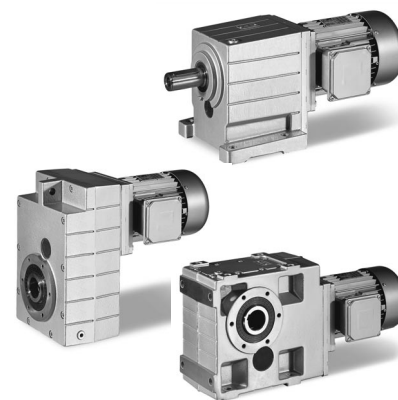


G...

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

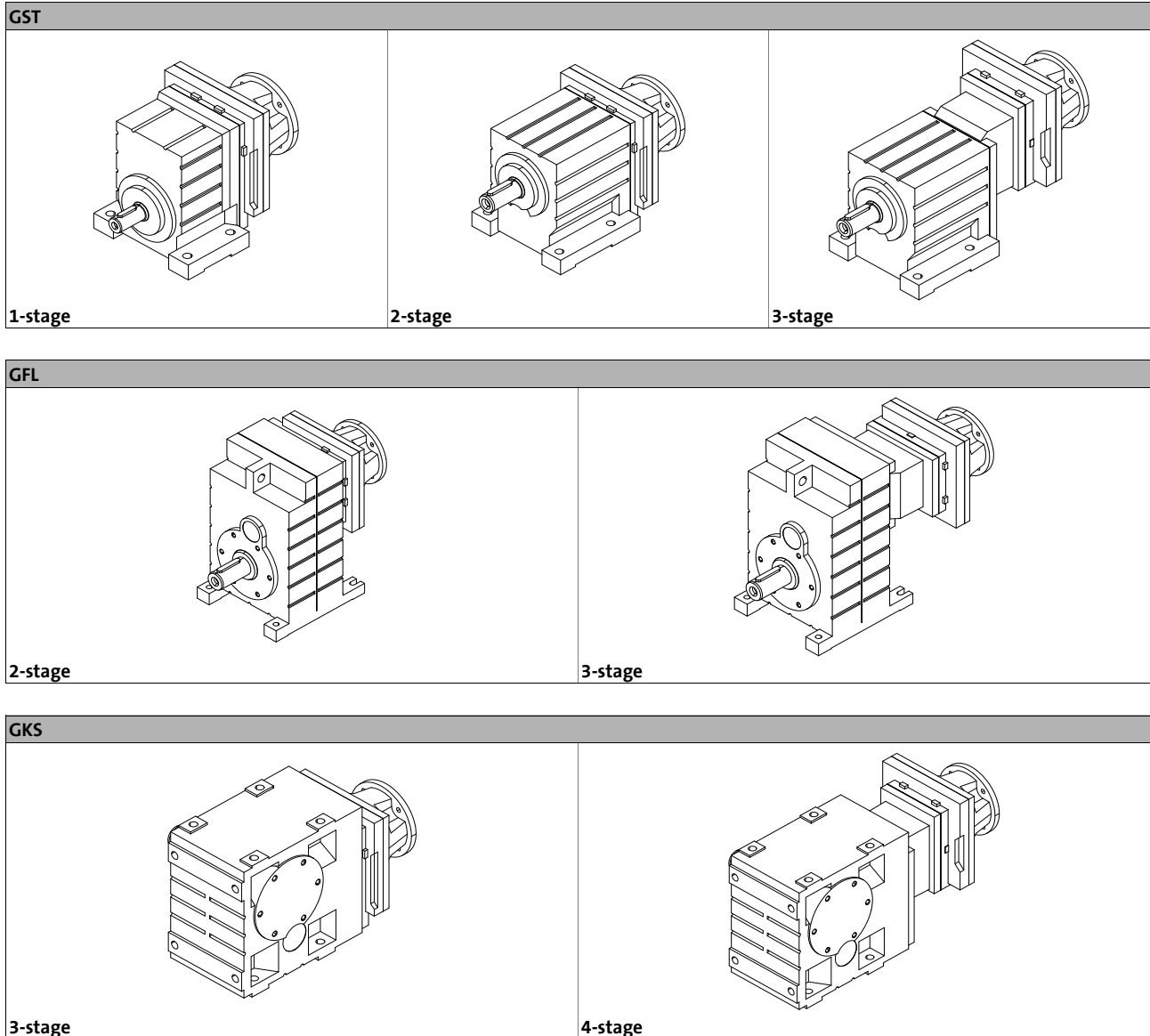
- Fire hazard
 - Prevent contact with flammable substances.

2.5 Disposal

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

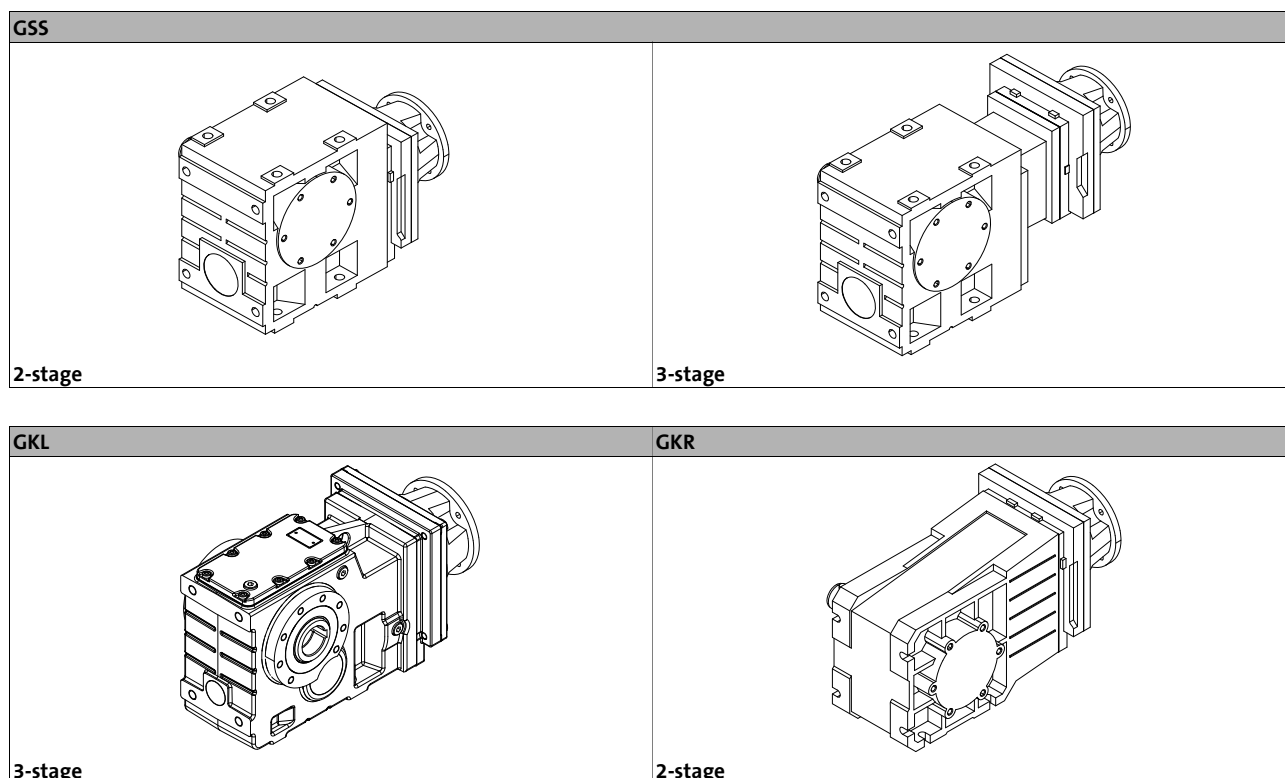
- The most important technical data is given on the nameplate.
- The product catalogues contain further technical data.

3.1 Identification



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

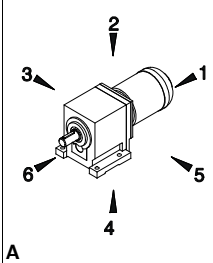
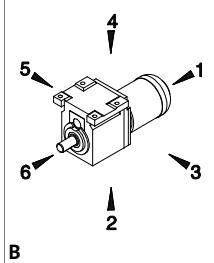
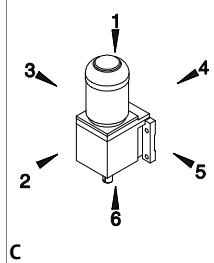
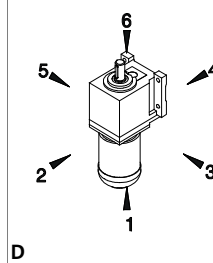
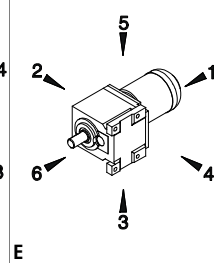
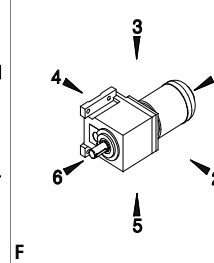
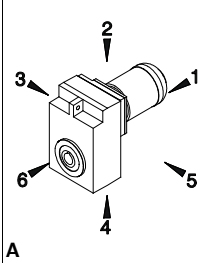
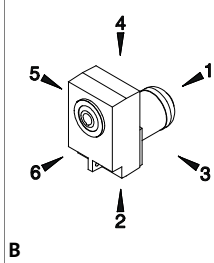
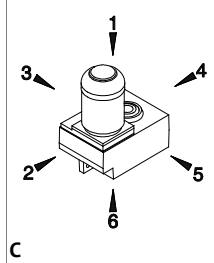
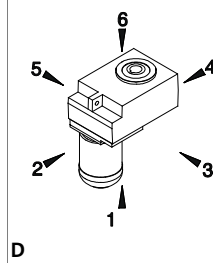
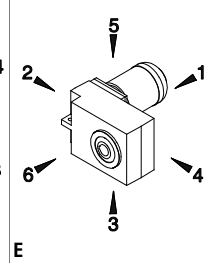
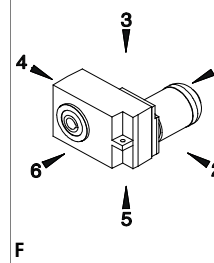
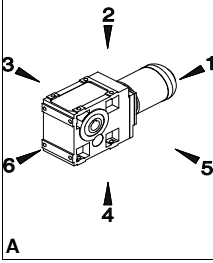
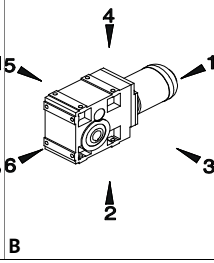
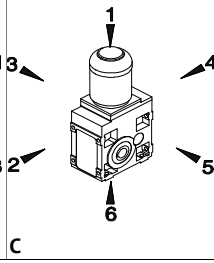
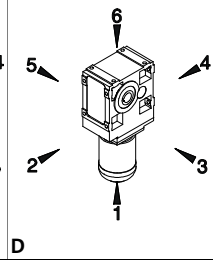
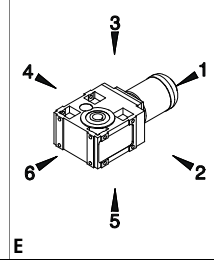
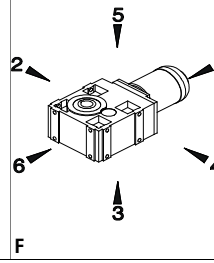
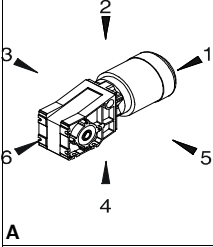
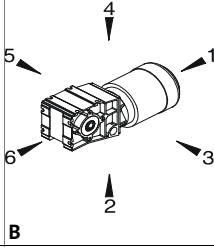
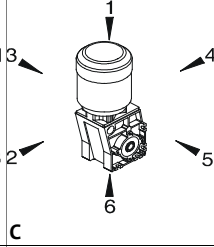
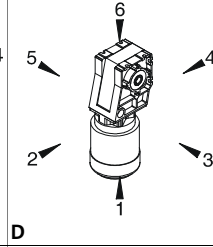
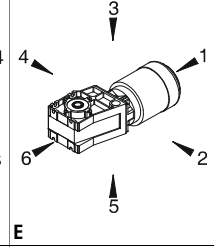
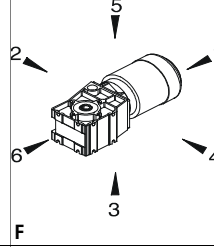
Mode of operation

