

# g500

Shaft-mounted helical gearboxes  
Shaft-mounted helical gearboxes with motor



G50BS113 ... G50BS319  
g500-S130 ... g500-S19000 |  
130 Nm ... 19000 Nm

Mounting Instruction

EN



13593156

**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.
- The information in this documentation can be supplemented by further documents, if necessary, e.g. information regarding the motors mounted, additional components on the gearbox or motor, or with regard to gearboxes and motors in ATEX design.

### 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.



### Tip!

Information and tools concerning the Lenze products can be found in the download area at [www.lenze.com](http://www.lenze.com)

## 1.1 Document history

Material number	Version			Description
13457346	1.0	12/2013	TD09	First edition for the pilot series
13518263	2.0	08/2016	TD09	Complete revision including the g500 cast iron gearboxes
13518263	2.1	01/2017	TD09	Extended product code
13535710	3.0	06/2017	TD09	Drawing exchanged in the chapter "Disassembly of gearbox with hollow shaft" Auxiliary tool table supplemented Ambient temperatures changed in the lubricant table
13593156	4.0	01/2020	TD09	MA g500 with three-phase AC motor and g500 with servo motor combined The "Temperature range" chapter has been newly incorporated Mounting positions designations updated
13593156	4.1	03/2021	TD09	Maintenance chapter: Designation of lubricant control elements corrected/adapted






# 1 About this documentation

## Conventions used

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### 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	In the following text used for
Gearboxes	Gearboxes of the g500 product family
Drive system	Drive systems with g500 gearboxes and other Lenze drive components




## 1.4 Notes used

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




### Safety instructions

Layout of the safety instructions:

	<p><b>Danger!</b> (characterises the type and severity of danger)</p> <p><b>Note</b> (describes the danger and gives information about how to prevent dangerous situations)</p>
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Pictograph and signal word	Meaning
 <b>Danger!</b>	<b>Danger of personal injury through dangerous electrical voltage</b> Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
 <b>Danger!</b>	<b>Danger of personal injury through a general source of danger</b> Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
 <b>Stop!</b>	<b>Danger of property damage</b> 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
 <b>Note!</b>	Important note to ensure trouble-free operation
 <b>Tip!</b>	Useful tip for easy handling
	Reference to another document

## 2 Safety instructions

General safety instructions for drive components

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### 2.1 General safety instructions for drive components

(in compliance with Low-Voltage Directive 2014/35/EU)

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.
  - ... must not be actuated if the drive system shows vibration accelerations  $> 2g$  ( $20m/s^2$ ).
  - ... must not be actuated in the resonance range of a system or the Lenze drive system.
- All specifications of the corresponding enclosed documentation must be observed.

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

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

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



## Temperatures

The permissible temperature range is determined by the following:

- The lubricant specifications in connection with the expected oil temperatures in operation (see chapter 7.2 and nameplate).
- The thermal class of the motor considering the motor temperature expected during operation (see nameplate and/or operating instructions of the motor).
- Protect geared motors against direct solar radiation. Avoid heat concentration beneath covers.

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) it is 100°C. If these temperatures are exceeded, measures are necessary to reduce the temperature, (📖 70).



### 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.
- Protect geared motors against direct solar radiation. Avoid heat concentration beneath covers.
- Dirt or dust deposits impede the heat dissipation (cooling).

## Transport

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! (📖 19)

## 2 Safety instructions

### General safety instructions for drive components

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#### 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) (📖 20).
- More than one year, up to two years:
  - Apply a long-term corrosion preventive (e.g. Anticorit BW 366 by Fuchs) to the shafts and uncoated surfaces before storing the motor away.
  - Install gearbox in mounting position M1[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.

#### 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.



#### Note!

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

#### Mechanical installation

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

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### 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.

### Temperature ranges for gearboxes / geared motors

- Standard                    0°C ... +40°C
- Low-temperature        -30°C ... +10°C
- Wide range                -30°C ... +40°C

Information about this can be found on the nameplate (ambient temperature range and lubricant type) and in the sales documents.

Gearboxes/geared motors are specially optimised for operation within the temperature range - as specified on the nameplate and in the sales documents. Operation outside the specified temperature range can lead to increased wear and even failure.

### Disposal

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

## 2 Safety instructions

Application as directed

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### 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 2014/35/EU 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

Impermissible applications:

- In a potentially explosive atmosphere
  - Exception: special ATEX design
- In aggressive environments (acids, gases, vapours, dusts, or oils).
- Under water or in liquids
- Under radiation

### 2.4 Residual hazards

#### Protection of persons

- Risk of burns!
  - Hot surfaces up to 140 °C during operation! Provide protection against contact.
- Highfrequency 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 drive system, ensure that the motor is at a 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!

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### Motor protection

- Installed thermal detectors are **no full protection** for the machine.
  - If required, limit the maximum current, parameterise the controller such 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 average operating frequency.
  - Use installed thermal detectors at high operating frequency.
- In the case of permanent-magnet motors, too high torques cause demagnetisation.
  - The maximum torques according to catalogue must not be exceeded.
- If deviations from normal operation occur, e.g. increased temperature, noise, vibration, determine the cause and, if necessary, contact the manufacturer. If in doubt, switch off the motor.
- Design with plug:
  - Never disconnect plug when energised! Otherwise, the plug can be destroyed.
  - Switch off power supply and inhibit controller prior to disconnecting the plug.

### Fire protection

- Fire hazard
  - Prevent contact with flammable substances.

# 3 Product description

## Important notes

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### 3.1 Important notes

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

### 3.2 Short overview of the new mounting positions

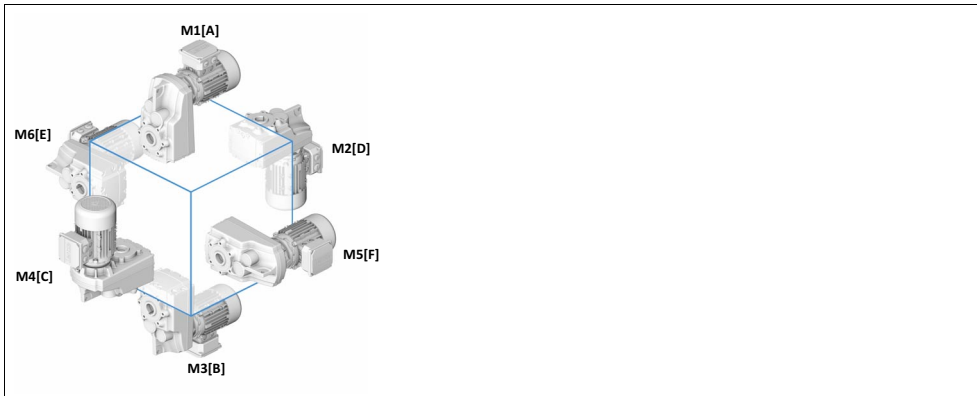


Fig. 1 Mounting positions: new designation - [old designation]

### 3.3 Identification

#### 3.3.1 Nameplate

Geared motor with a directly mounted motor (layout A)									
<b>Lenze</b>		1		15					
2	21		Hz	16.1		26			
3	18		kW	16.2		15			
4	17		V	16.4		19			
5.1	5.2		A	16.5		23			
5.3	5.4			16.5		13			
6	7.1	7.2	r/min	16.3		14.1			
8.1	8.2	8.3	η %	16.7		14.2			
9			cos φ	16.6		27			
10.2	10.3		C86	22					
11			20.1						

Geared motor with a directly mounted motor (layout B, with QR code)									
<b>Lenze</b>		1		43		15			
2	14.1	21	14.3	23	13	14.2			
3	18		Hz	16.1					
4	17		kW	16.2					
5.1	5.2		V	16.4					
5.3	5.4	30		16.5					
6	7.1	7.2	A	16.5					
8.1	8.2	8.3	r/min	16.3					
20.1				η %		16.7			
11				cos φ		16.6			
10.2	10.3		C86	22					

Gearbox with motor adapter									
<b>Lenze</b>		1							
3	4	18	6						
5.2		5.3	5.4	17					
7.1		7.2							
5.1	10.2	10.3	27						
11									
30		20.1							

### 3 Product description

Identification  
Nameplate

Three-phase AC motor for motor adapter									
<b>Lenze</b>		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						Δ	16.4		
						A	Y	16.5	
						Δ	16.5		
10.2	10.3			18	cos φ	16.6			
11						η %	16.7		

Gearbox									
<b>Lenze</b>		1				DE			
3			18			6			
	5.2	5.3	5.4			38			
	7.1	7.2							
5.1	10.2	10.3			27				
11									
10.1					20.1				

Asynchronous and synchronous servo motors									
<b>Lenze</b>		1		15					
2	4								
5.5	5.8	5.2	5.4	5.3					
5.6	5.9	5.10	16.6	22					
5.7	14.2	14.1	27	14.3					
9	12								
8.1	8.2	8.3							
10.2/10.3			18	11					

Pos.	Contents	
1	Manufacturer / production location	
2	Type of motor / standard	
3	Gearbox type	
4	Motor type	
5	Technical data	
5	5.1	Ratio
5	5.2	Rated torque
5	5.3	Rated speed
5	5.4	Rated frequency
5	5.5	Rated voltage
5	5.6	Rated current
5	5.7	Maximum current
5	5.8	Rated power [kW]
5	5.9	Rated power [HP]
5	5.10	Continuous standstill torque



