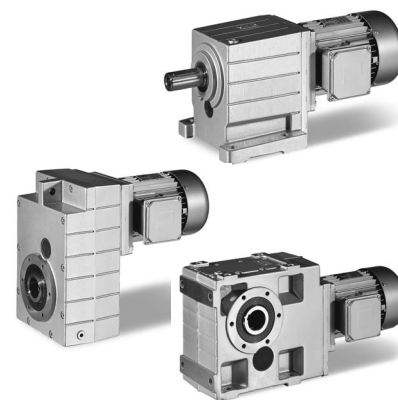


G...

Gearboxes / geared motors



GST, GFL, GKS/GKL, GKR, GSS

Operating Instructions

EN



13502911

Lenze



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

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Contents

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



Tip!

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

Validity

This documentation applies to the 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	First edition for pilot series
00 393 076	1.0	03/1997	TD09	Complete editorial revision
00 393 076	1.0	04/2000	TD09	Supplement for chapter 5.3.1 "Preparatory work" Update of the illustrations for chapter 5.3.10 "Gearbox with ventilation"
00 407 986	1.0	12/2000	TD09	Complete editorial revision Revision of the product key and position of the system blocks Supplemented by gearbox size 03 Chapter 5.3.12 "Gearbox with compensation container" in mounting position C Chapter Spare parts list for compensation reservoirs Change of lubricant amounts
00 425 604	1.0	08/2001	TD09	Chapter 5.3.8 "Mounting of shrink disc covers": new Chapter 5.3.9 "Mounting of hollow shaft covers hoseproof": new Supplemented by GKR 05
00 425 604	2.0	11/2001	TD09	Changes to lubricant amounts
00 460 708	1.0	12/2002	TD09	Changes with regard to nameplates Supplemented by GKR 06 Change of name
00 460 708	2.0	02/2003	TD09	Supplement - warning in chapter 5
00 476 711	2.1	10/2003	TD09	Changes: product key and position of the system blocks Supplemented by chapter 8.2.2, "Roller bearing grease" and chapter 8.2.3, "Lubricant table"
13124908	3.0	11/2005	TD09	New nameplate "Geared motor" included. Revision of the lubricant table
13166718	4.0	08/2006	TD09	Revision of the nameplate designation New nameplate: CSA/UL type Supplemented by chapter "Mounting of the shrink disc with a rotating cover" Revision of the chapter "Position of the ventilation unit, oil filler plug and oil drain plug" Supplemented by drive sizes: 3F; 4E; 6C, and 7C
13290892	5.0	03/2009	TD09	Complete revision
13321528	6.0	11/2009	TD09	Conversion from G-motion to L-force Geared Motors Chapter "Condensation drain hole" supplemented
13404748	7.0	11/2011	TD09	Update of the lubricant table Change of lubricant amounts for GST Transport weights supplemented Table of roller bearing greases supplemented
13477846	8.0	12/2014	TD09	Supplement to nameplate - geared motor standard type Note "Geared motors for deep-freeze application" inserted in "Safety instructions" chapter Values in Tab. 3 added Values in table of chapter 8.2.6 added for GST
13502911	9.0	11/2015	TD09	Operating condition: "Mechanical" deleted Supplement: encoder code, 22 "Auxiliary tool" table updated

1.2 Conventions used

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

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

1.3 Terminology used

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

1 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

Layout of the safety instructions:



Danger!

(characterises the type and severity of danger)

Note

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

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

Application notes

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

2.1 General safety instructions for drive components

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

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

Scope

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

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

General hazards



Danger!

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

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

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

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

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

2 Safety instructions

General safety instructions for drive components

Temperatures

The permissible temperature range is determined by the following:

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

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



Stop!

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



Danger!

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

Ambient media

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

Transport, storage

- Transport and storage in a dry, low-vibration environment without aggressive atmosphere; preferably in the packaging provided by the manufacturer.
 - Protect against dust and impacts.
 - Observe climatic conditions according to the technical data.
- Use load carrying equipment for transport! (📖 25)

Before transport

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

Use an appropriate means of transport and lifting equipment! (📖 25)

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

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

Corrosion protection

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

Mechanical installation

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

Electrical installation

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

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

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

Commissioning

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

2 Safety instructions

Application as directed

Geared motors for deep-freeze applications

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

2.2 Application as directed

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

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

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

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

Any other use shall be deemed inappropriate!

2.3 Foreseeable misuse

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



Note!

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

2.4 Residual hazards

Protection of persons

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

Motor protection

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

2 Safety instructions

Disposal

Fire protection

- Fire hazard
 - Prevent contact with flammable substances.

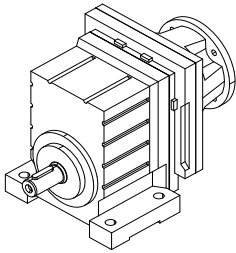
2.5 Disposal

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

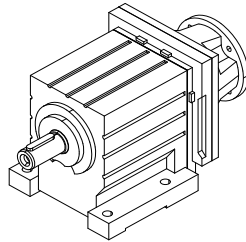
- The most important technical data is given on the nameplate.
- The product catalogues contain further technical data.

3.1 Identification

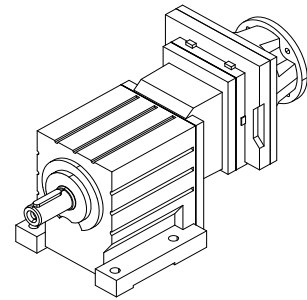
GST



1-stage

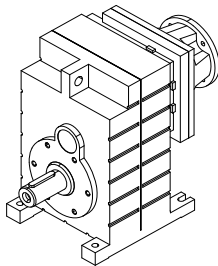


2-stage

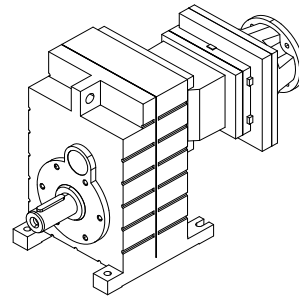


3-stage

GFL

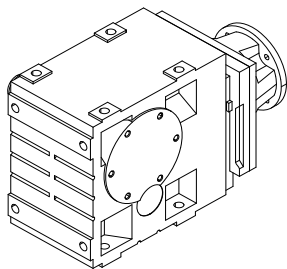


2-stage

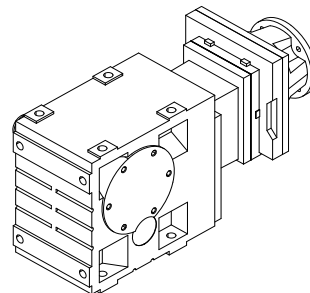


3-stage

GKS



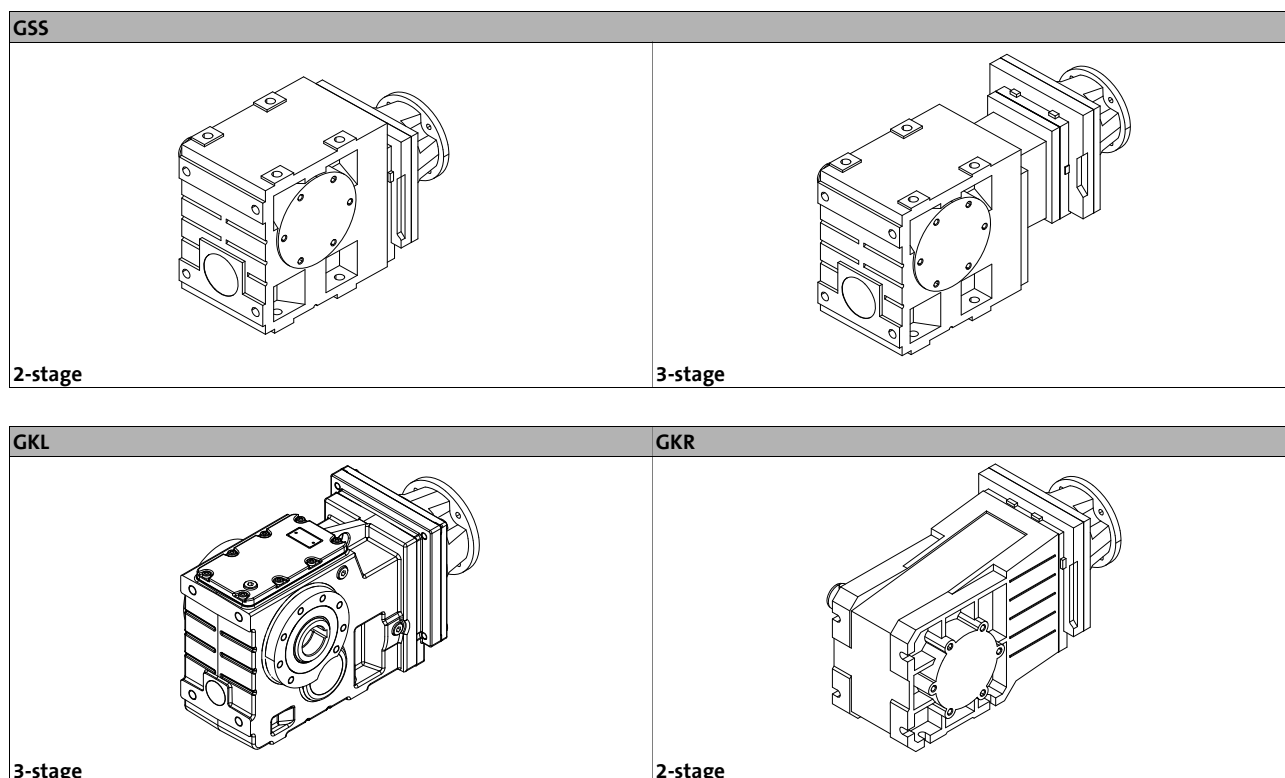
3-stage



4-stage

3 Product description

Product features



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	1. stage	2. stage	3. stage
Helical gearbox	Spur gear	Spur gear	Spur gear	---
Shaft-mounted helical gearbox				---
Helical-bevel gearbox			Bevel gear	Spur gear
Bevel gearbox	---		Worm	---
Helical-worm gearbox	Spur gear			---

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

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

GST					
Terminal box, Motec, plug: 2, 3, 4, 5 Without terminal box, Motec, plug: 0					
GFL					
Solid shaft: 6 Hollow shaft: 0 Hollow shaft with shrink disc: 1, 6					
Foot: 3, 4 Without foot: 0					
Terminal box, Motec, plug: 2, 3, 4, 5 Without terminal box, Motec, plug: 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, plug: 2, 3, 4, 5 Without terminal box, Motec, plug: 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, plug: 2, 3, 4, 5 Without terminal box, Motec, plug: 0					

3 Product description

Nameplate

3.2.1 Nameplate

Three-phase AC motor for direct gearbox attachment

Lenze		1		15	
2	21	Hz		16.1	26
3	18	kW		16.2	15
4	17	V	Y	16.4	19
5.1	5.2		Δ	16.4	
5.3	5.4	25			23
6	7.1	7.2	A	Y	16.5
8.1	8.2	8.3		Δ	16.5
9	r/min			16.3	14.2
20.2	η %			16.7	14.3
10.1	10.2	cos φ		16.6	27
11	C86		22	22	29
		20.1			

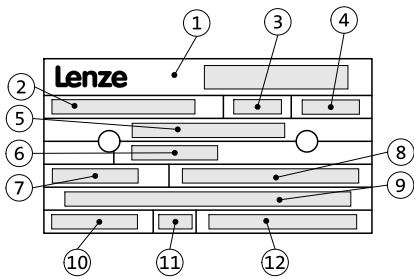
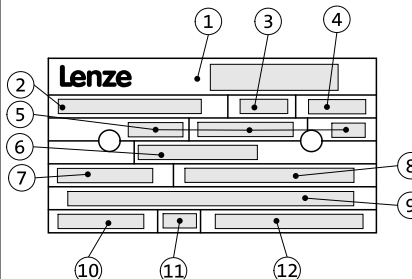
Three-phase AC motor with standard output flange

Lenze						1		15						
2		14.2		14.1		23		26		Hz	16.1			
4						22				kW	16.2			
21				13		14.3				r/min	16.3			
8.1		8.2		8.3		27				V	Y	16.4		
9						29					Δ	16.4		
24										A	Y	16.5		
10.1		20.1									Δ	16.5		
10.2		10.3				18				cos φ	16.6			
11										η %	16.7			

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

3 Product description

Gearbox

N and W design	M and N design with motor
 Nameplate GST-004.iso	 Nameplate GST-005.iso

Design	N and W design	M and N design with motor
Pos.		
1	Production location / country; www.Lenze.com	
2	Gearbox type	Gearbox and motor type
3	Year / week of manufacture	
4	Mounting position / position of the system blocks	
5	Rated torque/speed	Rated torque Rated speed/rated frequency Operating factor (indicated when <1.0)
6	Lubricant amount / type of lubricant	
7	Ratio	
8	Material number / serial number	
9	Bar code	
10	Order number	
11	Additional information	
12	Additional customer data	

3.2.2 Gearbox code

Example		GST	03	-	1	M	VAR	071N32; 080-12 1C
Meaning	Variant	Gearbox code						
Gearbox type	Helical gearbox	GST						
	Shaft-mounted helical gearbox	GFL						
	Helical-bevel gearbox	GKS/GKL						
	Bevel gearbox	GKR						
	Helical-worm gearbox	GSS						
Gearbox size	Depending on the gearbox type		XX					
Number of stages	1-stage		-	1				
	2-stage		-	2				
	3-stage		-	3				
Drive design	Servo motor, asynchronous; totally enclosed fan-cooled					A		
	Disco variable speed drive					D		
	Three-phase AC motor with 8400 motec					E		
	Three-phase AC motor SDS					G		
	Servo motor, asynchronous, with internal cooling					I		
	Compact unit					K		
	Three-phase AC motor					M		
	Gearbox with mounting flange for IEC standard motor					N		
	DC permanent-magnet motor 13.12x/SGS					P		
	DC motor, smooth housing MGFQU/MGFQK					Q		
	DC motor, ribbed housing MGFRK					R		
	Servo motor, synchronous; totally enclosed fan-cooled					S		
	DC shunt-wound motor 13.5xx					T		
	Three-phase AC motor 13.71x/13.75x					V		
	Gearbox with free drive shaft					W		
Output design	Solid shaft smooth (without keyway)					G		
	Solid shaft (with keyway)					V		
	Hollow shaft					H		
	Hollow shaft with shrink disk					S		
	Foot mounting, with centering						A	
	Foot mounting, without centring						B	
	Without foot, with centering						C	
	Without foot, without centering						D	
	Without flange							R
	With flange (through holes)							K
	With flange (threaded holes)							L
Drive size								
Example	Motor							071N32; 080-12
	Mounting flange/free drive shaft							1C

3 Product description

Encoder code

3.2.3 Encoder code

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



Note!

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

3.3 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 Motor frame sizes					Gearboxes
	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

General data and operating conditions

4.1 General data and operating conditions

General data

Conformity and approval			
CE	2006/42/EC	Machinery Directive	
	2014/35/EU	Low-Voltage Directive	
	2009/125/EC	ErP Directive	
EAC	TP TC 004/2011 (TR CU 004/2011)	On safety of low voltage equipment	Eurasian Conformity TR CU: Technical Regulation of Customs Union
	TP TC 020/2011 (TR CU 020/2011)	Electromagnetic compatibility of technical means	Eurasian Conformity TR CU: Technical Regulation of Customs Union

The applicable approvals for the product you have ordered are specified on the nameplate.

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

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

Operating conditions

Ambient conditions			
Climatic			
Transport	IEC/EN 60721-3-2	2K3 (-20 °C ... +70 °C)	
Storage	IEC/EN 60721-3-1	1K3 (-20 °C ... +60 °C)	< 3 months
		1K3 (-20 °C ... +40 °C)	> 3 months
Operation	IEC/EN 60721-3-3	3K3 (-20 °C ... +40 °C) MCA, MCS, MD□KS	Without brake
		3K3 (-15 °C ... +40 °C) MCM, MQA	
		3K3 (-10 °C ... +40 °C)	With brake
		3K3 (-15 °C ... +40 °C)	With blower
		> +40 °C	With power reduction, see catalogue
Site altitude		< 1000 m amsl - without power reduction > 1000 m amsl < 4000m amsl with power reduction, see catalogue	
Humidity		Relative humidity ≤ 85 %, without condensation	
Electrical			
The motor connection type depends on the controller			
Length of the motor cable		④ inverter instructions	
Length of cable for speed feedback			

**Danger!**

Only transport the drive with transport equipment or hoists which are suitable for this load (▢ 23). 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 dismounting and must **not** be used for the complete geared motor!

5.1 Transport equipment for gearboxes

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.

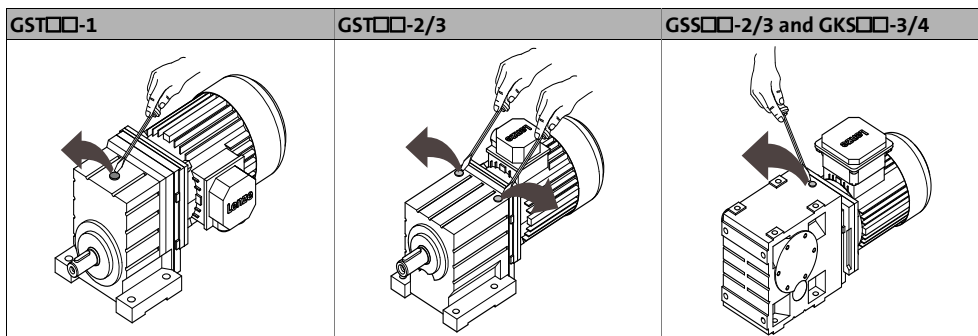


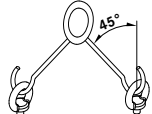
Fig. 1 Eye bolt position

**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.

5 Mechanical installation

Transport equipment for gearboxes

Gearbox size	Thread	Max. load carrying capacity of the eye bolt as specified by DIN 580	
		One-leg	Two-leg (45°)
			 GT-GNG-005.iso/dms
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 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!

Standing beneath floating loads is prohibited!

5.2 Storage

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

- Generally
 - Store gearboxes indoors in a dry, clean (low-dust) and sunlight-protected environment.
 - The storage location must be free from vibrations and shocks ($V_{\text{eff}} < 0.2 \text{ mm/s}$) in order to prevent roller bearing standstill damage.
 - Temperature changes with condensate formation are to be avoided.
 - Do not activate ventilation unit, in order to prevent air exchange with the ambient air.
- Up to one year:
 - Store gearboxes with a ventilation unit with the vent plug on top.
 - Shafts and uncoated surfaces are delivered in a protected against rust status. Aftertreatment is required where the corrosion protection has been damaged.
 - Remove the plug for motors with condensation drain holes (option) (see 28).
- More than one year, up to two years:
 - Apply a long-term corrosion preventive (e.g. Anticorit BW 366 from the Fuchs company) to the shafts and uncoated surfaces before storing the motor away.
 - Install gearbox in mounting position A.
 - Fill gearbox up to the top vent hole / oil hole with the oil grade specified (see nameplate). Then mount the locking screw and ventilation unit (do not activate) again.

5 Mechanical installation

Mounting
Specification of the direction of rotation

5.2.1 Specification of the direction of rotation

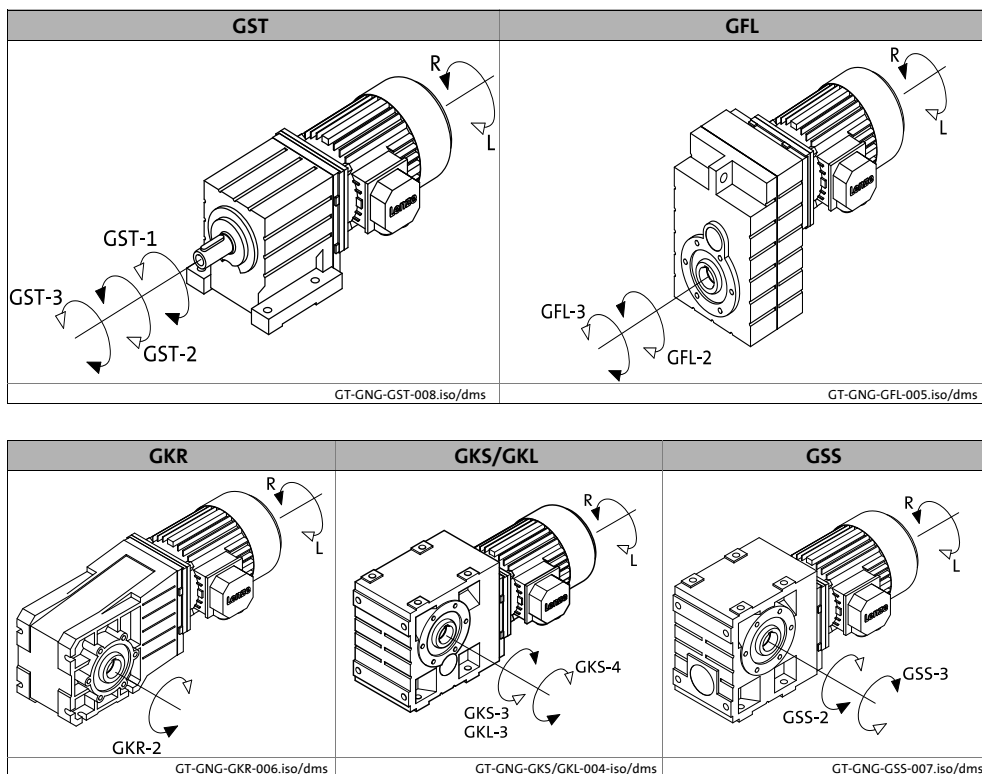


Fig. 2 Direction of rotation of the drive

5.3 Mounting

5.3.1 Preparation



Note!

Thoroughly remove anticorrosion agents from output shafts and flange faces.

Correcting the oil quantity

If the amount of oil in the gearbox has been increased for the purpose of longtime storage (see chapter 5.2), the oil must be drained completely and then refilled for the mounting position provided. The following steps have to be observed:

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

Condensation drain hole

**Note!**

Lenze delivers motors with condensation drain holes with sealed condensation drain holes. The holes are sealed with a plastic plug or a locking screw. This does not affect the type of protection and the motor is protected against the ingress of foreign substances during transport and operation. Further information, (📖 57).

5.3.2 General information about the assembly of drive systems

**Stop!**

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

- Take safety measures prior to any operation:
 - Disconnect the machine from the mains, ensure standstill of the drive system and avoid any machine movement.
 - Check faultless state of the drive system. Never install and commission damaged drive systems.
 - Check drive function - machine function assignment. Check direction of (📖 28)rotation.
- The mounting surfaces must be plane, torsionally rigid and free from vibrations.
- Align drive system on mounting surfaces exactly with the machine shaft to be driven.
 - Be sure to carry out mounting in a manner free from distortion, in order to avoid additional loads.
 - Even out slight inaccuracies by the use of suitable flexible couplings.
- Support reaction torque by suitable measures.
- Be absolutely sure to secure fastenings of accessories and built-on accessories so that they won't come loose.
We recommend glueing screwed connections.

5.3.3 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 Mechanical installation

Mounting

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

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

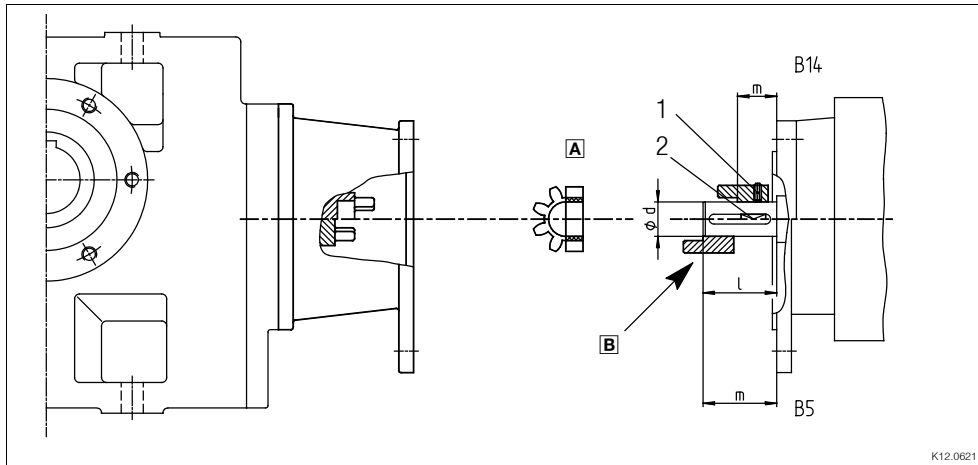


Fig. 3 Input side design N

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

Drive size	Motor shaft		Assembly dimension m [mm]	Standard hub Locking screw		Clamping hub		Keyway 1) DIN 6885/1 [mm]	Clamping ring hub					
	d	max. l		Thread	Tightenin g torque	Thread	Tightenin g torque		Thread	Tightenin g torque				
	[mm]	[mm]		[mm]	[Nm]	[mm]	[Nm]	[mm]	[Nm]					
1 A	11	23	23	M4	1.5	M3	1.34	*	M3	1.34				
1B	14	30	30											
2B	11	23	23											
1C	19	40	25	M5	2.0	M6	10.5	B6 x 6 x 16	M4	2.9				
2C	14	40	25					B5 x 5 x 16						
3C	14	40	25					*						
4C	14	40	25					B6 x 6 x 16						
6C	11	40	25	---	---	M4	2.9	*	---	---				
7C	19	40	25	M5	2.0			M6	10.5	B6 x 6 x 16	M4	2.9		
1D	24	50	50							*	---	---		
2D	19	40-50	50							*	M4	2.9		
1E	28	30-60	30			B8 x 7 x 18	M5			6				
2E	24	30-60	30			B6 x 6 x 18								
3E	19	30-60	30			*								
4E	24	50	50			B8 x 7 x 18								
1F	28	30-60	30			M8	10	M8	25	*	M8	35		
2F	24	30-60	30										M10	69
3F	24	50	50	M12	120									
1G	38	80	80											
2G	28	60	60											
3G	38	80	80	M10	69			M10	69					
1H	42	110	110											
2H	48	110	110											
3H	38	80	80	M12	120			M10	69					
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

5.3.5 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.

5.3.5.1 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 Mechanical installation

Mounting
Coupling hubs

5.3.5.2 Assembly of clamping ring hub

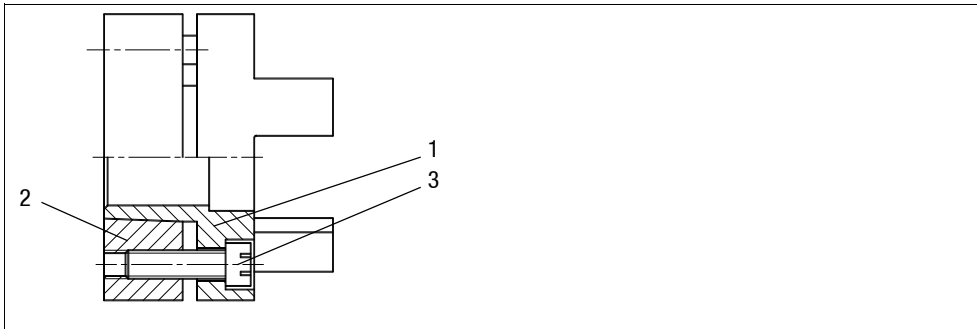


Fig. 4

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.

5.3.5.3 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.

5.3.6 Attachment of gearboxes with hollow shafts and keyway

Mounting

1. Draw the gearbox with hollow shaft onto the machine shaft to be driven:
 - Apply fitting grease (Fig. 5) to the shaft and into the hollow shaft bore.

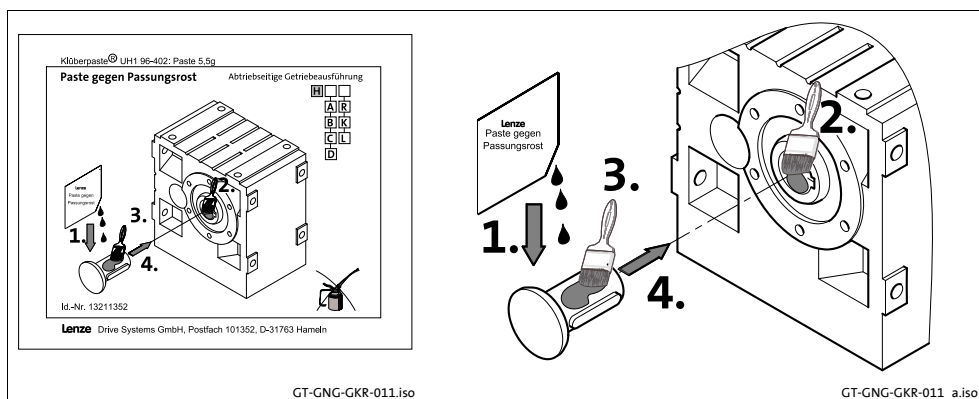


Fig. 5 Application of fitting grease against fretting corrosion (can be ordered optionally)



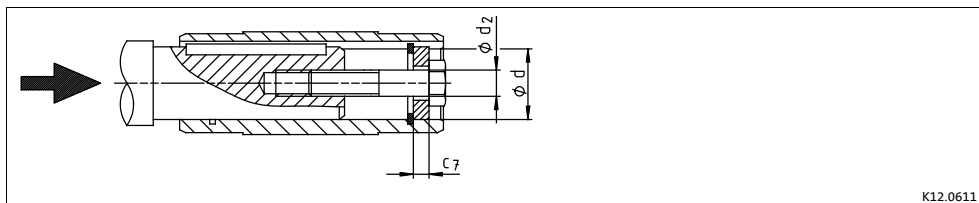
Stop!

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.

5 Mechanical installation

Mounting Attachment of gearboxes with hollow shafts and keyway



K12.0611

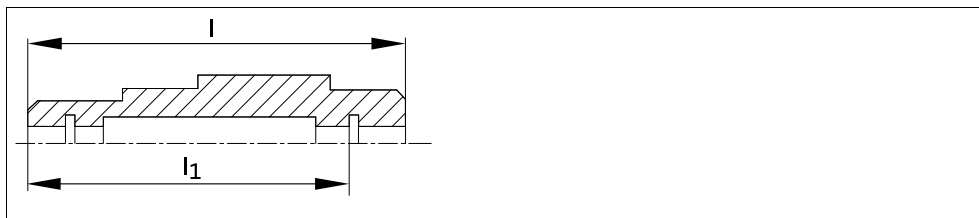
Auxiliary tool (recommended dimensions)		
ϕd^{H7}	d_2	c_7
18	M6	4
20		
25	M10	5
30		6
35	M12	7
40	M16	8
45		9
50	M16	10
55	M20	11
60	M20	13
70		14
80	M20	16
100	M24	24

Tab. 4 Dimensions in mm



Note!

With the bevel gearbox, 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).

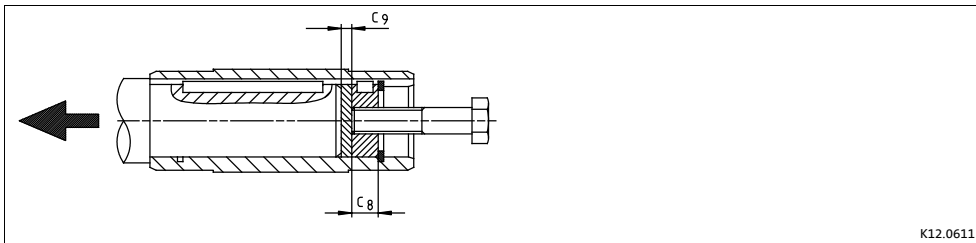


Fig. 6 Disassembly of gearboxes with a hollow shaft, with auxiliary tool; not for GKR

Auxiliary tool (recommended dimensions)		
$\varnothing d_{H7}$	c_8	c_9
25	10	3
30		
35	12	3
40		
45	16	4
50		
55	20	5
60		
70	20	5
80		
100	24	8

Tab. 6 Dimensions in [mm]

5.3.7 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!

5.3.7.1 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.

5 Mechanical installation

Mounting Mounting the shrink disc

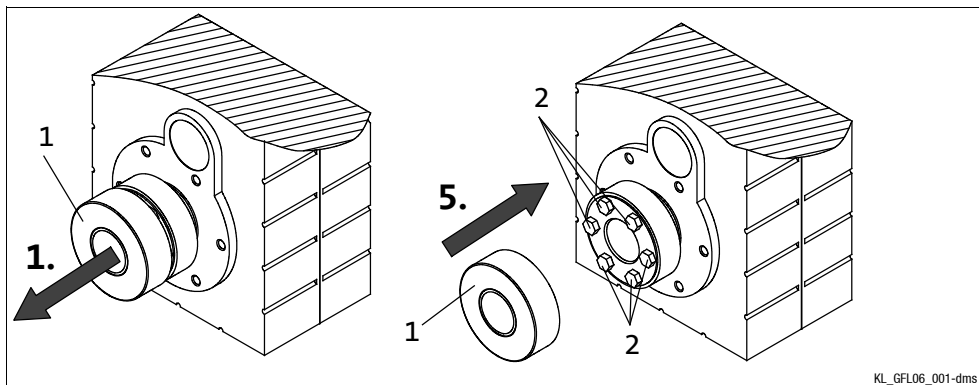


Fig. 7

- 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"



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.

