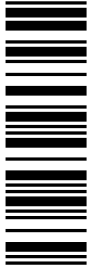
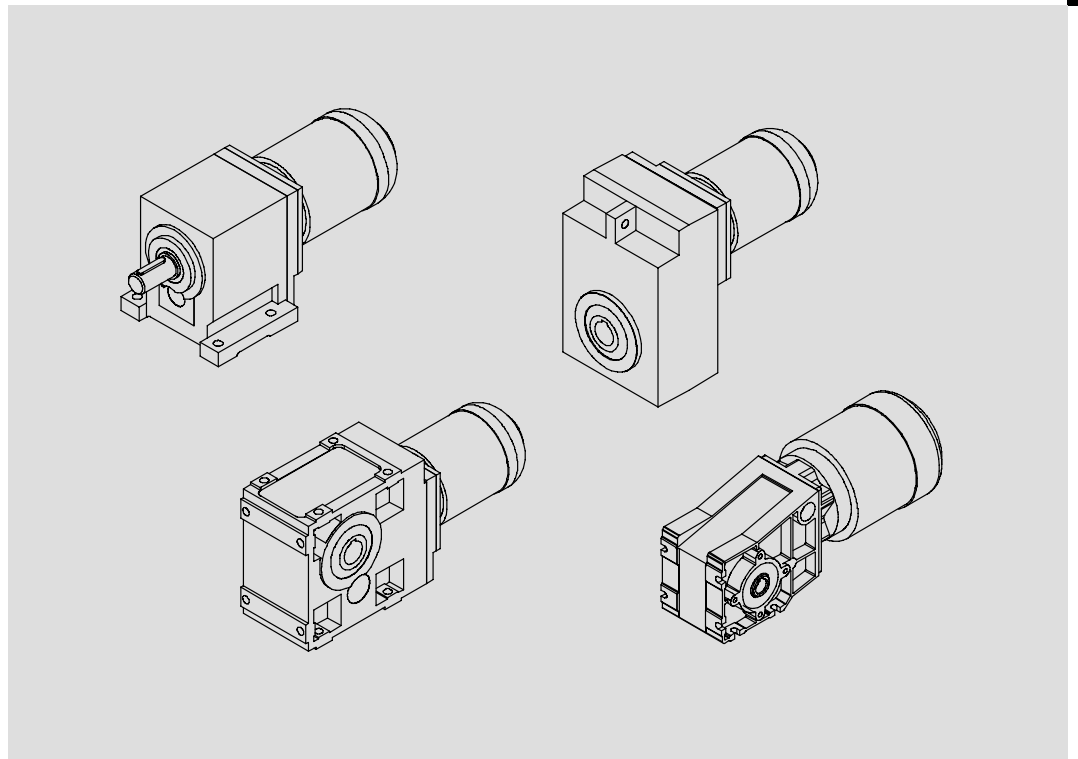


L-force *Geared Motors*



Operating Instructions

G□□



GST, GFL, GKS/GKL, GKR, GSS

Gearbox



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

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1 About this documentation

Contents

- ▶ These Operating Instructions are intended for safety-relevant operations on and with the gearboxes G□□. They contain safety instructions which must be observed.
- ▶ All personnel working on and with the gearboxes G□□ must have the Operating Instructions available and observe the information and notes relevant for them.
- ▶ The Operating Instructions must always be complete and perfectly readable.



Tip!

Information and auxiliary devices related to the Lenze products can be found in the download area at

<http://www.Lenze.com>

Validity

These instructions are valid for the following gearbox types:

Type	Name
GST	Helical gearbox
GFL	Shaft-mounted helical gearbox
GKS/GKL	Helical-bevel gearbox
GKR	Bevel gearbox
GSS	Helical-worm gearbox

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 About this documentation





Document history

1.1 Document history

Material number	Version			Description
00 390 375	1.0	11/1995	TD09	1st edition for pilot series
00 393 076	1.0	03/1997	TD09	Completely revised
00 393 076	1.0	04/2000	TD09	Addendum to Ch. 5.4.1 Preparatory work Updated illustrations for Ch. 5.4.10 Gearbox with breather
00 407 986	1.0	12/2000	TD09	Completely revised Revised product key and position of system blocks Supplement with gearbox 03 Ch. 5.4.12 Gearbox with compensation container in mounting position C Ch. Spare parts list compensation container Changes of lubricant quantities
00 425 604	1.0	08/2001	TD09	Ch. 5.4.8 Assembly of shrink disk cover: new Ch. 5.4.9 Assembly of hoseproof hollow shaft cover: new Supplement with GKR 05
00 425 604	2.0	11/2001	TD09	Changes of lubricant quantities
00 460 708	1.0	12/2002	TD09	Changes of nameplates Supplement with GKR 06 Change of company's name
00 460 708	2.0	02/2003	TD09	Supplement - Warning in Ch. 5
00 476 711	2.1	10/2003	TD09	Changes: Product key and position of system blocks Supplement with Ch. 8.2.2, Roller bearing grease and Ch. 8.2.3, Lubricant table
13124908	3.0	11/2005	TD09	New "geared motor" nameplate included. Revision of the lubricant table
13166718	4.0	08/2006	TD09	Revision of the nameplate marking New nameplate: CSA/UL version Supplement with Ch. Mounting the shrink disc with a rotating cover Revision of the Ch. Position of the breathing, oil filler plug and oil drain plug Addition of the drive sizes: 3F; 4E; 6C and 7C
13290892	5.0	03/2009	TD09	Complete revision
13321528	6.0	10/2009	TD09	Conversion from G-motion to L-force Geared Motors Supplement - Ch. Condensation drain hole
13404748	7.0	11/2011	TD09	Update of the lubricant table Changed lubricant quantities for GST Transport weights extended Table of the roller bearing greases extended

1.2 Conventions used

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

Type of information	Identification	Examples/notes
Spelling of numbers		
Decimal separator	Point	In general, the decimal point is used. For instance: 1234.56
Icons		
Page reference		Reference to another page with additional information For instance:  16 = see page 16
Document reference		Reference to another documentation providing additional information E.g.:  Software manual ...

1.3 Terminology used

Term	In the following text used for
Gearboxes	Gearbox of product family G□□
Drive system	Drive system with gearboxes G□□ and other Lenze drive components

1 About this documentation

Notes used

1.4 Notes used

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

Safety instructions

Structure of 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 troublefree operation
 Tip!	Useful tip for simple handling
	Reference to another documentation

2 Safety instructions

2.1 General safety instructions for drive components

(in accordance 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 safety instructions generally apply to Lenze drive 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 components ...
 - ... must only be used as directed.
 - ... must never be commissioned in the event of visible damage.
 - ... must never be technically changed.
 - ... must never be commissioned before assembly has been completed.
 - ... must never be operated without required covers.
 - ... can include live and rotating parts - depending on their type of protection - during and after operation. Surfaces can be hot.
- ▶ All specifications of the corresponding enclosed documentation must be observed. This is vital for a safe and trouble-free operation and for achieving the specified product features.
- ▶ Only qualified, skilled personnel is permitted to work on and with Lenze drive components.

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

 - ... are familiar with the installation, mounting, commissioning, and operation of the product.
 - ... have the qualifications required for their occupation.
 - ... know and are able to apply all national regulations for the preventions of accidents, directives and laws applicable on site.

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 shocks.
 - Comply with climatic conditions according to the technical data.
- ▶ Before transport
 - Check that all transport locking devices are mounted.
 - Tighten all transport aids.

**Note!**

Do not apply extra loads to the product as the transport aids (such as eye bolts or bearing plates) are designed for the weight of the motor only (refer to the catalogue for the weight).

**Danger!**

Completely screw in transport aids (such as eye bolts or bearing plates), they must be flat and applied over their entire surface!

If possible, the transport aids (such as eye bolts or bearing plates) must be stressed vertically in the direction of the screw axis! Angular tension or tension to the sides reduces the payload! Observe the information provided in the DIN 580!

Use additional appropriate lifting aids, if required, to achieve a direction of loading which is as vertical as possible (highest payload). Secure lifting aids against shifting!

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.

**Stop!**

Observe load carrying capacity!

Staying under floating load is prohibited!

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 a 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 documentation contains notes for the EMC-compliant installation (shielding, earthing, arrangement of filters and installation of the cables). The manufacturer of the system or machine is responsible for the compliance with the limit values required in connection with EMC legislation.
- ▶ 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.

2 Safety instructions

Application as directed

2.2 Application as directed

Low-voltage machines are no household appliances, they are designed as components for industrial or professional use in terms of IEC/EN 61000-3-2 only.

They comply with the harmonised standards of the series IEC/EN 60034.

Low-voltage machines are components for installation into machines as defined in the Machinery Directive 2006/42/EC. Commissioning is prohibited until the conformity of the end product with this directive has been established (follow i. a. IEC/EN 60204-1).

It is only permissible to use low-voltage machines with IP23 protection or less outdoors if special protective measures are taken.

The integrated brakes must not be used as safety brakes. It cannot be ruled out that interference factors which cannot be influenced cause a brake torque reduction.

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

Any other use shall be deemed inappropriate!

2.3 Improper use

- ▶ 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.

2.4 Residual hazards

Protection of persons

- ▶ The motor surfaces can become very hot. Danger of burns when touching!
 - Provide protection against accidental contact, if necessary.
- ▶ High-frequency voltages can be capacitively transferred to the motor housing through the inverter supply.
 - Carefully earth the motor housing.
- ▶ Danger of unintentional starting or electrical shocks
 - Connections must only be made when the equipment is deenergised and the motor is at standstill.
 - Built-in brakes are not fail-safe brakes.

Motor protection

- ▶ Integrated temperature sensors **do not provide full protection** for the machine.
 - Limit the maximum current if necessary. Select parameter settings for the controller which ensure a switch-off if operated at $I > I_r$ after a couple of seconds, particularly if a danger of blocking exists.
 - The integrated overload protection function does not prevent overloading under all circumstances.
- ▶ Built-in brakes are **not fail-safe brakes** .
 - Torque reduction is possible through disruptive factors which cannot be influenced, e.g. through oil ingress due to a defective shaft sealing ring at the A end.
- ▶ Fuses do not protect the motor.
 - Use current-dependent motor protection switches for average operating frequency.
 - Use built-in thermal detectors at high operating frequency.
- ▶ Excessive torques lead to a break of the motor shaft or demagnetisation.
 - Do not exceed the maximum torques according to the catalogue.
- ▶ Lateral forces from the motor shaft are possible.
 - Perfectly align shafts of motor and driving machine 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.

Fire protection

- ▶ Fire hazard
 - Avoid contact with inflammable substances.

2.4.1 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.

2.4.2 Ambient conditions

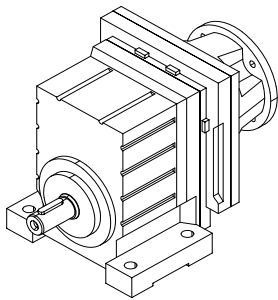
- ▶ Gearboxes are protected against dust and spray water.
- ▶ Motors according to their enclosure (see nameplate and/or Operating Instructions for the motor).
- ▶ Ambient media - especially chemically aggressive - can destroy shaft seals and coatings (plastic). Abrasive media endanger shaft seals.
-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

3 Product description

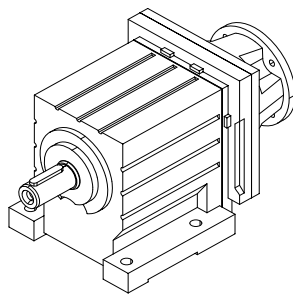
- ▶ The most important technical data are given on the nameplate (structure and contents  page 19 to 21).
- ▶ The product catalogues contain further technical data.

3.1 Identification

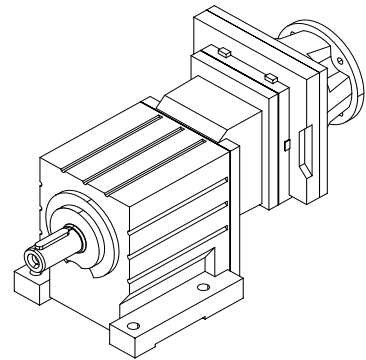
GST



1-stage

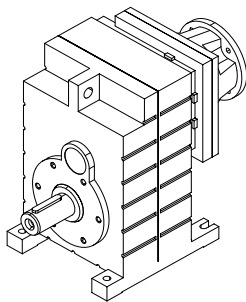


2-stage

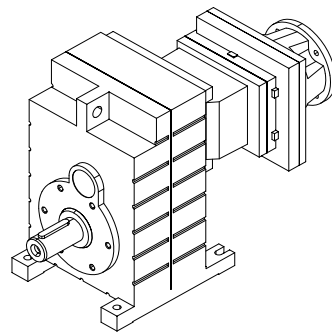


3-stage

GFL

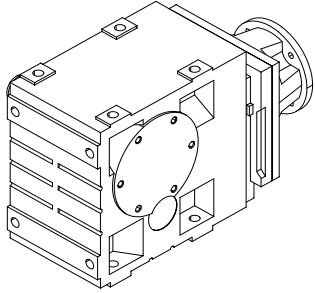


2-stage

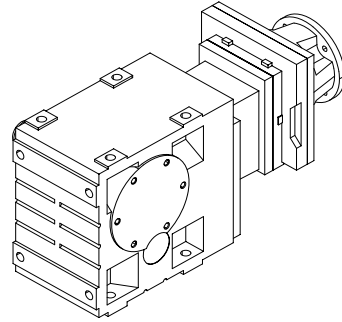


3-stage

GKS

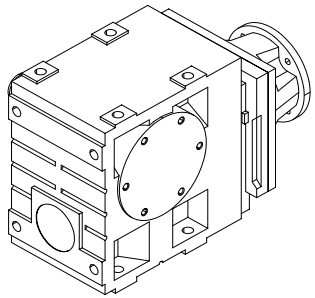


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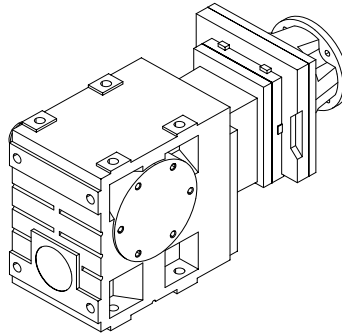


4-stage

GSS

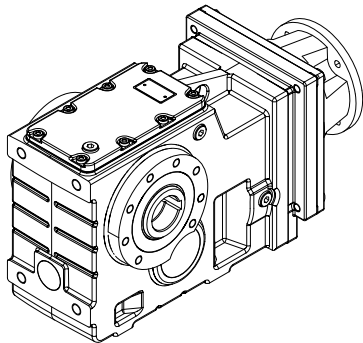


2-stage



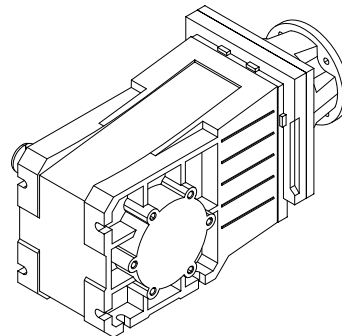
3-stage

GKL



3-stage

GKR



2-stage

3.2 Product features

Design

Drive systems have a modular design.

They consist of:

- ▶ Reduction gearboxes
 - Helical gearboxes
 - Shaft-mounted helical gearboxes
 - Helical-worm gearboxes
 - Helical-bevel gearboxes
 - Bevel gearbox
- ▶ Variable speed drives
- ▶ Motors

Mode of operation

- ▶ Torque and speed conversion

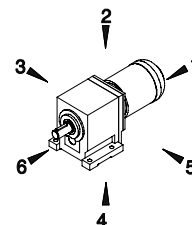
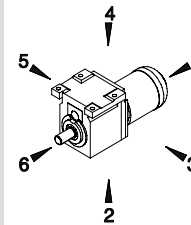
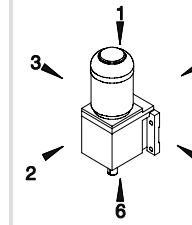
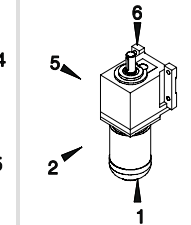
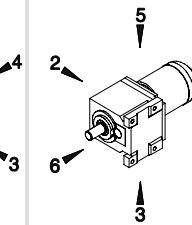
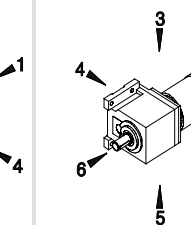
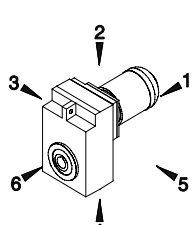
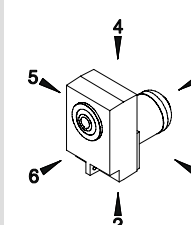
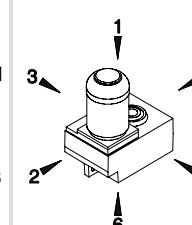
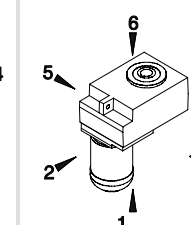
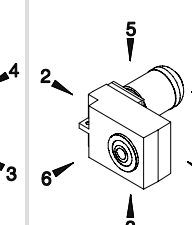
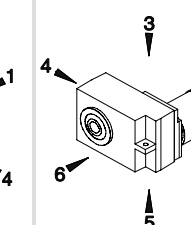
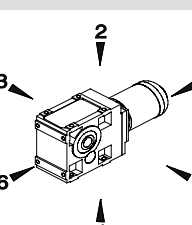
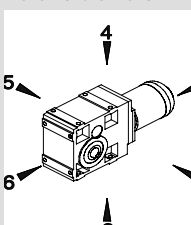
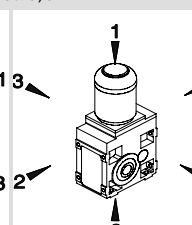
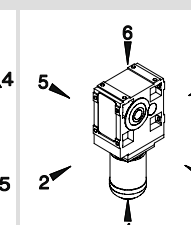
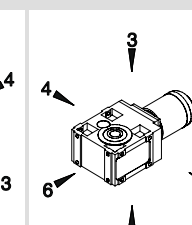
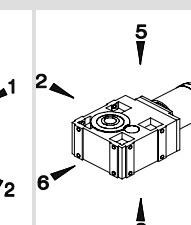
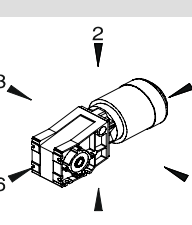
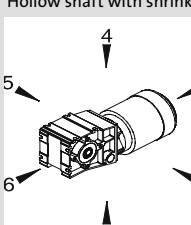
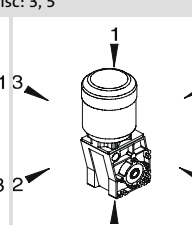
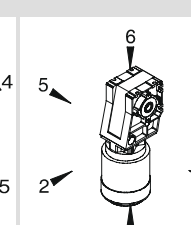
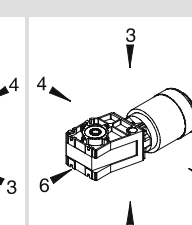
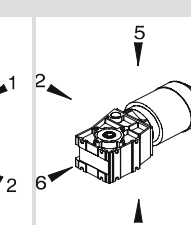
Product family	Pre-stage	1st stage	2nd stage	3rd stage
Helical gearbox	Helical	Helical	Helical	---
Shaft-mounted helical gearbox				---
Helical-bevel gearbox			Helical	
Bevel gearbox	---		Bevel	---
Helical-worm gearbox	Helical		Worm	---

- ▶ The torque reaction must be supported in a suitable manner.