- 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	---			---
Helical-worm gearbox	Spur gear		Worm	---

- 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					
					
GKS/GSS/GKL Solid shaft: 3, 5, 8 (3+5) Hollow shaft: 0 Hollow shaft with shrink disc: 3, 5					
					
GKR Solid shaft: 3, 5, 8 (3+5) Hollow shaft: 0 Hollow shaft with shrink disc: 3, 5					
					

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	16.4	19
5.1	5.2	25		23
5.3	5.4	A	16.5	13
6	7.1	7.2	16.5	14.1
8.1	8.2	8.3	r/min	16.3
9		η %	16.7	14.3
20.2		cos φ	16.6	27
10.1	10.2	C86	22	22
11		20.1		29

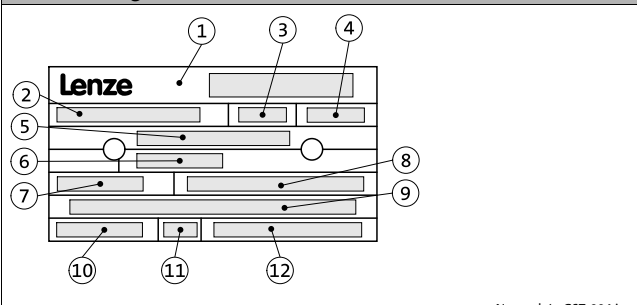
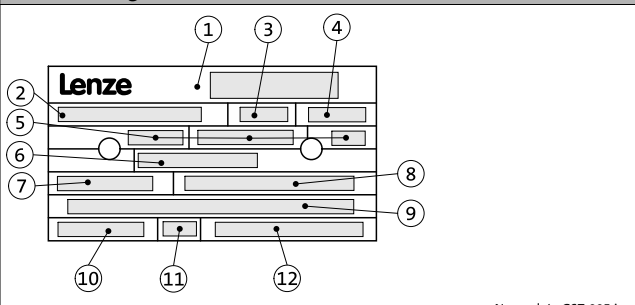
Three-phase AC motor with standard output flange

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

Pos.	Contents
1	Manufacturer / production location
2	Type of motor / standard
3	Gearbox type
4	Motor type
5	Technical data
5.1	Ratio
5.2	Rated torque
5.3	Rated speed
5.4	Rated frequency
5.10	Number of poles
6	Mounting position / position of the system blocks
7	Lubricant details
7.1	Lubricant amount
7.2	Lubricant type
8	Brake data
8.1	Type
8.2	AC/DC brake voltage
8.3	Braking torque, electrical power input
9	For feedback / pulse encoder or resolver data,  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
 The diagram shows a rectangular nameplate with the 'Lenze' logo on the left. It features 12 numbered callouts: 1 points to the top edge, 2 to the logo, 3 to the top section, 4 to the top right corner, 5 to the top left corner, 6 to the middle section, 7 to the bottom section, 8 to the bottom right corner, 9 to the bottom left corner, 10 to the bottom edge, 11 to the bottom left corner, and 12 to the bottom right corner. Nameplate GST-004.iso	 The diagram shows a rectangular nameplate with the 'Lenze' logo on the left. It features 12 numbered callouts: 1 points to the top edge, 2 to the logo, 3 to the top section, 4 to the top right corner, 5 to the top left corner, 6 to the middle section, 7 to the bottom section, 8 to the bottom right corner, 9 to the bottom left corner, 10 to the bottom edge, 11 to the bottom left corner, and 12 to the bottom right corner. 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		Ⓜ 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.

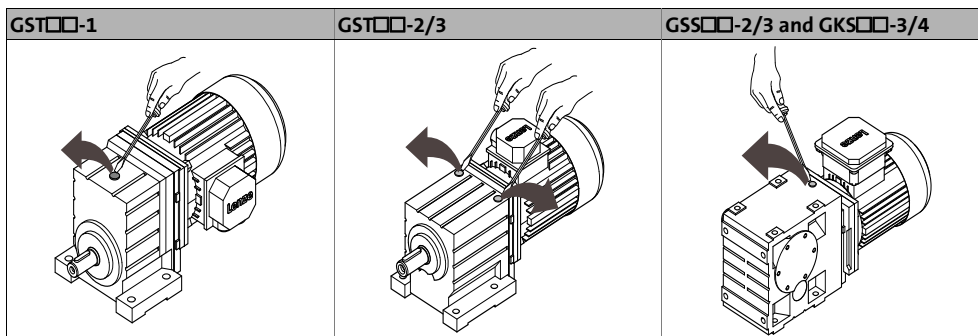


Fig. 1 Eye bolt position

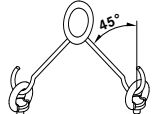


Note!

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

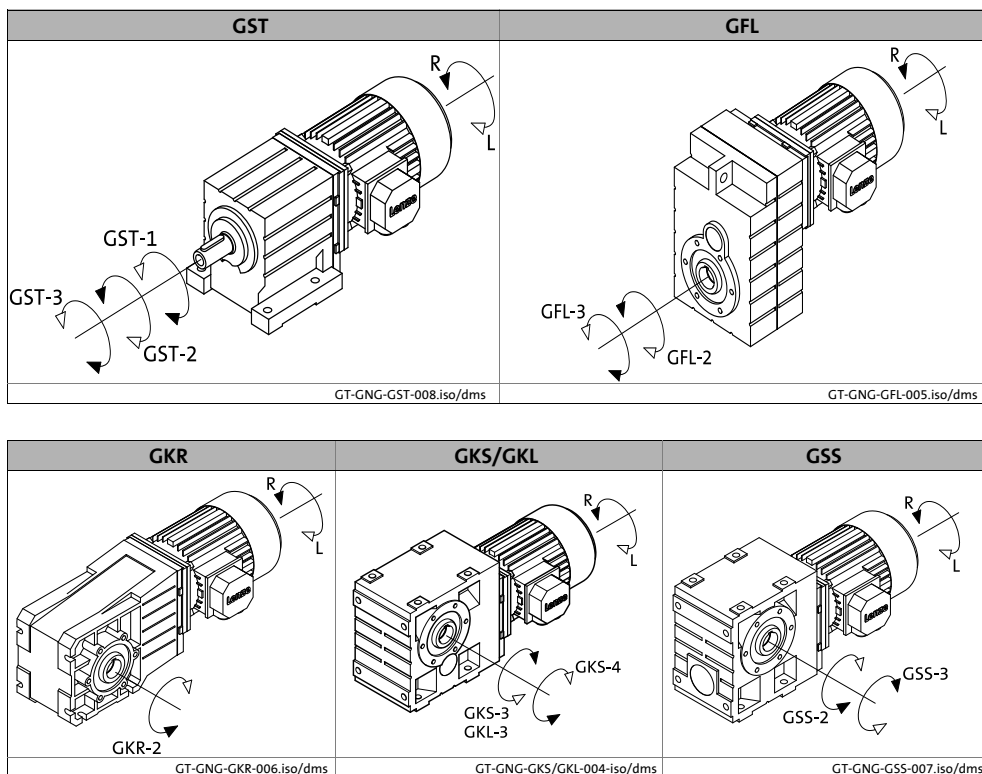


Fig. 2 Direction of rotation of the drive

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)

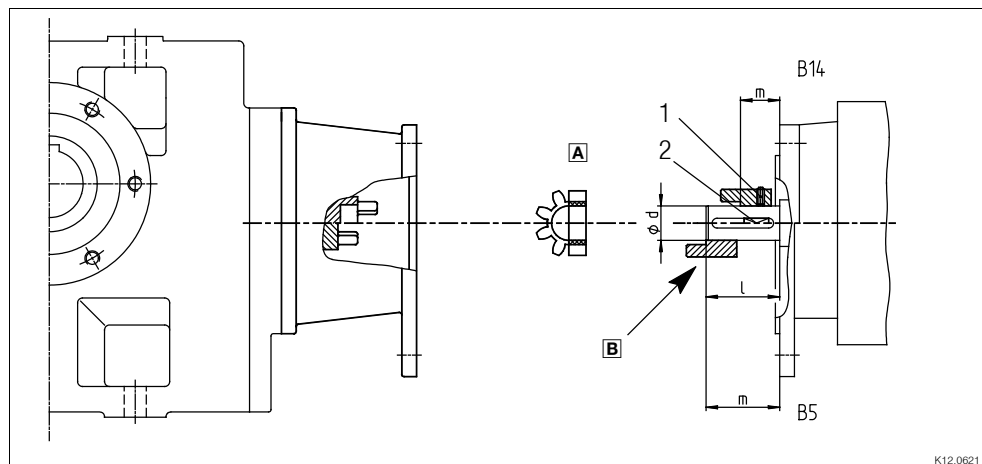


Fig. 3 Input side design N

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

Drive size	Motor shaft		Assembly dimension m	Standard hub Locking screw		Clamping hub		Keyway 1)	Clamping ring hub			
	d [mm]	max. l [mm]		Thread [mm]	Tightenin g torque [Nm]	Thread [mm]	Tightenin g torque [Nm]	DIN 6885/1 [mm]	Thread [mm]	Tightenin g torque [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			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			M6	10.5	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					*				
2F	24	30-60	30					*				
3F	24	50	50	M8	10	M8	25	*	M8	35		
1G	38	80	80									
2G	28	60	60									
3G	38	80	80			M10	69	*				
1H	42	110	110									
2H	48	110	110									
3H	38	80	80			M12	120	*				
1K	55	110	110									
2K	60	140	140					M10	69			

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

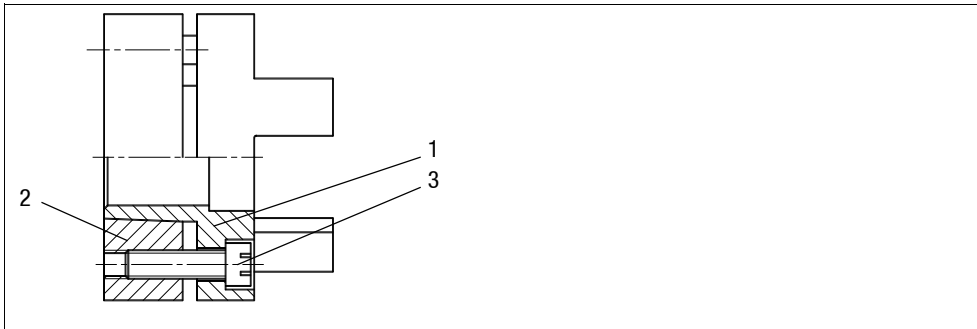


Fig. 4

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.