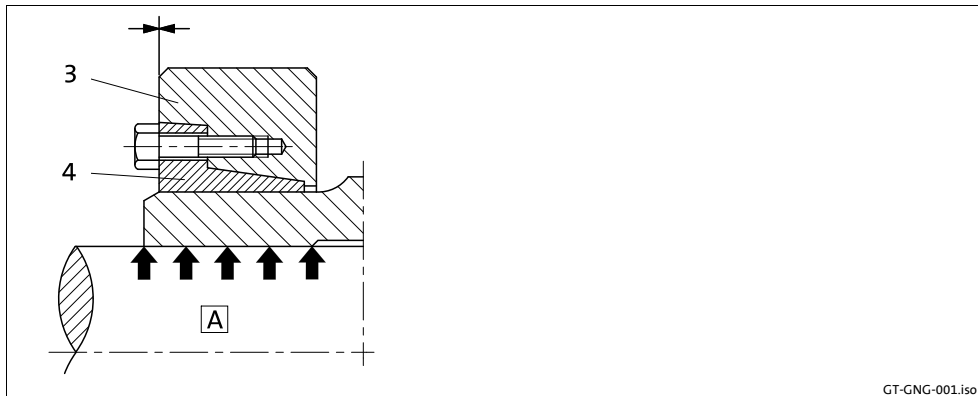


Fig. 9 Hollow shaft with shrink disc

- 3 Outer ring
4 Inner ring

A free of grease

Hollow shaft bore [mm]	20	25	28	30	35	40	45
Clamping screw thread	M6	M6	M8	M8	M6	M8	M8
Width across flats	10	10	13	13	10	13	13
Torque [Nm]	12	12	30	30	12	30	30

Hollow shaft bore [mm]	50	60	65	75	80	85	90	95	100
Clamping screw thread	M8	M10	M10	M10	M10	M10	M12	M12	M12
Width across flats	13	16	16	16	16	16	18	18	18
Torque [Nm]	30	59	70	70	70	70	125	100	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.

5 Mechanical installation

Mounting
Mounting the shrink disc

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.

5.3.8 Mounting the fixed cover

for size 09, 11 and 14



Note!

This cover can be ordered optionally and is loosely enclosed with the shipment!

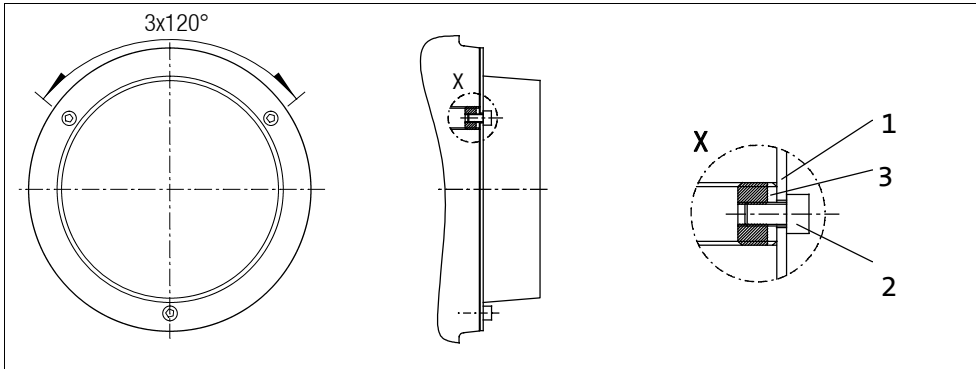


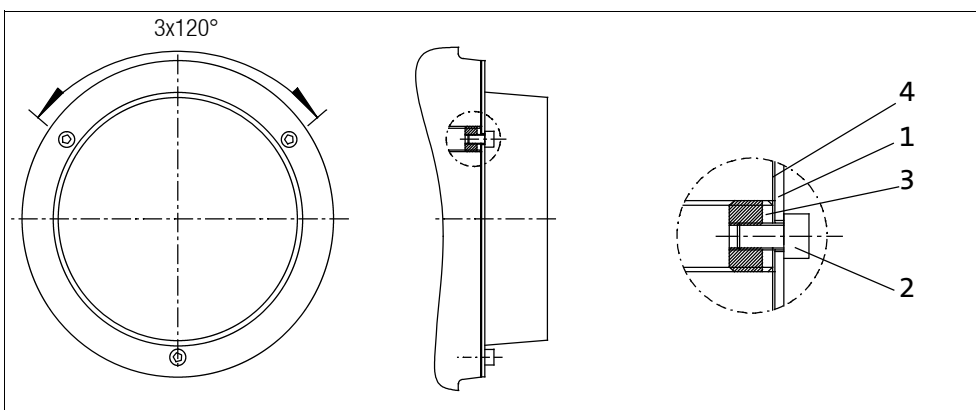
Fig. 10

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

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).

5.3.9 Mounting the hoseproof hollow shaft cover

for size 09, 11 and 14



- | | | | |
|---|-------------------|---|---------------|
| 1 | Protection cover | 3 | Reducing bush |
| 2 | Cheese head screw | 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 Mechanical installation

Mounting
Gearboxes with breathers

5.3.10 Gearboxes with breathers



Stop!

Do not place gearbox onto breather valve!

For gearboxes of sizes 03, 04 and 05 (exception GSS 05), no ventilation measures are required.

For gearboxes of sizes 06 to 14 and GSS 05, ventilation units are mounted. However, in specific cases they may be dispensed with. For gearbox sizes 09 to 14 in mounting position C we recommend using an oil compensation reservoir (📖 52).

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

Remove transport locking device on the vent valve.



If it deviates from standard mounting positions A - F, the ventilation unit must be checked with regard to its function. Mount ventilation units that are loosely attached (deviating from the standard) as specified in chapter 5.3.11. Gearboxes that are suitable for several mounting positions (📖 68) are delivered without ventilation units.

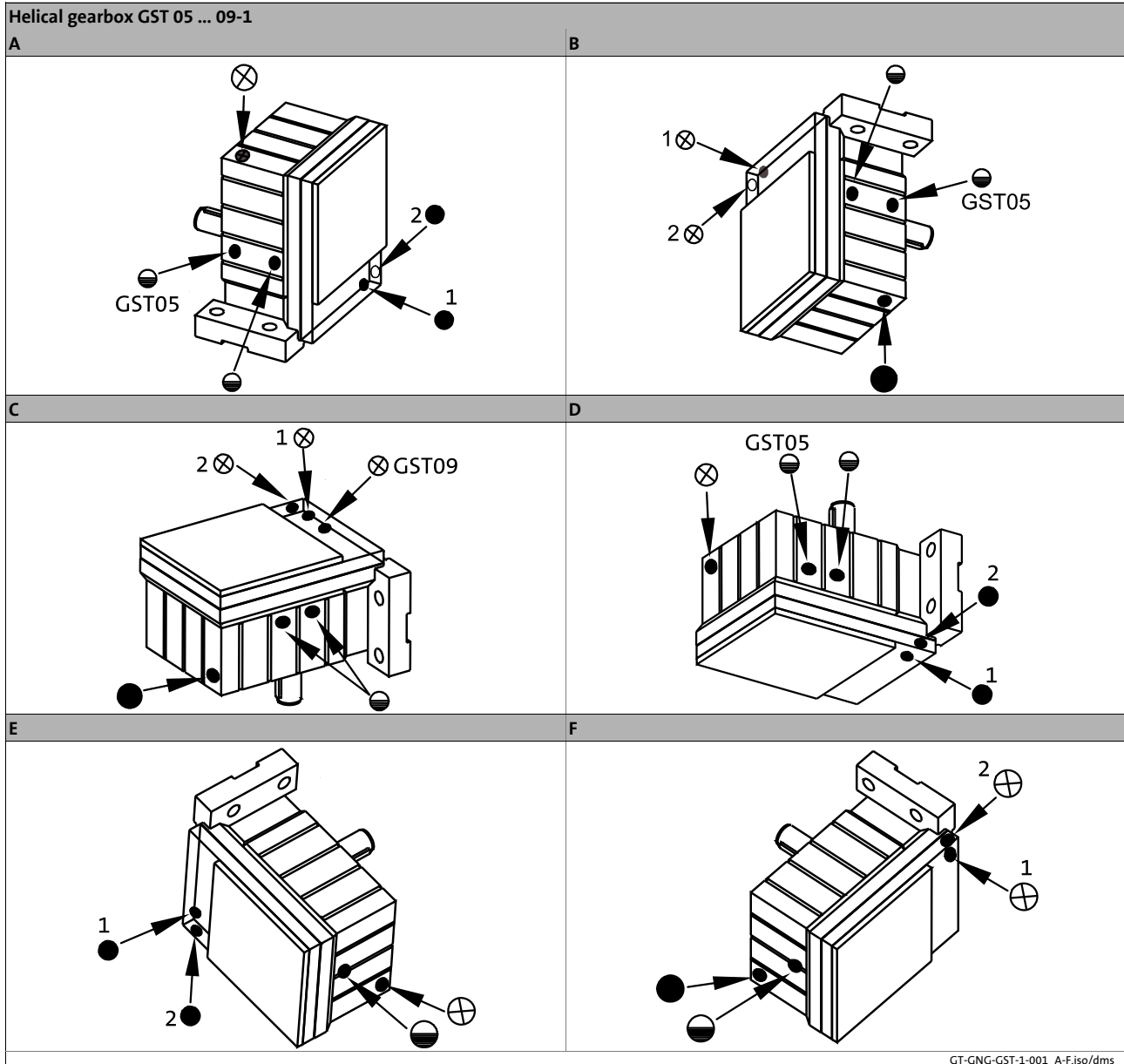
Ensure ventilation before initial commissioning!



Stop!

- Rotate gearbox to the mounting position shown on the nameplate ((📖 18) und (📖 41)).
- With gearbox types GST□□-3, GFL□□-3, GSS□□-3 and GKS□□-4, the pre-stage is separately ventilated! (Exception: size 06)

5.3.11 Breather position, oil filling screw and drain plug



A...F Mounting positions
* On both sides
** On the opposite side
⊗ Breathing / oil filler plug

● Oil drain plug
◐ Oil-control plug
Pos. 1 Standard
Pos. 2 only GST05-1A 080C22 with:

5 Mechanical installation

Mounting

Breather position, oil filling screw and drain plug

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

**

On the opposite side

⊗

Breathing / oil filler plug

●

Oil drain plug

◐

Oil-control plug

Pos. 1

Standard

Pos. 2 only
with:

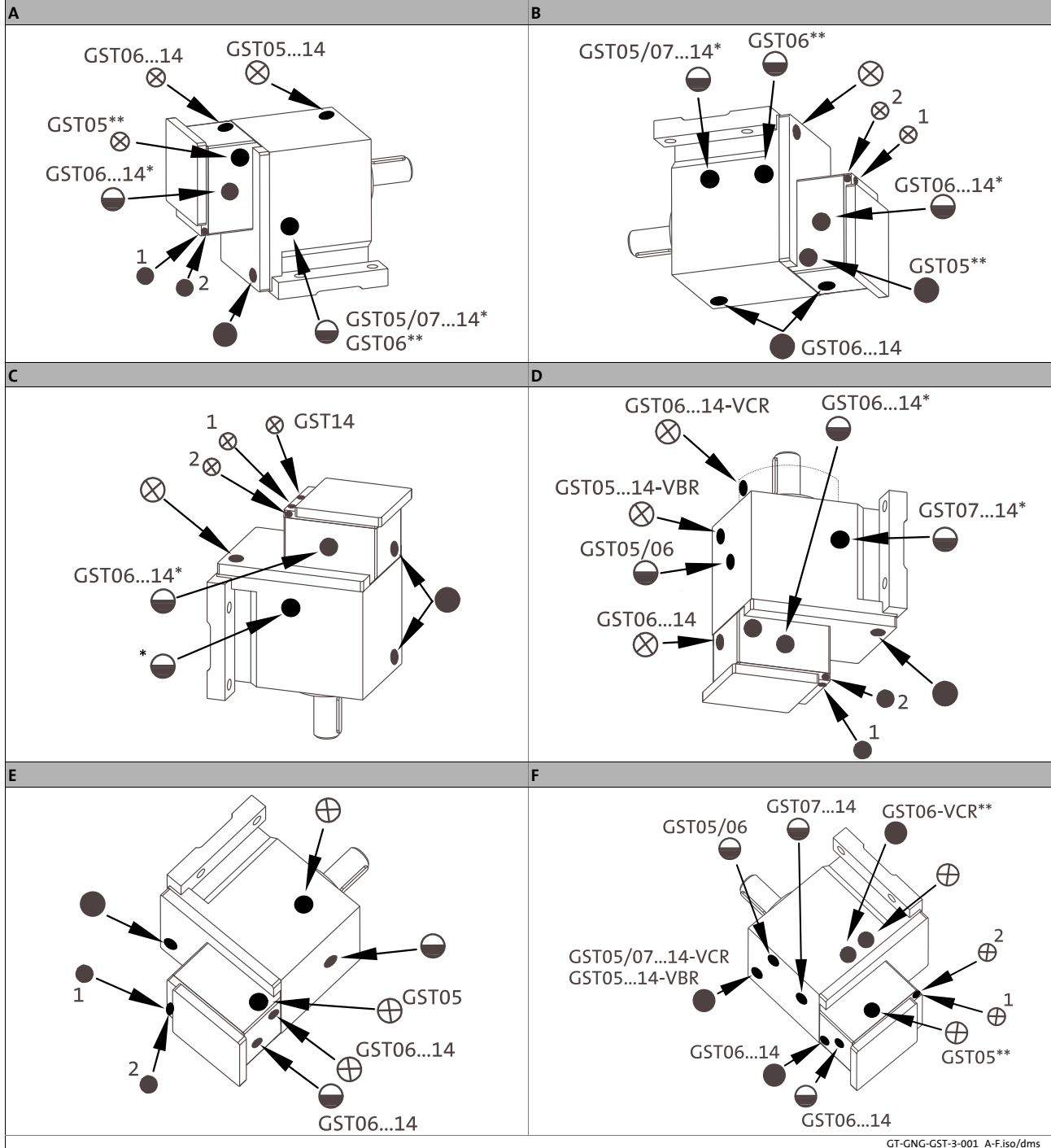
GST05-2M V□□ 090□□□

GST05-2M V□□ 100□□□

GST06-2M V□□ 112□□□

GST07-2M V□□ 160□□□

Helical gearbox GST 06 ... 14-3



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

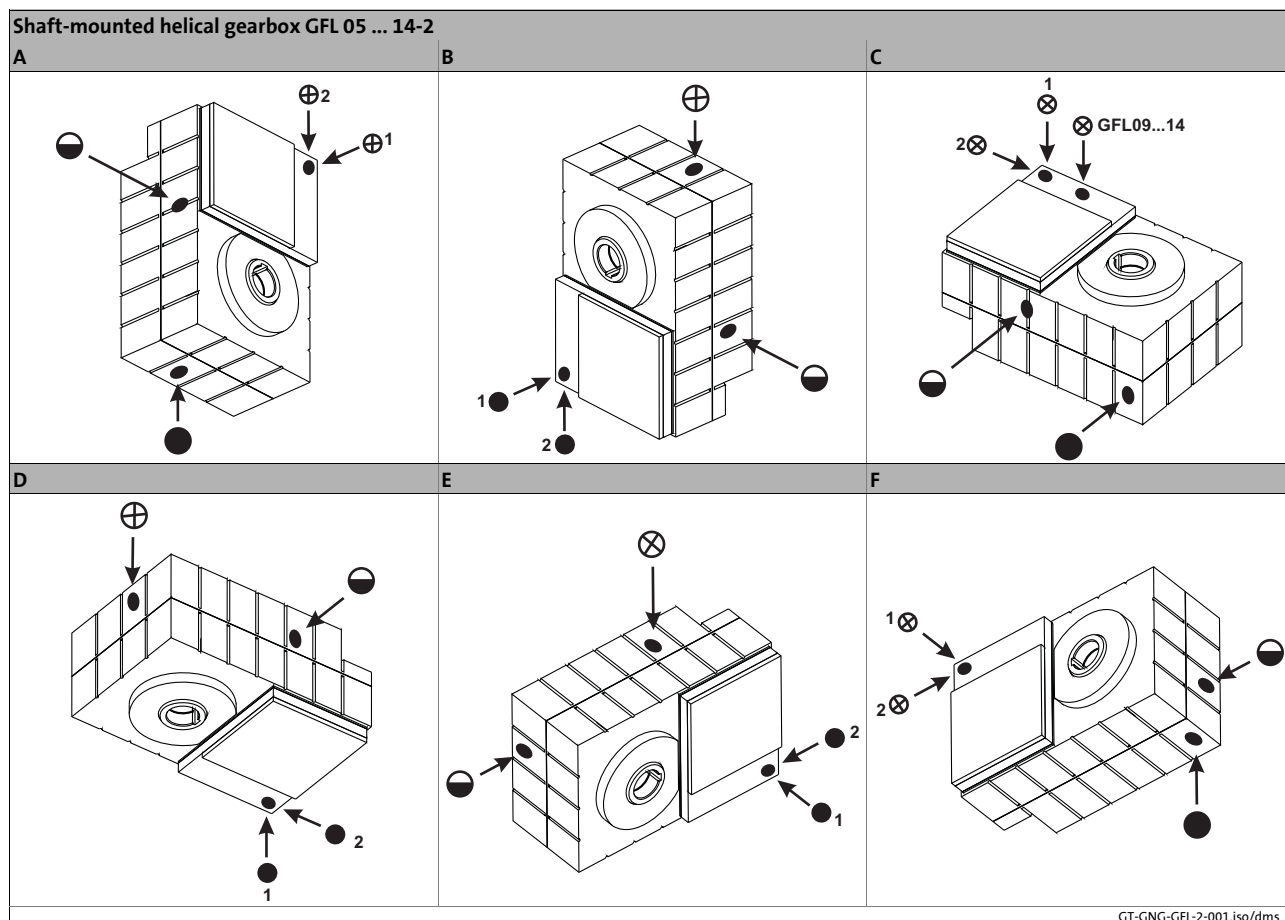
- A...F Mounting positions
- * On both sides
 - ** On the opposite side
 - ⊗ Breathing / oil filler plug
 - Oil drain plug
 - ◐ Oil-control plug

- Pos. 1 Standard
- Pos. 2 only with:
- GST05-3M V□□ 090□□
 - GST05-3M V□□ 100□□
 - GST06-3M V□□ 112□□

5 Mechanical installation

Mounting

Breather position, oil filling screw and drain plug



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

A...F

Mounting positions

*

On both sides

**

On the opposite side

⊗

Breathing / oil filler plug

●

Oil drain plug

◐

Oil-control plug

Pos. 1

Standard

Pos. 2 only
with:

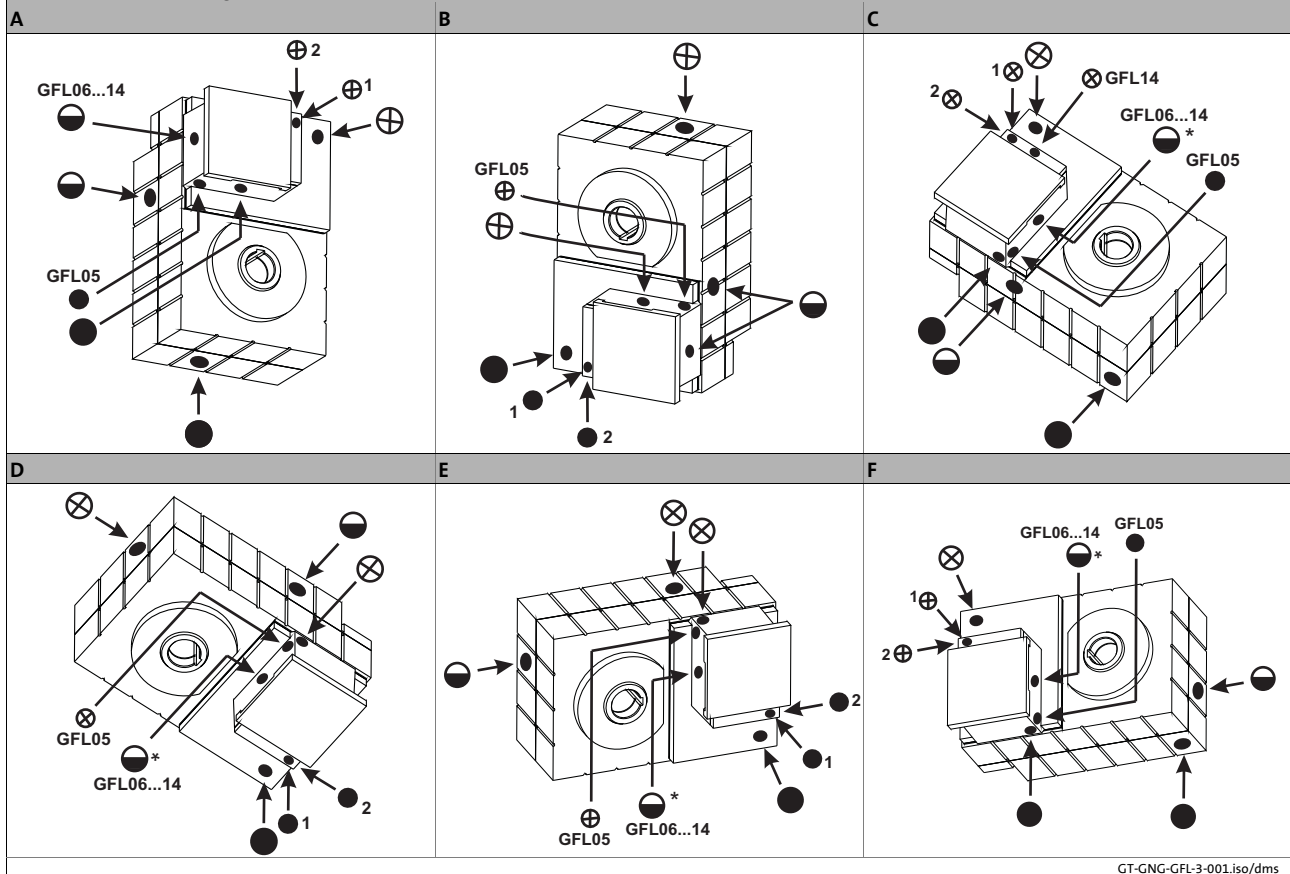
GFL05-2M □□□ 090□□

GFL05-2M □□□ 100□□

GFL06-2M □□□ 112□□

GFL07-2M □□□ 160□□

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



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

A...F

Mounting positions

*

On both sides

**

On the opposite side

⊗

Breathing / oil filler plug

●

Oil drain plug

◐

Oil-control plug

Pos. 1

Standard

Pos. 2 only
with:

GFL07-3M □□□ 090□□

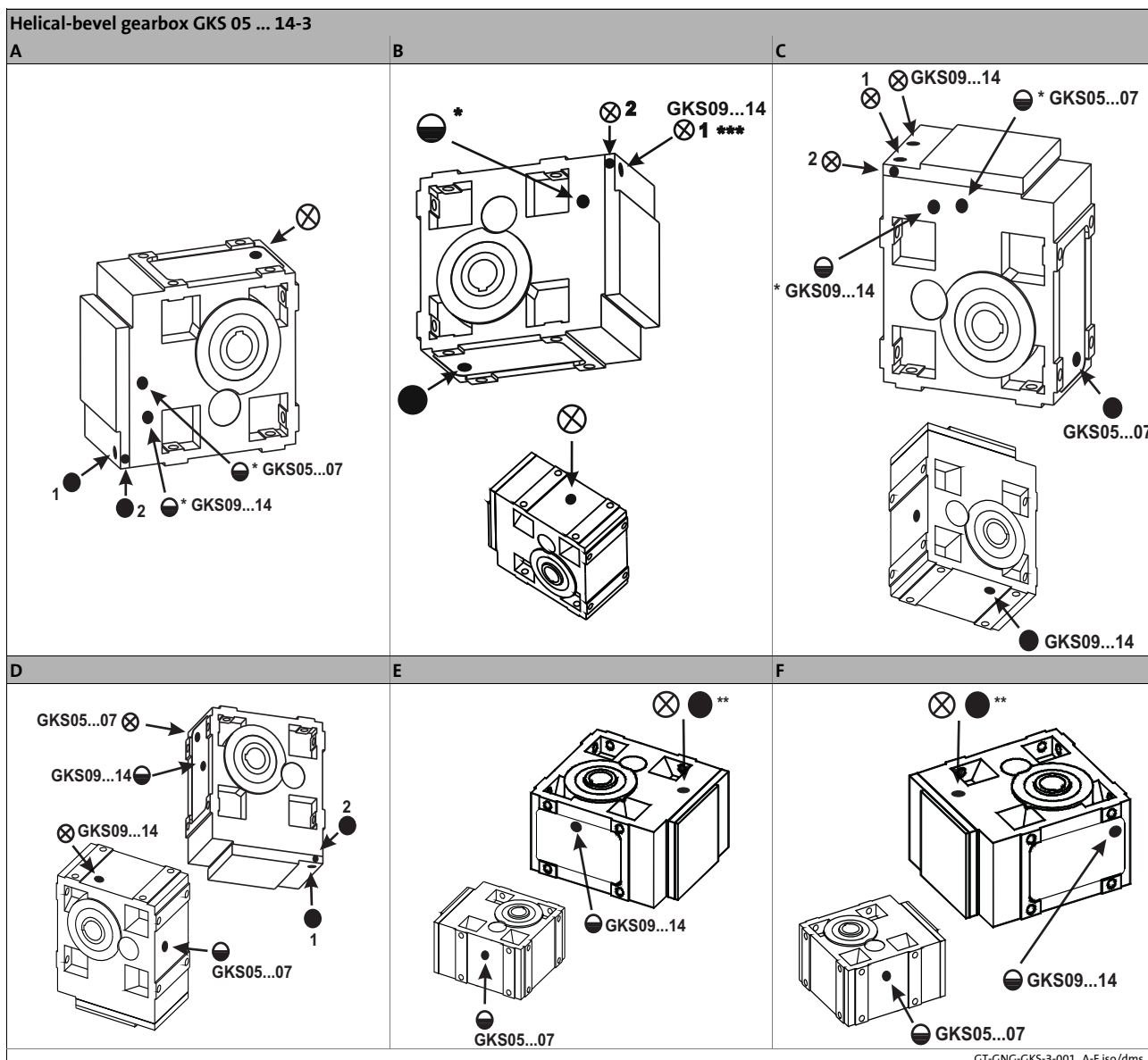
GFL07-3M □□□ 100□□

GFL09-3M □□□ 112□□

5 Mechanical installation

Mounting

Breather position, oil filling screw and drain plug



A...F

Mounting positions

*

On both sides

**

On the opposite side

GKS05...07 with torque plate on the foot in position 4

⊗

Ventilation / oil filler plug

●

Oil drain plug

◐

Oil control plug

Pos. 1

Standard

Pos. 2 only for:

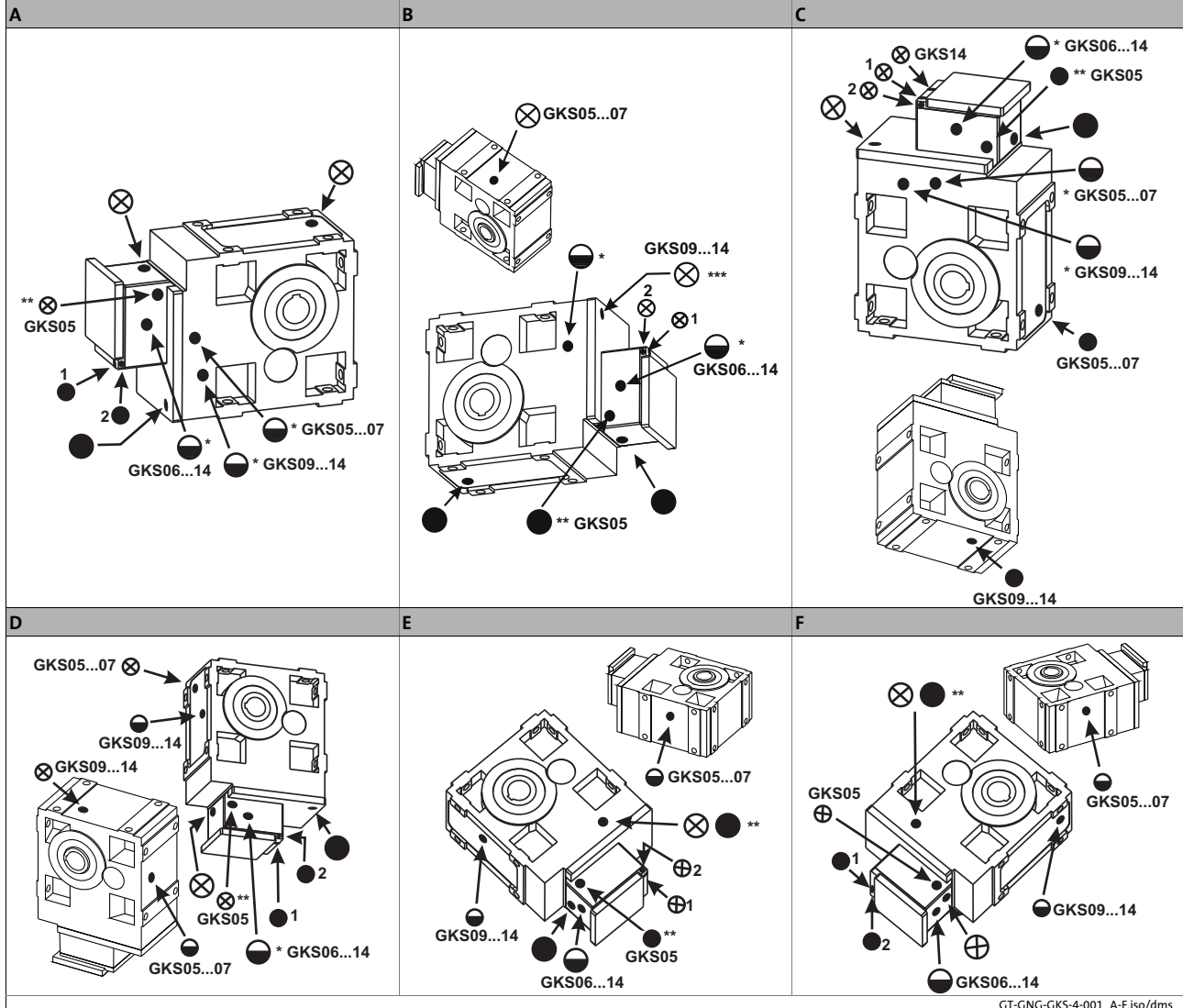
GKS05-3M □□□ 090□□

GKS05-3M □□□ 100□□

GKS06-3M □□□ 112□□

GKS07-3M □□□ 160□□

Helical-bevel gearbox GKS 05 ... 14-4



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

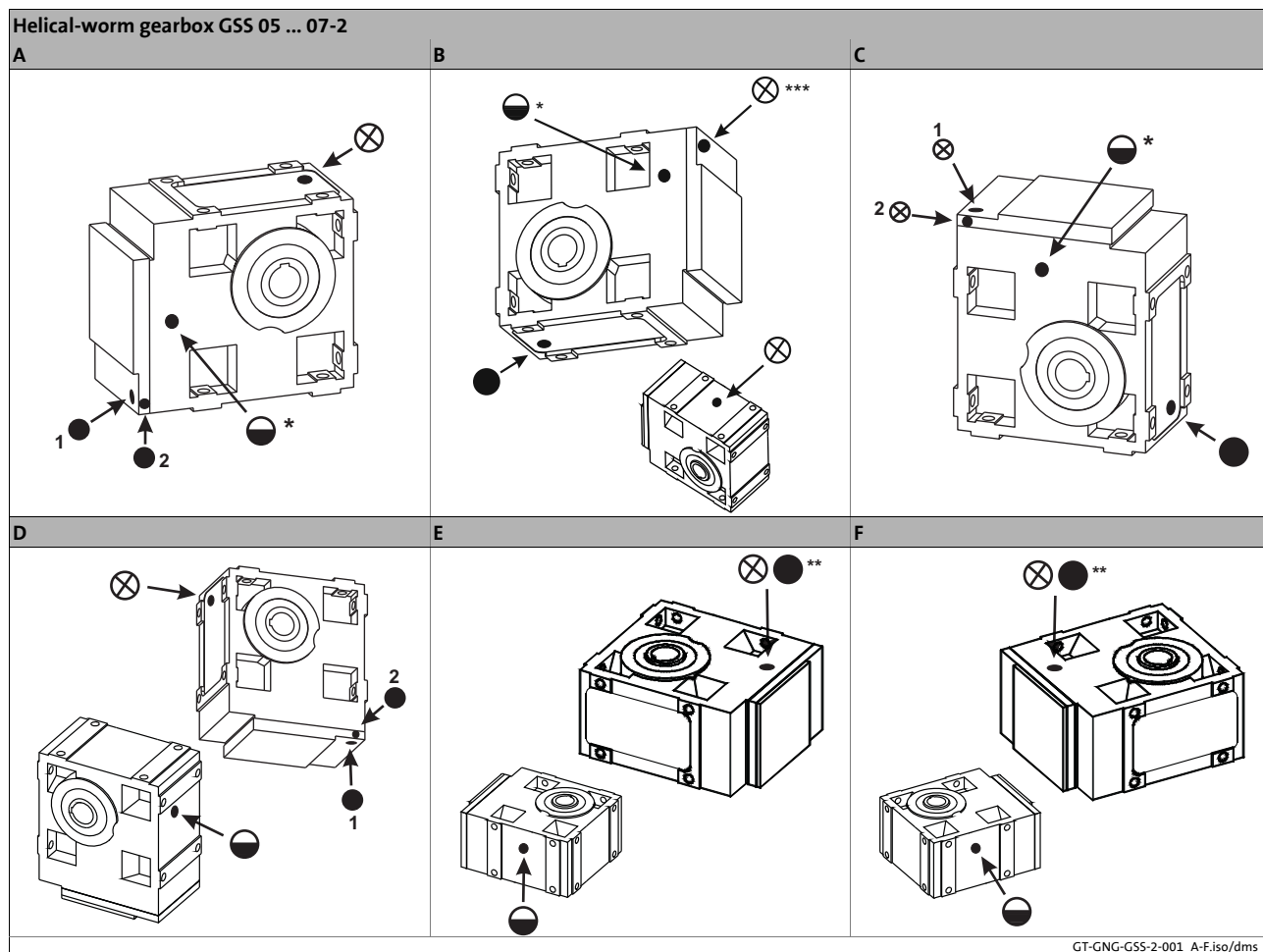
- A...F Mounting positions
 * On both sides
 ** On the opposite side
 *** GKS05...07 with torque plate on the foot in position 4
 ⊗ Ventilation / oil filler plug

