



G...

GKK

Bevel gearbox with clutch

Operating Instruction

EN



Lenze



Please read these instructions before you start working!
Follow the enclosed safety instructions.

1	About this documentation	5
1.1	Document history	5
1.2	Conventions used	6
1.3	Terminology used	6
1.4	Notes used	7
2	Safety instructions	8
2.1	General safety instructions for drive components	8
2.2	Application as directed	11
2.3	Foreseeable misuse	11
2.4	Residual hazards	12
2.5	Disposal	13
3	Product description	14
3.1	Identification	14
3.1.1	Product features	14
3.1.2	Mounting positions	15
3.1.3	Nameplate	16
3.1.4	Gearbox code	18
3.1.5	Encoder code	18
3.2	Transport weights	19
4	Technical data	20
4.1	Important notes	20
4.2	Characteristics for light load application	20
4.3	Characteristics for heavy load application	20
4.4	General data and operating conditions	21
5	Mechanical installation	22
5.1	Storage	22
5.1.1	Direction of rotation	23
5.2	Mounting	23
5.2.1	Preparation	23
5.2.2	General information about the assembly of drive systems	24
5.2.3	Assembly of transmission elements on solid shafts	24
5.2.4	Gearboxes with breathers	25
5.2.5	Breather position, oil filling screw and drain plug	26
6	Electrical installation	27
6.1	Motor connection	27
6.2	Motor options	27
6.3	Frequency inverter connection	27
7	Commissioning and operation	28
7.1	Before switching on	28

7.2	During operation	28
7.3	Clutches at the GKK gearbox	28
7.4	Operation of clutch at GKK gearbox	29
7.4.1	Switching via clutch lever	29
7.4.2	Manual switching	29
8	Maintenance	30
8.1	Maintenance intervals	30
8.2	Maintenance operations	31
8.2.1	Opening the condensation drain hole	31
8.2.2	Lubricate roller bearings	32
8.2.3	Table of lubricants	32
8.2.4	Replacing the lubricant	34
8.2.5	Lubricant quantity	35
8.3	Repair	35
9	Troubleshooting and fault elimination	36

Contents

- This documentation serves for safety-relevant operations on and with the gearboxes. It contains safety instructions which must be observed.
- All personnel working on and with the gearboxes must have the documentation available during the work and observe the information and notes relevant for them.
- The documentation must always be complete and in a perfectly readable state.



Tip!

Information and tools concerning the Lenze products can be found in the download area at www.lenze.com

Validity

This documentation applies to bevel gearboxes:

Type	Name
GKK	Bevel geared motor with clutch

Target group

This documentation is directed at qualified skilled personnel according to IEC 60364.

Qualified skilled personnel are persons who have the required qualifications to carry out all activities involved in installing, mounting, commissioning, and operating the product.

1.1 Document history

Material number	Version			Description
13014719	1.0	08/2004	TD09	First printing
13053411	2.0	05/2005	TD09	Revision of sections Mounting positions, Transport weights, Breather position and Lubricant tables
13430271	3.0	03/2013	TD09	Complete editorial revision
13502908	4.0	11/2015	TD09	New layout revision Operating condition: "Mechanical" deleted Supplement of encoder code

1 About this documentation

Conventions used

1.2 Conventions used

This documentation uses the following conventions to distinguish different types of information:

Type of information	Writing	Example/notes
Spelling of numbers		
Decimal	Normal spelling	Example: 1234
Decimal separator	Point	The decimal point is always used. For example: 1234.56
Icons		
Page reference		Reference to another page with additional information For instance:  16 = see page 16
Documentation reference		Reference to another documentation with additional information Example:  EDKxxx = see EDKxxx documentation
Wildcard		Wildcard for options, selection data

1.3 Terminology used

Term	Describes the following
Gearboxes	Gearbox of product range G□□
Drive system	Drive systems with gearboxes G□□ and other Lenze drive components

1.4 Notes used

The following pictographs and signal words are used in this documentation to indicate dangers and important information:

Safety instructions

Layout of the safety instructions:



Danger!

(characterises the type and severity of danger)

Note

(describes the danger and gives information about how to prevent dangerous situations)

Pictograph and signal word	Meaning
 Danger!	Danger of personal injury through dangerous electrical voltage Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
 Danger!	Danger of personal injury through a general source of danger Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
 Stop!	Danger of property damage Reference to a possible danger that may result in property damage if the corresponding measures are not taken.

Application notes

Pictograph and signal word	Meaning
 Note!	Important note to ensure trouble-free operation
 Tip!	Useful tip for easy handling
	Reference to another document

2 Safety instructions

General safety instructions for drive components

2.1 General safety instructions for drive components

(in compliance with Low-Voltage Directive 2006/95/EC)

At the time of dispatch, the drive components are in line with the latest state of the art and can be regarded as operationally safe.

Scope

The following general safety instructions apply to all Lenze drive and automation components.

The product-specific safety and application notes given in this documentation must be observed!

General hazards



Danger!

Disregarding the following basic safety measures may lead to severe personal injury and damage to material assets!

- Lenze drive and automation components ...
 - ... must only be used for the intended purpose.
 - ... must never be operated if damaged.
 - ... must never be subjected to technical modifications.
 - ... must never be operated unless completely assembled.
 - ... must never be operated without the covers/guards.
 - ... can - depending on their degree of protection - have live, movable or rotating parts during or after operation. Surfaces can be hot.
- All specifications of the corresponding enclosed documentation must be observed.

This is vital for safe and trouble-free operation and for achieving the specified product features.
- Only qualified skilled personnel are permitted to work with or on Lenze drive and automation components.

According to IEC 60364 or CENELEC HD 384, these are persons ...

 - ... who are familiar with the installation, assembly, commissioning and operation of the product,
 - ... possess the appropriate qualifications for their work,
 - ... and are acquainted with and can apply all the accident prevent regulations, directives and laws applicable at the place of use.

Temperatures

The permissible temperature range is determined by the following:

- The lubricant specifications in connection with the expected oil temperatures in operation (see chapter 8.1 and nameplate).
- The thermal class of the motor considering the motor temperature expected during operation (see nameplate and/or Operating Instructions of the motor).

The operating temperature is determined by the power loss, the ambient temperature and the cooling system!



Stop!

With mineral oil, the upper temperature limit for continuous operation is 80°C, with synthetic oil and shaft sealing rings made of FP (Viton) 100°C. If these temperatures are exceeded, measures are necessary to reduce the temperature, see chapter 9.



Danger!

Depending on the operating conditions, surfaces may be hot, provide protection against accidental contact.