3 Product description

Product features

Mounting position (A-F) and position of system modules (1-6)

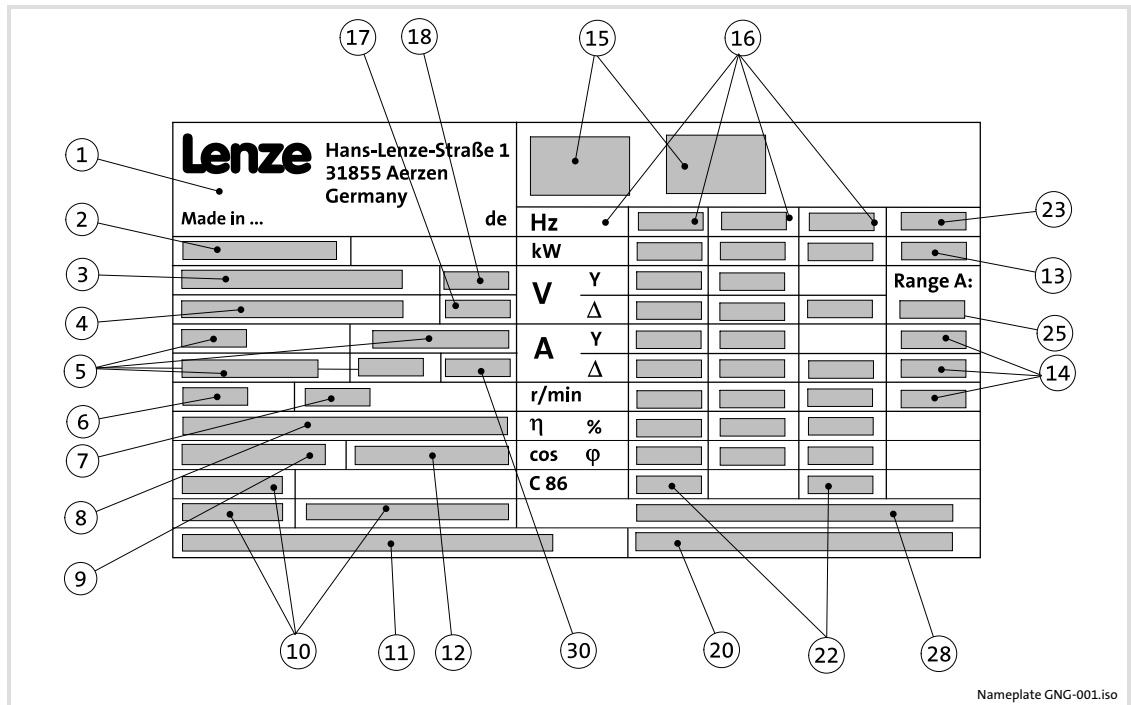
GST		Terminal box, Motec, connector: 2, 3, 4, 5 Without terminal box, Motec, connector: 0					
							
GFL		Solid shaft: 6 Hollow shaft: 0 Hollow shaft with shrink disc: 1, 6		Foot: 3, 4 Without foot: 0		Terminal box, Motec, connector: 2, 3, 4, 5 Without terminal box, Motec, connector: 0	
							
GKS/GSS/GKL		Solid shaft: 3, 5, 8 (3+5) Hollow shaft: 0 Hollow shaft with shrink disc: 3, 5		Flange: 3, 5, 8 (3+5) Without flange: 0		Terminal box, Motec, connector: 2, 3, 4, 5 Without terminal box, Motec, connector: 0	
							
GKR		Solid shaft: 3, 5, 8 (3+5) Hollow shaft: 0 Hollow shaft with shrink disc: 3, 5		Flange: 3, 5, 8 (3+5) Without flange: 0		Terminal box, Motec, connector: 2, 3, 4, 5 Without terminal box, Motec, connector: 0	
							

3.2.1

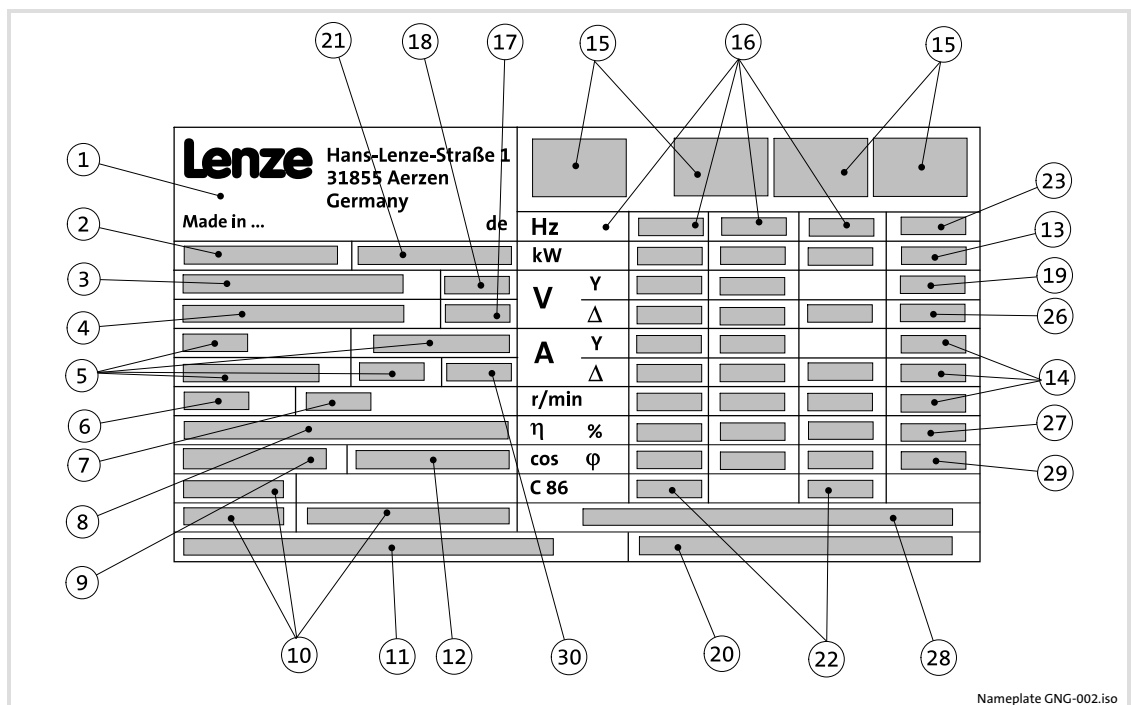
Nameplate

Geared motor

Standard version




CSA/UL version



Product description

Product features

Nameplate

Pos.	Contents	
1	Manufacturer / production location	
2	Motor type / standard	
3	Gearbox type	
4	Motor type	
5	Technical data	Ratio Rated torque Rated speed Rated frequency
6	Mounting position / position of the system blocks	
7	Lubricant	
8	Brake data (if fitted)	Type AC/DC brake voltage Braking torque, electrical power input
9	Feedback / pulse encoder or resolver data (if fitted), see product key  23	
10	Manufacture data	Order number Material number; Serial number
11	Bar code	
12	Rectifier designation	
13	Information on operating mode	
14	Additional motor specifications	Temperature class Enclosure Motor protection
15	Valid conformities, approvals and certificates	CE identification; CCC identification cURus logo / UL file number UL energy efficiency logo
16	Rated data for various frequencies	Hz = frequency kW = motor power r/min. = motor speed V = motor voltage A = motor current η = Motor efficiency: at a rated power of 100% $\cos \varphi$ = motor power factor
17	Application factor (given if < 1.0) / load capacity	
18	Year / week of manufacture	
19	UL file number	
20	Additional customer data	
21	Inverter duty motor	
22	Motor code for controller parameterisation (code 0086)	
23	Efficiency class	
24	Maximum ambient temperature	
25	Grade A = voltage tolerance range according to range A according to IEC/EN 60034-1	
26	CC number of the Department of Energy (optional)	
27	$T_a \leq 40^\circ\text{C}$	
28	Partial load efficiencies for 50Hz operation at a rated power of 50% and 75%	
29	ALR	
30	Weight	

Examples

Three-phase AC motor with square flange for direct gearbox attachment

Standard version

Lenze Hans-Lenze-Straße 1 31855 Aerzen Germany		CE				
Made in Germany	de	Hz	50	60	87	IE2
3~Mot EN60034		kW	5,50	5,50	9,70	S1
GST07-2MVAL-132C12	1127	V	Y	400	460	Range A: +10%/+10%
MHEMABI132-12C1			Δ	230	265	
i=5,2	M2=180 Nm	A	Y	11,9	10,4	Iso.CLF
n2=282,7 r/min	(50Hz)		Δ	20,6	18,0	
A 002	CLP 460	r/min		1470	1775	2580
BFK458-16N 230V AC 103V DC 56W 80Nm		η	%	89,2	90,3	91,8
IG2024-5V-T	BEG-261-460	cos φ		0,77	0,77	0,82
12345678		C 86		1537		1538
15499496	12345678901234	η % (50Hz):89,3 (75%), 88,2 (50%)				

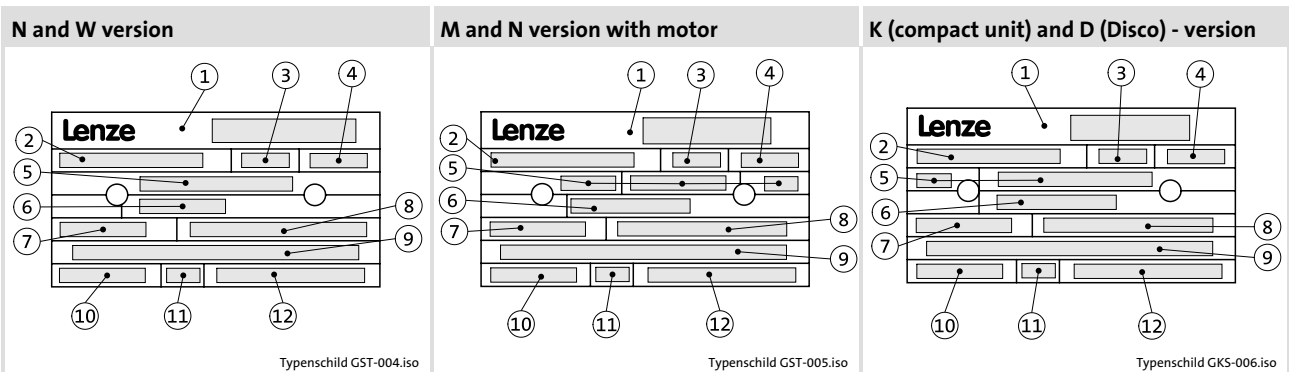
Typenschild-GNG-003.iso/dms

CSA/UL version

Lenze Hans-Lenze-Straße 1 31855 Aerzen Germany		CE				UL		Energy Verified	
Made in Germany	de	Hz	50	60	87	IE2			
3~Mot EN60034	inverter duty Motor	kW	5,50	5,50	9,70	S1			
GST07-2MVAL-132C12	1127	V	Y	400	460	E210321			
MHEMABI132-12C1U			Δ	230	265		400	CC127B	
i=5,2	M2=180 Nm	A	Y	11,9	10,4	Iso.CLF			
n2=282,7 r/min	(50Hz)		Δ	20,6	18,0		20,6	IP54	
A 002	CLP 460	r/min		1470	1775	2580	TKO/KTY		
BFK458-16N 230V AC 103V DC 56W 80Nm		η	%	89,2	90,3	91,8	Ta=40°C		
IG2024-5V-T	BEG-261-460	cos φ		0,77	0,77	0,82	ALR 81		
12345678		C 86		1537		1538			
15499494	12345678901234	η % (50Hz):89,3 (75%), 88,2 (50%)							

Typenschild-GNG-003.iso/dms

Gearbox



Version	N and W version	M and N version with motor	K (compact unit) and D (Disco) - version
Pos.			
1	Production site / country; www.Lenze.com		
2	Gearbox type	Gearbox and motor type	
3	Year of manufacture/ week of manufacture		
4	Mounting position / position of the system modules		
5	Rated torque/rated speed	Rated torque Rated speed/rated frequency Application factor (data if < 1.0)	Operating frequency Rated torque/rated speed
6	Lubricant		
7	Ratio		
8	Material number / serial number		
9	Bar code		
10	Order number		
11	Additional information		
12	Additional customer data		

3.2.2

Product key

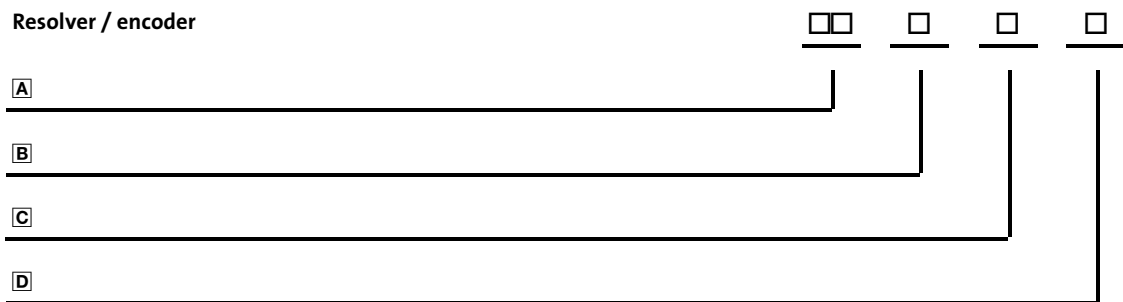
Geared motors



Legend for product key		
A	Gearbox type	GST Helical gearbox GFL Shaft-mounted helical gearbox GKS/GKL Helical-bevel gearbox GKR Bevel gearbox GSS Helical-worm gearbox
B	Gearbox size	
C	Number of stages	
D	Input design	A Servo motor, asynchronous, totally enclosed fan-cooled D Disco variable speed drive E Three-phase AC motor with Motec G SDS three-phase AC motor I Servo motor, asynchronous, internal cooling K Compact unit M Three-phase AC motor N Gearbox with bearing flange for IEC standard motors or NEMA P DC permanent magnet motor 13.12x/SGS Q DC motor, smooth housing, MGFQU/MGFQK R DC motor, ribbed housing, MGFRK S Servo motor, synchronous, totally enclosed fan-cooled T DC shunt motor 13.5xx U Three-phase AC motor 13.71x/13.75x W Gearbox with free drive shaft

Legend for product key			
E	Output design	G	Solid shaft, smooth (without keyway)
		V	Solid shaft (with keyway)
		H	Hollow shaft
		S	Hollow shaft with shrink disk
F		A	Foot mounting, with centering
		B	Foot mounting, without centering
		C	Without foot, with centering
		D	Without foot, without centering
G		R	Without flange
		K	With flange (through holes)
		I	With flange (threaded holes)
H	Drive size Examples	Motor	071C32
		Mounting flange/free input shaft	1C
		Mech. variable speed drive	071-1202C

Feedback system



Legend

A	Type		
	RS	Resolver	
	IG	Incremental encoder	
	IK	Incremental encoder with commutation signal	
	AS	Singleturn absolute value encoder	
AM	Multiturn absolute value encoder		
B	Number		
	0	2-pole resolver for servo motors	
	1	2-pole resolver for three-phase AC motors	
	2, 3, 4...	Number of pole pairs for resolvers	
32, 512, 1024, 2048, ...	Number of steps / increments per revolution		
C	Voltage		
	5 V, 9 V, 15 V, 24 V, ...	Medium supply voltage	
D	Interface or signal level		
	Standard	with safety function	
T	TTL	U	TTL
H	HTL for incremental encoders	K	HTL (for incremental encoders)
H	Hiperface for absolute value encoders	K	Hiperface (for absolute value encoders)
E	EnDat	F	EnDat
S	sin/cos 1 V _{SS}	V	sin/cos 1 V _{SS}

3 Product description

Transport weights

3.3 Transport weights

Gearbox size	Geared motors					
	Motor frame sizes					
	063-□□	071-□□	080-□□	090-□□	100-□□	112-□□
G□□03	< 10	< 10				
G□□04	< 30	< 30	< 40	< 50		
G□□05	< 50	< 50	< 60	< 60	< 70	
G□□06	< 70	< 70	< 80	< 90	< 100	< 125
G□□07		< 125	< 125	< 150	< 150	< 175
G□□09		< 200	< 200	< 225	< 225	< 250
G□□11			< 350	< 375	< 375	< 400
G□□14				< 625	< 650	< 650

Gearbox size	Geared motors					Gearboxes
	Motor frame sizes					
	132-□□	160-□□	180-□□	200-□□	225-□□	
G□□04						< 30
G□□05						< 50
G□□06	< 150					< 70
G□□07	< 200	< 250				< 150
G□□09	< 275	< 325	< 475	< 550		< 250
G□□11	< 425	< 450	< 600	< 700	< 850	< 400
G□□14	< 700	< 750	< 850	< 950	< 1100	< 625


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

4 Technical data

4.1 General data and operating conditions

General data

Conformity and approval

Conformity		
CE	2006/95/EC	Low-Voltage Directive
Approvals		
	File No. E210321	
CCC		

Protection of persons and equipment

Degree of protection	IEC/EN 60034-5	See nameplate Degrees of protection only apply to horizontal installation All unused plug-in connections must be sealed with protective caps or dummy connectors.
Thermal class	F (155 °C) IEC/EN 60034-1	Exceedance of the temperature limit weakens or destroys the insulation
Permissible voltage		According to limiting curve A of the pulse voltage from IEC / TS 60034-25 (image 14)

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 ... +70 °C)	
Storage	IEC/EN 60721-3-1	1K3 (-20 ... +60 °C)	< 3 months
		1K3 (-20 ... +40 °C)	> 3 months
Operation	IEC/EN 60721-3-3	Without brake -15 °C ... +40 °C	Without power reduction
		With brake -10 °C ... +40 °C > +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		Average relative humidity 85 %, without condensation	

Electrical

Motor connection dependent on the controller	See inverter instructions		
Length of motor cable			
Length of cable for speed feedback			

Mechanical

	IEC/EN60721-3-3	3M6
--	-----------------	-----

5 Mechanical installation

Transport equipment for gearbox

5 Mechanical installation



Danger!

Only transport the drive with transport equipment or hoists which are suitable for this load (see transport weights, chapter LEERER MERKER). 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!

5.1 Transport equipment for gearbox

As of size 05, Lenze GST, GKS and GSS gearboxes are as standard available with a transport thread for eye bolts according to DIN 580. The thread position can be seen from the below figures. The eye bolts are not contained in the delivery package.

