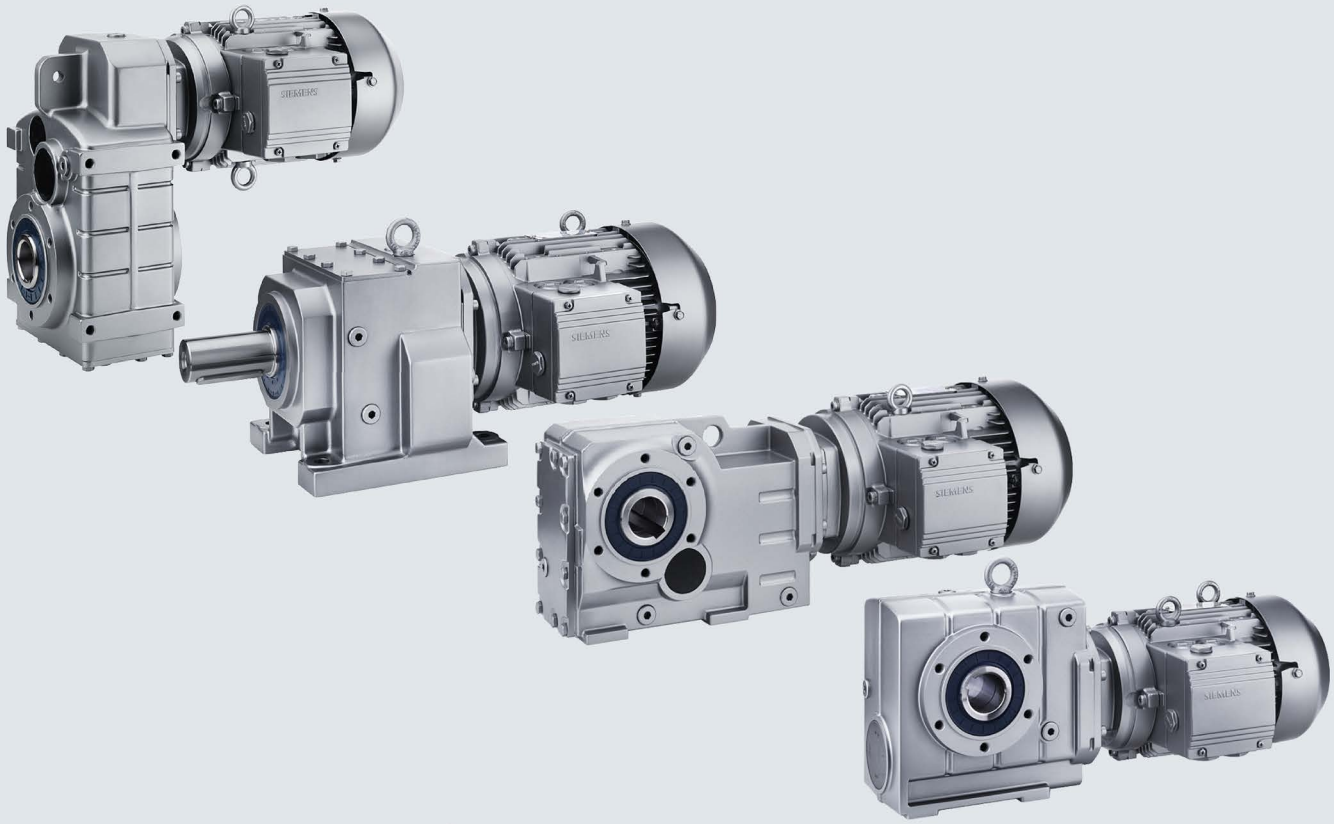
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Operating Instructions

MOTOX

Gearbox

BA 2010

Edition 02/2018

siemens.com/gearedmotors

SIEMENS

MOTOX

Gearbox
BA 2010

Operating Instructions

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02/2018
A5E38093846A/RS-AC

Legal information

Warning notice system

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

⚠ WARNING

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

Trademarks

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

Disclaimer of Liability

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

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General information and safety notes

1

1.1 General information



ATEX version gearboxes

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

Note

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

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

These operating instructions 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

The precise type designation is described in Section Type designation (Page 81).

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 special gearbox designs and the associated supplementary equipment.

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

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

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

The latest versions of the operating instructions, the declaration of incorporation and the declarations of conformity are available in electronic form in the Industry Online Support (https://support.industry.siemens.com/cs/ww/de/ps/13424/man).

You can find technical configuration data, spare parts lists and certificates of compliance on the Intranet at Once Delivered (https://c0p.siemens.com:8443/sie/1nce_delivered).

You can find the contact data of your Technical Support in the Database of contacts at Siemens AG (www.siemens.com/yourcontact).

If you have any technical questions, please contact Technical Support (https://support.industry.siemens.com/cs/ww/en/sc/2090).

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Valid operating instructions for MOTOX

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

1.2 Copyright

The copyright to these operating instructions is held by Siemens AG.

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

1.3 Intended use



ATEX version gearboxes

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

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

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

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

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

Note

The performance data assumes an ambient temperature of -20° C to +40° C and an installation altitude of up to 2000 m above sea level.

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

The gearboxes are designed only for the area of application described in Section Technical data (Page 81).
Do not operate the gearboxes outside the specified performance limits.
Any different operating conditions require new contractual agreements.

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

1.4 Obligations of the user

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

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

Note the following safety information:

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

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

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

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

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

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

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

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

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

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

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

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

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

Observe the permissible tightening torque of the fastening bolts.

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

Siemens AG accepts the warranty only for original spare parts.

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

1.5 The five safety rules

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

Five safety rules

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

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

1.6 Particular types of hazards

⚠ WARNING

Extreme surface temperatures

Hot surfaces over +55 °C pose a burn risk.

Cold surfaces below 0 °C pose a risk of damage due to freezing.

Do not touch the gearbox without protection.

⚠ WARNING

Hot, escaping oil

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

⚠ WARNING

Poisonous vapors when working with solvents

Avoid breathing in vapors when working with solvents.

Ensure adequate ventilation.

⚠ WARNING

Risk of explosion when working with solvents

Ensure adequate ventilation.

Do not smoke!

⚠ WARNING

Risk of eye injury

Rotating parts can throw off small foreign particles such as sand or dust.

Wear protective eyewear!

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

Technical description

2

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.

Housing

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

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.

Lubrication

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

Shaft bearings

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

2.2 Shaft seals

The 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.

Radial shaft sealing ring

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

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.

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.

2.3 Cooling

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

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

2.4 Backstop

ATEX version gearboxes

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

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

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

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

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.

2.5 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.

2.6 Surface treatment

2.6.1 General information on surface treatment

All paint finishes are sprayed on.



ATEX version gearboxes

The gearbox is delivered complete with primer and paint finish.

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



ATEX version gearboxes

When applying conductive paint, the operator must ensure that the paint remains in a perfect state.
The paint finish must be checked at intervals of approximately 2 - 3 years.



ATEX version gearboxes

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 that can generate charges:

- Fast air with high dust content directed past the gearbox
- Sudden escape of compressed gases that contain particles
- Harsh abrasive processes (this does not mean manual cleaning / wiping with cleaning cloths)

⚠WARNING

Danger due to electrostatic discharge

For paint finishes in explosion group III, the paint can be electrostatically charged as a result of intensive dust turbulence or processes with high levels of electrostatic charging.

Risk of explosion as a result of processes with high levels of electrostatic charging

Minimize the risk of electrostatic charging by applying effective measures according to IEC 60079-32-1.

NOTICE

Failure of the external protection

If the paint finish is damaged, the geared motor may corrode.

Do not damage the paint finish.

Note

Information about the ability to be repainted does not guarantee the quality of the paint product supplied by your supplier.

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

2.6.2 Painted version

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

Table 2- 2 Paint according to corrosiveness categories

Paint system	Description
Corrosiveness category C1, unpainted for gearbox and motor housings made of aluminum	
-	• Indoor installation • Heated buildings with neutral atmospheres • Resistance to greases and some resistance to mineral oils, aliphatic solvents • Standard

Paint system	Description
Corrosiveness category C1 for normal environmental stress	
1-component hydro paint, top coat	• Indoor installation • Heated buildings with neutral atmospheres • Resistance to greases and some resistance to mineral oils, aliphatic solvents • Standard paint for gearbox housings made of cast iron
Corrosiveness category C2 for low environmental stress	
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 for medium environmental stress	
2-component epoxy zinc phosphate 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 for high environmental stress	
2-component epoxy zinc phosphate base coat, 2-component polyurethane top coat	• Indoor and outdoor installation • Chemical plants, swimming pools, wastewater treatment plants, electroplating shops, and boathouses above seawater • Industrial areas and coastal areas with moderate salt levels • Resistance to greases, mineral oils, aliphatic solvents, sulfuric acid (10 %), caustic soda (10 %)
Corrosiveness category C5 for very high environmental stress	
2-component epoxy zinc phosphate base coat, 2-component polyurethane intermediate coat, 2-component polyurethane top coat	• Indoor and outdoor installation • Buildings and areas with almost constant condensation and high contamination, e.g. malt factories and aseptic areas • Industrial areas with high humidity and aggressive atmosphere, coastal areas and offshore environments with high salt levels • Resistance to greases, mineral oils, aliphatic solvents, sulfuric acid (10 %), caustic soda (20 %)

In case of corrosiveness category C1, overpainting with a 1-component hydrosystem after prior rubbing down is possible.

In case of corrosiveness categories C2 to C5, overpainting with 2-component polyurethane paint, 2-component epoxide paint and 2-component acrylic paint after prior rubbing down is possible.

2.6.3 Primed version

Table 2- 3 Primer according to corrosiveness category

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

Incoming goods, transport, and storage 3

3.1 Incoming goods

NOTICE
Transport damage impairs correct functioning
Do not commission faulty gearboxes or geared motors.

Note

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

Note

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

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

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

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

The products supplied are listed in the dispatch papers.

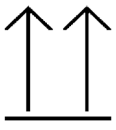
3.2 Transport

3.2.1 General information on transport

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

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

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


This way up


Center of gravity


Fragile


Do not use hand hook


Keep dry


Attach here


Keep cool

3.2.2 Fastening for suspended transport

⚠WARNING

Inadequately secured gearbox or geared motors

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.

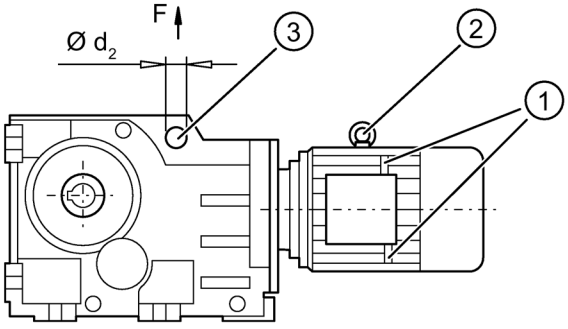
If necessary, use additional, suitable lifting accessories for transport or during installation.

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

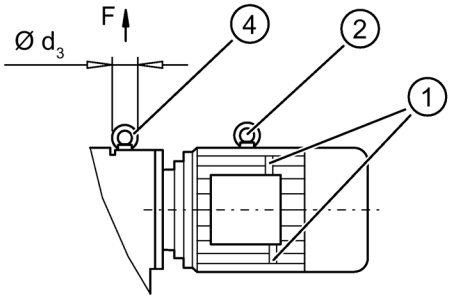
NOTICE

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

⚠ WARNING
Danger of serious injuries caused by falling objects
Danger of damage to the gearbox when stacked
Do not stack gearboxes or geared motors on each other.

NOTICE
Failure of the external protection
Mechanical damage, chemical damage and thermal damage, such as scratches, acids, alkalis, sparks, welding beads and heat cause corrosion.
Do not damage the paint finish.

Unless contractually agreed otherwise, the guarantee period for the standard preservative lasts 6 months from the date of delivery.

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

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

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

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

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

3.3.2.1 General notes for storage up to 36 months

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

If such premises are not available, pack the gearbox or the geared motor in plastic film or air-tight sealed film and materials. The films and materials must be able to accept moisture. Cover them to provide protection against heat, direct sunlight and rain.

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

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

3.3.2.2 Gearbox filled with operating oil and anti-corrosive agent

NOTICE
Damage to the gearbox caused by incorrect oil quantities
Check the oil level before commissioning.
Observe the information and procedures for Checking the oil level (Page 59).

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

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

3.3.2.3 Gearbox completely filled with oil

NOTICE
Damage to the gearbox caused by incorrect oil quantities
Prior to commissioning, remove excessive oil until it has the correct oil level.
Observe the information and procedures for Correcting the oil level (Page 59).

When biodegradable oils or oils for the food-processing sector are used, the gearbox is filled completely with operating oil. The gearbox is closed air-tight with a sealing plug or a pressure venting with transport fixture.

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

Installation 4

4.1 Unpacking

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

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

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

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. The information on grounding and equipotential bonding provided by the motor supplier must be observed.

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

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

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

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

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

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

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

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

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

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

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

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

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

4.3 Thread sizes and tightening torques for fastening bolts

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

Table 4- 1 Tightening torques for fastening bolts

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

4.4 Fastening in the case of high shock loads

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

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

4.5 Gearbox with foot mounting

NOTICE
Impermissible housing loadings when unevenness present
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 as of 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 structure on which the gearbox is to be mounted must be torsionally rigid. It must be dimensioned according to the weight and torque, taking into account the forces acting on the gearbox. If the substructure is too weak, it will cause radial or axial displacement during operation that cannot be measured at a standstill.

If the gearbox is fastened to a concrete foundation, use foundation blocks for the appropriate recesses.

Align and grout the slide rails into the foundation.

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

Prevent displacement from external forces due to lateral impacts.

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

4.6 Gearboxes in foot or flange version

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

To prevent strains on the housing, fasten the gearbox only on the flange or the foot fastening for force and torque transmission. Refer to Gearbox with foot mounting (Page 30).

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

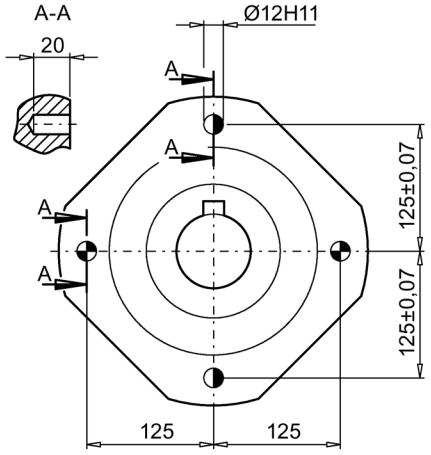
In the case of sizes 108 to 188, the customer's interface can be pinned on the C-type housing flange. The output flange has been designed to ensure the reliable transmission of the permissible torque and radial force by the bolt connections.

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

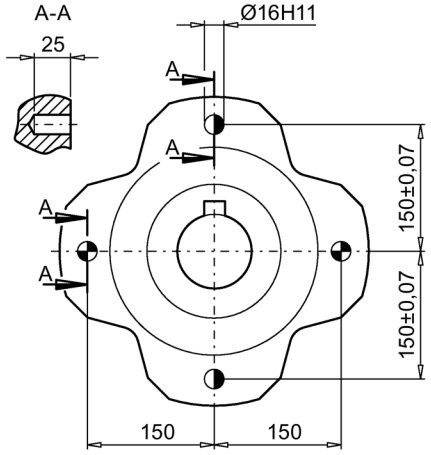
The gearboxes can also be drilled and pinned together with the machine. Compliance with the listed dimensions is mandatory in this case.

NOTICE
Observe the maximum drilling depth (A-A)

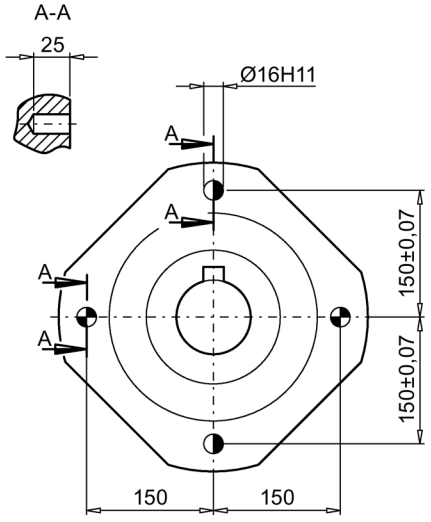
EZ128, DZ/ZZ108



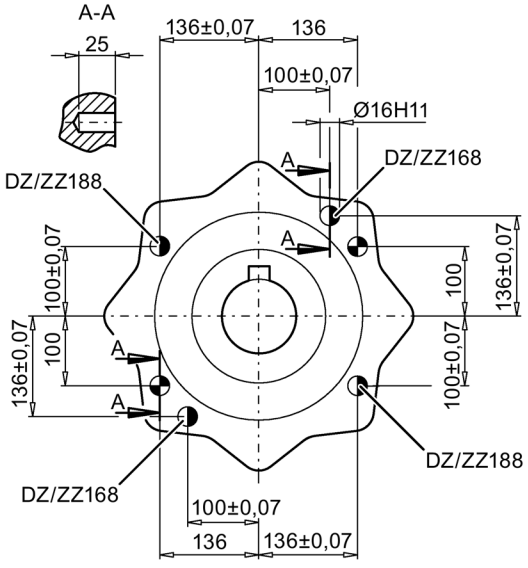
EZ148, DZ/ZZ128



DZ/ZZ148



DZ/ZZ168, DZ/ZZ188



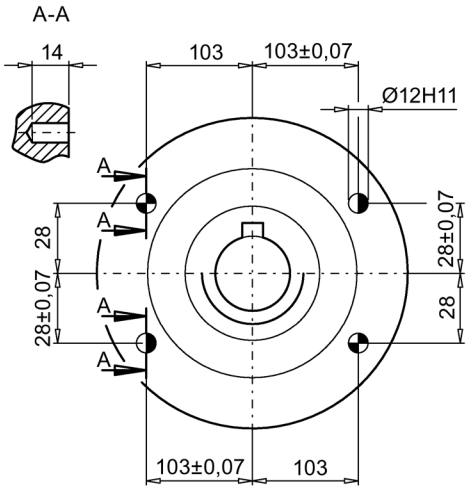
◑ Spring pin, heavy-duty design, to DIN 1481:
Use pin holes provided in the housing flange.