Ambient media

- Gearboxes are protected against dust and spray water.
- Motors according to their enclosure (see nameplate and/or Operating Instructions for the motor).
- Ambient media - especially chemically aggressive - can destroy shaft seals and coatings (plastic). Abrasive media endanger shaft seals.
- The installation site of the drive must be free of shocks and vibration.
- Dirt or dust deposits impede the heat dissipation (cooling).

Transport, storage

- Transport and storage in a dry, low-vibration environment without aggressive atmosphere; preferably in the packaging provided by the manufacturer.
 - Protect against dust and impacts.
 - Observe climatic conditions according to the technical data.
- Use load carrying equipment for transport! (📖 22)

Before transport

- check that all component parts are safely mounted;
- check that all component parts with a loose fastening are secured or removed;
- tighten all transport aids (eye bolts or support plates).

Use an appropriate means of transport and lifting equipment! (📖 22)

2 Safety instructions

General safety instructions for drive components

If you do not install the motor immediately, ensure proper storage conditions.

- Up to one year:
 - Shafts and uncoated surfaces are delivered in a protected against rust status. Aftertreatment is required where the corrosion protection has been damaged.
 - Remove the plug for motors with condensation drain holes (special version).
- More than one year, up to two years:
 - Apply a long-term corrosion preventive (e.g. Anticorit BW 366 from the Fuchs company) to the shafts and uncoated surfaces before storing the motor away.

Corrosion protection

Lenze offers paints with different resistance characteristics for drive systems. Since the resistance may be reduced when the paint coat is damaged, defects in paint work (e.g. through transport or assembly) must be removed professionally to reach the required corrosion resistance.

Mechanical installation

- Provide for careful handling and avoid mechanical overload. During handling neither bend components, nor change the insulation distances.

Electrical installation

- Carry out the electrical installation according to the relevant regulations (e. g. cable cross-sections, fusing, connection to the PE conductor). Additional notes are included in the documentation.
- The Instructions contain notes concerning wiring according to EMC regulations (shielding, earthing, filters and cable routing). The compliance with limit values required by the EMC legislation is the responsibility of the manufacturer of the machine or system.

Warning: The inverters are automation components which can be used in industrial environment according to EN 61000-6-4. These products may cause radio interference in residential areas. If this happens, the operator may need to take appropriate action.

- Only plug in or remove pluggable terminals in the deenergised state!

Commissioning

- If required, you have to equip the system with additional monitoring and protective devices in accordance with the respective valid safety regulations (e. g. law on technical equipment, regulations for the prevention of accidents).
- Before commissioning remove transport locking devices and keep them for later transports.

Geared motors for deep-freeze applications

- Geared motors for deep-freeze applications are specially optimised to operation at very low temperatures. Observe that for operation outside the temperature range specified (e.g. during commissioning) increased wear or even failures may occur.
- We recommend loading the gearbox with a maximum of 50 % of the rated output torque if it is outside the specified temperature range during commissioning.

2.2 Application as directed

All products which this documentation applies to are no household appliances but are exclusively intended as components for re-utilisation for commercial use or professional use in terms of IEC/EN 61000-3-2. They meet the requirements of the Low-Voltage Directive 2006/95/EC and the requirements of the harmonised standards of the IEC/EN 60034 series.

Only use the products under the operating conditions and power limits specified in this documentation.

Do not use the brakes installed as fail-safe brakes. It cannot be ruled out that the braking torque is reduced by disruptive factors which cannot be influenced.

- Drives
 - ... must only be operated under the operating conditions and power limits specified in this documentation.
 - ... comply with the protection requirements of the EU Low-Voltage Directive.

Any other use shall be deemed inappropriate!

2.3 Foreseeable misuse

- Do not operate the motors
 - ... in explosion-protected areas
 - ... in aggressive environments (acid, gas, vapour, dust, oil)
 - ... in water
 - ... in radiation environments



Note!

Increased surface and corrosion protection can be achieved by using adapted coating systems.

2 Safety instructions

Residual hazards

2.4 Residual hazards

Protection of persons

- Risk of burnst!
 - Hot surfaces up to 140 °C during operation! Provide protection against contact.
- High-frequency voltages can be capacitively transferred to the motor housing through the inverter supply.
 - Earth motor housing carefully.
- Risk of injury due to rotating shaft!
 - Before working on the motor ensure that the motor is at standstill.
- Danger of unintentional starting or electrical shocks!
 - Connections must only be made when the equipment is deenergised and the motor is at standstill.
 - Installed brakes are no fail-safe brakes.
- Dangerous voltages at the power terminals, even if the plug is removed: residual voltage >60 V!

Motor protection

- Installed thermal detectors do **not offer full protection** to the machine.
 - If required, limit the maximum current, parameterise the inverter so that it will be switched off after some seconds of operation with $I > I_N$, especially if there is the danger of blocking.
 - Installed overload protection does not prevent an overload under any conditions.
- Installed brakes are **no fail-safe brakes**.
 - The torque can be reduced due to disruptive factors that cannot be influenced, e.g. by ingressing oil due to a defect shaft sealing ring on the A side.
- Fuses are no motor protection.
 - Use current-dependent motor protection switches at an average operating frequency.
 - Use installed thermal detectors at a high operating frequency.
- Excessive torques lead to a break of the motor shaft or demagnetisation.
 - The maximum torques according to catalogue must not be exceeded.
- Lateral forces from the motor shaft may occur.
 - Align shafts of motor and driving machine exactly to each other.
- If deviations from normal operation occur, e.g. increased temperature, noise, vibration, determine the cause and, if necessary, contact the manufacturer. If in doubt, switch off the motor.
- Design with plug:
 - Never disconnect plug when energised! Otherwise, the plug can be destroyed.
 - Switch off power supply and inhibit controller prior to disconnecting the plug.

Fire protection

- Fire hazard
 - Prevent contact with flammable substances.

2.5 Disposal

Sort individual parts according to their properties. Dispose of them as specified by the current national regulations.

3 Product description

Identification



Stop!

The MOC geared motors GKK are classified as light load or heavy load; see the characteristics in the following tables .

- The most important technical data is given on the nameplate.
- The product catalogues contain further technical data.

3.1 Identification

3.1.1 Product features

Design

Drive systems have a modular design.

They consist of:

- Speed reduction gearbox
 - Bevel gearbox in different ratios with integrated clutch
- Electric motor
 - Three-phase AC motor

Mode of operation

- Torque and speed conversion

Product family	1st stage	2nd stage
Bevel gearbox	Helical	Bevel



Note!