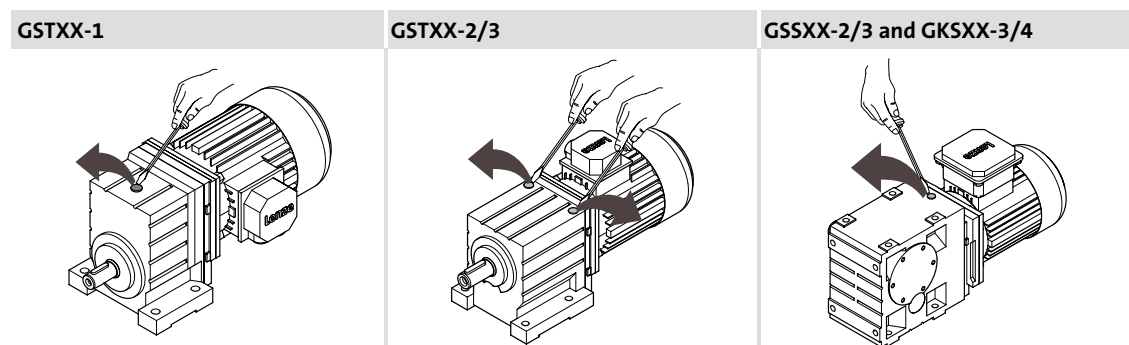

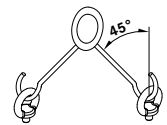


Fig. 1 Eye bolt position



Note!

As standard, threads are delivered with plug screws. The plug can be easily removed, e.g. by using a screwdriver blade. For the thread size and load carrying capacity of the eye bolt, please see Tab. 2.

Gearbox size	Thread	max. load carrying capacity of eye bolt to DIN 580	
		single-strand	two-strand (45°)
			
			<small>GT-GNG-005.iso/dms</small>
05	M8	140	100
06	M8	140	100
07	M12	340	240
09	M16	700	500
11	M20	1200	860
14	M20	1200	860

Tab. 2 Load carrying capacity of eye bolt in kg



Danger!

Completely screw in transport aids (such as eye bolts or bearing plates), they must be flat and applied over their entire surface!

If possible, the transport aids (such as eye bolts or bearing plates) must be stressed vertically in the direction of the screw axis! Angular tension or tension to the sides reduces the payload! Observe the information provided in the DIN 580!

Use additional appropriate lifting aids, if required, to achieve a direction of loading which is as vertical as possible (highest payload). Secure lifting aids against shifting!



Stop!

Observe load carrying capacity!

Staying under floating load is prohibited!

5.2 Storage

If you do not install the gearbox immediately, ensure appropriate conditions of storage.

- ▶ Generally
 - Store gearbox in dry, clean (dust-free) and sunlight-protected indoor rooms.
 - The storage location must be free of vibration and shocks ($V_{\text{eff}} < 0.2 \text{ mm/s}$) to avoid roller bearing downtime damage.
 - Temperature changes with condensate formation must be avoided.
 - Do not activate breather element to prevent air exchange with ambient air.
- ▶ Up to one year:
 - Store the gearbox with breather such that the breather screw is located at the top.
 - Shafts and bright surfaces are delivered with protection against corrosion. Spots with defective corrosion protection must be re-treated.
 - On motors with condensation drain holes (option), the plug screw must be removed (see chapter 5.4.1).
- ▶ Over one year, up to two years:
 - Before storage, shafts and bright surfaces must be provided with a long-term anticorrosive agent (e.g. Anticorit BW 366 from the company Fuchs).
 - Set up gearbox in mounting position A.
 - Fill gearbox with oil grade filled in (see nameplate) up to the top breather / oil bore. Then mount plug screw or breather element (do not activate) again.

5.3 Specified directions of rotation

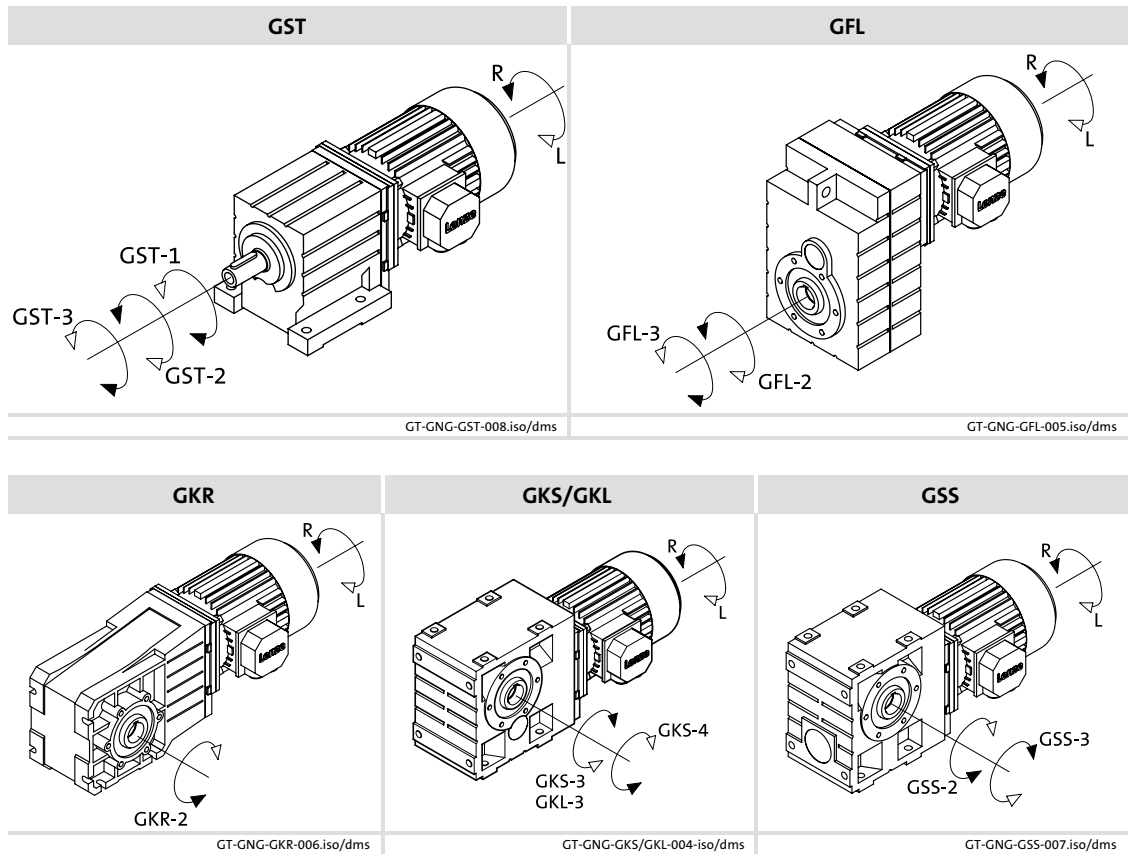


Fig. 2 Direction of rotation of drive

5 Mechanical installation

Mounting
Preparation

5.4 Mounting

5.4.1 Preparation




Stop!

Thoroughly remove anticorrosion agents from output shafts and flange faces.

Correcting the oil quantity

If the oil quantity has been increased in the gearbox for long-term storage (see chapter 5.2), the oil must be completely drained and then filled in again for the corresponding mounting position. The following steps must be observed:

1. Place receptacle under oil drain plug.
2. Remove ventilation / oil filler plug.
3. Completely drain lubricant.
4. Screw in oil drain plug.
5. Fill in oil quantity for the corresponding mounting position ( 66).
6. Screw in ventilation / 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 plug screw. This does not impair the enclosure and the motor is protected against ingress of foreign particles during transport and operation. For further information, please see chapter 8.2.1.

5.4.2 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 the proper state of the drive system. Never install and set up damaged drive systems.
 - Check the combination of drive function and machine functions. Check the direction of rotation (see 5.3).
- ▶ The mounting surfaces must be even, without torsion, and free from vibration.
- ▶ Align the drive system on the mounting surfaces exactly with the machine shaft to be driven.
 - Ensure that the assembly is without torsion to avoid additional load.
 - Compensate for minor misalignments by using suitable flexible couplings.
- ▶ Support the reaction torque appropriately.
- ▶ Fixings of accessories and attachments must be secured against loosening. We recommend that screw connections are glued.

5.4.3 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.

5.4.4 Attachment of motors to gearboxes with bearing housing (input design N)

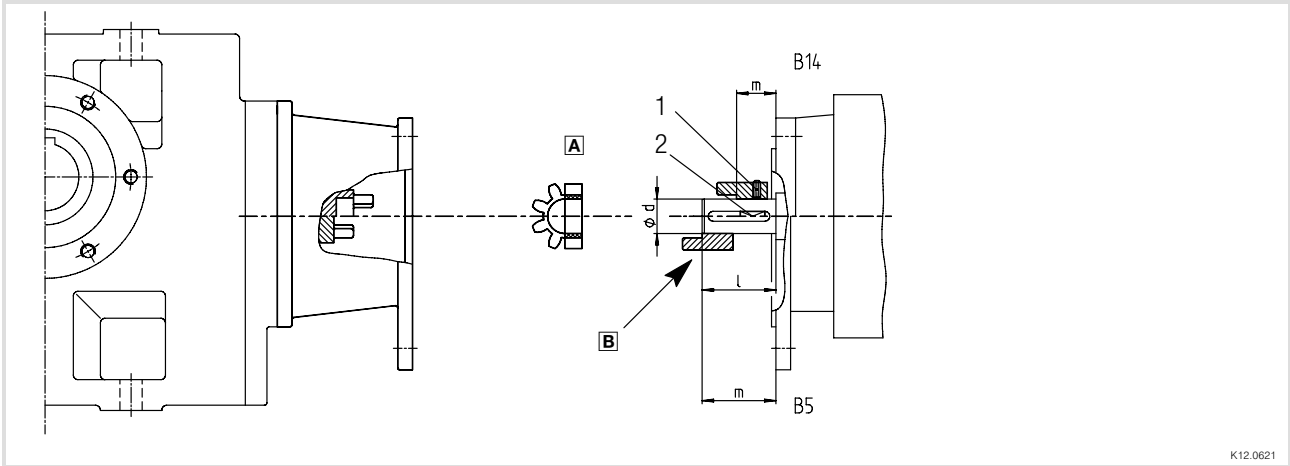


Fig. 3 Input side design N

- A Spider / gear rim
- B Coupling hub
- 1 Locking screw
- 2 Keyway

Drive size	Motor shaft		Assembly dimension M [mm]	Standard hub Locking screw Thread [mm]	Clamping hub		Key ¹⁾ DIN 6885/1 [mm]	Clamping ring hub	
	D [mm]	max. l [mm]			Thread [mm]	Tightening torque [Nm]		Thread [mm]	Tightening torque [Nm]
1A	11	23	23	M4	M3	1.34	*	M3	1.34
1B	14	30	30						
2B	11	23	23						
1C	19	40	25	M5	M6	10.5	B6 x 6 x 16	M4	2.9
2C	14	40	25						
3C	14	40	25						
4C	14	40	25						
6C	11	40	25	---	M4	2.9	B6 x 6 x 16	M4	2.9
7C	19	40	25						
1D	24	50	50						
2D	19	40-50	50	M5	M6	10.5	B8 x 7 x 18	M5	6
1E	28	30-60	30						
2E	24	30-60	30						
3E	19	30-60	30						
4E	24	50	50						
1F	28	30-60	30						
2F	24	30-60	30						
3F	24	50	50						
1G	38	80	80	M6	M8	25	*	---	---
2G	28	60	60						
3G	38	80	80						
1H	42	110	110	M8	M10	69	*	M8	35
2 h	48	110	110						
3H	38	80	80						
1K	55	110	110						
2K	60	140	140						

Tab. 3 Attachment of motors to gearboxes with mounting flange

* Use original key for the motor
¹⁾ Key for standard hub and clamping hub

5.4.5 Coupling hubs

General



Note!

Standard hubs, clamping hubs and clamping ring hubs are maintenance-free. We recommend checking the star-shaped spider and system components when inspecting the drive.

5.4.5.1 Assembly of standard hub / clamping hub

1. Fit motor key (2).
– Fit enclosed key for drive sizes □C, □E, □F.
2. Push the coupling hub over the motor shaft, mounting dimension m (see Fig. 3 and Tab. 3) must be observed.
3. Secure coupling hub against axial movement using the fixing screw or clamping screw (1).
4. Lay spider in the coupling claw on the gearbox side.
5. Align claws of the motor-side coupling hub with its counterpart.
6. Slowly push on motor, and bolt on to the gearbox flange.

5.4.5.2 Assembly of clamping ring hub

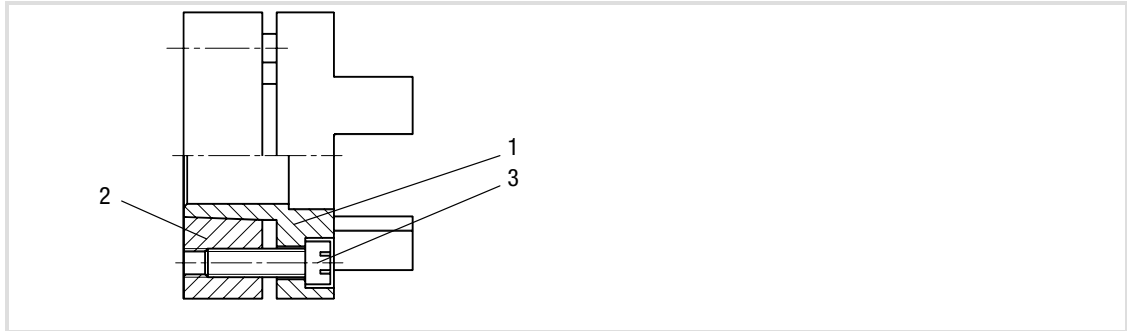


Fig. 4 Coupling

- 1 Clamping ring hub
- 2 Clamping ring
- 3 Clamping screws (DIN912)

**Note!**

The motor shaft must be designed with fit k6.

1. Grease the contact surfaces of the motor shaft using a thin-bodied oil, e. g. “Castrol 4 in 1” or “Klüber Quitsch Ex”!

**Stop!**

Do not use oil or grease with molybdenum-disulphide or high-pressure additives, or grease pastes!

2. Push the coupling hub over the motor shaft, mounting dimension “m” (see Fig. 3 and Tab. 3) must be observed.
3. Align the hub and tighten the clamping screws until they have contact.
4. Tighten the clamping screws evenly and crosswise with gradually rising torque until the indicated tightening torque (see Tab. 3) is reached at all clamping screws. In the intermediate steps, this procedure should also be repeated until the indicated tightening torque is reached at all clamping screws.
5. Lay spider in the coupling claw on the gearbox side.
6. Align claws of the motor-side coupling hub with its counterpart.
7. Slowly push on motor, and bolt on to the gearbox flange.

5.4.5.3 Disassembly of clamping ring hub

1. Loosen the clamping screws evenly one after the other.



Stop!

Each screw must only be loosened by half a revolution per pass! Unscrew all clamping screws by 3 - 4 threads.

2. Remove the screws next to the forcing threads and screw them into the other threads until they have contact.
3. Tighten the screws in the forcing threads crosswise and step-by-step so that the clamping ring is loosened.
4. Clean and grease all contact surfaces including threads and head of the clamping screws before reassembly.

5.4.6 Attachment of gearboxes with hollow shafts and keyway

Mounting

1. Draw the gearbox with hollow shaft onto the machine shaft to be driven:
 - Apply the supplied assembly paste (Fig. 5) on the shaft and in the hollow shaft bore.

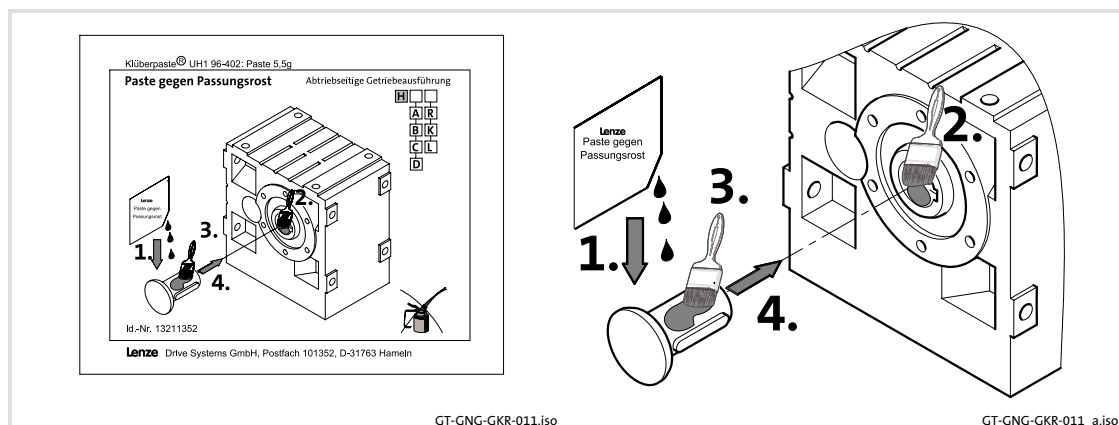


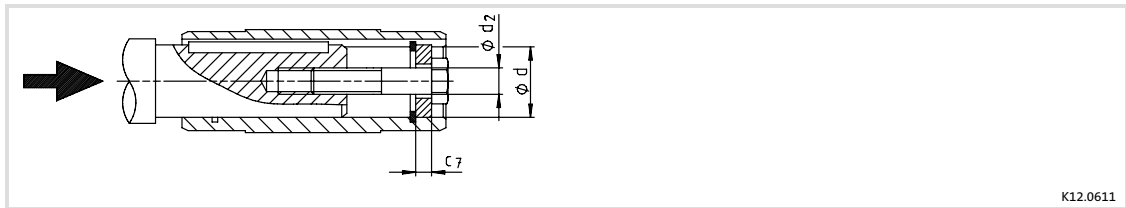
Fig. 5 Application of assembly paste against fretting corrosion (included in the scope of supply)



Stop!

Take up forces only via the hollow shaft, and not via gearbox housing.

2. Secure the gearbox axially:
 - The hollow shaft has snap ring grooves for axial securing. Parts used to fix the shaft are not included in the scope of supply.

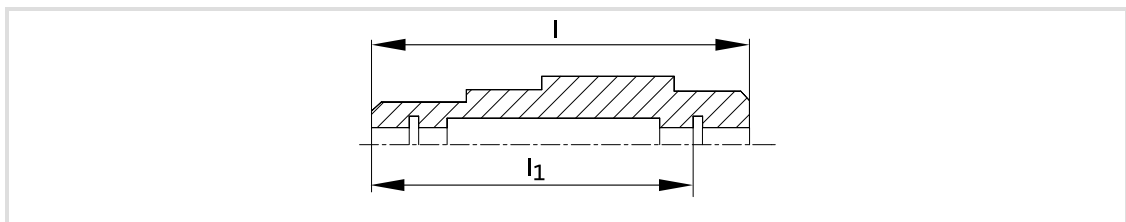


Auxiliary tool (recommended dimensions)		
ϕd^{H7}	d_2	c_7
18	M6	4
20		
25	M10	5
30		6
35	M12	7
40	M16	8
45		9
50	M16	10
55	M20	11
60	M20	13
70		14
80	M20	16
100	M24	24

Tab. 4 Dimensions in [mm]

**Note!**

With bevel gearbox GKR, the hollow shafts are turned free in the middle of the hollow shaft, i.e. the bore diameter is 0.1 mm higher here! A sufficient length of the machine shaft must be observed.