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

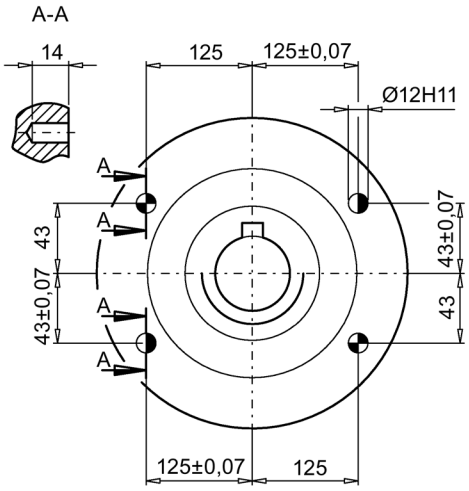
Figure 4-1 C-type case flange helical gearbox

NOTICE
Observe the maximum drilling depth (A-A)

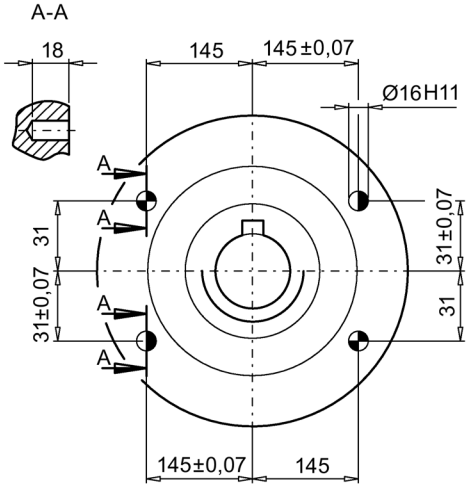
F.Z.108B, K.Z.108



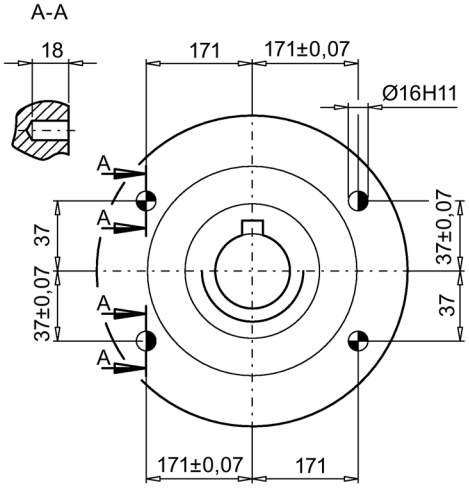
F.Z.128B, K.Z.128



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



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



◑ Spring pin, 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 an input or output element on the gearbox shaft

⚠WARNING

Risk of burns caused by hot parts

Do not touch the gearbox without protection.

NOTICE

Damage to shaft sealing rings caused by solvent

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

NOTICE

Damage to shaft sealing rings caused by heating

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

NOTICE

Premature wear or material damage due to misalignment

Misalignment caused by excessive angular or axis displacement to the connecting shaft ends.

Ensure precise alignment of the individual components.

NOTICE

Damage caused by improper handling

Bearings, housing, shaft and locking rings are damaged due to improper handling.

Do not use impacts or knocks to force the input and output elements to be mounted onto the shaft.

Note

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

Recommendation: 0.2 x 45°

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

Use the center holes in the shaft end faces.

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

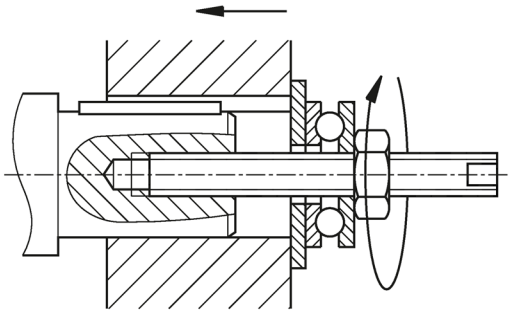
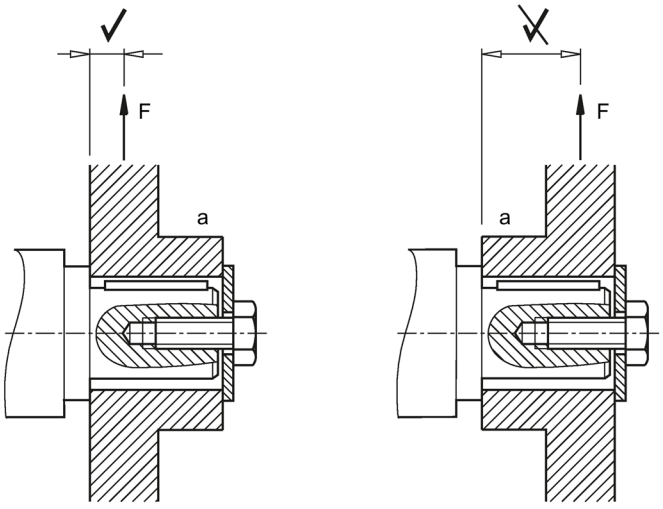


Figure 4-3 Example of a fitting device

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

Correct Incorrect



a Hub
F Force

Figure 4-4 Mounting arrangement for low stress on shafts and bearings

Procedure

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

You have now fitted the input or output element.

4.9 Removing and installing the protection cover

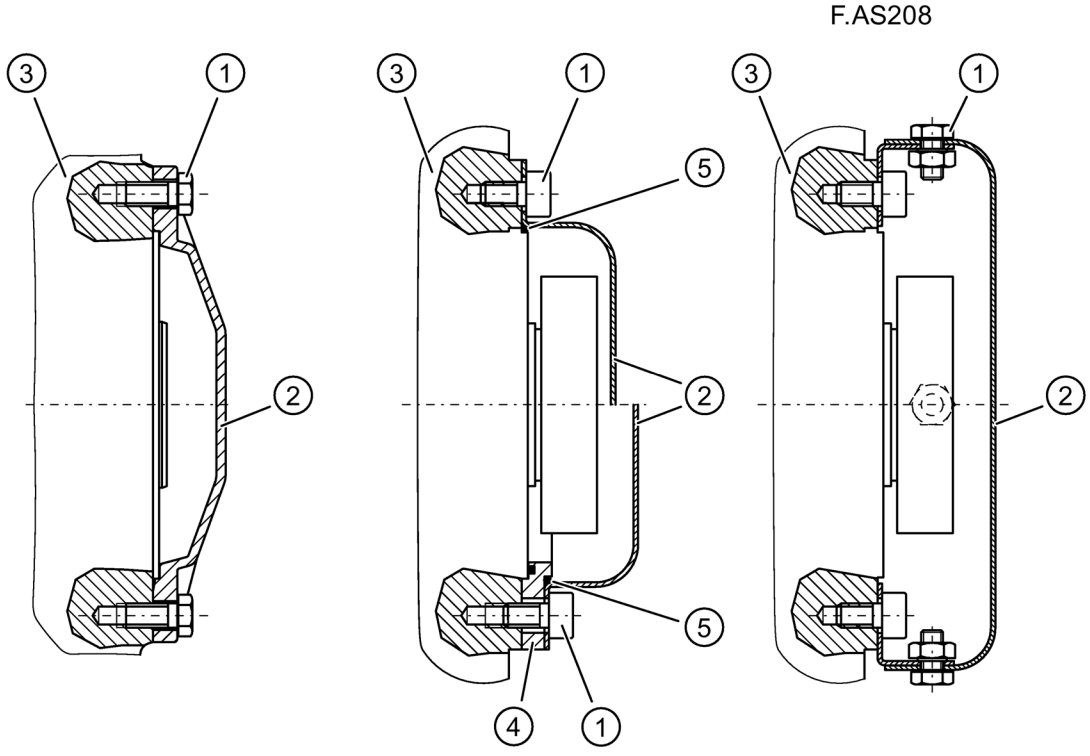
ATEX version gearbox with shrink disk

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



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 contact 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

NOTICE
Damage to shaft sealing rings caused by solvent Avoid any contact of solvent or benzine with the shaft sealing rings.

NOTICE
Subjecting stress to the hollow shaft causes bearing failure Skewing or stressing the hollow shaft increases the loading. This can cause bearing failure. The hollow shaft must be flush with the machine shaft to avoid misalignment. Do not subject the hollow shaft to axial and radial stress.

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

Note

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

Note

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

4.10.2 Removing and installing the hollow shaft

4.10.2.1 Mounting the hollow shaft

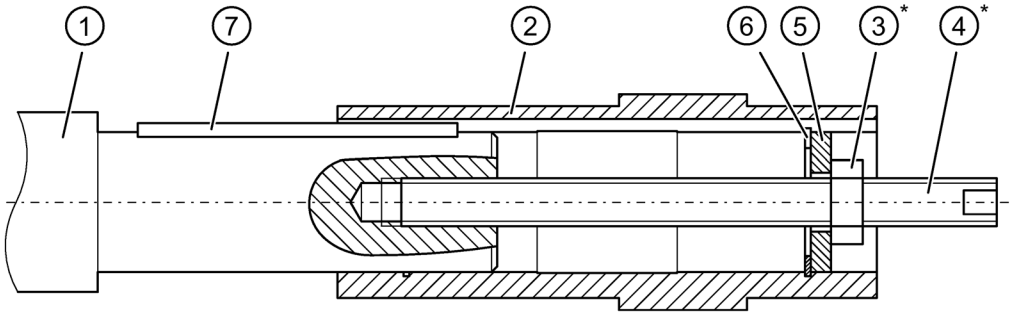


Figure 4-6 Installing the hollow shaft with parallel key

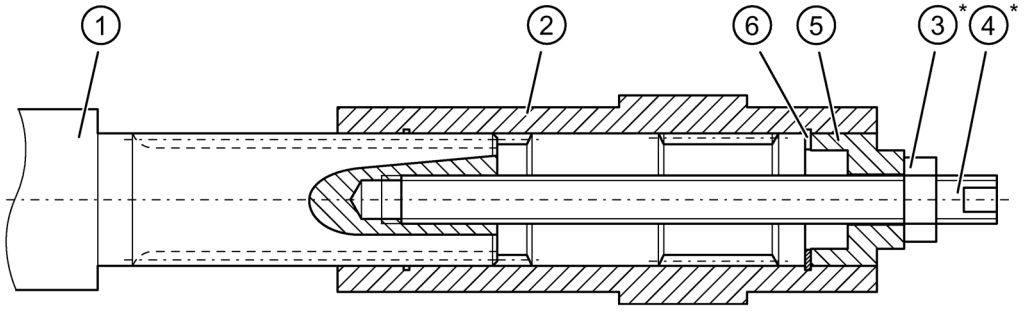
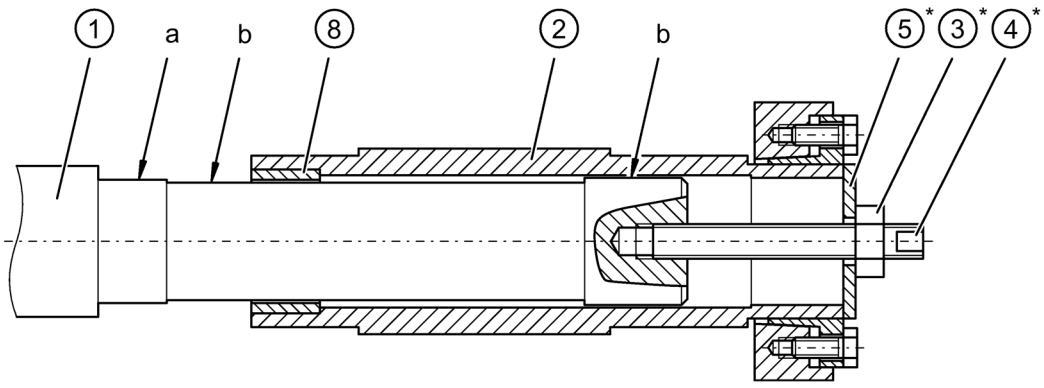


Figure 4-7 Installing the hollow shaft with splines



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

WARNING

Inadequately secured gearboxes or geared motors can break loose

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.

NOTICE

Subjecting stress to the hollow shaft causes bearing failure

It is essential to prevent misalignment when removing the unit.

NOTICE

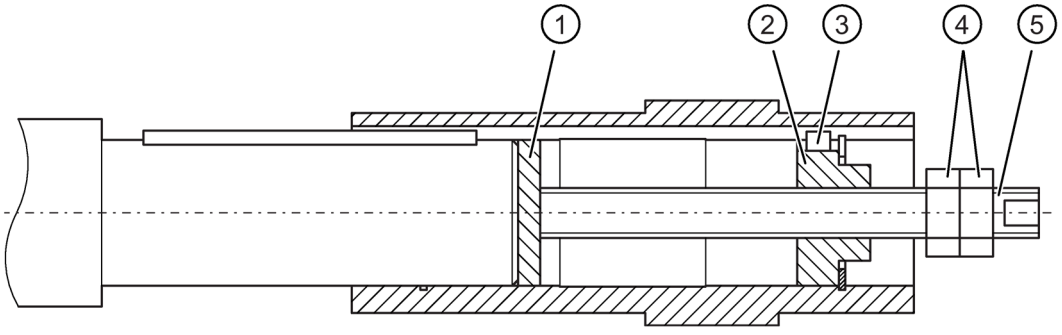
Excessive forces during removal

Excessive forces can occur during removal of the hollow shaft via the housing.

Stresses in the hollow shaft can lead to bearing failure and damage to the gearbox housing.

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

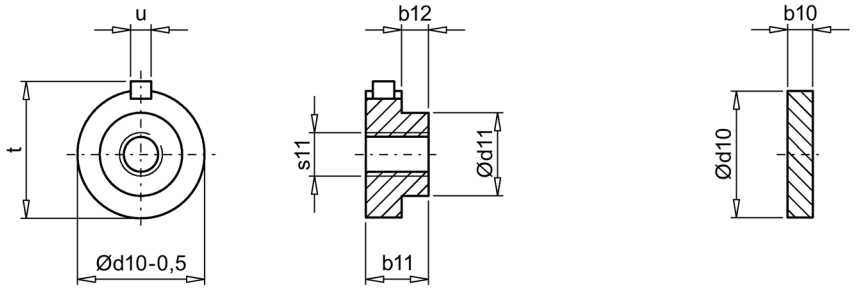
Items ① to ⑤ are not included in the scope of supply.

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

⚠ WARNING

Risk of injury due to freely rotating parts

Fit a cover cap or protection cover.

NOTICE

Lubricants in the shrink disk seat impair torque transmission

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

Do not use impure solvents and soiled cleaning cloths.

NOTICE

Plastic deformation of the hollow shaft caused by tightening the tightening bolts

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

First fit machine shaft. Then tighten the tightening bolts.

NOTICE

Avoid overloading the individual bolts

Do not exceed the maximum tightening torque for tightening bolt.

Size 28:
Tighten tightening bolts ③.

Sizes 38 - 208:
What is of prime importance is that the end faces of the outer ring ① and inner ring ② are flush with one another. If they are not flush with one another when tensioning, check the tolerance of the insert shaft.

Note

The shrink disk is delivered ready for installation.

Do not dismantle the shrink disk before initial fitting.

Note

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

- Yield point Re ≥ 360 N/mm²
- Modulus of elasticity: approx. 206 kN/mm²
- No face end thread in the machine shaft because it would reduce the transferred torque

Note

The shrink-fitted disc connection fastens the hollow shaft axially on the machine shaft.