6		Position of system modules / mounting position
7		Lubricant details
7	7.1	Lubricant amount
7	7.2	Lubricant type
8		Brake data
8	8.1	Type
	8.2	Brake supply voltage
8	8.3	Braking torque, electrical power input
9		Feedback / pulse encoder or resolver data
10		Production data
10	10.1	Order number
10	10.2	Material number
10	10.3	Serial number
11		Bar code
12		Motor number
13		Information with regard to the operating mode
14		Additional motor specifications
14	14.1	Temperature class
14	14.2	Enclosure
14	14.3	Motor protection
15		Applicable conformities, approvals and certificates
16		Rated data for various frequencies
16	16.1	Hz = frequency
16	16.2	kW = motor power
16	16.3	rpm = motor speed
16	16.4	V = motor voltage
16	16.5	A = motor current
16	16.6	$\cos \varphi$ = motor power factor
16	16.6	$\cos \varphi$ = motor power factor for M□A
16		$U_{in} [V]$ = induced voltage for M□□
16	16.7	$\eta$ = motor efficiency: at a rated power of 100%
17		Application factor / load capacity
18		Year of manufacture / week of manufacture
19		UL file number
20		Customer data
20	20.1	Additional customer data
21		UL category (e.g. inverter duty motor)
22		C86 = motor code for inverter parameterisation (code 0086)
23		Efficiency class
26		CC number Department of Energy (optional)
27		Permissible ambient temperature (e.g. $T_a \leq 40^\circ\text{C}$ )
30		Weight
33		Encoder data
	33.1	Encoder type
	33.2	Encoder voltage
38		Load capacity (specified if $c < 1.0$ )
43		Internal key: QR code

# 3 Product description

Gearbox / geared motor product code

## 3.3.2 Gearbox / geared motor product code

Example		G	50	B	S	113	M	H	D	R	2	N	XX
Meaning	Variant	Gearbox code											
Product family		G	50										
Generation				B									
Gearbox type	Shaft-mounted helical gearbox				S								
Output torque	130 Nm					113							
	220 Nm					122							
	400 Nm					140							
	660 Nm					166							
	950 Nm					195							
	2100 Nm					221							
	3100 Nm					231							
	4500 Nm					245							
	8000 Nm					280							
	14000 Nm					314							
19000 Nm					319								
Type of construction	Geared motor						M						
	Gearbox						N						
Shaft type	Solid shaft with featherkey							V					
	Hollow shaft with keyway							H					
	Hollow shaft with shrink disk							S					
Housing type	Foot mounting + centering								A				
	Foot mounting								B				
	Centering								C				
	Threaded pitch circle								D				
Flange mounting	Without flange									R			
	Flange with through holes									K			
Number of stages	2-stage										2		
	3-stage										3		
Motor mounting	Integrated											C	
	IEC adapter											N	
	NEMA adapter											A	
	Servo adapter											S	
Drive size	Without adapter (integrated motor)											C	
	NEMA adapter with a jaw coupling with a keyway											A	
	NEMA adapter with a plug-in hollow shaft with a keyway											B	
	IEC adapter with a plug-in hollow shaft with a keyway											H	00
	IEC adapter with a jaw coupling											N	... 82
	IEC adapter with a jaw coupling with a keyway											T	
	Servo adapter with a jaw coupling with a keyway											D	1A ... 2K
	Servo adapter with a jaw coupling without a keyway											E	
	Servo adapter with a jaw coupling with a plug-in hollow shaft											G	
	ICE adapter with a jaw coupling Servo adapter with a plug-in hollow shaft with a clamping ring without a keyway											S	

#### 4.1 Important notes

- The transport weights can be found in the shipping documents.
- Use lifting devices for the transport!
- Before transport
  - check that all component parts are safely mounted,
  - fasten all transport aids (eye bolts or support plates).



#### Danger!

##### Danger due to toppling or falling loads!

- The payload of the hoists and load handling devices must at least correspond to the weight of the load.
- Secure the load handling device so that it won't slip from its position.
- The load must be secured in such a way that it cannot topple or fall down.
- Do not stay under a pending load!

#### 4.2 Transport



#### Stop!

Observe load carrying capacity!  
Standing beneath floating loads is prohibited!



#### Danger!

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



Fig. 2 Ear for transporting the complete drive system

# 4 Mechanical installation

## Preparation

### 4.3 Preparation

- Protect shaft sealing rings against contact with solvents!
- Thoroughly remove anticorrosion agents from the output shaft and from flange faces.
- Repair paintwork damage.
- In some cases, due to lack of space, stud bolts with nuts must be used instead of head screws. In these cases, contact Lenze, if necessary.



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.

#### Correcting the lubricant amount


If the oil quantity in the gearbox has been increased for long-term storage (  10), the oil must be drained completely and must then be refilled for the intended mounting position. (  52). Carry out the following steps:

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 gearbox with correct oil quantity for intended mounting position (according to nameplate).
6. Screw in ventilation / oil filler plug.

#### Condensation drain hole



#### Note!

Lenze delivers motors with condensation drain holes with sealed condensation drain holes. The holes are sealed with a plastic plug or a 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, (  69).

### 4.3.1 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 (📖 51)rotation.
- The mounting areas / the foundation:
  - must be plane, torsionally rigid, and free from vibrations,
  - must be suited to absorb the forces and torques generated during operation,
  - should have vibration-absorbing properties.
- 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 fastening fixtures of accessories and built-on accessories against unintended loosening. We recommend:
  - the use of screws with a minimum property class of 8.8.
  - with steel or cast iron output flanges, in particular for applications with an alternating load, the use of screws with a strength of 10.9 with correspondingly high tightening torques.
  - Secure screwed connections with medium strength using screw locking adhesive.

## 4 Mechanical installation

Preparation  
Gearboxes with breathers

---

### 4.3.2 Gearboxes with breathers



#### Stop!

Do not place gearbox onto breather valve!

The g500-S130/G50BS113 und g500-S220/G50BS122 gearboxes do not require any ventilation measures. Gearboxes that are delivered with a ventilation unit are provided with a label.

Remove the transport locking device on the vent valve before initial commissioning.



#### Note!

Loosely enclosed vent valves must be mounted in accordance with the mounting position, (📖 55).

### 4.3.3 Gearbox with compensation container (preferably for mounting position "M4[C]")

Temperature fluctuations generate changes in the lubricant volume. A compensation reservoir serves to compensate for the change in volume in each case.

The compensation reservoir is supplied as a mounting set. Before commissioning, the oil vent plug must be replaced with the reservoir.



#### **Stop!**

For transporting the geared motor, the compensation reservoir must be removed and the gearbox must be locked by means of a locking screw.



#### **Stop!**

##### **Leaky pipe to the oil compensation reservoir**

The pipe of the oil compensation reservoir is subjected to a natural ageing process.

##### **Possible consequences:**

- Environmental impact

##### **Protective measures:**

- Make sure that the pipe does not show any signs of cracks or leakage.
- Do not commission a leaky pipe.
- If the pipe shows any signs of damage, replace it.



#### **Note!**

With unfavourable combinations of a small ratio and a high input speed, the use of a compensation reservoir may also be advisable in other mounting positions.

## 4 Mechanical installation

Preparation  
Mounting the gearboxes

---

### 4.3.4 Mounting the gearboxes



#### Stop!

Shocks and impacts on the shaft damage the roller bearings.

- Draw the transmission elements onto the output shaft only by using the centering thread.
- Align the gearbox shaft and transmission elements in an accurate fashion in order to prevent tensioning.
- Mount belt pulleys, sprockets, or gear wheels as closely as possible to the gearbox in order to keep the bending load of the shaft and the bearing forces at a minimum level.

#### Gearbox with output flange

- Especially with regard to applications with an alternating load, Lenze recommends...:
  - the use of anaerobic adhesive between the gearbox flange and mounting area in order to increase the friction fit;
  - with steel or cast iron output flanges, the use of screws with a strength of 10.9 with correspondingly high tightening torques.

### 4.3.5 Maximum permissible load at the motor adapter



#### Stop!

- The loads generated by the motor mounted must be checked!
- The forces  $F_M$  mentioned (see following tables) at the adapter must not be exceeded!

For the effective force  $F_M$ , static forces (e.g. weight) and dynamic forces (e.g. acceleration forces, for example caused by vibrations or start-up processes) have to be taken into consideration.



Furthermore the loading case of the force  $F_M$  has to be taken into consideration:

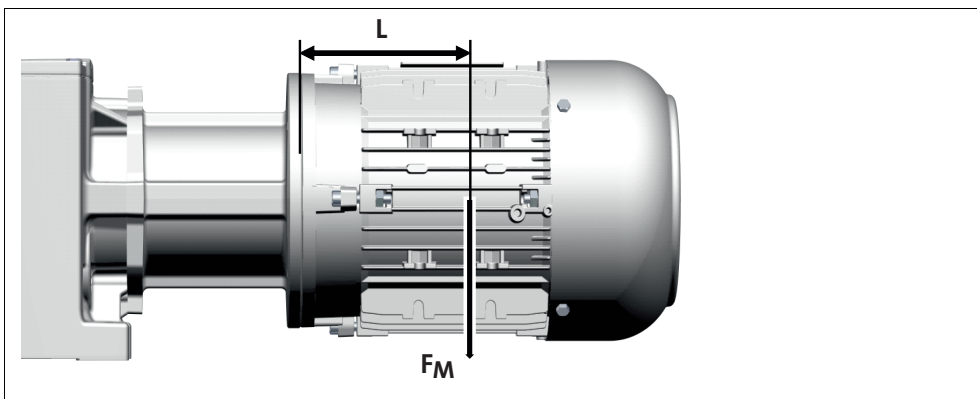
Loading case	$k_{\text{loading case}}$
Static	1
Dynamic-pulsating	0.8
Dynamic-alternating	0.6

The position of the motor's centre of gravity, including all motor options, must be calculated. If the distance of the centre of gravity  $L_{\text{Tab}}$  is greater, the permissible force must be reduced as follows.

$$U_{\text{Mzul}} = k_{\text{Lastfall}} \times F_{\text{MTab}} \times \frac{L_{\text{Tab}}}{L} \leq k_{\text{Lastfall}} \times F_{\text{MTab}}$$

If forces act from several directions, e.g. in the case of a moving horizontal travelling drive, the acting forces have to be added vectorially (e.g. vertical force due to weight plus horizontal acceleration force).