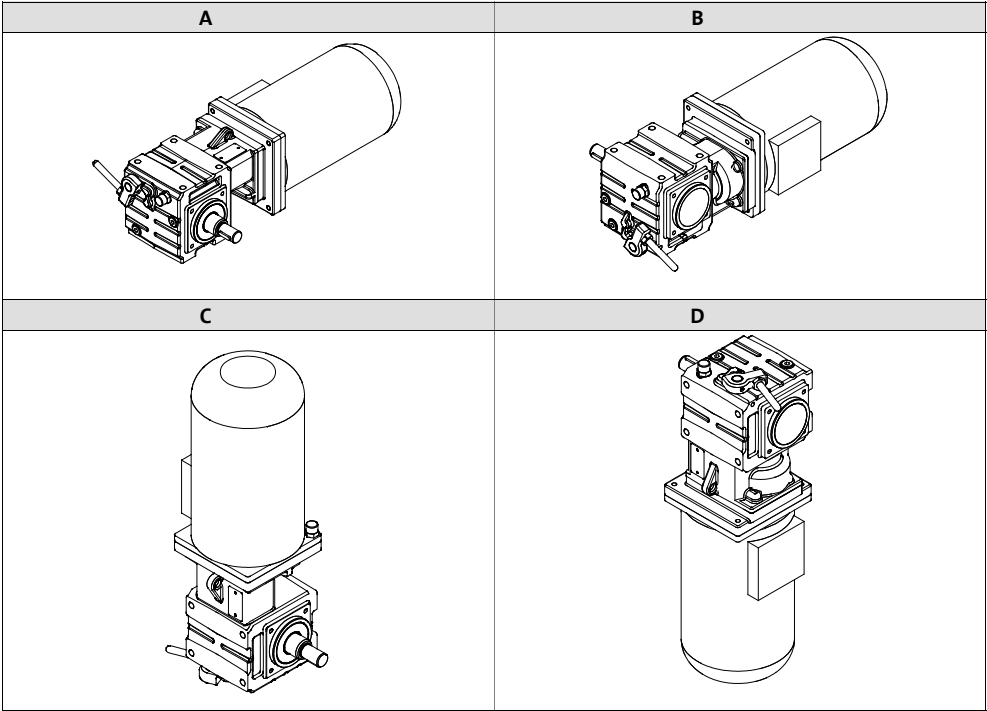
The reaction torque must be supported by foot mounting, flange mounting, or torque plate.

- Clutch

Jaw coupling between 1st and 2nd gearbox stage that is activated from the outside by means of an operating lever.

3.1.2 Mounting positions

GKK mounting positions



3 Product description

Nameplate

3.1.3 Nameplate

Three-phase AC motor for direct gearbox attachment

Lenze		1	15	
2	21	Hz	16.1	26
3	18	kW	16.2	15
4	17	V	16.4	19
5.1	5.2	25		23
5.3	5.4	A	16.5	13
6	7.1	7.2	16.5	14.1
8.1	8.2	8.3	r/min	16.3
9		η %	16.7	14.3
20.2		cos φ	16.6	27
10.1	10.2	C86	22	22
11		20.1		29

Three-phase AC motor with standard output flange

Lenze		1	15	
2	14.2	14.1	23	26
4		22	Hz	16.1
21	13	14.3	kW	16.2
8.1	8.2	8.3	r/min	16.3
9		29	V	16.4
24			A	16.5
10.1	20.1		16.5	
10.2	10.3	18	cos φ	16.6
11			η %	16.7

Pos.	Contents
1	Manufacturer / production location
2	Type of motor / standard
3	Gearbox type
4	Motor type
5	Technical data
5.1	Ratio
5.2	Rated torque
5.3	Rated speed
5.4	Rated frequency
5.10	Number of poles
6	Mounting position / position of the system blocks
7	Lubricant details
7.1	Lubricant amount
7.2	Lubricant type
8	Brake data
8.1	Type
8.2	AC/DC brake voltage
8.3	Braking torque, electrical power input
9	For feedback / pulse encoder or resolver data,  18
10	Production data
10.1	Order number
10.2	Material number
10.3	Serial number
11	Bar code
12	Motor number
13	Information with regard to the operating mode
14	Additional motor specifications
14.1	Temperature class
14.2	Enclosure
14.3	Motor protection
15	Applicable conformities, approvals and certificates
16	Rated data for various frequencies
16.1	Hz = frequency
16.2	kW = motor power
16.3	rpm = motor speed
16.4	V = motor voltage
16.5	A = motor current
16.6	$\cos \varphi$ = motor power factor
16.7	η = motor efficiency: at a rated power of 100%
16.8	η = motor efficiency: at a rated power of 75%
16.9	η = motor efficiency: at a rated power of 50%
17	Application factor (specified if <1.0) / load capacity
18	Year of manufacture / week of manufacture
19	UL file number
20	Customer data
20.1	Additional customer data
20.2	Customer order number
21	UL category (e.g. inverter duty motor)
22	C86 = motor code for controller parameterisation (code 0086)
23	Efficiency class
24	Partial load efficiencies for 50Hz operation at a rated power of 50% and 75%
26	CC number Department of Energy (optional)
27	Permissible ambient temperature (e.g. $T_a \leq 40^\circ\text{C}$)
29	Standstill current (ampere locked rotor ALR)
31	Plug design (number of poles)

3 Product description

3.1.4 Gearbox code

Example		GKK	04	-	1	M	VCR	071N32; 080-12 1C
Meaning	Type	Gearbox code						
Gearbox type	Bevel geared motor with clutch	GKK						
Gearbox size	04 / 05 / 06 / 07		XX					
Number of stages	1-stage			1				
	2-stage			2				
	3-stage			3				
Drive design	Three-phase AC motor				M			
Output design	Solid shaft (with keyway)					V		
	Without foot, with centering						C	
	Without flange							R
	With flange (through holes)							K
	With flange (threaded holes)							L
Drive size								
Example	Motor							071N32; 080-12
	Mounting flange/free drive shaft							1C

3.1.5 Encoder code

Example		SFC	1024	-	8V	-	K	2
Meaning	Type	Encoder code						
Product line	Resolver	RS						
	Resolver for safety function	RV						
	Incremental encoder	IG						
	Incremental encoder with commutation signal	IK						
	Singleturn absolute value encoder	SFC						
	Multiturn absolute value encoder	AM						
Number	2-pole resolver for servo motors		0					
	2-pole resolver for three-phase AC motors		1					
	Number of pole pairs for resolvers		2, 3, 4, ...					
	Number of steps / increments per revolution		32, 128, 512, 1024, 2048, ...					
Voltage	Medium supply voltage				5V, 8V, 15V, 24V, ...			
Interface or signal level	Standard							
	TTL						T	
	HTL (for incremental encoders)						H	
	Hiperface (for absolute value encoders)						H	
	EnDat						E	
	sin/cos 1 V _{SS}						S	
	For safety function							
	TTL						U	
	HTL (for incremental encoders)						K	
	Hiperface (for absolute value encoders)						K	
	EnDat						F	
	sin/cos 1 V _{SS}						V	
	Safety integration level (SIL)							1
								2
								3
								4

**Note!**

If feedback systems for safety functions are used, the manufacturer's documentation must be observed!