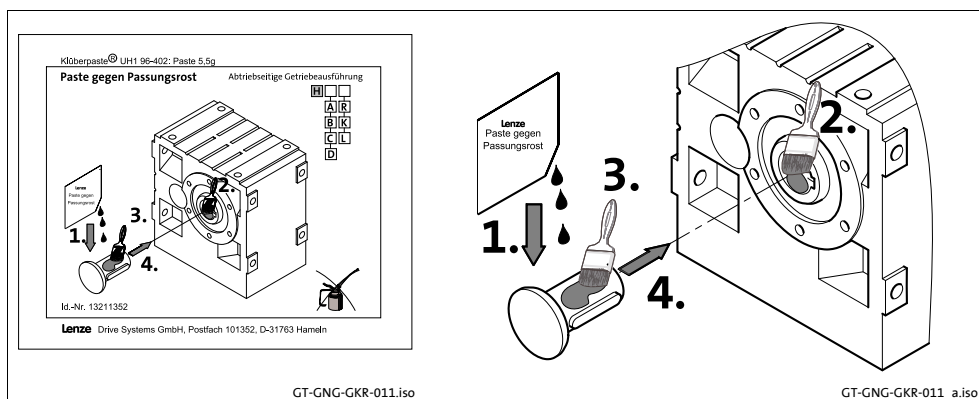


Fig. 5 Application of fitting grease against fretting corrosion (can be ordered optionally)



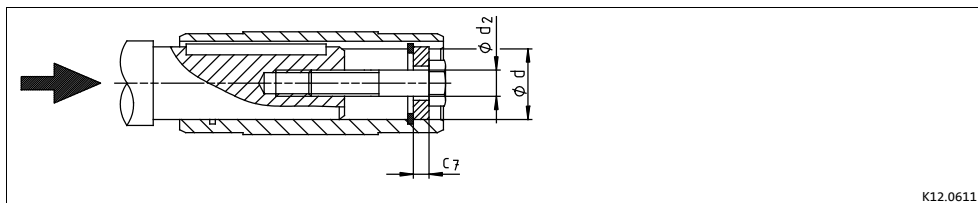
Stop!

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

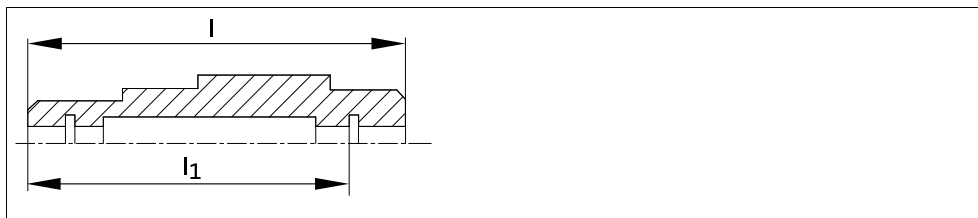
Auxiliary tool (recommended dimensions)		
$\varnothing d^{H7}$	d_2	c_7
18	M6	4
20		
25	M10	5
30		6
35	M12	7
40	M16	8
45		9
50	M16	10
55	M20	11
60	M20	13
70		14
80	M20	16
100	M24	24

Tab. 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).

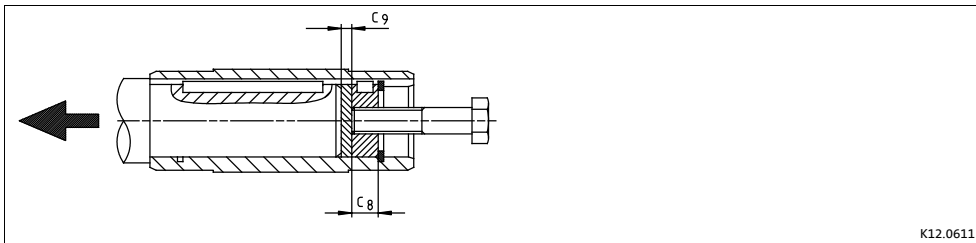


Fig. 6 Disassembly of gearboxes with a hollow shaft, with auxiliary tool; not for GKR

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

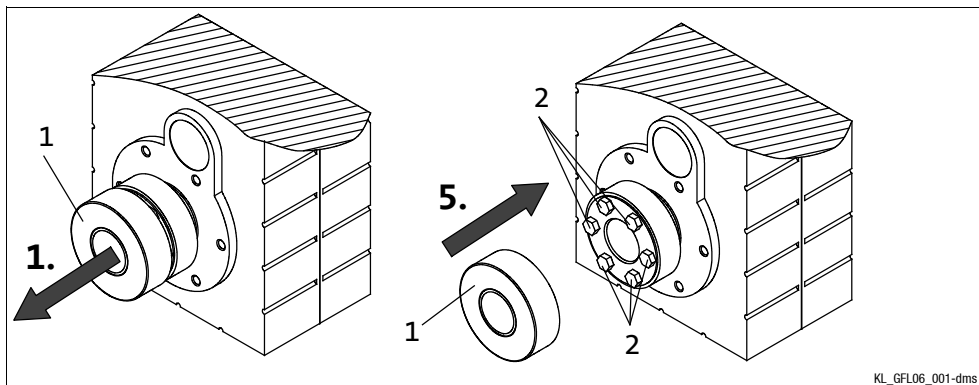


Fig. 7

- 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.

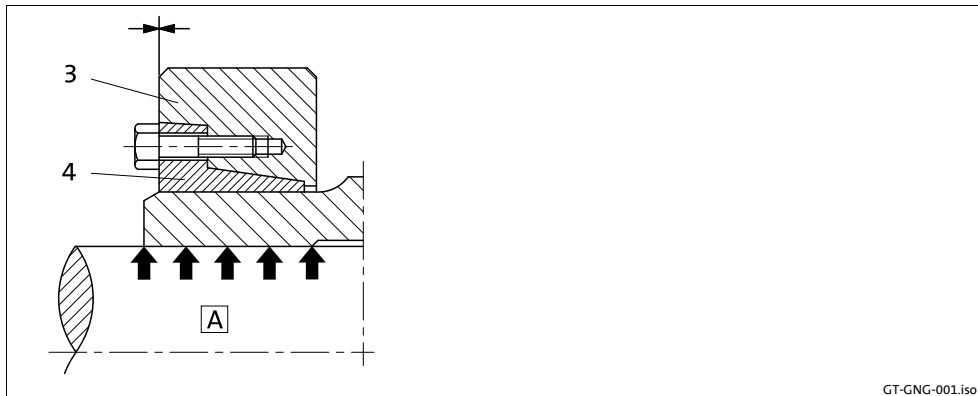


Fig. 9 Hollow shaft with shrink disc

- 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!

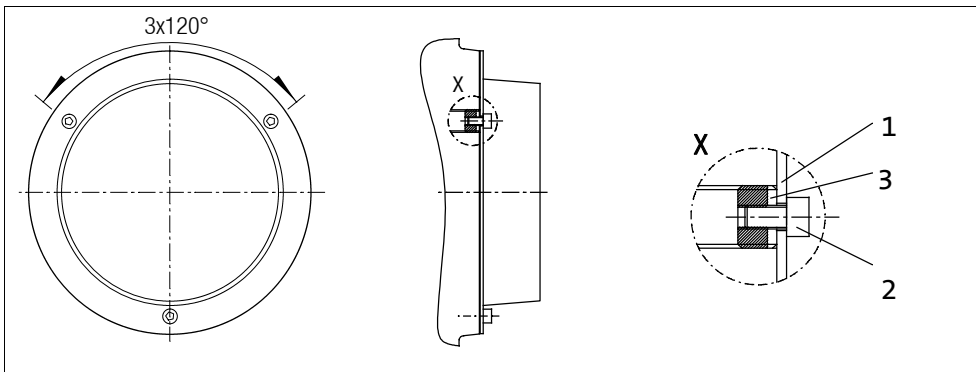


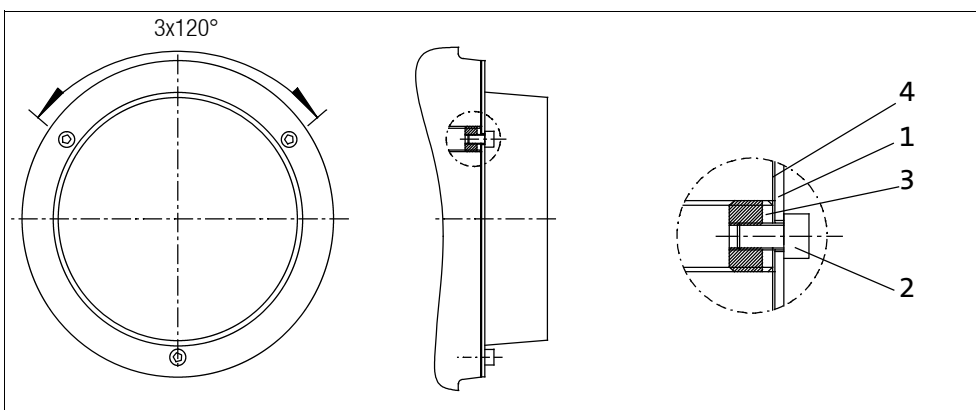
Fig. 10

- | | | | |
|---|-------------------|---|------------------------|
| 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.