GKR size	l_1 min	l max.
03	85	100
04	105	120
05	127	143
06	150	170

Tab. 5 Dimensions in mm

Dismounting

1. Undo axial gearbox locking in the hollow shaft.
2. Remove/extract the gearbox from the motor shaft using an appropriate auxiliary tool (Fig. 6).

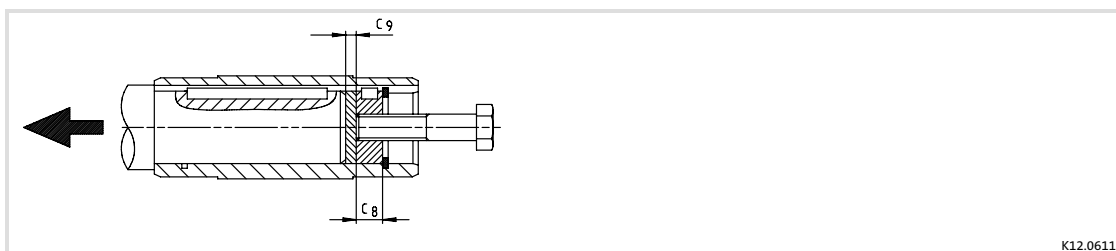


Fig. 6 Dismantling of gearboxes with hollow shaft using the auxiliary tool, not for GKR

Ø d ^{H7}	Auxiliary tool (recommended dimensions)	
	c ₈	c ₉
25	10	3
30		
35	12	3
40	16	4
45		
50	16	5
55	20	
60	20	5
70		
80	20	6
100	24	8

Tab. 6 Dimensions in [mm]

5.4.7 Mounting the shrink disc with a rotating cover



Stop!

Do not dismantle new shrink disc.
 Never tighten clamping screws before the machine shaft is pushed in.
 Otherwise the hollow shaft may be deformed plastically. Protect the shrink disc against contact while in operation by appropriate measures (e.g. cover).
 Degrease hollow shaft bore and machine shaft!

5.4.7.1 Mounting the shrink disc

Depending on the design, the shrink discs may be equipped with a rotating cover (protective cap, pos. 1).

**Note!**

This cover is fitted to the shrink disc on delivery.

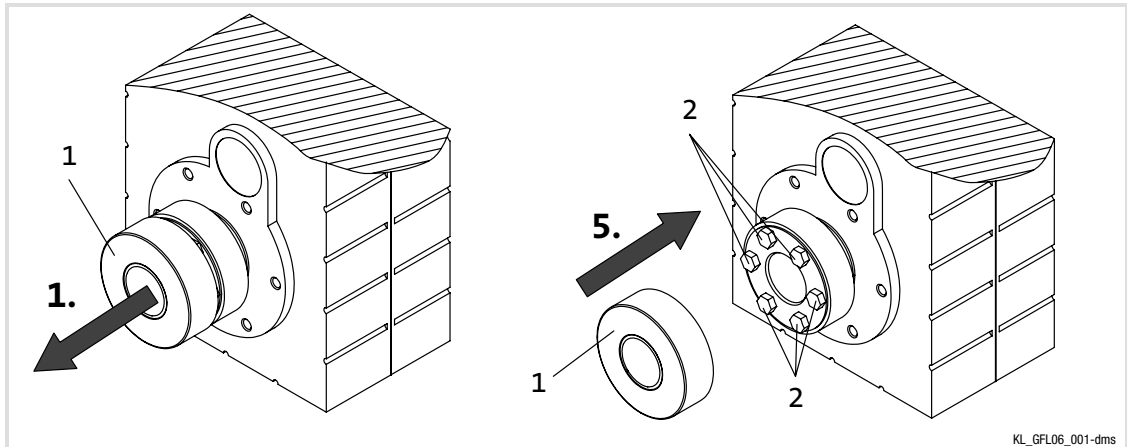


Fig. 7

- 1 Protection cover
- 2 Clamping screws

1. Remove protective cap (1), if available.
2. Check machine shaft
 - Diameter in fit tolerance h6
 - Surface roughness $R_z \leq 15 \mu\text{m}$
3. Thoroughly clean and **degrease** hollow shaft bore and machine shaft.

**Note!**

Thoroughly degrease the bore over the **entire** hollow shaft length to make sure that remainders of the anticorrosion agent will not be carried off into the area of the shrink disc when pushing on the machine shaft.

4. Slightly loosen clamping screws (2) one after the other, do **not** unscrew!
5. Push drive onto machine shaft.
6. Slightly tighten clamping screws manually.
7. Tighten clamping screws (2) one after the other (see Fig. 8) in several passes, with rising torque, evenly until the indicated screw-tightening torque (see Tab. 7) is reached at all screws.

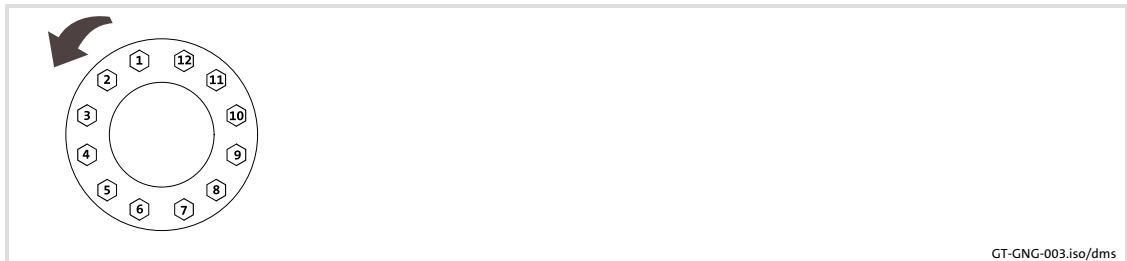


Fig. 8 Explanation: "one after the other"

GT-GNG-003.iso/dms



Tip!

Several (in general more than 5) passes are necessary until the full tightening torque is reached at all screws!

The shrink disc is mounted correctly and fixed when the faces of the outer ring and the inner ring are aligned (Fig. 9). Minimum misalignments are permissible.

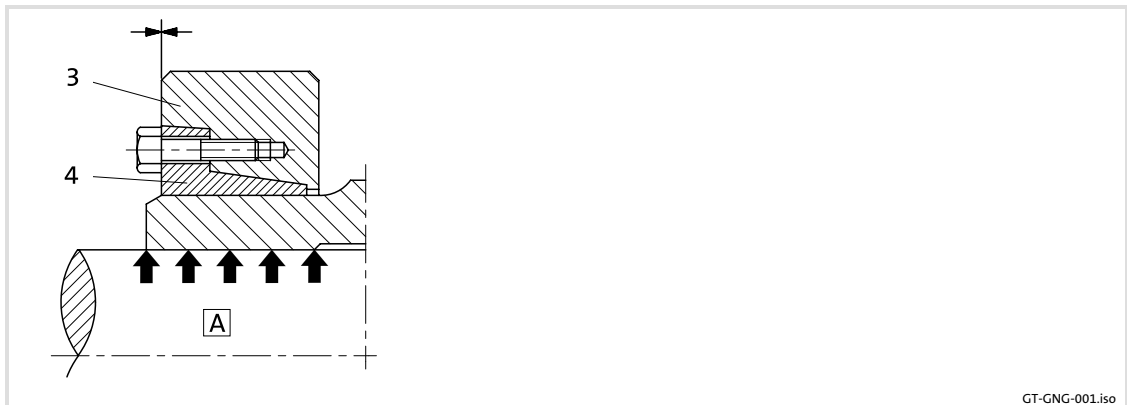


Fig. 9 Hollow shaft with shrink disc

GT-GNG-001.iso

- 3 Outer ring
- 4 Inner ring

A free of grease

Hollow shaft bore [mm]	20	25	30	35	40	50	60	65	80	100
Torque [Nm]	12	30	30	30	30	30	59	70	59	100

Tab. 7 Tightening torque for the clamping screws



Note!

If a different tightening torque is indicated on the shrink disc, this tightening torque has priority over the value indicated in the table.

8. Push protective cap (1, Fig. 7) onto the shrink disc.



Tip!

For finding out the cause of non-reached torques of the shrink disc connection, please go through the troubleshooting list in chapter 9.

Dismounting**Danger!**

Loose drive components or drive components falling down may cause injury to persons or damage to the machine. Secure the drive components **before** disassembly.

1. Remove protective cap (1).
2. Loosen clamping screws (2) evenly one after the other each by $\frac{1}{4}$ revolution in several passes. Do not unscrew clamping screws completely to prevent accidents!
3. Press off outer ring (see Fig. 9), if necessary. For this, loosen the outer ring using the forcing threads and some clamping screws (number corresponding to the forcing threads in the inner ring). For loosening the outer ring, screw in the screws evenly to prevent canting. Press off the outer ring until loosened completely.
4. Remove the drive from the machine shaft.

**Stop!**

Dismantle the shrink disc **only** for cleaning purposes. Afterwards, grease bevel surfaces and screws using a solid lubricant with a friction factor of $\mu = 0.04$.

- ▶ Suitable lubricants on molybdenum-disulphide lubricant (MoS₂) basis are, e.g.:
 - Molykote G Rapid (company Dow Corning)
 - Molykote BR2 Plus (company Dow Corning)
 - Molykombin UMFT1 (company Klüber Lubrication)

Usually, disassembly problems only occur if:

- ▶ the connection is spinning due to overload or a too low friction factor and fretting corrosion has occurred,
- ▶ the shrink disc has been tightened too much leading to a plastic deformation of components,
- ▶ the components are corroded.

5.4.8 Mounting the fixed cover

for size 09, 11 and 14



Note!

This cover is supplied loose on delivery!

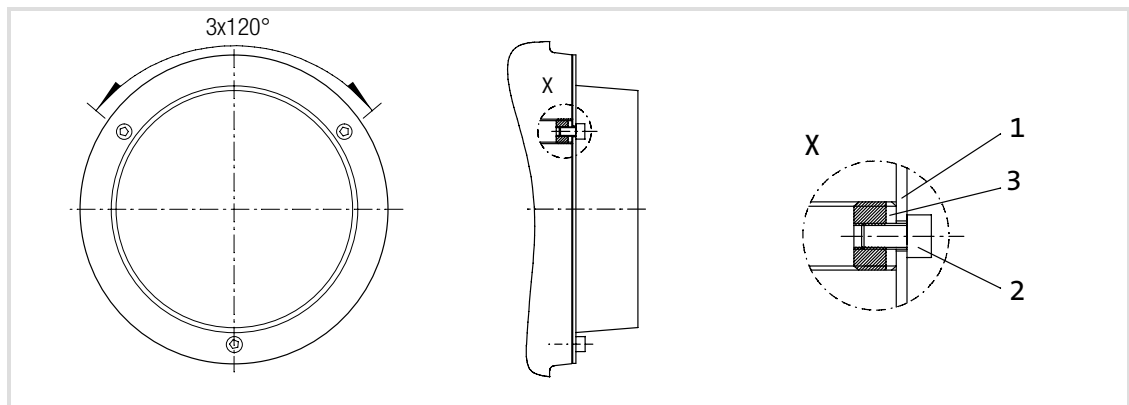


Fig. 10

- 1 Protection cover
- 2 Cheese head screw
- 3 Thread reducing sleeve

1. Screw the three reducing bushes (3) into the flange with a screwdriver so they are **flush** and staggered by 120°.
2. Fasten the protective cap (1) over the reducing bushes (3) on the flange using three cheese head screws (2).

5.4.9 Mounting the hoseproof hollow shaft cover for size 09, 11 and 14

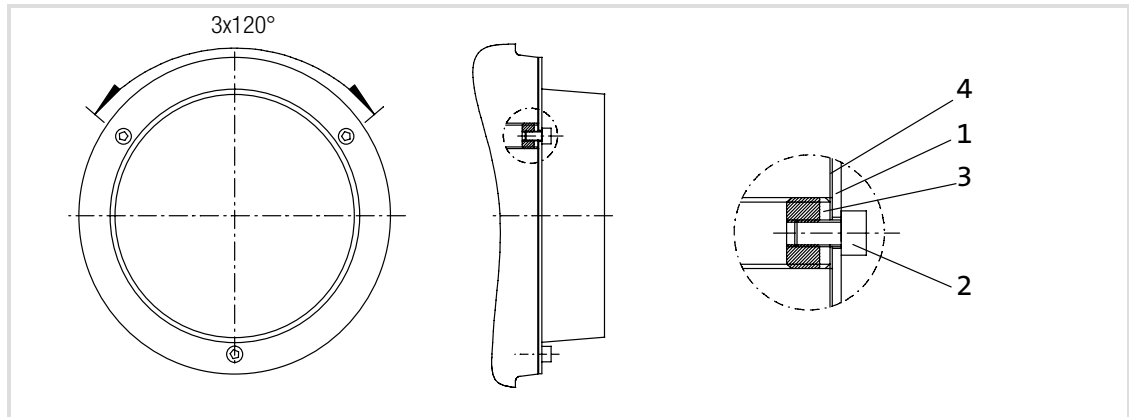


Fig. 11

- 1 Protection cover
- 2 Cheese head screw
- 3 Thread reducing sleeve
- 4 Seal

1. Screw the three reducing bushes (3) into the flange with a screwdriver so they are **flush** and staggered by 120°.
2. Fit seal (4) between flange and protective cap (1).
3. Fasten the protective cap (1) over the reducing bushes (3) on the flange using three cheese head screws (2).

5.4.10 Gearboxes with breathers



Stop!

Do not place gearbox onto breather valve!

When using gearbox sizes 03, 04 and 05 (except for GSS 05) it is not necessary to provide special breathing measures.

Breather elements are mounted for gearbox sizes 06 to 14 and GSS 05. In special cases, they may be done without. When using gearbox sizes 09 to 14 in mounting position C, we recommend the use of an oil compensation container (chapter 5.4.12).

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

Remove shipping bracket on breather valve.



For mounting positions differing from the standard mounting positions A - F, the breather function must be checked. Mount breather elements supplied loose (differing from the standard) as described in chapter 5.4.11. Gearboxes which can be mounted in different positions (see chapter 8.2.6) are supplied without breather element.

Ensure ventilation before initial commissioning!



Stop!

- ▶ Rotate gearbox to the mounting position shown on the nameplate (see nameplate, page 19- 21 and chapter 5.4.11).
- ▶ With gearbox types GST□□-3, GF□□-3, GSS□□-3 and GKS□□-4, the pre-stage is separately ventilated! (Exception: size 06)

5 Mechanical installation

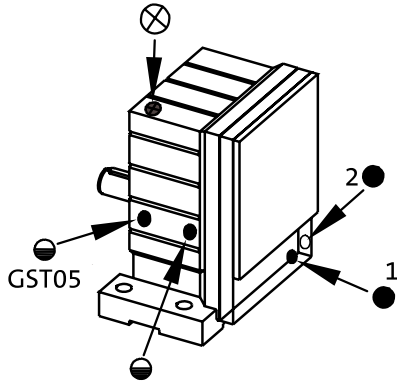
Mounting

Breather position, oil filling screw and drain plug

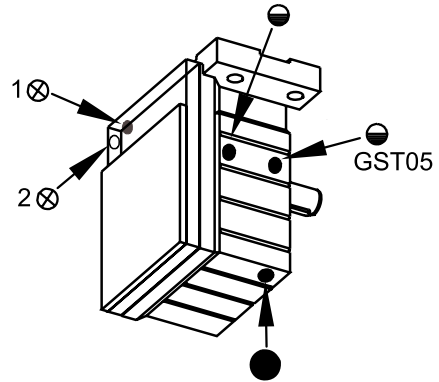
5.4.11 Breather position, oil filling screw and drain plug

Helical gearbox GST 05 ... 09-1

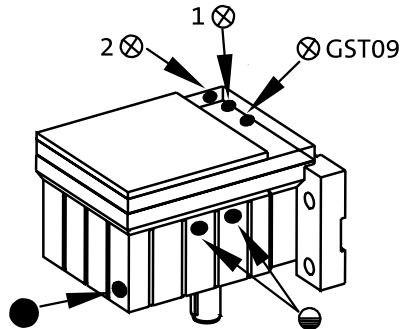
A



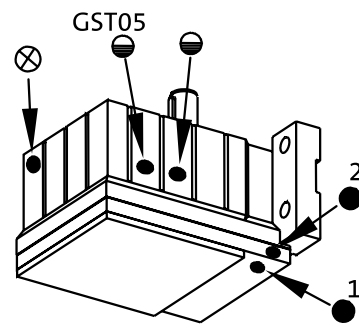
B



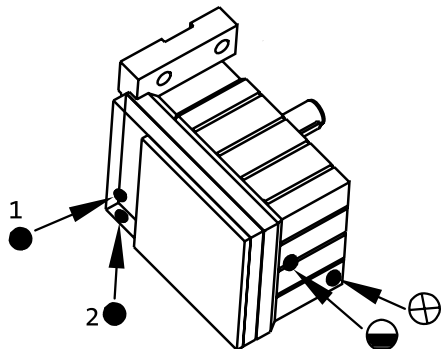
C



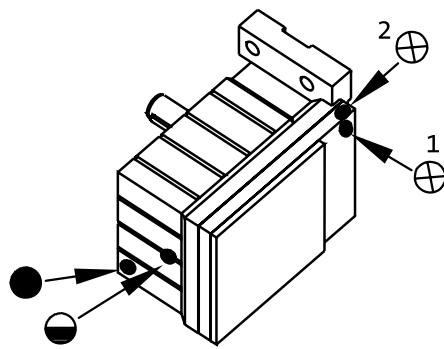
D



E



F



GT-GNG-GST-1-001_A-F.iso/dms

A...F

Mounting positions

*

on both sides

**

opposite

⊗

Breathing / oil filler plug

●

Oil drain plug

◐

Oil-control plug

Pos. 1

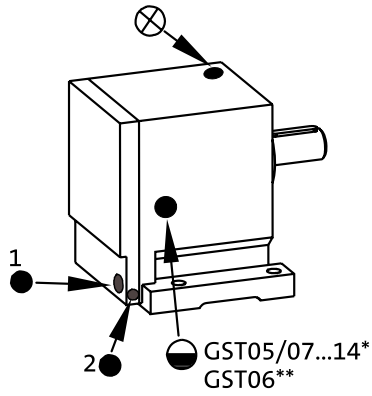
Standard

Pos. 2 only
with:

