B5-00)
CA. H-04



CZ, CF V1-00 (IM V1-00)
CA. H-05



CZ, CF V3-00 (IM V3-00)
CA. H-06

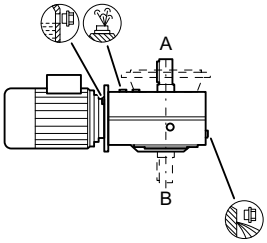


Figure 10-20 Type of construction options for CZ, CF, CAD, CAF, CAZ, CADS, CAFS, CAZS, CADT, CAFT, CAZT sizes 28 - 88

10.5.6 Tandem gearboxes - Intermediate helical gearboxes

Note

In a horizontal operating position the bulging part of the housing of the 2nd gearbox generally faces vertically downwards.

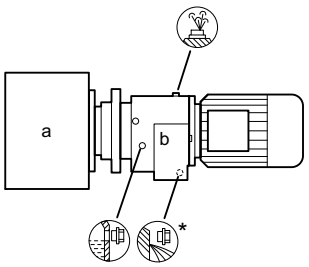
Note

Where tandem gearboxes are concerned, each individual gearbox is to be considered separately.

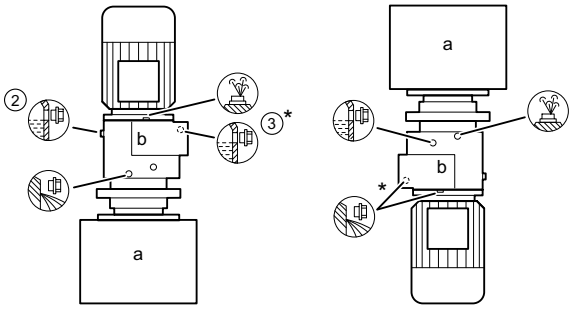
Gearbox sizes 28 and 38 on the 2nd gearbox are lubricated for life.

Screw plugs are not provided.

Horizontal operating position



Vertical operating position



a Main gearbox

b 2nd gearbox (intermediate helical gearbox)

* On opposite side

② 2-stage gearbox

③ 3-stage gearbox

Figure 10-21 Operating position for tandem gearbox

10.6 Oil quantities

CAUTION
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 precise oil quantities are stated on the gearbox or geared motor rating plate. The oil level must be checked before commissioning.

10.6.1 Helical gearboxes

Table 10- 3 Oil quantities [l] for E. sizes 38 - 148

Type	Type of construction											
	B3	B5 B14	B5-00 B14-00	B5-02 B14-02	B5-03 B14-03	B6	B7	B8	V1 V18	V3 V19	V5	V6
E.38	0.2	0.2	0.23	0.23	0.4	0.3	0.3	0.4	0.5	0.6	0.5	0.6
E.48	0.3	0.3	0.5	0.5	0.7	0.6	0.5	0.7	0.7	1.1	0.7	1.1
E.68	0.5	0.5	1.0	1.0	1.4	1.0	1.1	1.5	1.7	1.9	1.8	1.9
E.88	0.8	0.7	1.6	1.6	2.5	1.6	1.6	2.5	2.2	3.8	2.3	3.8
E.108	1.3	1.0	2.7	2.7	4.5	2.7	2.8	4.6	3.7	6.6	3.8	6.6
E.128	2.3	2.3	5.2	5.1	7.2	5.3	5.2	7.2	6.4	10.9	6.4	10.9
E.148	4.0	2.8	6.7	6.7	10.3	7.0	7.0	10.3	9.3	14.5	9.5	14.8

Table 10- 4 Oil quantities [l] for D./Z. sizes 18 - 188

Type	Type of construction											
	B3	B5 B14	B5-00 B14-00	B5-02 B14-02	B5-03 B14-03	B6	B7	B8	V1 V18	V3 V19	V5	V6
Z.18	0.2	0.2	0.3	0.35	0.4	0.35	0.3	0.4	0.5	0.5	0.5	0.5
Z.28	0.25	0.25	0.4	0.45	0.6	0.45	0.4	0.6	0.6	0.7	0.6	0.7
Z.38	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.8	1.2	0.7	1.1
Z.48	1.1	1.0	1.4	1.7	1.5	1.6	1.3	1.5	1.8	2.4	1.9	2.4
Z.68	1.8	1.7	2.4	2.8	2.5	2.7	2.3	2.5	3.0	4.1	3.2	4.1
Z.88	4.1	3.7	5.5	6.3	5.7	6.1	5.3	5.7	6.8	8.3	7.5	8.8
Z.108	7.3	6.0	10.0	11.2	8.6	10.5	9.3	8.6	13.8	14.0	13.2	13.6
Z.128	9.5	7.0	15.4	17.3	13.2	16.0	14.1	13.2	18.5	20.7	19.9	20.9
Z.148	13.0	9.9	19.9	22.4	26.9	20.8	18.3	26.9	23.9	27.7	25.7	27.4
Z.168	21.0	15.3	33.0	37.7	32.1	34.8	30.1	32.1	48.0	45.6	48.0	41.7
Z.188	18.5	18.5	46.0	50.0	75.0	50.0	46.0	75.0	72.0	70.0	72.0	70.0
D.18	0.2	0.2	0.3	0.35	0.4	0.35	0.3	0.4	0.5	0.5	0.5	0.5
D.28	0.25	0.25	0.4	0.45	0.6	0.45	0.4	0.6	0.6	0.7	0.6	0.7
D.38	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.9	1.1	0.9	1.1
D.48	1.1	1.0	1.5	1.6	1.5	1.5	1.4	1.5	2.3	2.4	2.4	2.4
D.68	1.7	1.6	2.5	2.7	2.6	2.6	2.4	2.6	3.9	4.0	4.0	4.0
D.88	4.0	3.6	5.6	6.1	5.9	5.9	5.4	5.9	8.7	8.9	9.3	8.9
D.108	7.1	5.7	10.2	11.0	10.0	10.3	9.5	10.0	16.3	14.2	15.6	13.7
D.128	9.4	6.8	16.1	17.1	14.1	15.8	14.8	14.1	24.6	21.8	24.4	21.5
D.148	12.5	9.4	20.7	22.0	23.4	20.4	19.1	23.4	30.6	28.2	32.2	27.9
D.168	19.0	16.0	32.7	35.6	33.8	34.1	31.2	33.8	53.0	43.7	54.4	42.2
D.188	18.4	18.4	46.0	48.0	73.0	48.0	46.0	73.0	69.0	68.0	69.0	68.0

10.6.2 Parallel shaft gearboxes

Table 10- 5 Oil quantities [l] for F. sizes 28, 38B - 188B, 208

Type	Type of construction					
	B5-01 H-01	B5-03 H-02	B5-02 H-03	B5-00 H-04	V1-00 H-05	V3-00 H-06
FZ.28	0.6	0.45	0.5	0.5	0.65	0.85
FZ.38B	0.7	0.6	0.7	0.7	1.0	1.1
FZ.48B	1.6	1.0	1.3	1.3	1.8	2.1
FZ.68B	2.5	2.3	2.4	2.3	3.3	3.8
FZ.88B	4.5	5.0	4.8	4.6	7.0	6.6
FZ.108B	7.4	9.2	8.4	8.1	11.1	13.1
FZ.128B	13.8	13.7	15.5	14.8	22.1	22.7
FZ.148B	19.5	20.8	22.7	22.3	34.5	33.5
FZ.168B	32.8	30.0	37.0	35.8	53.8	53.0
FZ.188B	41.4	40.7	44.2	46.5	68.0	66.4
FZ.208	77.0	64.5	73.8	66.3	108.7	112.2
FD.28	0.6	0.45	0.5	0.5	0.65	0.75
FD.38B	0.9	0.6	0.7	0.7	0.9	1.1
FD.48B	2.0	0.9	1.3	1.3	1.8	2.0
FD.68B	3.3	2.3	2.4	2.3	3.2	3.8
FD.88B	6.3	5.0	4.7	4.7	6.8	6.7
FD.108B	10.6	9.1	8.2	8.2	11.1	13.0
FD.128B	16.8	13.5	15.2	14.8	21.6	22.5
FD.148B	24.7	20.3	21.8	22.3	33.6	32.6
FD.168B	44.0	28.8	36.0	35.8	52.4	51.9
FD.188B	52.0	38.4	44.5	54.1	66.0	65.2
FD.208	95.4	61.5	71.5	66.2	104.6	108.6