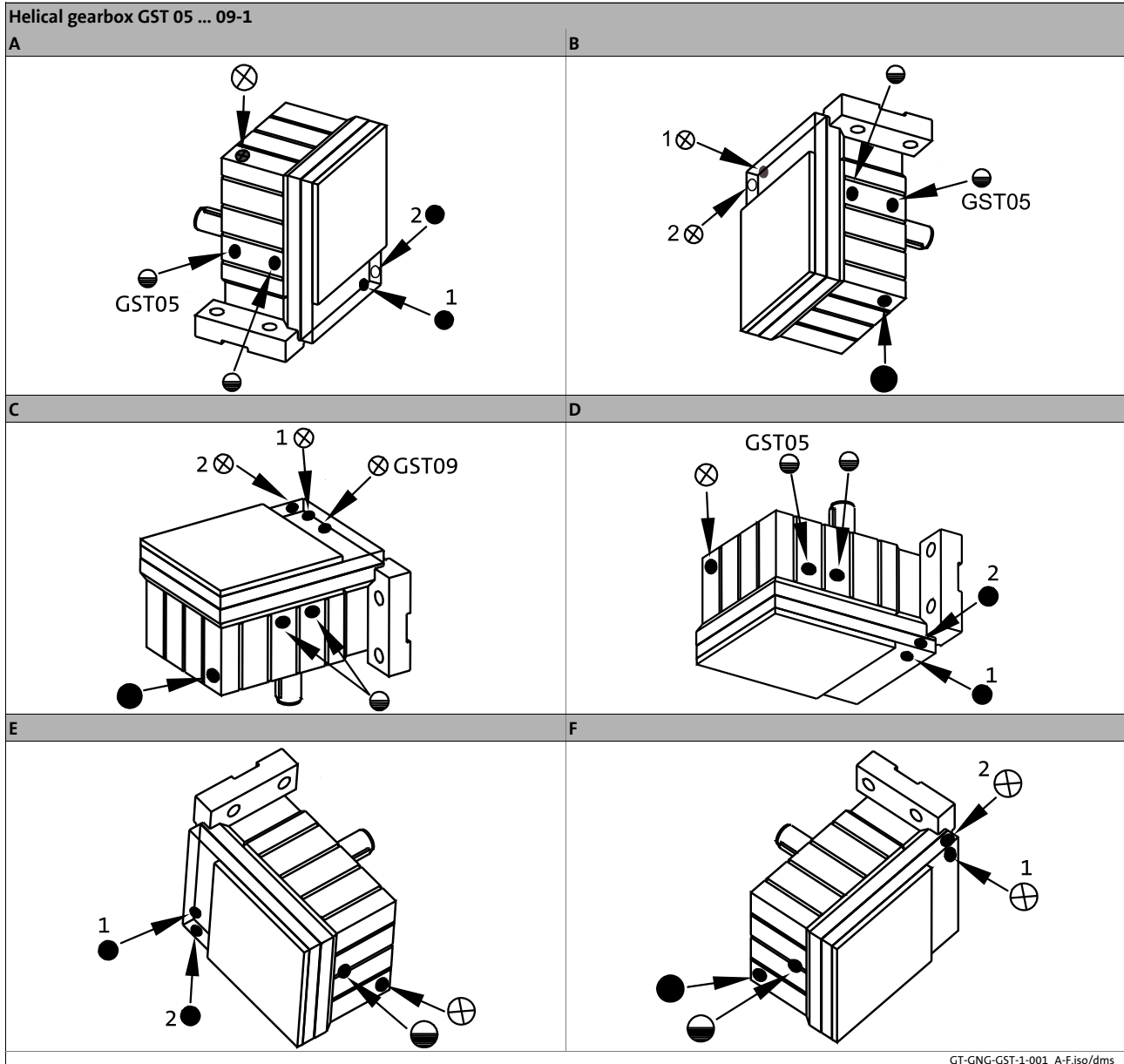
Ensure ventilation before initial commissioning!



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 with: GST05-1A 080C22

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:

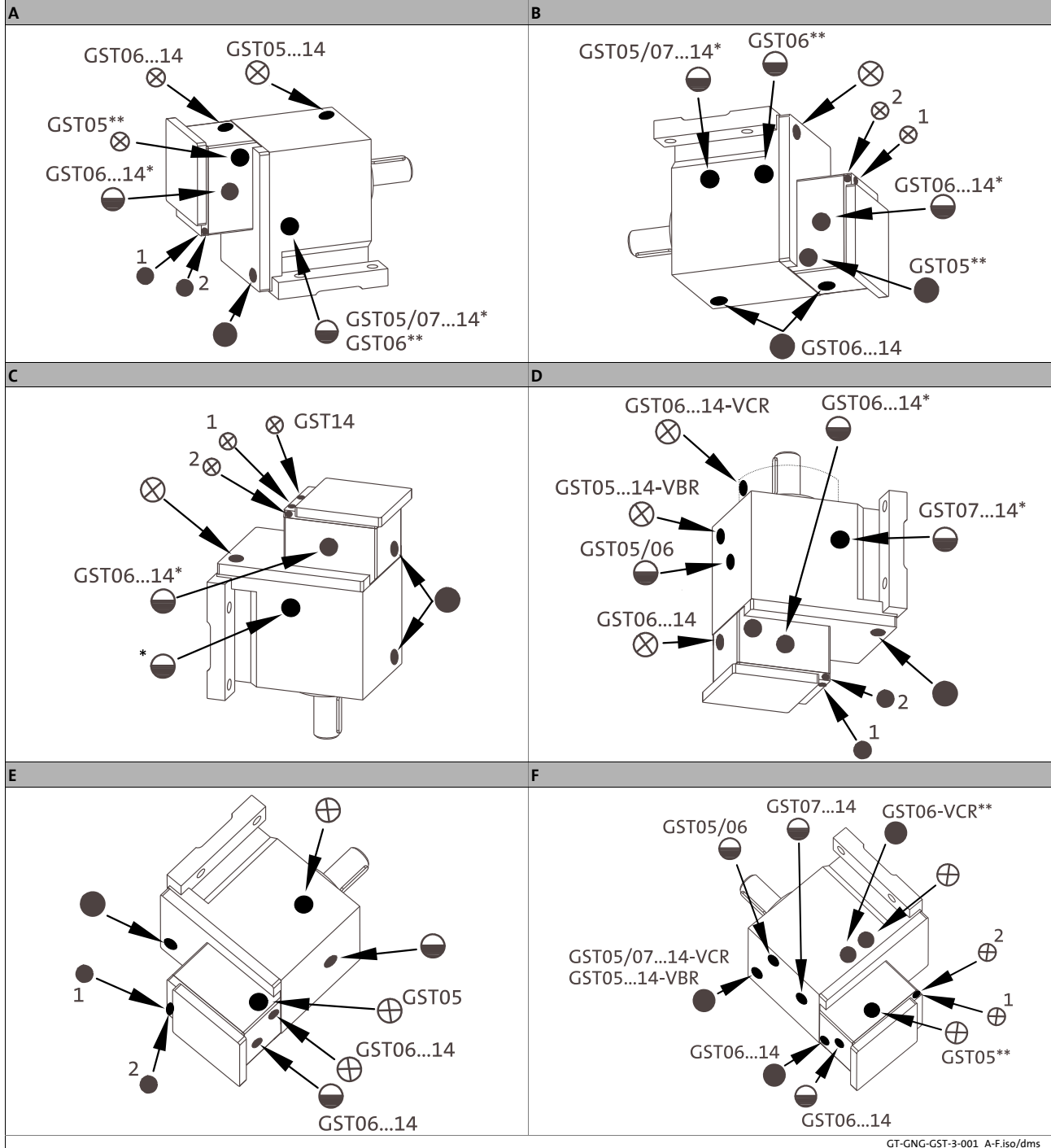
GST05-2M V□□ 090□□□

GST05-2M V□□ 100□□□

GST06-2M V□□ 112□□□

GST07-2M V□□ 160□□□

Helical gearbox GST 06 ... 14-3



A...F

Mounting positions

*

On both sides

**

On the opposite side

⊗

Breathing / oil filler plug

●

Oil drain plug

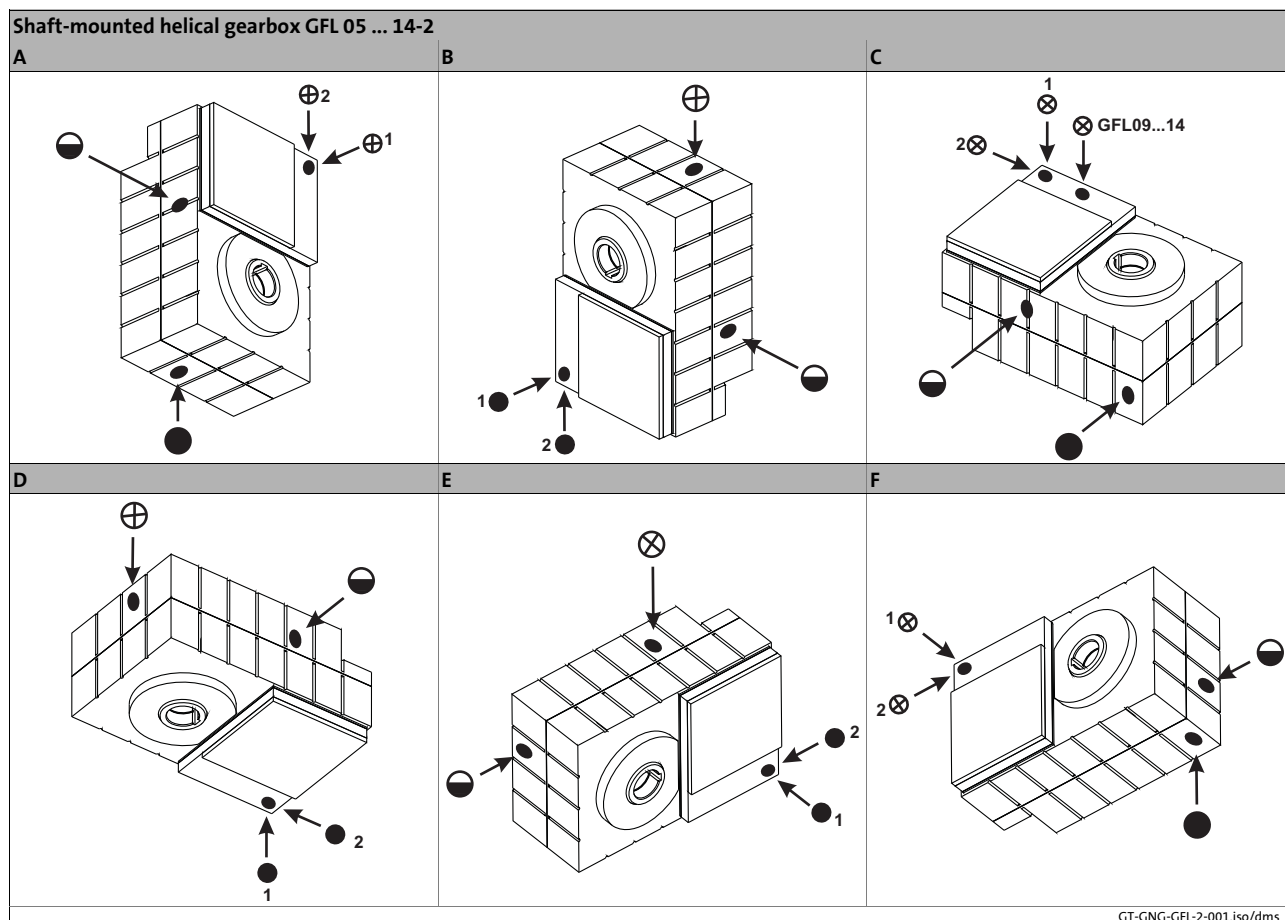
◐

Oil-control plug

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□□

A GFL06...14 GFL05 1 2	B GFL05 1 2	C GFL14 GFL06...14 GFL05 1 2
D GFL05 GFL06...14 1 2	E GFL05 GFL06...14 1 2	F GFL06...14 GFL05 1 2