3.2 Transport weights

**Note!**

Weight depends on the drive version.

Gearbox size	Motor size					
	063	071	080	090	100	112
GKK 04	15	17	22		---	---
GKK 05	21	23	28	34	---	---
GKK 06	51	53	58	64	71	---
GKK 07	---	---	88	94	101	115

Tab. 1 Transport weights in [kg]; values may differ from table value

4 Technical data

Important notes

4.1 Important notes

- The most important technical data are indicated on the nameplate (structure and contents  16).
- The product catalogues contain further technical data.

The output torque and radial forces are rated data and dependent upon:

- Speed
- Mounting position
- Ambient temperature
- Ratio
- Motor power
- Application of force of radial load

Depending on the application, the permissible load can be reduced.

4.2 Characteristics for light load application

Gearbox type	Max. torque [Nm]	Max. radial force [N]	Driven shafts d x l [mm]	Ratios [i]	Speed variants
GKK 04-2M...	70	5600	20 x 35	7.72 15.16 19.52 40.84	FU
GKK 05-2M...	160	8000	25 x 35	12.38 19.74 24.56 38.57	FU

4.3 Characteristics for heavy load application

Gearbox type	Max. torque [Nm]	Max. radial force [N]	Driven shafts d x l [mm]	Ratios [i]	Speed variants
GKK 05-2M...	200	10000	25 x 35	12.38 19.74 24.56 38.57	FU
GKK 06-2M...	500	20000	35 x 70	17.50 27.90 34.71 54.51	FU
GKK 07-2M...	900	25000	45 x 90	15.43 27.00	FU
GKK 07-2M...		36000	55 x 110	43.07 86.79	FU

4.4 General data and operating conditions

General data

Conformity and approval		
Conformity		
CE	2006/95/EC	Low-Voltage Directive
 US	File No. E210321	UL/CSA
CCC	GB Standard 12350-2009	Safety requirements of small-power motors

Protection of persons and devices		
Enclosure	IEC/EN 60034-5	See nameplate
		Degrees of protection only apply to horizontal installation
		All unused connectors must be closed with protection covers or blanking plugs.
Temperature class	F (155 °C) IEC/EN 60034-1	Exceedance of the temperature limit weakens or destroys the insulation
Permissible voltage		As specified by limiting curve A of the pulse voltage from IEC / TS 60034-25:2007 (corresponds to IVIC C/B/B@500V)

EMC		
Noise emission	IEC/EN 61800-3	Depending on the controller, see documentation for the controller.
Noise immunity		

Operating conditions

Ambient conditions			
Climatic			
Transport	IEC/EN 60721-3-2	2K3 (-20 °C ... +70 °C)	
Storage	IEC/EN 60721-3-1	1K3 (-20 °C ... +60 °C)	< 3 months
		1K3 (-20 °C ... +40 °C)	> 3 months
Operation	IEC/EN 60721-3-3	3K3 (-20 °C ... +40 °C) MCA, MCS, MD□KS	Without brake
		3K3 (-15 °C ... +40 °C) MCM, MQA	
		3K3 (-10 °C ... +40 °C)	With brake
		3K3 (-15 °C ... +40 °C)	With blower
		> +40 °C	With power reduction, see catalogue
Site altitude		< 1000 m amsl - without power reduction > 1000 m amsl < 4000m amsl with power reduction, see catalogue	
Humidity		Relative humidity ≤ 85 %, without condensation	
Electrical			
The motor connection type depends on the controller			
Length of the motor cable	Ⓜ inverter instructions		
Length of cable for speed feedback			

5 Mechanical installation

Storage



Danger!

Only transport the drive with transport equipment or hoists which are suitable for this load (☞ 19). Ensure a safe fixing. Avoid shocks!

The motors attached to the gearbox are partially equipped with eyebolts. These are **exclusively** determined for motor/gearbox mounting and dismantling and must **not** be used for the complete geared motor!



Stop!

Observe load carrying capacity!

Standing beneath floating loads is prohibited!

5.1 Storage

If you do not install the gearbox immediately, provide for proper storage conditions.

- Generally
 - Store gearboxes indoors in a dry, clean (low-dust) and sunlight-protected environment.
 - The storage location must be free from vibrations and shocks ($V_{\text{eff}} < 0.2 \text{ mm/s}$) in order to prevent roller bearing standstill damage.
 - Temperature changes with condensate formation are to be avoided.
 - Do not activate ventilation unit, in order to prevent air exchange with the ambient air.
- Up to one year:
 - Store gearboxes with a ventilation unit with the vent plug on top.
 - Shafts and uncoated surfaces are delivered in a protected against rust status. Aftertreatment is required where the corrosion protection has been damaged.
 - Remove the plug for motors with condensation drain holes (option)(☞ 23).
- More than one year, up to two years:
 - Apply a long-term corrosion preventive (e.g. Anticorit BW 366 from the Fuchs company) to the shafts and uncoated surfaces before storing the motor away.
 - Install gearbox in mounting position A.
 - Fill gearbox up to the top vent hole / oil hole with the oil grade specified (see nameplate). Then mount the locking screw and ventilation unit (do not activate) again.

5.1.1 Direction of rotation

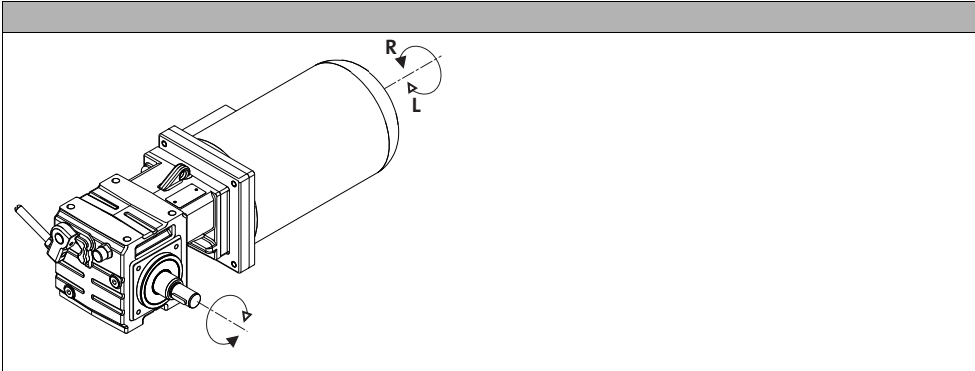


Fig. 1 Direction of rotation of the drive

5.2 Mounting

5.2.1 Preparation



Note!

Thoroughly remove anticorrosion agents from output shafts and flange faces.