$F_{\text{Mperm}}$  corresponds to the maximum value of the forces added vectorially!



If the permissible force  $F_{\text{Mperm}}$  is exceeded, the motor has to be supported in a suitable, distortion-free fashion!

Drive size	Distance $L_{\text{Tab}}$ of the motor	Gearbox type			
		B500-S130 G50BS113	g500-S220 G50BS122	g500-S400 G50BS140	g500-S660 G50BS166
[-]	[mm]	Maximum permissible force $F_{\text{M Tab}}$ [N]			
1A/2B	80	350	350	350	350
1B	80	550	600	800	800
xC	115	550	600	800	800
xD	115	550	800	1000	1300
xE	145	-----	800	1000	1300
xF	145	-----	-----	-----	-----
xG	190	-----	-----	-----	-----
xH	250	-----	-----	-----	-----

Drive size	Distance $L_{\text{Tab}}$ of the motor	Gearbox type			
		g500-S950 G50BS195	g500-S2100 G50BS221	g500-S3100 G50BS231	g500-S4500 G50BS245
[-]	[mm]	Maximum permissible force $F_{\text{M Tab}}$ [N]		Maximum permissible force $F_{\text{M Tab}}$ [N]	
1A/2B	80	-----	-----	-----	-----
1B	80	800	800	800	-----
xC	115	800	800	800	1500
xD	115	1500	1500	1500	1500
xE	145	1500	1500	1500	1500
xF	145	1500	1500	1500	1500
xG	190	1700	1700	1700	1700
xH	250	-----	2600	3500	3500

## 4 Mechanical installation

Mounting of g500 short/servo adapters with clamping connection  
Maximum permissible load at the motor adapter

Drive size		Distance $L_{Tab}$ of the motor [mm]	Gearbox type		
IEC	NEMA		g500-S8000 G50BS280	g500-S14000 G50BS314	g500-S19000 G50BS319
Maximum permissible force $F_{M Tab}$ [N]					
51	14	115	-----	-----	-----
55	18	145	2210	-----	-----
55	-	145	2490	2450	2450
61	21	190	4480	4420	4420
T 65	A 25	250	5230	5230	5230
H 66	B 28	250	4500	4500	4500
70	-	300	3720	3720	3720
76	32	300	7100	7100	7100
81	36	400	6880	6880	6880
82	-	400	11400	11400	11400

### 4.3.6 Mounting of g500 short/servo adapters with clamping connection

#### Important notes

- The transmission is made in a force-fitting manner via a clamping connection. Greases, oils and other substances which reduce the friction factor reduce the torque to be transmitted which is why these should be avoided in the connection.
- The motor shaft diameter must be designed with fit k6.
- The motor centering diameter must be designed with fit j6.
- With regard to smooth running tolerance of the motor shaft, concentricity of the centering and axial runout of the mounting flange, the motor must fulfil the requirements according to DIN 42955 R (reference values for smooth running < 0.025 mm; axial runout and concentricity < 0.05 mm).

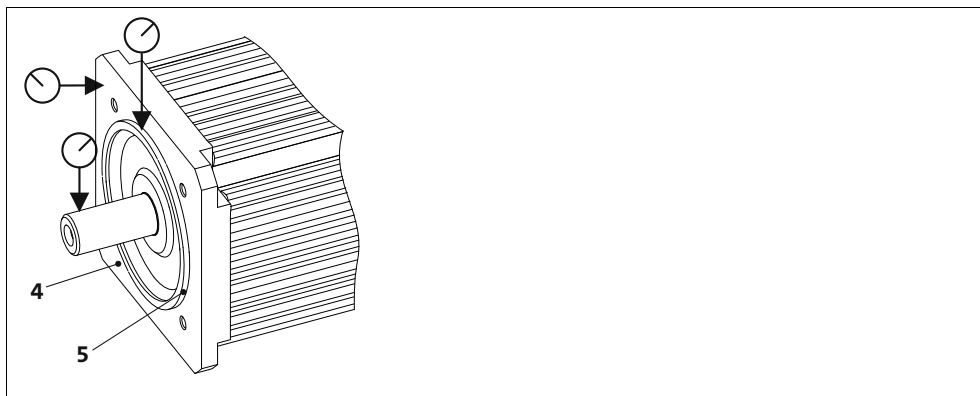


Fig. 3 Measurement of the surfaces of smooth running, axial runout and concentricity

- 4 Motor flange
- 5 Centering

---

**Preparation**

- Ensure standstill of the drive system and prevent any machine movement.
- The drive system must have cooled down.
- The motor must be deenergised.

**Note!**

Lenze recommends the use of smooth motor shafts without slots!

## 7. Check:

- If the drill depth in the hollow drive shaft is sufficient for the motor shaft.
  - For this purpose, compare the drill depth from the flange face with the distance of motor shaft front side to the motor flange.
- Check of the motor shaft journal, the hollow shaft bore of the gearbox drive shaft, the flange faces and the centering at the motor and gearbox for damages.  
In the event of irregularities, parts have to be reworked or sorted out.

## 4 Mechanical installation

Mounting of g500 short/servo adapters with clamping connection  
Maximum permissible load at the motor adapter

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### 8. Cleaning:

- Thoroughly clean and degrease hollow shaft bore and motor shaft journal, Fig. 4.

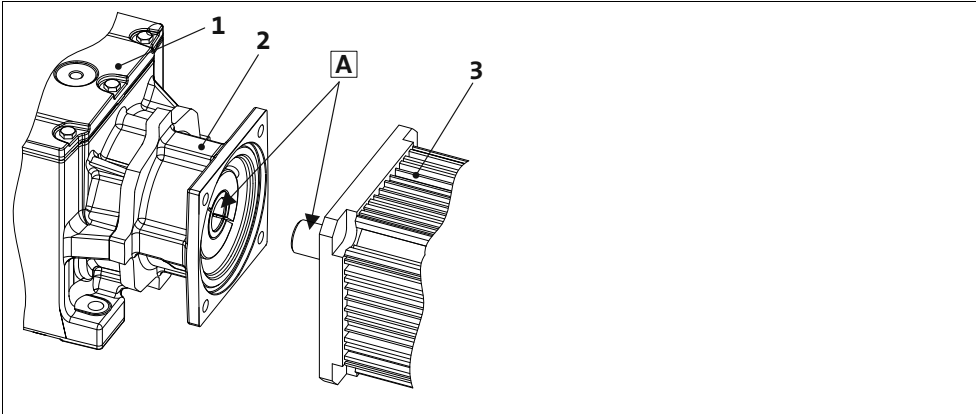


Fig. 4 Shaft surfaces

- 1 Gearbox
- 2 Bell housing
- 3 Motor

**A** degrease

### Mounting

1. Install the gearbox vertically so that the drive end is on top and securely fasten it.
2. Locate the position of the mounting hole and remove the plug (5) from the bell housing (2) and keep it!

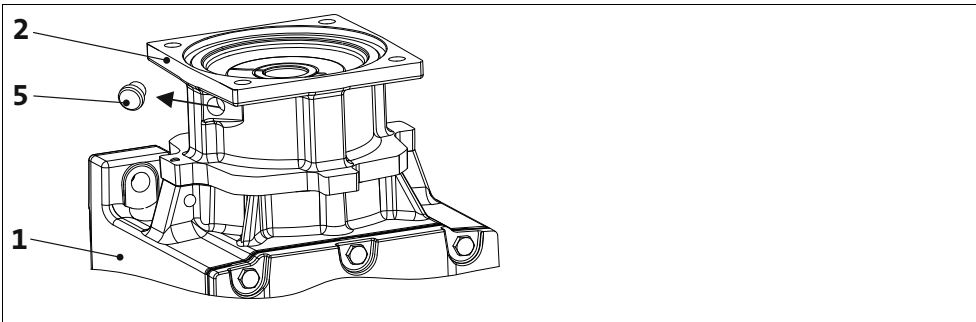


Fig. 5 Removing the plug from the bell housing

- 1 Gearbox
- 2 Bell housing

5 Plug

3. Align the slots of the gearbox drive hollow shaft and the clamping ring to each other and to the mounting hole (Fig. 6).