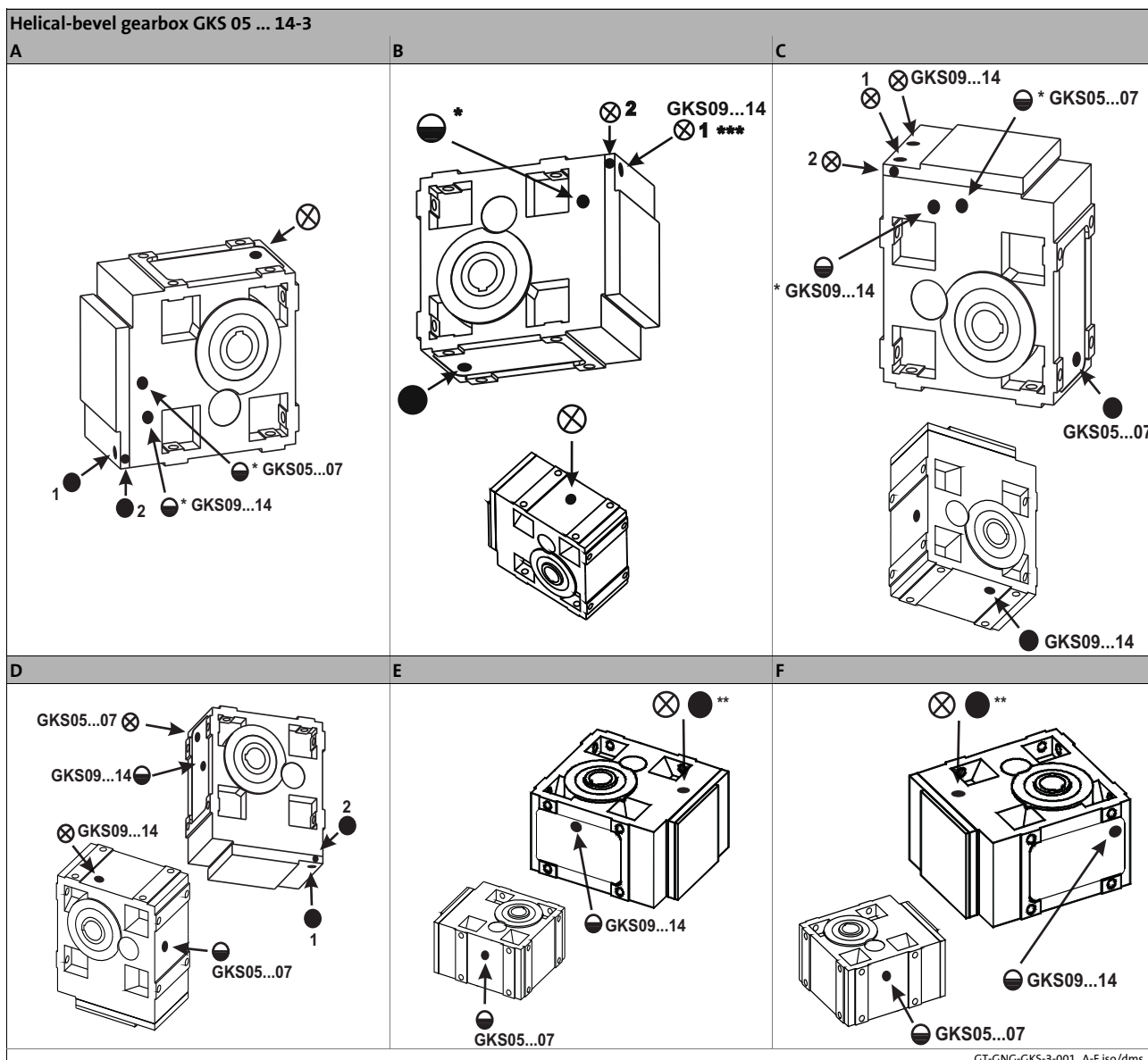
GT-GNG-GFL-3-001.iso/dms

Oil-control plug

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:

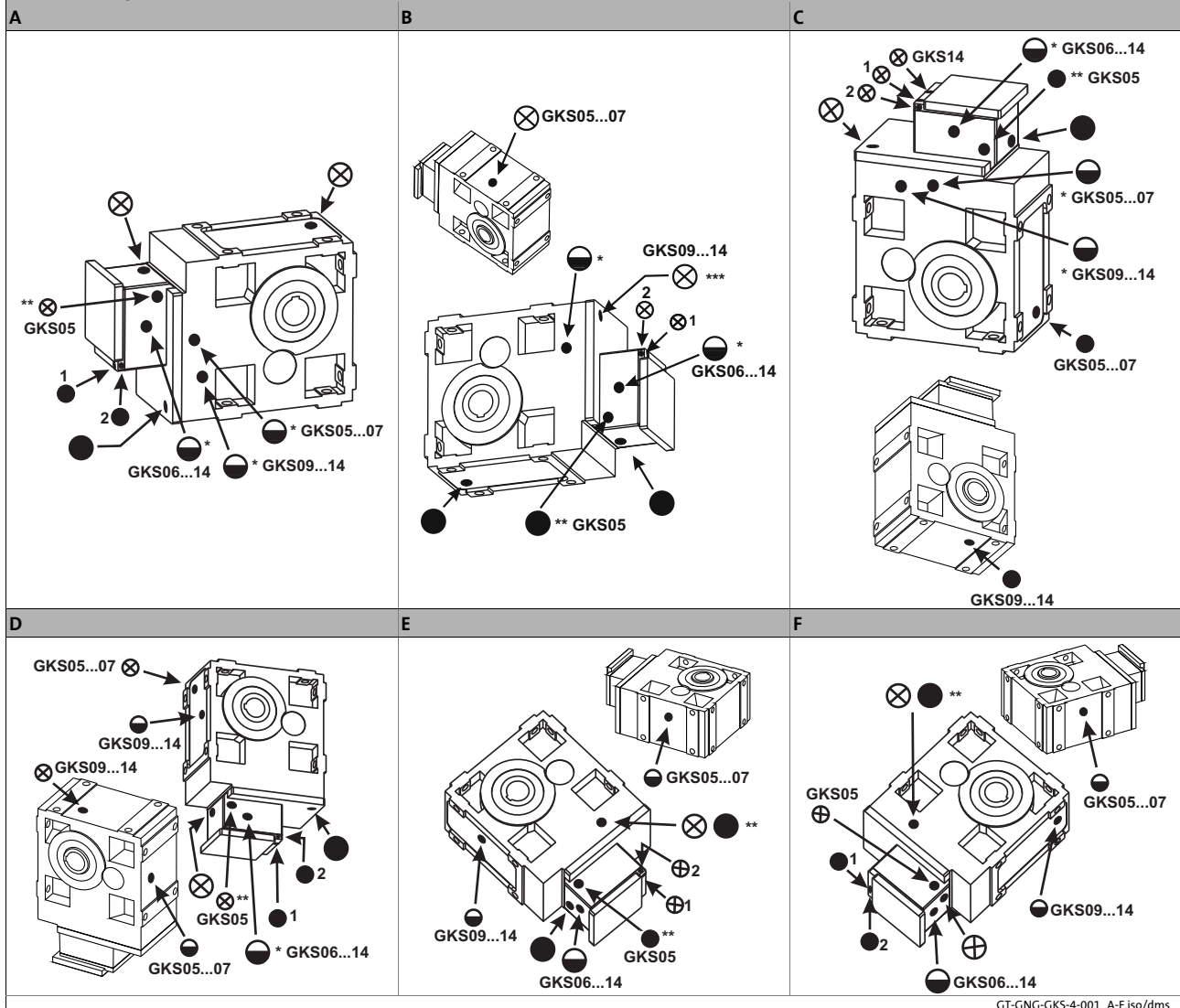
GKS05-3M □□□ 090□□

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

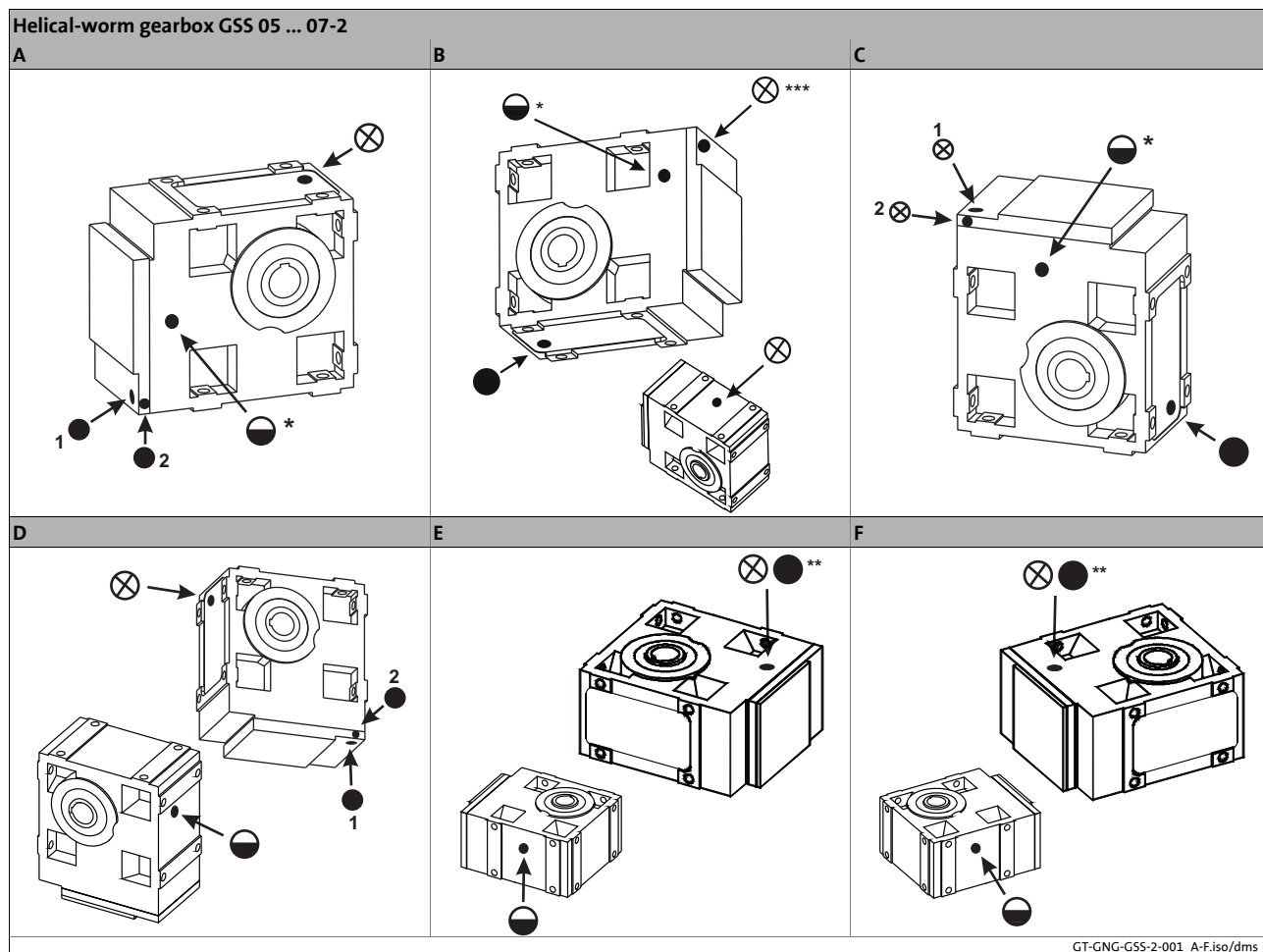
- A...F Mounting positions
 * On both sides
 ** On the opposite side
 *** GKS05...07 with torque plate on the foot in position 4
 ⊗ Ventilation / oil filler plug

- 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:

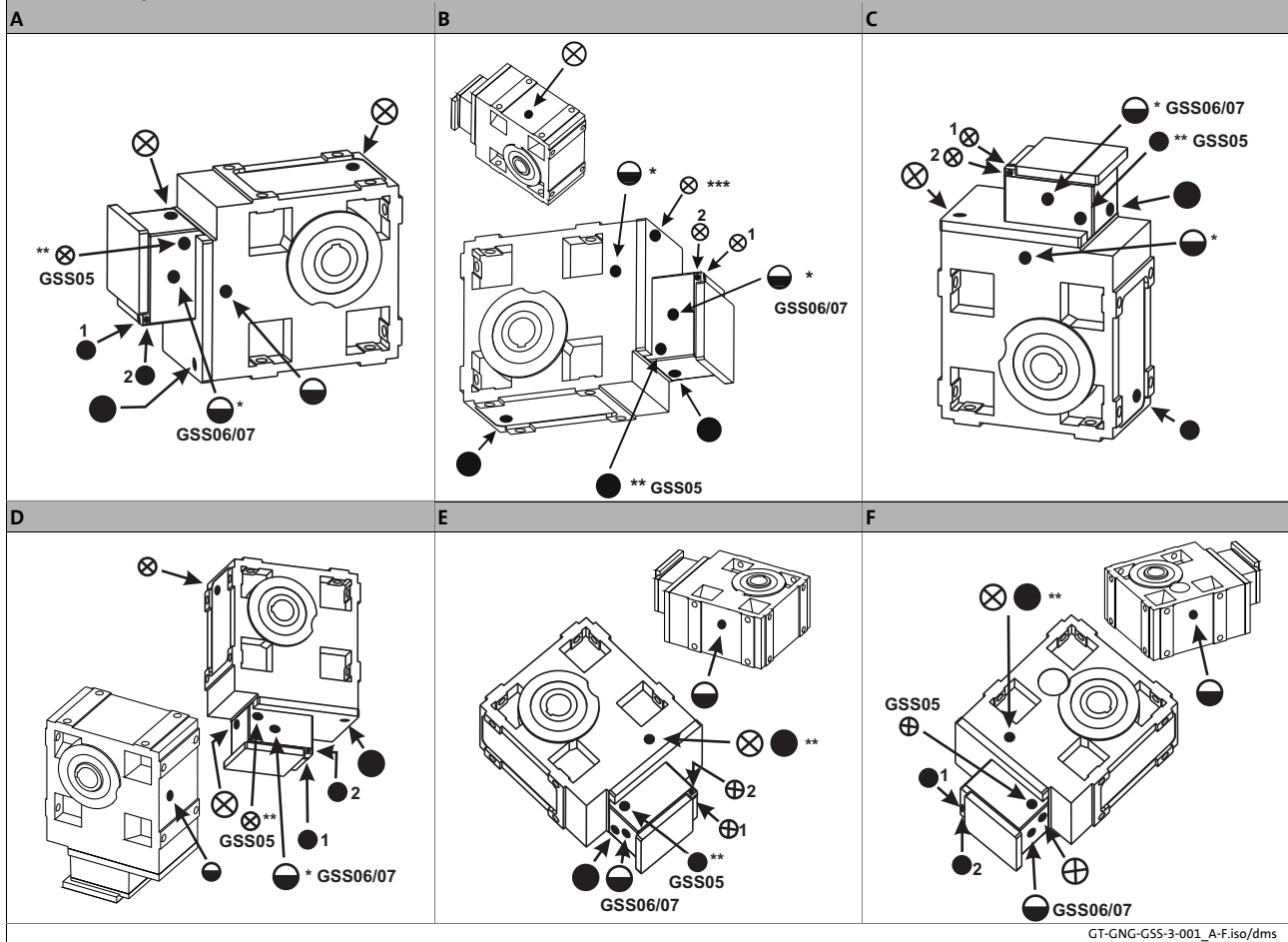
GSS05-2M □□□ 090□□

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

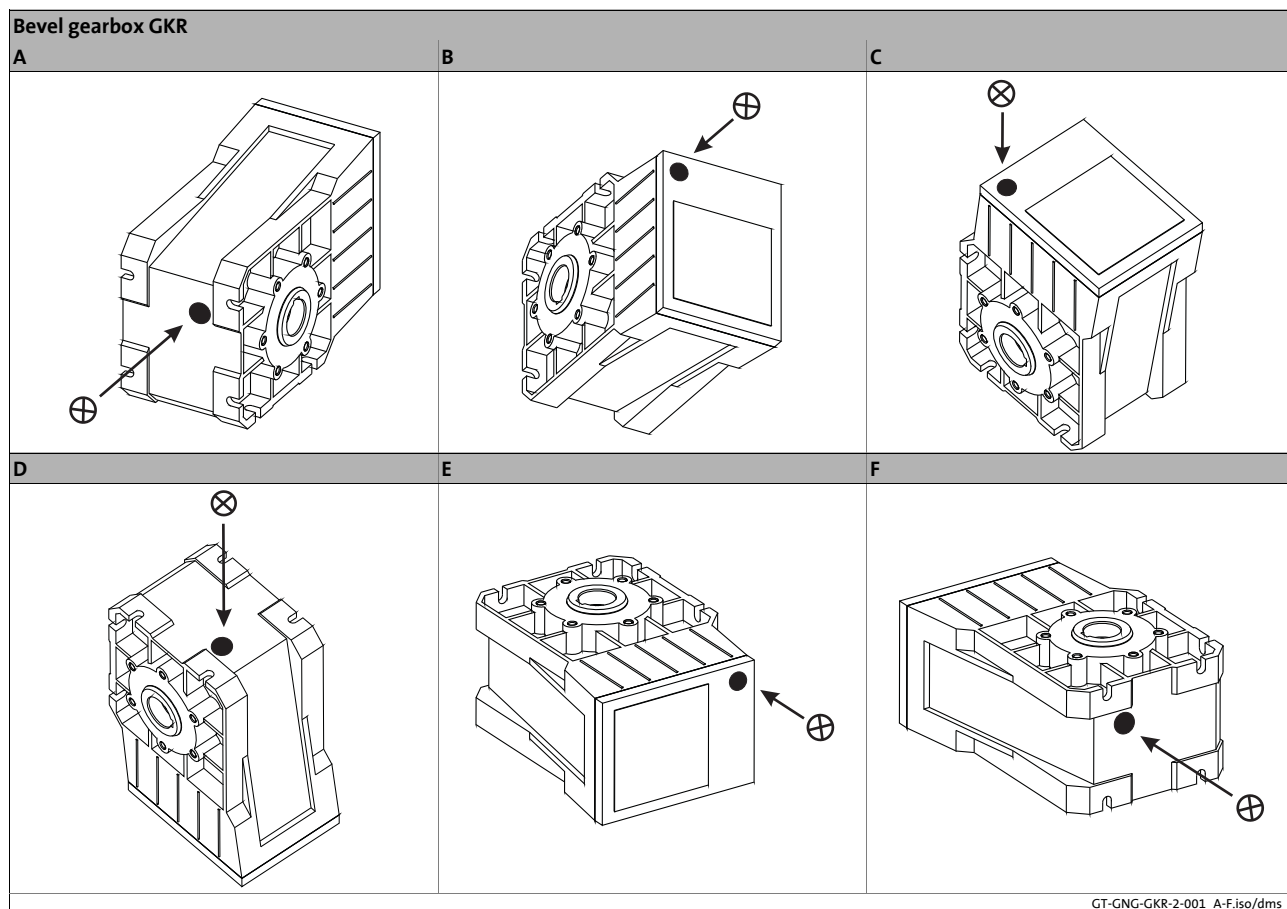
- A...F Mounting positions
 * On both sides
 ** On the opposite side
 *** With torque plate on the foot in position 4
 ⊗ Ventilation / oil filler plug