- Oil drain plug
 ⊖ Oil control plug
 Pos. 1 Standard
 Pos. 2 only for: GKS07-4M □□□ 090□□
 GKS07-4M □□□ 100□□
 GKS09-4M □□□ 112□□

5 Mechanical installation

Mounting

Breather position, oil filling screw and drain plug



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

A...F

Mounting positions

*

On both sides

**

On the opposite side

With torque plate on the foot in position 4

⊗

Ventilation / oil filler plug

●

Oil drain plug

◐

Oil control plug

Pos. 1

Standard

Pos. 2 only for:

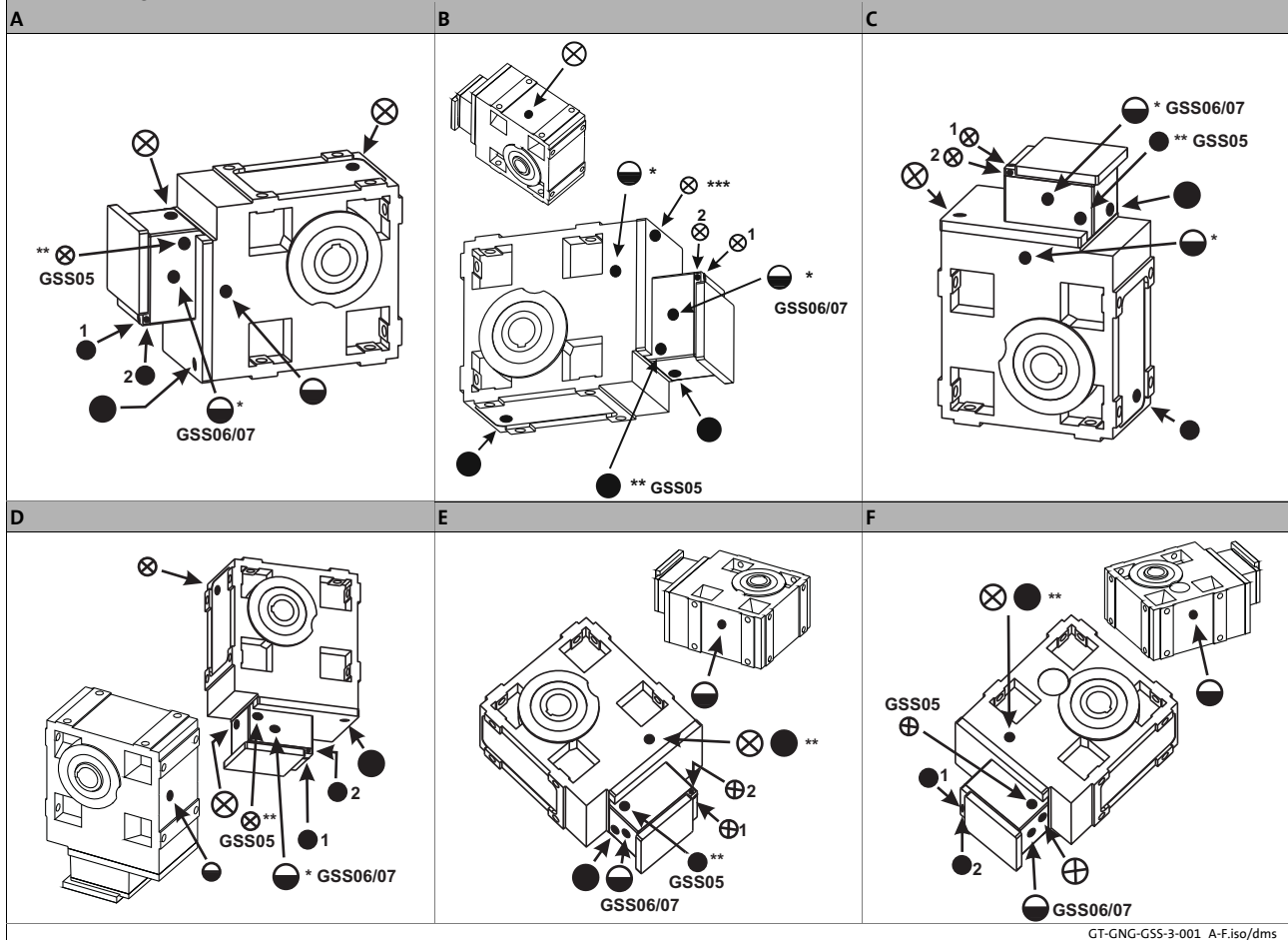
GSS05-2M □□□ 090□□

GSS05-2M □□□ 100□□

GSS06-2M □□□ 112□□

GSS07-2M □□□ 160□□

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



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

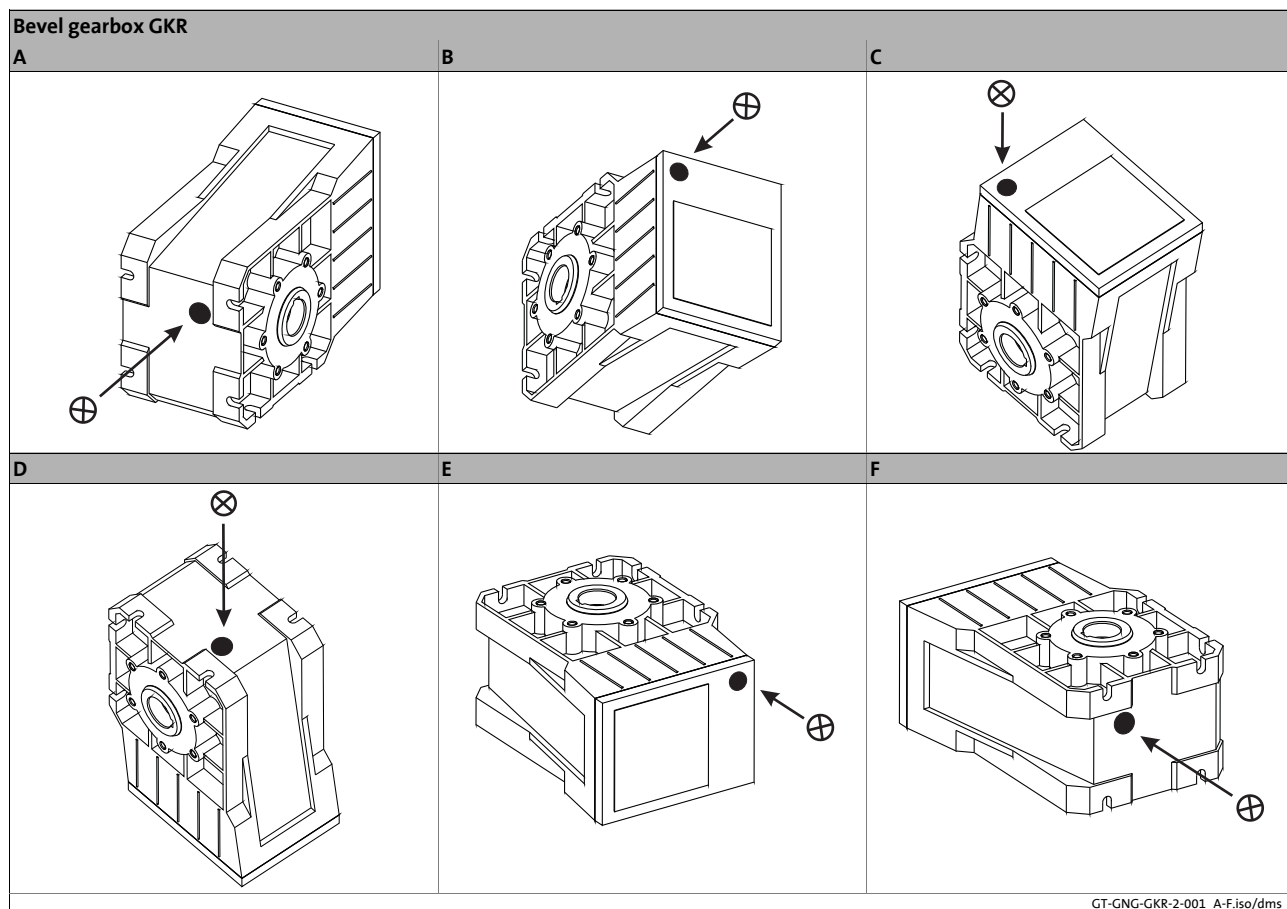
- A...F Mounting positions
 * On both sides
 ** On the opposite side
 *** With torque plate on the foot in position 4
 ⊗ Ventilation / oil filler plug

- Oil drain plug
 ● Oil control plug
 Pos. 1 Standard
 Pos. 2 only for: GSS07-3M □□□ 090□□
 GSS07-3M □□□ 100□□

5 Mechanical installation

Mounting

Breather position, oil filling screw and drain plug



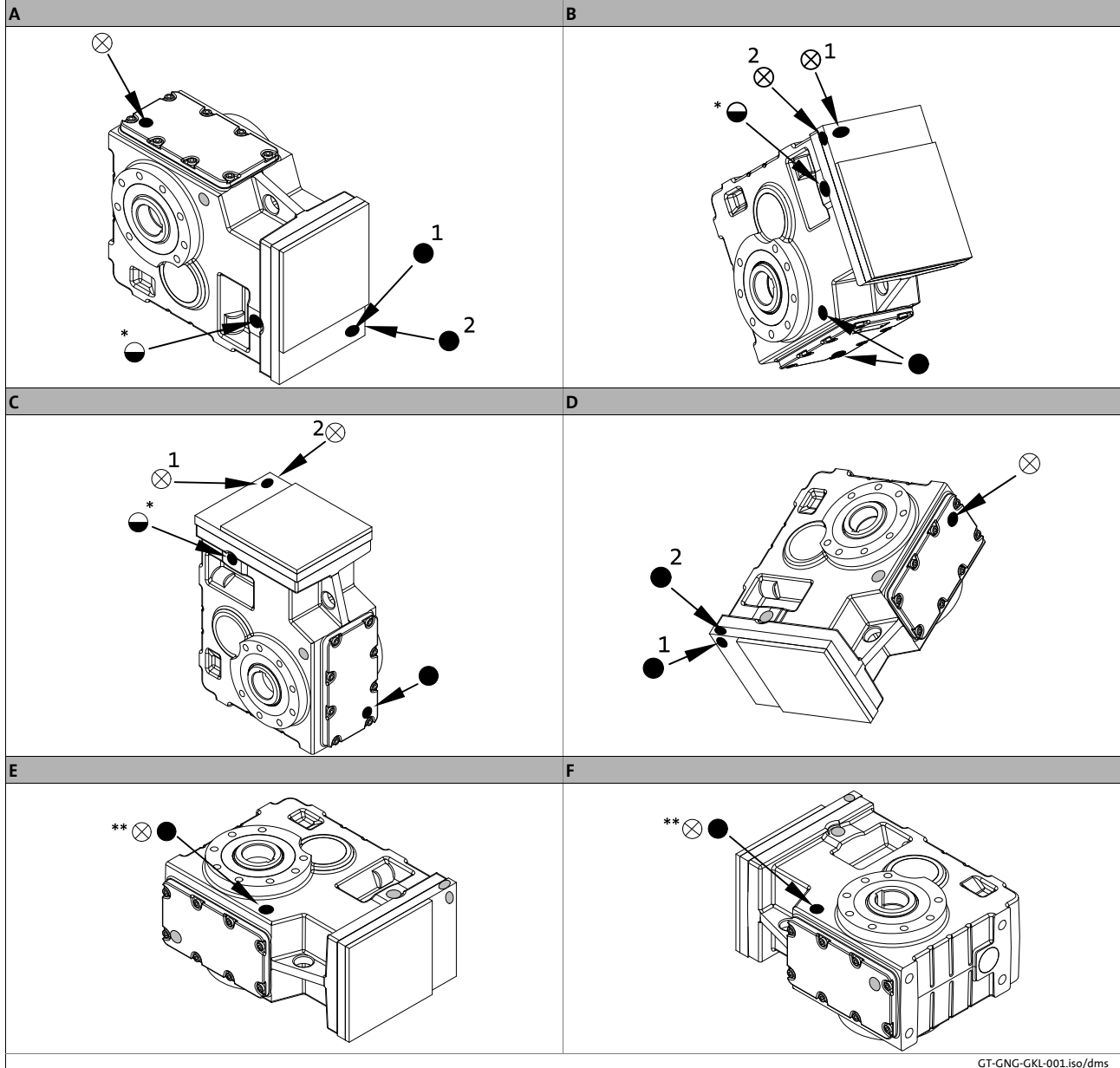
A...F

Mounting positions



Breathing / oil filler plug

Helical-bevel gearbox GKL07...09-3



GT-GNG-GKL-001.iso/dms

A...F Mounting positions
* On both sides
** On the opposite side
Pos. 1 or 2 Depending on version

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

5 Mechanical installation

Mounting

Gearbox with compensation container for mounting position C

5.3.12 Gearbox with compensation container for mounting position C

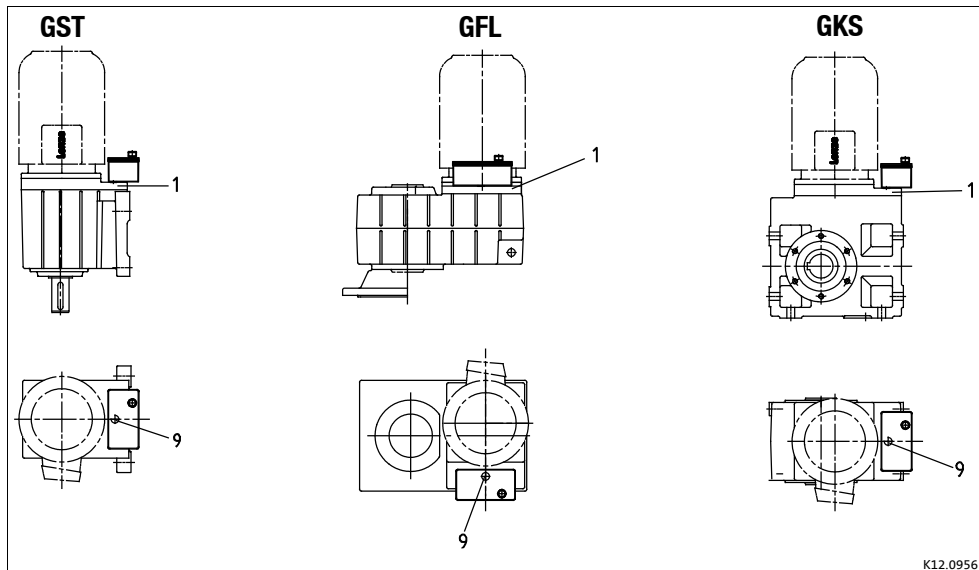


Fig. 11 Positioning of the compensation reservoir in mounting position C

1 Intermediate cover

9 Locking screw

5.3.12.1 Component parts list

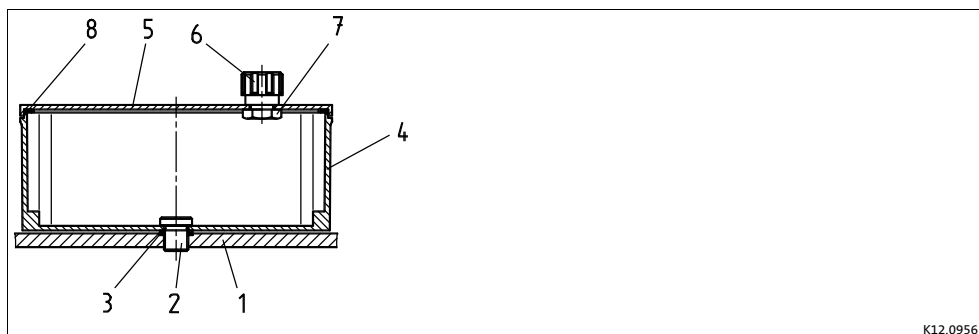


Fig. 12 List of details for compensation reservoirs

1 Intermediate cover

2 Fixing screw

3 Gaskets

4 Housing

5 Cover

6 Ventilation

7 Hexagon nut

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).

**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



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 (27), 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? (28)

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:

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

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

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



Note!

Gearboxes of sizes 03 and 04 are lubricated for life. Due to the low thermal load, no lubricant change is required.

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. 13.
- Shaft seals and roller bearings:
 - The service life depends on the operating conditions.
 - Replace seals in case of leakage to avoid consequential damage.



Note!

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



Stop!

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

Type	Lubricants		Note
	Specification	Ambient temperature	
CLP 460	Mineral oil with additive compounds	0 °C ... + 40 °C	
CLP PG 460	Synthetic oil (polyglycol)	-20 °C ... + 40 °C	Do not mix with mineral oils!
CLP HC 220 USDA H1	Food-compatible synthetic oil	-20 °C ... + 40 °C	Approval in compliance with USDA-H1
CLP HC 320 CLP HC 220	Synthetic oil (synthetic hydrocarbon)	-25 °C ... + 50 °C	Mixable with residual amounts of mineral oil
CLP HC 46 USDA H1	Synthetic oil (synthetic hydrocarbon)	-40 °C ... 0 °C	Good low-temperature flow characteristics Approval in compliance with USDA-H1

Tab. 8 Overview of lubricant change

8 Maintenance

Maintenance intervals



Note!

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

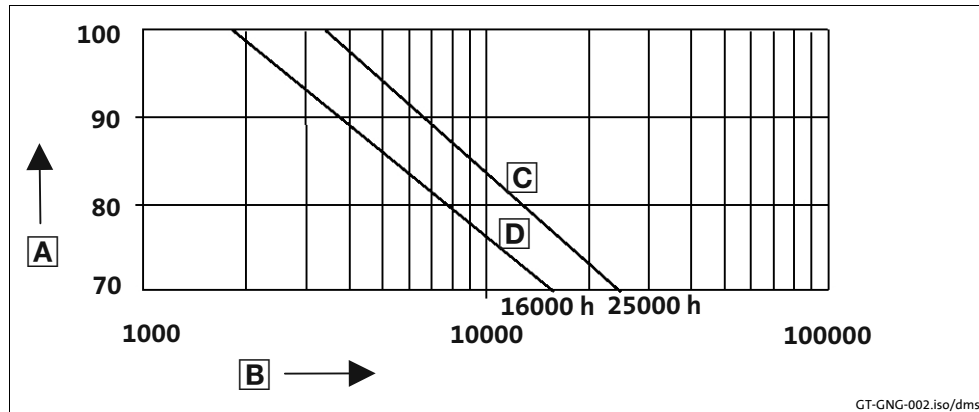


Fig. 13 Lubricant diagram

- | | |
|--|--------------------------------------|
| A Oil sump temperature [$^{\circ}\text{C}$] | C Synthetic oil CLP HC/CLP PG |
| B Oil life/changing intervals [operating hours h] | D Mineral oil CLP |

8.2 Maintenance operations

8.2.1 Opening the condensation drain hole

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

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



Stop!

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

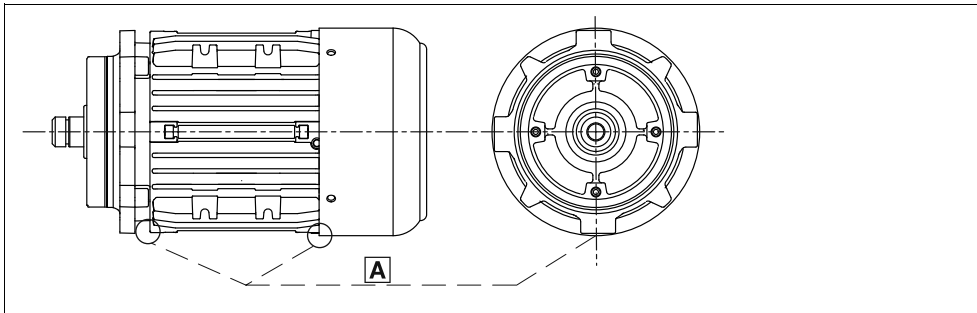


Fig. 14 Motor with condensation drain holes

A Condensation drain holes

8 Maintenance

Maintenance operations Lubricate roller bearings

8.2.2 Lubricate roller bearings

The roller bearings 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 °C ... +50 °C -30 °C ... +80 °C -40 °C ... +60 °C	Fuchs Klüber Klüber	Renolit H 443 Petamo 133 N Microlube GHY 72
Gearbox roller bearing GSS	-30 °C ... +80 °C -15 °C ... +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 bearings			
Low-temperature oils, observe critical starting performance at low temperatures	-40 °C ... +80 °C	Klüber	Asonic GHY 72
Biopetroleum (lubricant for forestry, agriculture and water supply and distribution)	-40 °C ... +50 °C	Fuchs	Plantogel 01205

The following lubricant quantities are required:

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

8.2.3 Table of lubricants

**Note!**

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

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

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

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

8 Maintenance

Maintenance operations Table of lubricants

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

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

8.2.4 Replacing the lubricant



Stop!

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



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 in lubricant through filler hole (quantities see nameplate).
6. Screw in breathing / oil filler plug.
7. Dispose of waste oil according to the applicable regulations.

8 Maintenance

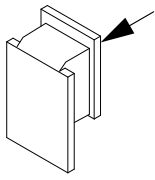
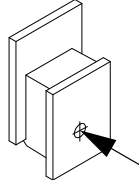
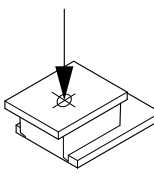
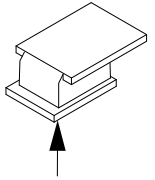
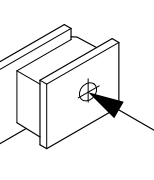
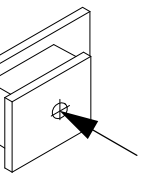
Maintenance operations
Lubricant quantity

8.2.5 Lubricant quantity



Stop!

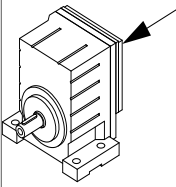
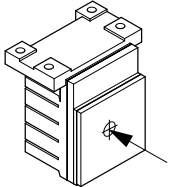
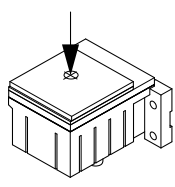
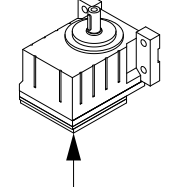
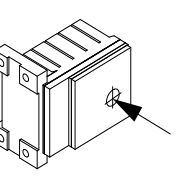
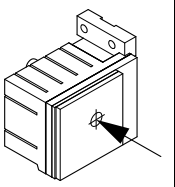
At drive speeds below 200 rpm the amount of lubricant may need to be increased. Consultation with Lenze is required.

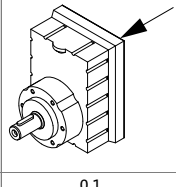
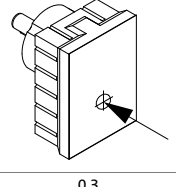
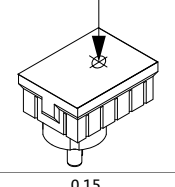
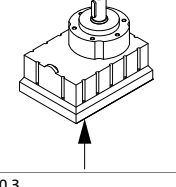
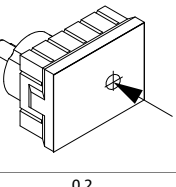
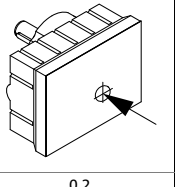
Mounting position	Pre-stage GST□□-3; GKS□□-4; GSS□□-3					
	A	B	C	D	E	F
						
	GT-GNG-GST/GL-010.iso/dms					
GST05	0.12 0.15 W ≥ 1C	0.3 0.35 W ≥ 1C	0.15	0.3 0.35 N ≥ 1B 0.4 W ≥ 1C	0.2	0.2
GST06	0.15	0.4	0.35	0.3 0.4 W ≥ 1C	0.3	0.3
GST07	0.3	0.7	0.5	0.55 0.65 M ≥ 90 A ≥ 80 N ≥ 1D	0.4	0.4
GST09	0.6	1.4	1.1	1.2	0.8	0.8
GST11	1.5 2.0 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.5 2.9 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.1	1.7 2.4 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.7	1.7
GST14	2.7 4.0 M ≥ 132 A ≥ 112 N ≥ 1G	4.6 5.2 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	4.3	3.2 4.1 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	3	3

Pre-stage shaft-mounted helical gearbox GFL□□-3□						
GFL05	0.2	0.2	0.15	0.3 0.35 N ≥ 1B 0.4 W ≥ 1C	0.12 0.15 W ≥ 1C	0.3 0.35 W ≥ 1C
GFL06	0.3	0.3	0.35	0.3 0.4 W ≥ 1C	0.15	0.4
GFL07	0.4	0.4	0.5	0.55 0.65 M ≥ 90 A ≥ 80 N ≥ 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 ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.5 2.0 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.5 2.9 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G
GFL14	3.0	3.0	4.3	3.2 4.1 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.7 4.0 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	4.6 5.2 M ≥ 132 A ≥ 112 N ≥ 1G

Tab. 9 Amount of lubricant in litres

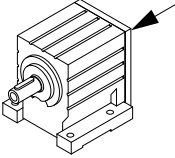
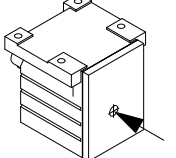
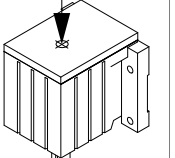
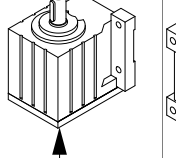
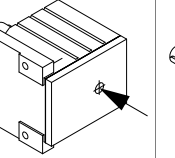
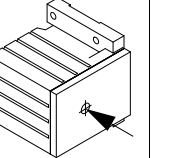
→ Drive 90...132 Motor size
A, M, N, W Drive-end version 1A ...2K Drive size

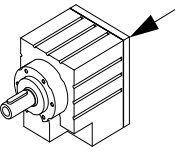
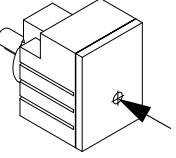
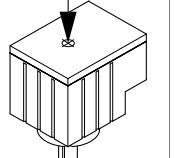
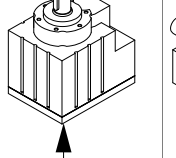
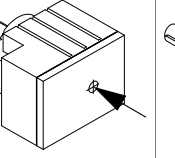
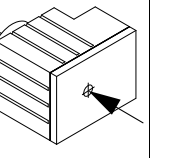
Helical gearbox GST□□-1□VA□ / VB□ (foot housing)						
Mounting position	A	B	C	D	E	F
						
GST04	0.1	0.37	0.2	0.3 0.35 W ≥ 1C	0.25	0.25
GST05	0.2	0.6	0.35	0.5 0.6 M ≥ 90 A ≥ 80 N ≥ 1D	0.35	0.35
GST06	0.4	1.2	0.65	0.85 1 W ≥ 1E	0.7	0.7
GST07	0.7 1.3 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.3 2.7 M ≥ 132 A ≥ 112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

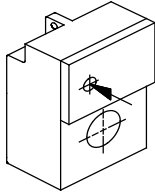
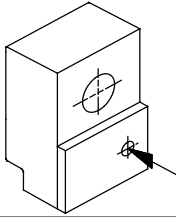
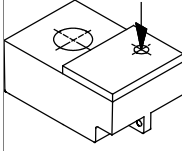
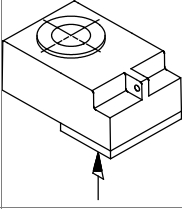
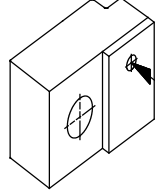
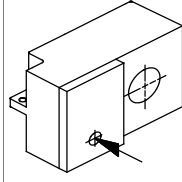
→ Drive 90...132 Motor size
A, M, N, W Drive-end version 1A ...2K Drive size

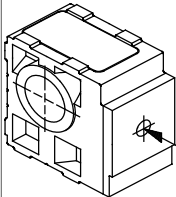
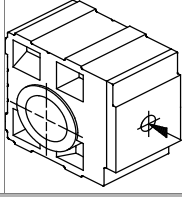
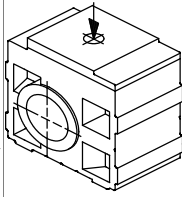
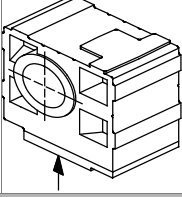
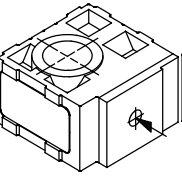
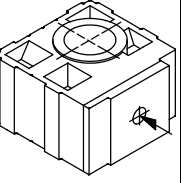
Mounting position	Helical gearbox GST□□-2□; -3□ VA□ / VB□ (foot housing)					
	A	B	C	D	E	F
						
GST03	0.2	0.2	0.2	0.2	0.2	0.2
GST04	0.35	0.5	0.45	0.55	0.3	0.3
GST05	0.5	0.80	0.75	1	0.55	0.55
GST06	0.6 0.7 M ≥ 132	1.1 1.2 M ≥ 132	1.2	1.7 1.8 M ≥ 132	1.0 1.1 M ≥ 132	1.0 1.1 M ≥ 132
GST07	2.2 2.6 M ≥ 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

Mounting position	Helical gearbox GST□□-2□; -3□ VC□ (flange housing)					
	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	1.1	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 90...132 Motor size
A, M, N, W Drive-end version 1A ...2K Drive size

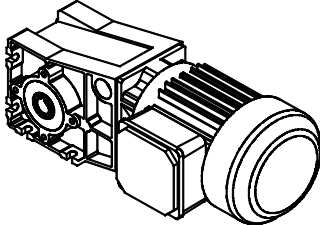
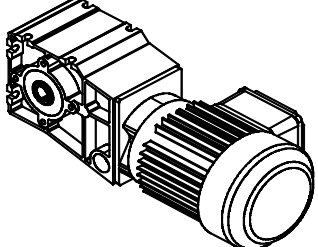
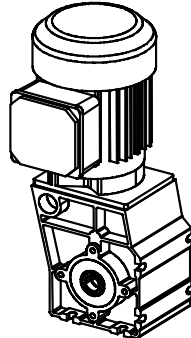
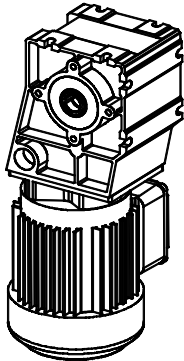
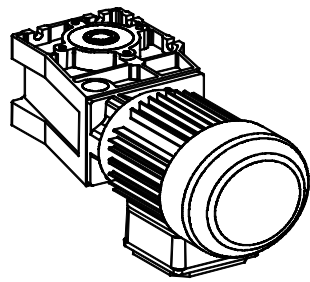
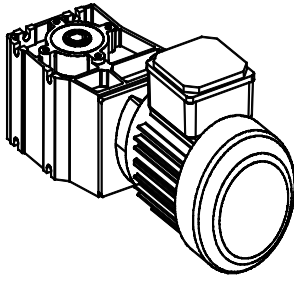
Mounting position	Shaft-mounted helical gearbox GFL□□-2; -3					
	A	B	C	D	E	F
						
GFL04	0.65	0.6	1.05	0.8	0.75	0.35
GFL05	1.3	1.4	1.7	1.7	1.3	0.7
GFL06	2.0	2.1	3.0	2.8	2.1	1.2
GFL07	4.3	3.8	6.3	5.8	4.6	2.5
GFL09	8.9	7.6	13	11.3	9.5	5.2
GFL11	16	15	25	21	20	9.0
GFL14	32	36	47	42	27	28