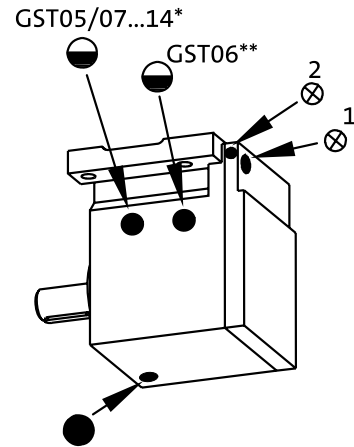
GST05-1A 080C22

Helical gearbox GST 05 ... 14-2, foot mounting

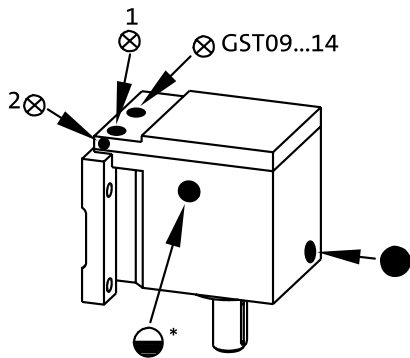
A



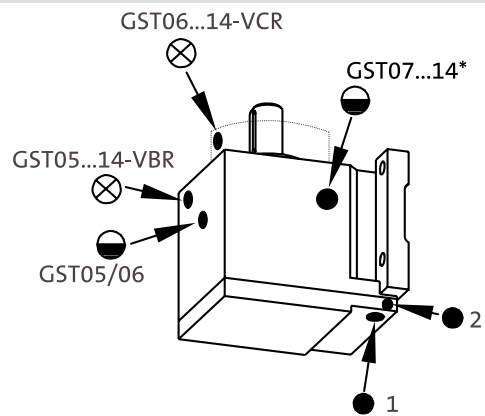
B



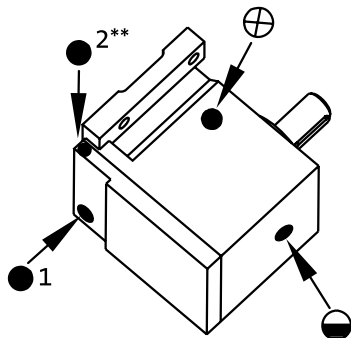
C



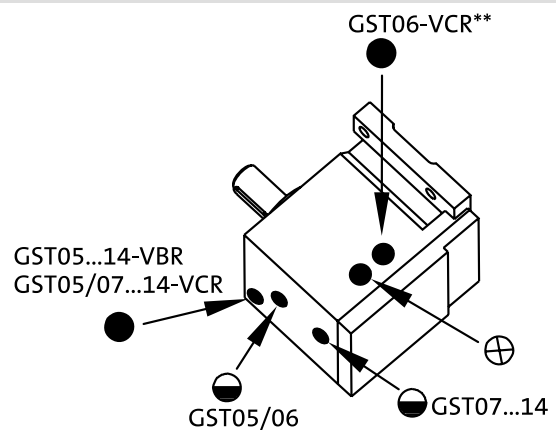
D



E



F



GT-GNG-GST-2-001_A-F.iso/dms

A...F

Mounting positions

* on both sides

** opposite

⊗ Breathing / oil filler plug

● Oil drain plug

◐ Oil-control plug

Pos. 1

Standard

Pos. 2 only
with:

GST05-2M V□□ 090□□

GST05-2M V□□ 100□□

GST06-2M V□□ 112□□

GST07-2M V□□ 160□□

5

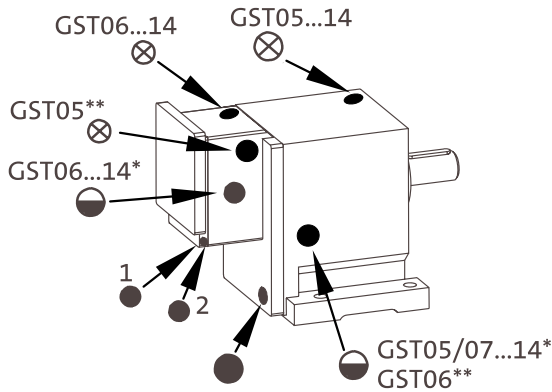
Mechanical installation

Mounting

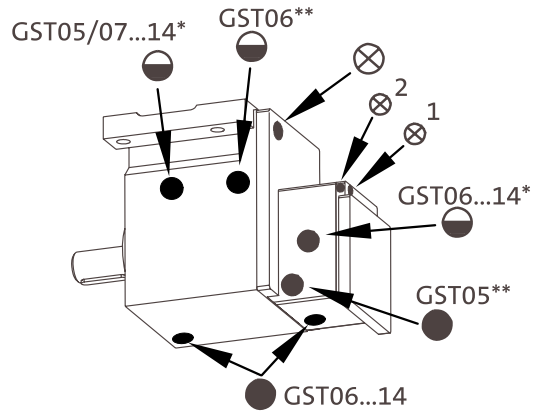
Breather position, oil filling screw and drain plug

Helical gearbox GST 06...14-3

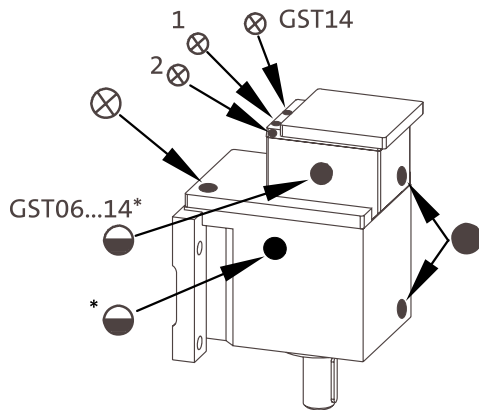
A



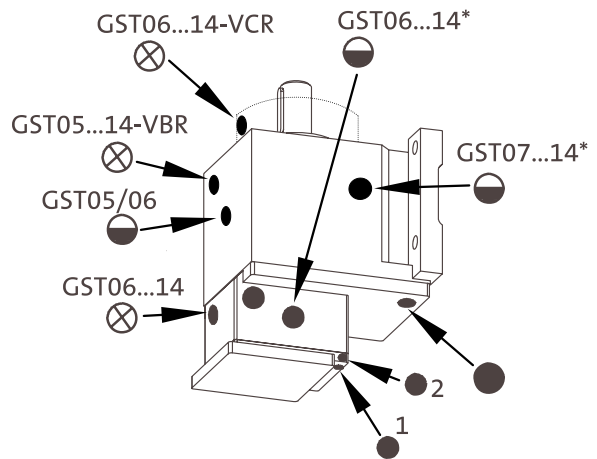
B



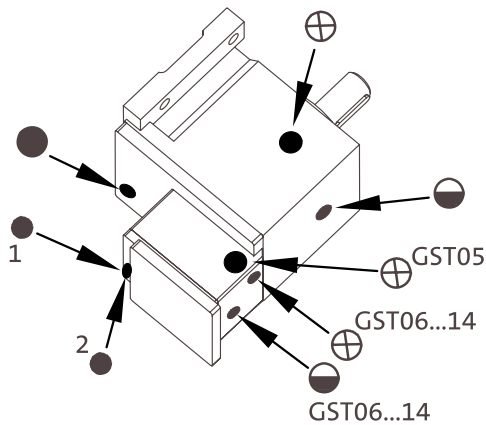
C



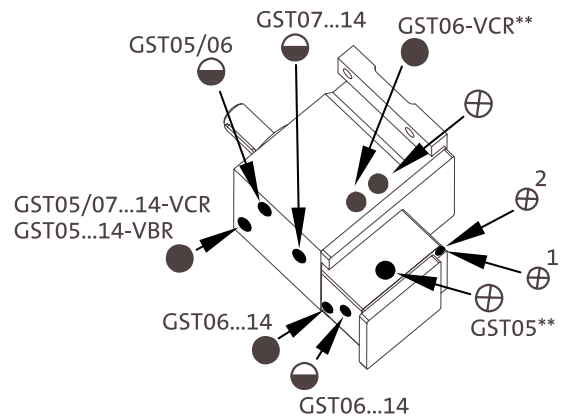
D



E



F



GT-GNG-GST-3-001_A-F.iso/dms

A...F

Mounting positions

*

on both sides

**

opposite

⊗

Breathing / oil filler plug

●

Oil drain plug

●

Oil-control plug

Pos. 1

Standard

Pos. 2 only

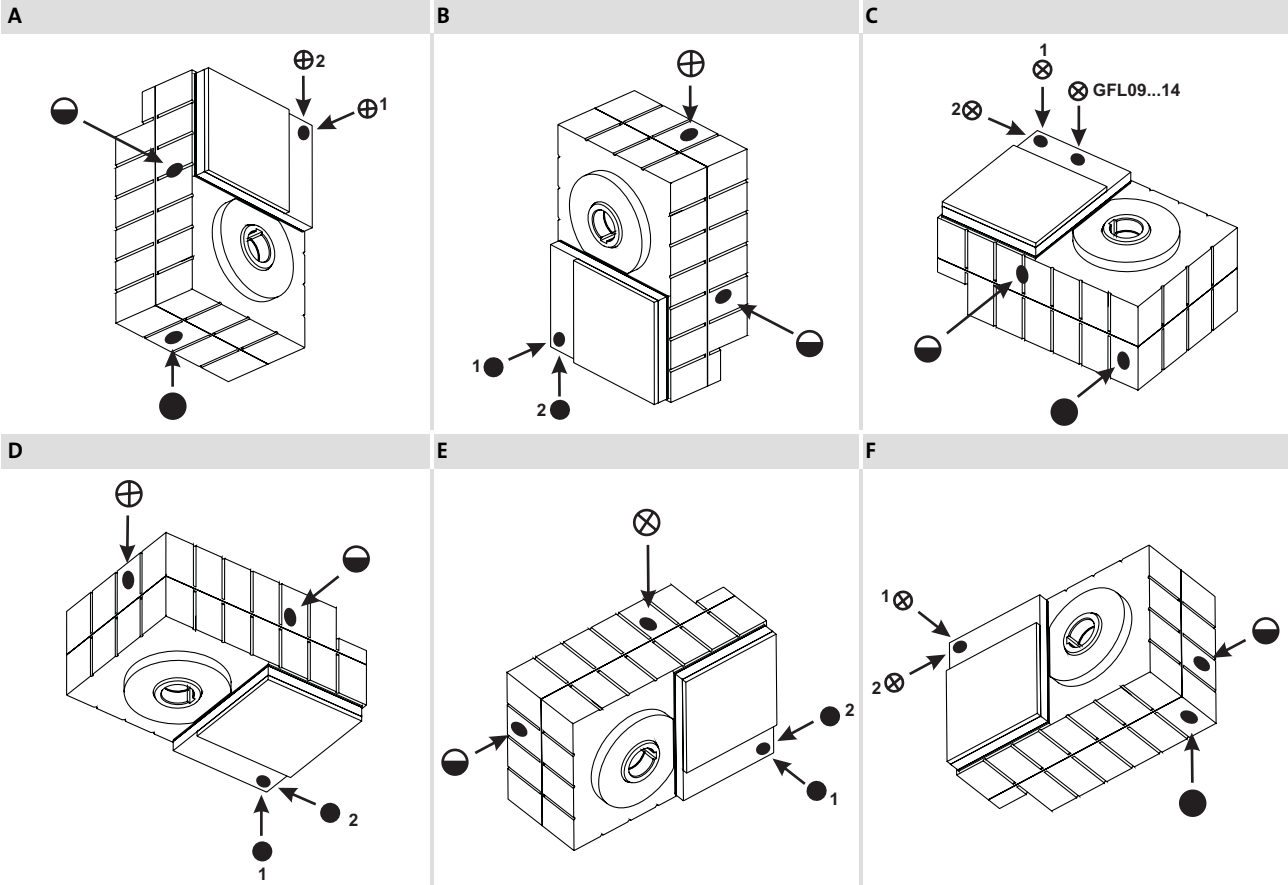
GST05-3M V□□ 090□□□

with:

GST05-3M V□□ 100□□□

GST06-3M V□□ 112□□□

Shaft-mounted helical gearbox GFL 05 ... 14-2



GT-GNG-GFL-2-001.iso/dms

- A...F Mounting positions
- * on both sides
 - ** opposite
 - ⊗ Breathing / oil filler plug
 - Oil drain plug
 - ⊖ Oil-control plug

- | | |
|-------------|---------------------|
| Pos. 1 | Standard |
| Pos. 2 only | GFL05-2M □□□ 090□□□ |
| with: | GFL05-2M □□□ 100□□□ |
| | GFL06-2M □□□ 112□□□ |
| | GFL07-2M □□□ 160□□□ |

5

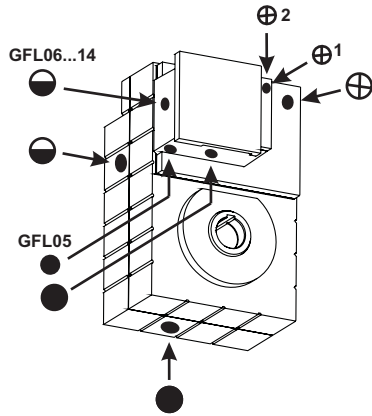
Mechanical installation

Mounting

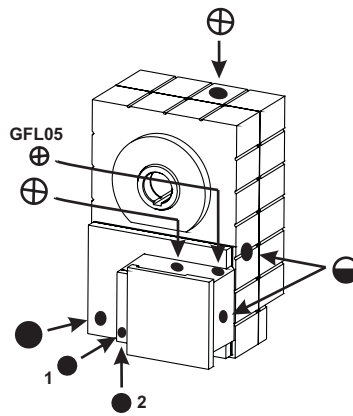
Breather position, oil filling screw and drain plug

Shaft-mounted helical gearbox GFL 06 ... 14-3

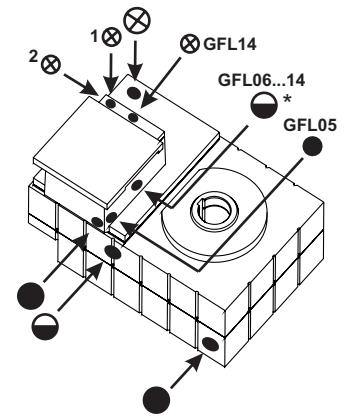
A



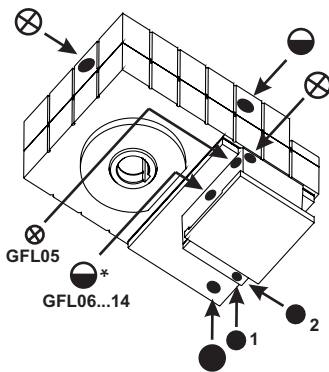
B



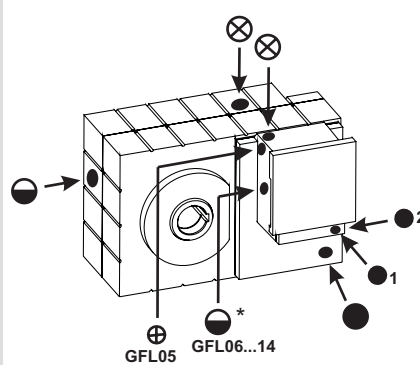
C



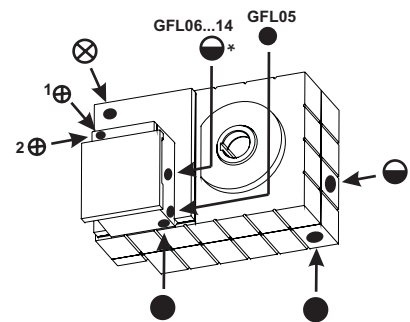
D



E



F



GT-GNG-GFL-3-001.iso/dms

A...F

Mounting positions

Pos. 1

Standard

*

on both sides

Pos. 2 only
with:

GFL07-3M □□□ 090□□

**

opposite

GFL07-3M □□□ 100□□

⊗

Breathing / oil filler plug

GFL09-3M □□□ 112□□

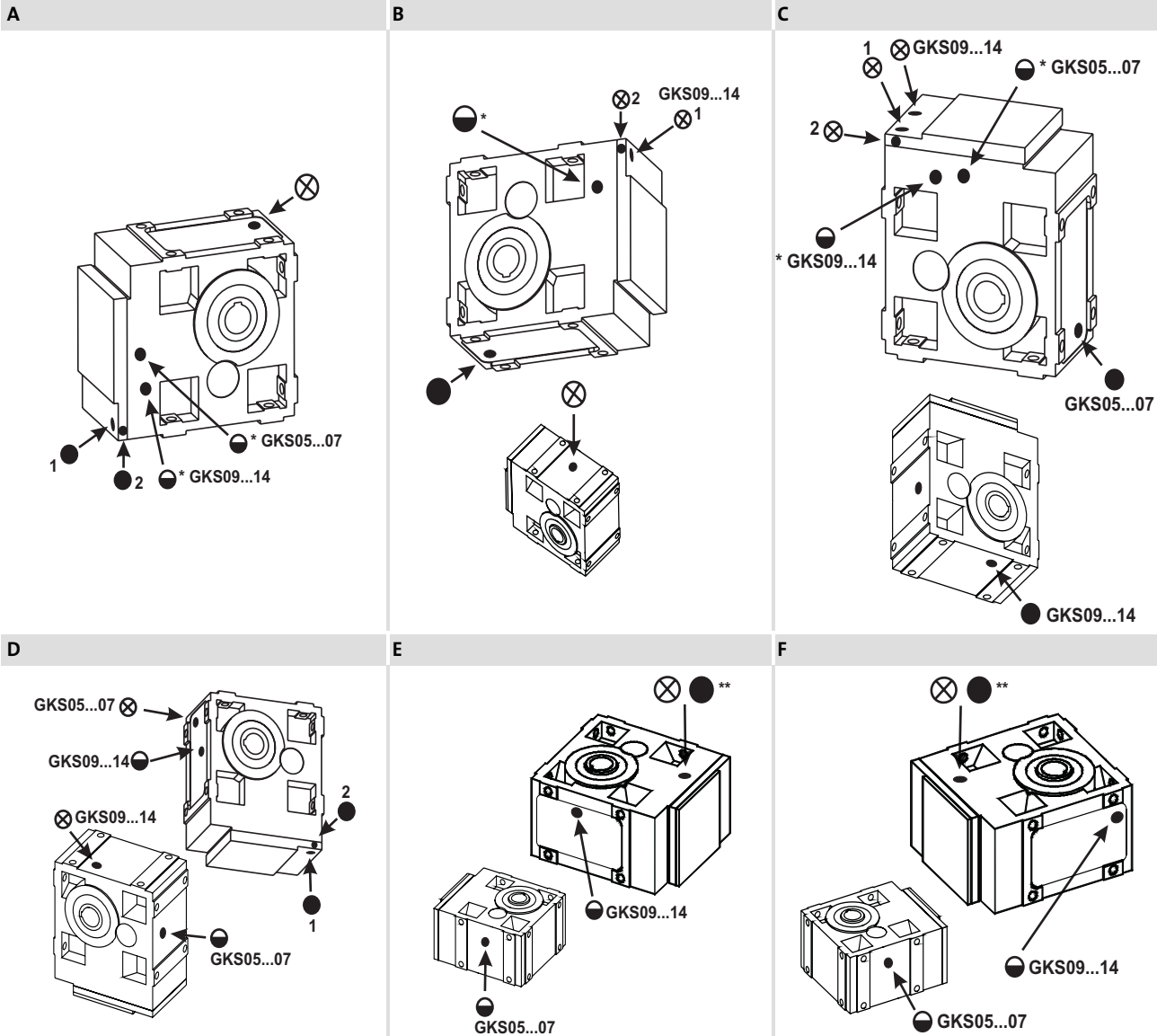
●

Oil drain plug

◐

Oil-control plug

Helical bevel gearbox GKS 05...14-3



GT-GNG-GKS-3-001_A-F:iso/dms

- A...F Mounting positions
 * on both sides
 ** opposite
 ⊗ Breathing / oil filler plug
 ● Oil drain plug
 ◐ Oil-control plug