- 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



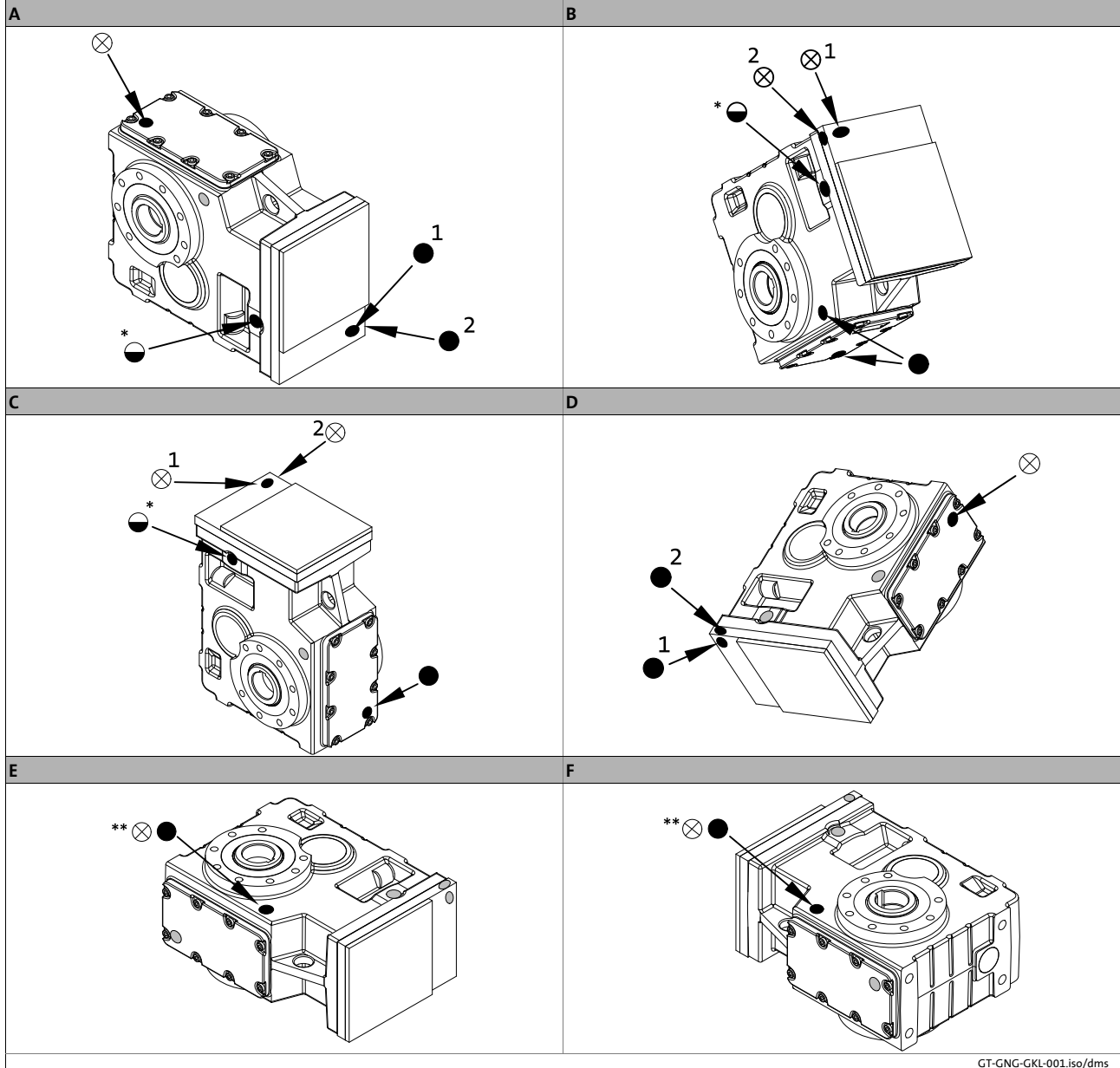
A...F

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

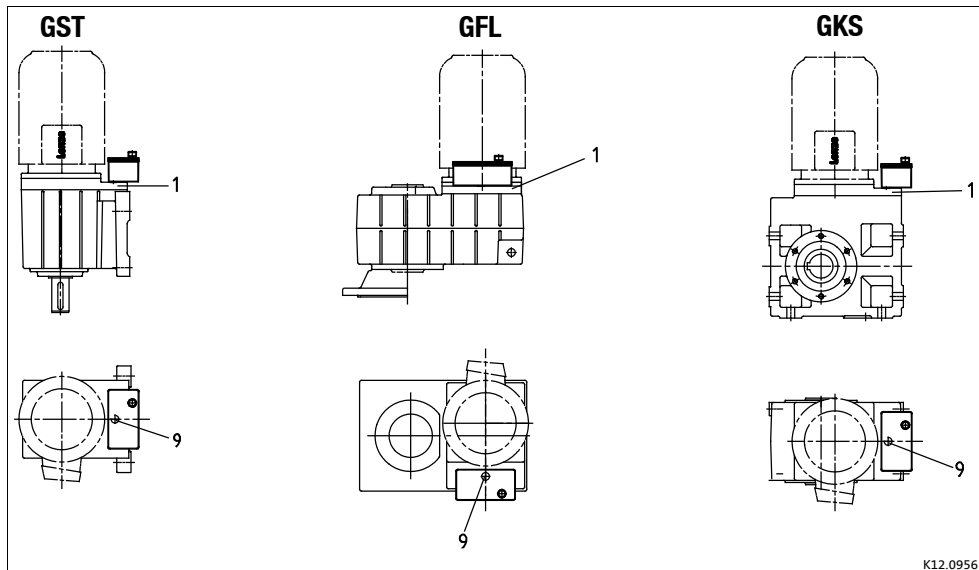


Fig. 11 Positioning of the compensation reservoir in mounting position C

1 Intermediate cover

9 Locking screw

5.3.12.1 Component parts list

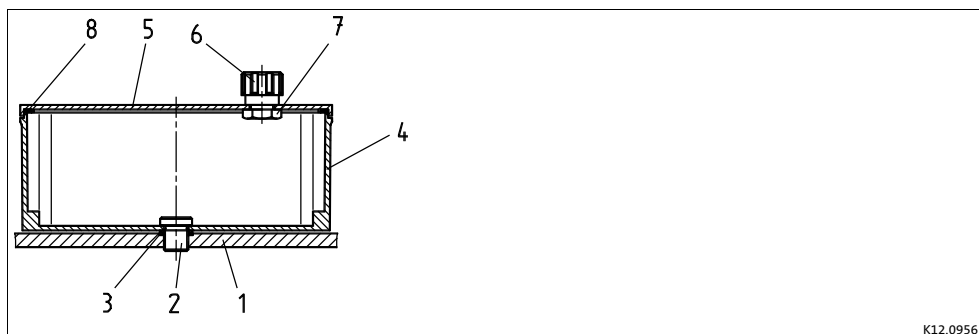


Fig. 12 List of details for compensation reservoirs

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!

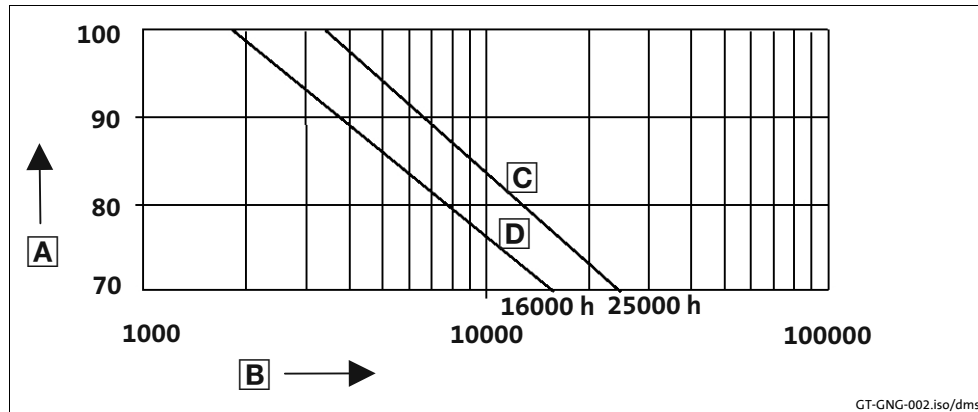


Fig. 13 Lubricant diagram

- | | |
|--|--------------------------------------|
| 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.

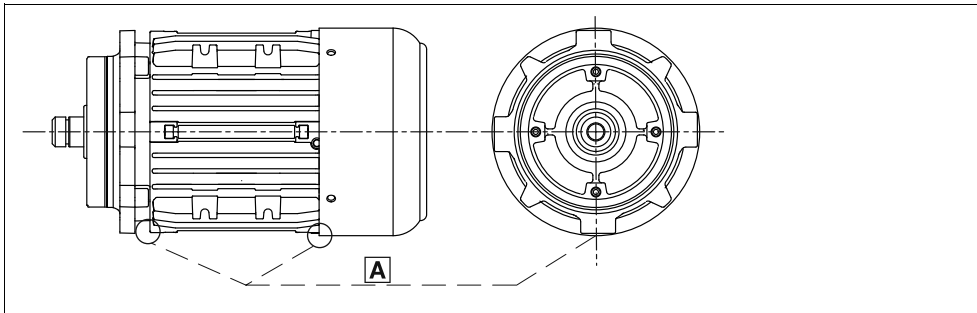


Fig. 14 Motor with condensation drain holes

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!

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

	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

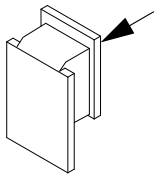
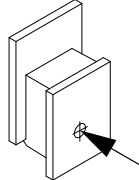
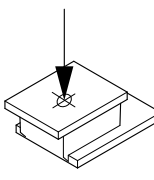
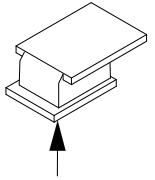
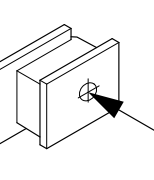
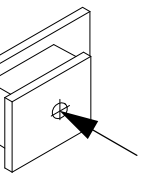
Maintenance operations
Lubricant quantity

8.2.5 Lubricant quantity



Stop!

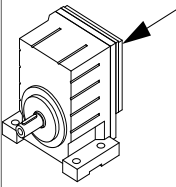
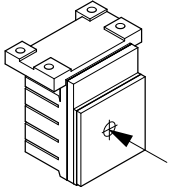
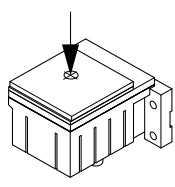
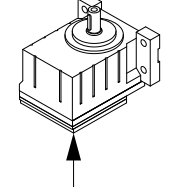
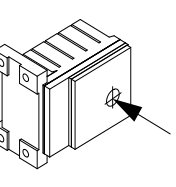
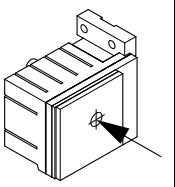
At drive speeds below 200 rpm the amount of lubricant may need to be increased. Consultation with Lenze is required.

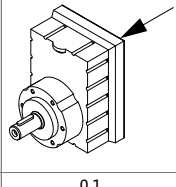
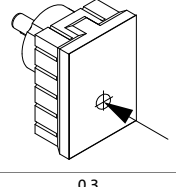
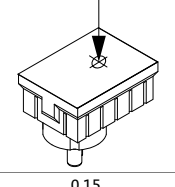
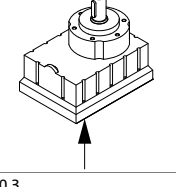
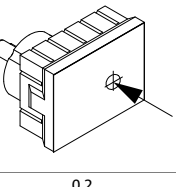
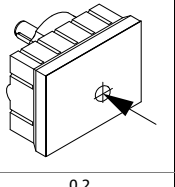
Mounting position	Pre-stage GST□□-3; GKS□□-4; GSS□□-3					
	A	B	C	D	E	F
						
	GT-GNG-GST/GL-010.iso/dms					
GST05	0.12 0.15 W ≥ 1C	0.3 0.35 W ≥ 1C	0.15	0.3 0.35 N ≥ 1B 0.4 W ≥ 1C	0.2	0.2
GST06	0.15	0.4	0.35	0.3 0.4 W ≥ 1C	0.3	0.3
GST07	0.3	0.7	0.5	0.55 0.65 M ≥ 90 A ≥ 80 N ≥ 1D	0.4	0.4
GST09	0.6	1.4	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

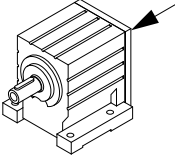
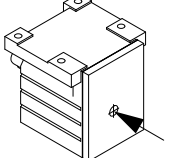
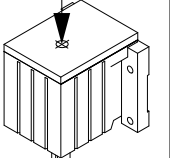
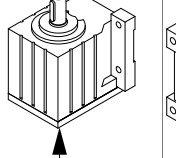
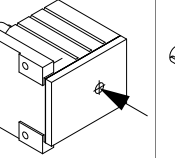
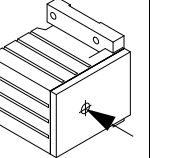
→ Drive 90...132 Motor size
A, M, N, W Drive-end version 1A ...2K Drive size

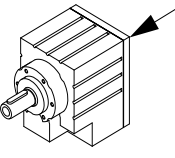
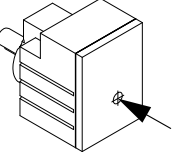
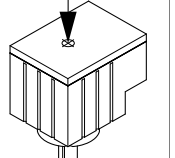
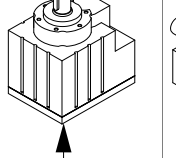
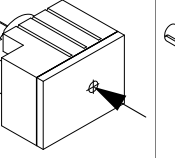
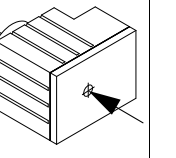
Helical gearbox GST□□-1□VA□ / VB□ (foot housing)						
Mounting position	A	B	C	D	E	F
						
GST04	0.1	0.37	0.2	0.3 0.35 W ≥ 1C	0.25	0.25
GST05	0.2	0.6	0.35	0.5 0.6 M ≥ 90 A ≥ 80 N ≥ 1D	0.35	0.35
GST06	0.4	1.2	0.65	0.85 1 W ≥ 1E	0.7	0.7
GST07	0.7 1.3 M ≥ 132 A ≥ 112 N ≥ 1G W ≥ 1G	2.3 2.7 M ≥ 132 A ≥ 112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

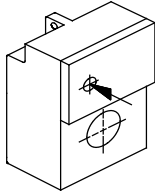
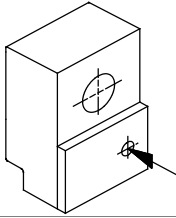
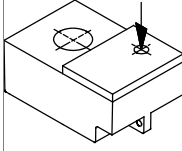
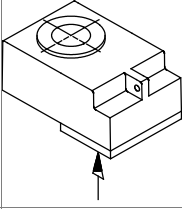
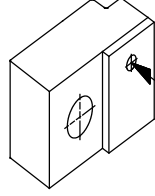
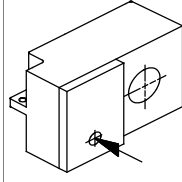
→ Drive 90...132 Motor size
A, M, N, W Drive-end version 1A ...2K Drive size