Mounting position	Right-angle gearbox					
	A	B	C	D	E	F
						
Helical-bevel gearbox GKS□□-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 Maintenance

Maintenance operations

Lubricant amounts for combinable mounting positions

8.2.6 Lubricant amounts for combinable 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 GST04 ... 05-1; V□□

Mounting position	All types V□□ except for V□□	
	GST04	GST05
A	0.10	0.20
B D	0.35	0.60
C E F	0.25	0.35
Type V□□		
A C	0.15	0.20
B D	0.35	0.50
E F	0.20	0.30

Helical gearbox GST03 ... 05-2; V□□

All types except for VC□			
Mounting position	GST03	GST04	GST05
A B C D E F	0.20	---	---
A E F	---	0.35	0.55
B C		0.50	0.85
D		0.55	1.0
Type VC□			
A B C D E F	0.17	---	---
A E F	---	0.35	0.45
B C		0.45	0.70
D		0.60	0.95

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

Mounting position	Types V□R; V□L	
	GFL04	GFL05
A B E	0.7	1.4
C D	1.0	1.7
F	0.3	0.7
Type 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□□

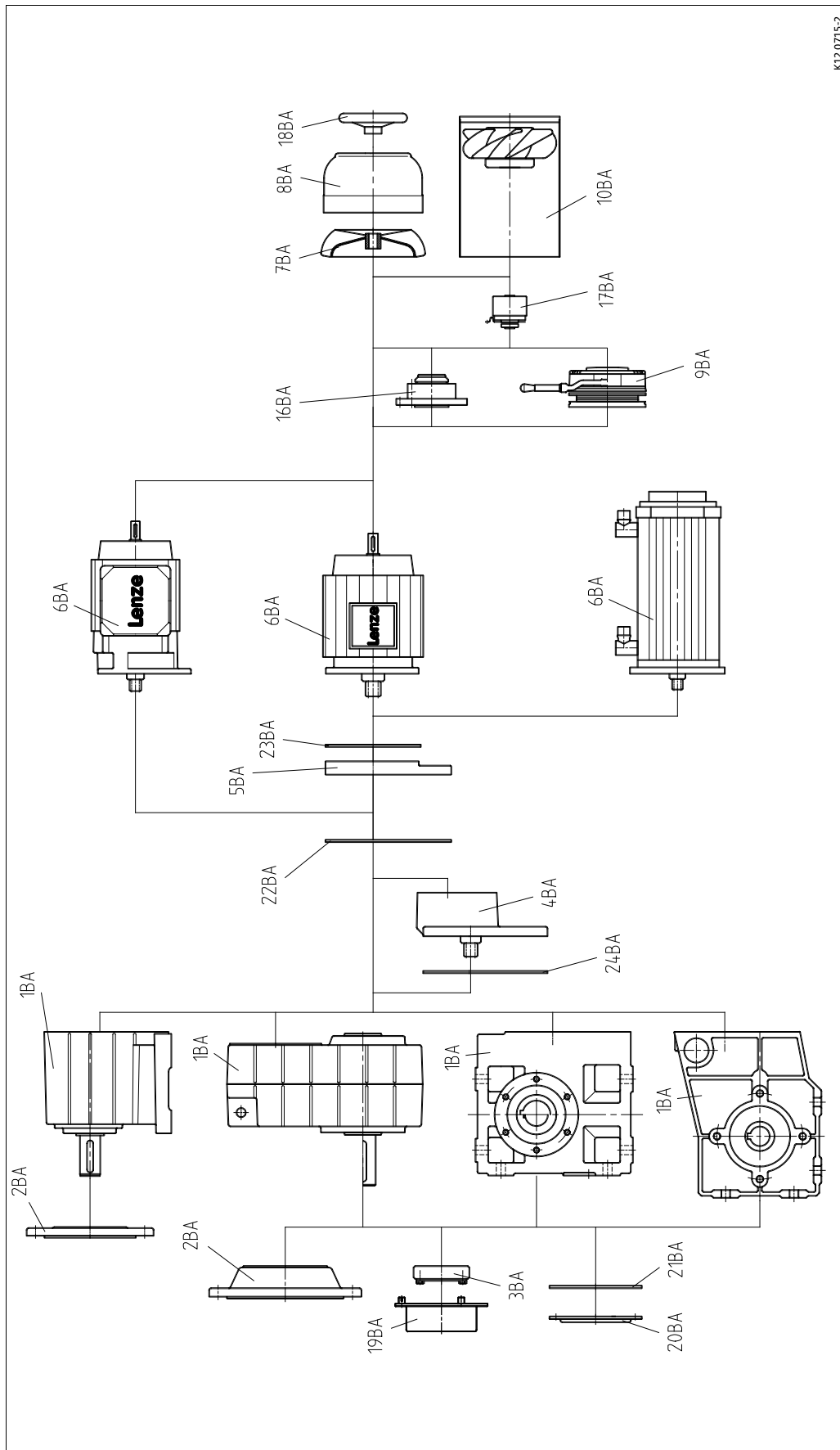
Mounting position	Type V□R; V□L	
	GKS04	GKS05
A	0.8	1.3
B C E F	1.3	2.0
D	1.0	1.6
Type V□K		
A	0.8	1.4
B C E F	1.5	2.1
D	1.1	1.7

Bevel gearbox GKR03 ... 05-2; V□□

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

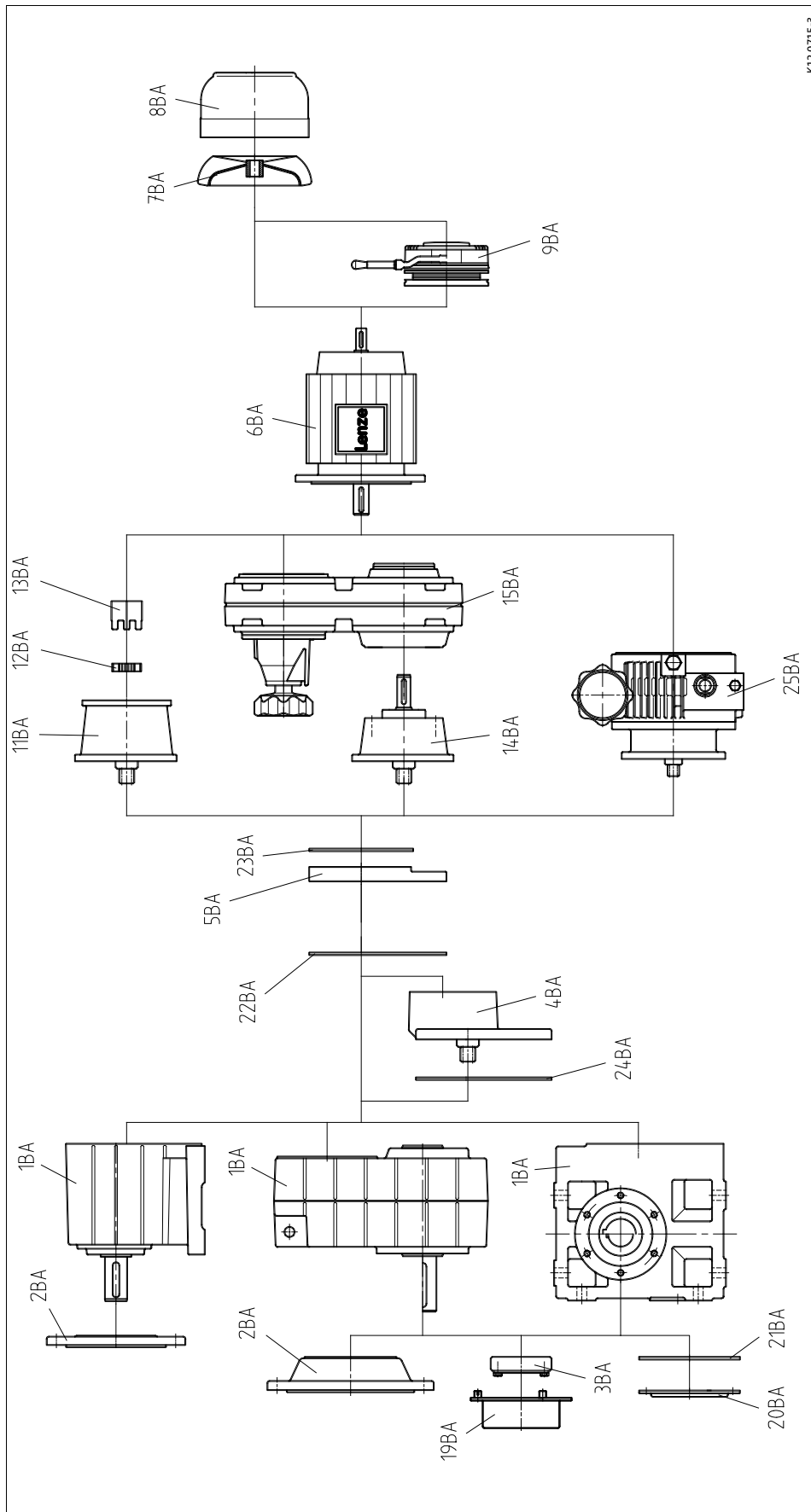
8.3 Repair

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



K12.0715-2

8.5 Spare parts list for gearboxes and gearboxes with variable speed drives



8 Maintenance

Order form

8.6 Order form

		Recipient: Lenze	
		Postcode / town, city: _____	
		Telefax No.: _____	
Sender _____		Customer no. _____	
Address / P.O. box _____		Order No. _____	
Postcode / town, city _____		Originator _____	
Delivery address _____		Telephone _____	
		Fax _____	
Invoice recipient * _____		Delivery date _____	
Date _____		Signature _____	
* Please state if different to sender			

Position	Name	Pce. number	Position	Name	Pce. number
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	Speed sensor / 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	Blower		25BA	Planetary variable speed drive	
11BA	Mounting flange				

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

Fault	Possible cause	Remedy
Drive is not running	Voltage supply interrupted	Check connection
	Faulty electrical connection	Check that supply voltage matches nameplate data
	Excessive load	Reduce load Check drive-machine assignment
Motor is running, but gearbox is not running	Coupling components are missing or defective	Check mounting
	Gearbox is defective	Inform Lenze Service
	Clutch disengaged	Engage the clutch
Unusual running noises	Overload	Reduce load Check drive-machine assignment
	Damage to the gearbox or motor	Inform Lenze Service
Excessive temperature	Overload	Reduce load Check drive-machine assignment
	Inadequate heat dissipation	Improve cooling air flow Clean gearbox / motor
	Lack of lubricant	Top up lubricant according to regulations
Loose fixing elements	Vibrations	Avoid vibrations
Shrink disc connection is spinning	- Correct screw tightening torque has not been reached - Insufficient number of passes, not all screws are tightened correctly. - Machine shaft and hollow shaft bore not sufficiently degreased - Wrong component part dimensions - Fits, roughnesses - Yield point of machine shaft material is too low $R_e > 300 \text{ N/mm}^2$ required - Friction factors are too low - 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



Notes





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🌐 www.lenze.com



Lenze Service GmbH
Breslauer Straße 3, D-32699 Extertal

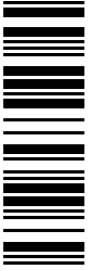
Germany

☎ 0080002446877 (24 h helpline)

📠 +49 5154 82-1112

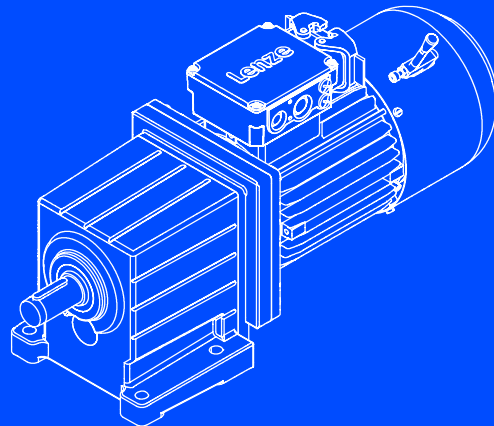
@ service@lenze.com

10 9 8 7 6 5 4 3 2 1



Operating Instructions

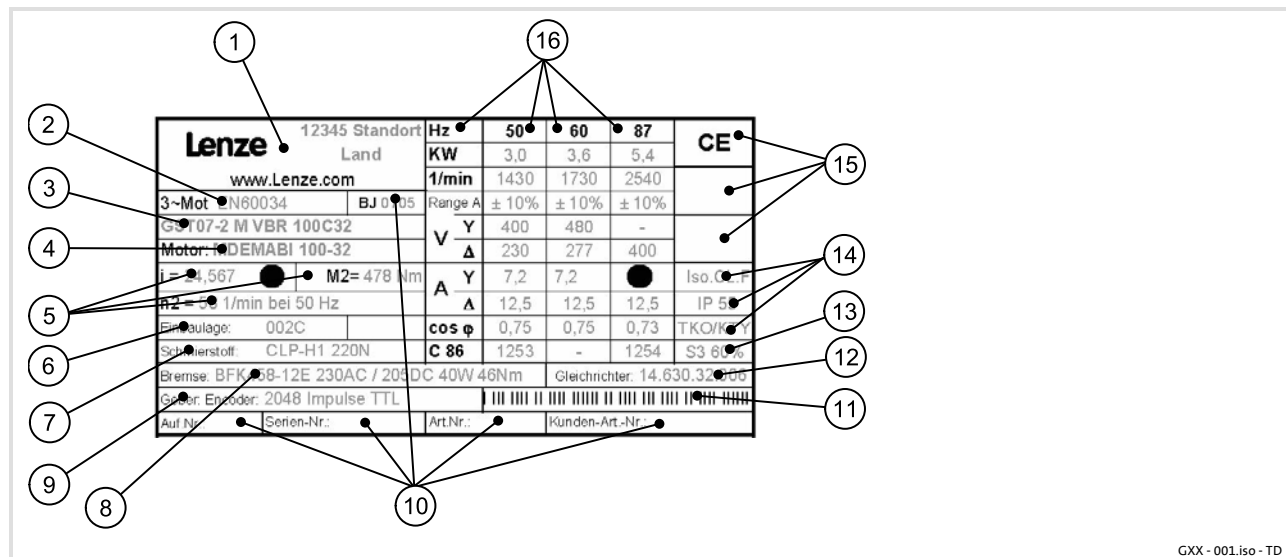
G-motion



Gearbox G□□

Variante Automotive

Geared motor



GXX - 001.iso - TD

Pos.	Contents
1	Production site
2	Motor identifier
3	Gearbox type
4	Motor type
5	Technical data
	Ratio
	Rated torque
	Rated speed and rated frequency
6	Mounting position
7	Lubricant
8	Brake data
	Type
	AC/DC and brake voltage
	Braking torque
9	Encoder information, if fitted
10	Production data
	Order number
	Serial number
	Week of manufacture / year of manufacture
	Material number
	Customer order number / customer additional data
11	Bar code
12	Rectifier identifier
13	Information on operating mode
14	Additional information on motor
	Thermal class
	Degree of protection
	Motor protection
15	Applicable conformities and approvals
16	Rated data for 50 Hz, 60 Hz and 87 Hz
	Hz = output frequency
	kW = motor power
	1/min. = motor speed
	Range A = voltage tolerances
	V = motor voltage
	A = motor current
	cos φ = motor power factor
	C 86 = Code 0086, selection code for operation on servo inverter

Document history

Material number	Version			Description
13144311	1.0	07/2006	TD27	First edition



Tip!

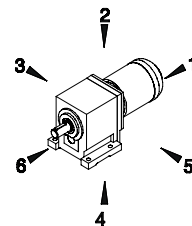
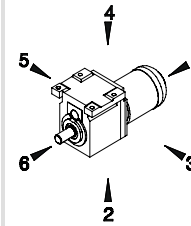
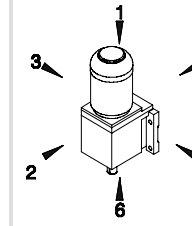
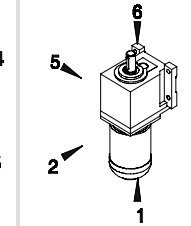
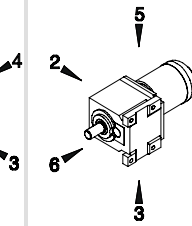
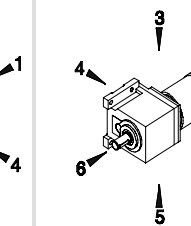
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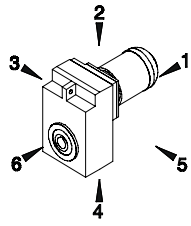
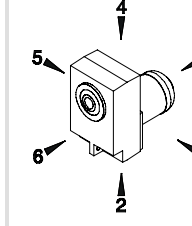
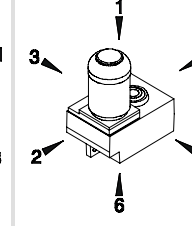
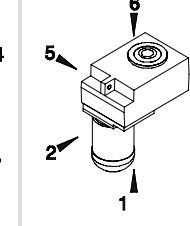
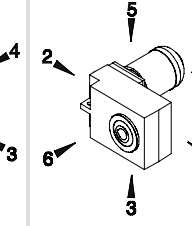
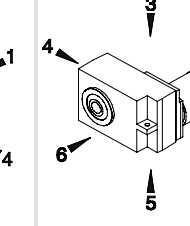
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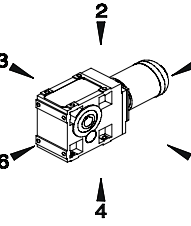
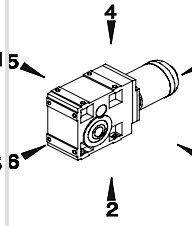
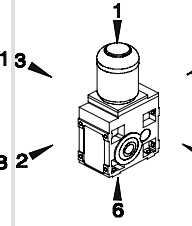
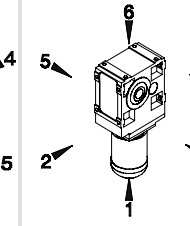
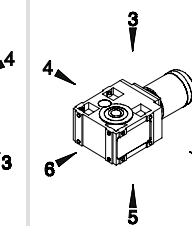
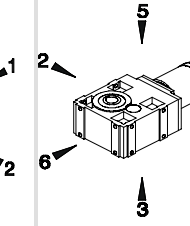
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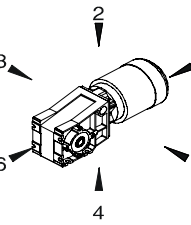
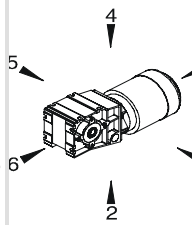
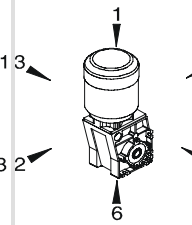
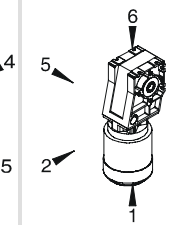
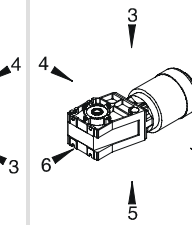
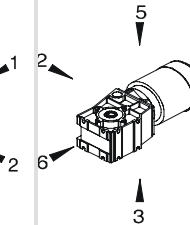
All information given in this documentation has been selected carefully and complies with the hardware and software described. Nevertheless, deviations cannot be ruled out. We do not take any responsibility or liability for damages which might possibly occur. Necessary corrections will be included in subsequent editions.

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			
					
A	B	C	D	E	F

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	
							
A	B	C	D	E	F		

GKS/GSS		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	
							
A	B	C	D	E	F		

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	
							
A	B	C	D	E	F		

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1 Preface and general information

How to use these Operating Instructions

1 Preface and general information

1.1 How to use these Operating Instructions

- ▶ 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.

1.2 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

1.3 Scope of supply

- ▶ The drive systems are combined individually according to a modular design. The scope of supply can be obtained from the pertinent papers.
- ▶ After receipt of the supply, check immediately whether it corresponds with the accompanying papers. Lenze does not grant any warranty for subsequent claims. Claim for
 - visible transport damages immediately to the forwarder.
 - visible deficiencies / incompleteness immediately to the responsible Lenze subsidiary / agency.

1.4 Lenze drive systems

1.4.1 Labelling

Lenze drive systems are uniquely designated by the content of their nameplates.

Manufacturer

Lenze Drive Systems GmbH

Hans-Lenze-Straße 1

D-31855 Aerzen

1.4.2 Application as directed

- ▶ Lenze drive systems
 - are intended for use in machinery and plant,
 - must only be used for the purposes ordered and confirmed,
 - must only be operated under the ambient conditions prescribed in these Operating Instructions,
 - must not be operated beyond their corresponding power limits.

Any other use shall be deemed inappropriate!

1.5 Legal regulations

Liability

- ▶ The information, data, and notes in the Operating Instructions were state of the art at the time of printing. Claims referring to drive systems which have already been supplied cannot be derived from the information, illustrations, and descriptions.
- ▶ We do not accept any liability for damage and operating interference caused by:
 - inappropriate use,
 - unauthorised modifications to the drive system,
 - improper working on and with the drive system,
 - operating faults,
 - disregarding the Operating Instructions.

Warranty

- ▶ Conditions of warranty: see terms of sale and delivery of Lenze Drive Systems GmbH.
- ▶ Warranty claims must be made to Lenze immediately after detecting the deficiency or fault.
- ▶ The warranty is void where liability claims cannot be made.

2**Safety instructions****2.1****Personnel responsible for safety****Operator**

- ▶ An operator is any natural or legal person who uses the drive system or on behalf of whom the drive system is used.
- ▶ The operator or his safety officer must ensure
 - that all relevant regulations, instructions and legislation are observed.
 - that only qualified personnel work with and on the drive system.
 - that the personnel have the Operating Instructions available for all corresponding operations.
 - that non-qualified personnel are prohibited from working with and on the drive system.

Skilled personnel

Skilled personnel are persons who - because of their education, experience, instructions, and knowledge about corresponding standards and regulations, rules for the prevention of accidents, and operating conditions - are authorised by the person responsible for the safety of the plant to perform the required actions and who are able to recognise potential hazards.

(See IEC 364, definition of skilled personnel)

2.2**General safety information**

- ▶ This safety information does not claimed to be complete. In case of questions and problems, please contact your Lenze representative.
- ▶ At the time of delivery the drive system meets the state of the art and ensures safe basic operation.
- ▶ The drive system is a source of danger for persons, for the drive system itself, and for other material assets of the operator, if
 - unqualified personnel works with and on the drive system,
 - the drive system is used inappropriately.
- ▶ The drive systems must be designed such that they perform their functions after proper installation and with application as directed in fault-free operation and that they do not cause hazards for persons. This also applies for their interaction with the complete plant.
- ▶ Be sure to take appropriate measures in the case of drive system failure so that no material damage occurs.
- ▶ Operate the drive system only when it is in a proper state.
- ▶ Retrofittings, modifications, or redesigns of the drive system are basically prohibited. Lenze must be contacted in all cases.

2.3 Definition of 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

3 Technical data

- ▶ The most important technical data are indicated on the nameplate (for Design and Contents see page 3).
- ▶ Additional technical data are listed in the product catalogues.

3.1 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			Bevel	Helical
Bevel gearbox	---			---
Helical-worm gearbox	Helical		Worm	---

- ▶ The reaction torque must be supported by the flange fixing in a suitable manner.

3.2 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 Motor frame sizes					Gearboxes
	132-□□	160-□□	180-□□	200-□□	225-□□	
G□□04						< 30
G□□05						< 50
G□□06						< 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 weight in [kg]

3.3 General data/operating conditions**3.3.1 Temperatures**

The permissible temperature range is determined by the following:

- ▶ The lubricant specifications in connection with the expected oil temperatures in operation (see chapter 7.1 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!

3.3.2 Ambient conditions

- ▶ Gearboxes are protected against dust and spray water.
- ▶ Motors according to their enclosure (see nameplate and/or Operating Instructions of the motor).
- ▶ Ambient media - especially chemically aggressive - can destroy shaft seals and coatings (plastic). Abrasive media endanger shaft seals.

4 Mechanical installation



Danger!

Only transport the drive with transport equipment or hoists which are suitable for this load (see transport weights, chapter 3.2). 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 dismounting and must **not** be used for the complete geared motor!

4.1 Storage

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

- ▶ Up to one year:
 - Without special measures in dry, dust-free and sunlight-protected indoor rooms.
 - 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.
 - On motors with condensation drain holes (option), the plug screw must be removed (see chapter 4.2.1).
- ▶ Over a year:
 - Requires consultation with the plant.

4 Mechanical installation

Mounting
Preparation

4.2 Mounting

4.2.1 Preparation



Stop!

Thoroughly remove anticorrosion agents from output shafts and flange faces.

- As standard, geared motors with the option “condensation drain hole” are delivered with plug screws. Please ensure the plug screws are removed when the geared motor is installed or stored. Depending on the mounting position, the plug screws are at the bottom of the motor.

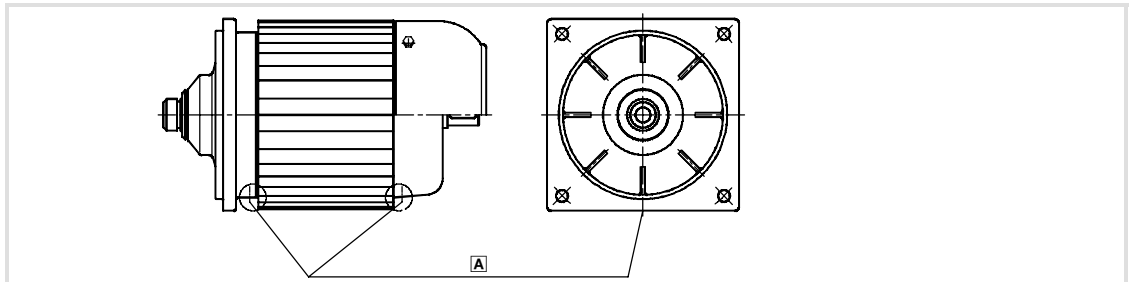


Fig. 1 Motor with condensation drain holes

A Condensation drain holes

4.2.2 General information about the assembly of drive systems

- ▶ Take safety measures prior to any operation:
 - Disconnect the machine from the mains, ensure standstill of the machine 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.
- ▶ 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.



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.

4.2.3 Assembly of transmission elements on solid shafts

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



Stop!

Shocks and blows to the shafts damage the roller bearings.

4.2.4

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

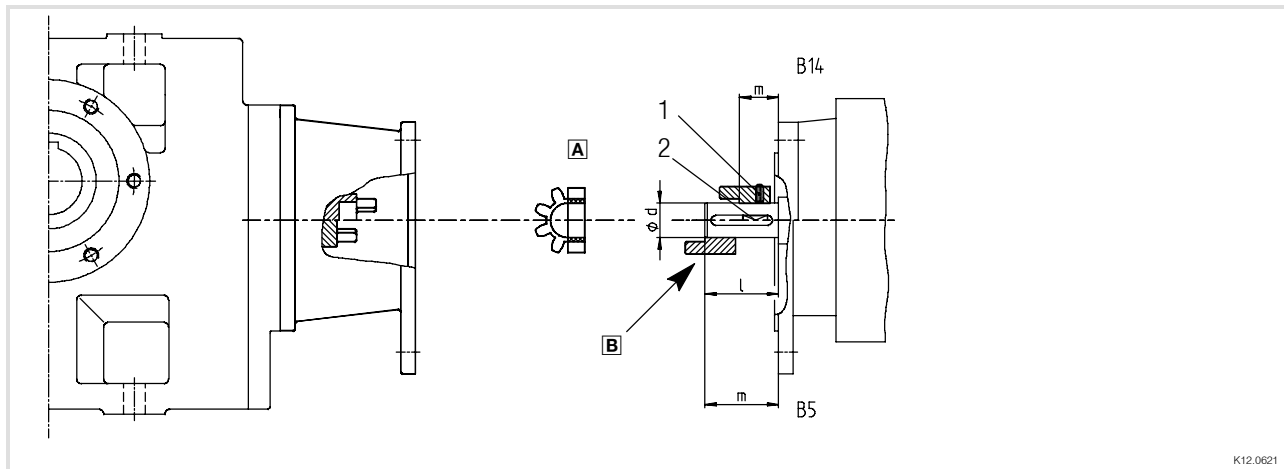


Fig. 2 Input side design N

- A Spider
 B Coupling hub

Drive size	Motor shaft		Assembly dimension	Standard hub Locking screw	Clamping hub		Key ¹⁾	Clamping ring hub		
	D	max. l		Thread	Thread	Tightening torque	DIN 6885/1 [mm]	Thread	Tightening torque	
	[mm]	[mm]	[mm]	[mm]	[mm]	[Nm]	[mm]	[mm]	[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 6	M4	2.9	
2C	14	40	25				B5 x 5 x 16			
3C	14	40	25				*			
4C	14	40	25							
1D	24	50	50		M4	2.9	M5	---	---	
2D	19	40-50	50		M6	10.5		M4	2.9	
1E	28	30-60	30					B8 x 7 x 18 B6 x 6 x 18 B8 x 7 x 18	M5	6
2E	24	30-60	30							
3E	19	30-60	30							
1F	28	30-60	30							
2F	24	30-60	30		M6	M8	25	*	---	---
1G	38	80	80							
2G	28	60	60							
3G	38	80	80	M8	M10	69	*	---	---	
1H	42	110	110							
2 h	48	110	110							
3 h	38	80	80							
1K	55	110	110							
2K	60	140	140					---	---	

Tab. 2 Attachment of motors to gearboxes with mounting flange

* Use original key for the motor

¹⁾ Key for standard hub and clamping hub

4.2.5 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.

4.2.5.1 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. 2 and Tab. 2) 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.

4.2.5.2 Assembly of clamping ring hub

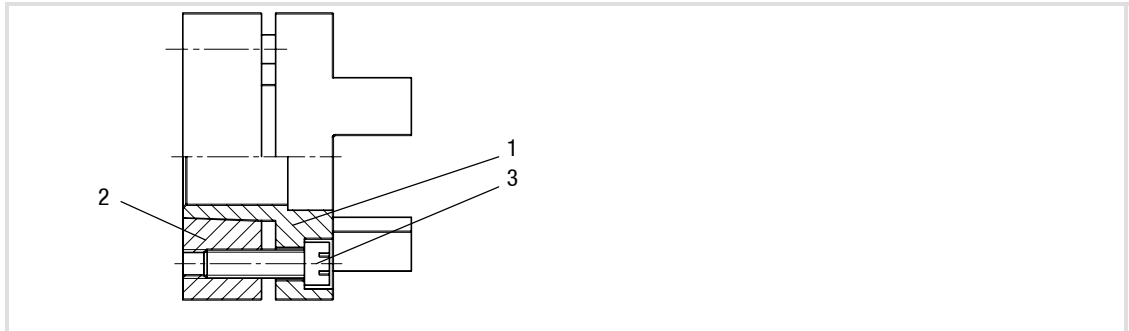


Fig. 3

Coupling

- ▣ A Clamping ring hub
- ▣ B Clamping ring
- ▣ C Clamping screws (DIN912)

- 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!

- Push the coupling hub over the motor shaft, mounting dimension "m" (see Fig. 2 and Tab. 2) must be observed.
- Align the hub and tighten the clamping screws until they have contact.
- Tighten the screws evenly and crosswise using a torque wrench until the indicated tightening torque is reached at all screws.
- Lay spider in the coupling claw on the gearbox side.
- Align claws of the motor-side coupling hub with its counterpart.
- Slowly push on motor, and bolt on to the gearbox flange.

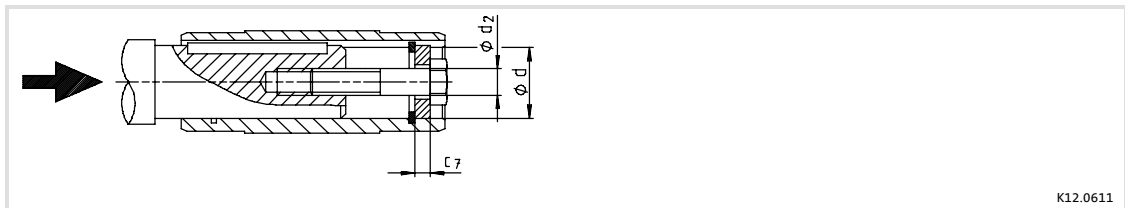
4.2.5.3 Disassembly of clamping ring hub

- Loosen the clamping screws evenly one after the other.
- Remove the screws next to the forcing threads and screw them into the other threads until they have contact.
- Tighten the screws in the forcing threads crosswise and step-by-step so that the clamping ring is pushed from the tapering clamping ring hub.
- Clean and grease all contact surfaces including threads and head of the clamping screws before reassembly.

4.2.6 Attachment of gearboxes with hollow shafts and keyway

Mounting

1. Draw the gearbox with hollow shaft onto the machine shaft to be driven:
 - Use a suitable assembly paste.
 - 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 (Fig. 4). Parts used to fix the shaft are not included in the scope of supply.