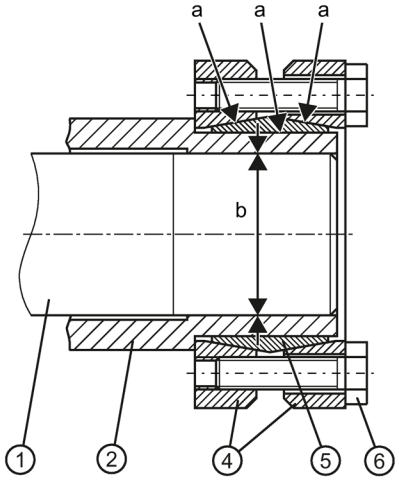
Note

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

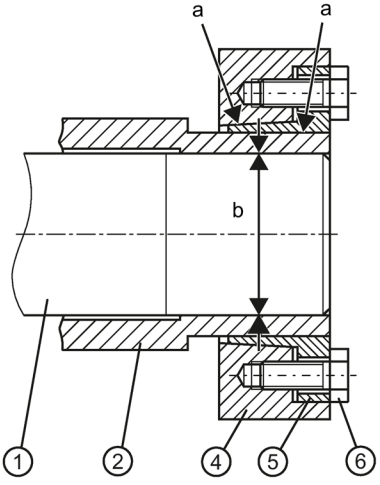
Note

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

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 ¼ turn each time (not crosswise).
3. Attach the rubber cover or protection cover included in the scope of delivery, see Removing and installing the protection cover (Page 36).

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, 88	M8	12.9	35
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

Procedure

1. Release the tightening bolts ③ one after the other by a ¼ turn each time using a wrench. Do not completely remove the bolts.
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 back-off threads.

You have pulled the shrink disk off the hollow shaft.

4.10.3.3 Cleaning and lubricating shrink disks

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

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

Procedure

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

Clean the shrink disk.

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 regarding torque arms

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



ATEX version gearboxes

Worn or irreparably damaged rubber elements will not function properly.

Impacts can cause sparks.

Damaged rubber elements must be replaced immediately.

NOTICE
Dangerous 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.

NOTICE
Impermissible gearbox loading caused by incorrect mounting
Do not tension torque arms when mounting.

NOTICE
Damage to the rubber elements caused by solvent
Solvents, oils, greases, and fuels damage rubber elements.
Avoid contact at all times.

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.

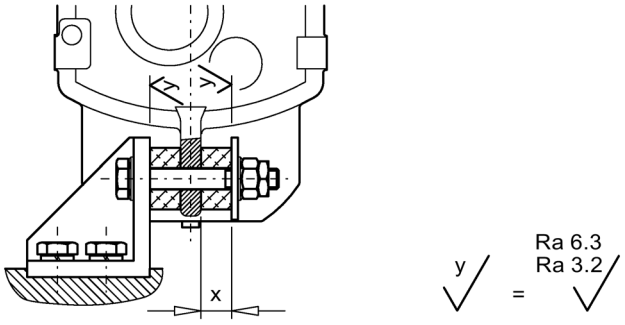


Figure 4-11 Mounting suggestion for torque arm on F.28, 38B - 188B

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

Note

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

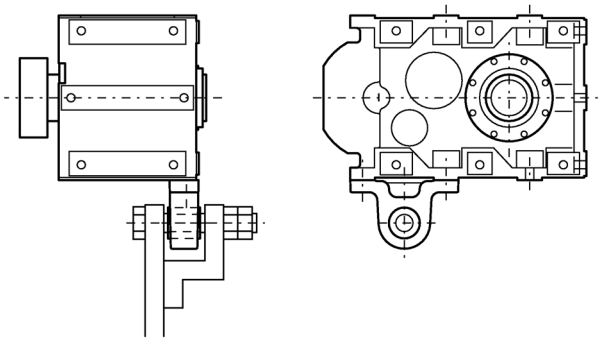


Figure 4-12 Mounting suggestion for torque arms on F.208

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

Note

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

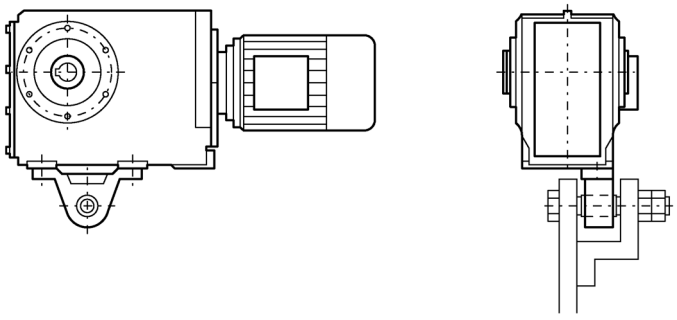


Figure 4-13 Mounting suggestion for torque arm on foot

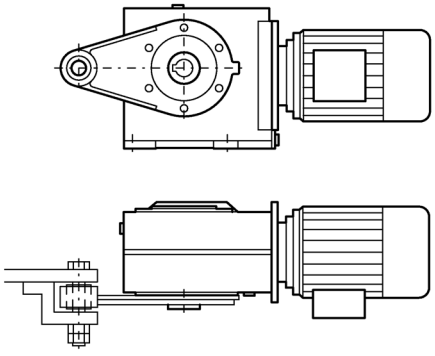


Figure 4-14 Mounting suggestion for torque arm on flange

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

Procedure

1. Clean the contact surfaces between the housing and the torque arm.
2. Tighten the 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
Unintentional starting of the drive unit
Secure the drive unit to prevent it from being started up unintentionally.
Attach a warning notice to the start switch.

⚠ WARNING
Risk of slipping on oil
Remove any oil spillage immediately with an oil-binding agent.

NOTICE
Undershooting the minimum radial force can damage the bearings
On cylindrical-roller bearings in the input unit, undershooting the minimum radial force can damage the 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. Correct the oil quantity when required. Note Checking and changing lubricants (Page 59).

Siemens AG recommends a complete oil change after a storage time longer than 24 months:

- For gearboxes with long-term preservation.
- For gearboxes supplied completely filled with oil.

Note Checking and changing lubricants (Page 59).

5.3 Vent filter

Vent filter 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 Mounting positions (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.

Pressure breather valve with securing clip

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

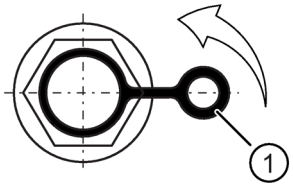


Figure 5-1 Pressure breather valve with securing clip

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

5.4 Gearbox with backstop (optional)

NOTICE
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

Malfunctions can cause personal injuries or gearbox damage

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

Determine the cause of the fault using the fault table (Page 53). Remedy faults or have faults remedied.

Check the gear unit 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 that occur during the warranty period and requiring repair work on the gearbox must be remedied only by Technical Support. If faults occur without a clearly identifiable cause, Siemens AG recommends the services of the Technical Support even after the warranty period has elapsed.

If you need the help from the Technical Support, please have the following information ready:

- Rating plate data
- Nature and extent of the fault
- Suspected cause

Table 7- 1 Faults, causes and remedies

Faults	Causes	Remedy
Unusual noise on the gearbox.	Oil level too low.	Check the oil level (Page 59).
	Foreign objects in the oil (irregular noise).	Checking the oil quality (Page 64). Cleaning the gearbox (Page 76). Change the oil (Page 59).
	Excessive bearing play and / or bearing defective.	Check the bearing and replace if necessary.
	Defective gearing.	Check the gearing and replace if necessary.
	Fastening bolts loose.	Checking tightness of fastening bolts (Page 76).
	Excessive external load on the drive input and output.	Check the load against rated data (you might need to correct the belt tension, for example).
	Transport damage.	Check the gearbox for damage in transit.
	Damage due to blockage during commissioning.	Call Technical Support.

Faults	Causes	Remedy
Unusual noise from the drive unit.	Drive unit bearing not lubricated (motor size 160 and higher).	Regrease bearing (Page 69).
	Excessive bearing play and / or bearing defective.	Check the bearing and replace if necessary.
	Fastening bolts loose.	Checking tightness of fastening bolts (Page 76).
Unusual motor noise.	Excessive bearing play and / or bearing defective.	Check the bearing and replace if necessary.
	Motor brake is rubbing.	Check air gap and adjust if necessary.
	Converter parameterization.	Correct the parameterization.
Oil escapes.	Incorrect oil level for the mounting position being used.	Check the mounting position (Page 87) and the oil level (Page 59).
	Gearbox leaks.	Checking the gearbox for leaks (Page 74).
	Overpressure due to lack of venting.	Mount the venting as appropriate for the mounting position (Page 87).
	Overpressure due to soiled venting.	Clean the venting (Page 75).
	Shaft sealing rings defective.	Replace the shaft sealing rings.
	Cover / flange bolts loose.	Checking tightness of fastening bolts (Page 76). 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 leak at the gearbox vent.	Incorrect oil level for the mounting position used and / or incorrect venting position.	Check the venting position, the mounting position (Page 87) and the oil level (Page 59).
	Frequent cold starts during which the oil foams up.	Call Technical Support.
Gearbox overheats.	Motor fan cover and / or gearbox very dirty.	Clean the fan cover and surface of the geared motor (Page 76).
	Incorrect oil level for the mounting position being used.	Check the mounting position (Page 87) and the oil level (Page 59).
	Incorrect oil being used (e.g. incorrect viscosity).	Checking the oil quality (Page 64).
	Oil is too old.	Check the date of last oil change. If required, change the oil (Page 59).
	Excessive bearing play and / or bearing defective.	Check the bearing and replace if necessary.
	Backstop not running freely.	Replace the backstop.
Output shaft does not turn when the motor is running.	Force flow interrupted by breakage in gearbox.	Call Technical Support.

Faults	Causes	Remedy
Geared motor only starts with difficulty or not at all.	Incorrect oil level for the mounting position being used.	Check the mounting position (Page 87) and the oil level (Page 59).
	Incorrect oil being used (e.g. incorrect viscosity).	Checking the oil quality (Page 64).
	Excessive external load on the drive input and output.	Check the load against rated data (you might need to correct the belt tension, for example).
	Motor brake is not released.	Check circuit / connection of brake. Check brake for wear and readjust if necessary.
	Geared motor runs against backstop.	Change the direction of motor or backstop rotation.
Excessive play at drive input and output.	Flexible elements worn (e.g. on couplings).	Replace flexible elements.
	Positive connection disrupted by overload.	Call Technical Support.
Speed and torque drop.	Belt tension too low (for belt drive).	Check the belt tension and replace belt if necessary.

Service and maintenance

8

8.1 General notes about maintenance work



ATEX version gearboxes

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

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

NOTICE
Improper maintenance Only authorized qualified personnel may perform the maintenance and servicing. Only original parts supplied by Siemens AG may be installed.

Only qualified personnel may perform the inspection, maintenance and servicing work. Note the General information and safety instructions (Page 7).

Table 8- 1 Maintenance measures

Measure	Interval	Description of work
Monitor and check the gearbox for unusual noise, vibrations and changes.	Daily; if possible, more frequently during operation.	Operation (Page 51)
Check the housing temperature.	After 3 hours, on the first day, thereafter monthly.	
Check the oil level.	After the first day, thereafter monthly.	Checking and changing lubricants (Page 59)

Measure	Interval	Description of work
Check the oil level sensor.	Regularly and after oil changes.	Checking the oil level sensor (optional) (Page 75)
Check the oil quality.	Every 6 months.	Checking the oil quality (Page 64)
First oil change after commissioning.	After approximately 10000 operating hours or at the latest after 2 years.	Checking and changing lubricants (Page 59)
Subsequent oil changes.	Every 2 years or 10000 operating hours [1].	
Visual inspection of the gearbox and shaft sealing ring for leaks.	After the first day, thereafter monthly.	Checking the gearbox for leaks (Page 74)
Clean the gearbox ventilation and replace if necessary.	Depending on the degree of pollution, at least every 6 months.	Cleaning the vent filter (Page 75)
Clean the gearbox.		Cleaning the gearbox (Page 76)
Check the friction clutch and adjust if necessary.	After 500 hours, thereafter once a year and after every blockage.	Maintenance of the friction clutch (Page 77)
Check the coupling.	For the first time after 3 months.	Please refer to the separate operating instructions.
Complete inspection of the geared motor.	Every 12 months.	Inspecting the gearbox (Page 77)
Check that fastening bolts on gearboxes and add-on elements are securely tightened. Check that covers and plugs are securely fastened.	After 3 hours, regularly thereafter.	Checking tightness of fastening bolts (Page 76)
Change the roller bearing grease.	When the oil is changed.	Change the roller bearing grease (Page 69)
Replace the bearing.	-	Replace bearings (Page 73)
Check the rubber buffers on the torque arms.	Every 6 months.	Torque arms with shaft-mounted gearboxes (Page 46)

[1] With 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 the intervals for other temperatures.

8.2 Checking and changing lubricants

8.2.1 General safety instructions

⚠ WARNING

Danger of scalding from escaping hot oil

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

⚠ WARNING

Risk of slipping on oil

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

NOTICE

Damage to the gearbox caused by incorrect oil quantities

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

After removing the oil level screw, up to and including gearbox size 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.

NOTICE

Damage to the gearbox due to open oil holes

Dirt and damaging atmosphere can penetrate through open oil holes.

Close the gearbox immediately after checking the oil level or changing the oil.

Note

Oil specifications

Refer to the rating plate for the type of oil, oil viscosity and quantity of oil required.

For oil compatibility see Recommended lubricants (Page 72).

Note

Gearbox sizes 18 and 28

Gearbox sizes 18 and 28 are lubricated for life. An oil change is not required.

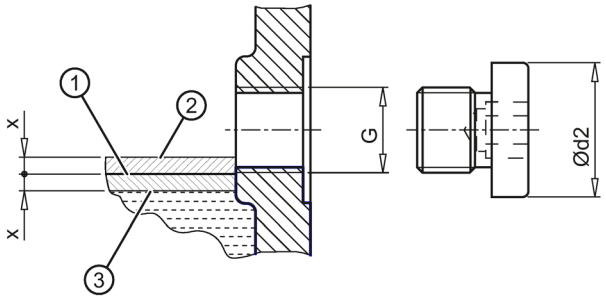
Note

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

NOTICE
The volume of gearbox oil changes with temperature If the temperature rises, the volume increases. Where temperature differences and filling quantities are significant, the volume difference 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.



① Specified oil level
② Maximum oil level
③ Minimum oil level

Figure 8-1 Oil level in the gearbox housing

Table 8- 2 Minimum and maximum fill levels x

Oil level hole	Ød2	Fill level x	Tightening torque
	[mm]	[mm]	[Nm]
G 1/8"	14	2.5	10
G 1/4"	18	3	10
G 3/8"	22	4	25
G 3/4"	32	7	50

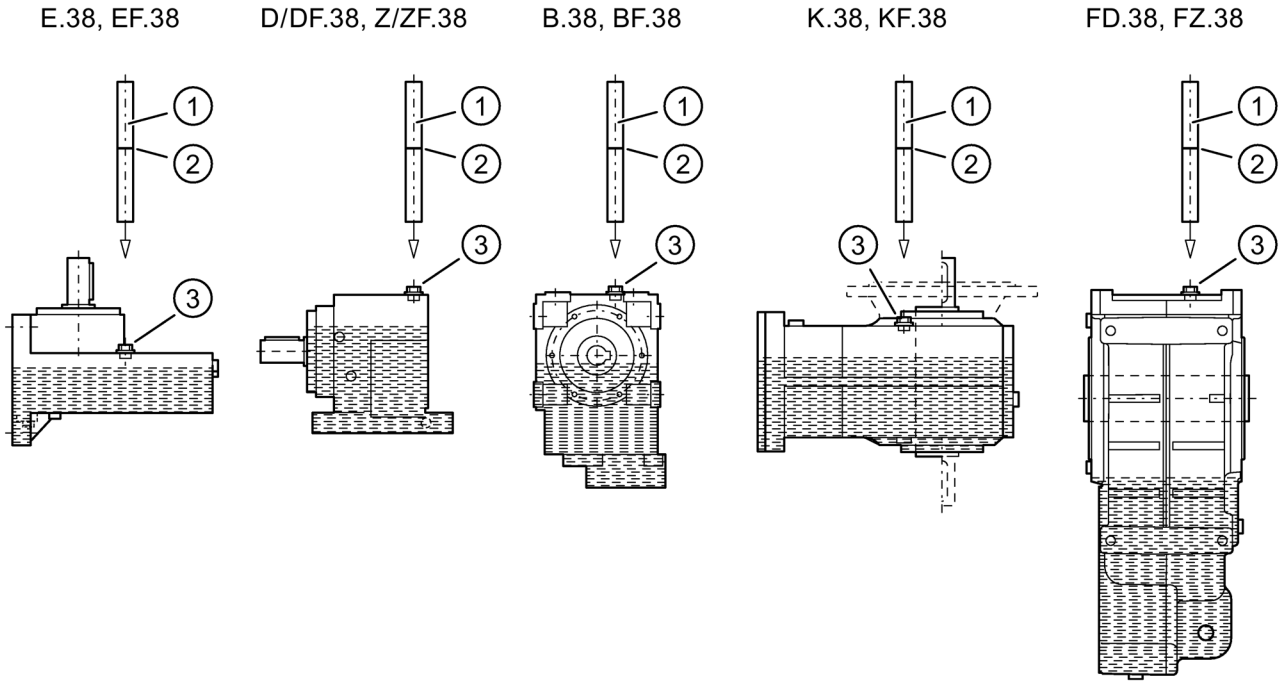
Procedure

1. Switch off the power supply to the drive unit.
2. Unscrew the oil level screw, see Mounting positions (Page 87). Oil escapes if the maximum fill level is above the plug hole.
3. Check the oil level. Observe the fill level x.
4. Top up the oil level if necessary and check it again.
5. Check the state of the sealing ring on the sealing element. If the sealing ring is damaged, replace the sealing element with a new one.
6. After checking, seal the gearbox immediately using 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 B38 and BF38 bevel helical gearboxes, there is an additional screw plug so that the oil level can be checked as described above.