10.6.3 Bevel helical gearboxes

Table 10- 6 Oil quantities [l] for B, BA, BAS, BAT sizes 28 - 38; K, KA, KAS, KAT sizes 38 - 188

Type	Type of construction					
	B3-00 H-01	B8-00 H-02	B7-00 H-03	B6-00 H-04	V5-00 H-05	V6-00 H-06
B.28	0.25	0.6	0.9	0.55	0.5	0.5
B.38	0.7	1.1	1.6	1.0	0.95	0.8
K.38	0.5	1.1	1.5	0.8	1.0	0.9
K.48	0.7	1.6	2.1	1.4	1.5	1.8
K.68	1.6	3.2	4.2	2.7	3.0	3.0
K.88	2.6	5.7	7.8	5.0	4.9	5.2
K.108	5.5	9.5	13.0	8.8	8.7	8.3
K.128	8.3	19.6	24.7	15.8	16.9	16.1
K.148	14.8	30.2	40.1	22.0	25.8	27.0
K.168	21.6	45.6	62.0	34.2	40.2	38.5
K.188	33.8	82.5	105.0	63.4	70.7	69.4

Table 10- 7 Oil quantities [l] for BZ, BF, BAD, BAF, BAZ, BADS, BAFS, BAZS, BADT, BAFT, BAZT sizes 28 - 38; KZ, KF, KM, KAD, KAZ, KAF, KAM, KADS, KAZS, KAFS, KADT, KAZT, KAFT sizes 38 - 188

Type	Type of construction					
	B5-01 H-01	B5-03 H-02	B5-02 H-03	B5-00 H-04	V1-00 H-05	V3-00 H-06
B.28	0.25	0.6	0.9	0.55	0.5	0.5
B.38	0.7	1.1	1.6	1.0	0.95	0.8
K.38	0.5	1.1	1.6	0.8	1.0	0.9
K.48	0.7	1.7	2.2	1.4	1.6	1.8
K.68	1.6	3.2	4.4	2.6	2.8	3.0
K.88	2.6	5.8	8.1	5.0	5.1	5.0
K.108	6.2	9.9	14.2	8.9	10.0	8.9
K.128	8.7	19.6	25.4	14.8	17.5	16.6
K.148	14.8	30.1	42.0	25.0	26.0	28.1
K.168	21.7	46.3	64.0	34.8	41.1	39.4
K.188	33.8	82.5	105.0	63.4	70.7	69.4

10.6.4 Helical worm gearboxes

Table 10- 8 Oil quantities [l] for C, CA, CAS, CAT sizes 28 - 88

Type	Type of construction					
	B3-00 H-01	B8-00 H-02	B7-00 H-03	B6-00 H-04	V5-00 H-05	V6-00 H-06
C.28	0.2	0.4	0.6	0.2	0.6	0.35
C.38	0.5	1.2	1.3	1.2	1.2	1.2
C.48	0.7	1.6	1.7	1.6	1.3	1.3
C.68	1.5	3.3	4.1	3.3	2.8	2.9
C.88	1.7	6.1	6.5	5.1	4.5	4.5

Table 10- 9 Oil quantities [l] for CZ, CF, CAD, CAF, CAZ, CADS, CAFS, CAZS, CADT, CAFT, CAZT sizes 28 - 88

Type	Type of construction					
	B5-01 H-01	B5-03 H-02	B5-02 H-03	B5-00 H-04	V1-00 H-05	V3-00 H-06
C.28	0.2	0.4	0.6	0.2	0.6	0.35
C.38	0.4	1.2	1.3	1.1	1.0	1.0
C.48	0.5	1.7	1.8	1.6	1.3	1.3
C.68	1.5	3.6	4.2	3.3	3.1	3.2
C.88	1.7	5.9	7.3	5.2	4.8	4.8

10.6.5 Tandem gearboxes - Intermediate helical gearboxes

10.6.5.1 Two- and three-stage helical gearboxes

Table 10- 10 Oil quantities [l] for Z.38, D. sizes 48 - 188

Type	Type of construction							
	B3	B5 B14	B5-00 B14-00	B5-02 B14-02	B5-03 B14-03	B6	B7	B8
Z.38-D/Z28	0.5+0.25 0.75	0.5+0.25 0.75	0.6+0.25 0.85	0.6+0.25 0.85	0.6+0.25 0.85	0.6+0.25 0.85	0.6+0.25 0.85	0.6+0.25 0.85
D.48-D/Z28	1.1+0.25 1.35	1.0+0.25 1.25	1.5+0.25 1.75	1.6+0.25 1.85	1.5+0.25 1.75	1.5+0.25 1.75	1.4+0.25 1.65	1.5+0.25 1.75
D.68-D/Z28	1.7+0.25 1.95	1.6+0.25 1.85	2.5+0.25 2.75	2.7+0.25 2.95	2.6+0.25 2.85	2.6+0.25 2.85	2.4+0.25 2.65	2.6+0.25 2.85
D.88-D/Z28	4.0+0.25 4.25	3.6+0.25 3.85	5.6+0.25 5.85	6.1+0.25 6.35	5.9+0.25 6.15	5.9+0.25 6.15	5.4+0.25 5.65	5.9+0.25 6.15
D.108-Z38	7.1+0.5 7.6	5.7+0.5 6.2	10.2+0.5 10.7	11.0+0.5 11.5	10.0+0.5 10.5	10.3+0.5 10.8	9.5+0.5 10.0	10.0+0.5 10.5
D.108-D38	7.1+0.5 7.6	5.7+0.5 6.2	10.2+0.5 10.7	11.0+0.5 11.5	10.0+0.5 10.5	10.3+0.5 10.8	9.5+0.5 10.0	10.0+0.5 10.5
D.128-Z38	9.4+0.5 9.9	6.8+0.5 7.3	16.1+0.5 16.6	17.1+0.5 17.6	14.1+0.5 14.6	15.8+0.5 16.3	14.8+0.5 15.3	14.1+0.5 14.6
D.128-Z48	9.4+1.0 10.4	6.8+1.0 7.8	16.1+1.0 17.1	17.1+1.0 18.1	14.1+1.0 15.1	15.8+1.0 16.8	14.8+1.0 15.8	14.1+1.0 15.1
D.128-D38	9.4+0.5 9.9	6.8+0.5 7.3	16.1+0.5 16.6	17.1+0.5 17.6	14.1+0.5 14.6	15.8+0.5 16.3	14.8+0.5 15.3	14.1+0.5 14.6
D.148-Z38	12.5+0.5 13.0	9.4+0.5 9.9	20.7+0.5 21.2	22.0+0.5 22.5	23.4+0.5 23.9	20.4+0.5 20.9	19.1+0.5 19.6	23.4+0.5 23.9
D.148-Z48	12.5+1.0 13.5	9.4+1.0 10.4	20.7+1.0 21.7	22.0+1.0 23.0	23.4+1.0 24.4	20.4+1.0 21.4	19.1+1.0 20.1	23.4+1.0 24.4
D.148-D38	12.5+0.5 13.0	9.4+0.5 9.9	20.7+0.5 21.2	22.0+0.5 22.5	23.4+0.5 23.9	20.4+0.5 20.9	19.1+0.5 19.6	23.4+0.5 23.9
D.168-Z48	19.0+1.0 20.0	16.0+1.0 17.0	32.7+1.0 33.7	35.6+1.0 36.6	33.8+1.0 34.8	34.1+1.0 35.1	31.2+1.0 32.2	33.8+1.0 34.8
D.168-Z68	19.0+1.7 20.7	16.0+1.7 17.7	32.7+1.7 34.4	35.6+1.7 37.3	33.8+1.7 35.5	34.1+1.7 35.8	31.2+1.7 32.9	33.8+1.7 35.5
D.168-D48	19.0+1.0 20.0	16.0+1.0 17.0	32.7+1.0 33.7	35.6+1.0 36.6	33.8+1.0 34.8	34.1+1.0 35.1	31.2+1.0 32.2	33.8+1.0 34.8
D.188-Z48	18.4+1.0 19.4	18.4+1.0 19.4	46.0+1.0 47.0	48.0+1.0 49.0	73.0+1.0 74.0	48.0+1.0 49.0	46.0+1.0 47.0	73.0+1.0 74.0
D.188-Z68	18.4+1.7 20.1	18.4+1.7 20.1	46.0+1.7 47.7	48.0+1.7 49.7	73.0+1.7 74.7	48.0+1.7 49.7	46.0+1.7 47.7	73.0+1.7 74.7
D.188-D48	18.4+1.0 19.4	18.4+1.0 19.4	46.0+1.0 47.0	48.0+1.0 49.0	73.0+1.0 74.0	48.0+1.0 49.0	46.0+1.0 47.0	73.0+1.0 74.0