Auxiliary tool (recommended dimensions)		
$\varnothing d^{H7}$	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

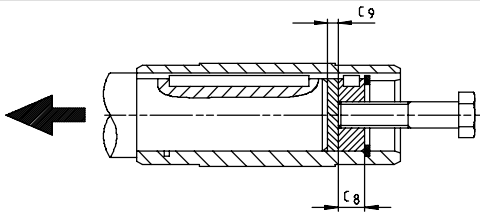
Tab. 3 Dimensions in [mm]

Dismounting

- 1. Undo axial gearbox locking in the hollow shaft.
- 2. Remove the gearbox from the motor shaft using an appropriate auxiliary tool (Fig. 4).



Note!
Use suitable extractors for bevel gearbox GKR!



K12.0611

Fig. 4 Dismantling of gearboxes with hollow shaft using the auxiliary tool, not for GKR

Auxiliary tool (recommended dimensions)		
Ø d ^{H7}	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. 4 Dimensions in [mm]

4.2.7

Attachment of gearboxes with hollow shaft with shrink disk

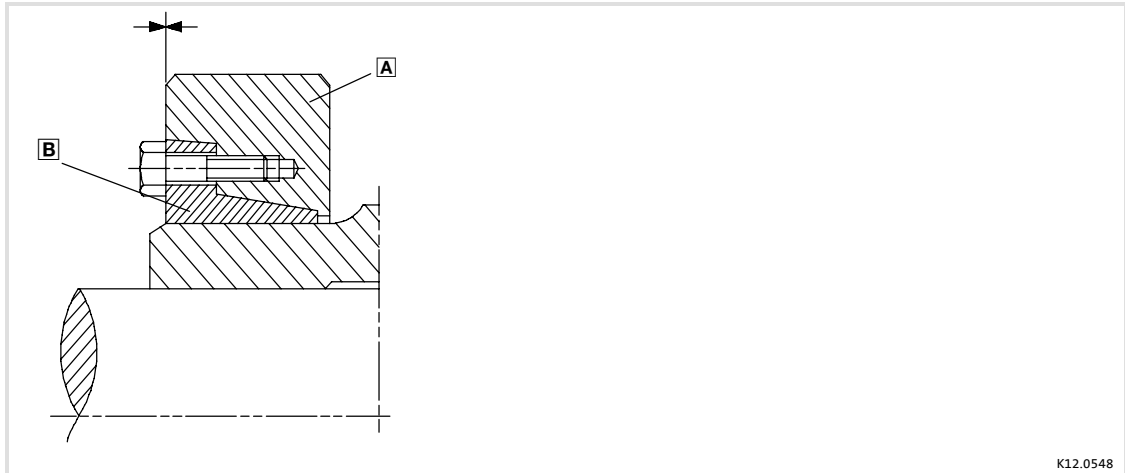


Fig. 5 Hollow shaft with shrink disk

- A** Outer ring
- B** Inner ring



Stop!

Do not dismantle new shrink disk.

Never tighten clamping screws before the machine shaft is pushed in. Protect the shrink disk against contact while in operation by appropriate measure (e.g. cover).

Mounting

1. Degrease hollow shaft bore and machine shaft.
2. Push drive onto machine shaft.
3. Tighten clamping screws using torque wrench consecutively in several turns. Observe tightening torques:

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

4. Check correct fixing:
 - The shrink disk is mounted correctly and fixed when the faces of the outer ring and the inner ring are aligned. Minimum misalignments are permissible.

Dismounting

1. Loosen the clamping screws evenly one after the other.
2. Extract outer ring, if necessary.
3. Remove the drive from the motor shaft.
4. Dismantle the shrink disk only for cleaning purposes. Afterwards, lubrication is required.

4.2.8 Gearboxes with breathers

When using gearbox sizes 03, 04 and GKR05, 06 it is not necessary to provide special ventilation.

Breather elements are included for gearbox sizes 07 to 14. When using these gearbox sizes in mounting position C, we recommend the use of an oil compensation reservoir.

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

**Stop!**

Ensure breathing is provided prior to initial commissioning!

- ▶ Rotate gearbox to the mounting position shown on the nameplate (see nameplate and 7.2).
- ▶ With gearbox types GST□□-3, GFL□□-3, GSS□□-3 and GKS□□-4, the pre-stage is separately ventilated.
- ▶ Remove the sealing plug as indicated for the corresponding mounting position (see the following drawing) and replace it by the supplied breather element.

For breather elements with brackets:

- ▶ Mount the bracket onto the gearbox as indicated.
Caution! The inner thread must be at top after the mounting (according to the mounting position). Screw the breather element into the bracket.

4.2.9 Mounting instructions for shrink disk cover

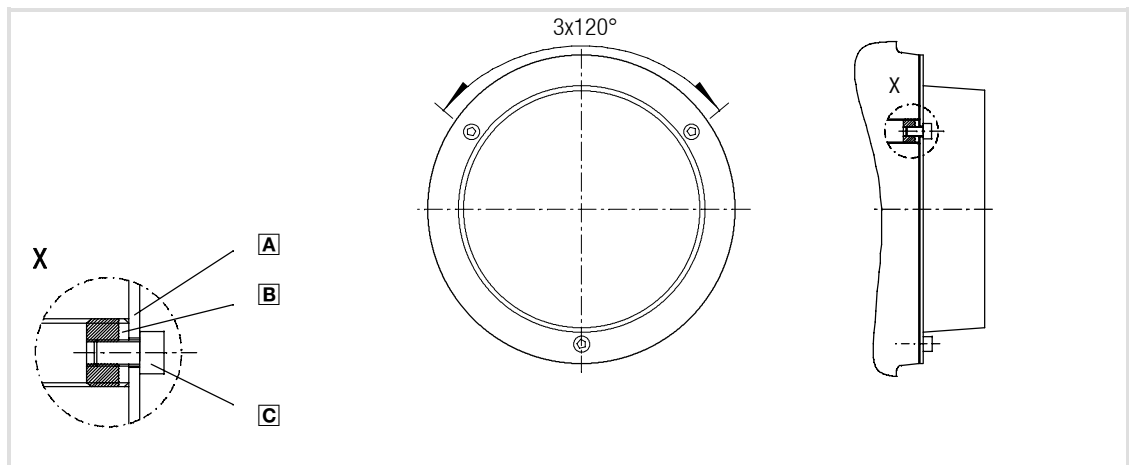


Fig. 6

- A** Protection cover
- B** Thread reducing sleeve
- C** Cheese head screw

1. Screw the three thread reducers into the flange with a screwdriver, ensure **even** surfaces and stagger reducers by 120°.
2. Mount the protection cover to the flange using the three cheese head screws.

4.2.10 Mounting instructions for hoseproof hollow shaft cover

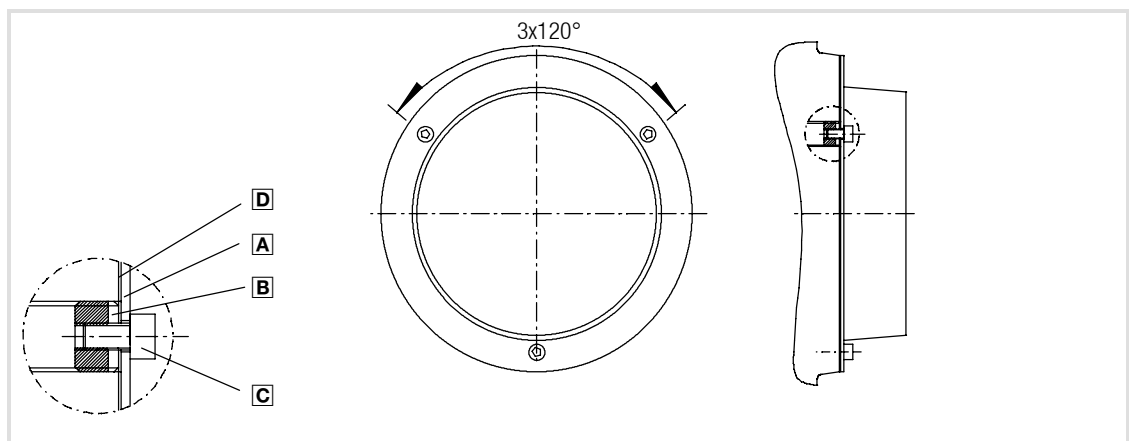


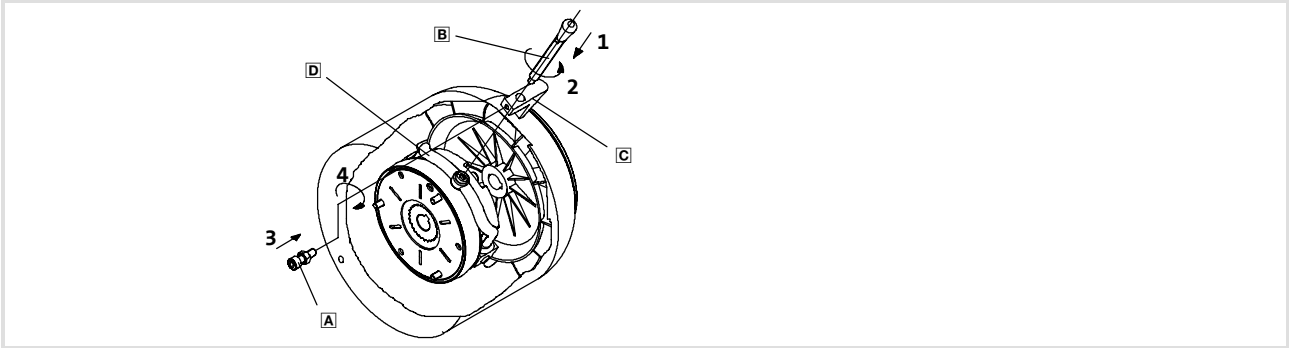
Fig. 7

- A** Protection cover
- B** Thread reducing sleeve
- C** Cheese head screw
- D** Seal

1. Screw the three thread reducers into the flange with a screwdriver, ensure **even** surfaces and stagger reducers by 120°.
2. Insert seal between flange and protection cover.
3. Mount the protection cover to the flange using the three cheese head screws.

4.2.11 Locking with manual release

Mounting



- A

Cheese head screw with nut
- B

Manual release lever with knob
- C

Terminal block
- D

Manual release shackle (brake)

Check mounting dimension



Stop!
 Dimension "s" must be maintained! Check air gap "s_{Lü}"!
 (📖 Operating Instructions INTORQ BFK458)

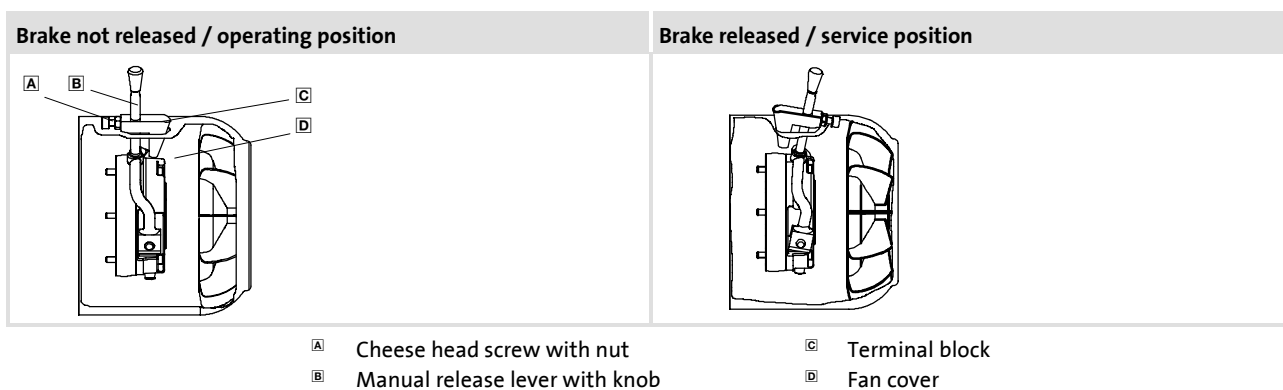
	Size	s _{Lü} (mm)	s ^{+0.1} (mm)	s + s _{Lü} (mm)
	06	0.2	1	1.2
	08			
	10			
	12			
	14	0.3	1.5	1.8
	16			
	18			
	20	0.4	2	2.4
	25			
		0.5	2.5	3

Handling



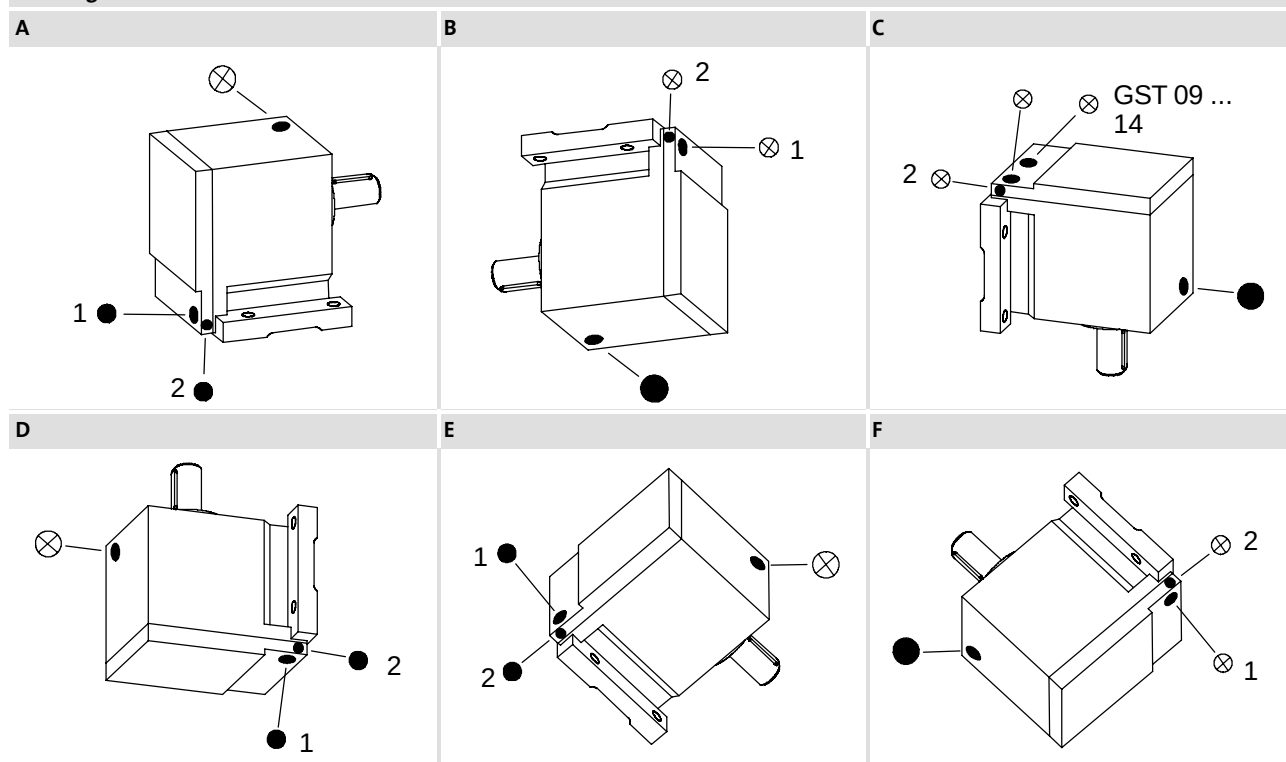
Stop!

- ▶ Lock the manual release only for service work!
- ▶ The manual release must not be locked during operation, otherwise the brake could be damaged!
- ▶ Always secure the terminal block against loosening in every position with cheese head screw and nut!

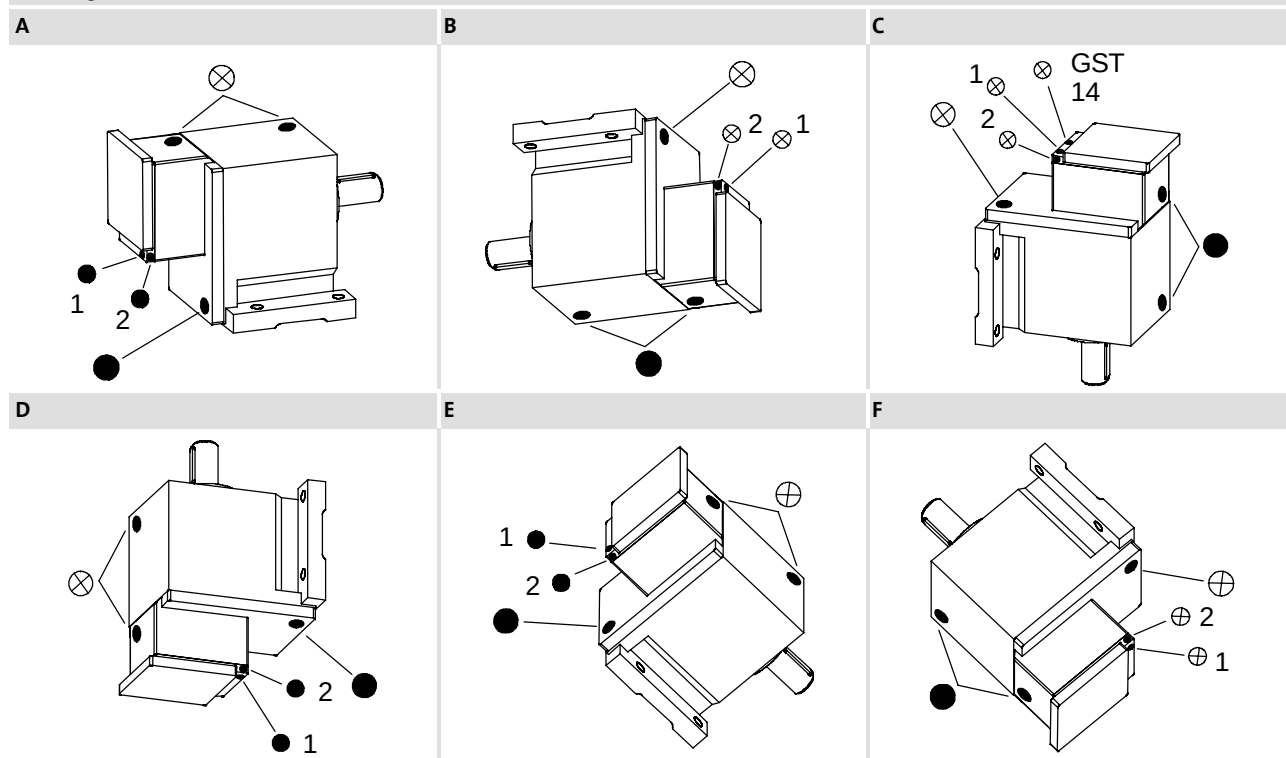


4.2.12 Position of the breather, oil-filler and oil-drain plug

Helical gearbox GST 05 ... 09-1 and GST 05 ... 14-2



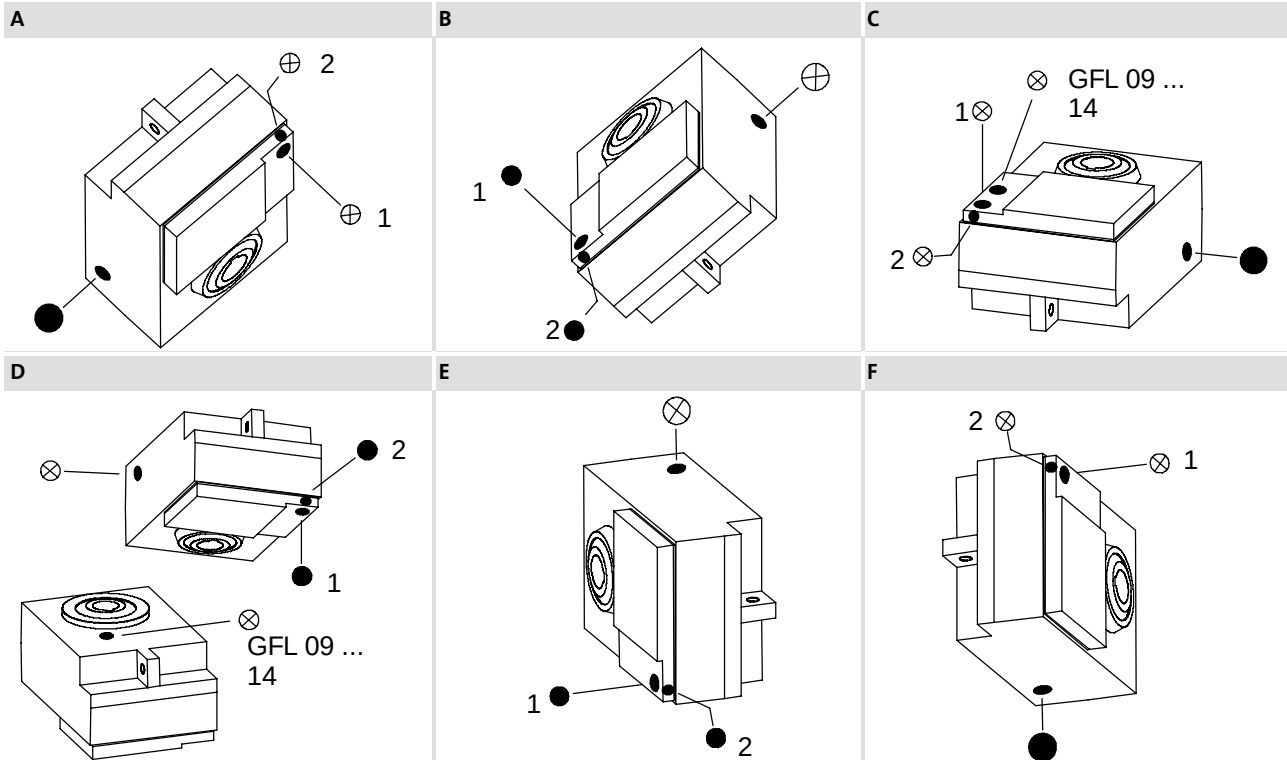
Helical gearbox GST 05 ... 14-3



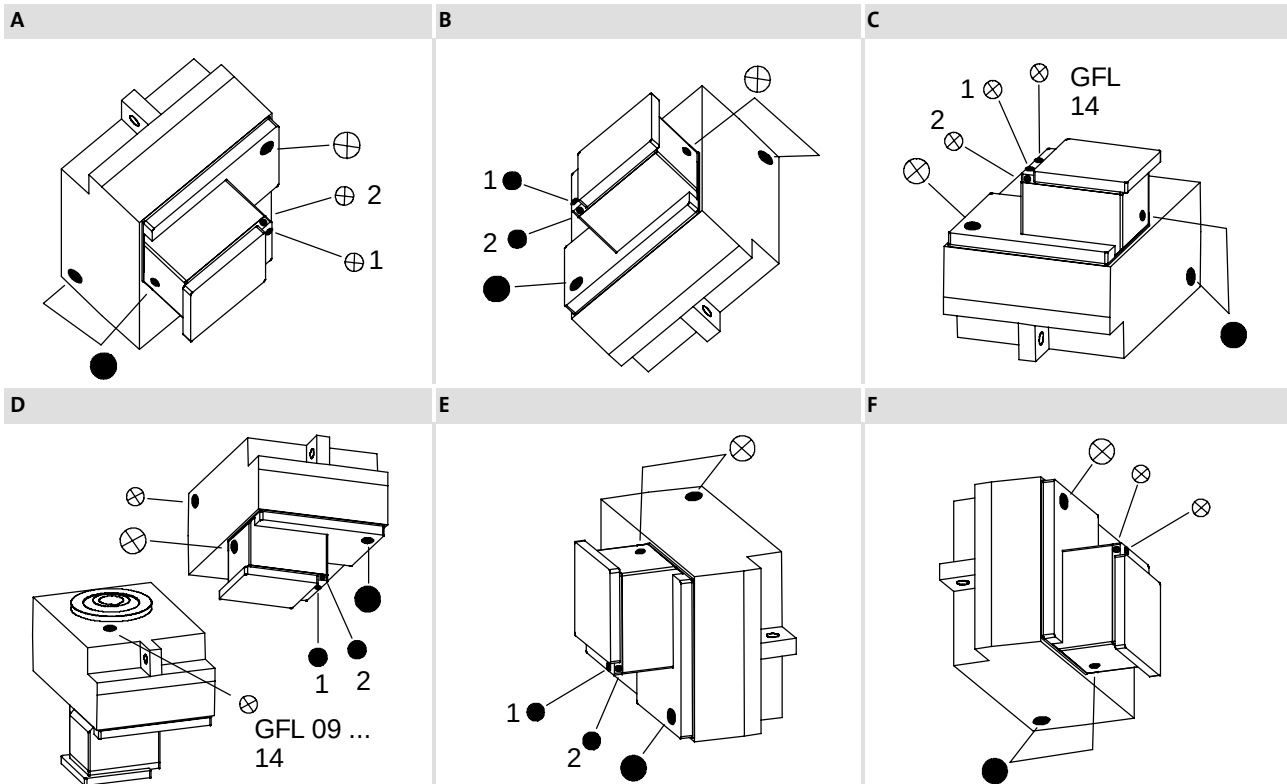
A ... F Mounting positions
Pos. 1 or 2 depending on version

⊗ Breathing / oil filler plug
● Oil drain plug

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

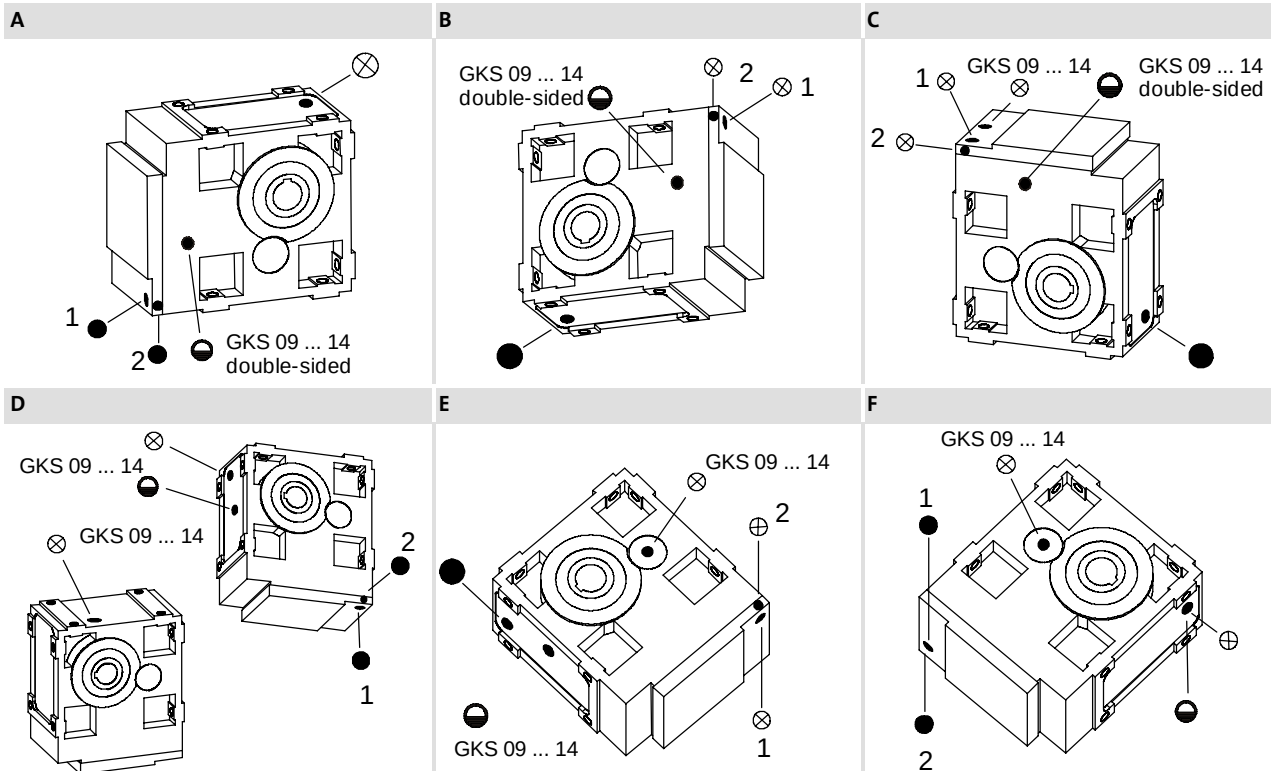
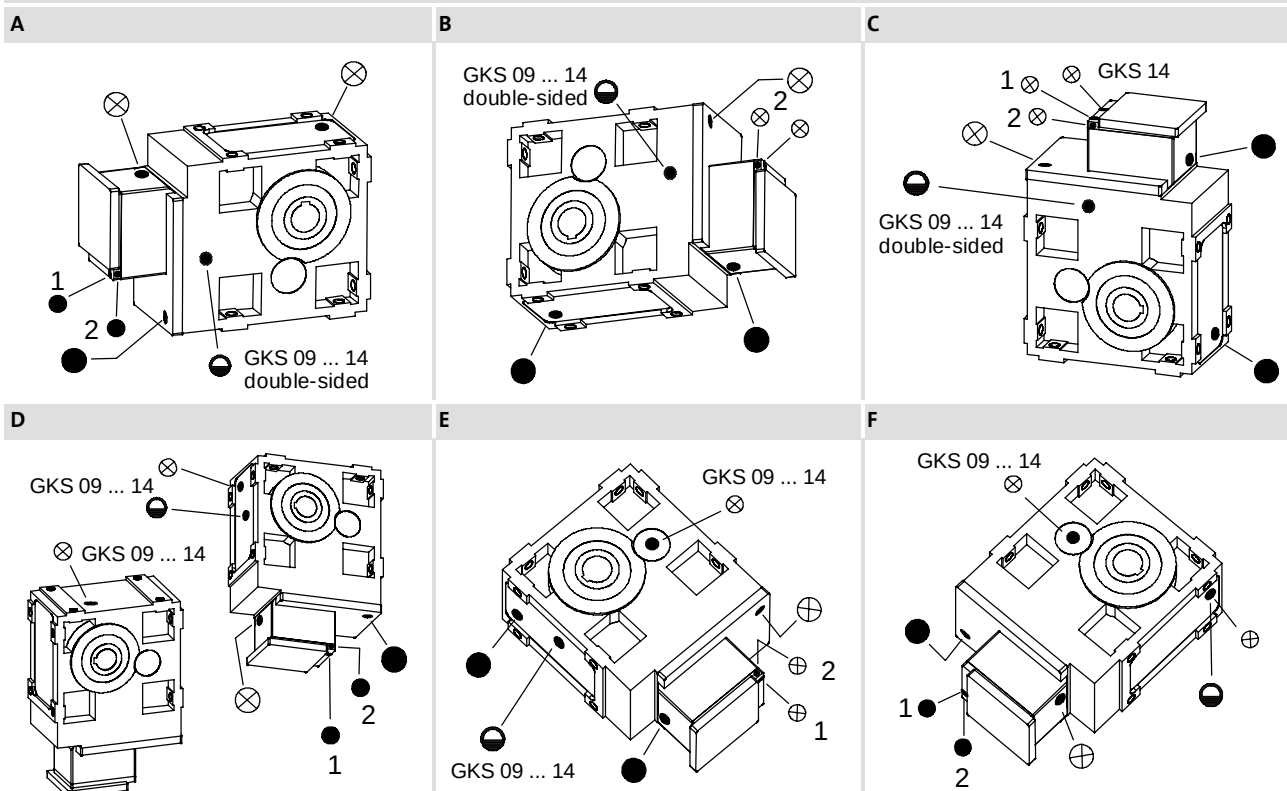


Shaft-mounted helical gearbox GFL 05 ... 14-3



A ... F Mounting positions
Pos. 1 or 2 depending on version

⊗ Breathing / oil filler plug
● Oil drain plug

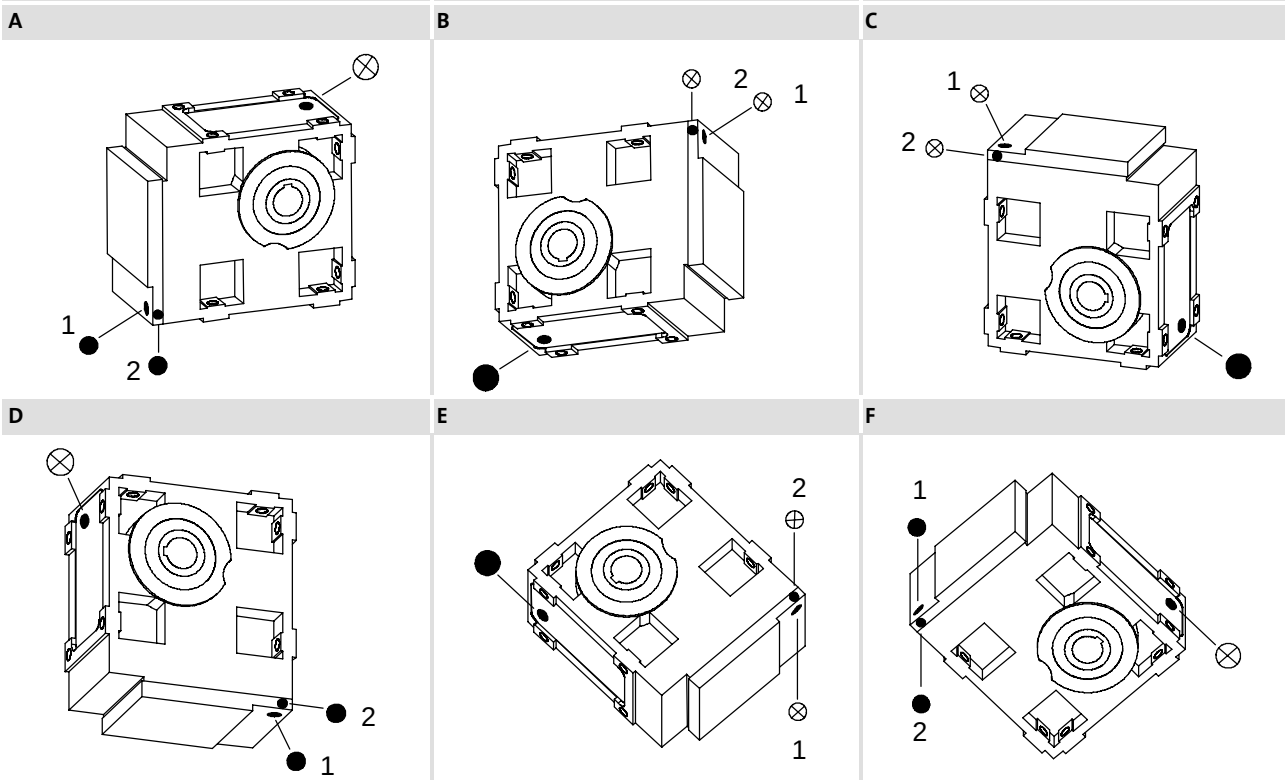
Helical bevel gearbox GKS 05 ... 14-3**Helical bevel gearbox GKS 05 ... 14-4**