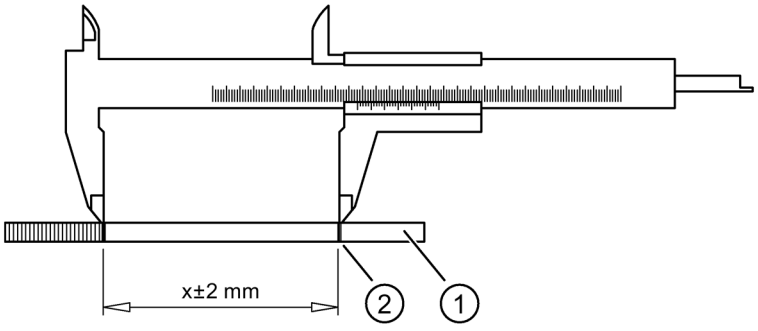
① Dipstick
② Mark
③ Screw plug

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- 3 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	

Gearbox type	Distance "x"					
	[mm]					
	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 there is an oil sight glass to check the oil level ①, the oil must be visible in the center of the sight glass when the oil is cool. When the oil is hot, the oil level ① is above the center of the sight glass. The oil level ① of cold oil is below the center of the sight glass.

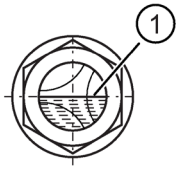


Figure 8-4 Oil level in the oil sight glass

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

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

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

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

If you are using the electric oil level monitoring system, the oil must be level with the upper 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 Mounting positions (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

NOTICE

Impermissible mixing of oils leads to damage

Impermissible mixing of oils leads to:

- Darkening
- Sediment
- Foam formation
- Change of the viscosity or reduced corrosion protection
- Wear protection.

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

NOTICE

Contaminations of the oil impair the lubricity

Do not mix the gearbox oil with other substances.

Do not flush with paraffin or other solvents, as traces of these substances will always remain inside the gearbox.

Note

The oil must be warm because insufficient viscosity caused by oil that is too cold impairs correct emptying.

If necessary, run the gearbox for 15 to 30 minutes to become warm.

8.2.6.2 Draining the oil

Observe the symbols in the type of construction diagrams, see Mounting positions (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 oil for 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

⚠ WARNING

Impermissible mixing of oils results in damage

Residual quantities of original oil can impair the specific properties of the new oil.

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

Polyglycol oil has a higher density than mineral oil. Therefore, polyglycol oil 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.

Note

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

Observe the symbols in the diagrams of the mounting positions (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. Unscrew the venting 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. Unscrew the oil drain plug. Drain all the oil into the receptacle.

7. After flushing, immediately 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

NOTICE
Mixing different oils impairs the lubricating capability
When adding oil, use the same oil type and viscosity. When changing mutually incompatible oils, see Flushing the gearbox (Page 67).

Observe the symbols in the diagrams of the mounting positions (Page 87).



Ventilation



Oil filling

Procedure

1. Remove the vent plug or oil filler screw.
2. Fill the gearbox with fresh oil. Use a filler filter with mesh of max. 25 µm.
3. Check the oil level.
4. Rectify the oil level if necessary and check it again.
5. Check the state of the sealing ring on the sealing element. If the sealing ring is damaged, replace the sealing element with a new one.
6. After filling with oil, seal the gearbox immediately using the sealing element.

You have now filled up the gearbox with oil.

8.2.7 Topping up with oil

If the mounting position of the gearbox is changed or oil lost because of leakage, check the oil level. 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: Fuchs Renolin CLP220

CLP ISO PG VG220: Fuchs Renolin PG220

CLP ISO PG VG460: Fuchs Renolin PG460

CLP ISO PAO VG68: Fuchs Renolin Unisyn CLP68

CLP ISO PAO VG220: Fuchs Renolin Unisyn XT220

CLP ISO E VG220: Fuchs Plantogear S220

CLP ISO H1 VG460: Castrol Optileb GT 1800/460

If, following agreement, the gearbox is filled at the factory with special lubricant for the special applications referred to above, the lubricant must be shown on the rating plate.

8.2.8 Change the roller bearing grease

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

Renew the grease quantify for grease-lubricated bearings with each oil change.

Clean the bearing before filling it with fresh lubricant.

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

Table 8- 4 Roller-bearing and shaft-sealing-ring grease

Fields of application	Ambient temperature	Manufacturer	Type
Standard	-40 °C to +80 °C	Klüber	Petamo GHY 133 N
Foodstuff-compatible for the food industry	-30 °C to +40 °C	Castrol	Optileb GR UF 1 NSF H1
Biologically degradable, for agriculture, forestry and water industries	-35 °C to +40 °C	BP	Biogrease EP 2

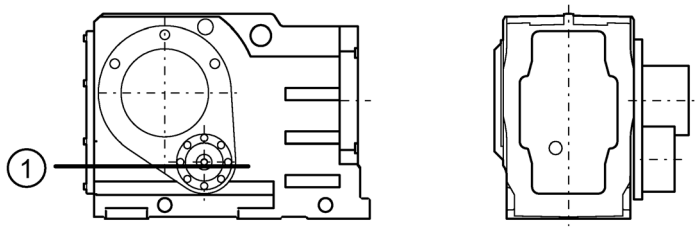
8.2.9 Changing the oil when using backstops in bevel helical gearboxes

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

Table 8- 5 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.

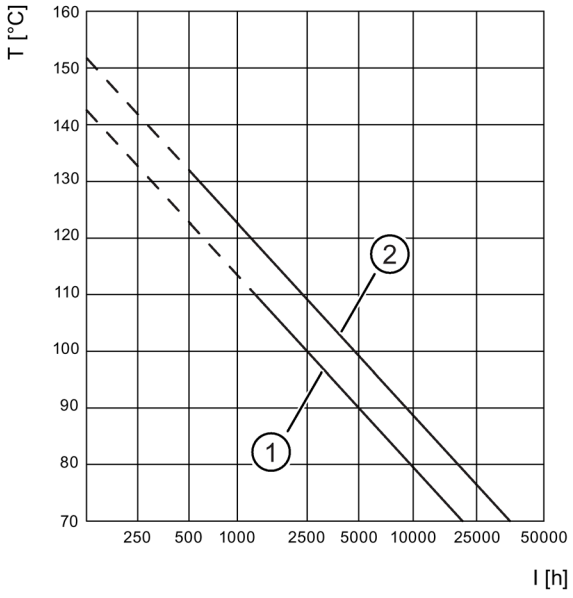
Note

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".

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

Table 8- 6 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

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

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

We recommend that the grease filling of the bearings is also changed when the oil or shaft sealing rings are replaced.

8.2.11 Recommended lubricants

The released and recommended lubricants are listed in the table NT 7300 (https://support.industry.siemens.com/cs/ww/en/view/109753864).

DANGER

Used lubricants only have conditional approval

The used lubricants are not or only conditionally approved for use in the foodstuff or pharmaceutical industry.

Use only lubricants with USDA (United States Department of Agriculture) H1 / H2 approval for deployment in the foodstuff or pharmaceutical industry.

NOTICE

Incorrect operating temperatures impair lubricity of the gearbox oil

Operating temperatures outside the permitted range impair the lubricating property of the gearbox oil.

Maximum permissible temperature for:

- Mineral oil +90 °C, for brief periods +100 °C
- Polyglycols and polyalphaolefins +100 °C, for brief periods +110 °C
- Synthetic esters +90 °C

The minimum permissible temperature for initial filling corresponds to the lowest ambient temperature specified on the rating plate.

The oil used must be approved for use in the ambient temperature range given on the rating plate.

When changing the oil, please observe the operating temperature range of the new oil as specified by the oil manufacturer.

Note

As standard, the lubricants and shaft seals are harmonized and coordinated with one another corresponding to the prevailing operating conditions.

Contact Technical Support for:

- Change of the operating conditions
- Change in oil grade
- Deployment of new shaft seals.

Note

The lubricants used are not at all or only conditionally biodegradable. If biologically degradable lubricants are required, use only gearbox lubricants with the appropriate classification listed in the NT 7300 table.

Note

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

The oil viscosity is decisive for the oil selection (ISO VG class). The viscosity is specified on the rating plate of the gearbox. The viscosity class indicated applies for the contractually agreed operating conditions.

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

If, following agreement, the gearbox is filled at the factory with special lubricant for the special applications referred to above, the lubricant is shown on the rating plate.

The oil quality must meet the gearbox lubricant requirements specified in the NT 7300 table. The Siemens warranty is otherwise null and void. We recommend the use of one of these gearbox lubricants. These gearbox oils are subject to constant testing and meet the specified requirements. It is possible that the recommended oils are removed or replaced by oils that have been further developed at a later point in time. We recommend that you regularly check as to whether the selected lubricating oil is still recommended by Siemens. Otherwise change the product.

8.3 Replace bearings

The bearing service life depends greatly on the operating conditions and so cannot be calculated 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



ATEX version gearboxes

Shaft sealing rings are subject to natural wear. The service life depends on the operating conditions.

Include the shaft sealing rings in periodic maintenance and servicing work on the system.

Note

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

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

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

Table 8- 7 Description and measures

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

8.5 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 Replacing the vent valve

To ensure correct functioning, renew the breather valve yearly.

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

If too much oil is contained in the gearbox, oil will escape from the breather valve. Correct the oil quantity and replace the breather valve.

8.7 Checking the oil level sensor (optional)

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

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

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

8.8 Cleaning the gearbox

NOTICE
Dust deposits cause higher housing temperatures
Dust deposits prevent heat radiation.
Keep the geared motor free from dirt and dust.

NOTICE
Cleaning with a high-pressure cleaning appliance
Water can penetrate into the geared motor. Seals can become damaged.
Do not use a high-pressure cleaning appliance to clean the geared motor.
Do not use tools with sharp edges.

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

8.9 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 bolts with new bolts of the same type and strength class.

Switch off the power supply to the drive unit. Check all fastening bolts for tightness using a torque wrench.

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

Table 8- 8 Tightening torques for fastening bolts

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

8.10 Inspecting the gearbox

Carry out a scheduled inspection of the gearbox once a year in accordance with the possible criteria listed in General notes about maintenance work (Page 57).

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

Touch up damaged paintwork carefully.

8.11 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

⚠ WARNING

Incorrect used oil disposal

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. Dispose of polyglycols separately.

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

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, motor parts, gear wheels, shafts and roller bearings of the geared motor as scrap metal.

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

Dispose of packaging material in accordance with regulations.

Table 9- 1 Disposal codes for gear oils

Type of oil	Designation	Disposal code
Mineral oil	CLP ISO VG220	13 02 05
Polyglycols	CLP ISO PG VG220, CLP ISO PG VG460, CLP ISO H1 VG460	13 02 08
Polyalphaolefins	CLP ISO PAO VG68, CLP ISO PAO VG220	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.

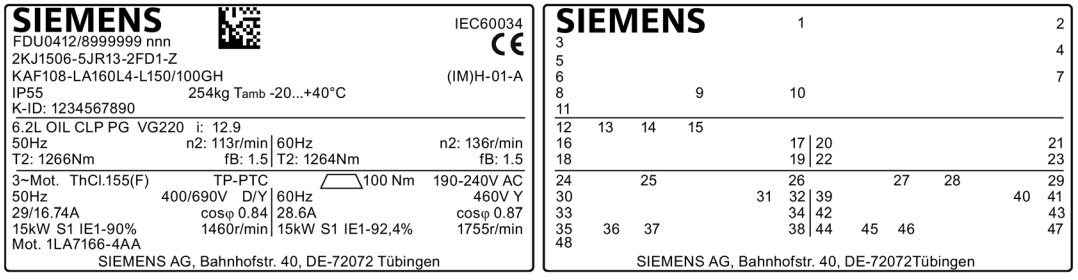


Figure 10-1 Rating plate example

1 Data matrix code
2 Applicable standard
3 Factory serial number
FDU = Siemens AG, Bahnhofstr. 40, 72072 Tübingen, Germany
4 CE marking or other marking, if required
5 Article number
6 Type designation
7 Mounting position
8 Degree of protection acc. to IEC 60034-5
9 Weight m [kg]
10 Ambient temperature
11 Customer ID
12 Oil quantity [l] main gearbox / intermediate gearbox + extruder flange
13 Type of oil
14 Oil viscosity ISO VG class to DIN 51519 / ISO 3448
15 Total transmission ratio i

Frequency 1

16 Rated frequency f [Hz]

17 Gearbox output speed n_2 [rpm]

18 Geared motor output torque T_2 [Nm]

19 Service factor f_B

Frequency 2

20 Rated frequency f [Hz]

21 Gearbox output speed n_2 [rpm]

22 Geared motor output torque T_2 [Nm]

23 Service factor f_B

Motor and brake data

24 Phase number and type of current for the motor

25 Temperature class Th.Cl.

26 Motor protection (TP)

27 Symbols (IEC 60617-2): ⏢ = brake

28 Rated braking torque T_{Br} [Nm]

29 Brake supply voltage U [V]

Frequency 1

30 Rated frequency f [Hz]

31 Rated voltage / range U [V]

32 Circuit, graphical symbols as per DIN EN 60617 Part 6 / IEC 60617-6

33 Rated current I_N [A]

34 Power factor cos φ

35 Rated output P_N [kW]

36 Duty type

37 Efficiency class marking according to IEC 60034-30

38 Rated speed n_N [rpm]

Frequency 2

39 Rated frequency f [Hz]

40 Rated voltage / range U [V]

41 Circuit, graphic symbols according to DIN EN 60617 Part 6 / IEC 60617-6

42 Rated current I_N [A]

43 Power factor cos φ

44 Rated output P_N [kW]

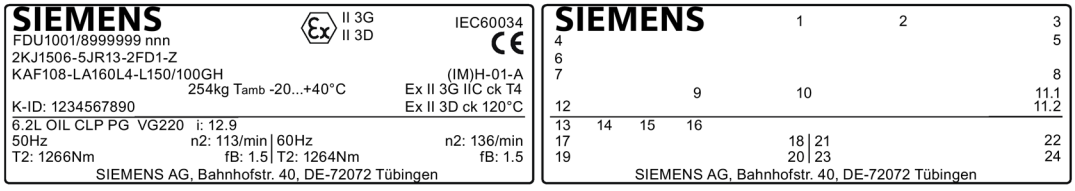
45 Duty type

46 Efficiency class marking according to IEC 60034-30

47 Rated speed n_N [rpm]

48 Motor designation

Rating plate for ATEX version gearboxes



1 Data matrix code
2 marking
3 Applied standard
4 Factory serial number
FDU = Siemens AG, Bahnhofstr. 40, 72072 Tübingen, Germany
5 CE marking or other marking, if required
6 Article number
7 Type designation
8 Mounting position
9 Weight m [kg]
10 Ambient temperature
11.1 Type of protection gas
11.2 Type of protection dust
12 Customer ID
13 Oil quantity [l] main gearbox / intermediate gearbox + extruder flange
14 Oil type
15 Oil viscosity ISO VG class according to DIN 51519 / ISO 3448
16 Total transmission ratio i

Frequency 1

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

Frequency 2

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

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 product in the delivery state.