Correcting the oil quantity

If the amount of oil in the gearbox has been increased for the purpose of longtime storage (see chapter 5.1), the oil must be drained completely and then refilled for the mounting position provided. The following steps have to be observed:

1. Place receptacle under oil drain plug.
2. Remove breathing / oil filler plug.
3. Completely drain lubricant.
4. Screw in oil drain plug.
5. Fill in amount of oil for the mounting position provided (according to nameplate).
6. Screw in breathing / oil filler plug.

Condensation drain hole



Note!

Lenze delivers motors with condensation drain holes with sealed condensation drain holes. The holes are sealed with a plastic plug or a locking screw. This does not affect the type of protection and the motor is protected against the ingress of foreign substances during transport and operation. Further information, (📖 31).

5 Mechanical installation

Mounting

General information about the assembly of drive systems

5.2.2 General information about the assembly of drive systems



Stop!

The lubricant fill quantity of the gearboxes is matched to the mounting position. The mounting position indicated on the nameplate must be observed to avoid damage to the gearbox.

- Take safety measures prior to any operation:
 - Disconnect the machine from the mains, ensure standstill of the drive system and avoid any machine movement.
 - Check faultless state of the drive system. Never install and commission damaged drive systems.
 - Check drive function - machine function assignment. Check direction of (📖 23) rotation.
- The mounting surfaces must be plane, torsionally rigid and free from vibrations.
- Align drive system on mounting surfaces exactly with the machine shaft to be driven.
 - Be sure to carry out mounting in a manner free from distortion, in order to avoid additional loads.
 - Even out slight inaccuracies by the use of suitable flexible couplings.
- Support reaction torque by suitable measures.
- Be absolutely sure to secure fastenings of accessories and built-on accessories so that they won't come loose.
We recommend glueing screwed connections.

5.2.3 Assembly of transmission elements on solid shafts

Draw the transmission elements onto the output shaft only by using the centering thread.



Stop!

Shocks and blows to the shafts damage the roller bearings.

5.2.4 Gearboxes with breathers



Stop!

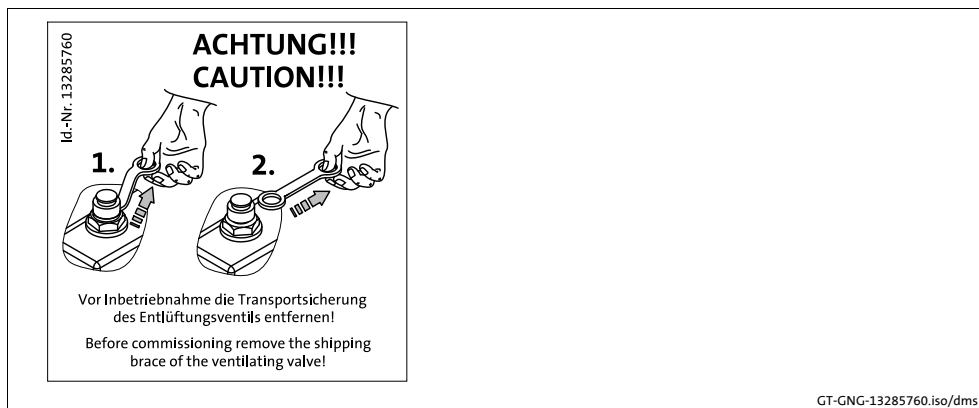
Do not place gearbox onto breather valve!

Ventilating measures are intended as standard for gearboxes of type GKK. Depending upon the mounting position, the ventilation may be restricted or even excluded.

Gearboxes supplied with a breather element bear a corresponding label on the gearbox.

Gearboxes that are delivered with a ventilation unit are provided with a label.

Remove transport locking device on the vent valve.



Mount loosely attached ventilation units (deviating from the standard) according to chapter 5.2.5. Gearboxes that are suitable for several different mounting positions (📖 15) are delivered without ventilation units.

Ensure ventilation before initial commissioning!



Stop!

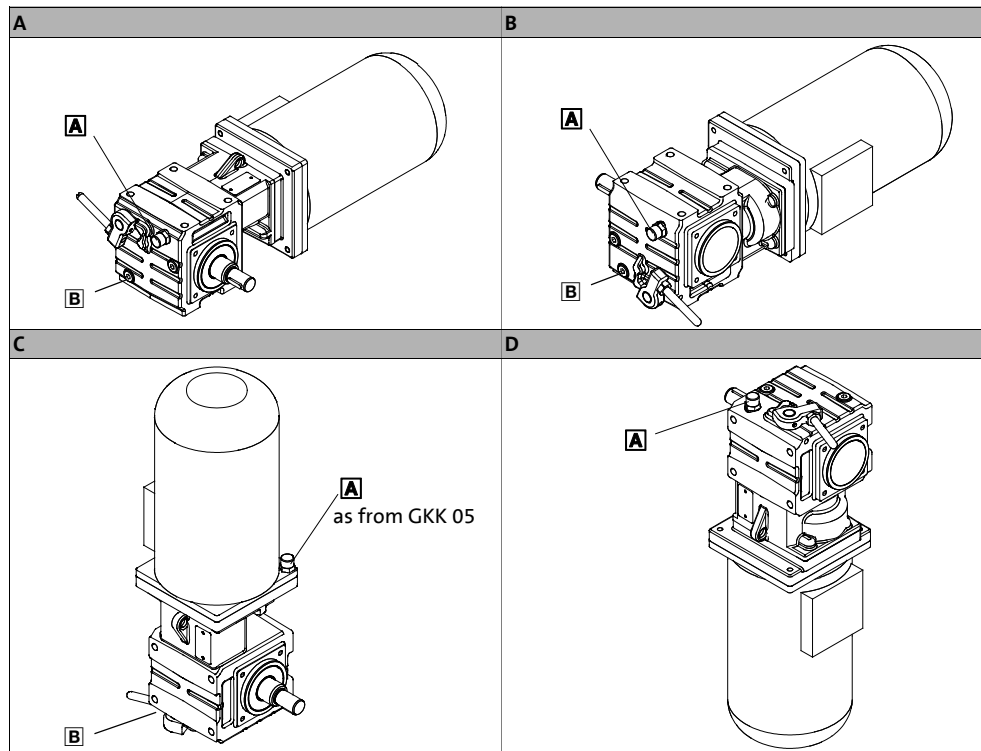
Rotate gearbox to the mounting position specified on the nameplate (📖 16 and 26).

5 Mechanical installation

Mounting

Breather position, oil filling screw and drain plug

5.2.5 Breather position, oil filling screw and drain plug



- A** oil filling screw or breather, if permissible)
- B** Drain plug

**Danger!**

Electrical connections must only be carried out by skilled personnel!