## Mounting of g500 short/servo adapters with clamping connection Maximum permissible load at the motor adapter

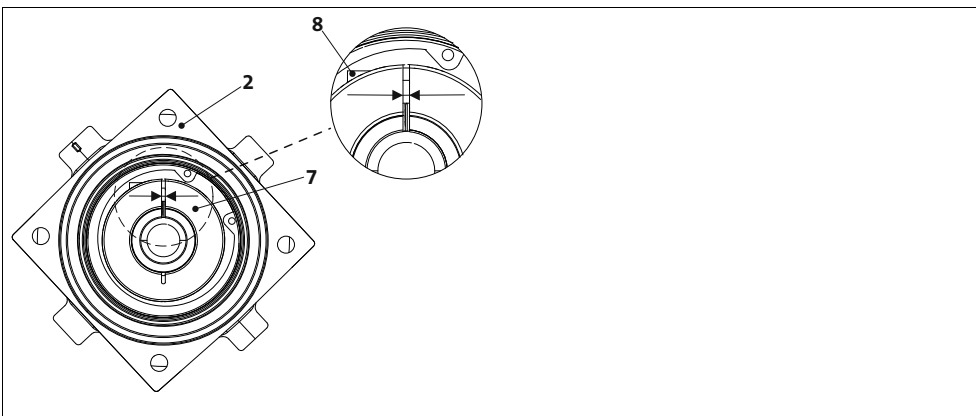


Fig. 6 Assignment: Motor shaft, clamping ring and mounting hole

- |   |                |   |               |
|---|----------------|---|---------------|
| 2 | Bell housing   | 7 | Clamping ring |
| 8 | Terminal screw |   |               |

4. Afterwards, insert the wrench (9) into the terminal screw (8) of the clamping ring (7) and leave it there (Fig. 7). The terminal screw (8) must only be tightened to such a degree that the clamping ring (7) does not move but the shaft is not tightened yet!

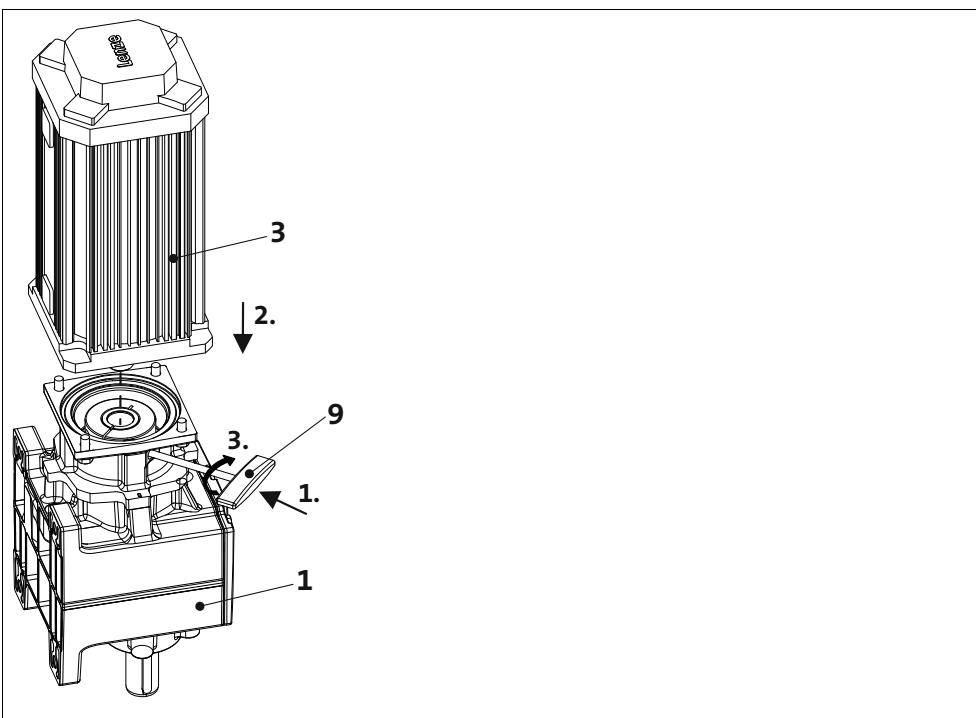


Fig. 7 Mounting of motor and gearbox

- |   |         |   |        |
|---|---------|---|--------|
| 1 | Gearbox | 9 | Wrench |
| 3 | Motor   |   |        |



### Stop!

If the motor shaft is provided with a keyway, align the motor shaft in such a way that the keyway is located opposite to the terminal screw.

## 4 Mechanical installation

Mounting of g500 short/servo adapters with clamping connection  
Maximum permissible load at the motor adapter

---



### Note!

Lenze recommends the use of smooth motor shafts without slots!

5. Position the motor shaft vertically and centrally to the hollow drive shaft and insert it carefully into the hollow drive shaft. Exert only little force in order to prevent damage to the ball bearing in the bell housing and the motor. Never assemble the parts by applying blows! If it is difficult to put the parts together, check if the terminal screw (8) has not been tightened too much. If required, loosen it.
6. Only when the flange of bell housing (2) and motor (3) lie flat on top of each other, the fixing screws may be mounted for the motor (screw strength at least 8.8, tightening torques according to strength 8.8). Secure the screw connections with medium-strength screw locking adhesive.
7. Tighten terminal screw (8). Tightening torque according to table  $\pm 10\%$ .

Screw [mm]	Width across flats [mm]	Tightening torque [Nm]
M5	4	6
M6	5	10
M8	6	25

8. Close the mounting hole in the bell housing (2) with the plug (5).
9. Install the geared motor into the machine / system.
  - Correct mechanical fixing and a professionally implemented electrical connection must be ensured.
10. Perform a test run;
  - Pay attention to unusual noises and vibrations.
  - Overheating is not permissible!

### 4.3.7 Mounting of motors to gearboxes with an adapter and a flexible coupling

When mounting a motor to an adapter, be sure to observe a fully circumferential contact of the flange faces, thus ensuring that there is no aperture to the interior of the adapter.

With higher degrees of protection or when there is a risk of dirt or humidity entering, additionally seal the contact surfaces with a suitable sealant.

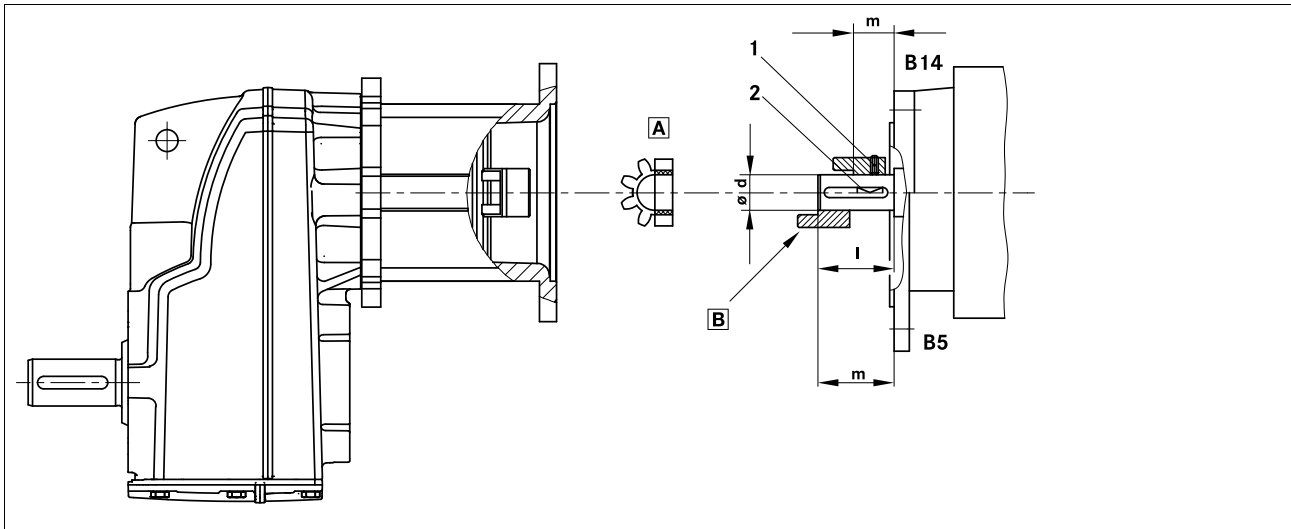


Fig. 8 Input side design N

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li><b>A</b> Spider / gear rim</li> <li><b>B</b> Coupling hub</li> </ul> | <ul style="list-style-type: none"> <li>1 Locking screw</li> <li>2 Keyway</li> </ul> |
|---|---|

## 4 Mechanical installation

Mounting of g500 short/servo adapters with clamping connection

Mounting of motors to gearboxes with an adapter

### Adapter for IEC motors

Drive size IEC	Motor shaft		Assembly dimension m [mm]	Standard hub Locking screw		Clamping hub		Featherkey <sup>1)</sup> DIN 6885/1 [mm]	Clamping ring hub						
	d [mm]	max. l [mm]		Thread	Tightening torque [Nm]	Thread	Tightening torque [Nm]		Thread	Tightening torque [Nm]					
N1A	11	23	23	M4	1.5	M3	1.34	*	M3	1.34					
N1B	14	40	25	M5	2.0	M6	10.5	B5 x 5 x 16	M4	3.0					
N2B	11	23	23	M4	1.5	M3	1.34	*	M3	1.34					
N1C	19	40	25	M5	2.0	M6	10.5	B6 x 6 x 16	M4	3.0					
N2C	14	40	25												
N3C	14	40	25												
N4C	14	40	25												
N6C	11	40	25	---	---	---	---	*	---	---					
N7C	19	40	25	M5	2.0	M6	10.5	B6 x 6 x 16	M4	3.0					
N1D	24	60	30												
N2D	19	60	30												
N1E	28	60	30												
N2E	24	60	30												
N3E	19	60	30												
N4E	24	50	50												
N1F	28	60	30												
N2F	24	60	30												
N3F	24	50	50												
N1G	38	80	80	M8	10	M8	25	*	M5	6					
N2G	28	60	60												
N3G	38	80	80												
N1H	42	110	110			M10	69				---	---	---	M8	35
N2H	48	110	110												
N3H	38	80	80												
T51	24	50	50			M5	2.0				---	---	---	---	---
T55	28	60	60												
T55	28	60	60												
T61	38	80	60	M8	10	---	---	*	---	---					
T65	42	110	111												
T66	48	110	109												
T70	55	110	110												
T76	60	140	140												
T81 <sup>2)</sup>	65	140	140	M10	17	---	---	---	---	---					
T82	75	140	136												