A ... F Mounting positions
Pos. 1 or 2 depending on version

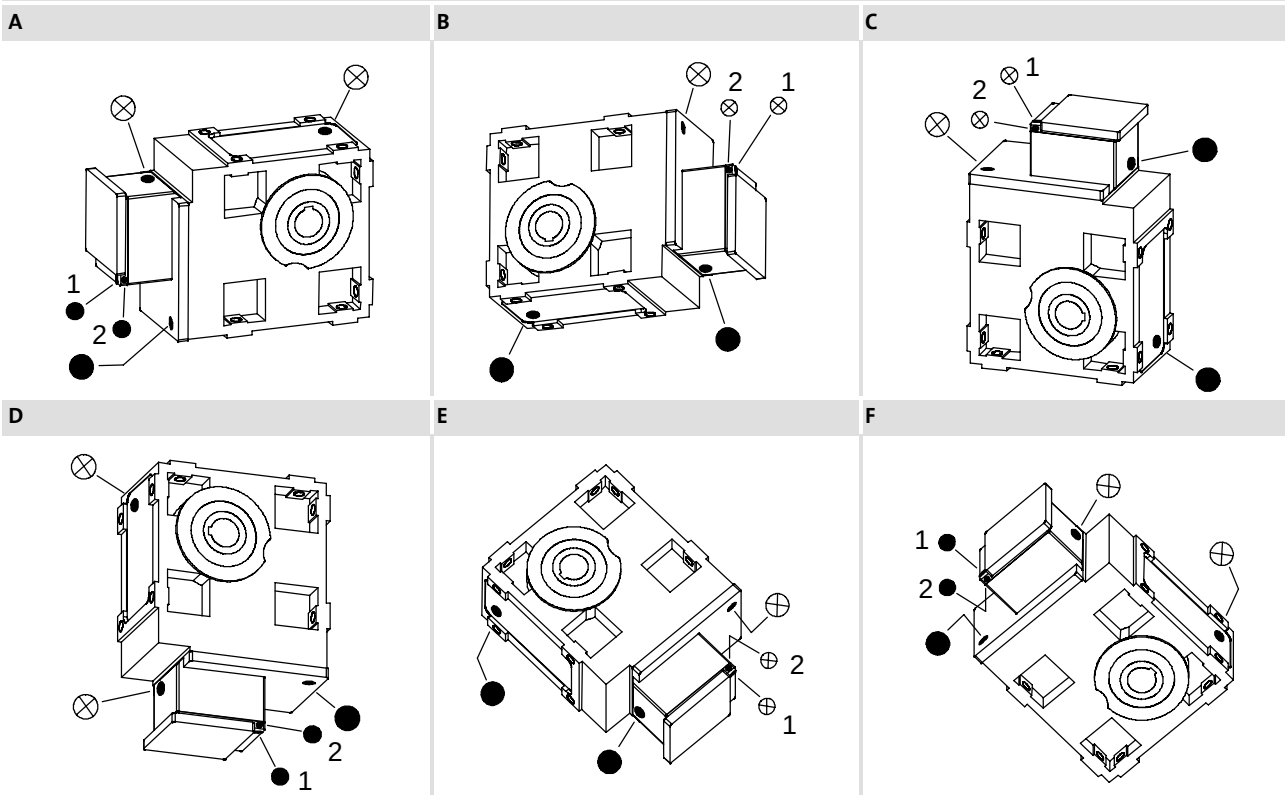
⊗ Breathing / oil filler plug
● Oil drain plug

⊙ Oil-control plug

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

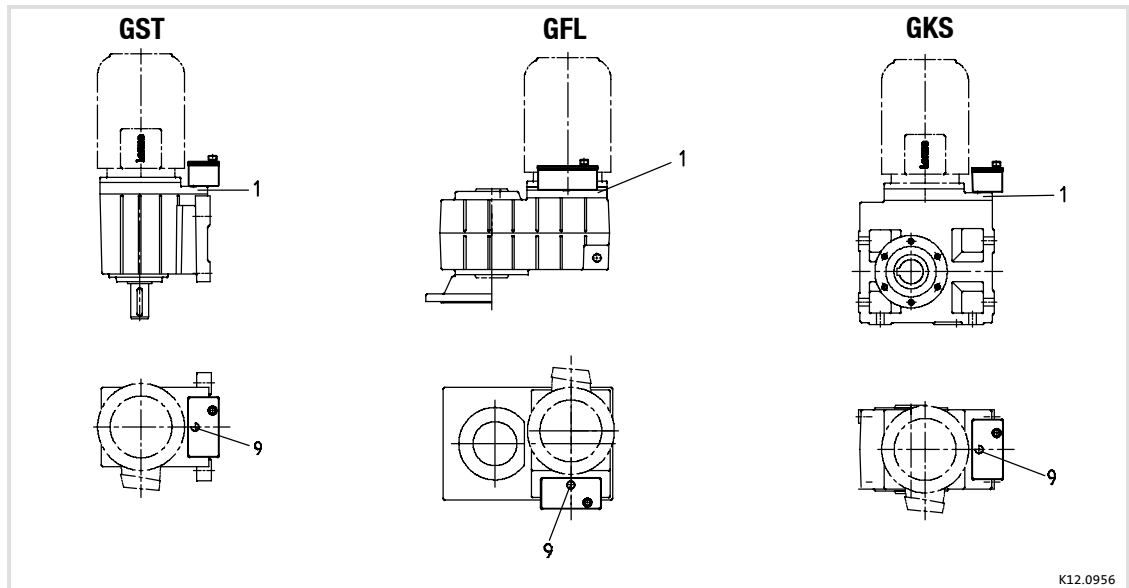
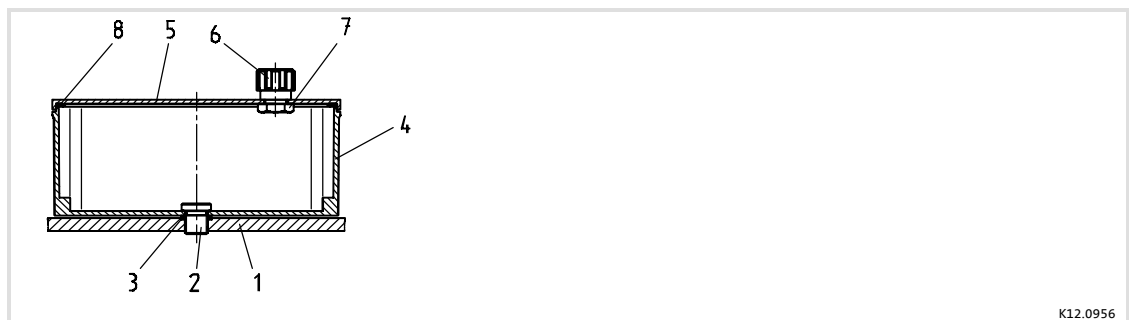


Helical-worm gearbox GSS 05 ... 07-3



A ... F Mounting positions
Pos. 1 or 2 depending on version

⊗ Breathing / oil filler plug
● Oil drain plug

4.2.13**Gearbox with compensation container for mounting position C****4.2.13.1****Spare-parts list compensation reservoir**

- 1 Intermediate cover
- 2 Fixing screw
- 3 Sealing rings
- 4 Housing

- 5 Cover
- 6 Breather filter
- 7 Hexagon head cap screw
- 8 Seal

Mounting

1. Mount gearbox in mounting position C (motor on top).
2. Remove the plug from the intermediate cover (9).
3. Mount housing (4) using fixing screw (2) to the intermediate cover (instead of the plug).

**Note!**

Insert **two** sealing rings between counterbores of intermediate cover and housing.

4. Use hexagon nut to bolt the breather filter to the lid.
5. Mount lid and seal to the cover.

**Stop!**

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

5 Electrical installation



Danger!

Electrical connections must only be carried out by skilled personnel!

5.1 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.

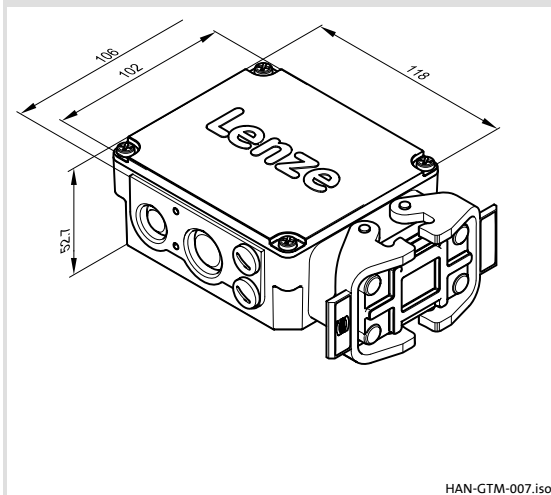
5.2 Motor options

To correctly connect the motor options, e. g. Lenze spring-applied brakes, please observe:

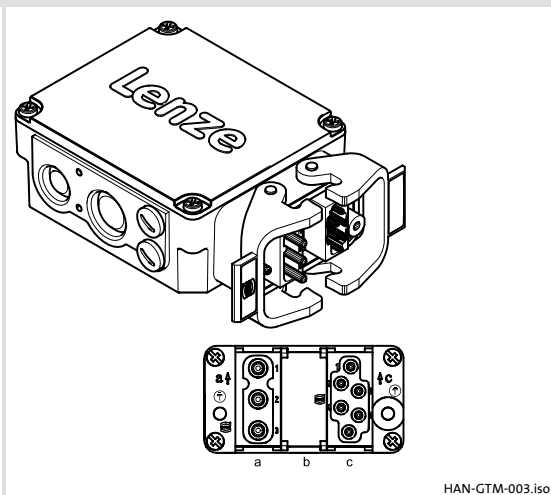
- ▶ the notes in the corresponding terminal box
- ▶ the notes in the corresponding operating instructions
- ▶ the technical data on the corresponding motor nameplate.

5.3 Terminal box HAN connectors

Pin contact HAN modular 16 A

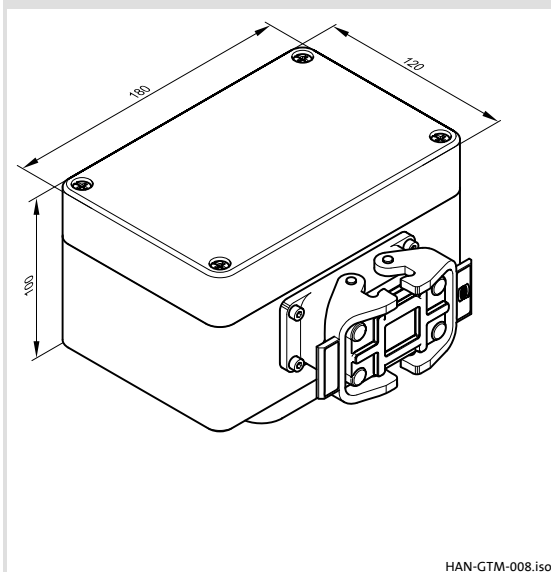


HAN-GTM-007.iso

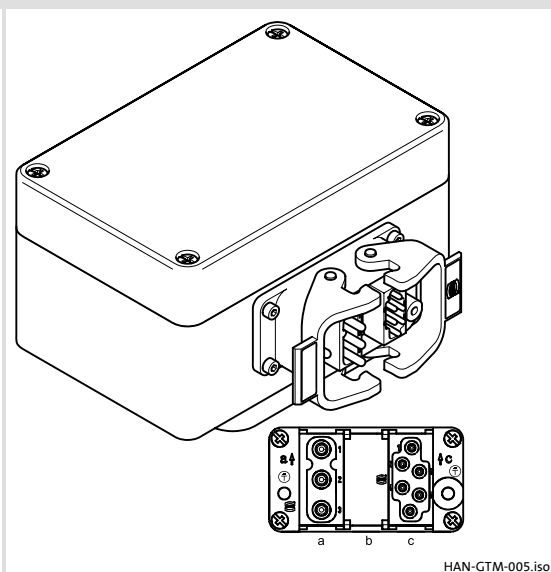


HAN-GTM-003.iso

Pin contact HAN modular 40 A

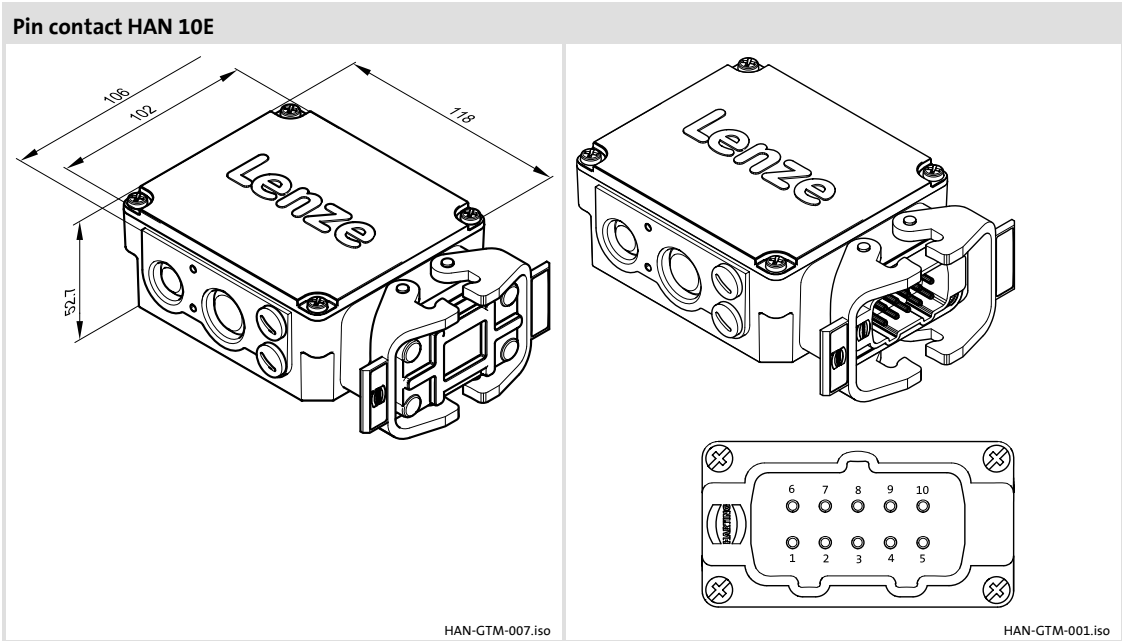


HAN-GTM-008.iso



HAN-GTM-005.iso

Slot		Terminal box	
No.	Contact	Core colour	Connection
A	1	brown	Terminal board: U1
	2	black	Terminal board: V1
	3	red	Terminal board: W1
B	Blind module		
C	1	white or blue	Thermal contact: S1/+KTY T1/PTC (P1)
	2	black	Rectifier: ~
	3	black	Rectifier: ~
	4	blue or brown	Rectifier: switching contact
	5	blue or brown	Rectifier: switching contact
	6	white or black	Thermal contact: S2/-KTY T2/PTC (P2)



Slot	Terminal box	
Contact	Core colour	Connection
1	brown	Terminal board: U1
2	black	Terminal board: V1
3	red	Terminal board: W1
4	black	Rectifier: ~
5	black	Rectifier: ~
6	red	Terminal board: W2
7	brown	Terminal board: U2
8	black	Terminal board: V2
9	white	Thermal contact: S1/+KTY T1/PTC (P1)
10	white	Thermal contact: S2/-KTY T2/PTC (P2)



Note!

Make the wiring in $\blacktriangle$ or $\triangle$ in the counter plug:

- ▶ $\blacktriangle$ - circuit: 6-7-8
- ▶ $\triangle$ - circuit: 1-6/2-7/3-8

6 Commissioning and operation



Stop!

The drive may only be commissioned by skilled personnel!

6.1 Before switching on

Check:

- ▶ Is the mechanical fixing o.k.?
- ▶ Are the electrical connections o.k.?
- ▶ Are all rotating parts and surfaces that may become hot protected against contact?
- ▶ For gearboxes with breathing:
 - Is the plug removed from the breather screw?

6.2 During operation



Stop!

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:
 - unusual noises or temperatures,
 - leakages,
 - loose fixing elements,
 - the condition of the electrical cables.
- ▶ If any interference should occur, proceed according to the troubleshooting list in chapter 8. If the interference cannot be eliminated, please contact the Lenze Service.

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.

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

7.1**Maintenance intervals**

- ▶ The mechanical power transmission system is free of maintenance.
- ▶ Gearboxes as of size 05 require regular lubricant replacement.
 - The type of lubricant is indicated on the nameplate. Replace the lubricant only with the same type.
 - Maintenance interval: see Tab. 5
- ▶ Shaft seals:
 - The service life depends on the operating conditions.
 - Replace seals in case of leakage to avoid consequential damage.

**Stop!**

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

Type	Lubricants			Changing intervals
	Specification	Ambient temperature	Note	
CLP 460	Oil on mineral basis with additives	0 °C ... +40 °C		16000 hours of operation - after three years at the latest (oil temperature 70 ... 80 °C)
CLP PG 220 CLP PG 460 CLP PG 680	Oil on synthetic basis (polyglycol)	-20 °C ... +40 °C	Do not mix with mineral oil!	25000 operating hours - no longer than three years (oil temperature 70 ... 80 °C)
CLP HC 220 (H1)	Food-compatible oil on synthetic basis	-20 °C ... +40 °C	Approval acc. to USDA-H1	16000 hours of operation - after three years at the latest (oil temperature 70 ... 80 °C)
CLP E 320	Biodegradable diester oil on synthetic basis	-20 °C ... +40 °C	Water pollution class 0	16000 operating hours - no longer than three years (oil temperature 70 ... 80 °C)
CLP HC 320	Oil on synthetic basis (synthetic hydrocarbon)	-25 °C ... +50 °C	Can be mixed with residual mineral oil	25000 operating hours - no longer than three years (oil temperature 70 ... 80 °C)
CLP HC 46	Oil on synthetic basis (synthetic hydrocarbon)	-40 °C ... 0 °C	Good cold-flow behaviour	25000 operating hours - no longer than three years

Tab. 5 Overview of lubricant change

7.2**Maintenance operations****7.2.1****Roller bearing grease**

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

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

**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.

7.2.2 Table of lubricants

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 for the lubricant table on the selection of lubricants!

CLP	⇒	Mineral oil
CLP PG	⇒	Polyglycol oil
CLP HC	⇒	Synthetic hydrocarbons or polyalphaolefin oil
CLP E	⇒	Ester oil (water pollution class 1)
1)	⇒	The performance of the mentioned lubricants for worm gearboxes and GKK07 (hypoid gearbox) has not yet been tested. When these oils are used, the permissible torque must be reduced to 80% of the catalog 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!
	⇒	Low-temperature oils, observe critical starting behaviour for low temperatures!
//	⇒	Food oil (approval acc. to USDA-H1)
≈	⇒	Bio oil (lubricant for forestry, agriculture and water supply and distribution)
*	⇒	Low-temperature oils, observe critical starting behaviour for low temperatures!
Lubricant	⇒	Lubricant filled by the manufacturer

	Ambient temperature [°C]			DIN 51517-3: CLP ISO 12925-1: CKC/CKD		Gearbox type GST, GFL, GKS, GKR, GKK04 ... 06	Gearbox type GSS GKK07
	-50	0	+50				
 Shell	0		+40		CLP	VG 460	Omala 460
	-25		+50 ³⁾		CLP HC	VG 320	Omala HD 320
	-10		+50 ³⁾	//	CLP HC	VG 460	Cassida Fluid GL 460
	-20		+40	//	CLP HC	VG 220	Cassida Fluid GL 220
	-20		+40		CLP PG	VG 220	
	-20		+40		CLP PG	VG 460	
	-40		0 ⁴⁾	*	CLP HC	VG 46	Cassida HF 46
	-20		+40	//	CLP PG	VG 320	Cassida Fluid WG 320 ^{1) 2)}
	-20		+50 ³⁾	≈	CLP E	VG 320	Omala EPB 320 Omala EPB 320 ¹⁾
 KLÜBER LUBRICATION	0		+40		CLP	VG 460	Klüberoil GEM1 460
	-25		+50 ³⁾	*	CLP HC	VG 320	Klübersynth EG 4-320
	-20		+40		CLP PG	VG 460	Klübersynth GH 6-460 ²⁾
	-20		+40		CLP PG	VG 220	Klübersynth GH 6-220 ²⁾
	0		0 ⁴⁾	*	CLP PG	VG 32	Klübersynth GH 6-32 ^{1) 2)}
	-40		0 ⁴⁾	* //	CLP HC	VG 46	Klüber Summit HySyn FG-46
	-20		+40	//	CLP HC	VG 220	Klüberoil 4 UH1-220N
	-20		+40	//	CLP PG	VG 320	Klübersynth UH 1-320 ^{1) 2)}
	-20		+50 ³⁾	≈	CLP E	VG 320	Klübersynth GEM 2-320 Klübersynth GEM 2-320 ¹⁾
 FUCHS	-25		+50 ³⁾		CLP HC	VG 320	Renolin Unisyn CLP 320
	-20		+40	≈	CLP E	VG 320	Plantogear 320 S Plantogear 320 S ¹⁾
	-20		+40		CLP PG	VG 460	Renolin PG 460 ^{1) 2)}
	0		+40		CLP	VG 460	Renolin CLP 460
 ARAL	-10		+50 ³⁾	//	CLP HC	VG 460	Eural Gear 460
	-25		+40	//	CLP HC	VG 220	Eural Gear 220
	-20		+40		CLP PG	VG 460	Degol GS 460 ^{1) 2)}
	0		+40		CLP	VG 460	Degol BG 460
	-25		+50 ³⁾		CLP HC	VG 320	Degol PAS 320
 Eni	0		+40		CLP	VG 460	Blasia 460
	-25		+50 ³⁾		CLP HC	VG 320	Blasia SX 320
 bp	0		+40		CLP	VG 460	Energol GR-XP 460
	-20		+50 ³⁾		CLP HC	VG 320	Energol HTX 320
 Castrol	0		+40		CLP	VG 460	Alpha MW 460
	0		+40		CLP	VG 460	Alpha SP 460
	-20		+40		CLP PG	VG 460	Alpha PG 460 ²⁾ Alpha PG 460 ^{1) 2)}
 Esso	0		+40		CLP	VG 460	Spartan EP 460
	-20		+40		CLP PG	VG 460	Glycolube 460 ^{1) 2)}
	-25		+50 ³⁾		CLP HC	VG 320	Spartan Synthetic EP 320
 Mobil®	0		+40		CLP	VG 460	Mobilgear 634
	-20		+40		CLP PG	VG 460	Mobil Glygoyle HE 460 ^{1) 2)}
	-20		+50 ³⁾		CLP HC	VG 320	Mobilgear SHC XMP 320

Ambient temperature [°C]				DIN 51517-3: CLP ISO 12925-1: CKC/CKD		Gearbox type GST, GFL, GKS, GKR, GKK04 ... 06	Gearbox type GSS GKK07
-50	0		+50				
	0		+40		CLP	VG 460	Turmogearoil 460 OM
	-25		+50 ³⁾		CLP HC	VG 320	Turmofluid GV 320
	-20		+40		CLP PG	VG 460	Turmopoloil 460 EP ¹⁾
	-20		+40		CLP PG	VG 220	Turmopoloil 220 EP ¹⁾
	-40		0 ⁴⁾	*	CLP HC	VG 46	Turmofluid GV 46
	-20		+40	//	CLP HC	VG 220	Turmosynthoil GV 220
	-20		+40	//	CLP PG	VG 460	Turmosynthoil PG 460 ^{1) 2)}
	-20		+50 ³⁾	≈	CLP E	VG 320	Turmofluid Biolube CLP 320
							Turmofluid Biolube CLP 320 ¹⁾
	0		+40		CLP	VG 460	Optigear BM 460
	-25		+50 ³⁾		CLP HC	VG 320	Optigear Synthetic A 320
	0		+40		CLP	VG 460	Tribol 1100/460
	-20		+40		CLP PG	VG 460	Tribol 800/460 ^{1) 2)}
	-25		+40		CLP HC	VG 320	Tribol 1510/320
	-20		+40	//	CLP	VG 220	Food Proof 1810/220
	-20		+50 ³⁾	//	CLP PG	VG 460	Food Proof 1800/460 ^{1) 2)}

7.2.3

Replacing the lubricant**Stop!**

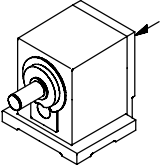
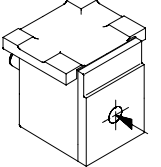
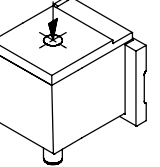
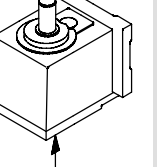
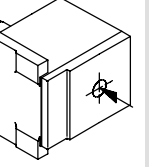
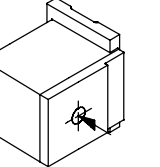
- ▶ Gearbox should be warm.
- ▶ Secure drive system and machine from inadvertent movement and mains connection.

**Stop!**

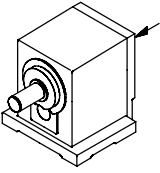
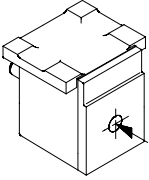
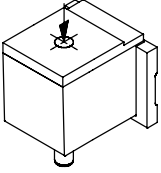
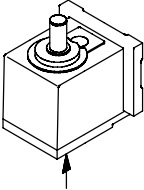
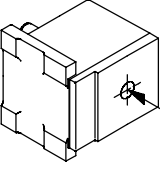
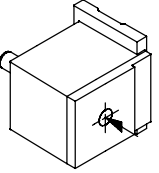
With gearbox types GST□□-3, GFL□□-3, GSS□□-3 and GKS□□-4, the pre-stage is separately lubricated—all gearbox components have to be completely drained!

1. Drain lubricant by removing the oil drain plug.
2. Insert oil drain plug with new seal.
3. Remove oil filler plug/breather element.
4. Fill lubricant through filler.
5. Insert oil filler plug/breather element with new seal.
6. Dispose of waste oil according to the applicable regulations.

7.2.4 Lubricant quantity

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

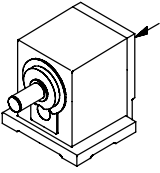
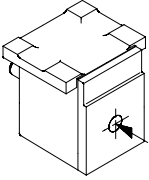
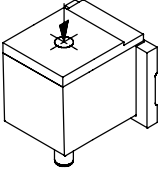
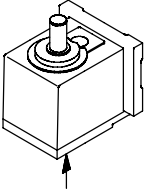
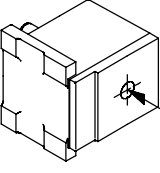
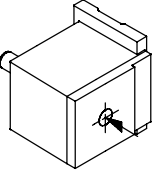
Tab. 6 Amount of lubricant in litres
→ Drive
A, M, N, W Drive-end version
90 ... 132 Motor size
1A ... 2K Drive size

Helical gearbox GST□□-1□ V□□						
Mounting position	A	B	C	D	E	F
						
GST04	0.1	0.3	0.15	0.3 0.35 $W \geq 1C$	0.2	0.2
GST05	0.2	0.5	0.2	0.45 0.55 $M \geq 90$ $A \geq 80$ $N \geq 1D$	0.3	0.3
GST06	0.4	1	0.45	0.85 1 $W \geq 1E$	0.6	0.6
GST07	0.8 1.5 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	1.6 2.0 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	0.85	1.6 2.3 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	1.3	1.3
GST09	1.6 2.7 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	3.0 3.5 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	1.7	2.7 3.7 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	2.3	2.3
Helical gearbox GST□□-2□; -3□ V□□ / V□□						
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	0.7	0.85	0.75	1	0.55	0.55
GST06	1.25	1.5	1.35	1.8	1	1
GST07	2.2 2.6 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	2.5 2.9 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	2.6	3 3.7 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	1.3	1.3
GST09	4.2 4.8 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	5.3 5.9 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	5.4	6.1 7.3 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	3.1 3.7 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$	3.1 3.7 $M \geq 132$ $A \geq 112$ $N \geq 1G$ $W \geq 1G$
GST11	8.5	95	10	11.5	7	7
GST14	15	18	18	20	11	11

Tab. 7

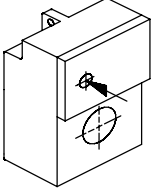
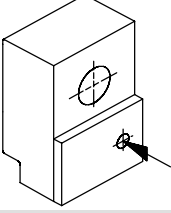
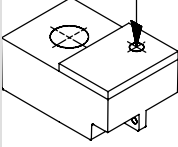
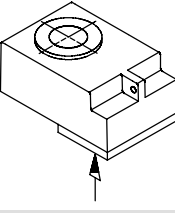
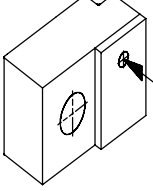
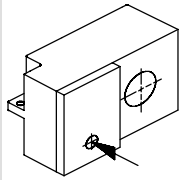
Amount of lubricant in litres

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

Helical gearbox GST□□-2□; -3□ V□□							
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	0.55	0.7	0.6	0.95	0.45	0.45	
GST06	1.1	1.3	1.1	1.7	0.9	0.9	
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	
Helical gearbox pre-stage GST□□-3□							
GST05	0.12 0.15 W ≥ 1C	0.3 0.35 W ≥ 1C	0.15	0.3 0.35 0.4 N ≥ 1B W ≥ 1C	0.2	0.2	
GST06	0.15	0.4	0.35	0.3 0.4 W ≥ 1G	0.3	0.3	
GST07	0.3	0.7	0.5	0.55 0.65 M ≥ 90 A ≥ 80 N ≥ 1D	0.4	0.4	
GST09	0.6	1.4	1.1	1.2	0.8	0.8	
GST11	1.5 2.0 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.5 2.9 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.1	1.7 2.4 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.7	1.7	
GST14	2.7 4.0 M ≥ 132 A ≥ 112 N ≥ 1G	4.6 5.2 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	4.3	3.2 4.1 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	3	3	

Tab. 8 Amount of lubricant in litres

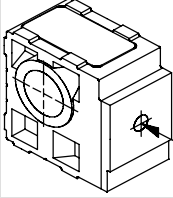
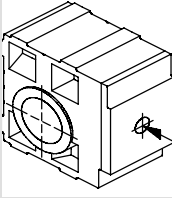
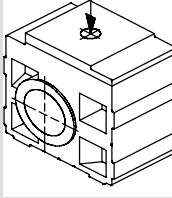
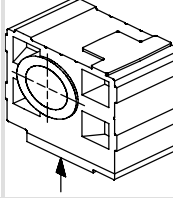
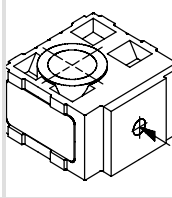
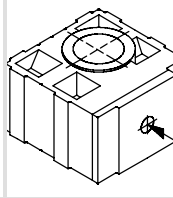
→ Drive
A, M, N, W Drive-end version
90 ... 132 Motor size
1A ... 2K Drive size

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
Shaft-mounted helical gearbox pre-stage GFL□□-3□						
GFL05	0.2	0.2	0.15	0.3 0.35 N ≥ 1B 0.4 W ≥ 1C	0.12 0.15 W ≥ 1C	0.3 0.35 W ≥ 1C
GFL06	0.3	0.3	0.35	0.3 0.4 W ≥ 1G	0.15	0.4
GFL07	0.4	0.4	0.5	0.55 0.65 M ≥ 90 A ≥ 80 N ≥ 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 ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.5 2.0 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.5 2.9 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G
GFL14	3.0	3.0	4.3	3.2 4.1 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.7 4.0 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	4.6 5.2 M ≥ 132 A ≥ 112 N ≥ 1G

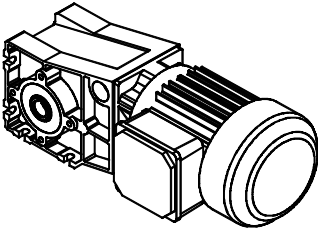
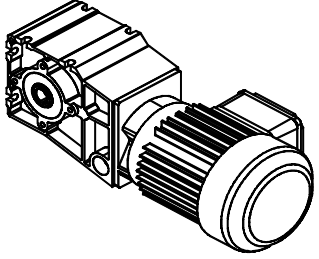
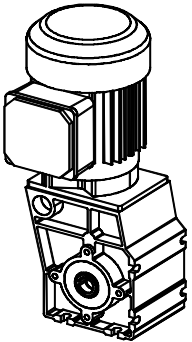
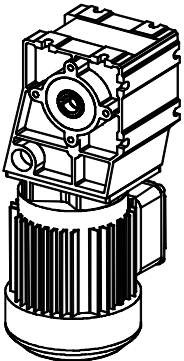
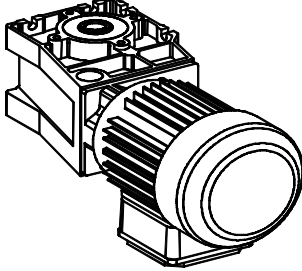
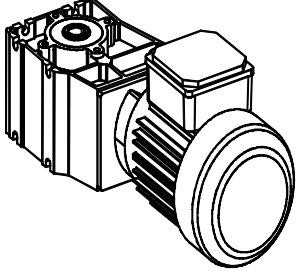
Tab. 9

Amount of lubricant in litres

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

Right-angle gearbox						
Mounting position	A	B	C	D	E	F
						
Helical-bevel gearbox GKS□□-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
Pre-stage GKS□□-4 / GSS□□-3						
G□□-05□	0.12 0.15 W ≥ 1C	0.3 0.35 W ≥ 1C	0.15	0.3 0.35 N ≥ 1B 0.4 W ≥ 1C	0.2	0.2
G□□-06□	0.15	0.4	0.35	0.3 0.4 W ≥ 1C	0.3	0.3
G□□-07□	0.3	0.7	0.5	0.55 0.65 M ≥ 90 A ≥ 80 N ≥ 1D	0.4	0.4
G□□-09□	0.6	1.4	1.1	1.2	0.8	0.8
G□□-11□	1.5 2.0 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.5 2.9 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.1	1.7 2.4 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	1.7	1.7
G□□-14□	2.7 4.0 M ≥ 132 A ≥ 112 N ≥ 1G	3.0 5.2 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	4.3	3.2 4.1 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	3.0	3.0

Tab. 10 Amount of lubricant in litres
→ Drive
A, M, N, W Drive-end version
90 ... 132 Motor size
1A ... 2K Drive size

Bevel gearbox GKR			
Mounting position	A	B	C
			
GKR03	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. 11 Amount of lubricant in litres

* with version V□K at the output end

7.2.5 Amount of lubricant for combined mounting positions

For the gearbox sizes 03 ... 06 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.