Table 10- 11 Oil quantities [l] for Z.38, D. sizes 48 - 188

Type	Type of construction			
	V1 V18	V3 V19	V5	V6
Z.38-D/Z28	0.8+0.6 1.4	1.2+0.7 1.9	0.7+0.6 1.3	1.1+0.7 1.8
D.48-D/Z28	2.3+0.6 2.9	2.4+0.7 3.1	2.4+0.6 3.0	2.4+0.7 3.1
D.68-D/Z28	3.9+0.6 4.5	4.0+0.7 4.7	4.0+0.6 4.6	4.0+0.7 4.7
D.88-D/Z28	8.7+0.6 9.3	8.9+0.7 9.6	9.3+0.6 9.9	8.9+0.7 9.6
D.108-Z38	16.3+0.8 17.1	14.2+1.2 15.4	15.6+0.8 16.4	13.7+1.2 14.9
D.108-D38	16.3+0.9 17.2	14.2+1.1 15.3	15.6+0.9 16.5	13.7+1.1 14.8
D.128-Z38	24.6+0.8 25.4	21.8+1.2 23.0	24.4+0.8 25.2	21.5+1.2 22.7
D.128-Z48	24.6+1.8 26.4	21.8+2.4 24.2	24.4+1.8 26.2	21.5+2.4 23.9
D.128-D38	24.6+0.9 25.5	21.8+1.1 22.9	24.4+0.9 25.3	21.5+1.1 22.6
D.148-Z38	30.6+0.8 31.4	28.2+1.2 29.4	32.2+0.8 33.0	27.9+1.2 29.1
D.148-Z48	30.6+1.8 32.4	28.2+2.4 30.6	32.2+1.8 34.0	27.9+2.4 30.3
D.148-D38	30.6+0.9 31.5	28.2+1.1 29.3	32.2+0.9 33.1	27.9+1.1 29.0
D.168-Z48	53.0+1.8 54.8	43.7+2.4 46.1	54.4+1.8 56.2	42.2+2.4 44.6
D.168-Z68	53.0+3.0 56.0	43.7+4.1 47.8	54.4+3.0 57.4	42.2+4.1 46.3
D.168-D48	53.0+2.3 55.3	43.7+2.4 46.1	54.4+2.3 56.7	42.2+2.4 44.6
D.188-Z48	83.0+1.8 84.8	68.0+2.4 70.4	83.0+1.8 84.8	68.0+2.4 70.4
D.188-Z68	83.0+3.0 86.0	68.0+4.1 72.1	83.0+3.0 86.0	68.0+4.1 72.1
D.188-D48	83.0+2.3 85.3	68.0+2.4 70.4	83.0+2.3 85.3	68.0+2.4 70.4

10.6.5.2 Parallel shaft gearboxes

Table 10- 12 Oil quantities [l] for FD. sizes 38B - 188B, 208

Type	Type of construction					
	B5-01 H-01	B5-03 H-02	B5-02 H-03	B5-00 H-04	V1-00 H-05	V3-00 H-06
FD.38B-D/Z28	0.9+0.25 1.15	0.6+0.25 0.85	0.7+0.25 0.95	0.7+0.25 0.95	0.9+0.6 1.5	1.1+0.7 1.8
FD.48B-D/Z28	2.0+0.25 2.25	0.9+0.25 1.15	1.3+0.25 1.55	1.3+0.25 1.55	1.8+0.6 2.4	2.0+0.7 2.7
FD.68B-D/Z28	3.3+0, 25 3.55	2.3+0.25 2.55	2.4+0.25 2.65	2.3+0.25 2.55	3.2+0.6 3.8	3.8+0.7 4.5
FD.88B-D/Z28	6.3+0.25 6.55	5.0+0.25 5.25	4.7+0.25 4.95	4.7+0.25 4.95	6.8+0.6 7.4	6.7+0.7 7.4
FD.108B-Z38	10.6+0.5 11.1	9.1+0.5 9.6	8.2+0.5 8.7	8.2+0.5 8.7	11.1+0.8 11.9	13.0+1.2 14.2
FD.108B-D38	10.6+0.5 11.1	9.1+0.5 9.6	8.2+0.5 8.7	8.2+0.5 8.7	11.1+0.9 12.0	13.0+1.1 14.1
FD.128B-Z38	16.8+0.5 17.3	13.5+0.5 14.0	15.2+0.5 15.7	14.8+0.5 15.3	21.6+0.8 22.4	22.5+1.2 23.7
FD.128B-Z48	16.8+1.0 17.8	13.5+1.0 14.5	15.2+1.0 16.2	14.8+1.0 15.8	21.6+1.8 23.4	22.5+2.4 24.9
FD.128B-D38	16.8+0.5 17.3	13.5+0.5 14.0	15.2+0.5 15.7	14.8+0.5 15.3	21.6+0.9 22.5	22.5+1.1 23.6
FD.148B-Z38	24.7+0.5 25.2	20.3+0.5 20.8	21.8+0.5 22.3	22.3+0.5 22.8	33.6+0.8 34.4	32.6+1.2 33.8
FD.148B-Z48	24.7+1.0 25.7	20.3+1.0 21.3	21.8+1.0 22.8	22.3+1.0 23.3	33.6+1.8 35.4	32.6+2.4 35.0
FD.148B-D38	24.7+0.5 25.2	20.3+0.5 20.8	21.8+0.5 22.3	22.3+0.5 22.8	33.6+0.9 34.5	32.6+1.1 33.7
FD.168B-Z48	44.0+1.0 45.0	28.8+1.0 29.8	36.0+1.0 37.0	35.8+1.0 36.8	52.4+1.8 54.2	51.9+2.4 54.3
FD.168B-Z68	44.0+1.7 45.7	28.8+1.7 30.5	36.0+1.7 37.7	35.8+1.7 37.5	52.4+3.0 55.4	51.9+4.1 56.0
FD.168B-D48	44.0+1.0 45.0	28.8+1.0 29.8	36.0+1.0 37.0	35.8+1.0 36.8	52.4+2.3 54.7	51.9+2.4 54.3
FD.188B-Z48	52.0+1.0 53.0	38.4+1.0 39.4	44.5+1.0 45.5	54.1+1.0 55.1	66.0+1.8 67.8	65.2+2.4 67.6
FD.188B-Z68	52.0+1.7 53.7	38.4+1.7 40.1	44.5+1.7 46.2	54.1+1.7 55.8	66.0+3.0 69.0	65.2+4.1 69.3
FD.188B-D48	52.0+1.0 53.0	38.4+1.0 39.4	44.5+1.0 45.5	54.1+1.0 55.1	66.0+2.3 68.3	65.2+2.4 67.6
FD.208-D68	95.4+1.6 97.0	61.5+1.6 63.1	71.5+1.6 73.1	66.2+1.6 67.8	126.5+3.9 130.4	108.6+4.0 112.6
FD.208-Z68	95.4+1.7 97.1	61.5+1.7 63.2	71.5+1.7 73.2	66.2+1.7 67.9	126.5+3.0 129.5	108.6+4.1 112.7
FD.208-Z88	95.4+3.7 99.1	61.5+3.7 65.2	71.5+3.7 75.2	66.2+3.7 69.9	126.5+6.8 133.3	108.6+8.3 116.9