- Pos. 1 Standard
 Pos. 2 only with:
 GKS05-3M □□□ 090□□
 GKS05-3M □□□ 100□□
 GKS06-3M □□□ 112□□
 GKS07-3M □□□ 160□□

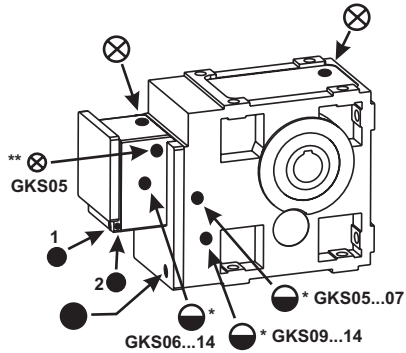
5 Mechanical installation

Mounting

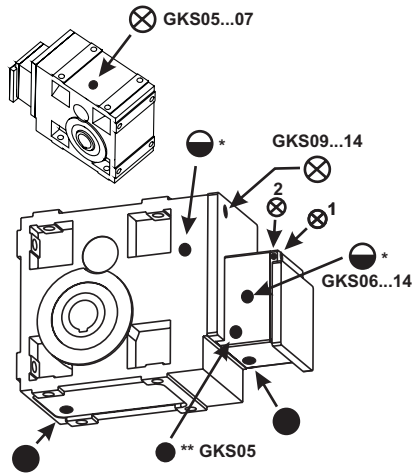
Breather position, oil filling screw and drain plug

Helical bevel gearbox GKS 05 ... 14-4

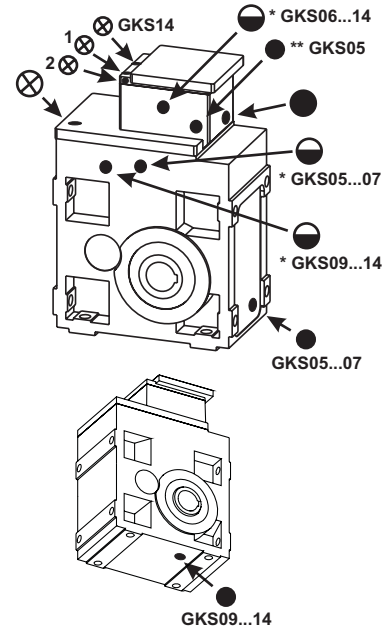
A



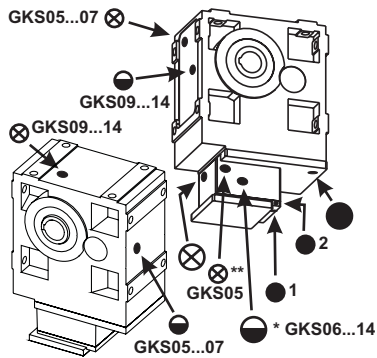
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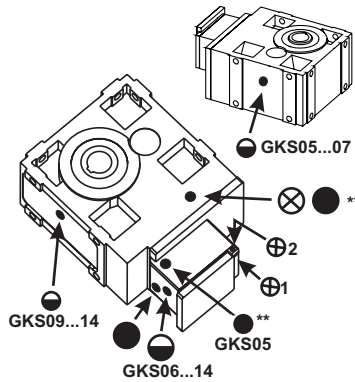
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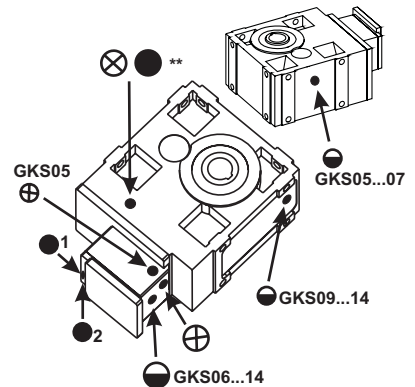
D



E



F



GT-GNG-GKS-4-001_A-F.iso/dms

A...F

Mounting positions

*

on both sides

**

opposite

⊗

Breathing / oil filler plug

●

Oil drain plug

◐

Oil-control plug

Pos. 1

Standard

Pos. 2 only

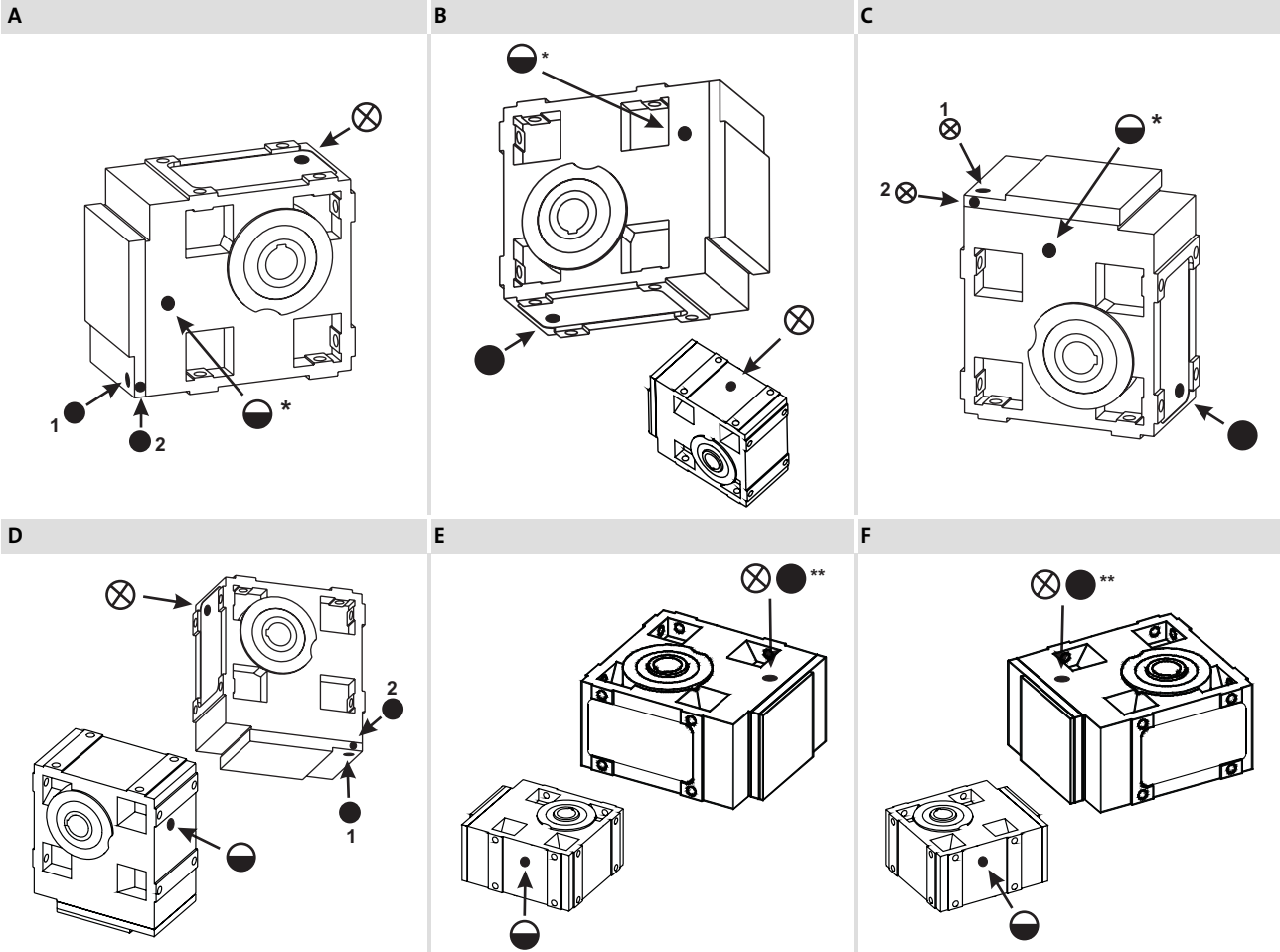
GKS07-4M □□□ 090□□□

with:

GKS07-4M □□□ 100□□□

GKS09-4M □□□ 112□□□

Helical-worm gearbox GSS 05 ... 07-2



GT-GNG-GSS-2-001_A-F.iso/dms

- A...F Mounting positions
- * on both sides
 - ** opposite
 - ⊗ Breathing / oil filler plug
 - Oil drain plug
 - ◐ Oil-control plug

- | | |
|-------------|--------------------|
| Pos. 1 | Standard |
| Pos. 2 only | GSS05-2M □□□ 090□□ |
| with: | GSS05-2M □□□ 100□□ |
| | GSS06-2M □□□ 112□□ |
| | GSS07-2M □□□ 160□□ |

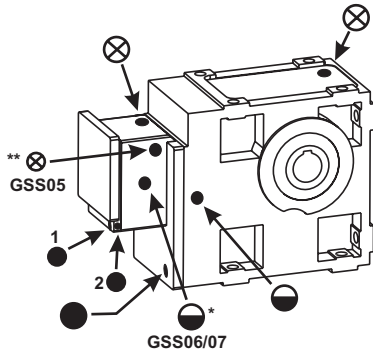
5 Mechanical installation

Mounting

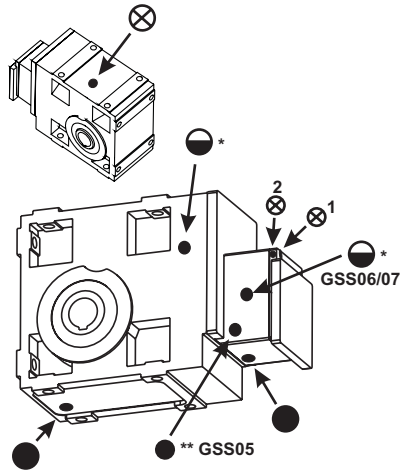
Breather position, oil filling screw and drain plug

Helical-worm gearbox GSS 05...07-3

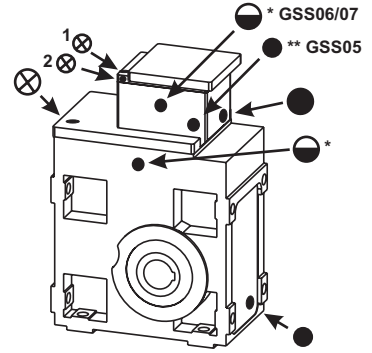
A



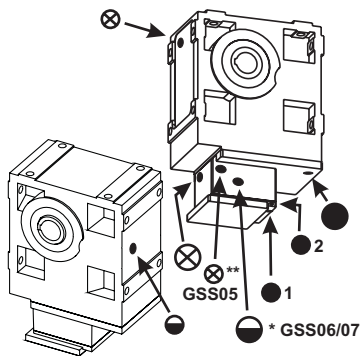
B



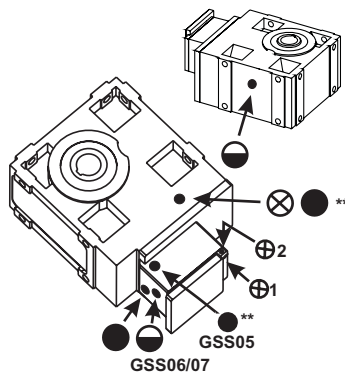
C



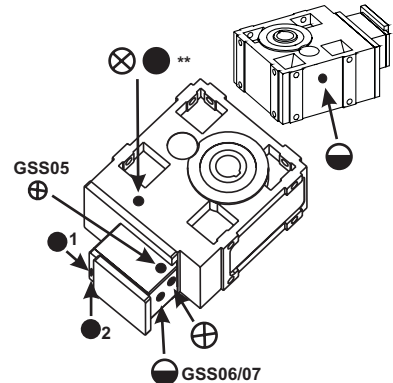
D



E



F



GT-GNG-GSS-3-001_A-F.iso/dms

A...F

Mounting positions

* on both sides

** opposite

⊗ Breathing / oil filler plug

● Oil drain plug

◐ Oil-control plug

Pos. 1

Standard

Pos. 2 only

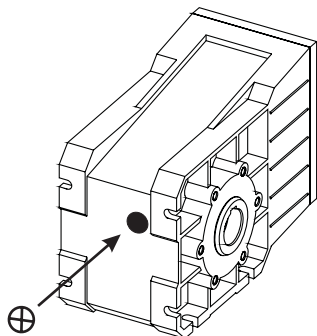
GSS07-3M □□□ 090□□□

with:

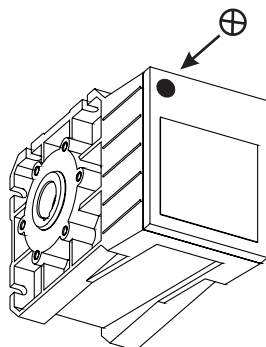
GSS07-3M □□□ 100□□□

Bevel gearbox GKR

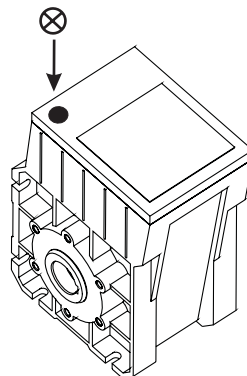
A



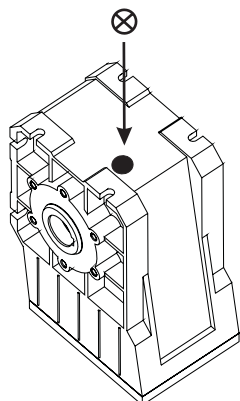
B



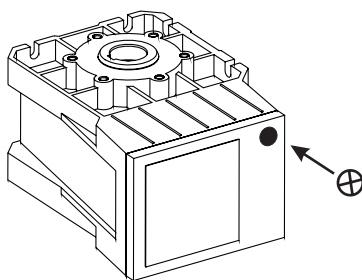
C



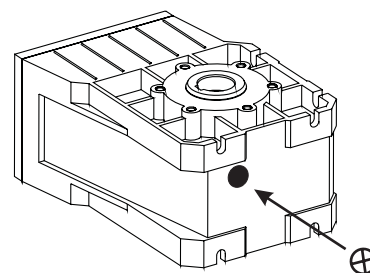
D



E



F



GT-GNG-GKR-2-001_A-F.iso/dms

A...F

Mounting positions



Breathing / oil filler plug

5

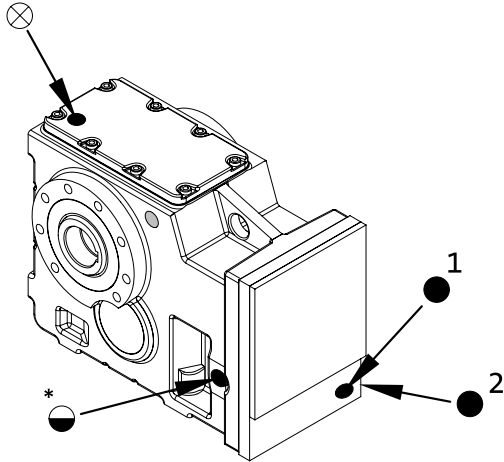
Mechanical installation

Mounting

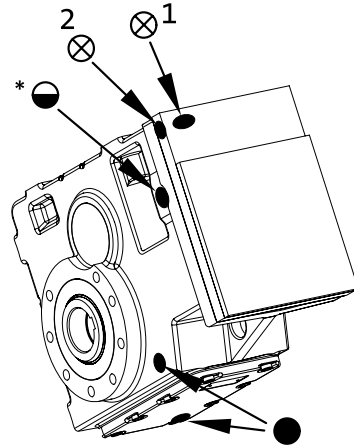
Breather position, oil filling screw and drain plug

Helical-bevel gearbox GKL 07...09-3

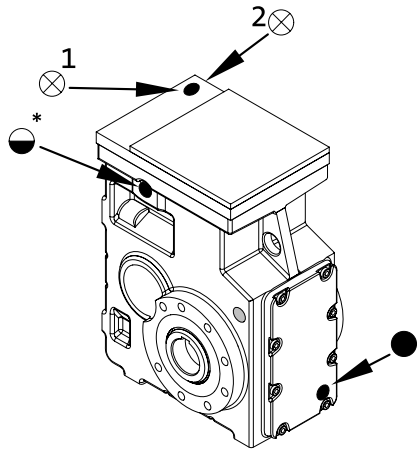
A



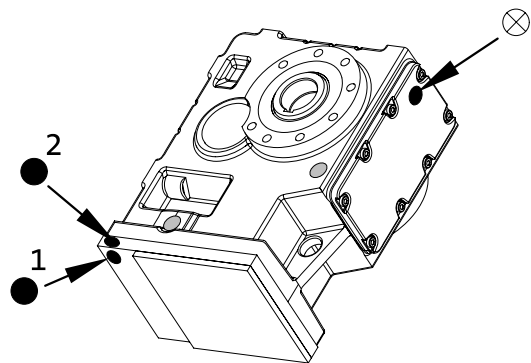
B



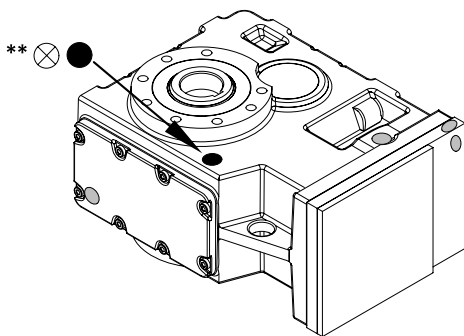
C



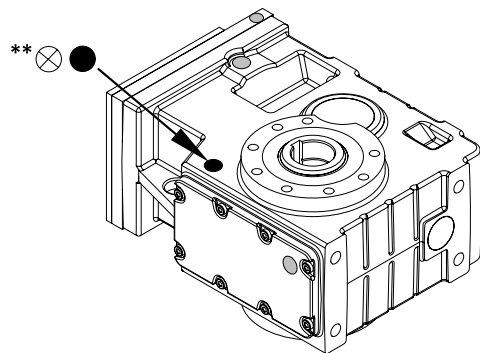
D



E



F



GT-GNG-GKL-001.iso/dms

A...F Mounting positions
 * on both sides
 ** opposite
 Pos. 1 or 2 depending on version

⊗ Breathing / oil filler plug
 ● Oil drain plug
 ◐ Oil-control plug
 ● Sealing plug without function