10.4 Sound energy 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.

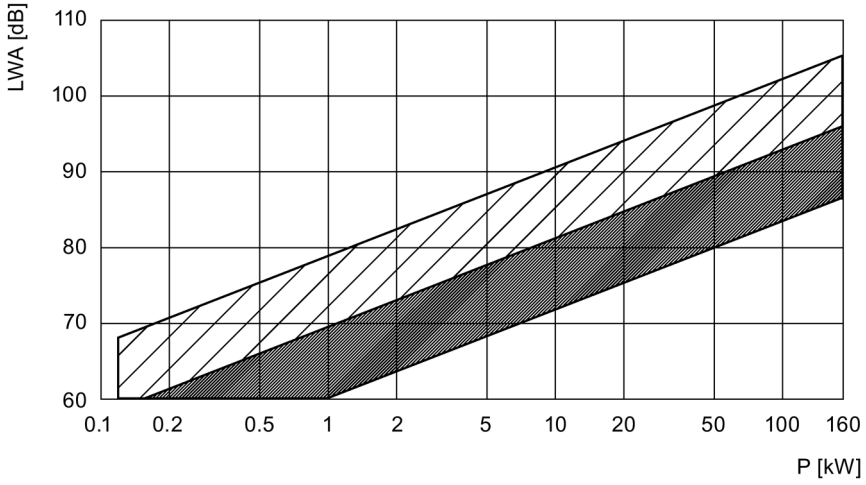


Figure 10-3 Sound energy level MOTOX geared motors

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 Siemens AG 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 Mounting positions

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

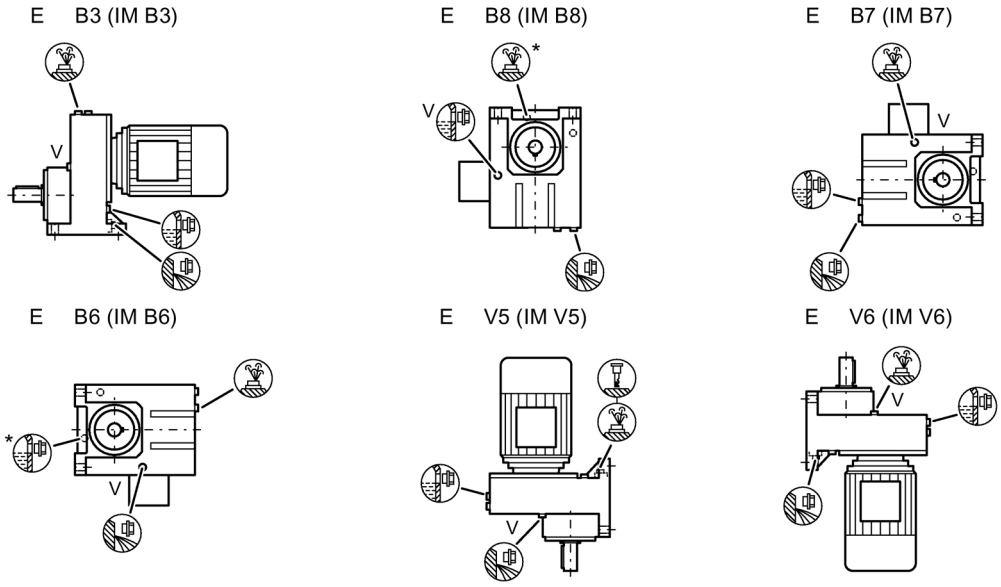


Figure 10-4 Type of construction options for E sizes 38 - 148

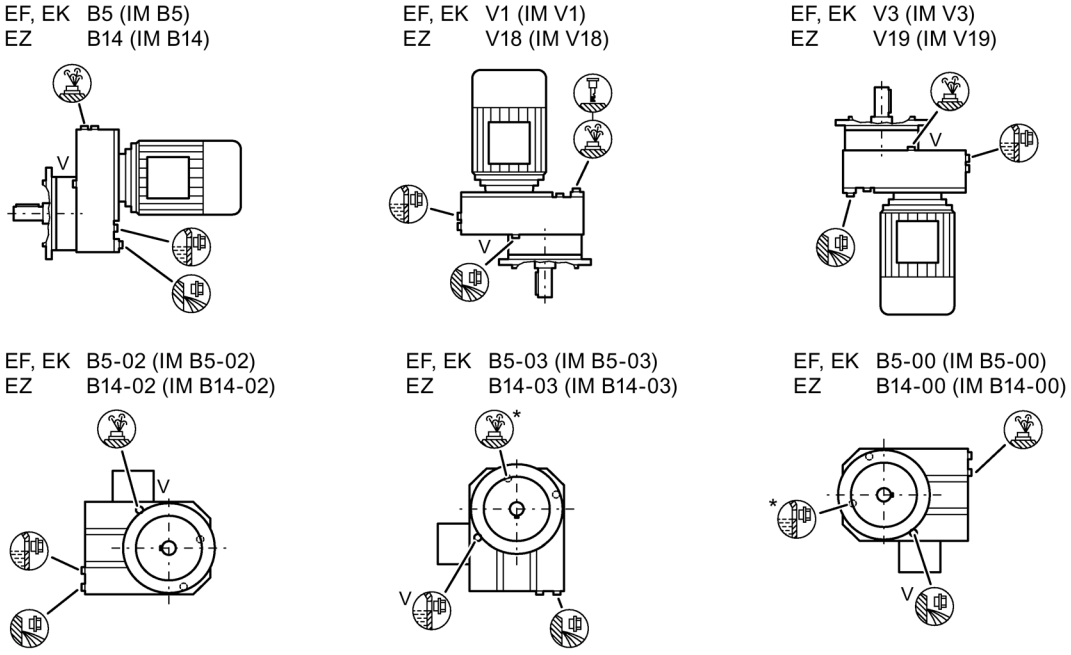


Figure 10-5 Type of construction options for E. sizes 38 - 148

10.5.2 Two- and three-stage helical gearboxes

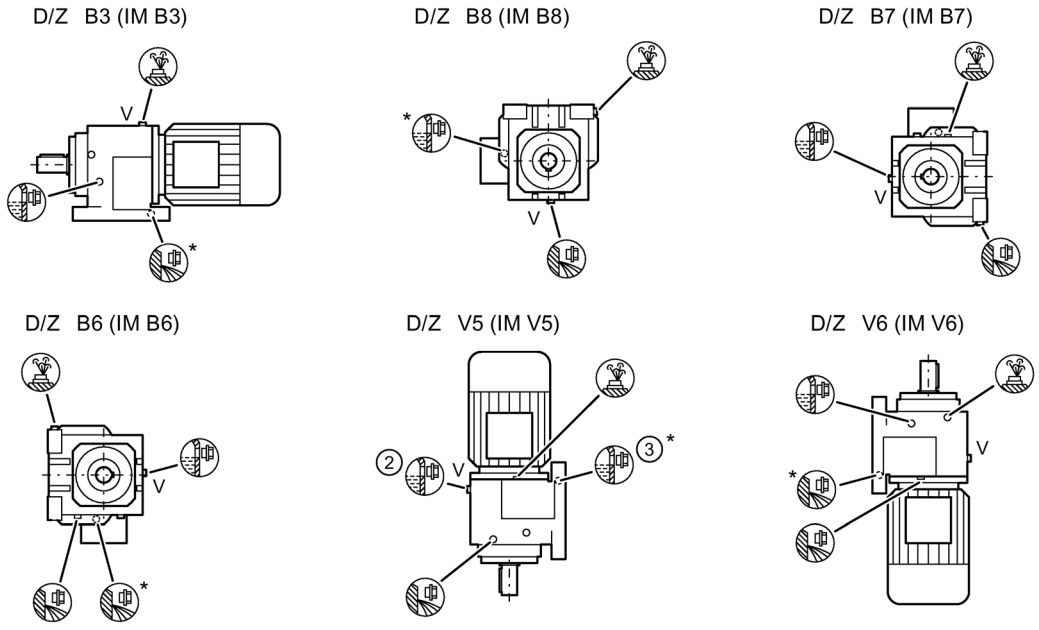


Figure 10-6 Type of construction options for D/Z sizes 18 - 88

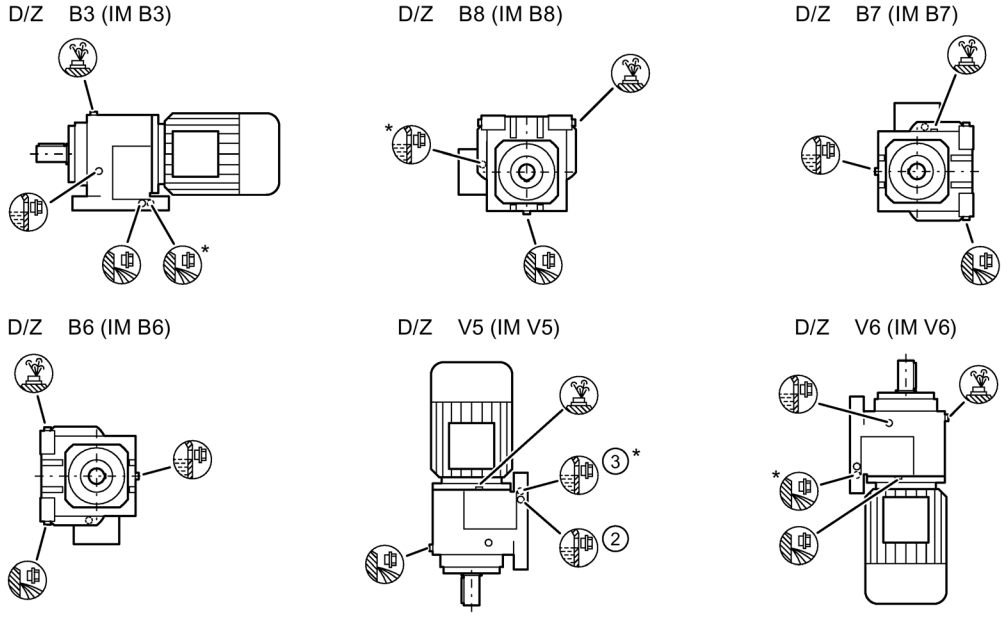


Figure 10-7 Type of construction options for D/Z sizes 108 - 168

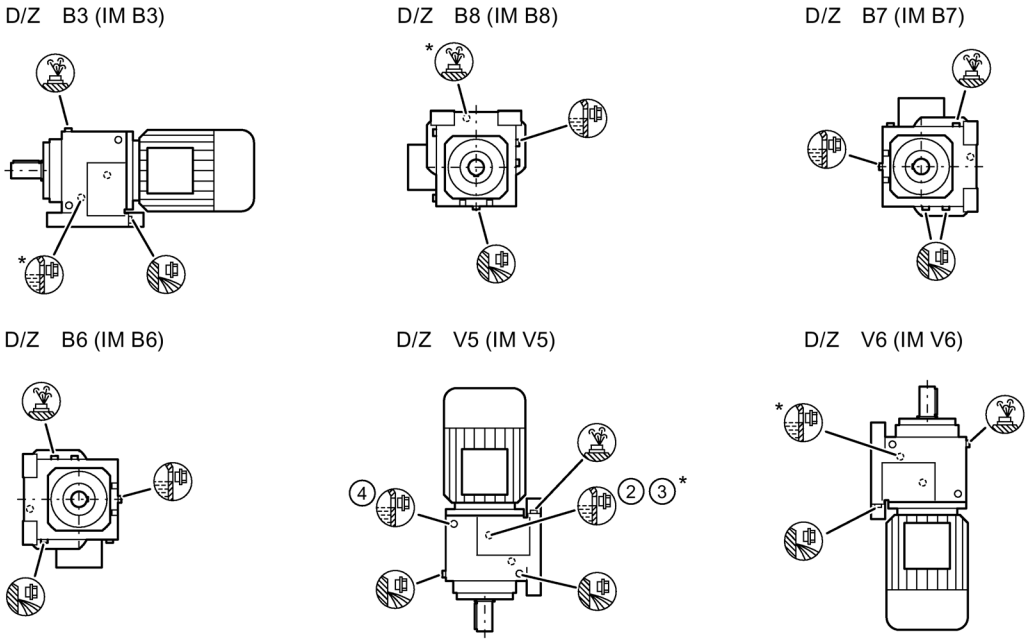


Figure 10-8 Type of construction options for D/Z188

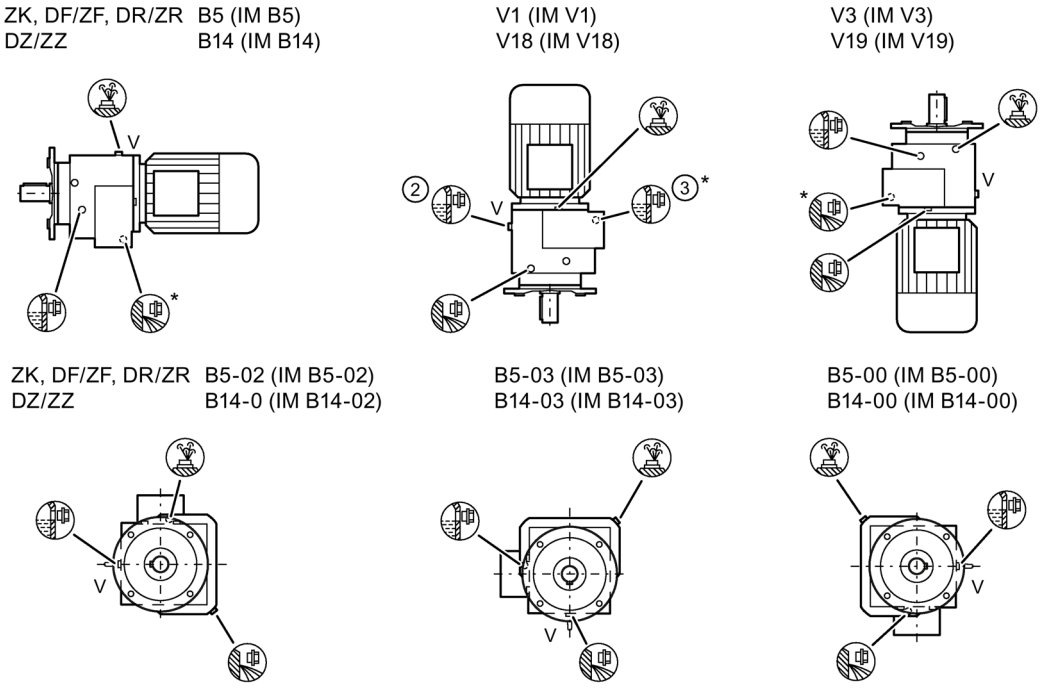


Figure 10-9 Type of construction options for DF/ZF, DZ/ZZ sizes 18 - 88, DR/ZR sizes 68 - 88

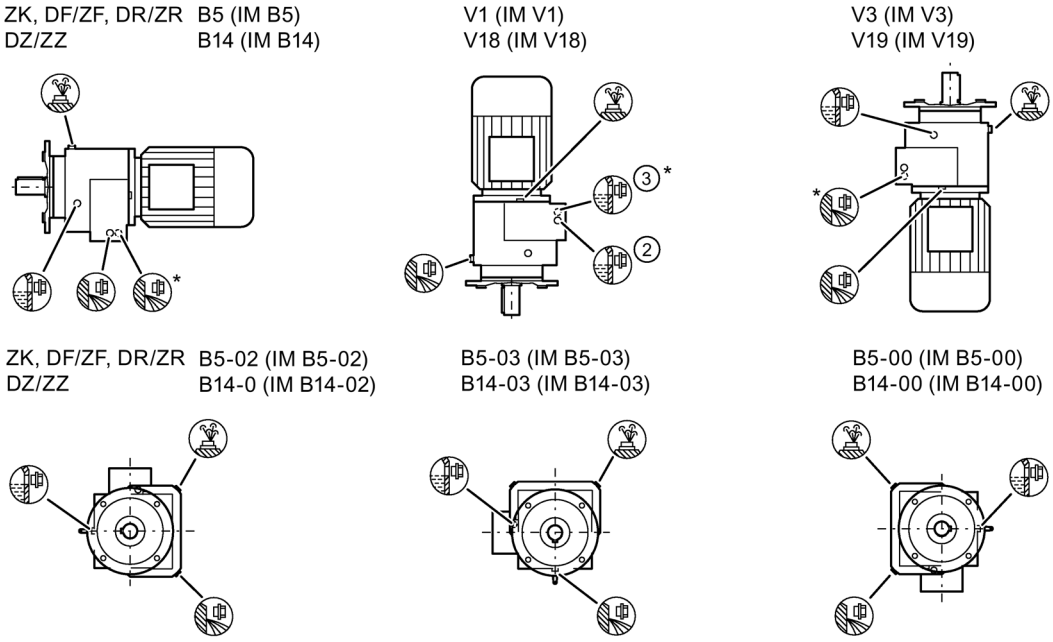


Figure 10-10 Type of construction options for D./Z. sizes 108 - 168

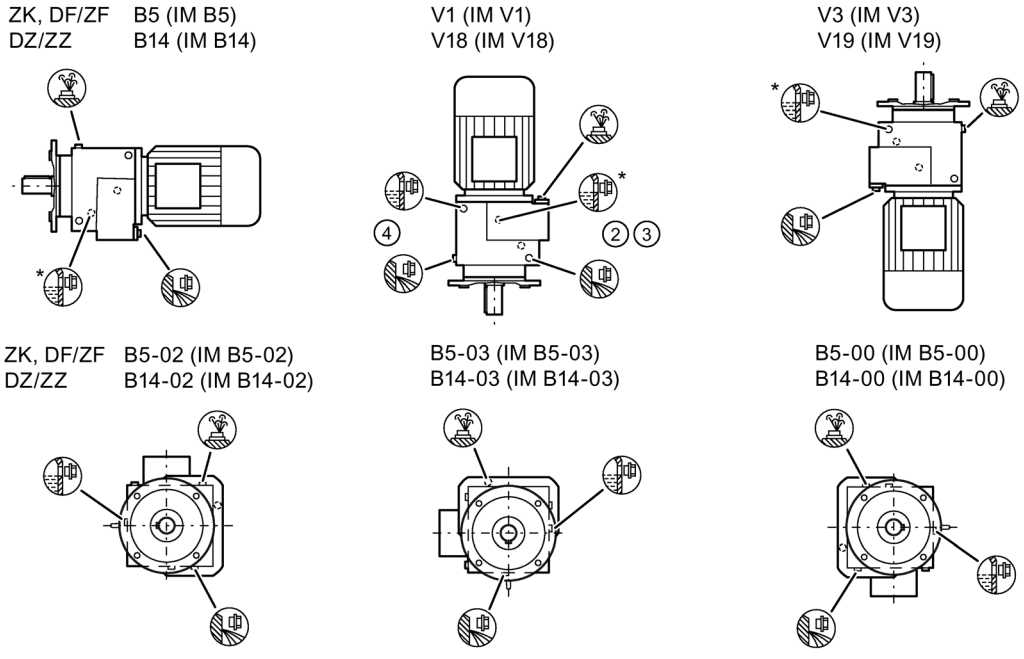


Figure 10-11 Type of construction options for D./Z.188

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.