10.6.5.3 Bevel helical gearboxes

Table 10- 13 Oil quantities [l] for K, KA, KAS, KAT sizes 38 - 188

Type	Type of construction					
	B3-00 H-01	B8-00 H-02	B7-00 H-03	B6-00 H-04	V5-00 H-05	V6-00 H-06
K.38-D/Z28	0.5+0.25 0.75	1.1+0.25 1.35	1.5+0.6 2.1	0.8+0.7 1.5	1.0+0.25 1.25	0.9+0.25 1.15
K.48-D/Z28	0.7+0.25 0.95	1.6+0.25 1.85	2.1+0.6 2.7	1.4+0.7 2.1	1.5+0.25 1.75	1.8+0.25 2.05
K.68-D/Z28	1.6+0.25 1.85	3.2+0.25 3.45	4.2+0.6 4.8	2.7+0.7 3.4	3.0+0.25 3.25	3.0+0.25 3.25
K.88-D/Z28	2.6+0.25 2.85	5.7+0.25 5.95	7.8+0.6 8.4	5.0+0.7 5.7	4.9+0.25 5.15	5.2+0.25 5.45
K.108-Z38	5.5+0.5 6.0	9.5+0.5 10.0	13.0+0.8 13.8	8.8+1.2 10.0	8.7+0.5 9.2	8.3+0.5 8.8
K.108-Z48	5.5+1.0 6.5	9.5+1.0 10.5	13.0+1.8 14.8	8.8+2.4 11.2	8.7+1.0 9.7	8.3+1.0 9.3
K.108-D38	5.5+0.5 6.0	9.5+0.5 10.0	13.0+0.9 13.9	8.8+1.1 9.9	8.7+0.5 9.2	8.3+0.5 8.8
K.128-Z38	8.3+0.5 8.8	19.6+0.5 20.1	24.7+0.8 25.5	15.8+1.2 17.0	16.9+0.5 17.4	16.1+0.5 16.6
K.128-Z48	8.3+1.0 9.3	19.6+1.0 20.6	24.7+1.8 26.5	15.8+2.4 18.2	16.9+1.0 17.9	16.1+1.0 17.1
K.128-D38	8.3+0.5 8.8	19.6+0.5 20.1	24.7+0.9 25.6	15.8+1.1 16.9	16.9+0.5 17.4	16.1+0.5 16.6
K.148-Z38	14.8+0.5 15.3	30.2+0.5 30.7	40.1+0.8 40.9	22.0+1.2 23.2	25.8+0.5 26.3	27.0+0.5 27.5
K.148-Z68	14.8+1.7 16.5	30.2+1.7 31.9	40.1+3.0 43.1	22.0+4.1 26.1	25.8+1.7 27.5	27.0+1.7 28.7
K.148-D38	14.8+0.5 15.3	30.2+0.5 30.7	40.1+0.9 40.9	22.0+1.1 23.1	25.8+0.5 26.3	27.0+0.5 27.5
K.168-Z48	21.6+1.0 22.6	45.6+1.0 46.6	62.0+1.8 63.8	34.2+2.4 36.6	40.2+1.0 41.2	38.5+1.0 39.5
K.168-Z.68	21.6+1.7 23.3	45.6+1.7 47.3	62.0+3.0 65.0	34.2+4.1 38.3	40.2+1.7 41.9	38.5+1.7 40.2
K.168-D48	21.6+1.0 22.6	45.6+1.0 46.6	62.0+2.3 64.3	34.2+2.4 36.6	40.2+1.0 41.2	38.5+1.0 39.5
K.188-Z68	33.8+1.7 35.5	82.5+1.7 84.2	105.0+3.0 108.0	63.4+4.1 67.5	70.7+1.7 72.4	69.4+1.7 71.1
K.188-Z88	33.8+3.7 37.5	82.5+3.7 86.2	105.0+6.8 111.8	63.4+8.3 71.7	70.7+3.7 74.4	69.4+3.7 73.1
K.188-D68	33.8+1.6 35.4	82.5+1.6 84.1	105.0+3.9 108.9	63.4+4.0 67.4	70.7+1.6 72.3	69.4+1.6 71.0

Table 10- 14 Oil quantities [l] for KZ, KF, KAD, KAZ, KAF, KADS, KAZS, KAFS, KADT, KAZT, KAFT sizes 38 - 188

Type	Type of construction					
	B5-01 H-01	B5-03 H-02	B5-02 H-03	B5-00 H-04	V1-00 H-05	V3-00 H-06
K.38-D/Z28	0.5+0.25 0.75	1.1+0.25 1.35	1.6+0.6 2.2	0.8+0.7 1.5	1.0+0.25 1.25	0.9+0.25 1.15
K.48-D/Z28	0.7+0.25 0.95	1.7+0.25 1.95	2.2+0.6 2.8	1.4+0.7 2.1	1.6+0.25 1.85	1.8+0.25 2.05
K.68-D/Z28	1.6+0.25 1.85	3.2+0.25 3.45	4.4+0.6 5.0	2.6+0.7 3.3	2.8+0.25 3.05	3.0+0.25 3.25
K.88-D/Z28	2.6+0.25 2.85	5.8+0.25 6.05	8.1+0.6 8.7	5.0+0.7 5.7	5.1+0.25 5.35	5.0+0.25 5.25
K.108-Z38	6.2+0.5 6.7	9.9+0.5 10.4	14.2+0.8 15.0	8.9+1.2 10.1	10.0+0.5 10.5	8.9+0.5 9.4
K.108-Z48	6.2+1.0 7.2	9.9+1.0 10.9	14.2+1.8 16.0	8.9+2.4 11.3	10.0+1.0 11.0	8.9+1.0 9.9
K.108-D38	6.2+0.5 6.7	9.9+0.5 10.4	14.2+0.9 15.1	8.9+1.1 10.0	10.0+0.5 10.5	8.9+0.5 9.4
K.128-Z38	8.7+0.5 9.2	19.6+0.5 20.1	25.4+0.8 26.2	14.8+1.2 16.0	17.5+0.5 18.0	16.6+0.5 17.1
K.128-Z48	8.7+1.0 9.7	19.6+1.0 20.6	25.4+1.8 27.2	14.8+2.4 17.2	17.5+1.0 18.5	16.6+1.0 17.6
K.128-D38	8.7+0.5 9.2	19.6+0.5 20.1	25.4+0.9 26.3	14.8+1.1 15.9	17.5+0.5 18.0	16.6+0.5 17.1
K.148-Z38	14.8+0.5 15.3	30.1+0.5 30.6	42.0+0.8 42.8	25.0+1.2 26.2	26.0+0.5 26.5	28.1+0.5 28.6
K.148-Z68	14.8+1.7 16.5	30.1+1.7 31.8	42.0+3.0 45.0	25.0+4.1 29.1	26.0+1.7 27.7	28.1+1.7 29.8
K.148-D38	14.8+0.5 15.3	30.1+0.5 30.6	42.0+0.9 42.9	25.0+1.1 26.1	26.0+0.5 26.5	28.1+0.5 28.6
K.168-Z48	21.7+1.0 22.7	46.3+1.0 47.3	64.0+1.8 65.8	34.8+2.4 37.2	41.1+1.0 42.1	39.4+1.0 40.4
K.168-Z68	21.7+1.7 23.4	46.3+1.7 48.0	64.0+3.0 67.0	34.8+4.1 38.9	41.1+1.7 42.8	39.4+1.7 41.1
K.168-D48	21.7+1.0 22.7	46.3+1.0 47.3	62.6+2.3 64.9	34.8+2.4 37.2	41.1+1.0 42.1	39.4+1.0 40.4
K.188-Z68	33.8+1.7 35.5	82.5+1.7 84.2	105.0+3.0 108.0	63.4+4.1 67.5	70.7+1.7 72.4	69.4+1.7 71.1
K.188-Z88	33.8+3.7 37.5	82.5+3.7 86.2	105.0+6.8 111.8	63.4+8.3 71.7	70.7+3.7 74.4	69.4+3.7 73.1
K.188-D68	33.8+1.6 35.4	82.5+1.6 84.1	105.0+3.9 108.9	63.4+4.0 67.4	70.7+1.6 72.3	69.4+1.6 71.0

10.6.5.4 Helical worm gearboxes

Table 10- 15 Oil quantities [l] for C, CA, CAS, CAT sizes 38 - 88

Type	Type of construction					
	B3-00 H-01	B8-00 H-02	B7-00 H-03	B6-00 H-04	V5-00 H-05	V6-00 H-06
C.38-D/Z28	0.5+0.25 0.75	1.2+0.25 1.45	1.3+0.6 1.9	1.2+0.7 1.9	1.2+0.25 1.45	1.2+0.25 1.45
C.48-D/Z28	0.7+0.25 0.95	1.6+0.25 1.85	1.7+0.6 2.3	1.6+0.7 2.3	1.3+0.25 1.55	1.3+0.25 1.55
C.68-D/Z28	1.5+0.25 1.75	3.3+0.25 3.55	4.1+0.6 4.7	3.3+0.7 4.0	2.8+0.25 3.05	2.9+0.25 3.15
C.88-D/Z28	1.7+0.25 0.95	6.1+0.25 6.35	6.5+0.6 7.1	5.1+0.7 5.8	4.5+0.25 4.75	4.5+0.25 4.75

Table 10- 16 Oil quantities [l] for CZ, CF, CAD, CAF, CAZ, CADS, CAFS, CAZS, CADT, CAFT, CAZT sizes 38 - 88

Type	Type of construction					
	B5-01 H-01	B5-03 H-02	B5-02 H-03	B5-00 H-04	V1-00 H-05	V3-00 H-06
C.38-D/Z28	0.4+0.25 0.65	1.2+0.25 1.45	1.3+0.6 1.9	1.1+0.7 1.8	1.0+0.25 1.25	1.0+0.25 1.25
C.48-D/Z28	0.5+0.25 0.75	1.7+0.25 1.95	1.8+0.6 2.4	1.6+0.7 2.3	1.3+0.25 1.55	1.3+0.25 1.55
C.68-D/Z28	1.5+0.25 1.75	3.6+0.25 3.85	4.2+0.6 4.8	3.3+0.7 4.0	3.1+0.25 3.35	3.2+0.25 3.45
C.88-D/Z28	1.7+0.25 1.95	5.9+0.25 6.15	7.3+0.6 7.9	5.2+0.7 5.9	4.8+0.25 5.05	4.8+0.25 5.05

Spare parts / Accessories

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.