5.4.12 Gearbox with compensation container for mounting position C

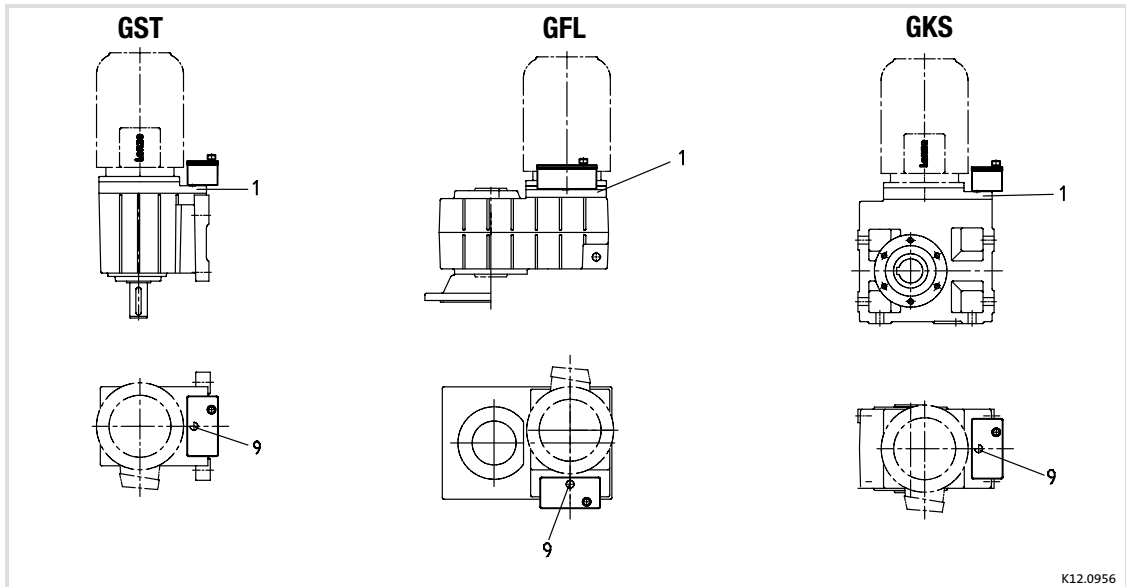


Fig. 12 Position of the compensation container in mounting position C

- | | | | |
|---|--------------------|---|------------|
| 1 | Intermediate cover | 9 | Plug screw |
|---|--------------------|---|------------|

5.4.12.1 Component parts list

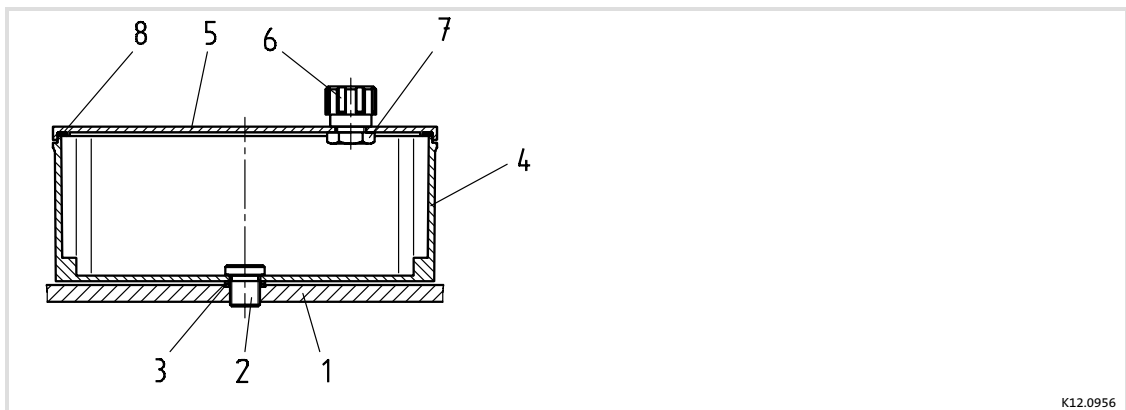


Fig. 13 Component-parts list - compensation container

- | | | | |
|---|--------------------|---|------------------|
| 1 | Intermediate cover | 5 | Cover |
| 2 | Fixing screw | 6 | Breather element |
| 3 | Sealing rings | 7 | Hexagon nut |
| 4 | Housing | 8 | Seal |

Mounting

1. Mount gearbox in mounting position C (motor on top).
2. Remove the plug (9) from the intermediate cover (1).
3. Mount housing (4) using seal (3) and fixing screw (2) to intermediate cover (1) (instead of the plug (9)).
4. Use hexagon nut (7) to bolt the breather element (6) to the cover (5).
5. Mount cover (5) and seal (8) to the housing (4).

**Stop!**

For transport the compensation reservoir must be removed and the plug must seal the gearbox (pos. 9).

6 Electrical installation



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.

7 Commissioning and operation

Before switching on

7 Commissioning and operation





Stop!

The drive may only be commissioned by skilled personnel!

7.1 Before switching on

Please check:

- ▶ Does the drive appear undamaged?
- ▶ 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 has been increased due to storage purposes ( 28), it must be reduced again to the height permissible for the intended mounting position.
- ▶ For gearboxes with breathing:
 - Has the transport locking device been removed?
- ▶ For gearboxes with backstop:
 - Will the motor start to rotate in the correct direction? ( 29)

7.2 During operation



Note!

The helical-worm gearboxes reach their full performance only after a short running-in period of 24...48 hours at rated torque!

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

- ▶ Deviations from normal operation such as
 - abnormal noises, stronger vibrations, or increased temperatures
 - leakages,
 - loose fixing elements,
 - the condition of the electrical cables.
- ▶ If any interference should occur, you have to stop the drive and go through the steps for troubleshooting and fault elimination (chapter 9). If the interference cannot be eliminated, please contact the Lenze Service.

8 Maintenance

Lenze gearboxes and geared motors are filled with a drive and design-specific lubricant filling upon delivery. This original filling corresponds to the lubricant listed in the column of the respective gearbox type from Lenze. The important factors for the lubricant filling on ordering are the mounting position and the design.



Note!

Gearboxes of size 03 and 04 are lubricated for life. Because of the minimum thermal load it is not necessary to replace the lubricant.

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. 14.
- ▶ 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!

Lubricants			
Type	Specification	Ambient temperature	Note
CLP 460	Oil on mineral basis with additives	0 °C ... + 40 °C	
CLP PG 460	Oil on synthetic basis (polyglycol)	-20 °C ... + 40 °C	Do not mix with mineral oil!
CLP HC 220 USDA H1	Food-compatible oil on synthetic basis	-20 °C ... + 40 °C	Approval acc. to USDA-H1
CLP HC 320 CLP HC 220	Oil on synthetic basis (synthetic hydrocarbon)	-25 °C ... + 50 °C	Can be mixed with residual mineral oil
CLP HC 46	Oil on synthetic basis (synthetic hydrocarbon)	-40 °C...0 °C	Good cold-flow behaviour
CLP PG 220 USDA H1	Food-compatible oil on synthetic basis	20 °C ... + 40 °C	Approval acc. to USDA-H1

Tab. 8 Overview of lubricant change



Note!

In case of ambient temperatures $< -20^{\circ}\text{C}$ or $> +40^{\circ}\text{C}$, please contact Lenze!
Observe increased starting torques at low temperatures!

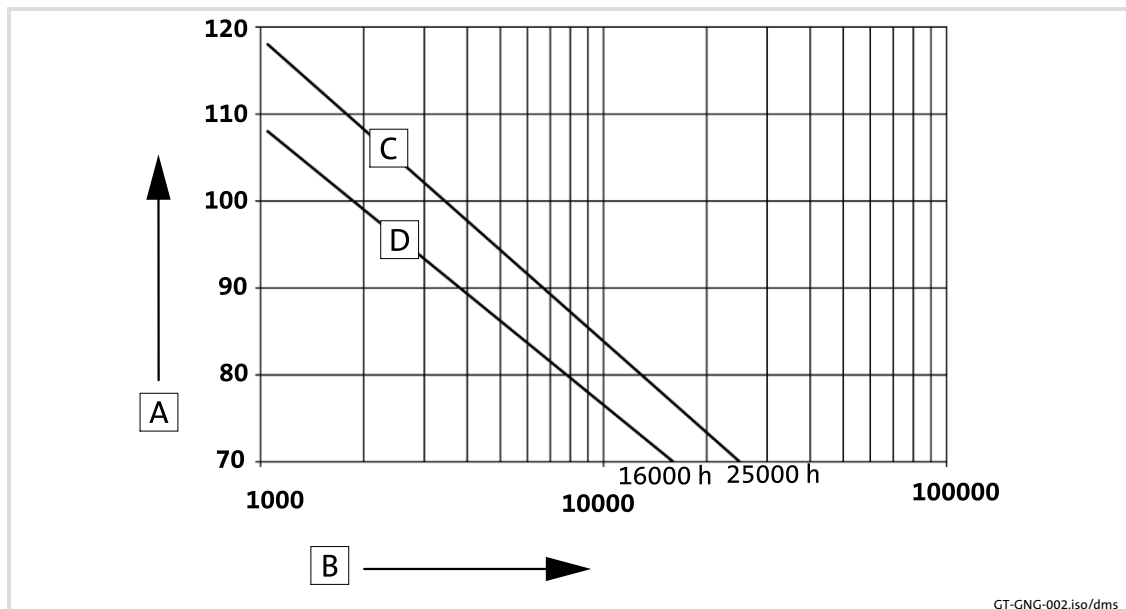


Fig. 14

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

8.2 Maintenance operations

8.2.1 Opening the condensation drain hole



Note!

- ▶ 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.

The required maintenance intervals strongly depend on the corresponding ambient and operating conditions. Initially, the condensation drain holes should be opened more frequently (at least once a week) to obtain experimental values for the condensate quantity arising.

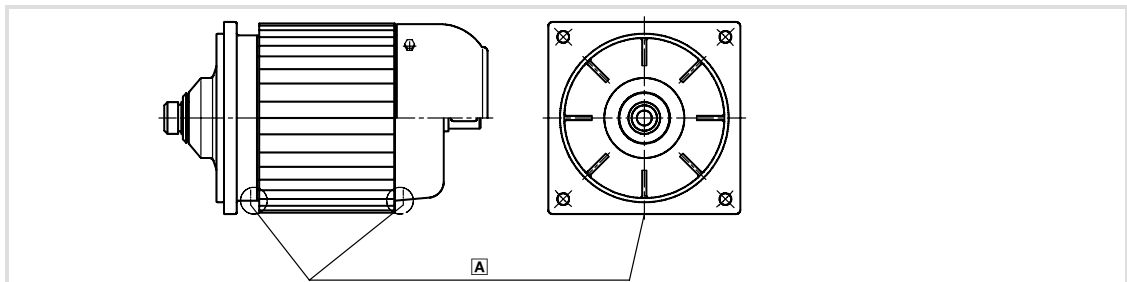


Fig. 15 Motor with condensation drain holes

A Condensation drain holes

8.2.2 Lubricate roller bearings

The roller bearings on motors and gearboxes from Lenze are filled with the greases listed below:

	Ambient temperature	Manufacturer	Type
Gearbox roller bearing			
GST, GFL, GKS, GKR, GKL	-30...+50°C -30...+80°C -40...+60°C	Fuchs Klüber Klüber	Renolit H 443 Petamo 133 N Microlube GHY 72
Gearbox roller bearing			
GSS	-30...+80°C -15...+60°C	Klüber Klüber	Petamo GHY 133 N Klüberplex BE 11-462
Motor roller bearing			
	-30 °C ... +70 °C -40 °C ... +80 °C	Lubcon Klüber	Thermoplex 2TML Asonic GHY 72
Special grease for gearbox roller bearing			
Low-temperature oils, observe critical starting performance at low temperatures	-40...+80°C	Klüber	Asonic GHY 72
Biodegradable oil (lubricant for forestry, agriculture and water economy)	-40...+50°C	Fuchs	Plantogel 0120S

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.

The lubricants listed in the lubricant table are permissible for Lenze drives. Specialty lubricants must be used, for example, for long-term storage or special operating conditions. These corresponding lubricants are available at a surcharge.

Observe the following legend of the lubricant table for the selection of lubricants!

CLP	⇒	Mineral oil
CLP PG	⇒	Polyglycol oil
CLP PAO	⇒	Synthetic hydrocarbon or poly-alpha-olefin oil
CLP E	⇒	Diester oil (water pollution class 1)
1)	⇒	No test results are currently available about the performance of listed 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 oil types
3)	⇒	For ambient temperatures higher than 40°C please contact the manufacturer for exact ambient conditions!
4)	⇒	Observe critical starting behaviour for low temperatures! For temperatures lower than -25°C special measures for the motor storage and NBR shaft seals are necessary!
5)	⇒	Ambient temperature range
	⇒	Food-grade lubricant
	⇒	Biodegradable lubricant (lubricant for forestry, agriculture and water supply and distribution)
	⇒	Low-temperature oils, observe critical starting performance at low temperatures!

	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 as of 2011 Omala S2 G 460	
	-25		+50 ³⁾		CLP HC	VG 320	Omala HD 320 as of 2011 Omala S4 GX 320	
	-20		+40		CLP PG	VG 220	Tivela S 220 as of 2011 Omala S4 WE 220	
	-20		+40		CLP PG	VG 460	Naturelle Gear Fluid EP 320	Tivela S 460 as of 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 GROUP	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	Energol EP-XP 320	
	-20		+40		CLP PG	VG 220	Energol SG-XP 220 ^{1) 2)}	
	-20		+40		CLP PG	VG 460	Energol 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	

	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					
	-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	
	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.

**Stop!**

With gearbox types GST□□-3, GFL□□-3, GSS□□-3 and GKS□□-4, the pre-stage is separately lubricated—all gearbox components have to be completely drained!

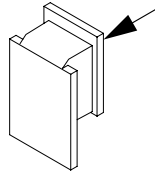
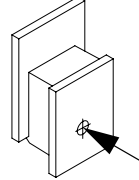
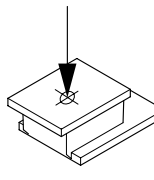
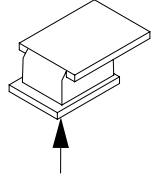
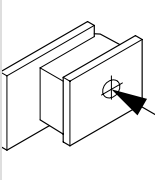
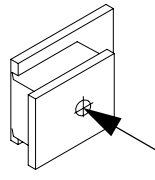
**Tip!**

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 up lubricant through filler (quantity see chapter 8.2.5).
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.

Mounting position	Pre-stage GST□□-3; GKS□□-4; GSS□□-3					
	A	B	C	D	E	F
						
	GT-GNG-GST/GFL-010.iso/dms					
GST05	0.12 0.15 $W \geq 1C$	0.3 0.35 $W \geq 1C$	0.15	0.3 0.35 $N \geq 1B$ 0.4 $W \geq 1C$	0.2	0.2
GST06	0.15	0.4	0.35	0.3 0.4 $W \geq 1C$	0.3	0.3
GST07	0.3	0.7	0.5	0.55 0.65 $M \geq 90$ $A \geq 80$ $N \geq 1D$	0.4	0.4
GST09	0.6	1.4	1.1	1.2	0.8	0.8
GST11	1.5 2.0 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	2.5 2.9 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	2.1	1.7 2.4 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	1.7	1.7
GST14	2.7 4.0 $M \geq 132$ $A \geq 112$ $N \geq 1G$	4.6 5.2 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	4.3	3.2 4.1 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	3	3
Shaft-mounted helical gearbox GFL pre-stage □□-3□						
GFL05	0.2	0.2	0.15	0.3 0.35 $N \geq 1B$ 0.4 $W \geq 1C$	0.12 0.15 $W \geq 1C$	0.3 0.35 $W \geq 1C$
GFL06	0.3	0.3	0.35	0.3 0.4 $W \geq 1C$	0.15	0.4
GFL07	0.4	0.4	0.5	0.55 0.65 $M \geq 90$ $A \geq 80$ $N \geq 1D$	0.3	0.7
GFL09	0.8	0.8	1.1	1.2	0.6	1.4
GFL11	1.7	1.7	2.1	1.7 2.4 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	1.5 2.0 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	2.5 2.9 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$
GFL14	3.0	3.0	4.3	3.2 4.1 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	2.7 4.0 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	4.6 5.2 $M \geq 132$ $A \geq 112$ $N \geq 1G$

Tab. 9 Amount of lubricant in litres
 → Drive
 A, M, N, W Drive-end version

90...132 Motor size
 1A ...2K Drive size

Helical gearbox GST□□-1□ VA□ / VB□ (foot housing)							
Mounting position	A	B	C	D	E	F	
GST04	0.1	0.37	0.2	0.3 0.35 W ≥ 1C	0.25	0.25	
GST05	0.2	0.6	0.35	0.5 0.6 M ≥ 90 A ≥ 80 N ≥ 1D	0.35	0.35	
GST06	0.4	1.2	0.65	0.85 1 W ≥ 1E	0.7	0.7	
GST07	0.7 1.3 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.3 2.7 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.3	1.5 2.2 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.5	1.5	
GST09	1.2 2.5 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	4.1 4.8 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.8	2.7 3.7 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.5	2.5	

Helical gearbox GST□□-1□ VC□ (flange housing)							
Mounting position	A	B	C	D	E	F	
GST04	0.1	0.3	0.15	0.3 0.35 W ≥ 1C	0.2	0.2	
GST05	0.2	0.5	0.2	0.45 0.55 M ≥ 90 A ≥ 80 N ≥ 1D	0.3	0.3	
GST06	0.4	1	0.45	0.85 1 W ≥ 1E	0.6	0.6	
GST07	0.8 1.5 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.6 2.0 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	0.85	1.6 2.3 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.3	1.3	
GST09	1.6 2.7 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	3.0 3.5 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.7	2.7 3.7 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.3	2.3	

Tab. 10 Amount of lubricant in litres

→ Drive 90...132 Motor size
A, M, N, W Drive-end version 1A ...2K Drive size

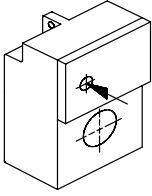
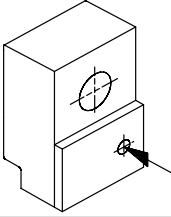
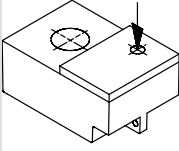
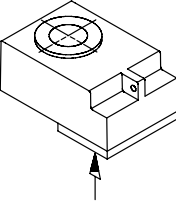
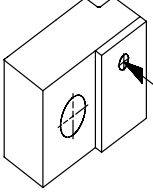
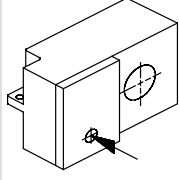
Helical gearbox GST□□-2□; -3□ VA□ / VB□ (foot mounting)												
Mounting position	A		B		C		D		E		F	
GST03	0.2		0.2		0.2		0.2		0.2		0.2	
GST04	0.35		0.5		0.45		0.55		0.3		0.3	
GST05	0.5		0.80		0.75		1		0.55		0.55	
GST06	0.6 0.7	M ≥ 132	1.1 1.2	M ≥ 132	1.2		1.7 1.8	M ≥ 132	1.0 1.1	M ≥ 132	1.0 1.1	M ≥ 132
GST07	2.2 2.6	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.5 2.9	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.6		3 3.7	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.7 2.1	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.7 2.1	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G
GST09	4.2 4.8	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	5.3 5.9	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	5.4		6.1 7.3	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	3.1 3.7	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	3.1 3.7	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G
GST11	8.5		9.5		10		11.5		7		7	
GST14	15		18		18		20		11		11	