**Stop!**

At drive speeds below 200 1/min. the amount of lubricant may need to be increased. Consultation with Lenze is required.

Helical gearbox GST03 ... 06-2; V□□

Versions V□R; V□L				
Mounting position	GST03	GST04	GST05	GST06
A E F	0.20	0.35	0.7	1.25
B C		0.55	0.85	1.5
D			1.0	1.8
Version V□K				
A E F	0.17	0.35	0.55	1.1
B C		0.45	0.7	1.3
D		0.6	0.95	1.7

Shaft-mounted helical gearbox GFL04 ... 06-2; V□□

Versions V□R; V□L			
Mounting position	GFL04	GFL05	GFL06
A B E	0.7	1.4	2.1
C D	1.0	1.7	2.8
F	0.3	0.7	1.2
Version V□K			
A B E	0.8	1.4	2.1
C D	1.1	1.7	3.0
F	0.4	0.7	1.2

Helical-bevel gearbox GKS04 ... 06-3; V□□

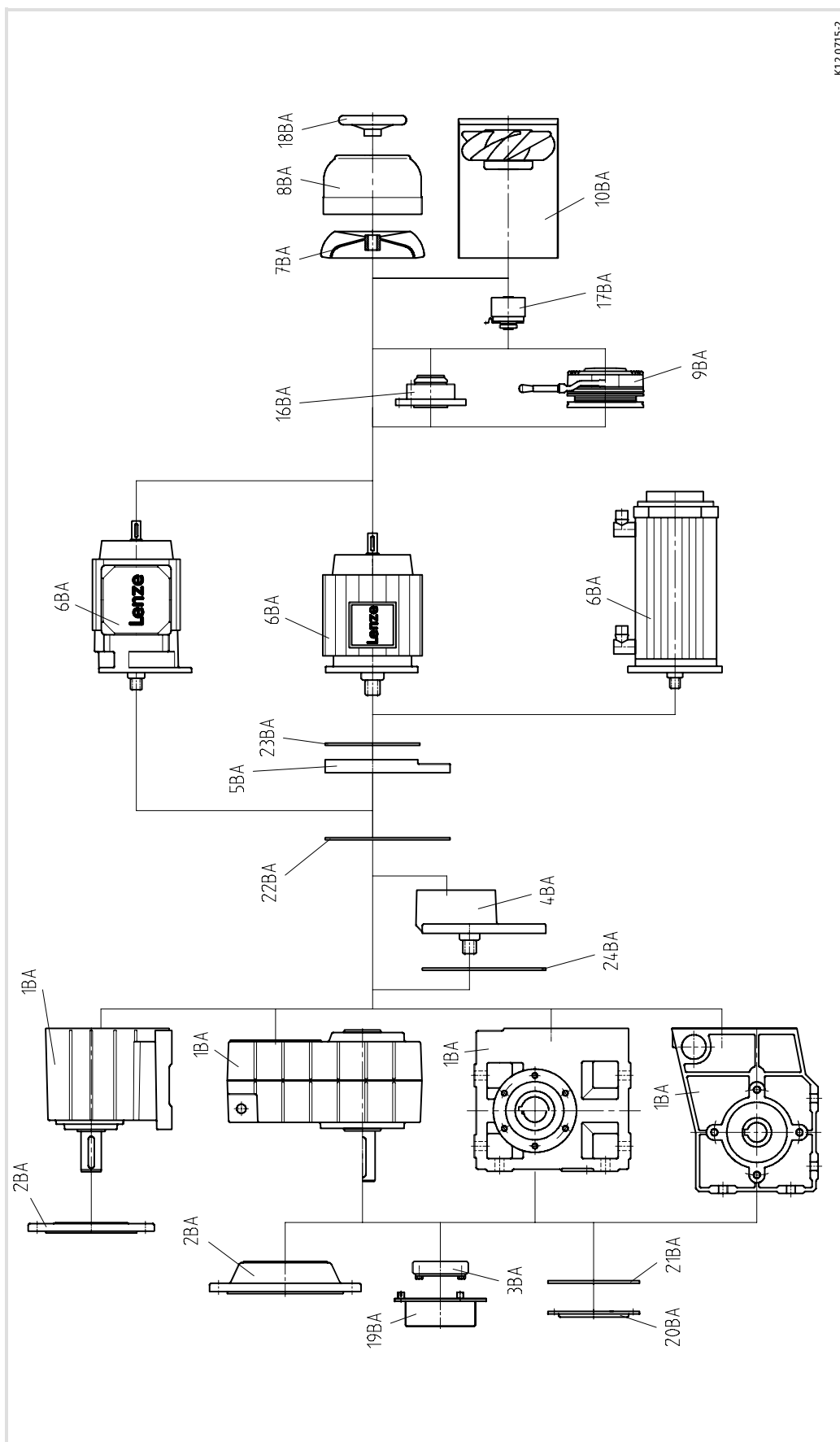
Version V□R; V□L			
Mounting position	GKS04	GKS05	GKS06
A	0.8	1.3	2.3
B C E F	1.4	2.0	3.8
D	1.0	1.6	2.9
Version V□K			
A	0.8	1.4	2.4
B C E F	1.5	2.1	4.0
D	1.1	1.7	3.0

Bevel gearbox GKR03 ... 06-3; V□□

Version V□R; V□L				
Mounting position	GKR03	GKR04	GKR05	GKR06
A	0.35	0.4	0.8	1.5
B C D E		0.7	1.5	3.0
F		0.4	1.0	1.8
Version V□K				
A	0.35	0.4	0.8	1.5
B D E		0.7	1.5	3.0
C	0.4	0.8	1.6	3.2
F	0.35	0.4	1.0	1.8

7.3 Repair

Lenze recommends that repairs are carried out by the Lenze Service.



K120715-2

7.5 Order form

Sender	_____	Recipient: Lenze	
Street / PO box	_____	Postcode / town, city:	_____
Postcode / town, city	_____	Fax no.:	_____
Delivery address	_____		_____
	_____	Customer no.	_____
Invoice recipient *	_____	Order no.	_____
Date	_____	Originator	_____
		Telephone	_____
		Fax	_____
		Delivery date	_____
		Signature	_____

* 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				
11BA	Mounting flange				

8

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

9

Disposal

Protect the environment! Valuable materials can be recycled.

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	Dispose according to current regulations
Components	Housing: Cast iron Bearings, shafts, gear wheels: Steel Seals: Hazardous waste	Separate different types of material and dispose



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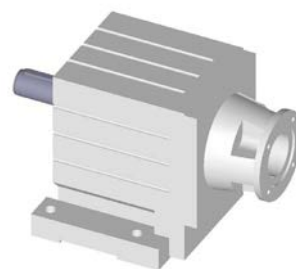
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ATEX G n G

GST, GFL, GKS, GKR, GSS

Gearboxes / geared motors

Operating Instructions

EN



13588037

Lenze



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

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Contents

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



Tip!

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

Validity

These instructions apply to the following gearbox types:

Type	Name
GST	Helical gearbox
GFL	Shaft-mounted helical gearbox
GKS	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
473630	1.0	07/2003	TD09	1st edition for pilot series
474854	1.0	09/2003	TD09	Change: oil change diagram chap. 4.1.3 Supplemented by chapter 4.3.1
474854	2.0	01/2004	TD09	Change: Gearbox nameplate Change: Tab. 2 Torque for gearbox size 14
13025899	3.0	08/2004	TD09	Revision of the entire instructions Supplement to the chapters 7.1.1 Supplement to the chapters 7.4.1
13061856	4.0	08/2005	TD09	Supplement: Chapter 4.6.1 Chapter 7.1.1 Supplement and amendment of the chapters 7.4.1
13168445	5.0	10/2006	TD09	New nameplates
13294454	6.0	03/2009	TD09	Reprint due to reorganisation of company Change: Tab. 2 Torque for gearbox sizes 07 and 11 Change of lubricants filled in at the factory
13294454	6.1	10/2009	TD09	Conversion from G-motion to L-force geared motors ATEX classification key added Designation of the lubricants types in chapter 7.3 changed.
---	7.0	03/2015	TD09	Complete revision
13588037	9.0	10/2019	TD09	• "Lubricant change" diagram: lubricant type changed • "Maintenance intervals" table changed • Surface temperature limit tables changed • "During commissioning" table changed
13513694	8.0	05/2016	TD09	"ATEX" application area change Declaration of Conformity renewed
13588037	9.0	10/2019	TD09	Various chapters were revised or added Position designations of mounting positions updated

1.2 Conventions used

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

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

1.3 Terminology used

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

1 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

Layout of the safety instructions:



Danger!

(characterises the type and severity of danger)

Note

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

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

Application notes

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

2.1 Important notes

- These operating instructions only apply in connection with the general L-force gearbox G□□ operating instructions!
- Observe operating instructions for devices with individual ignition protection, e.g. motor!
- If the data are inconsistent, these operating instructions have priority.
- Pay attention to an installation according to EMC, especially for frequency inverter operation!

If these operating instructions are disregarded, especially the inspection and maintenance intervals, the EU declaration of conformity will become void.

For the evaluation of the product, the following versions of the standards are taken into account:

- EN ISO 80079-36:2016
- EN ISO 80079-37:2016
- TRGS 727:2016

2.2 Application as directed

The gearboxes / geared motors are intended for use in machinery and systems and may only be used in accordance with these operating instructions, the nameplate and the text of the order confirmation. They correspond to existing standards and regulations and meet the requirements of EU directive 2014/34/EU.

Explosive gas, fog, vapour, or dust atmospheres can cause severe injuries or death when getting in contact with hot and / or sparking parts of the geared motor.

All operations concerning mounting, connection, commissioning as well as maintenance and repairs on the gearbox /geared motor and the electrical supplementary equipment must only be carried out by qualified personnel!

- For installation, observe EN 60079-14 for locations with potentially explosive atmospheres!

The machines can be used as follows:

- A In zone 2 (gas Ex, category 3G, EPL Gc) in explosion groups IIA, IIB and IIC.
- B In zone 22 (dust Ex, category 3D, EPL Dc) in explosion groups IIIA and IIIB.
- C In zone 1 (gas Ex, category 2G, EPL Gb) in explosion groups IIA, IIB and IIC.
- D In zone 21 (dust Ex, category 2D, EPL Db) in explosion groups IIIA and IIIB.



Note!

Observe nameplate data with regard to the category and explosion group!

2 Safety instructions

Disposal

2.3 Disposal

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

2.4 General requirements

The gearboxes/geared motors have been designed for industrial applications. Any other use is improper use.

- To ensure safe operation, the gearboxes/geared motors are only to be used in accordance with the information in the operating instructions and the technical data sheet. During use, the required legal and safety instructions for the respective application are also to be observed. This also applies analogously to the use of accessories.
- We cannot be held liable if the notes specified in this extract are not observed or in the event of improper handling of the product. Furthermore, the warranty for products and spare parts shall be considered null and void.
- The products are not safety elements in the context of the intended use.

2.5 General safety information

The gearboxes/geared motors correspond to the state of the art and are safe to operate. The product may be a source of residual hazards if it is used and operated improperly by untrained personnel.

Every person commissioned with the installation, commissioning, maintenance, or repair of the gearboxes/geared motors must have read and understood the customer documentation and, in particular, the safety-related notes.

- When selecting and operating a product, comply with generally accepted engineering rules.
 - All connected electrical and mechanical equipment must be suitable for the respective application.
- Observe the notes in these operating instructions as well as the operating conditions and permissible data specified on the labels/nameplates of the respective products.
 - Ensure that only the types of protection for products corresponding to the respective zones are installed!
 - The product is only approved for proper and intended use in normal industrial atmospheres.
 - Ensure that no falling objects can strike the products. In connection with rust, light metals, and kinetic energy, an exothermic ignitable reaction may be triggered.
 - The operator is to ensure lightning protection for the entire system in compliance with local regulations.
- Note that live conductors must never be disconnected! This may result in danger to life if an explosive atmosphere is present at that point in time.
- Take suitable measures to rule out impermissible interferences.

- The surface on which the products are mounted must be load-bearing and clean.
- The gearboxes/geared motors (surface) and the connecting cable must not be damaged.
- All cables must be laid such that they are protected against external mechanical influences.
- Electrical cables/equipment must only be installed by a qualified electrician and must fulfil the requirements of any additional applicable standards (e.g. EN 60079-14).
- The manufacturer of the motors should be informed of the issue of "Shaft voltages in frequency inverter mode"; in his operating instructions, the operation of the motors with frequency inverters must be explicitly permitted. The shaft voltages generate significant currents which irreparably damage the ball bearings in standard machines. This situation can only be remedied by using ceramic balls in the bearings (expensive variant) or by using insulated bearings (simpler variant).
- Ventilation equipment is to be kept free and clear.
- Simple electrical equipment may be installed in mounting boxes; they may be used in intrinsically safe electric circuits. In all cases, the manufacturer is to draft a control drawing for this purpose (proof of intrinsic safety) and attach it to the delivery documents.
- When assembling the motor and gearbox (except for products which are delivered by the manufacturer in an already combined fashion), the permissible angle error is to be observed.
- Ensure that the air velocity of the fans in dusty atmospheres does not exceed a value of 20 m/sec.

3 Product description

Identification

Gearbox / geared motor product code

3.1 Identification

3.1.1 Gearbox / geared motor product code

Example		GST	03	-	1	M	VAR			071N32; 080-12 1C				
Meaning	Type	Gearbox code												
Gearbox type	Helical gearbox	GST												
	Shaft-mounted helical gearbox	GFL												
	Helical-bevel gearbox	GKS												
	Bevel gearbox	GKR												
	Helical-worm gearbox	GSS												
Gearbox size	Depending on the gearbox type		XX	-	1	M N E								
Number of stages	1-stage		2											
	2-stage		3											
	3-stage													
Drive design	Three-phase AC motor													
	Gearbox with mounting flange for IEC standard motor													
	Three-phase AC motor with 8400 motec													
Output design	Solid shaft							V						
	Hollow shaft											H		
	Hollow shaft with shrink disk											S		
	Foot mounting, with centering												A	
	Foot mounting, without centering												B	
	Without foot, with centering												C	
	Without foot, without centering												D	
	Without flange													R
	With flange (through holes)													K
	With flange (threaded holes)													I
	Drive size													
Example	Motor									071N32; 080-12				
	Mounting flange/free drive shaft									1C				

ATEX classification

Example		Ex	II	2	G	Ex h	IIB	T3
Meaning	Variant	ATEX classification						
Classification	Explosion protection symbol	Ex						
Device group	Above-ground use		II					
Category	Zone 1, 21			2				
	Zone 2, 22			3				
Drive design	Explosive atmosphere caused by gas				G			
	Explosive atmosphere caused by dust				D			
Ignition protection type	Constructional safety/liquid immersion					Ex h		
Explosion group: Areas exposed to gases	High ignition power required						IIA	
	Medium ignition power required						IIB	
	Low ignition power required						IIC	
Exposed to dust	Lint						IIIA	
	Non-conductive dust						IIIB	
	Conductive dust						IIIC	
Temperature class/temperature limits for the zones	≤450°C							T1
	≤ 300°C							T2
	≤ 200°C							T3
	≤ 135°C							T4
	≤ 100°C							T5
	≤85°C							T6

3.2 Short overview of the new mounting positions

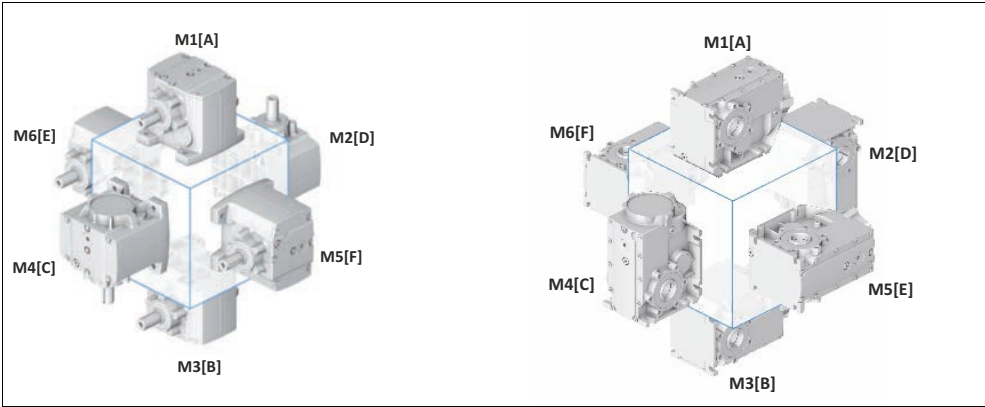


Fig. 1 Example of mounting positions on a H gearbox: new designation [old designation]

3.2.1 Nameplate

ATEX gearbox - nameplate with serial no. and bar code

Lenze

1

15

42

6

5.1

7.2

28

5.2

5.3/5.4

38 1)

10.1

39.4

5.11

Ex 39.5

18

39.7

Ex 39.6

10.2/10.3

40

11

GT-ATEX-001.des

1) Data only for gearboxes with a motor

3 Product description

Short overview of the new mounting positions

Nameplate

Pos.	Contents
1	Manufacturer / production location
5	Technical data
5 5.1	Ratio
5 5.2	Rated torque
5 5.3	Rated speed
5 5.4	Rated frequency
5 5.11	Maximum input speed
6	Position of system modules / mounting position
7	Lubricant details
7 7.2	Lubricant type
10	Production data
10 10.1	Order number
10 10.2	Material number
10 10.3	Serial number
11	Bar code
15	Applicable conformities, approvals and certificates
18	Year of manufacture / week of manufacture
28	Degree of protection of the gearbox / geared motor
38	Load capacity (specified if $c < 1.0$)
39	ATEX details on the gearbox
39.4	ATEX temperature range (only specified if deviating from -20 °C ... +40 °C)
39.5	Explosion protection specification for gas
39.6	Explosion protection specification for dust
39.7	ATEX file number
40	Additional data
42	Gearbox/geared motor type

4.1 Important notes



Observe the "Important notes" chapter of the mounting instructions.

Depending on the model, various temperature classes may be specified on the nameplate; for T4 / T3 the qualification is in regard to the surface temperature; for all gases, vapours, and mists with an ignition temperature $> 135\text{ °C}$ / 200 °C , the equipment is not an ignition source. In dust Ex atmospheres, 125 °C / 140 °C is the reference temperature for other considerations regarding the safety distance from the glow temperature, etc. Generally, the geared motors from 0.06 to 45 kW are operated in a temperature range of -20 °C ... 40 °C without power reduction. At higher ambient temperatures, a reduction of the rated power is necessary. As the standard for gas explosion protection, the explosion group IIB is specified; IIC requires a special routine test, inter alia for equipotential bonding and the film thickness of paints.

4.2 Preparation

- It must be checked that the data given on the nameplate of the gearbox/motor and in the order confirmation text comply with the permissible explosion-proof application conditions on site:
 - Explosion group
 - Category
 - Zone
 - Temperature class
 - Maximum surface temperature
- Mount the gearbox only in the mounting position indicated on the nameplate!
- The max. input speed and the max. rated torque given on the nameplate must not be exceeded!
- The application limits for temperature class T4 (gas Ex) and T125 °C (dust Ex) are specified in the chapter 6.3 "Surface temperature limit". In particular, for input speeds $< 200\text{ rpm}$, a consultation with Lenze is required.
- The application of the gearboxes is only permissible at an ambient temperature of -20 °C to $+40\text{ °C}$ unless the nameplate bears another temperature.

Tighten all screw connections with the torques given and lock them with standard screw locking adhesive!

	Thread												
	M3	M4	M5	M6	M8	M10	M12	M16	M20	M24	M27	M30	M36
Strength	Tightening torque [Nm]												
4.8	0.7	1.4	2.8	4.8	12	23	-	-	-	-	-	-	-
8.8	1.3	3.0	5.9	10.1	24.6	48	84	206	415	714	1050	1428	2482
10.9	1.9	4.6	8.6	14.9	36.1	71	123	302	592	1017	1496	2033	3535

Tab. 1 Tightening torques for friction factor $\mu = 0.12$; tolerance of the tightening torque $\pm 10\%$

Please note: increase the tightening torque by 10% for screwed connections with flat gaskets.

4 Mechanical installation

Ambient conditions

4.3 Ambient conditions

The following must be ensured:

- During mounting there must be no explosive atmospheres, oils, gases, vapours, combustible dusts etc.
- The lubricant must be adapted to the ambient temperature.
- If the site contains substances that act in a chemically aggressive fashion (which, for instance, affect elastomer materials), it must be examined whether the gearbox/geared motor is stable with regard to the substance!
For this purpose, consult Lenze.
- All processes which may cause an impermissibly high electrostatic charge of the varnish coating of the gearbox / geared motor must be avoided.

4.4 Installation / mounting condition



Danger!

The installation of the gearbox onto/into the customer machine must be made in such a way that no clearances may develop where dust can deposit which may come into contact with moving parts (risk of heat development).

The gearboxes are filled in the factory with the required quantity of oil.



Danger!

- A change in mounting position may only be carried out after consultation with Lenze. The ATEX approval no longer applies when Lenze is not consulted!
- Parts of the gearbox can be made of aluminium and must be protected against external shocks in order to prevent shock sparks!
- The gearboxes/geared motors must **not** be used in systems with cathodic protection!
- The gearboxes and motors must be included in the equipotential bonding of the system.
- Placing an installation above hot parts on which, for instance, leaking oil may ignite is not permissible. If required, install an oil collecting trough.
- For use in the areas of explosion group IIC, the total thickness of all paint layers must not exceed 0.18 mm. For explosion group IIB, the maximum is 1.5 mm.

Repair paint damages in order to avoid corrosion.

Protect uncoated steel / cast iron surfaces against corrosion by the use of suitable anticorrosive agents.

4.5 Mounting of input and output elements

Only suitable input and output elements must be used for the application in areas with increased danger of explosion!

The applicability can be proven by:

- A an own ATEX approval or
- B a standardised evaluation of the danger of ignition.

Mount transmission elements only by means of a pusher tool and / or the tapped centre hole at the end of the shaft.

The forces of the transmission elements must not exceed the permissible radial and axial forces.



Danger!

- Avoid blows and impacts on the shaft at all costs. Damages could result at the roller bearing, housing and shaft.
- Tighten all screw connections with the torques given and lock them with standard screw locking adhesive!
- The assembly of the single components tested by ATEX must be checked for new ignition danger.

4.5.1 Mounting with belt pulleys

In the case of belt pulleys, the correct tension of the belt specified by the manufacturer must be observed, in order to prevent the belt from slipping, which entails an increase in temperature.



Danger!

Belt drives are permissible in potentially explosive atmospheres under the following conditions.

- The belt drive is only to be outfitted with conductive belts in accordance with TRGS 727.
- The belt drive is equipped with a pre-tensioning device.
- The belt drive is designed for at least 50 K above the maximum ambient temperature.
- The supporting frames and/or connections with the belt drive are only to be operated when earthed.
- The power of the transmission, the maximum belt speed, the correct belt tension range and how it is measured, and the alignment tolerance are defined in the original operating instructions.
- In explosion group IIC, no belt drives are permissible in category 2!
- Approval is only given in explosion groups IIA/IIB for circumferential belt speeds of ≤ 30 m/s.

4 Mechanical installation

Information on gearboxes with shrink disc

4.6 Information on gearboxes with shrink disc



Danger!

All screw connections must be locked with standard screw locking adhesive!

The customer shaft must meet the following requirements:

- Sufficient material strength, yield point $R_e > 360 \text{ N/mm}^2$ (use e. g. C45 or 42 CrMo4)
- Medium surface roughness $R_z < 15 \mu\text{m}$
- Shaft fit in quality h6



Danger!

Stainless steel connections must be checked by Lenze due to the modified friction factors.

It must be ensured that the shrink disc is correctly installed according to the Operating Instructions (L-force gearbox G□□). An incorrectly installed shrink disc connection can slip and the subsequent heating can lead to a potential ignition source.

The maximum permissible torques of shrink disc connections must not be exceeded! Observe the following table.

Gearbox size [-]	Hollow shaft bore [mm]	Max. torque [Nm]
03	20	160
04	25	340
	30	600
05	30	380
	35	750
06	40	1250
07	50	2400
09	60	3000
	65	5200
11	80	10400
14	100	17000

Tab. 2 Torques of the shrink disc connections



Danger!

The torque values in Tab. 2 apply to a true torque stress. If a radial or axial force is at work, it is necessary to consult Lenze.

4.6.1 Shrink disc and hollow shaft cover

**Danger!**

If the cover is supplied with a seal, it must be installed to prevent the ingress of dust.

After mounting the cover it must be ensured by means of a test run that the shrink disc or the plugged-in machine shaft does not rub against the cover.

The cover must be protected against impact and falling objects using suitable measures. Any attached protective devices must be electrically conductive and integrated in the equipotential bonding.

If the cover is damaged, the cover and seal must be replaced to avoid ingress of dust. The dispersion of dust which might have ingressed must be prevented. Thus, if ingress of dust is suspected, the shrink disc cover must be removed and cleaned according to the local conditions. Covers that are no longer firmly seated must be replaced by new ones.

4.7 Shaft sealing rings

**Note!**

If the site contains material that might affect elastomer materials, the stability of the shaft sealing rings with regard to the material has to be inspected.

For this, please consult Lenze.

Lenze uses shaft sealing rings of fluoro rubber (FKM) or acrylonitrile butadiene rubber (NBR).

Shaft sealing rings seal the gap between the housing and the rotating shafts. These are wearing parts whose replacement is required after reaching the wear limit.

In the case of abrasive environmental conditions, protect shaft sealing rings against contact with the abrasive material.

The service life of shaft sealing rings is influenced by many parameters including the following:

- Circumferential speed at the sealing lip
- Temperature
- Internal pressure in the gearbox
- Lubricant viscosity
- Chemical composition and additivation of lubricants
- Installation (lubricant supply of the sealing lip)
- Particles or metallic abrasion in the lubricant
- Material of shaft sealing ring

Due to this multitude of influencing parameters, without tests that are tailored to the application it is almost impossible to make an exact statement with regard to the service life. Since the service life of the shaft sealing rings is subject to the variations described above, regular inspections are absolutely required. This is the only way of avoiding an unnoticed loss of lubricant in the gearbox (time intervals (📖 28).

4 Mechanical installation

Lubricants

During the renewal of the shaft sealing ring, the condition of the sealing lip contact areas on the shaft must also be checked. If grooves are noticeable, the shaft must be serviced or replaced. Alternatively, the shaft sealing ring can be mounted slightly moved in axial direction so that the sealing lip runs on a new location.

4.8 Lubricants

A sufficient amount of lubricant in the gearbox is essential to ensure its reliable function. The lubricant prevents dry running in the metallic contacts as well as resulting impermissible surface temperatures or mechanical sparks. The main risk in this respect is an unnoticed loss of lubricant. Therefore the gearboxes must be monitored at regular intervals with regard to the loss of lubricant (📖 28). For this purpose a leakage inspection and oil-level inspection must be carried out.



Danger!

- The lubricant must be changed at defined intervals (📖 28).
- The gearbox must be inspected for leakage at regular intervals!

4.9 Roller bearings

The roller bearings in the gearboxes also have a finite service life under perfect operating conditions. This so-called fatigue life is a purely statistical value for roller bearings. The actual service life that a single bearing reaches may differ greatly. For this reason, a regular inspection and/or monitoring of the roller bearings is necessary.

The following measurements are carried out for monitoring:

- Running noises
- Temperature
- Vibration diagnosis
- Frequency analysis

A combination of several measurements is frequently applied. During the measurements, the periodic change is generally checked, i.e. reference values are determined after a short run-in period and compared with the subsequent measurements. This allows for determining changes in the operational performance that point to a forthcoming loss or a necessary maintenance.

The roller bearing industry offers appropriate devices for monitoring (e.g. from SKF or FAG). The roller bearing industry also offers the possibility of having their experts perform the monitoring. Please contact the roller bearing industry concerning an appropriate measure for your specific situation.



Note!

In order to make it easier to assess at which point in time a preventive replacement is advisable, a calculation should be carried out at Lenze if the precise operating conditions are known. This recalculation makes it possible to provide recommendations with regard to the changing intervals of the roller bearings.

4.10 Mounting of motors on gearboxes with mounting flange

**Stop!**

- In frequency inverter operation, the motor must be provided with a corresponding ATEX approval.
- In frequency inverter operation in explosion group IIC, stray currents must be ruled out, since very low stray currents are already potentially explosive.
- Operation of the gearbox must be permissible for all working points! If required, consult Lenze.

**Note!**

The IP enclosure specified may be only obtained by mounting a motor to the mounting flange.

- The motor flange must fully cover the access to the interior of the bearing flange/adaptor and prevent the ingress of dust and liquids. Use a suitable surface sealing compound on the contact area of the motor flange and bearing flange for sealing purposes.
- Mount coupling hub on the motor side, documentation for the respective gearbox.
- Lock screws at the clutch hubs with adhesive for medium-strength screw locking.
- Tighten all screw connections with the torques given and lock them with standard screw locking adhesive!
- Clamping hubs must only be used together with a featherkey, otherwise the hubs may slip in the event of sudden torque changes!
- Check the clutch in the prescribed maintenance intervals.

5 Electrical installation

Motor connection

5.1 Motor connection



Note!

Please observe the operating instructions for the explosion-protected motor!



Danger!

Hazardous electrical voltage

The electrical installation has to be carried out by skilled personnel in compliance with electrotechnical regulations and standards.

The manufacturer of the motors must grant approval for frequency inverter mode. Only flameproof motors are permitted in this case!

The N-end bearing of the motors must be outfitted with an insulated bearing.

- Exceptions are permissible for flameproof motors IF an insulating coupling is used at the motor shaft; this is the case for Lenze ATEX gearboxes / geared motors with bearing flange with jaw coupling.
- Alternatives:
 - The installing party evaluates the influence of the vagrant currents under its own responsibility.
 - Note: For smaller motors up to approx. 6 kW and an impedance $< 10 \text{ M}\Omega$ between the drive end and N-end bearing, dangerous external vagrant currents are generally not to be expected.

The gearboxes/geared motors are to be installed in a higher-level system. Depending on the degree of protection, the time for the cleaning of the equipment (dust deposits) is to be defined. It must be ensured that only the types of protection for the device which correspond to the zones/categories are installed! During installation, the valid national installation regulations, e.g. EN 60079-14 must be observed.