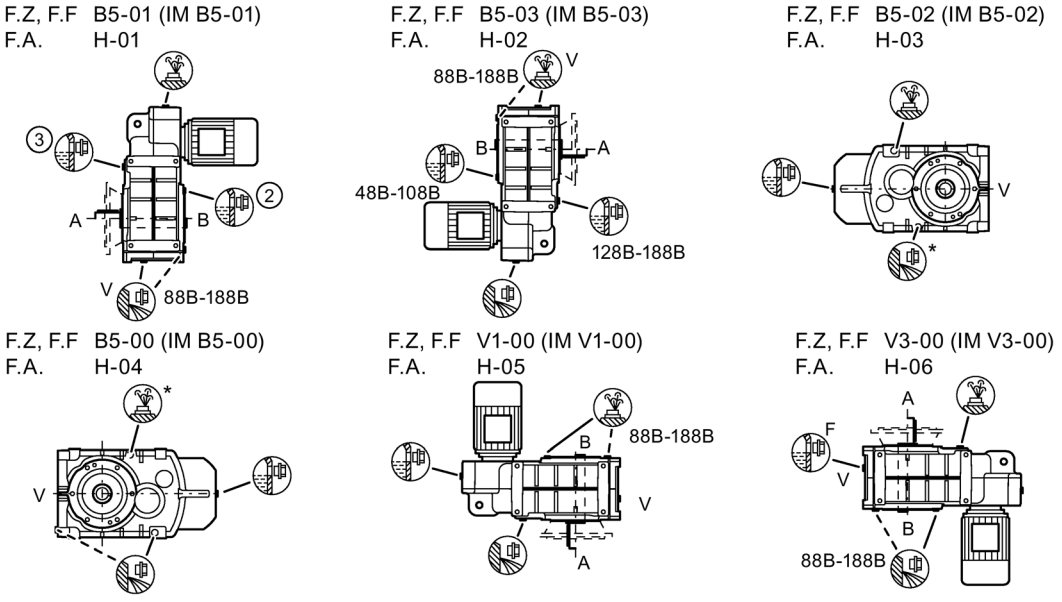


Figure 10-12 Type of construction options for F.28, F. sizes 38B - 188B

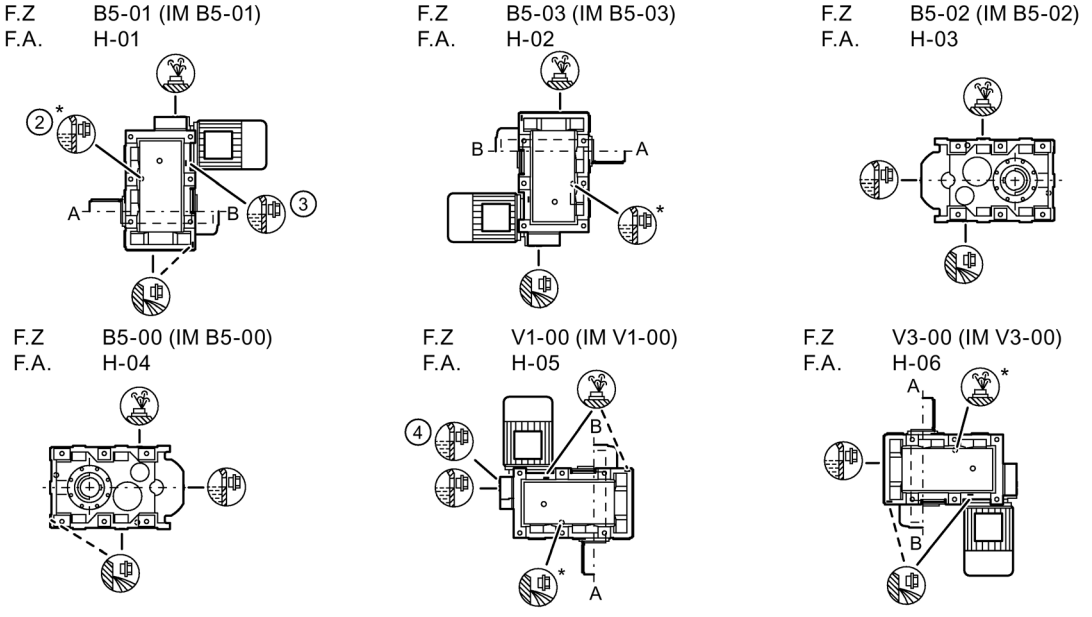


Figure 10-13 Type of construction options for F.208

10.5.4 Bevel helical gearboxes

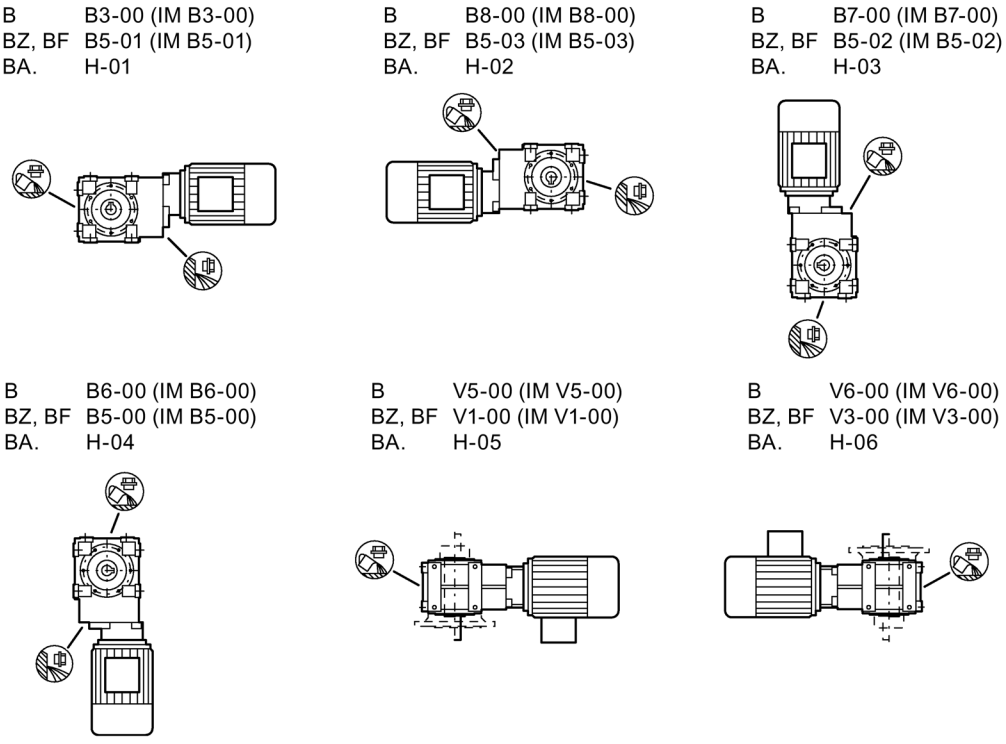


Figure 10-14 Type of construction options for B. sizes 28 - 38 without additional screw plug

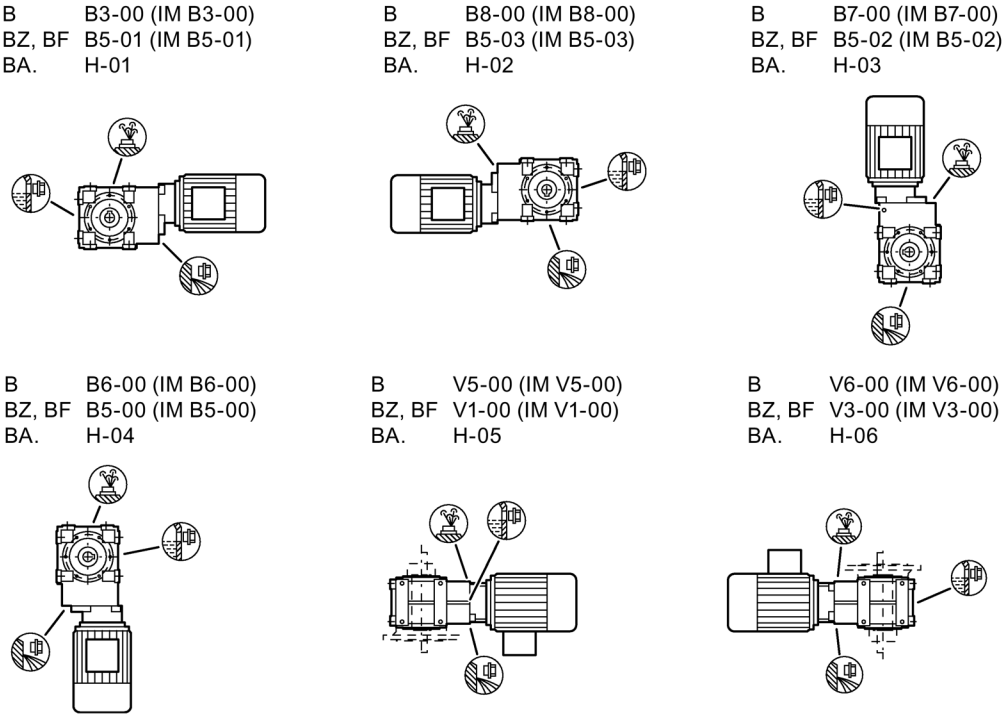


Figure 10-15 Type of construction options for B.38 with additional screw plug

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

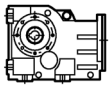
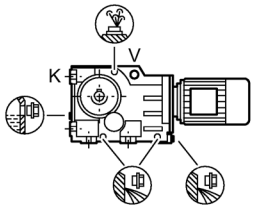


Figure 10-16 Image of foot- / flange-mounted housing K.188

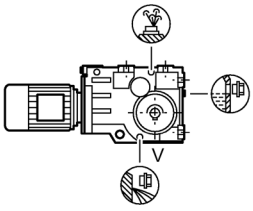
Note

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

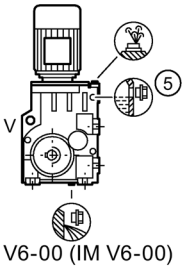
K B3-00 (IM B3-00)
KA. H-01



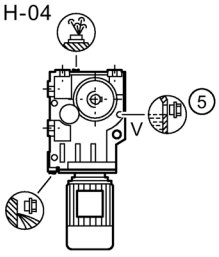
K B8-00 (IM B8-00)
KA. H-02



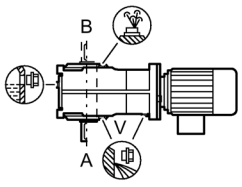
K B7-00 (IM B7-00)
KA. H-03



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

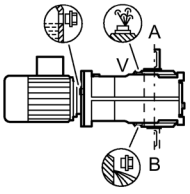
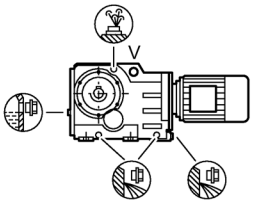
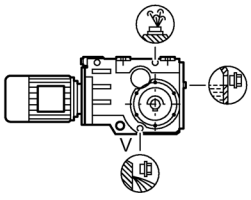


Figure 10-17 Type of construction options for K, KA, KAS, KAT sizes 38 - 188

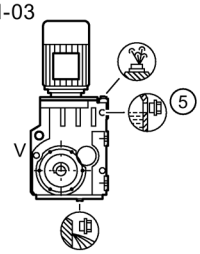
K. B5-01 (IM B5-01)
KA. H-01



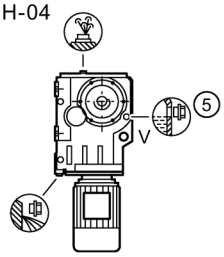
K. B5-03 (IM B5-03)
KA. H-02



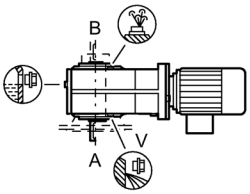
K. B5-02 (IM B5-02)
KA. H-03



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

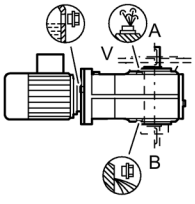


Figure 10-18 Type of construction options for KZ, KF, KM, KAD, KAZ, KAF, KAM, KADS, KAZS, KAFS, KADT, KAZT, KAFT sizes 38 - 188

10.5.5 Helical worm gearboxes

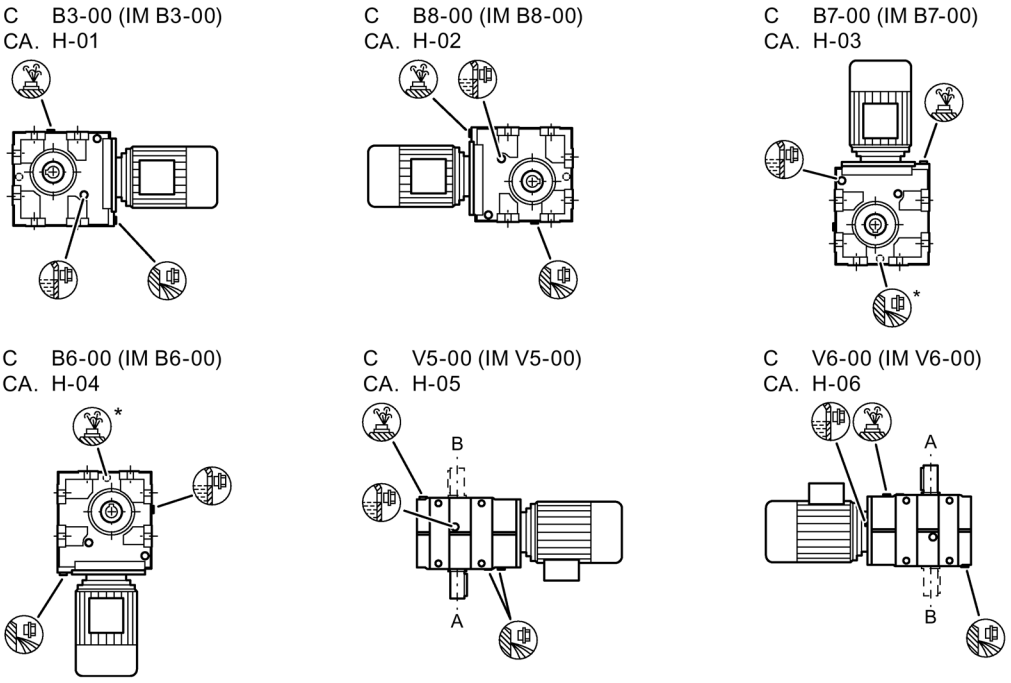


Figure 10-19 Type of construction options for C, CA, CAS, CAT sizes 28 - 88

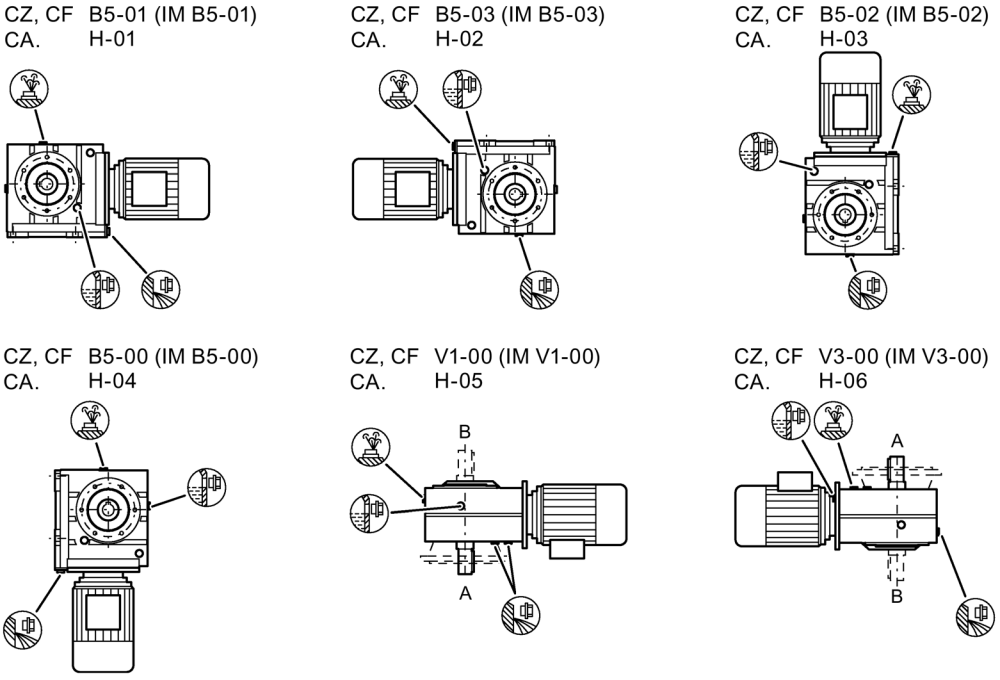


Figure 10-20 Type of construction options for CZ, CF, CAD, CAF, CAZ, CADS, CAFS, CAZS, CADT, CAFT, CAZT sizes 28 - 88

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.