CAUTION
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 Geared Motors GmbH will accept no liability or warranty whatsoever for damage occurring as the result of the use of non-original spare parts or accessories.

We can only accept liability for original spare parts supplied by Siemens Geared Motors GmbH.

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 ⑤
- Type designation see rating plate ③
- Part no. (3-digit item no. from spare parts list, 6-digit code no. or 7-digit article no.)
- Quantity

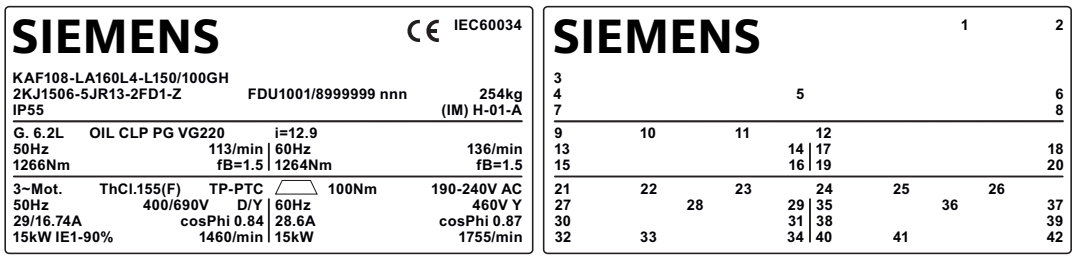
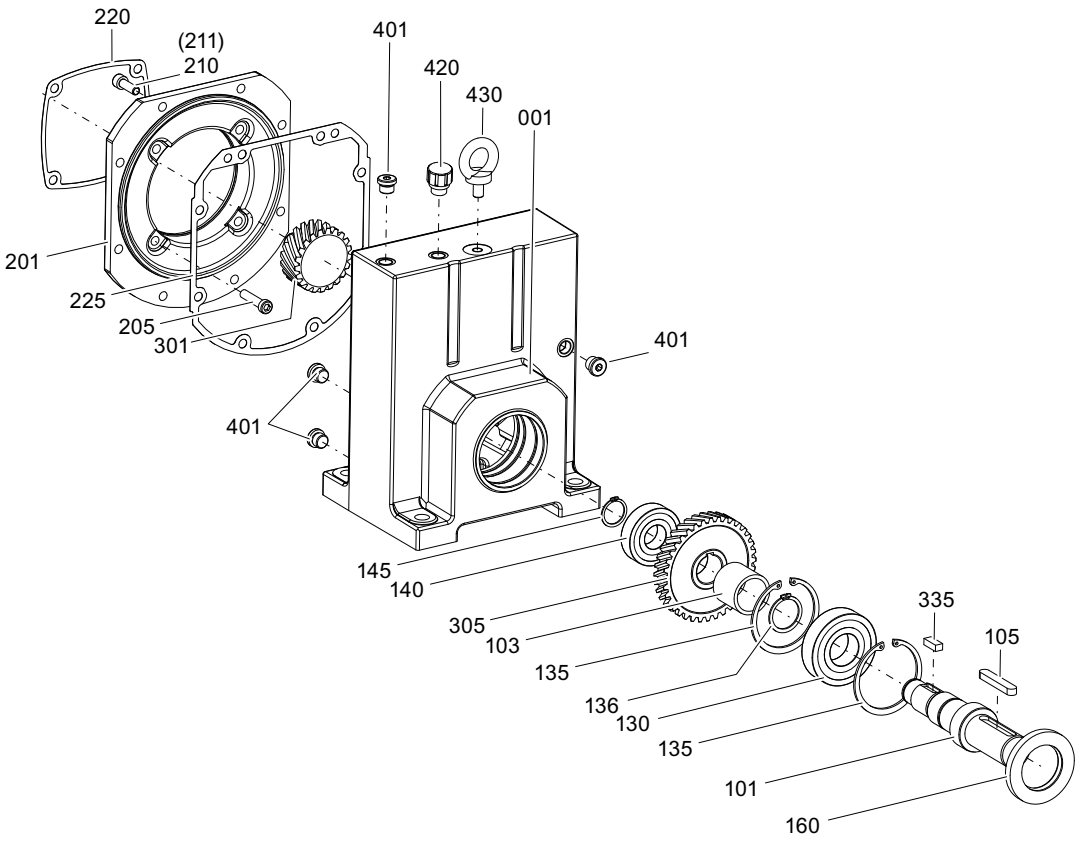


Figure 11-1 Rating plate example

For motors of series 1LA / 1LG with their own rating plate, the spare parts documentation in the original operating instructions applies.

11.2 Spare parts lists

11.2.1 Single-stage helical gearboxes sizes 38 - 148

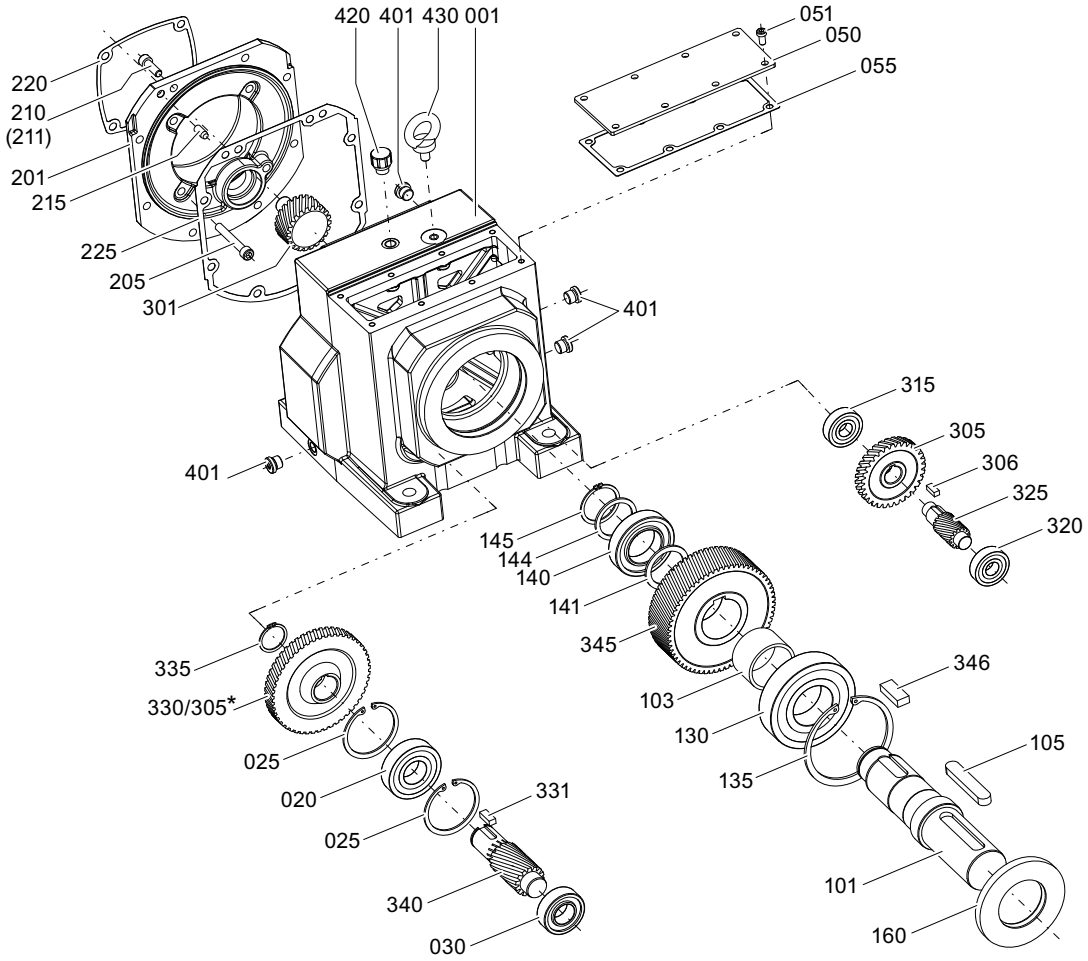


001	Gearbox housing
101	Output shaft
103	Spacer / bush
105	Parallel key
130	Bearing
135	Locking ring
136	Locking ring
140	Bearing
145	Locking ring
160	Shaft sealing ring
201	Adapter plate
205	Screw
210	Screw
211	Screw lock
220	Seal
225	Seal