1) Featherkey with a standard hub and clamping hub

2) T81 only valid for motor frame size 250, 4-pole

### Adapter for NEMA motors

Drive size NEMA	Motor shaft		Assembly dimension m [mm]	Standard hub Locking screw		Clamping hub		Featherkey <sup>1)</sup> DIN 6885/1 [mm]	Clamping ring hub				
	d [mm]	max. l [mm]		Thread	Tightening torque [Nm]	Thread	Tightening torque [Nm]		Thread	Tightening torque [Nm]			
A5B	15.875	54	40.0	M5	2.0	M6	10.5	B4.76 x 4.76 x 20	M4	3			
A5C									M5	6			
A5D	22.225	54	54.0					M8	10	M8	25	M8	35
A5E	28.575	67	66.7 <sup>2)</sup>										
A5G	34.925	102	101.5 <sup>2)</sup>										
A5H	41.275	112	102.0 <sup>2)</sup>	M8	10	---	---	*	---	---			
A6H	47.625	112	111.1 <sup>2)</sup>										
A14	22.225	57.15	53 <sup>2)</sup>										
A18	28.575	69.85	66.5 <sup>2)</sup>										
A21	34.925	85.725	79 <sup>2)</sup>										
A25	41.275	101.6	95 <sup>2)</sup>										
A28	47.625	117.475	111 <sup>2)</sup>	M10	17	---	---	*	---	---			
A32	53.975	133.35	127 <sup>2)</sup>										
A36	60.325	149.225	143 <sup>2)</sup>										

Tab. 2 Attachment of motors to gearboxes with adapter

\* Use original featherkey of the motor

1) Featherkey for standard hub and clamping hub

2) Measured from the seating face of the motor flange



### 4.3.8 Coupling hubs

#### General

**Note!**

Standard hubs, clamping hubs and clamping ring hubs are maintenance-free.  
We recommend carrying out a visual inspection of the star-shaped spider/ring gear and the system parts within the inspection intervals.

**Note!**

Tighten all screws to the coupling hubs and the motor fastening of gearboxes in ATEX design with an intermediate strength screw retention.

#### Mounting the standard hub / clamping hub

1. Fit motor keyway (2).
  - With some sizes a shorter featherkey is supplied, which is to be mounted. The sizes concerned by this are shown on (📖 32)
2. With a clamping hub:
  - slightly loosen the clamping screw
  - Fit coupling hub on the motor shaft using a center hole thread (do not mount by hammer strokes, in order to avoid damage to the roller bearings in the motor).
  - Observe mounting dimension m of the coupling hub (📖 31).
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.
  - The mounting process can be facilitated by lightly greasing or oiling the ring gear sides or the hub sides. For this purpose, only use mineral oil-based lubricants without additives, silicone-based lubricants, or vaseline.
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 Mechanical installation

### Mounting of g500 short/servo adapters with clamping connection Coupling hubs

#### Mounting the clamping ring hub

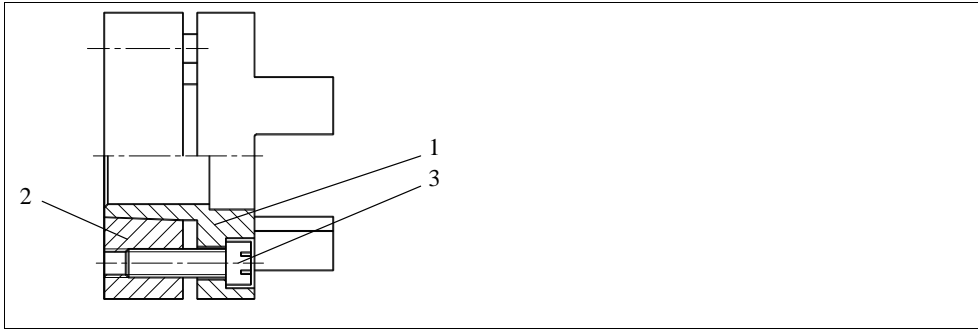


Fig. 9 Coupling

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



#### Note!

The motor shaft must be designed with fit k6.

1. Slightly oil contact surfaces of the motor shaft using low-viscosity lubricating oil such as “Castrol 4 in 1” or “Klüber Quietsch Ex”.



#### Stop!

Do not use oils and greases with molybdenum disulphide or extreme pressure additives such as lubricating grease pastes!

2. Slightly loosen clamping screws in the coupling hub.
  - Fit coupling hub on the motor shaft using a center hole thread (do not mount by hammer strokes, in order to avoid damage to the roller bearings in the motor).
  - Observe mounting dimension m of the coupling hub (see Tab. 2).
3. Align hub and slightly tighten clamping screws until they are fitting closely.
4. Tighten the clamping screws evenly crosswise in several steps until the indicated tightening torque is reached (see Tab. 2).
5. Lay spider in the coupling claw on the gearbox side.
  - The mounting process can be facilitated by lightly greasing or oiling the ring gear sides or the hub sides. For this purpose, only use mineral oil-based lubricants without additives, silicone-based lubricants, or vaseline.
6. Align claws of the motor-side coupling hub with its counterpart.
7. Slowly push on motor, and bolt on to the gearbox flange.

---

**Dismounting the 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.

## 4 Mechanical installation

Mounting of g500 short/servo adapters with clamping connection

Mounting of motors to gearboxes with a short adapter with a plug-in hollow shaft with a keyway

### 4.3.9 Mounting of motors to gearboxes with a short adapter with a plug-in hollow shaft with a keyway (drive-end version B or H)

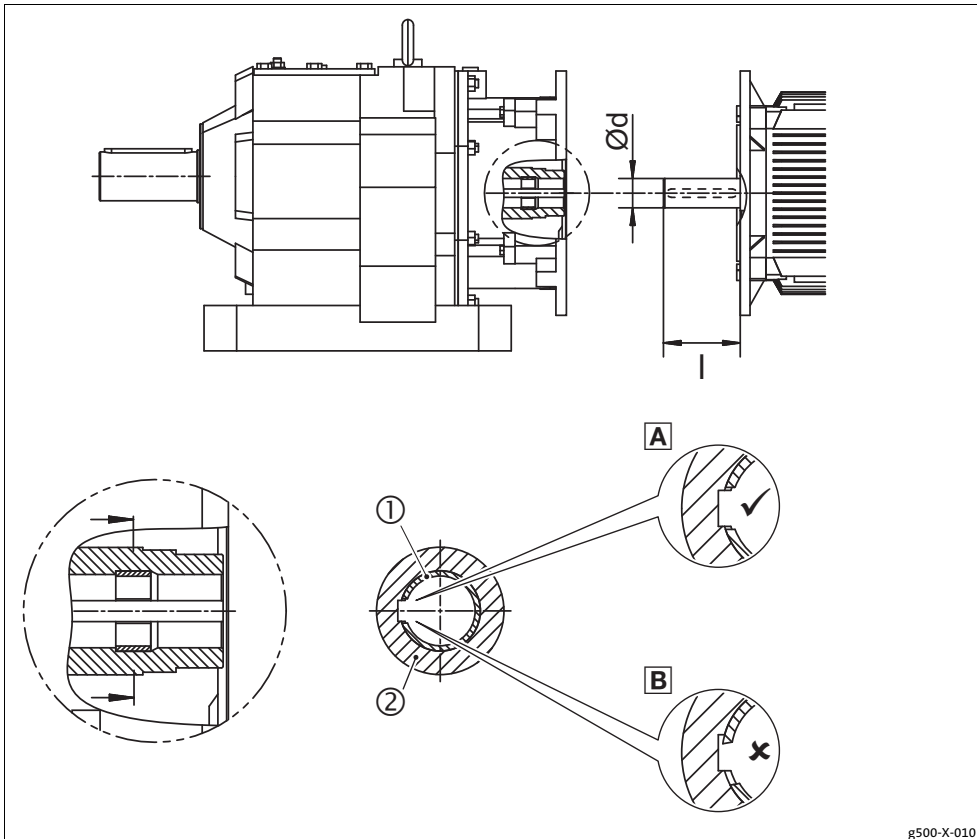


Fig. 10 Motors on gearboxes with a short adapter with a plug-in hollow shaft with a keyway

- 1 Plastic ring
- 2 Hollow shaft
- A Correct
- B Incorrect



#### Note!

Ensure that the plastic ring is not twisted and that it is in the correct position.

The plastic ring prevents fretting corrosion. It does not have to be greased.

1. Check whether the dimensions of the motor shaft and the featherkey match the hollow shaft bore and keyway.
2. Check whether the drill depth in the hollow drive shaft for the motor shaft is sufficient. For this purpose, compare the drill depth from the flange face with the distance of motor shaft front side to the motor flange.
3. Check whether the opening of the plastic ring to the keyway in the hollow shaft is aligned correctly and correct it, if necessary.
4. Align the featherkey in the motor shaft to the keyway in the hollow shaft.
5. Position the motor shaft centrally to the hollow drive shaft and then insert it into the hollow drive shaft carefully, only exerting little force, in order to avoid damaging the ball bearings in the bell housing and the motor. By no means join

Mounting of g500 short/servo adapters with clamping connection  
Mounting of motors to gearboxes with a short adapter with a plug-in hollow shaft with a keyway

---

the parts by hammer strokes!