6.1 Motor connection

To correctly connect the motor, please observe:

- the notes in the terminal box of the motor
- the notes in the Operating Instructions of the motor
- the technical data on the motor nameplate.

6.2 Motor options

To correctly connect the motor options, e. g. brakes or feedback systems, please observe:

- the notes in the corresponding terminal box
- the notes in the corresponding operating instructions
- the technical data on the corresponding motor nameplate.

6.3 Frequency inverter connection

To correctly connect the frequency inverter, please observe:

- the notes in the operating instructions of the inverter

7 Commissioning and operation

Before switching on



Stop!

The drive may only be commissioned by skilled personnel!

7.1 Before switching on

Please check:

- That the drive does not show any visible signs of damage.
- Is the mechanical fixing o.k.?
- Has the electrical connection been carried out properly?
- Are all rotating parts and surfaces that may become hot protected against contact?
- If the oil level of the drive was increased for the purpose of longer storage, it now has to be reduced to the quantity intended for the mounting position (📖 22).
- For gearboxes with ventilation:
 - Has the transport locking device been removed?

7.2 During operation

During operation, check the drive periodically and take special care of:

- changes compared to normal operation, like
 - unusual noise, stronger vibrations or increased temperatures,
 - leakages,
 - loose fixing elements,
 - the condition of the electrical cables.
- In the event of faults:
 - shut down the drive,
 - check the troubleshooting table.

If the fault cannot be remedied, please contact the Lenze customer service.

7.3 Clutches at the GKK gearbox

The clutch (jaw coupling) is designed for switching under load. It is arranged in the gearbox between first and second gearbox stage. Disengaging causes an interruption of the power flow between motor and driven shaft so that the driven shaft can be freely rotated.

7.4 Operation of clutch at GKK gearbox

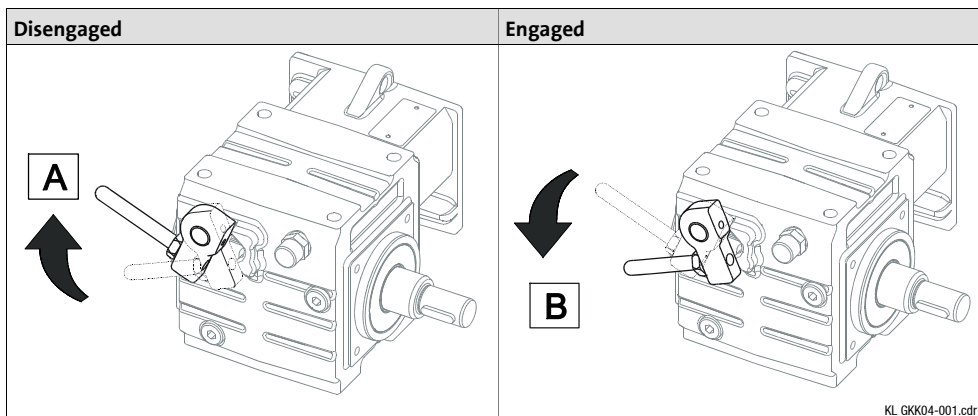


Fig. 2 Positions of the clutch lever in mounting position A

Disengage: Move clutch lever to the stop in direction
Engage: Move clutch lever to the stop in direction

A
B

7.4.1 Switching via clutch lever

The GKK gearbox is suitable for moving into and out of the material in drag conveyors or similar systems of the materials handling technology. During the positioning process, the clutch is switched via clutch lever. Switching is permissible at low speed difference (up to 10 m/min).



Note!

To achieve the highest possible service life of the components involved in the switching process, a speed synchronisation is desirable.

With an integrated frequency inverter in the controller, it is also possible to match the travelling speed of the GKK gearbox to the speed of the drag conveyor so that engaging can be omitted.

7.4.2 Manual switching

The gearbox can be **disengaged** under load during operation.



Note!

Engaging only with motor and driven shaft at standstill.

8 Maintenance

Maintenance intervals

When they are delivered, Lenze gearboxes and geared motors are filled with a drive and type-specific lubricant so that they are ready for production. This initial filling corresponds to a lubricant from the column of the respective Lenze gearbox type. When the order is placed, the mounting position and the design are the decisive factors for the lubricant amount.

8.1 Maintenance intervals

- The mechanical power transmission system is free of maintenance.
- Gearboxes as of size 05 (pre-stages as of size 06) require regular lubricant replacement.
 - The type of lubricant is indicated on the nameplate. Replace the lubricant only with the same type.
 - The lubricant maintenance interval depends on the oil temperature, see Fig. 3.
- Shaft seals and roller bearings:
 - The service life depends on the operating conditions.
 - Replace seals in case of leakage to avoid consequential damage.



Note!

When changing the lubricant, Lenze recommends also changing the grease packing of the bearings and replacing the rotary shaft seals!



Stop!

For drive systems: Also observe the maintenance intervals for the other drive components!

Type	Lubricants		Note
	Specification	Ambient temperature	
CLP 460	Mineral oil with additive compounds	0 °C ... + 40 °C	
CLP PG 460	Synthetic oil (polyglycol)	-20 °C ... + 40 °C	Do not mix with mineral oils!
CLP HC 220 USDA H1	Food-compatible synthetic oil	-20 °C ... + 40 °C	Approval in compliance with USDA-H1

Tab. 2 Overview of lubricant change



Note!

If ambient temperatures are < -20 °C or > +40 °C, please contact Lenze!
Observe increased starting torques at low temperatures!

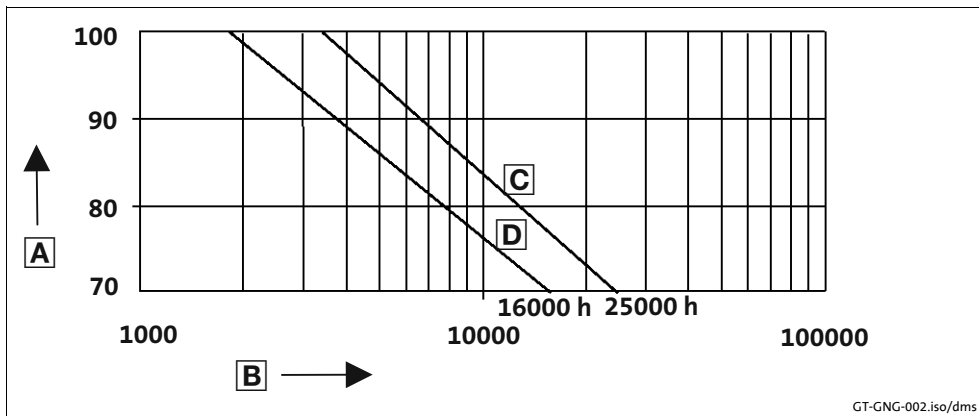


Fig. 3 Lubricant diagram

- | | |
|--|--------------------------------------|
| A Oil sump temperature [°C] | C Synthetic oil CLP HC/CLP PG |
| B Oil life/changing intervals [operating hours h] | D Mineral oil CLP |

8.2 Maintenance operations

8.2.1 Opening the condensation drain hole

Depending on the mounting position, the condensation drain holes are always at the bottom of the motor!