301 Plug-in pinion
305 Helical gear wheel
335 Parallel key
401 Screw plug
420 Vent filter
430 Eyebolt

Figure 11-2 Single-stage helical gearboxes sizes 38 - 148

11.2.2 Two- and three-stage helical gearboxes sizes 38 - 188



* 2-stage
001 Gearbox housing
020 Bearing
025 Locking ring
030 Bearing
050 Housing cover
051 Screw
055 Seal
101 Output shaft
103 Spacer / bush
105 Parallel key
130 Bearing
135 Locking ring
140 Bearing
141 Supporting disk / shim
144 Supporting disk / shim
145 Locking ring

160 Shaft sealing ring
201 Adapter plate
205 Screw
210 Screw
211 Screw lock
215 Cylindrical pin
220 Seal
225 Seal
301 Plug-in pinion
305 Helical gear wheel
306 Parallel key
315 Bearing
320 Bearing
325 Pinion shaft
330 Helical gear wheel
331 Parallel key
335 Locking ring
340 Pinion shaft
345 Helical gear wheel
346 Parallel key
401 Screw plug
420 Vent filter
430 Eyebolt

Figure 11-3 Two- and three-stage helical gearboxes sizes 38 - 188

11.2.3 Parallel shaft gearboxes sizes 38B - 188B, 208

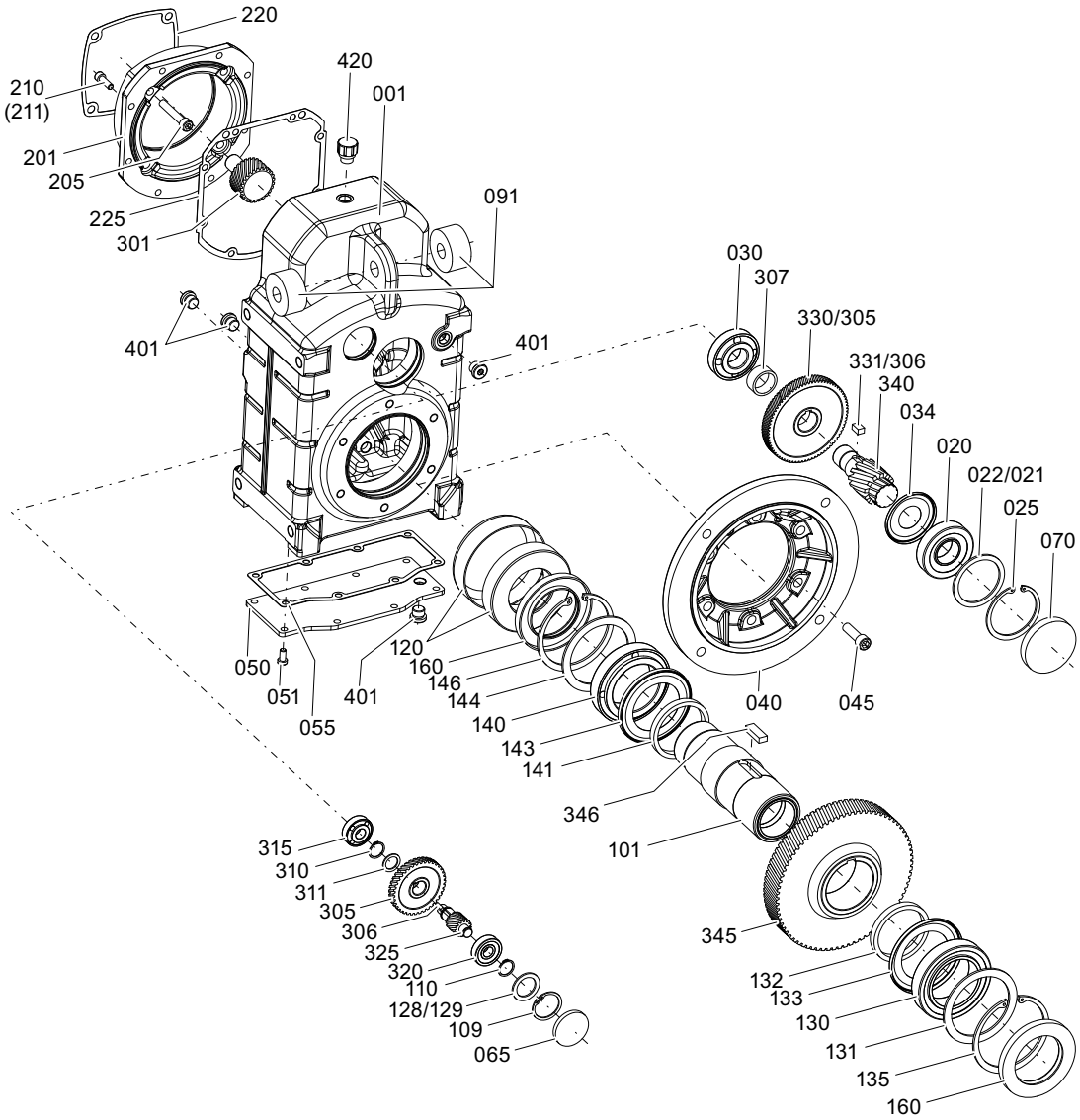


Figure 11-4 Parallel shaft gearbox sizes 38B - 188B

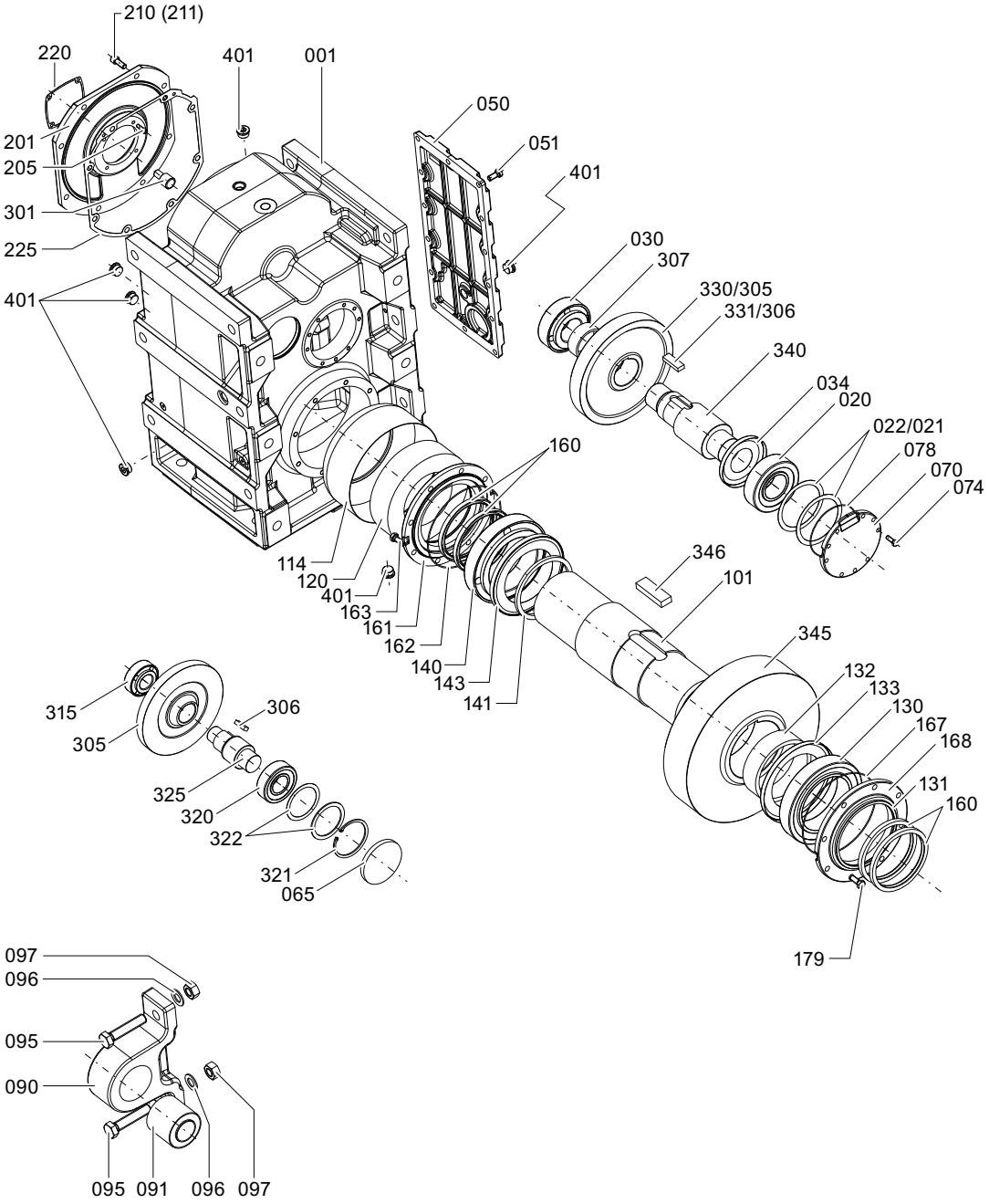


Figure 11-5 Parallel shaft gearbox size 208

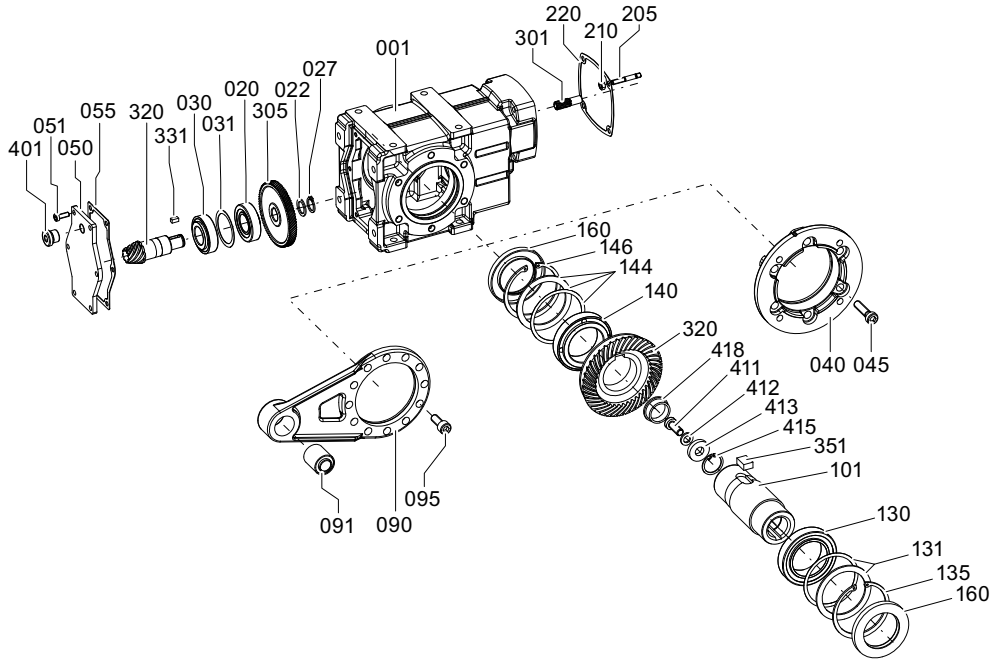