6. Screw the motor and gearbox flange together, securing the fixing screws using medium-strength screw locking adhesive.

## 4 Mechanical installation

Mounting of g500 short/servo adapters with clamping connection  
Attachment of gearboxes with hollow shafts and keyway

---

### 4.3.10 Attachment of gearboxes with hollow shafts and keyway

1. If necessary, remove anti-corrosion coating in the hollow shaft and on the machine shaft.
2. Check the seat and edges of the hollow shaft and the machine shaft for damage. Rework, if necessary. Ensure good concentricity of the machine shaft in order to avoid unnecessary additional forces caused by tensioning.
3. Apply a fitting grease (LEERER MERKER) to the shaft and into the hollow shaft bore.
4. Mount gearbox with hollow shaft on the machine shaft to be driven, ensuring exact alignment. In the mounting process, lead forces only across the hollow shaft and not across the housing.

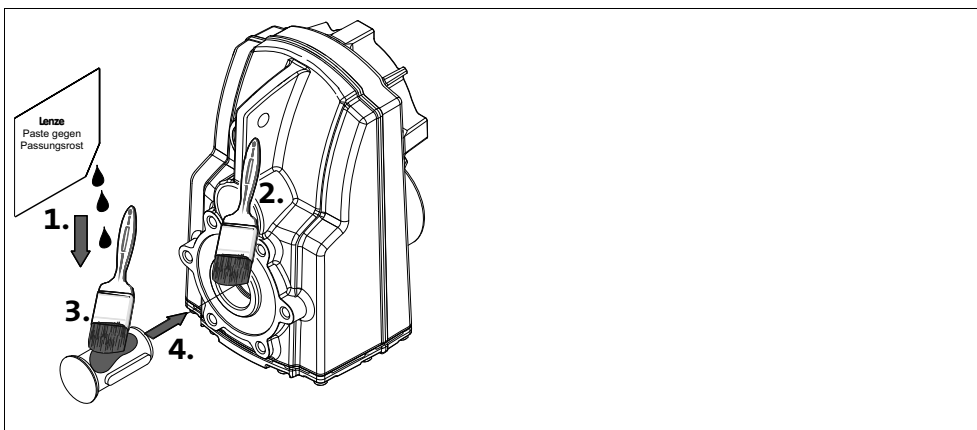


Fig. 11 Application of fitting grease against fretting corrosion

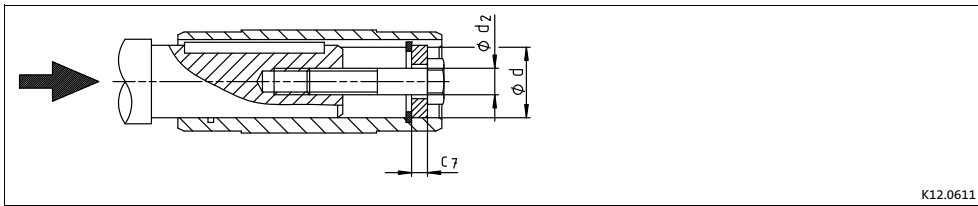


### Stop!

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

5. 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.

## Mounting of g500 short/servo adapters with clamping connection Attachment of gearboxes with hollow shafts and keyway



K12.0611

Auxiliary tool (recommended dimensions)		
$\phi d^{H7}$	$d_2$	$c_7$
18	M6	4
20		
25	M10	5
30		6
35	M12	7
40		8
45	M16	9
50		10
55	M20	11
60		13
65		13
70		14
80		16
90		20
100	M24	24
120		24

Tab. 3 Dimensions in [mm]

6. Cover rotating screw heads, interfering edges, slots or similar items safe against contact.

## 4 Mechanical installation

Mounting of g500 short/servo adapters with clamping connection  
Attachment of gearboxes with hollow shafts and keyway

### Dismounting



#### Stop!

- Before dismantling the machine shaft, mount an adequately dimensioned load handling device at the gearbox.
- Ensure pretensioning of the drive mechanism, preventing the gearbox from falling into the drive mechanism when it is loosened from the plug-in shaft.
- When removing the hollow shaft via the housing, impermissibly great forces may be generated.
- Tensioning of the hollow shaft causes a bearing failure and damage of the gearbox housing.

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

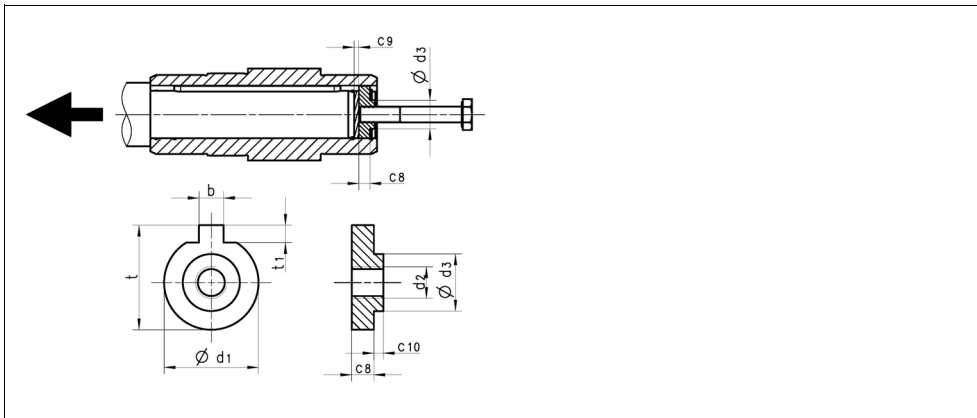


Fig. 12 Disassembly of gearboxes with hollow shaft, with auxiliary tool

Auxiliary tool (recommended dimensions)									
$\varnothing$ dH7	b $\pm 0.1$	c <sub>8</sub>	c <sub>9</sub>	c <sub>10</sub>	d <sub>1</sub> $\pm 0.1$	d <sub>2</sub>	d <sub>3</sub>	t -0.1	t <sub>1</sub>
25	7.8	10	3	---	24.8	M10	---	28	5.5
30	7.8	10	3	---	29.8	M10	---	33	5.5
35	9.8	12	3	---	34.8	M12	---	38	6
40	11.8	12	4	---	39.8	M16	---	43	6
45	13.8	12	4	---	44.8	M16	---	48.5	7
50	13.8	12	5	---	49.8	M16	---	53.5	7
55	15.8	16	5	---	54.8	M20	---	59	7.5
60	17.8	16	5	---	59.8	M20	---	64.1	8
70	19.8	16	5	---	69.8	M20	---	74.1	8
80	21.8	20	5	---	79.8	M20	---	85.1	9
90	24.8	10	10	---	89.8	M20	72	95	11
100	27.8	15	10	---	99.8	M24	80	106	12
120	31.8	15	10	---	119.8	M24	80	127	15

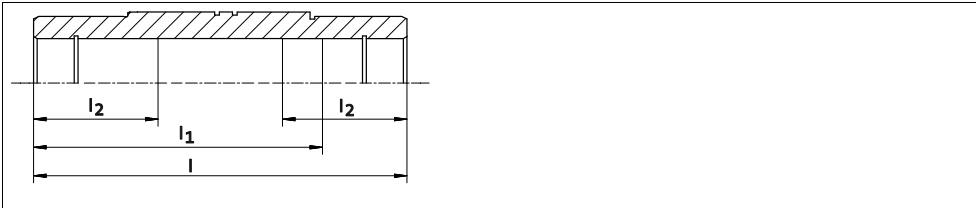
Tab. 4 Dimensions in mm





**Note!**

In the case of the shaft-mounted helical gearbox, the hollow shafts are released to rotate freely in the central part, i.e. the hole diameter is greater by 0.1 mm in this area! Provide for a sufficient length of the machine shaft so that the machine shaft is guided on both sides.



Gearbox Code	Type	$l_1$ min	$l_2$	$l$ max.
G50BS113	g500-S130	75	35	104
G50BS122	g500-S220	91	40	120
G50BS140	g500-S400	117	50	150
G50BS166	g500-S660	133	57	170
G50BS195	g500-S950	143	60	180
G50BS221	g500-S2100	163	70	210
G50BS231	g500-S3100	188	80	240
G50BS245	g500-S4500	234	100	300
G50BS280	g500-S8000	260	135	350
G50BS314	g500-S14000	310	150	410
G50BS319	g500-S19000	380	180	500

Tab. 5 Dimensions in mm

### 4.3.11 Mounting the shrink disc with a rotating cover



**Stop!**

- Do not disassemble new shrink disc.
- Never tighten clamping screws before the machine shaft has been inserted, since otherwise the hollow shaft may undergo plastic deformation.
- During operation, the shrink disc has to be covered so that it is safe against contact by implementing suitable measures (e.g. cover).
- Degrease hollow shaft bore and machine shaft!

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



**Note!**

This cover is fitted to the shrink disc on delivery.