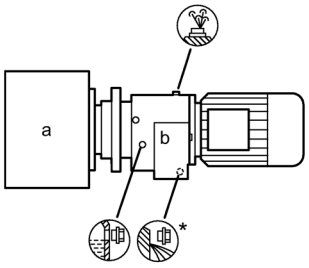
Note

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

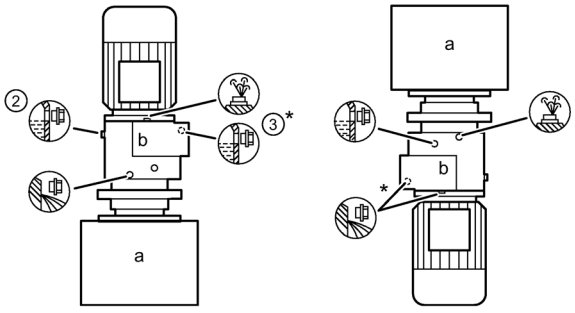
Gearbox sizes 28 and 38 on the 2nd gearbox are lubricated for life.

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

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

11

11.1 Stocking of spare parts

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

NOTICE
Safety impairment caused by inferior products The installation and/or use of inferior products can have a negative impact on the design characteristics of the geared motor and might consequently impair the active and/or passive safety features of the machine. Siemens AG states explicitly that only spare parts and accessories supplied by Siemens have been tested and approved by Siemens AG. If you do not use original spare parts and original accessories, Siemens AG excludes every liability and warranty. Siemens AG accepts the warranty only for original spare parts.

Note that special manufacturing and delivery specifications often apply to individual components. All spare parts offered by Siemens AG are state-of-the-art and conform to the latest legal regulations.

Please supply the following data when ordering spare parts:

- Serial number shown on the rating plate ③
- Type designation shown on the rating plate ⑥
- Part number
  - 3-digit position number from the spare parts list
  - 6-digit part number
  - 7-digit article number
  - 14-digit material number
- Quantity

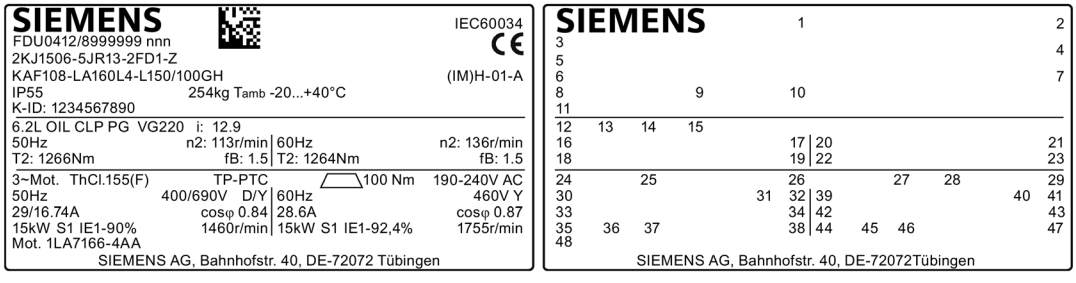
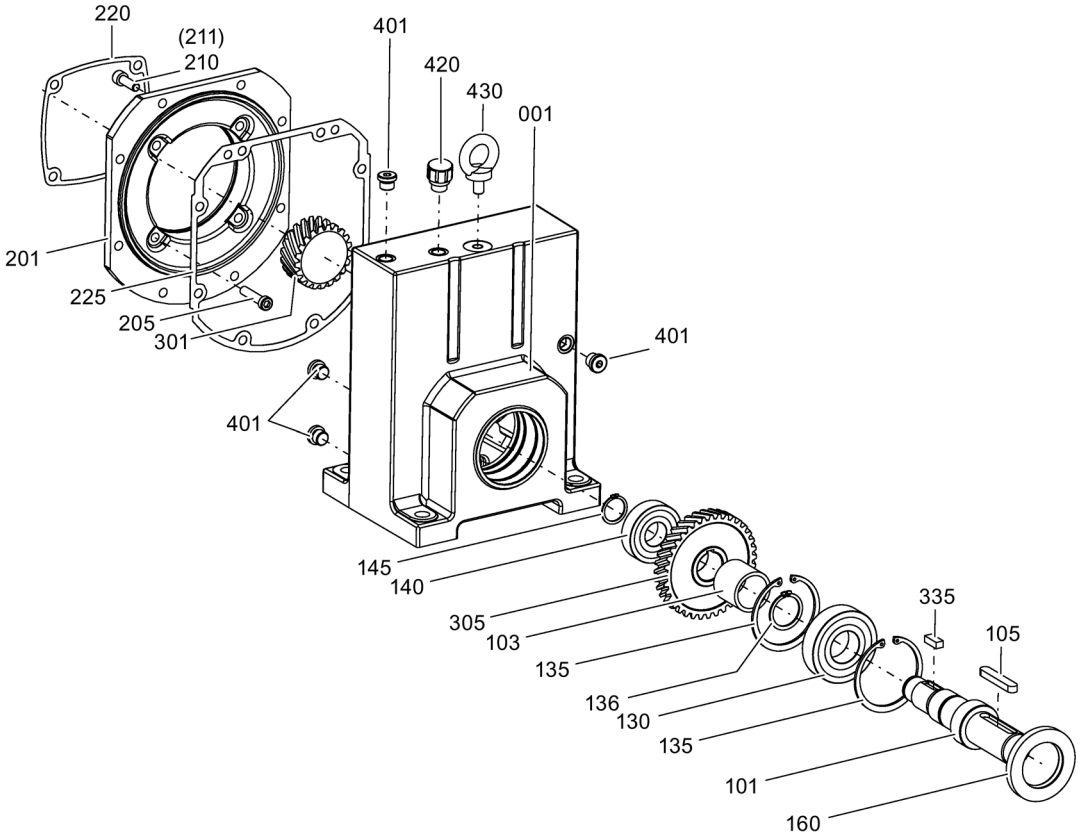


Figure 11-1 Example of a MOTOX rating plate

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

11.2 Spare parts lists

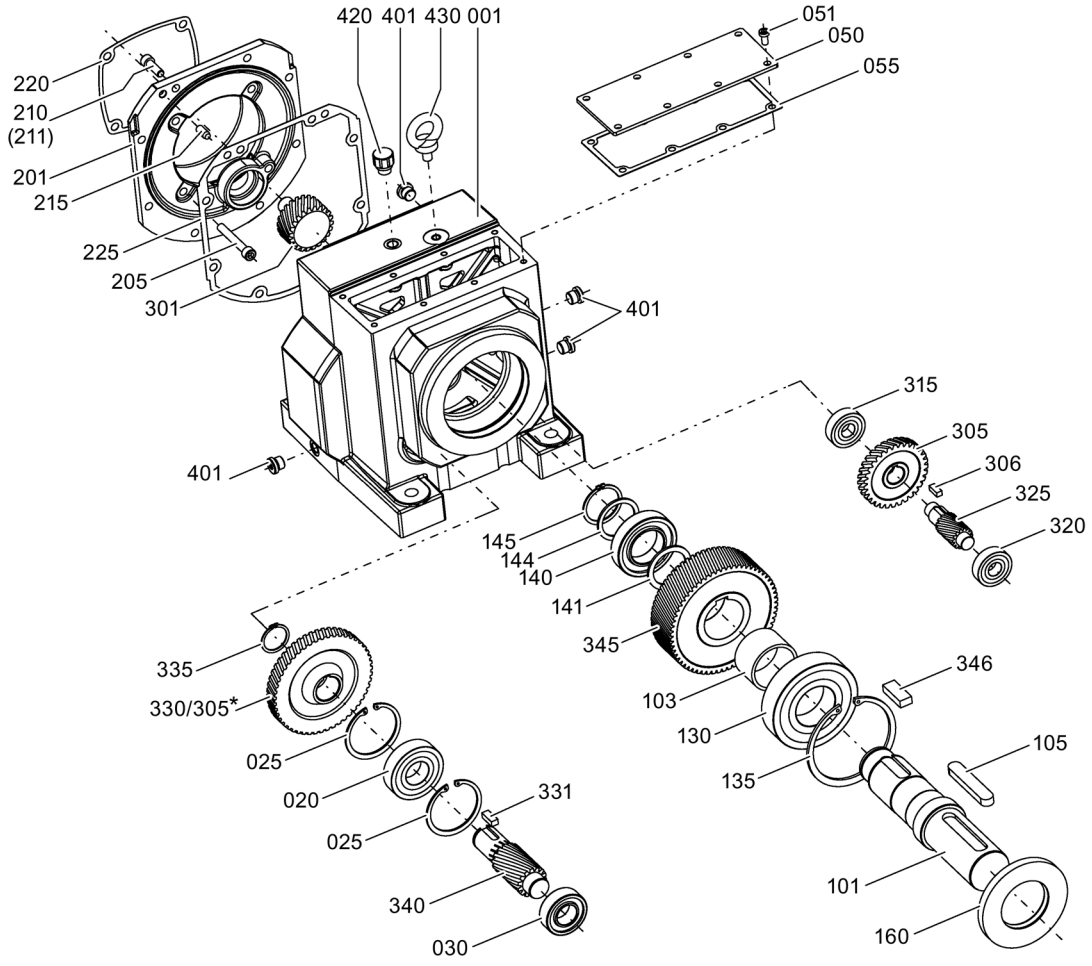
11.2.1 Single-stage helical gearbox sizes 38 - 148



001	Gearbox housing	225	Seal
101	Output shaft	301	Plug-in pinion
103	Spacer / bush	305	Helical gear wheel
105	Parallel key	335	Parallel key
130	Bearing	401	Screw plug
135	Locking ring	420	Vent filter
136	Locking ring	430	Eyebolt
140	Bearing		
145	Locking ring		
160	Shaft sealing ring		
201	Adapter plate		
205	Screw		
210	Screw		
211	Screw lock		
220	Seal		

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

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



*	2-stage	210	Screw
001	Gearbox housing	211	Screw lock
020	Bearing	215	Cylindrical pin
025	Locking ring	220	Seal
030	Bearing	225	Seal
050	Housing cover	301	Plug-in pinion
051	Screw	305	Helical gear wheel
055	Seal	306	Parallel key
101	Output shaft	315	Bearing
103	Spacer / bush	320	Bearing
105	Parallel key	325	Pinion shaft
130	Bearing	330	Helical gear wheel
135	Locking ring	331	Parallel key
140	Bearing	335	Locking ring
141	Supporting disk / shim	340	Pinion shaft
144	Supporting disk / shim	345	Helical gear wheel
145	Locking ring	346	Parallel key