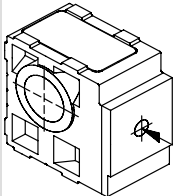
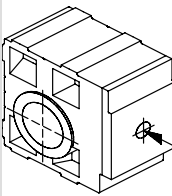
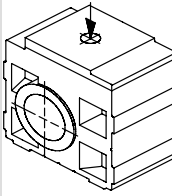
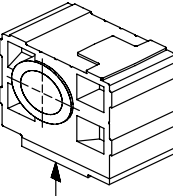
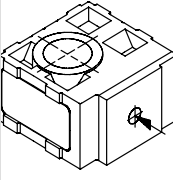
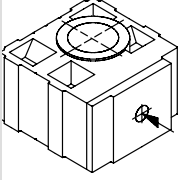
Helical gearbox GST□□-2□; -3□ VC□ (flange housing)												
Mounting position	A		B		C		D		E		F	
GST03	0.17		0.17		0.17		0.17		0.17		0.17	
GST04	0.35		0.45		0.3		0.6		0.3		0.3	
GST05	0.45		0.7		0.6		0.95		0.45		0.45	
GST06	0.5 0.6	M ≥ 132	0.9 1.0	M ≥ 132	0.9		1.6 1.7	M ≥ 132	0.9 1.0	M ≥ 132	0.9 1.0	M ≥ 132
GST07	1.8 2.2	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.4 2.8	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.2		2.7 3.4	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.5 1.9	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.5 1.9	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G
GST09	3.5 4.1	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	4.5 5.0	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	4.4		5.5 6.7	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.8 3.4	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.8 3.4	M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G
GST11	7.5		8.5		8.0		10.5		6		6	
GST14	13		16		14		18		9.5		9.5	

Tab. 11 Amount of lubricant in litres

→ Drive
A, M, N, W Drive-end version

90...132 Motor size
1A ...2K Drive size

Shaft-mounted helical gearbox GFL□□-2; -3						
Mounting position	A	B	C	D	E	F
						
GFL04	0.65	0.6	1.05	0.8	0.75	0.35
GFL05	1.3	1.4	1.7	1.7	1.3	0.7
GFL06	2.0	2.1	3.0	2.8	2.1	1.2
GFL07	4.3	3.8	6.3	5.8	4.6	2.5
GFL09	8.9	7.6	13	11.3	9.5	5.2
GFL11	16	15	25	21	20	9.0
GFL14	32	36	47	42	27	28

Right-angle gearbox						
Mounting position	A	B	C	D	E	F
						

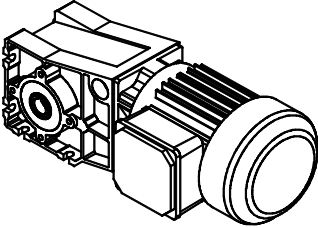
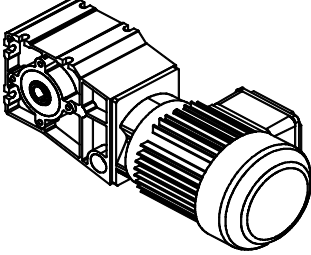
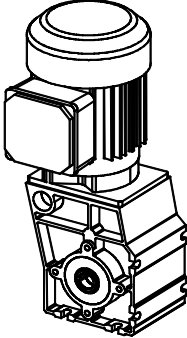
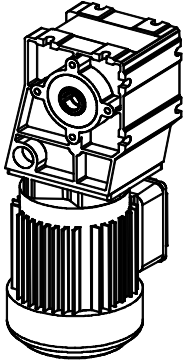
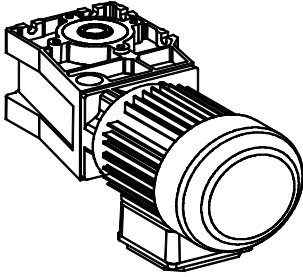
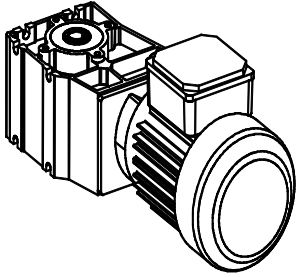
GKS helical-bevel gearbox□□-3; -4						
GKS04	0.8	1.4	1.5	1.1	1.3	1.3
GKS05	1.4	2	2.1	1.7	1.9	1.9
GKS06	2.4	3.6	4	3	3.6	3.6
GKS07	4.5	6.7	7.7	5.6	6.5	6.5
GKS09	6	14	16	10	14	14
GKS11	11.5	27	29	21	25	25
GKS14	21	50	56	38	47	47

Helical-worm gearbox GSS□□-2; -3						
GSS04	0.5	1.0	1.0	1.0	0.8	0.8
GSS05	1.2	1.7	1.7	1.7	1.4	1.4
GSS06	1.8	3.0	3.0	3.0	2.6	2.6
GSS07	3.6	5.6	5.9	5.6	4.8	4.8

Helical-bevel gearbox GKL□□						
GKL07	2.6	5.0	6.8	4.8	4.8	4.8
GKL09	4.6	8.4	10.4	7.7	8.8	8.4

Tab. 12 Amount of lubricant in litres

→ Drive

Bevel gearbox GKR			
Mounting position	A	B	C
			
GKR03	0.35	0.35	0.35 / 0.4 *
GKR04	0.4	0.5	0.7 / 0.8 *
GKR05	0.8	1.3	1.5 / 1.6 *
GKR06	1.5	2.3	3.0 / 3.2 *
Mounting position	D	E	F
			
GKR03	0.35	0.35	0.35
GKR04	0.7	0.6	0.4
GKR05	1.4	1.5	1.0
GKR06	2.6	3.0	1.8

Tab. 13 Amount of lubricant in litres
* with version V□K at the output end

8.2.6 Amount of lubricant for combined mounting positions

For the gearbox sizes 03 ...05 a combination of different mounting positions with amounts of lubricant to suit are permissible as per the following tables.

Advantage:

Easier logistics for users who use gearboxes in different mounting positions.

Disadvantage:

On some gearboxes more lubricant is necessary in the gearbox than is necessary technically. As a result a higher internal pressure is produced.

Helical gearbox GST03 ... 05-2; V□□

Mounting position	Versions V□R; V□L		
	GST03	GST04	GST05
A E F	0.20	0.35	0.7
B C		0.50	0.85
D		0.55	1.0
Version V□K			
A E F	0.17	0.35	0.55
B C		0.45	0.7
D		0.6	0.95

Shaft-mounted helical gearbox GFL04 ... 05-2; V□□

Mounting position	Versions V□R; V□L	
	GFL04	GFL05
A B E	0.7	1.4
C D	1.0	1.7
F	0.3	0.7
Version V□K		
A B E	0.8	1.4
C D	1.1	1.7
F	0.35	0.7

Helical-bevel gearbox GKS04 ... 05-3; V□□

Mounting position	Versions V□R; V□L	
	GKS04	GKS05
A	0.8	1.3
B C E F	1.4	2.0
D	1.0	1.6
Version V□K		
A	0.8	1.4
B C E F	1.5	2.1
D	1.1	1.7

Bevel gearbox GKR03 ... 05-2; V□□

Mounting position	Versions V□R; V□L		
	GKR03	GKR04	GKR05
A	0.35	0.4	0.8
B C D E		0.7	1.5
F		0.4	1.0
Version V□K			
A	0.35	0.4	0.8
B D E		0.7	1.5
C	0.4	0.8	1.6
F	0.35	0.4	1.0

8.3 Repair

- ▶ It is recommended to have all repairs performed by Lenze Service.
- ▶ Delivery of spare parts is available upon request.

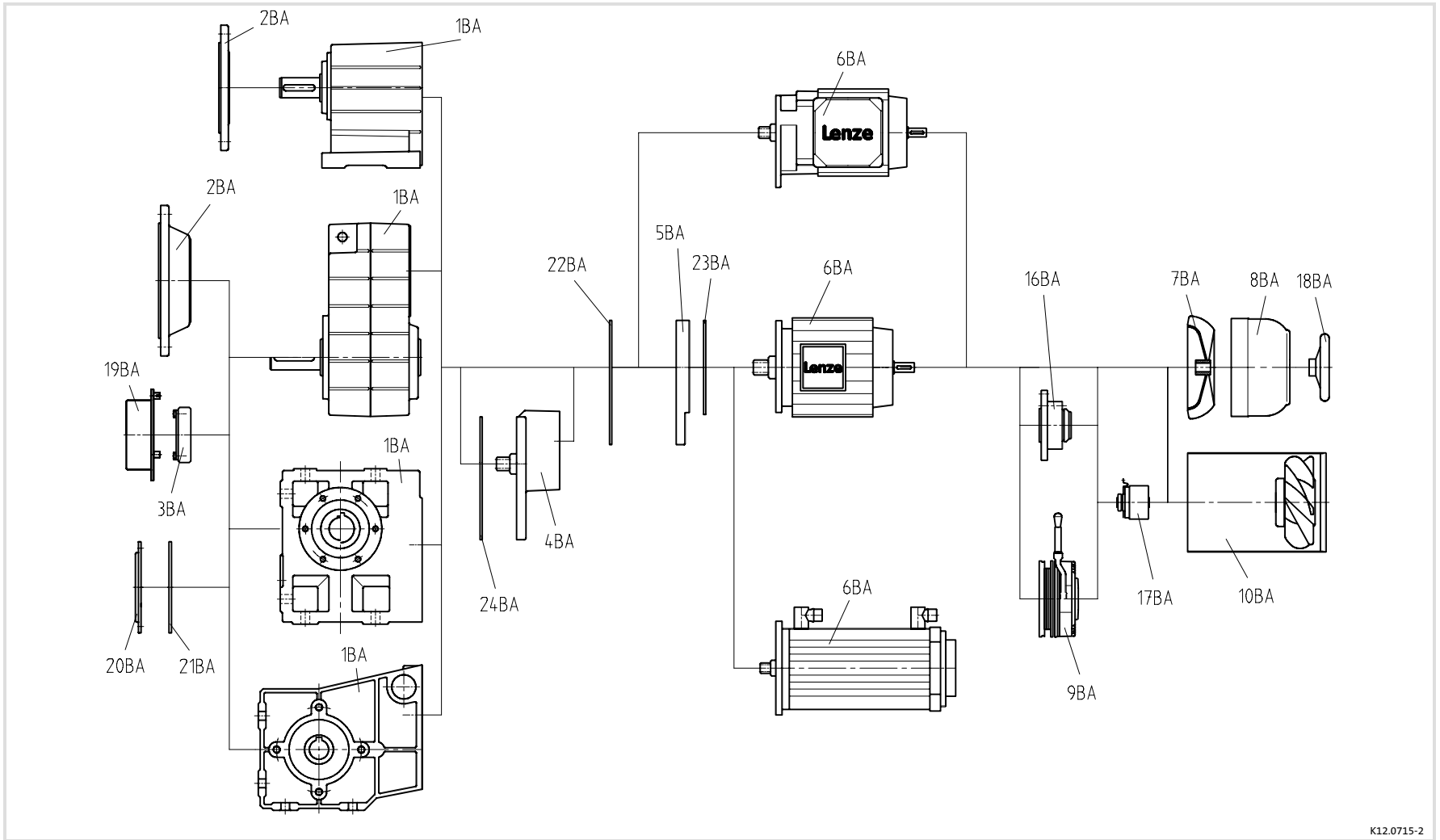
8.4 Disposal

Protect the environment! Packing material can be recycled. Dispose of your separated resources according to the waste disposal regulations or via a waste management company.

The following table provides recommendations for an environmentally friendly disposal of the machine and its components.

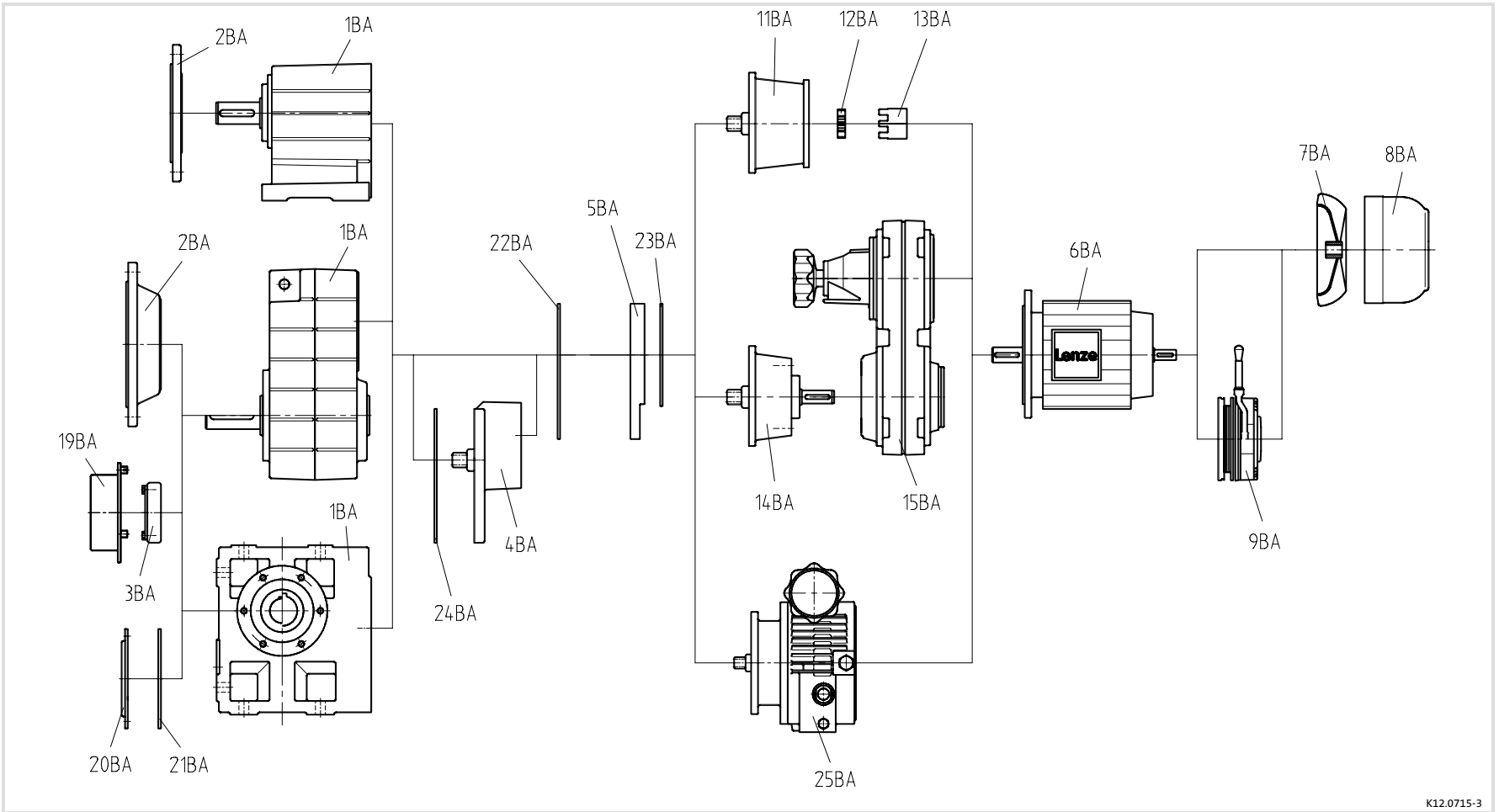
What?		Where?
Transport material	Pallets	Return to the manufacturer or forwarder
	Packaging material	Cardboard box to waste paper Plastics to plastics recycling or residual waste Reuse or dispose of wood wool
Lubricants	Oil, grease Detergents and solvents Paint residues	Dispose according to current regulations
Components	Housing:	Separate valuable substances and dispose
	Bearings, gear wheel shafts: Seals, electronic scrap	

8.5 Spare parts list, geared motors



K12.0715-2

8.6 Spare parts list, gearbox and gearbox with variable speed drive



8 Maintenance

Order form

8.7 Order form

<p>Sender _____</p> <p>Street / PO box _____</p> <p>Postcode / town, city _____</p> <p>Delivery address _____</p> <p>_____</p> <p>Invoice recipient * _____</p> <p>Date _____</p>	<p>Recipient: Lenze</p> <p>Postcode / town, city: _____</p> <p>Fax no.: _____</p> <p>_____</p> <p>Customer no. _____</p> <p>Order no. _____</p> <p>Originator _____</p> <p>Telephone _____</p> <p>Fax _____</p> <p>Delivery date _____</p> <p>Signature _____</p>
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* Please state if different to sender

Position	Name	Quantity	Position	Name	Quantity
1BA	Basic gearbox GST □□		12BA	Spider	
	Basic gearbox GFL □□		13BA	Coupling hub	
	Basic gearbox GKS □□		14BA	Free drive shaft	
	Basic gearbox GKR □□		15BA	Variable speed belt drive	
	Basic gearbox GSS □□		16BA	Backstop	
2BA	Output flange		17BA	Tacho generator / position encoder	
3BA	Shrink disc		18BA	Handwheel	
4BA	Pre-stage		19BA	Shrink disc cover	
5BA	Intermediate cover		20BA	Hollow shaft cover	
6BA	Motor		21BA	Seal	
7BA	Fan		22BA	Seal	
8BA	Fan cover		23BA	Seal	
9BA	Spring-applied brake		24BA	Seal	
10BA	Separate fan		25BA	Planetary variable speed drive	
11BA	Mounting flange				

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 does not turn	Voltage supply interrupted	Check connection
	Incorrect electrical connection	Check if nameplate matches voltage supply
	Excessive load	Reduce load Check drive-machine assignment
Motor running, gearbox at standstill	Fixing elements are missing or defective	Check attachment
	Gearbox is defective	Contact Lenze Service
	Clutch disengaged	Engage the clutch
Unusual running noises	Overload	Reduce load Check drive-machine assignment
	Damage in the gearbox or motor	Contact Lenze Service
Excessive temperature	Overload	Reduce load Check drive-machine assignment
	Insufficient heat dissipation	Improve cooling air supply Clean gearbox / motor
	Insufficient lubricant	Refill lubricant as specified
Loose fixing elements	Vibrations	Avoid vibrations
Shrink disc connection is spinning	<ul style="list-style-type: none"> ● Correct screw tightening torque has not been reached <ul style="list-style-type: none"> – Insufficient number of passes, not all screws are tightened correctly. ● Machine shaft and hollow shaft bore not sufficiently degreased ● Wrong component part dimensions <ul style="list-style-type: none"> – Fits, roughnesses ● Yield point of machine shaft material is too low <ul style="list-style-type: none"> – $Re > 300 \text{ N/mm}^2$ required ● Friction factors are too low <ul style="list-style-type: none"> – Coefficients of friction $\mu \geq 0.15$ required ● The shrink disc itself has been degreased so that the screws and the bevels are dry. Due to incorrect friction factors, the shrink disc cannot be tightened correctly. 	Specifications for assembly, dimensions and material not observed







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