## 4 Mechanical installation

Mounting of g500 short/servo adapters with clamping connection  
Mounting the shrink disc with a rotating cover

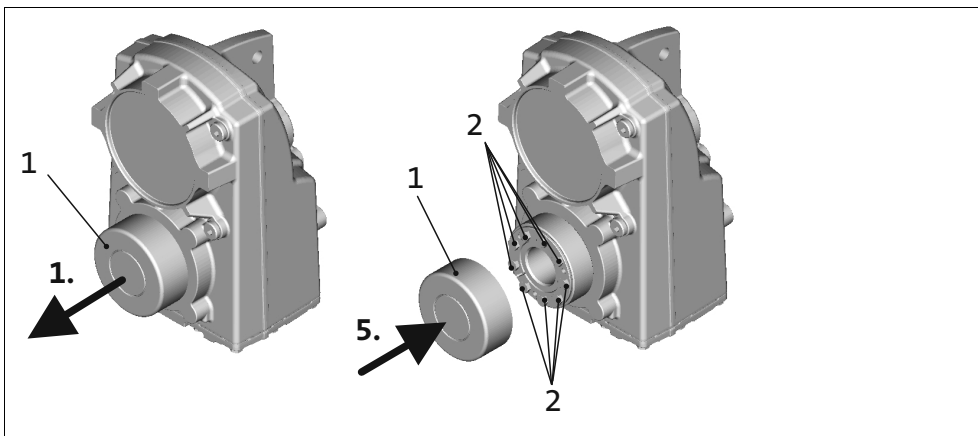


Fig. 13 Shrink disc cover

- 1 Protection cover
- 2 Clamping screws

1. Remove protective cap (1), if available.
2. Check machine shaft:
  - Diameter in fit tolerance h6
  - Material yield point  $Re \geq 360$  MPa
  - E-module approx. 210000 MPa
  - Surface roughness  $R_z \leq 15 \mu\text{m}$
  - Concentricity in order to prevent unnecessary additional forces caused by tensioning.
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. 14) in several passes, with rising torque, evenly until the indicated screw-tightening torque (see Tab. 6) is reached at all screws.

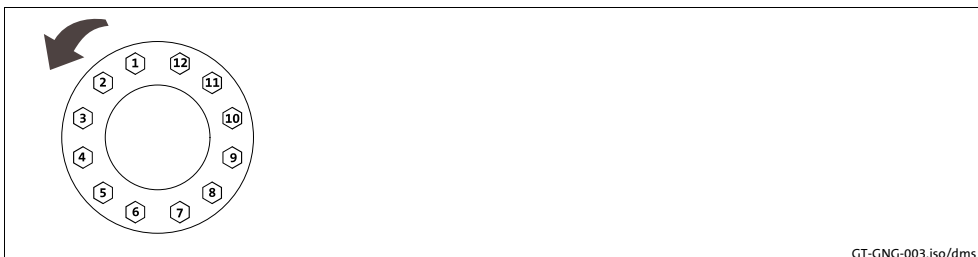


Fig. 14 Explanation: "one after the other"

GT-GNG-003.iso/dms



**Tip!**

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

The shrink disc is mounted correctly and fixed when the faces of the outer ring and the inner ring are aligned (Fig. 15). Minimum misalignments are permissible.

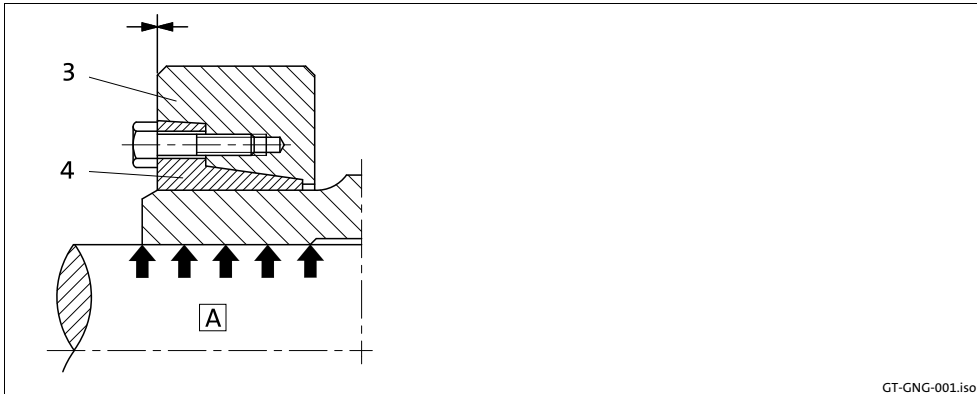


Fig. 15 Hollow shaft with shrink disk

- 3 Outer ring
- 4 Inner ring

**A** free of grease

Hollow shaft bore [mm]	20	25	30	35	40
Clamping screw thread	M6	M5	M6	M6	M8
Width across flats SW <sup>1)</sup> [mm]	10	8	10	10	13
Torque [ Nm ]	12	6	14	14	30

Hollow shaft bore [mm]	50	65	75	80	95	105	125
Clamping screw thread	M8	M10	M10	M10	M12	M14	M14
Width across flats SW <sup>1)</sup> [mm]	13	17	17	17	19	22	22
Torque [ Nm ]	34	70	70	70	121	193	193

Tab. 6 Tightening torque for the clamping screws

<sup>1)</sup> Width across flats of the shrink disc 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. 13) 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 8.

## 4 Mechanical installation

Mounting of g500 short/servo adapters with clamping connection  
Mounting the shrink disc with a rotating cover

---

### 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. 15), 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 (MoS<sub>2</sub>) 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.

## 4.3.12 Mounting the fixed cover

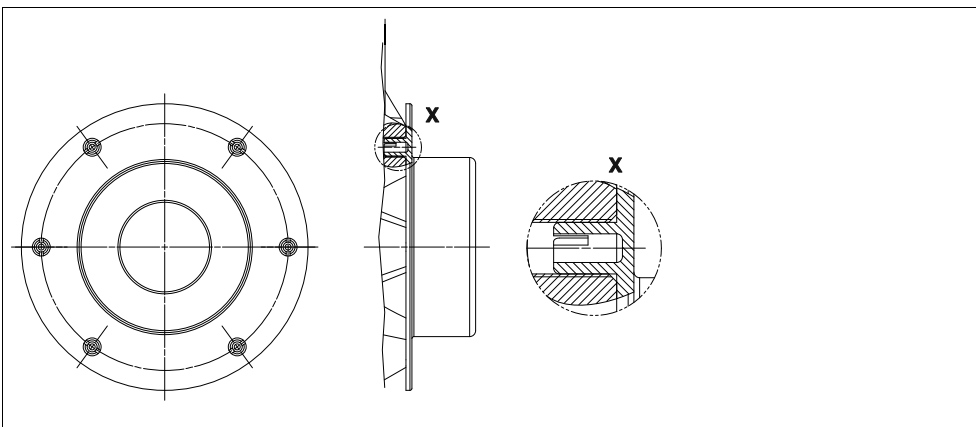


### Note!

This cover can be ordered optionally and will then be loosely enclosed with the shipment, or it is already mounted to the gearbox.

Gearbox size: **g500-S130/G50BS113 ... g500-S950/G50BS195**

With these sizes, the protective cap is clipped on.



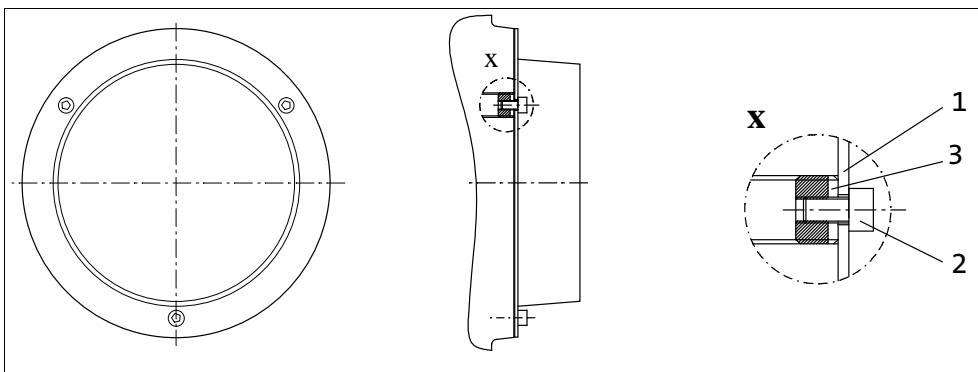
Clip the protection cover into the bores, 6 x flange side, 4 x motor side.

Gearbox size: **g500-S2100/G50BS221 ... g500-S19000/G50BS319**

With these sizes, the cover is screwed together with the housing.

Gearbox size: **g500-S2100/G50BS221 ... g500-S4500/G50BS245**

With these sizes, additional reducing bushes are screwed into the gearbox housing thread.



1 Protection cover  
2 Cheese head screw

3 Reducing bush

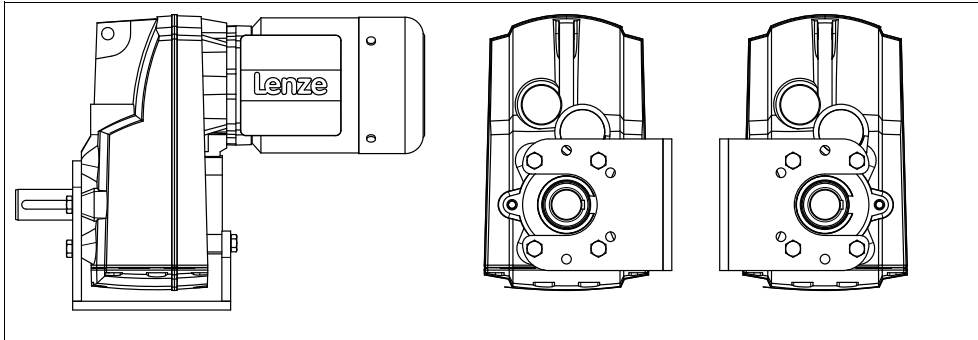
1. Screw reducing bushes (3) into the flange **so that they are flush** using a screwdriver.
2. Fasten the protective cap (1) over the reducing bushes (3) on the flange using cheese head screws (2).

## 4 Mechanical installation

Mounting of g500 short/servo adapters with clamping connection  
Foot mounting

---

### 4.3.13 Foot mounting



The foot on the g500-S130 ... S660 gearboxes can be mounted in three positions (3, 4, 5) using the supplied screws. It is mounted on side 6 using 4 screws and additionally on side 1 using 2 screws. The screws must be mounted according to the hole pattern on the foot (see figure) depending on the foot position.