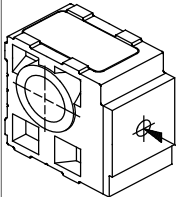
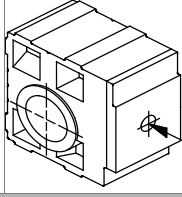
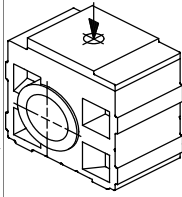
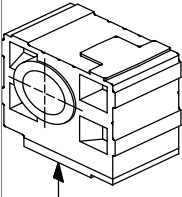
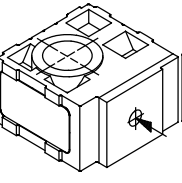
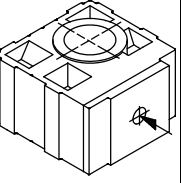
Helical gearbox GST□□-2□; -3□ VA□ / VB□ (foot housing)						
Mounting position	A	B	C	D	E	F
						
GST03	0.2	0.2	0.2	0.2	0.2	0.2
GST04	0.35	0.5	0.45	0.55	0.3	0.3
GST05	0.5	0.80	0.75	1	0.55	0.55
GST06	0.6 0.7 M ≥ 132	1.1 1.2 M ≥ 132	1.2	1.7 1.8 M ≥ 132	1.0 1.1 M ≥ 132	1.0 1.1 M ≥ 132
GST07	2.2 2.6 M ≥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

Helical gearbox GST□□-2□; -3□ VC□ (flange housing)						
Mounting position	A	B	C	D	E	F
						
GST03	0.17	0.17	0.17	0.17	0.17	0.17
GST04	0.35	0.45	0.3	0.6	0.3	0.3
GST05	0.45	0.7	0.6	0.95	0.45	0.45
GST06	0.5 0.6 M ≥ 132	0.9 1.0 M ≥ 132	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

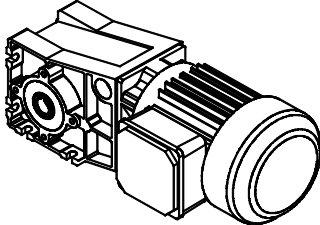
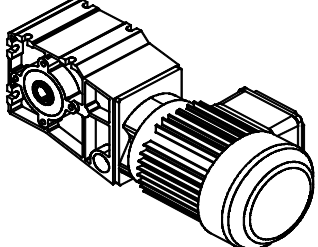
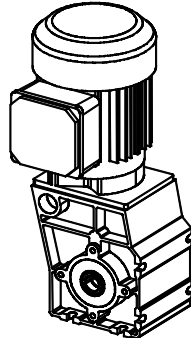
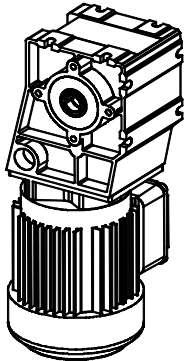
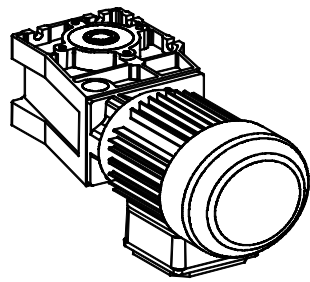
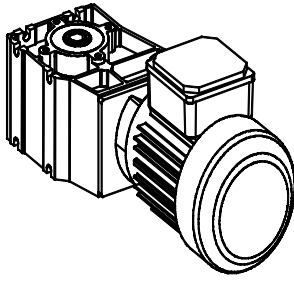
→ Drive 90...132 Motor size
A, M, N, W Drive-end version 1A ...2K Drive size

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□□

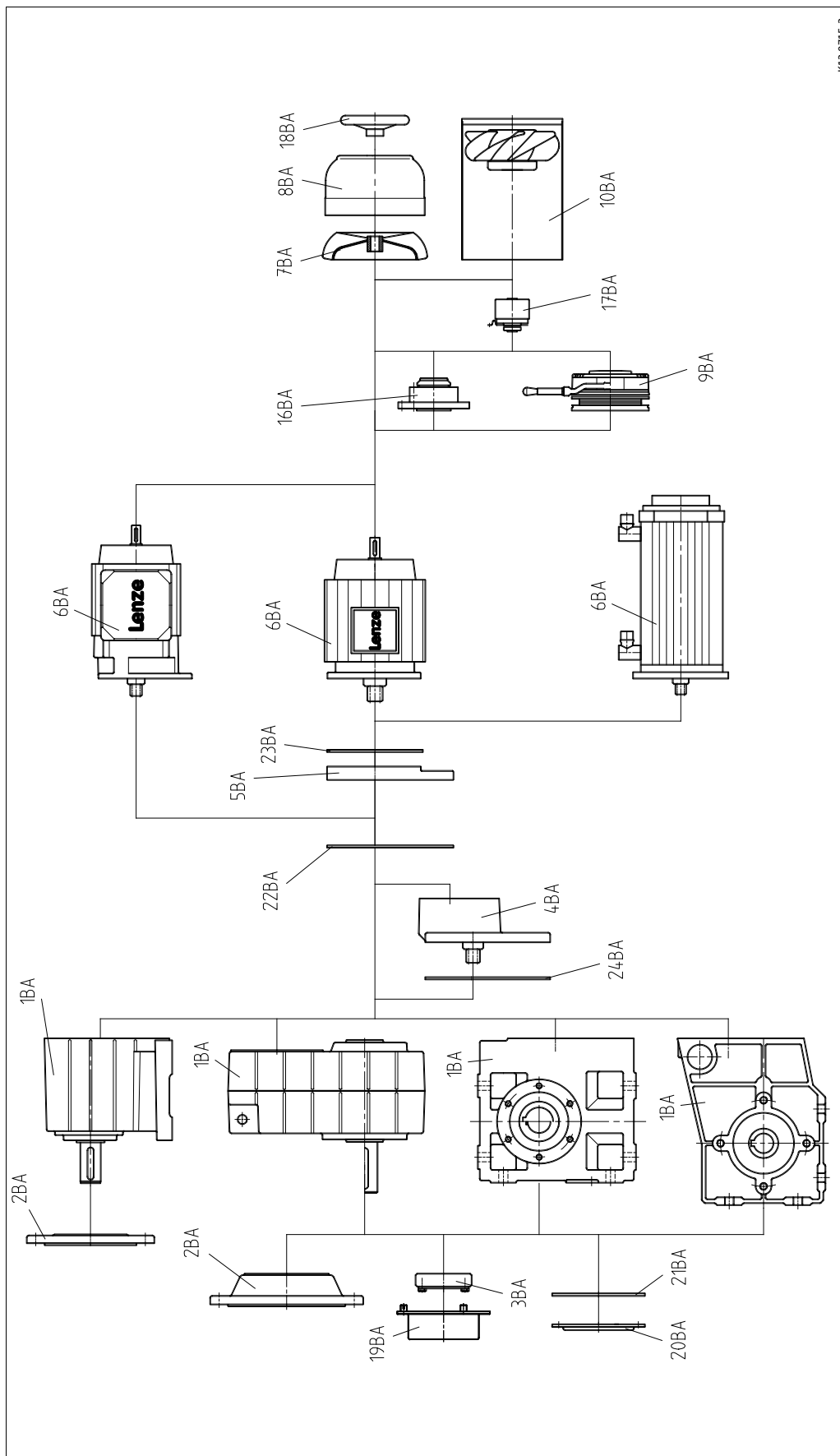
Mounting position	Type V□R; V□L	
	GKS04	GKS05
A	0.8	1.3
B C E F	1.3	2.0
D	1.0	1.6
Type V□K		
A	0.8	1.4
B C E F	1.5	2.1
D	1.1	1.7

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

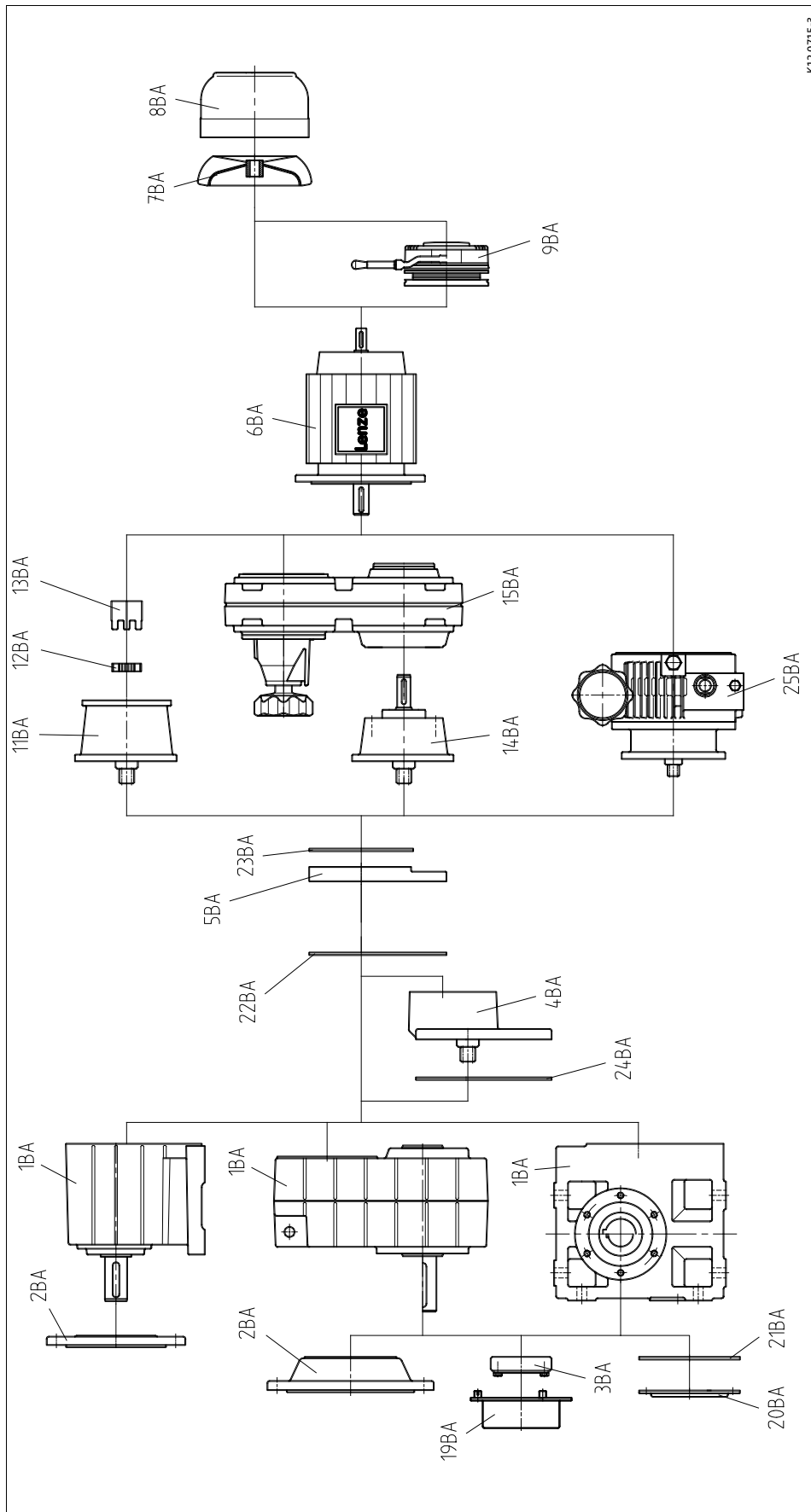
8.3 Repair

- 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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