Table 11- 1 Spare parts list for parallel shaft gearbox sizes 38B - 188B, 208

001	Gearbox housing
020	Bearing
021	Supporting disk / shim
022	Supporting disk / shim
025	Locking ring
030	Bearing
034	NILOS ring
040	Output flange
045	Screw
050	Housing cover
051	Screw
055	Seal
065	Sealing cap
070	Sealing cap
074	Screw
078	O-ring
090	Torque arm
091	Rubber bush
095	Screw
096	Locking ring
097	Nut
101	Input shaft
109	Locking ring
110	Locking ring
114	Protection cover (optional)
120	Shrink disk
128	Supporting disk / shim
129	Supporting disk / shim
130	Bearing
131	Supporting disk / shim
132	Spacer / bush
133	NILOS ring
135	Locking ring
140	Bearing
141	Spacer / bush
143	NILOS ring
144	Supporting disk / shim
146	Locking ring
160	Shaft sealing ring
161	Bearing cover

162	O-ring
163	Screw
167	O-ring
168	Bearing cover
179	Screw
201	Adapter plate
205	Screw
210	Screw
211	Screw lock
220	Seal
225	Seal
301	Pinion
305	Helical gear wheel
306	Parallel key
307	Spacer / bush
310	Locking ring
311	Supporting disk / shim
315	Bearing
320	Bearing
321	Locking ring
322	Supporting disk / shim
325	Pinion shaft
330	Helical gear wheel
331	Parallel key
340	Pinion shaft
345	Helical gear wheel
346	Parallel key
401	Screw plug
420	Vent filter