160	Shaft sealing ring	401	Screw plug
201	Adapter plate	420	Vent filter
205	Screw	430	Eyebolt

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

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

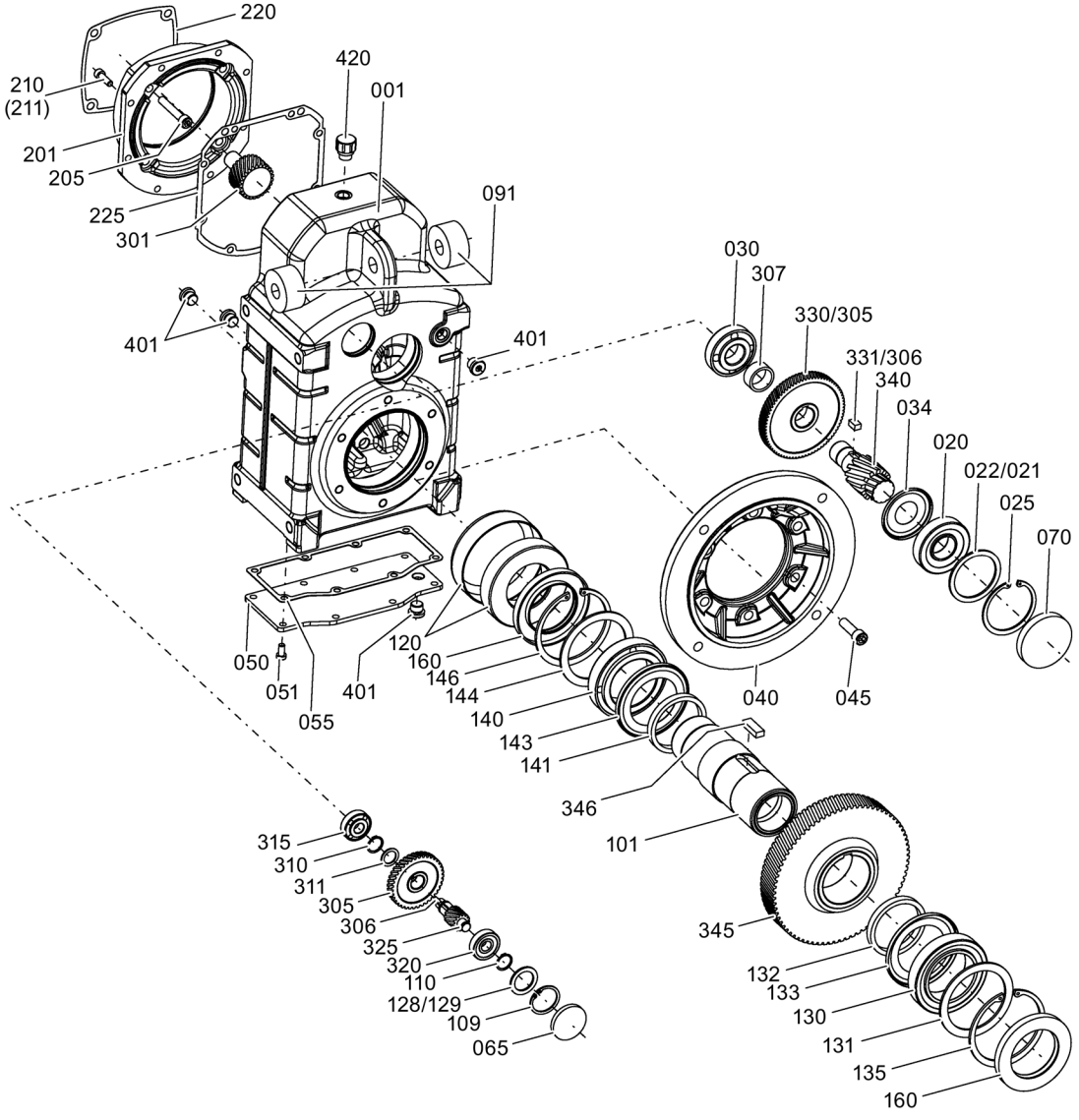


Figure 11-4 Parallel shaft gearbox sizes 38B - 188B

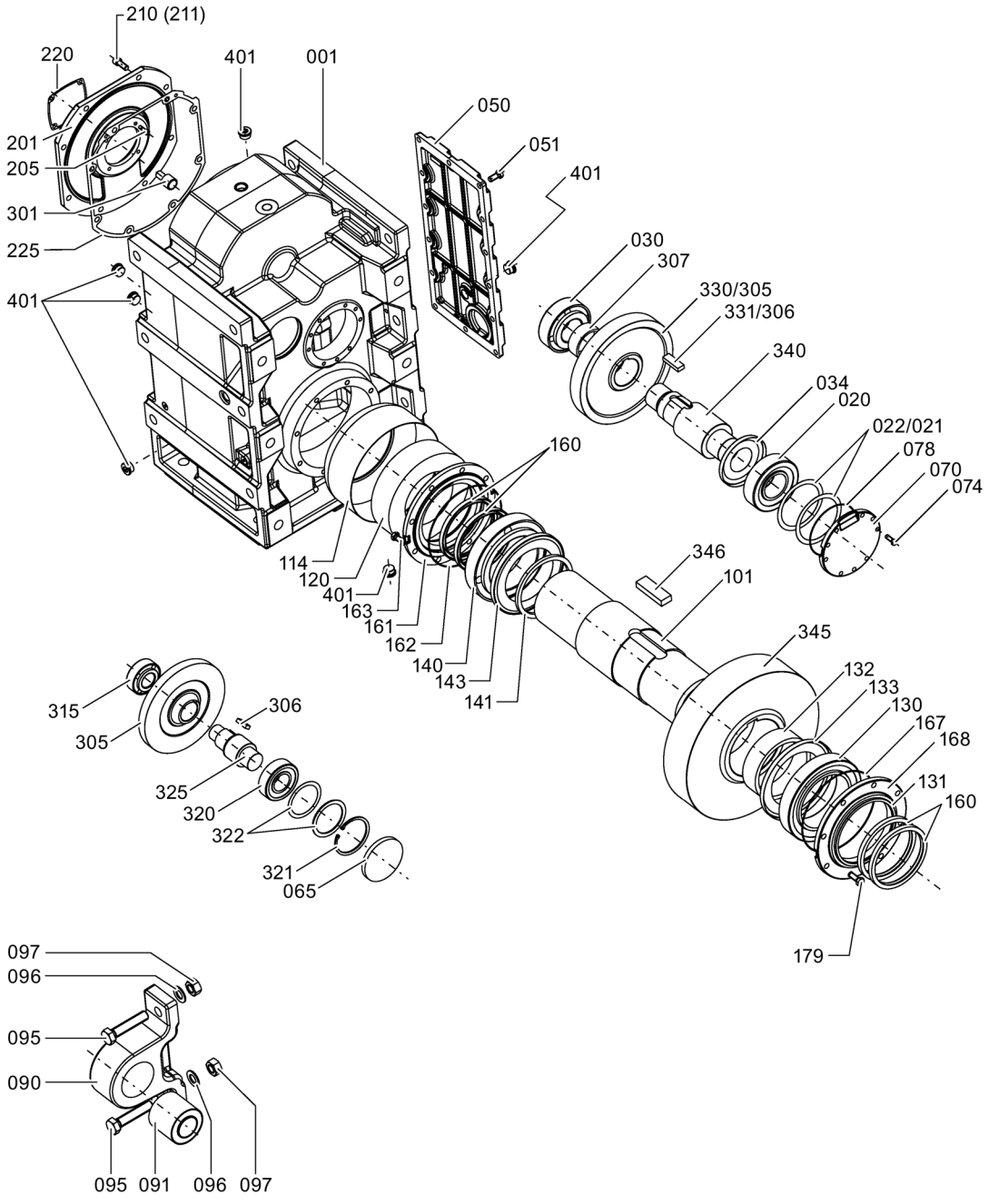


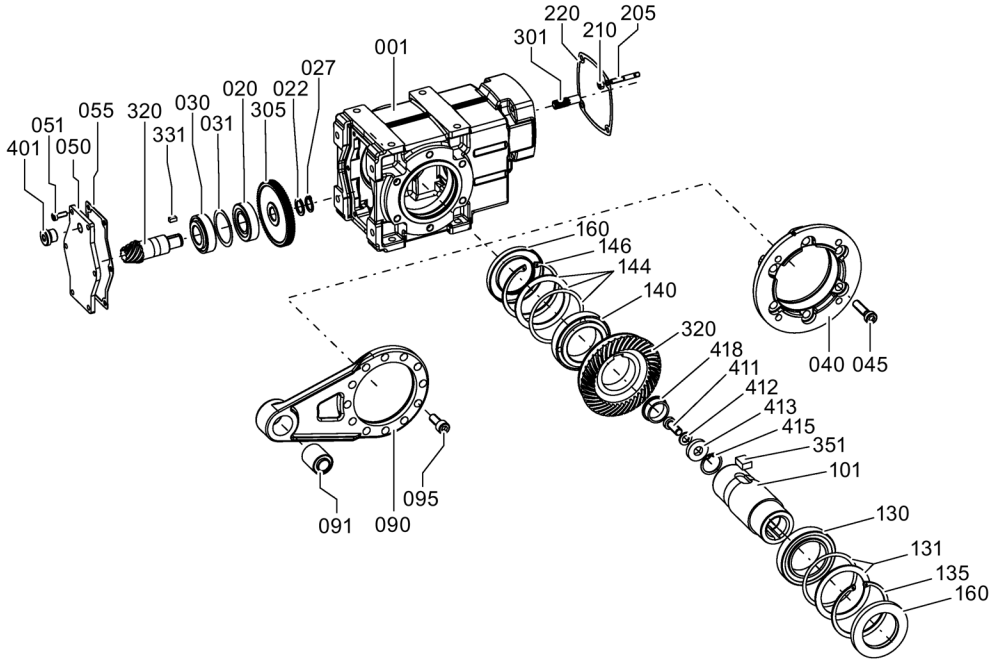
Figure 11-5 Parallel shaft gearbox size 208

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

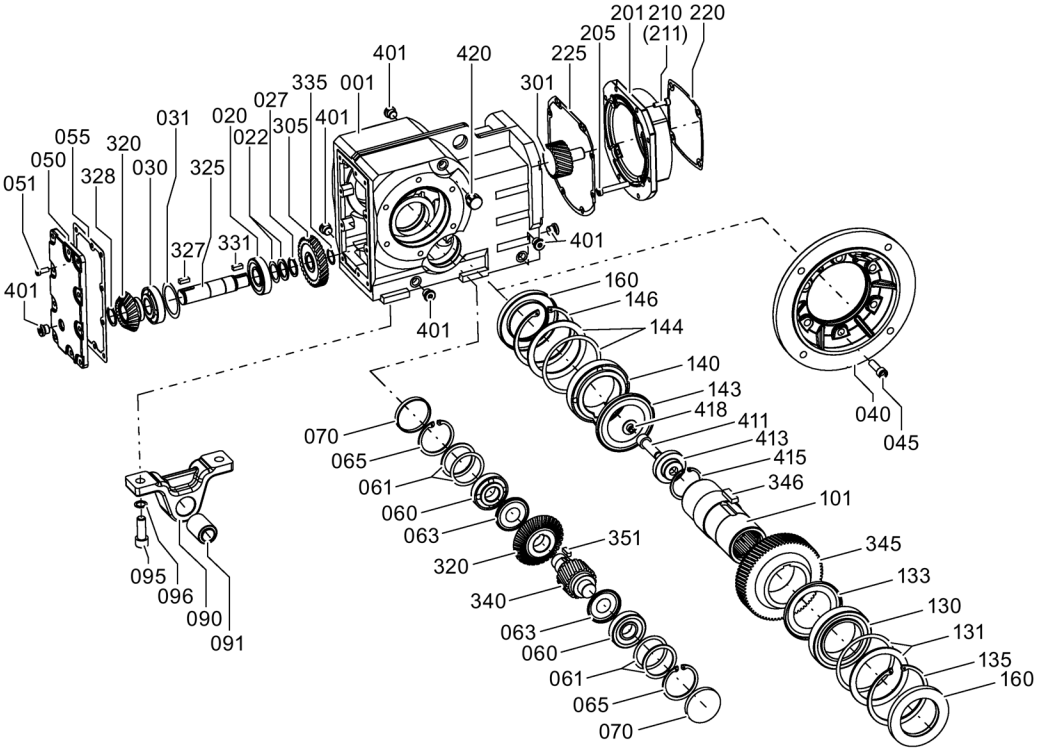
001	Gearbox housing	162	O ring
020	Bearing	163	Screw
021	Supporting disk / shim	167	O ring
022	Supporting disk / shim	168	Bearing cover
025	Locking ring	179	Screw
030	Bearing	201	Adapter plate
034	NILOS ring	205	Screw
040	Output flange	210	Screw
045	Screw	211	Screw lock
050	Housing cover	220	Seal
051	Screw	225	Seal
055	Seal	301	Pinion
065	Sealing cap	305	Helical gear wheel
070	Sealing cap	306	Parallel key
074	Screw	307	Spacer / bush
078	O-ring	310	Locking ring
090	Torque arm	311	Supporting disk / shim
091	Rubber bush	315	Bearing
095	Screw	320	Bearing
096	Locking ring	321	Locking ring
097	Nut	322	Supporting disk / shim
101	Drive shaft	325	Pinion shaft
109	Locking ring	330	Helical gear wheel
110	Locking ring	331	Parallel key
114	Protection cover (optional)	340	Pinion shaft
120	Shrink disk	345	Helical gear wheel
128	Supporting disk / shim	346	Parallel key
129	Supporting disk / shim	401	Screw plug
130	Bearing	420	Vent filter
131	Supporting disk / shim	340	Pinion shaft
132	Spacer / bush	345	Helical gear wheel
133	NILOS ring	346	Parallel key
135	Locking ring	401	Screw plug
140	Bearing	420	Vent filter
141	Spacer / bush		
143	NILOS ring		
144	Supporting disk / shim		
146	Locking ring		
160	Shaft sealing ring		
161	Bearing cover		

11.2.4 Bevel helical gearbox sizes B38, 38 - 188

B38



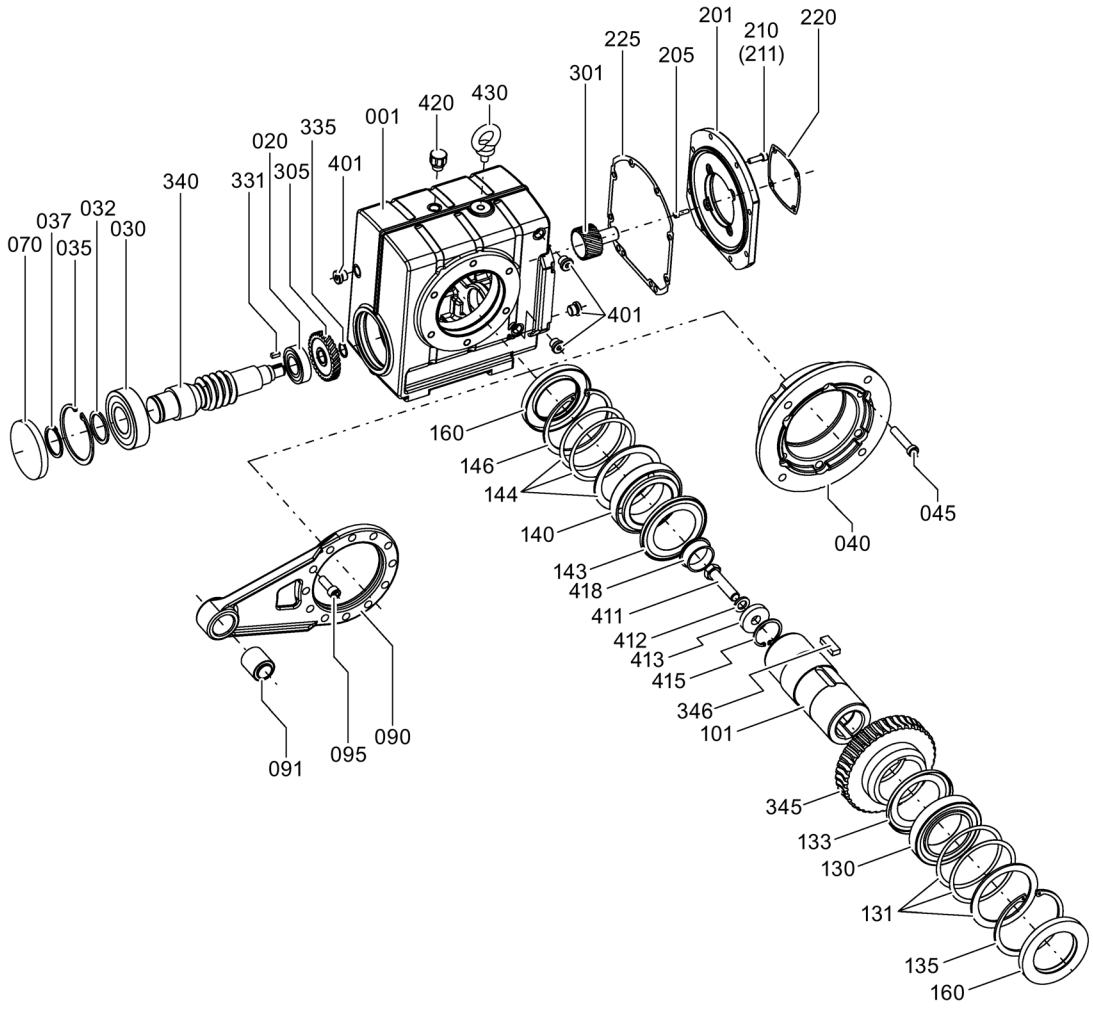
38 - 188



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

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

11.2.5 Helical worm gearbox sizes 38 - 88



001	Gearbox housing	201	Adapter plate
020	Bearing	205	Screw
030	Bearing	210	Screw
032	Supporting disk / shim	211	Screw lock
035	Locking ring	220	Seal
037	Locking ring	225	Seal
040	Output flange	301	Plug-in pinion
045	Screw	305	Helical gear wheel
070	Sealing cap	331	Parallel key
090	Torque arm	335	Locking ring
091	Rubber bush	340	Worm shaft
095	Screw	345	Worm wheel
101	Output shaft	346	Parallel key
130	Bearing	401	Screw plug
131	Supporting disk / shim	411	Screw

133	NILOS ring	412	Screw lock
135	Locking ring	413	Disk
140	Bearing	415	Locking ring
143	NILOS ring	418	Plug / sealing cap
144	Supporting disk / shim	420	Vent filter
146	Locking ring	430	Eyebolt
160	Shaft sealing ring		

Figure 11-7 Helical worm gearbox sizes 38 - 88

Explanations 12

12.1 Declaration of Incorporation

Document No. A5E37802169AB

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

Manufacturer:	Siemens AG Division Digital Factory DF MC
Address:	Bahnhofstraße 40, 72072 Tübingen, Germany
Product designation:	MOTOX gearboxes with input units A, K, P • Single-stage helical gearboxes E. 38 - 148 • Three- and two-stage helical gearboxes D./Z. 18 - 188 • Parallel shaft gearboxes F. 28 - 208 • Bevel gearboxes B. 28 - 38, K. 38 - 168 • Helical worm gearboxes C. 28 - 88

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

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

- 1.1.1, 1.1.2, 1.1.3, 1.1.5
- 1.2.4.4, 1.2.6
- 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.6, 1.3.8.1
- 1.4.1, 1.4.2, 1.4.2.1
- 1.5.1, 1.5.2, 1.5.4, 1.5.5, 1.5.6, 1.5.8, 1.5.9, 1.5.10, 1.5.11, 1.5.13, 1.5.15
- 1.6.1, 1.6.2
- 1.7.1, 1.7.1.1, 1.7.2, 1.7.3, 1.7.4, 1.7.4.1, 1.7.4.2, 1.7.4.3

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

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

The named person for compiling the technical documents:
Georg Böing, Head of Research & Development

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

Tübingen, July 1, 2017

Georg Böing Head of Research & Development	Florian Hanisch Vice President Lead Factory Simogear

12.2 EU Declaration of Conformity DIN EN 80079-36

Document No. A5E43968684AA

Manufacturer:	Siemens AG Division Digital Factory DF MC
Address:	Bahnhofstraße 40, 72072 Tübingen, Germany
Product designation:	MOTOX gearbox series
Gearbox types:	E, Z, D, F, B, K, C
Sizes:	18 - 208
Input units:	A, K, P

The designated product complies with the regulations of the following European Directive:

Directive 2014/34/EU, OJ L 96/309, 29.3.2014, of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.

Conformance with the regulations laid down in these Directives is proven by fully complying with the following standards:

- DIN EN 1127-1: 2011
- DIN EN 80079-37: 2016
- DIN EN 60079-0: 2014
- DIN EN 80079-36: 2016
- DIN EN 80079-34: 2012
- DIN EN 15198: 2007

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

- Ⓔx II 2G Ex h IIB T4 Gb
- Ⓔx II 2G Ex h IIC T4 Gb
- Ⓔx II 2D Ex h IIIB T120° C Db
- Ⓔx II 2D Ex h IIIC T120° C Db
- Ⓔx II 3G Ex h IIB T4 Gc
- Ⓔx II 3G Ex h IIC T4 Gc
- Ⓔx II 3D Ex h IIIB T120° C Dc
- Ⓔx II 3D Ex h IIIC T120° C Dc

The specific marking of the gearbox is noted on the rating plate.

The technical documentation for Category 2 gearboxes has been subjected to a voluntary validation. The documentation has been filed with the designated body under No. 0123, TÜV SÜD PRODUCT SERVICE GmbH, Ridlerstraße 65, 80339 München, Germany.

Tübingen, January 22, 2018

Georg Böing Head of Research & Development	Florian Hanisch Vice President Lead Factory Simogear

12.3 EC/EU Declaration of Conformity

Document No. A5E37802261AB

Manufacturer:	Siemens AG Division Digital Factory DF MC
Address:	Bahnhofstraße 40, 72072 Tübingen, Germany
Product designation:	Low-voltage motors, types
Sizes:	LA/LAI 63 - 160, LG/LGI 180 - 315
Where relevant in conjunction with MOTOX gearbox types:	E, Z, D, F, B, BH, K, KH, C, CH

The designated product complies with the regulations of the following European Directive:

Directive 2014/35/EU, OJ L 96/357, 29.3.2014, of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits (Low-Voltage Directive).

Conformance with the regulations laid down in these Directives is proven by fully complying with the following standards:

- EN 60034-1: 2010
- EN 60034 - all other relevant sections in the latest version in each case
- EN 60664-1: 2007
- EN 60204-1: 2006 +A1: 2009 +AC: 2010

EC/EU Declarations of Conformity and / or manufacturer's declarations for all subassemblies, integrated and add-on units are available.

Specifically, these are:

- Electromagnetic brakes L, ZL, P, FDX, FDW, KFB with connected accessories such as rectifiers and switching devices
- External fan units F
- Shaft encoders IA, IM, IN, RE, TA

The designated product also complies with the regulations of the following legal acts:

- Commission Regulation (EC) No 640/2009 of 22 July 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for electric motors.
- Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products.
- Commission Regulation (EU) No 4/2014 of 6 January 2014 amending Regulation (EC) No 640/2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for electric motors.

Conformance with the regulations laid down in this legislation is proven by fully complying with EN 60034-30: 2009.

The designated product is intended for installation in a machine. Commissioning is prohibited until it has been established that the end product conforms with Directive 2006/42/EC.

First time that the CE marking was applied: 2016

Tübingen, July 1, 2017

Georg Böing	Florian Hanisch
Head of Research & Development	Vice President Lead Factory Simogear

This declaration certifies compliance with the Directives named above, but does not guarantee any specific properties or durability in the sense of § 443 BGB (Section of the German Civil Code governing guarantee provisions). Please observe the safety information in the supplied product documentation.

Further information

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

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Motion Control
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