- For condensate drainage
 - the motor must be deenergised;
 - the plugs (screws) must be removed.



Stop!

To restore the enclosure, re-insert the plugs (screws) after condensate drainage. If the condensation drain holes are not sealed again, the IP enclosure of the motor will be reduced. For horizontal motor shafts to IP23 and for vertical motor shafts to IP20.

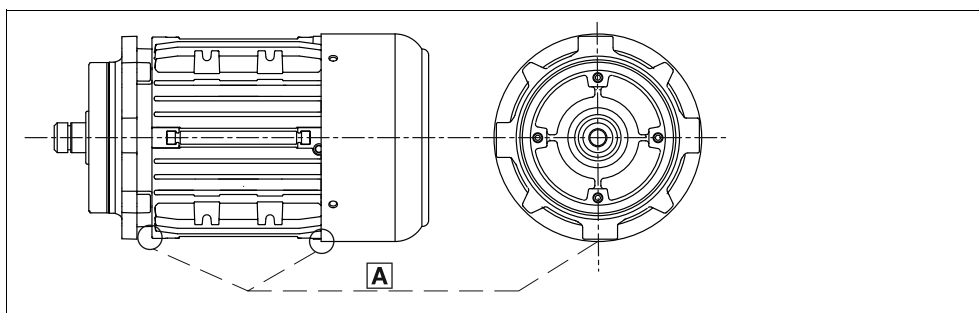


Fig. 4 Motor with condensation drain holes

- A** Condensation drain holes

8 Maintenance

Maintenance operations Lubricate roller bearings

8.2.2 Lubricate roller bearings

The roller bearings of motors and gearboxes from Lenze are filled with the grease listed below:

Roller bearings	Ambient temperature	Manufacturer	Type
GKK gearbox	-30 °C ... +50 °C	Fuchs	Renolit H 443
	-30 °C ... +80 °C	Klüber	Petamo 133N
	-40 °C ... +60 °C	Klüber	Microlube GHY 72
Motor	-30 °C ... +70 °C	Lubcon	Thermoplex 2TML
	-40 °C ... +80 °C	Klüber	Asonic GHY 72

The following lubricant quantities are required:

- For fast-running bearings (motor and drive end of gearbox): fill approx. one-third of the hollow space between rolling bodies with grease.
- For slow-running bearings (in gearbox and driven side of gearbox): fill approx. two-thirds of the hollow space between roller bearings with grease.

8.2.3 Table of lubricants



Note!

Please note that the recommendation of a lubricant/grease or its listing in a Lenze lubricant table does not mean that Lenze is liable for these lubricants or damages resulting from incompatibilities of materials used.

For Lenze drives, the lubricants listed in the lubricant table on the following page are permitted. Special lubricants must be used, for instance for longtime storage or special operating conditions. These corresponding lubricants are available at a surcharge.

For the lubricant selection observe the following legend relating to the lubricant table!

CLP	⇒	Mineral oil
CLP PG	⇒	Polyglycol oil
CLP PAO	⇒	Synthetic hydrocarbons or poly-alpha-olefin oil
CLP E	⇒	Diester oil (water pollution class 1)
1)	⇒	Currently no test results are provided yet for the efficiency of the specified lubricants for worm gearbox lubrication. If these oils are used, the permissible torque must be reduced to 80% of the catalogue values.
2)	⇒	Polyglycol oils cannot be mixed with other types of oil
3)	⇒	For ambient temperatures above 40°C please consult us and specify the exact operating conditions!
4)	⇒	Observe critical starting performance at low temperatures! Temperatures below -25°C require special measures for the motor bearing and NBR shaft sealing rings!
5)	⇒	Ambient temperature range
	⇒	Food-grade lubricant
	⇒	Biopetroleum (lubricant for forestry, agriculture and water supply and distribution)
	⇒	Low-temperature oils, observe critical starting performance at low temperatures!

Maintenance operations
Table of lubricants

	Ambient temperature [°C]			DIN 51517-3: CLP ISO 12925-1: CKC/CKD			Gearbox type GKL, GST, GFL, GKS, GKR, GKK04 ... 06	Gearbox type GSS GKK07
	-50	0	+50					
 Shell	0		+40		CLP	VG 460	Omala 460 From 2011 Omala S2 G 460	
	-25		+50 ³⁾		CLP HC	VG 320	Omala HD 320 From 2011 Omala S4 GX 320	
	-20		+40		CLP PG	VG 220		Tivela S 220 From 2011 Omala S4 WE 220
	-20		+40		CLP PG	VG 460	Naturelle Gear Fluid EP 320	Tivela S 460 From 2011 Omala S4 WE 460
	-20		+50 ³⁾	⚙	CLP E	VG 320		Naturelle Gear Fluid EP 320 ¹⁾
 KLÜBER LUBRICATION	0		+40		CLP	VG 460	Klüberoil GEM 1-460 N	
	-25		+50 ³⁾		CLP HC	VG 320	Klübersynth GEM 4-320 N	
	-20		+40		CLP PG	VG 460		Klübersynth GH 6-460 ²⁾
	-20		+40		CLP PG	VG 220		Klübersynth GH 6-220 ²⁾
	-30		0 ⁴⁾	❄	CLP PG	VG 32		Klübersynth GH 6-32 ^{1) 2)}
	-40		0 ⁴⁾	❄	CLP HC	VG 46	Klüber Summit HySyn FG-46 Klübersynth GEM 4-46 N	
	-20		+40	⚙	CLP HC	VG 220	Klüberoil 4 UH1-220N	
	-20		+50 ³⁾	⚙	CLP E	VG 320	Klübersynth GEM 2-320	Klübersynth GEM 2-320 ¹⁾
 FUCHS	0		+40		CLP	VG 460	Renolin CLP 460	
	-25		+50 ³⁾		CLP HC	VG 320	Renolin Unisyn CLP 320	
	-20		+40		CLP PG	VG 460		Renolin PG 460 ^{1) 2)}
	-20		+40	⚙	CLP E	VG 320	Plantogear 320 S	Plantogear 320 ¹⁾
 Eni	0		+40		CLP	VG 460	AGIP BLASIA 460	
	-25		+50 ³⁾		CLP HC	VG 320	AGIP BLASIA SX 320	
	-20		+40		CLP PG	VG 460		AGIP BLASIA S 460 ^{1) 2)}
 bp	0		+40		CLP	VG 460	Energol GR-XP 460	
	-25		+50 ³⁾		CLP HC	VG 320	Enersyn EP-XF 320	
	-20		+40		CLP PG	VG 220		Enersyn SG-XP 220 ^{1) 2)}
	-20		+40		CLP PG	VG 460		Enersyn SG-XP 460 ^{1) 2)}
 Mobil®	0		+40		CLP	VG 460	Mobilgear 600 XP 460	
	-25		+50 ³⁾		CLP HC	VG 320	Mobilgear SHC Gear 320	
	-10		+50	⚙	CLP HC	VG 460	Mobil SHC Cibus 460	
	-10		+40	⚙	CLP HC	VG 220	Mobil SHC Cibus 220	
	-20		+40	⚙	CLP PG	VG 220		Mobil Glygoyle 220 ^{1) 2)}
	-20		+40	⚙	CLP PG	VG 460		Mobil Glygoyle 460 ^{1) 2)}
 TOTAL	0		+40		CLP	VG 460	Carter EP 460	
	-25		+50 ³⁾		CLP HC	VG 320	Carter SH 320	
 FUCHS LUBRITECH	-10		+50 ³⁾	⚙	CLP HC	VG 460	Cassida Fluid GL 460	
	-20		+40	⚙	CLP PG	VG 220	Cassida Fluid GL 220	
	-40		0 ⁴⁾	❄	CLP HC	VG 46	Cassida HF 46	