11.2.4 Bevel helical gearboxes sizes B38, 38 - 188

B38



38 - 188

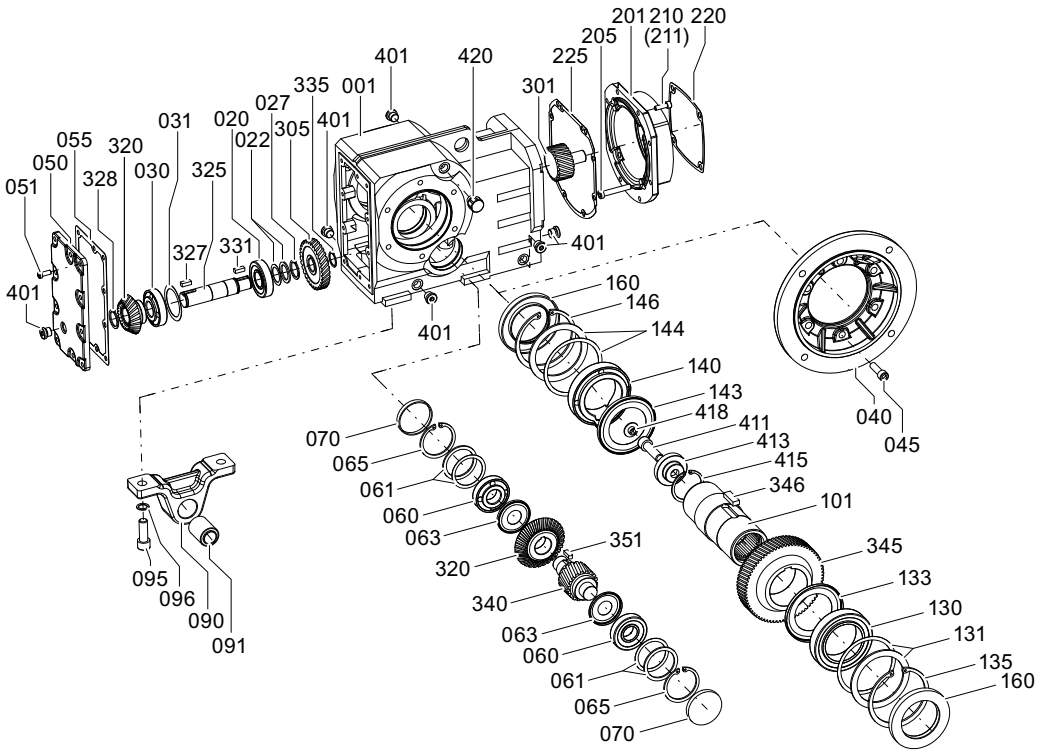


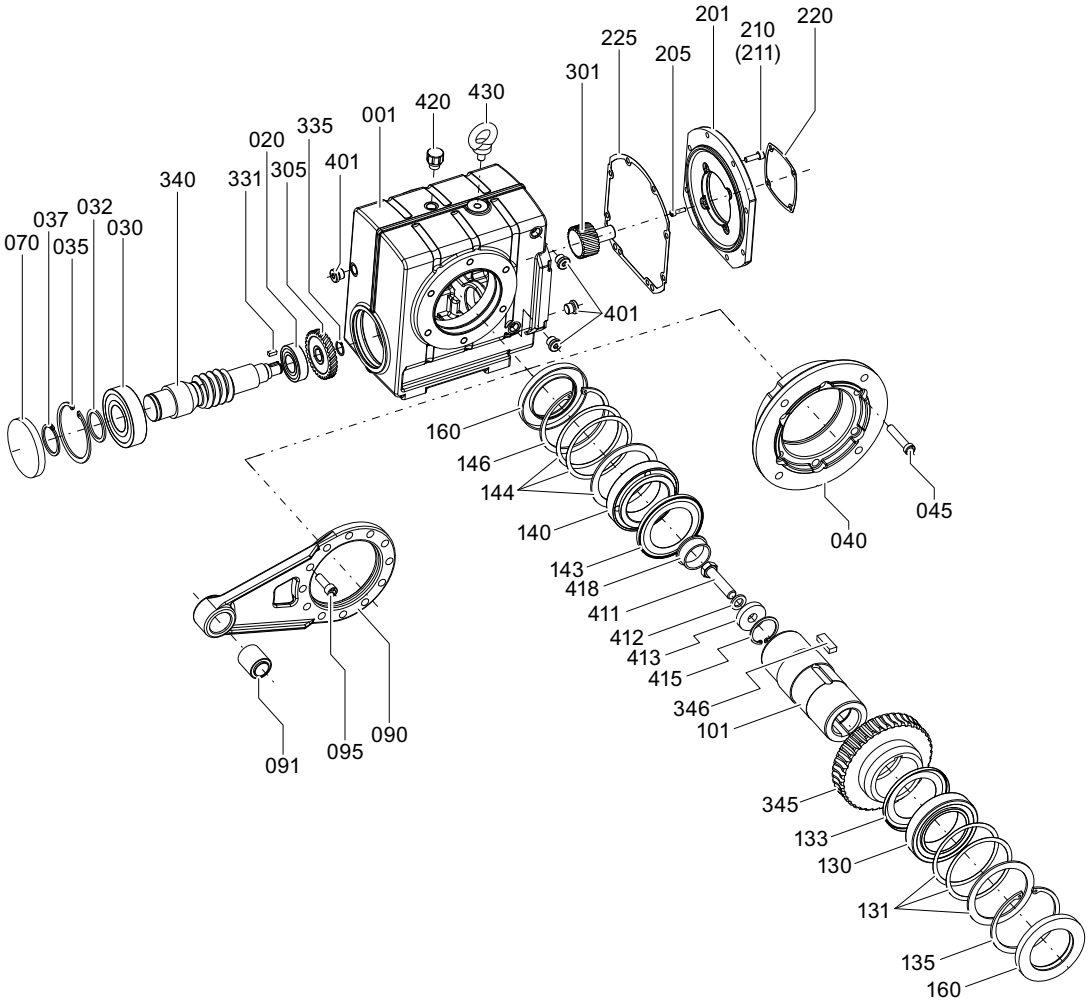
Figure 11-6 Bevel helical gearbox sizes B38, 38 - 188

Table 11- 2 Spare parts list for bevel helical gearbox sizes B38, 38 - 188

001 Gearbox housing
020 Bearing
022 Supporting disk / shim
027 Locking ring
030 Bearing
031 Supporting disk / shim
040 Output flange
045 Screw
050 Housing cover
051 Screw
055 Seal
060 Bearing
061 Supporting disk / shim
063 NILOS ring
065 Locking ring
070 Sealing cap
090 Torque arm
091 Rubber bush
095 Screw
096 Screw lock
101 Output shaft
130 Bearing
131 Supporting disk / shim
133 NILOS ring
135 Locking ring
140 Bearing
143 NILOS ring
144 Supporting disk / shim
146 Locking ring
160 Shaft sealing ring
201 Adapter plate
205 Screw
210 Screw
211 Screw lock
220 Seal
225 Seal
301 Plug-in pinion
305 Helical gear wheel
320 Bevel gear pair
325 Bevel pinion shaft

327	Parallel key
328	Locking ring
331	Parallel key
335	Locking ring
340	Pinion shaft
345	Helical gear wheel
346	Parallel key
351	Parallel key
401	Screw plug
411	Screw
413	Disk
415	Locking ring
418	Plug / sealing cap
420	Vent filter

11.2.5 Helical worm gearboxes sizes 38 - 88



001 Gearbox housing
020 Bearing
030 Bearing
032 Supporting disk / shim
035 Locking ring
037 Locking ring
040 Output flange
045 Screw
070 Sealing cap
090 Torque arm
091 Rubber bush
095 Screw
101 Output shaft
130 Bearing
131 Supporting disk / shim
133 NILOS ring

135 Locking ring
140 Bearing
143 NILOS ring
144 Supporting disk / shim
146 Locking ring
160 Shaft sealing ring
201 Adapter plate
205 Screw
210 Screw
211 Screw lock
220 Seal
225 Seal
301 Plug-in pinion
305 Helical gear wheel
331 Parallel key
335 Locking ring
340 Worm shaft
345 Worm wheel
346 Parallel key
401 Screw plug
411 Screw
412 Screw lock
413 Disk
415 Locking ring
418 Plug / sealing cap
420 Vent filter
430 Eyebolt

Figure 11-7 Helical worm gearbox sizes 38 - 88

Declaration of Incorporation, Declaration of Conformity

12

12.1 Declaration of Incorporation

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

The manufacturer Siemens Geared Motors GmbH, 72072 Tübingen, declares for the partly completed machine

- Single-stage helical gearboxes of types
  E.38, E.48, E.68, E.88, E.108, E.128, E.148
- Two- and three-stage helical gearboxes of types
  D./Z.18, D./Z.28, D./Z.38, D./Z.48, D./Z.68, D./Z.88, D./Z.108, D./Z.128, D./Z.148, D./Z.168, D./Z.188
- Parallel shaft gearboxes of types
  F.28, F.38B, F.48B, F.68B, F.88B, F.108B, F.128B, F.148B, F.168B, F.188B, F.208
- Bevel helical gearboxes of types
  B.28, B.38, K.38, K.48, K.68, K.88, K.108, K.128, K.148, K.168, K.188
- Helical worm gearboxes of types
  C.28, C.38, C.48, C.68, C.88:

The special technical documentation was generated according to Annex VII B.

The following essential health and safety requirements from Directive 2006/42/EC Annex I apply and have been fulfilled:

- 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

The partly completed machine may only be commissioned once it has been established, if applicable, that the machine in which the partly completed machine is to be incorporated meets the provisions of Directive 2006/42/EC.

The manufacturer is obligated to transmit the special technical documentation for the partly completed machine in electronic form to national authorities upon legitimate request.

Person authorized to compile the relevant technical documentation:
Georg Böing, Head of Research and Development Gears.

Tübingen Date March 10, 2010

i. V. Böing

Georg Böing
Head of Research & Development Gears

i. V.

Jürgen Pflaum
Head of Quality Management

12.2 EC Declaration of Conformity

Document no. D87.1 10.09

Equipment designation:	Gearbox series MOTOX
Gearbox types:	E, Z, D, F, K, C
Sizes:	38 to 208
Input units:	A, K, P

The designated equipment conforms to the requirements of Explosion Protection Directive 94/9/EC, ATEX 95. It has been developed and manufactured in compliance with the following European standards:

- DIN EN ISO 14121-1: 2007
- DIN EN 1127-1: 2007
- DIN EN 13463-1: 2001
- DIN EN 13463-5: 2003
- DIN EN 13463-6: 2005
- DIN EN 13463-8: 2003

Type of explosion protection for equipment group II or categories 2 and 3:

- ⟨Ex⟩ II2 G / D IIB ck T4 / 120 °C
- ⟨Ex⟩ II2 G / D IIB bck T4 / 120 °C
- ⟨Ex⟩ II3 G / D IIB ck T4 / 120 °C

EC Declarations of Conformity and / or EC-type examination certificates for further equipment added to the gearbox and / or for safety systems are enclosed. These may be specifically:

- Rotating electrical machines
- Safety systems for oil level and / or temperature monitoring equipment

The technical documentation for category 2 gearboxes has undergone voluntary inspection and has been filed with the designated body under no. 0123, TÜV SÜD PRODUCT SERVICE GmbH, Ridlerstraße 65, 80339 München.

Tübingen Date October 1, 2009

i. V. Böing

Georg Böing
Head of Research & Development Gears

i. V.

Jürgen Pflaum
Head of Quality Management

Further information

MOTOX geared motors on the Internet:
www.siemens.com/gearedmotors

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Industry Sector
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90026 NÜRNBERG
GERMANY

Subject to change

www.siemens.com/automation