Important facts

- In zone 1 and/or zone 2 (category 2G; EPL Gb and 3G; EPL Gc) and zone 21 (category 2D; EPL Db) and/or Zone 22 (category 3D; EPL Dc) - be sure to observe restrictions indicated on the nameplate and/or the accompanying documentation! - the product is only to be put into operation by specialists with a qualification similar to a qualified person pursuant to TRBS 1203. The category 2 gearboxes can be combined with category 3 drives; however, they will then only be usable in the associated zone.
 - When doing so, the information on the nameplate and in the order confirmation must be observed.
 - Observe the notes in these operating instructions as well as the operating conditions and permissible data specified on the labels/nameplates of the respective products.
- The gearboxes/geared motors may only be used in conventional industrial atmospheres. If aggressive substances are present in the air, Lenze must always be consulted first.
 - The operation of the product is only permissible in a completely assembled and intact state. In the event of any possible leaks in the system, the operator must note the possibility of any changes in zone classification caused by this.
 - The ambient conditions specified in the operating instructions must always be observed and protected accordingly against adverse ambient conditions. Heat radiation from foreign products/components are also to be taken into account.
 - Some components may be made of light metals. These must be protected against external impacts.
 - The gearboxes/geared motors are to be protected against the impermissible ingress of liquids and/or pollution.
 - The gearboxes/geared motors are only to be operated with the lubricants specified in chapter 7.3. The solidification/freezing point and/or the flow temperature, inter alia, are also to be observed. Sufficient lubricant must be present.
 - Stuck parts (e.g. due to frost or corrosion) must not be released with force if an explosive atmosphere is present. Hence, freezing conditions must be avoided.
 - The gearboxes/geared motors must only be exposed to minimal vibrations. Operation is not permitted in the resonance range of the system or the Lenze drive system.
- Equipotential bonding is to be established. It is to be handled in accordance with installation regulations in the user country (VDE 0100 Part 540, IEC 364-5-54). This is to be checked before commissioning. An insulated structure is not permissible!
 - Ensure that the equipotential bonding includes all conductive parts.
 - The gearboxes/geared motors must not be used in systems with cathodic corrosion protection; in borderline cases, consult the manufacturer.
 - Pay particular attention to ensure that no compensating currents (generated e.g. by motors which are operated with frequency inverters, welding systems and/or cathodic corrosion protection systems) are carried via the drives.
 - Check separately that any possible electrostatic hazards are minimised via the use and putting up of warning signs. Electrostatic charges are to be avoided.

5 Electrical installation

Motor connection

- Direct high-energy electrostatic discharge to the equipment is not permissible (generally cannot be generated by human contact).
- To ensure that electrostatic charges are drained, the national requirements are to be observed.
 - In particular, insulated built-up capacitances are to be avoided. The gearboxes/geared motors are to be electrostatically earthed. The earthing resistance is not to exceed a limit value of 1 MΩ.
 - The effectiveness of the drainage of the equipotential bonding is to be verified annually.
- The permissible ignition temperature of a gas must have a safety distance of at least 10 K to the temperature class; the greater the better. In individual cases, after special consideration and evaluation, this limit may be lowered to 5 K.
 - Coatings/paints with a thickness of up to 0.18 mm are permissible in the explosion group IIC.
 - In IIB, a thickness of 1.5 mm is never to be exceeded; where necessary, a reduction to e.g. 0.5 ... 1 mm may need to be performed depending on the quality of the coating/paint.
 - The operator is not to apply paint!
- Accessory components used in potentially explosive areas must fulfil all requirements of the European directives and national legislation.
 - Electrical equipment in zone 1 must possess an EU type examination certificate and is only to be installed by specialists according to their operating instructions.
 - Particular attention is to be paid to ensuring that electrical equipment – or mechanical equipment with its own approval – is not included in the inspection scope of the products. The ignition protection of these products is to be evaluated separately; installation is permissible within the framework approved by the manufacturer. This may reduce the application area of the products.
- Installation in potentially explosive atmospheres is only to be performed when local installation regulations are observed. The following notes are to be observed (list is incomplete):
 - Installation and maintenance are only to be conducted in the absence of potentially explosive atmospheres and in compliance with regulations in the user country.
 - Additional precautionary measures are to be taken when the presence of hydrogen sulphide, ethylene oxide, and/or carbon monoxide is to be expected. These substances have a very low ignition power!
 - For these substances and all substances in the explosion group IIC, only spark-free tools are to be used if the presence of a potentially explosive atmosphere is to be expected nonetheless!

6.1 Checklist for commissioning



Stop!

The drive must not be commissioned until everything is checked and answered with "yes"!

Before you start

Check the following	Checked
Supply:	
- Does the scope of supply comply with the accompanying papers? - Claim visible transport damages immediately to the forwarder. - Claim visible deficiencies/incompleteness immediately to your Lenze representative.	
Ex application:	
- Do the following data on the nameplate of the gearbox/motor comply with the permissible Ex application on site? - Explosion group - Category - Zone - Temperature class - Maximum surface temperature	
Ambient temperature:	
- Is the ambient temperature range adhered to according to the data given in the lubricant table? - A maximum ambient temperature of 40 °C must not be exceeded during the entire operating time, unless the gearbox nameplate contains a different maximum temperature.	
Ventilation:	
Is a sufficient ventilation of the gearbox guaranteed?	
Mounting position:	
- Does the mounting position comply with the mounting position given on the nameplate of the gearbox? - Please observe: Changing the mounting position may only be performed after consultation with Lenze. Without consultation, the ATEX approval no longer applies!	
Oil level for drives of category 2:	
- Was the oil-level control carried out in the correct mounting position? - Is the oil level correct?	
Oil control and oil drain plugs /breather elements:	
- Are all oil control screws and drain screws as well as breather screws and valves freely accessible? - For gearboxes with ventilation remove the transport locking device of the ventilation or mount the breather element.	
Input and output elements:	
Are all input and output elements to be installed suitable for this explosion-protected application?	
Nameplate data:	
Are the data given on the nameplate of the gearboxes not exceeded?	
Gearbox with hollow shaft and shrink disk:	
Has the cover been mounted correctly? (19)	
Mains-operated geared motors:	
Do the data given on the nameplate of the gearbox and motor comply with the ambient conditions on site?	
Inverter-operated geared motors:	
- Is the geared motor permitted for inverter operation? - The parameter setting of the inverter must prevent an overload of the gearbox (gearbox nameplate).	
Drives in mounting position M4[C] (motor at the top):	
Is the protection for the fan cover mounted?	
Equipotential bonding:	
- Is equipotential bonding of the motor and gearbox guaranteed in the mounted state? - Has it been ensured that all conductive components have been included in the equipotential bonding?	
State:	
Is the gearbox closed and undamaged?	

6 Commissioning

Measurement of surface temperature

During commissioning

Check the following	Checked
Ambient area: – It must be ensured that there are no explosive atmospheres, oils, acids, gases, vapours, or combustible dusts!	
Temperature measurement: • The temperature must be measured after 3 hours of operation at the maximum load of the corresponding application! – The temperature must be measured at points that are protected against the cooling air flow, in the area of the drive. It is useful to carry out measurements at several points in order to determine the maximum,  26. – An absolute housing surface temperature of 90 °C should not be exceeded to keep the thermal stress of shaft sealing rings and lubricant low; this contributes positively to the service life.	
Temperature class T4 in zones 1 and 2: – The temperature limit for temperature class T4 in zones 1 and 2 must not be exceeded,  27. When the drive gets warmer it has to be decommissioned.	
Absolute temperature: • Is the maximum permissible absolute temperature of 90 °C exceeded? – If this is the case, the drive must be put out of operation and Lenze must be contacted.	
Oil change: – The oil change depends on the oil temperature,  28	

6.2 Measurement of surface temperature

During the commissioning of the gearbox it is absolutely necessary to perform a measurement of the surface temperature under maximum load condition at thermal equilibrium. The maximum surface temperature is reached after approx. 3 hours.

The temperature measurements must be performed in points in the area of the drive that are protected against the cooling air flow. It is useful to take measurements in several points to determine the maximum.

The maximum permissible absolute temperature is 90 °C at the hottest point. For temperature class T4 in zone 1 or 2, the temperature limit ( 27) must be observed!



Danger!

If the temperature is higher than the value given, the drive must immediately be stopped and Lenze must be contacted!

6.3 Surface temperature limits for temperature class T4 in area 1 and 2

Since the application and installation conditions for the geared motors can differ significantly, it must be ensured that a maximum temperature of 135°C is not exceeded in the gearbox, even under adverse conditions. The maximum temperature measured at the housing in chap. 6.2 must not exceed the values listed in the following tables.

Input speeds up to 1500 rpm

Mounting positions M1[A], M3[B], M2[D], M6[E] and M5[F]		Mounting position M4[C]	
Drive size [-]	Temperature limit [°C]	Drive size [-]	Temperature limit [°C]
☐ A	90	☐ A	90
☐ B		☐ B	
☐ C		☐ C	
☐ D		☐ D	
☐ E		☐ E	
☐ F		☐ F	
☐ G		☐ G	
☐ H		☐ H	
☐ K		☐ K	80

Tab. 3 Detailed explanation of the mounting positions:  "Adjustment made easy" documentation (see Lenze homepage)

Input speeds 1501 to 3000 rpm

Mounting positions M1[A], M3[B], M2[D], M6[E] and M5[F]		Mounting position M4[C]	
Drive size [-]	Temperature limit [°C]	Drive size [-]	Temperature limit [°C]
☐ A	90	☐ A	90
☐ B		☐ B	
☐ C		☐ C	
☐ D		☐ D	
☐ E		☐ E	85
☐ F		☐ F	
☐ G	80	☐ G	80
☐ H		☐ H	70
☐ K		☐ K	65

Tab. 4 Detailed explanation of the mounting positions:  "Adjustment made easy" documentation (see Lenze homepage)



Note!

Mounting position M2[D] does not permit input speeds higher than 1500 rpm due to the high stress on the shaft sealing ring!

6.4 Measurement of oil temperature

The oil temperature is measured in the lower area of the gearbox (on the level of the oil sump). In the case of gearboxes with an oil drain plug, the temperature must be measured on the oil drain plug. 10 K are added to the temperature measured and, on the basis of the diagram ( 31), the lubricant change ( 28) is determined.

7 Maintenance

Maintenance intervals



Danger!

If there are unusual operating noises, vibrations, or increased temperatures in the gearboxes/geared motors during or between the prescribed checks, the geared motor must be stopped immediately and maintenance work must be performed!

The guidelines and standards as for instance the "berufsgenossenschaftliche Vorschriften, BGV A2" (guidelines of German Professional Associations), operating instructions (EN 50110) and the instructions for installation (EN 60079-14 and EN 50281-1-2) and maintenance (EN 60079-17) must always be observed!

Plastic parts must be damp-cleaned only to prevent electrostatic charge.

7.1 Maintenance intervals

Based on EN 60079-17, the following terms are used in this chapter:

Visual inspection

Inspection which identifies, without the use of access equipment or tools, those defects, such as missing bolts, which will be apparent to the eye.

Close inspection

Inspection which encompasses those aspects covered by a visual inspection and, in addition, identifies those defects, such as loose bolts, which will be apparent only by the use of access equipment, for example steps, and tools.

Detailed inspection

Inspection which comprises those aspects covered by a close inspection and, in addition, identifies those defects, such as loose terminations, which will only be apparent by opening the enclosure, and/or using tools and test equipment, where necessary.

Inspection

Action comprising careful scrutiny of an item carried out either without dismantling or with the addition of partial dismantling as required, supplemented by means such as a measurement, in order to arrive at a reliable conclusion as to the condition of an item.

Maintenance and repair

Combination of any actions carried out to retain an item in, or restore it to conditions in which it is able to meet the requirements of the relevant specification and perform its required functions.



Danger!

The maintenance intervals must be adhered to for safe operation with respect to explosion protection!

Non-adherence to the maintenance intervals voids the EU Declaration of Conformity!

Maintenance measures involving disassembly of the machine are only to be performed in/upon the absence of potentially explosive atmospheres.

7.1.1 Periodic inspections

For use in zone 2 or 22 and mounting positions M1[A], M3[B], M4[C], M6[E] and M5[F] (ⓘ "Adjustment made easy" documentation; see Lenze homepage) the following specified time intervals can be doubled for close and detailed inspections.

If the checks show any irregularities or items of damage, the cause has to be determined immediately and the damage has to be repaired.



Stop!

A check with regard to leakage, unusual operating noises, vibrations, and impermissibly high temperatures is to be additionally performed within the first days after commissioning.

	Type of inspection		
	Visual	Close	Detailed
Inspection to be carried out within the time interval of operating hours:	100 h	500 h	3000 h
But at the latest:	Once a week	3 months	6 months
Actions			
Visual inspection of the geared motor.	•		
Inspection regarding unusual operating noises, vibrations and inadmissibly high temperatures.			
Dust deposits must be cleaned according to the amount of dust. We recommend removing the dust cover when the thickness exceeds 1.0 mm.			
When the entry of dust is suspected, covers are to be removed and cleaned, ⓘ 19.		•	
Examination with regard to oil leakage, ⓘ 33.			
Check of the oil level with integrated motor mounting, ⓘ 34. The check of the oil level in this case serves the purpose of leakage monitoring at the shaft sealing ring of the motor.			
Visual inspection and backlash check of the elastic ring gear, ⓘ 36.			
Check rubber buffer of the torque arm and replace it in the event of visible wear or damage.			
Check oil level (only drives for category 2)			•
For gearboxes with ventilation: Check the air passage of the breather element and clean it, if necessary (e.g. blow through) or replace it.			
Check whether earthing / equipotential bonding is still ensured.			
Check mounting of the gearbox (foot, flange and shrink disk mounting).			
Inspections of the electric motors	As specified in the operating instructions for the motor		

7.1.2 Inspection to be made only in area 1 and/or 21

	Type of inspection
Visual	
Inspection to be carried out once after:	2000 h
Not later than after:	3 months
Actions	
Visual inspection and backlash check of the elastic ring gear, ⓘ 36.	•

7.2 Maintenance and repair



Danger!

Maintenance or repair operations under ex conditions are not permissible!

The repair work of explosion-protected electrical machines must only be performed by the manufacturer or qualified personnel, in compliance with the Ordinance for Industrial Safety and Health, in a workshop equipped for these tasks. Only use the respective original spare parts from Lenze. The operating steps must be performed in accordance with the instructions given by the manufacturer.

Equipment which has been changed or repaired at parts that guarantee explosion protection must only be started again if a qualified person in accordance with the Ordinance for Industrial Safety and Health has confirmed the compliance with the valid technical regulations.

	Type of inspection Maintenance/repair	
Maintenance/repair to be made in the time interval of operating hours:	Acc. to diagram ¹⁾	Immediately if any irregularities are detected during monitoring, or as a preventive measure after a calculated changing interval ²⁾
But at the latest after:	3 years	---
Actions		
Change oil	●	
Replace shaft seals, check condition of sealing lip contact area and repair it, if necessary.		
Replace roller bearing grease		
For gearboxes with ventilation - replace breather element. Check of state of all gearbox parts - replacement in the case of damage.		
Replacement of roller bearings		●
Maintenance of the electric motors used	According to company's own operating instructions	

- 1) Determination of the period by means of temperature measurement, 27 and using the oil change diagram.
- 2) For better assessment of the roller bearing changing interval, a calculation taking the real operating conditions into consideration should be carried out at Lenze, 20



Note!

Since it is not possible to reliably calculate the service life of an individual roller bearing (20), it is absolutely essential that the roller bearings are checked at regular intervals. A difference in the noise or vibration response or rising temperatures indicate the immediate necessity for replacing the bearings.



Note!

An oil analysis presents a more detailed procedure for determining the necessity of an oil change, analysing the state of the gearbox oil on the basis of an oil sample.

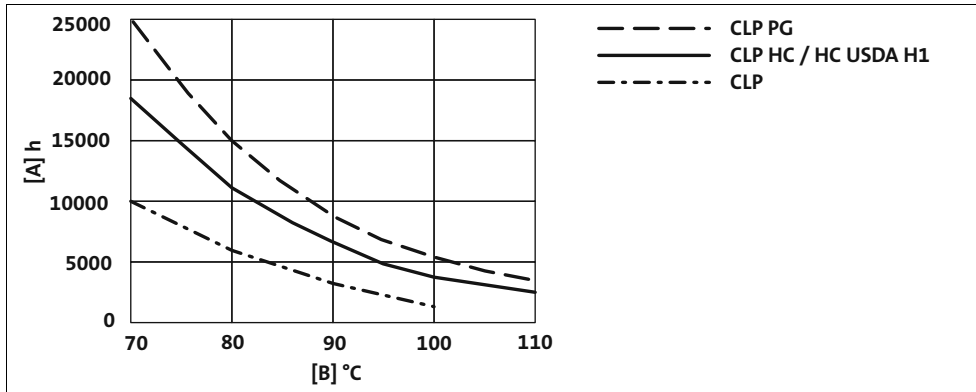


Fig. 2 "Lubricant change" diagram

- A** Operating hours
- B** Oil temperature

7 Maintenance

Lubricant table for ATEX geared motors
Lubricate roller bearings

7.3 Lubricant table for ATEX geared motors

The lubricants listed in the following table are approved for Lenze ATEX gearboxes.

	Ambient temperature [°C]			DIN 51517-3: CLP ISO 12925-1: CKC/CKD		Gearbox type GST, GFL, GKS, GKR	Gearbox type GSS
	-50	0	+50				
 Shell	-25		+50 ³⁾	CLP HC	VG 320	Omala S4 GX 320 Omala S4 GXV 320	
	-20		+40	CLP PG	VG 220		Omala S4 WE 220 ²⁾
	-25		+50 ³⁾	CLP HC	VG 320	Klübersynth GEM 4-320 N	
	-20		+40	CLP PG	VG 220		Klübersynth GH 6-220 ²⁾
	-20		+40	CLP HC	VG 220	Klüberöl 4 UH1-220 N	
	-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	
	-25		+50 ³⁾	CLP HC	VG 320	Renolin Unisyn CLP HC 320 Renolin Unisyn XT 320	
	-20		+40	CLP PG	VG 220		Renolin PG 220 ²⁾

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

CLP PG	⇒	Polyglycol oil
CLP HC	⇒	Synthetic hydrocarbons or poly-alpha-olefin oil
1)	⇒	Currently no test results are provided yet for the efficiency of the specified lubricants for worm gearbox lubrication. If these oils are used, the permissible torque must be reduced to 80% of the catalogue values.
2)	⇒	Polyglycol oils cannot be mixed with other types of oil
3)	⇒	For ambient temperatures above 40°C please consult us and specify the exact operating conditions!
4)	⇒	Observe critical starting performance at low temperatures! At temperatures below -20 °C, special measures must be implemented! In this case, contact Lenze!
	⇒	Low-temperature oils, observe critical starting performance at low temperatures!

7.3.1 Lubricate roller bearings

For regreasing the roller bearings and lubricating the shaft sealing lip in the Lenze ATEX gearboxes with an ambient temperature range of -30°C to + 50°C use the following lubricant: Klüber Petamo 133N.

The following lubricant quantities are required:

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

7.4 How to check for oil leakages

The operator must check the gearboxes and geared motors for oil leakages according to the maintenance intervals given in chapter 7.1 et seqq..

A visual inspection for leakages must be performed on the complete gearbox / geared motor. A lubricant leakage can be recognised, for example, by means of flow traces on the gearbox / geared motor, drop formation and/or lubricant spots under the gearbox / geared motor.

The occurrence of a leakage can usually be expected at the shaft sealing rings. Other possible locations include the parting lines between housing components, flanges, covers, caps and similar.

Gearboxes with a mounting flange for IEC standard motors are provided with a leakage check bore hole in order to be able to detect leakages of the drive shaft sealing ring at an early stage. The position of the bore hole depends on the mounting position ordered.

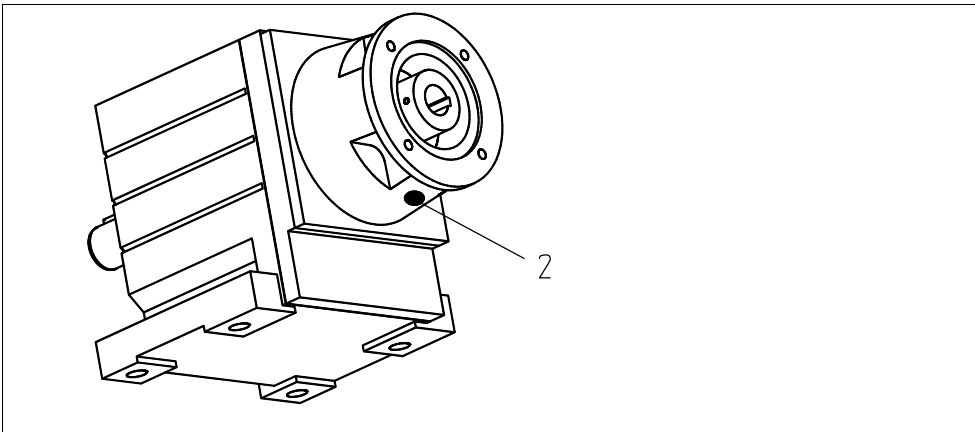


Fig. 3 Standard motor flange; position of the check bore hole for leakages

For every leakage test, the screw plug (item 2) in the bearing flange must be removed and checked whether leakage oil can be found behind the screw. Afterwards, the bore must be closed again.

If a leakage is detected, the lubricant filling level in the gearbox must be checked immediately and, if necessary, adjusted to the prescribed value.

- If the leakage quantity consists of only a few drops of lubricant, continued operation is possible. However, continued operation presupposes that a more frequent monitoring must take place to rule out an unnoticed increase of leakage amount. Short-term plans for a repair to stop the leakage must be made.
- With higher leakage quantities the leakage must be repaired immediately.

During the replacement of the shaft sealing ring, the condition of the sealing lip contact areas on the shaft must also be checked. If grooves are noticeable, the shaft must be serviced or replaced. Alternatively, the shaft sealing ring can be mounted slightly moved in axial direction so that the sealing lip runs on a new location.

7 Maintenance

How to check for oil leakages
Oil level check for gearboxes (geared motors)

7.4.1 Oil level check for gearboxes (geared motors)

For gearboxes (geared motors) that are used in zone 1 or 21, a check of the oil level is required in addition to a check for oil leakage. The check must be performed before the initial commissioning and subsequently at regular intervals (📖 29).

The gearboxes are fitted with one or several oil-level plugs or oil-sight glasses. Depending on the oil level control device, the oil-level inspection must be performed as follows.

Geared motors with direct motor mounting (without standard cup) are also equipped with oil-sight glass or oil-level check plug in category 3. This is to provide a means for performing a check with regard to oil loss in the gearbox if oil enters the motor unnoticed through leakage at the shaft sealing ring of the motor.

7.4.1.1 How to check gearboxes with oil-sight glasses for the oil level

1. Switch off geared motor.
2. Wait a few minutes until all of the oil has accumulated in the oil sump.
 - An oil level must be visible in the sight glass.
- In case of mounting position M4[C] the oil level must be visible in the middle of the oil-sight glass with the following tolerances:

Gearbox size	04...06	07	09...14
Oil level tolerance [mm]	3	4	5

Tab. 5

3. Correct the oil level if required.



Stop!

The same type of oil must always be used for refilling the gearbox.

7.4.1.2 How to check the oil level for gearboxes with oil-level plugs

1. Disconnect the geared motor from the mains and protect it from unintentional switch-on.
2. Wait a few minutes until all of the oil has accumulated in the oil sump.
3. Determine position of the oil-level plug. The position of the oil-level bores is indicated in the respective standard mounting instructions for the gearbox types in the "Maintenance" chapter.
4. Remove oil-level plug.
5. Oil-level inspection.
 - Max. oil level: bottom edge of oil-level bore
 - Min. oil level: X mm below bottom edge of oil-level bore (see Fig. 4 and Tab. 6).
6. If necessary, correct oil level to the correct value. Use the same oil grade as the one already in the gearbox.
7. Close oil-level bore again; for tightening torque of the screw see Tab. 7.

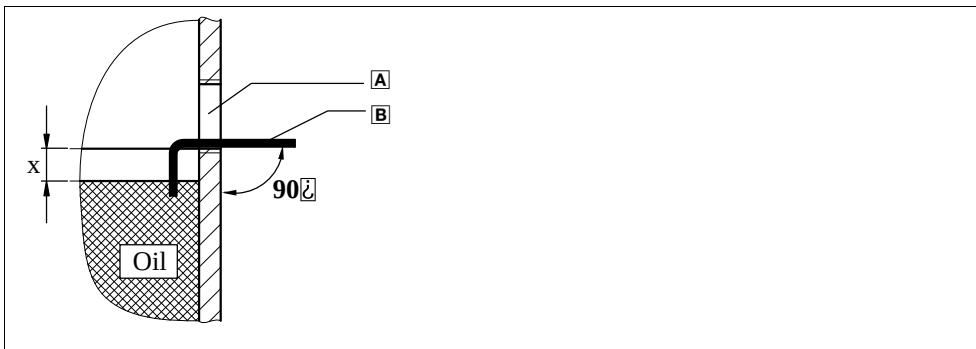


Fig. 4 Oil-level check with auxiliary tool

- A** Oil check bore hole
B Auxiliary tool, e. g. angled wire (not included in the scope of supply)

Gearbox size	04 ... 05	06 ... 07	09 ... 11	14
Dimension X [mm]	2	3	4	5

Tab. 6

Thread size	M10 x 1	M12 x 1.5	M16 x 1.5	M20 x 1.5
Tightening torque M_a [Nm]	10	20	34	50

Tab. 7 Tightening torques of the oil-level plugs

7 Maintenance

Check intervals for clutches in potentially explosive atmospheres

7.5 Check intervals for clutches in potentially explosive atmospheres

Explosion group	Check intervals
II 2G Ex h IIB T4	After commissioning the clutch, the backlash check and visual inspection of the elastic ring gear must be first carried out after 3000 operating hours, after six months at the latest. If no or only negligible wear of the ring gear is detected at this first inspection, further inspection intervals can be carried out after every 6000 operating hours, after 18 months at the latest, provided that the same operating parameters are applied. If there is an increased wear after the first inspection calling for a replace of the ring gear, the cause must be detected. In this case, the maintenance intervals must be adapted to the changed operating parameters.
II 2G Ex h IIC T4	After commissioning the clutch, the backlash check and visual inspection of the elastic ring gear must be first carried out after 2000 operating hours, after three months at the latest. If no or only negligible wear of the ring gear is detected at this first inspection, further inspection intervals can be carried out after every 4000 operating hours, after 12 months at the latest, provided that the same operating parameters are applied. If there is an increased wear after the first inspection calling for a replace of the ring gear, the cause must be detected. In this case, the maintenance intervals must be adapted to the changed operating parameters.



Stop!

When the wear limit of max. abrasion is reached (▢ 37) the ring gear must be replaced immediately!

7.5.1 Wear and backlash check

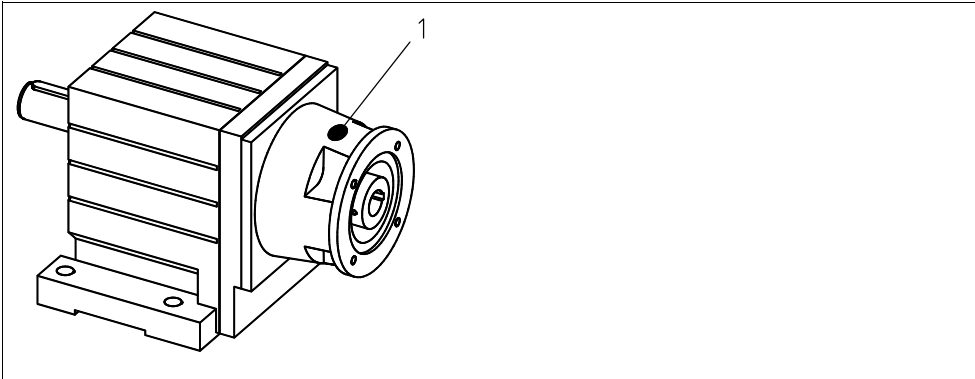


Fig. 5 Standard motor with flange; position of the screw plug (1)

1. Remove the screw plug (item 1) for the wear and backlash check.
2. Check the clearance between clutch hub and elastic ring gear with a feeler gauge (Fig. 6).
3. If the wear limit " $X_{\max.}$ " (Tab. 8) is exceeded, the ring gear must be replaced. If the hub shows damages, the complete clutch must be replaced.
4. After performing the test, the opening (item 1) must be closed again with the screw plug.

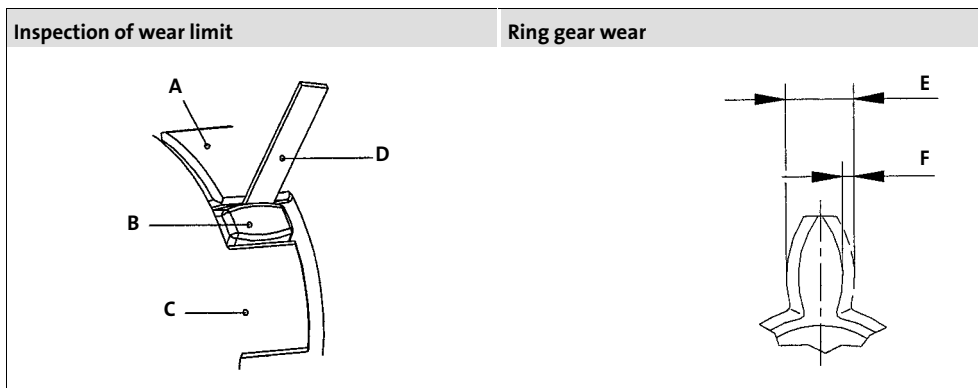


Fig. 6 Inspection: wear

- A** Hub 1
- B** Ring gear
- C** Hub 2
- D** Feeler gauge
- E** B = new condition
- F** X = wear (guide value/backlash)

Drive size	Wear limits $X_{\max.}$ [mm]
xA	2
xB	2
xC	3
xD	3
xE	3
xF	3
xG	3
xH	4
xK	4

Tab. 8 Wear limits for Rotex coupling ring gear

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erklärt in alleiniger Verantwortung die Übereinstimmung der Produkte

declares under sole responsibility compliance of the products:

Getriebe/Getriebemotoren mit mechanisch konstanter Übersetzung L-force GST, GFL, GKS, GKR, GSS und Serie g500 G50BB, G50BH, G50BS**Gear/gearedmotor units with constant ratio L-force GST, GFL, GKS, GKR, GSS and Serie g500 G50BB, G50BH, G50BS**

Kennzeichnung mechanischer Ausrüstung:

Marking mechanical equipment:

CE  II 2G Ex h IIB / IIC T4 / T3 Gb oder / or  II 2D Ex h IIIB T125 °C / T140 °C Db oder / or
CE  II 3G Ex h IIB / IIC T4 / T3 Gc oder / or  II 3D Ex h IIIB T125 °C / T140 °C Dc

Die spezifische Kennzeichnung und die Seriennummer ist auf dem Typenschild angegeben

The specific identification and serial number is indicated on the nameplate

mit der

with the

ATEX-Richtlinie
2014/34/EU**ATEX-Directive**
2014/34/EU

Angewandte harmonisierte Normen der Union:

Applied Union harmonized legislation:

EN ISO 80079-36:2016 Explosionsfähige Atmosphären – Teil 36:**Nicht-elektrische Geräte für den Einsatz in explosionsfähigen Atmosphären - Grundlagen und Anforderungen / Explosive atmospheres - Part 36: Non-electrical equipment for use in explosive atmospheres - Basic method and requirements****EN ISO 80079-37:2016 Explosionsfähige Atmosphären – Teil 37:****Nicht-elektrische Geräte für den Einsatz in explosionsfähigen Atmosphären - Schutz durch konstruktive Sicherheit "c", Zündquellenüberwachung "b", Flüssigkeitskapselung "k" / Explosive atmospheres - Part 37: Non-electrical equipment for use in explosive atmospheres - Non electrical type of protection constructional safety "c", control of ignition source "b", liquid immersion "k"**

Ebenfalls mit folgenden Europäischen und nationalen Normen und technischen Vorschriften übereinstimmt:

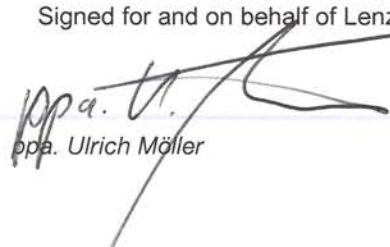
Also complies with the following European and National Standards and technical provisions:

Die Sicherheitshinweise der Betriebsanleitung sind zu beachten.

The safety instructions of the manual are to be considered.

Ort / Datum
Place / date**Profit Center Leiter**
Head of Profit Center**Ex-Beauftragter**
Test officer for explosion protectionUnterzeichnet für und im Namen der Lenze Drives GmbH
Signed for and on behalf of Lenze Drives GmbH

Extertal 23.09.2019


ppa. Ulrich Möller
i. A. Andreas Hilke



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