8 Maintenance

Maintenance operations Replacing the lubricant

	Ambient temperature [°C]				DIN 51517-3: CLP ISO 12925-1: CKC/CKD			Gearbox type GKL, GST, GFL, GKS, GKR, GKK04 ... 06	Gearbox type GSS GKK07
	-50	0	+50						
		0		+40		CLP	VG 460	Alpha SP 460	
		0		+40		CLP	VG 460	Optigear BM 460	
		0		+40		CLP	VG 460	Tribol 1100/460	
		-25		+50 ³⁾		CLP HC	VG 320	Alphasyn EP 320	
		-25		+50 ³⁾		CLP HC	VG 320	Optigear Synthetic A 320	
		-25		+50 ³⁾		CLP HC	VG 320	Tribol 1510/320	
		-20		+40		CLP E	VG 320	Tribol Bio Top 1418/320	
	-40		0 ⁴⁾			CLP HC	VG 46	Optileb HY 46	
		-25		+50 ³⁾		CLP HC	VG 320	Optileb GT 220	
		-20		+40		CLP	VG 220	Food Proof 1810/220	
		-20		+40		CLP PG	VG 220		Tribol 800/220 ^{1) 2)}
		-20		+40		CLP PG	VG 460		Tribol 800/460 ^{1) 2)}
		-20		+40		CLP PG	VG 220		Alphasyn PG 220 ^{1) 2)}
		-20		+40		CLP PG	VG 460		Alphasyn PG 460 ^{1) 2)}

8.2.4 Replacing the lubricant



Stop!

- Gearbox should be warm.
- Secure drive system and machine from inadvertent movement and mains connection.



Tip!

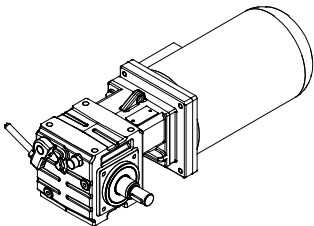
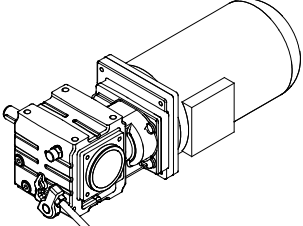
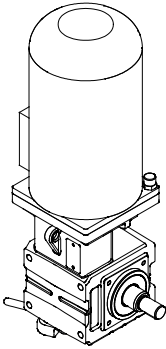
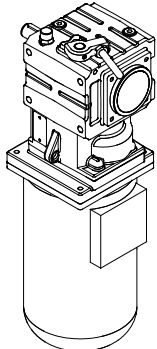
When changing the lubricant, also change the grease packing of the bearings and replace the rotary shaft seals!

1. Place receptacle under oil drain plug.
2. Remove breathing / oil filler plug.
3. Completely drain lubricant by removing the oil drain plug.
4. Reinsert drain plug (if necessary, replace seal).
5. Fill in lubricant through filler hole (quantities see nameplate).
6. Screw in breathing / oil filler plug.
7. Dispose of waste oil according to the applicable regulations.

8.2.5 Lubricant quantity

**Stop!**

At drive speeds below 200 rpm the amount of lubricant may need to be increased. Consultation with Lenze is required.

Lubricant quantities bevel gearbox GKK		
Mounting position	A	B
		
GKK04 V_R	0.8	0.9
GKK05 V_R	1.1	1.3
GKK06 V_R	2.4	3.7
GKK06 V_L	2.5	3.9
GKK06 V_N	2.7	4.2
GKK07 V_R	3.1	5.8
GKK07 V_L	3.2	6.0
GKK07 V_N	3.4	6.3
Mounting position	C	D
		
GKK04 V_R	1.2	0.8
GKK05 V_R	1.8	1.2
GKK06 V_R	5.0	3.1
GKK06 V_L	5.2	3.3
GKK06 V_N	5.5	3.7
GKK07 V_R	6.2	5.0
GKK07 V_L	6.4	5.1
GKK07 V_N	6.7	5.2

Tab. 3 Lubricant quantities in litres; the table values may differ depending on the ratio and drive design.

8.3 Repair

- We recommend having all repairs carried out by the Lenze customer service.

9 Troubleshooting and fault elimination

If any malfunctions should occur during operation of the drive system, please check the possible causes using the following table. If the fault cannot be eliminated by one of the listed measures, please contact the Lenze Service.

Fault	Possible cause	Remedy
Drive is not running	Voltage supply interrupted	Check connection
	Faulty electrical connection	Check that supply voltage matches nameplate data
	Excessive load	Reduce load Check drive-machine assignment
Motor is running, but gearbox is not running	Coupling components are missing or defective	Check mounting
	Gearbox is defective	Inform Lenze Service
	Clutch disengaged	Engage the clutch
Unusual running noises	Overload	Reduce load Check drive-machine assignment
	Damage to the gearbox or motor	Inform Lenze Service
Excessive temperature	Overload	Reduce load Check drive-machine assignment
	Inadequate heat dissipation	Improve cooling air flow Clean gearbox / motor
	Lack of lubricant	Top up lubricant according to regulations
Loose fixing elements	Vibrations	Avoid vibrations
Operating lever collides with path components	Operating lever incorrectly set	Correctly set operating lever
Operating lever does not switch at switch arm		





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