Mounting order: depending on the mounting situation and installation space, the foot can first be screwed to the machine housing and then to the gearbox or vice versa. The foot can be mounted to the machine using studs or screws (not included in the scope of supply).

Aligning the gearbox with the foot: independent of the mounting order, the gearbox must be aligned with the machine shaft.

Gearbox		Tightening torque [Nm]
Code	Type	
G50BS113 + G50BS122	g500-S130 + g500-S220	10
G50BS140 + G50BS166	g500-S400 + g500-S660	48

### 4.3.14 Torque plate assembly

- In order to prevent tensioning, the machine shaft should run with good concentricity.
- Use screws and nuts of the 8.8 property class.
- Manufacture washers according to the dimensions indicated in the table below if they are not included in the scope of supply.
- Surface roughness of washers and the fixing strap approx. Rz 25.
- Mount the rubber buffers with the washers in the fashion shown (Fig. 16) on both sides of the gearbox torque plate and at the fixing strap of your machine.
- Tighten the screws until the rubber buffers are pre-stressed by the dimension  $\Delta c_7$ .
- Tighten the screwed connection using 2 nuts to secure it.

Screws, nuts, and the fixing strap at the machine are not included in the scope of supply

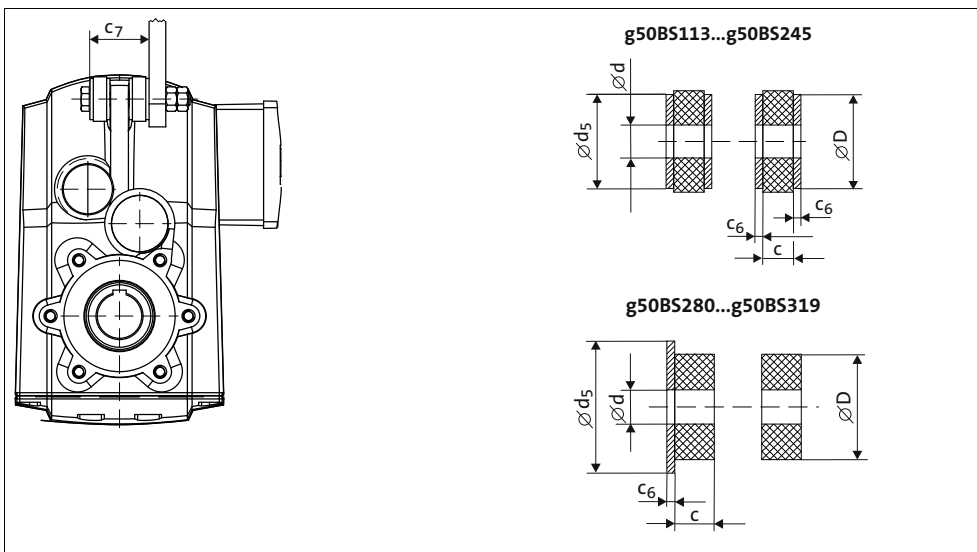


Fig. 16 Dimensions of washers and rubber buffers

Gearbox		Dimensions			Pretension	Washer	
Code	Type	d [mm]	D [mm]	c [mm]	$\Delta c_7$ [mm]	$d_5$ [mm]	$c_{6 \text{ min.}}$ [mm]
G50BS113	g500-S130	11	30	12	1	30	2.5
G50BS122	g500-S220	11	30	12	1	30	2.5
G50BS140	g500-S400	13	40	12	1	37	3
G50BS166	g500-S660	13	40	12	1	37	3
G50BS195	g500-S950	13	40	12	1	37	3
G50BS221	g500-S2100	17	50	2x12	2	50	3
G50BS231	g500-S3100	21	60	2x12	2	60	4
G50BS245	g500-S4500	26	72	2x12	2	72	5
G50BS280	g500-S8000	25	80	40	7	100	10
G50BS314	g500-S14000	31	120	50	5	140	12
G50BS319	g500-S19000	31	120	50	7	140	12



#### Note!

Solvents, oils, greases, and fuels damage the rubber elements. Be absolutely sure to prevent contact with these substances!

# 5 Electrical installation

## Motor connection

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### **Danger!**

#### **Hazardous electrical voltage**

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

### **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. brakes or feedback systems, please observe:

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



## 6.1 Important notes



### Stop!

The drive may only be commissioned by skilled personnel!

- Before commissioning remove transport locking devices and keep them for later transports.
- Take safety measures prior to any operation:
  - Disconnect the machine from the mains, ensure standstill of the drive system and avoid any machine movement.
  - That the ambient temperature match the data on the nameplate.

Follow the instructions specified for the temperature ranges.

Temperature range	
Standard	
Ambient temperature	0 °C ... +40 °C
Lubricant	Mineral oil <ul style="list-style-type: none"> <li>• CLP 460</li> </ul> Synthetic oil <ul style="list-style-type: none"> <li>• CLP HC 220</li> </ul> Food-compatible oil <ul style="list-style-type: none"> <li>• CLP PG 460 USDA H1</li> </ul>
Note	At an ambient temperature mainly above +30 °C <ul style="list-style-type: none"> <li>• Application case must be verified by Lenze</li> </ul>
Low-temperature	
Ambient temperature	-30 °C ... +10 °C
Lubricant	Food-compatible oil <ul style="list-style-type: none"> <li>• CLP HC 46 USDA H1</li> </ul>
Note	When starting up a cold motor, increased starting torques are to be expected at temperatures below -20 °C due to the higher viscosity of the roller bearing grease. <ul style="list-style-type: none"> <li>• During project planning, allow a motor starting torque reserve of about 20 %.</li> </ul> Commissioning at over +10 °C: <ul style="list-style-type: none"> <li>• Operate the drive at max. 50 % of the rated torque to avoid a reduction in service life.</li> </ul>
Wide range	
Ambient temperature	-30 °C ... +40 °C
Lubricant	Synthetic oil <ul style="list-style-type: none"> <li>• CLP HC 220</li> </ul>
Note	When starting up a cold motor, increased starting torques are to be expected at temperatures below -20 °C due to the higher viscosity of the roller bearing grease. <ul style="list-style-type: none"> <li>• During project planning, allow a motor starting torque reserve of about 30 %.</li> </ul> At an ambient temperature mainly above +30 °C: <ul style="list-style-type: none"> <li>• Individual case must be verified by Lenze!</li> </ul> At a continuous temperature of between -30 °C and -25 °C, the service life is up to 20 % shorter than with the low-temperature range.

Tab. 7 Temperature range

# 6 Commissioning and operation

Before switching on

---

## 6.2 Before switching on

Check:

- The oil level of the gearbox after previous long-term storage!
- That the drive does not show any visible signs of damage.
- Is the mechanical fixing o.k.?
- Has the electrical connection been implemented correctly?
- Is the assignment of the drive function - machine function correct?
- Is the direction of rotation of the drive shaft correct?
- Are all rotating parts and surfaces that may become hot protected against contact?
- For gearboxes with ventilation:
  - Has the transport locking device been removed?



### Stop!

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

## 6.3 Initial commissioning

In order to ensure trouble-free operation, carry out checks during initial commissioning.

When	Check
At initial start-up	Rotating direction of the drive shaft (Fig. 17)
Continuously	Monitor geared motor with regard to noticeable noise, vibrations, and changes
After 3 hours under rated load	Measure housing temperature (Tab. 9) at the hottest point. The value measured at the same time serves as a reference value for later measurements. If necessary, implement required measures if temperatures are rising too high,  51
	Fastening elements, locking screws, and covers
	Leakages: small quantities of escaping lubricant
After the first day	Check oil level,  62

Tab. 8 Measures at initial commissioning

Please check the following:

- Drive function - machine function assignment
- The direction of rotation of the drive shaft

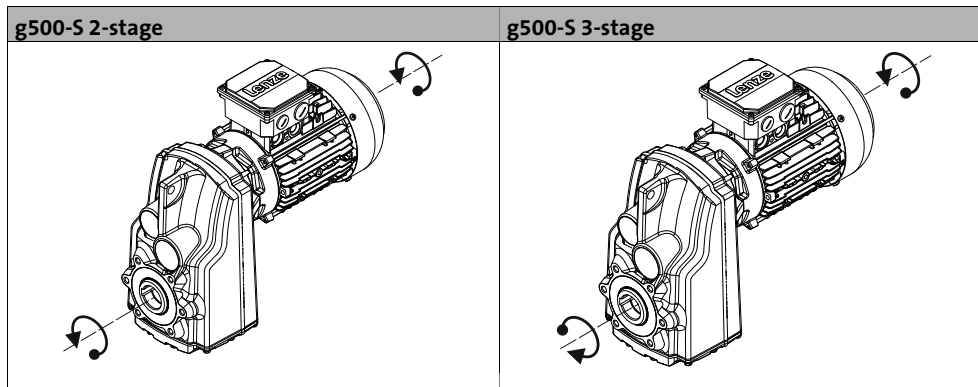


Fig. 17 Rotating direction of drive shaft

### 6.4 During operation

- Warming

If operating conditions are unfavourable (e.g. high input speed, small ratio, vertical mounting position, high ambient temperature, ...), the gearboxes may heat up more.

Temperature	Measures
> 70 °C	Apply covers and warning labels
> 80 °C	Gearboxes with mineral oil (CLP) or for standard shaft sealing ring, <ul style="list-style-type: none"> <li>• Use synthetic oil,</li> <li>• Provide for better cooling,</li> <li>• It may be necessary to contact Lenze</li> </ul>
> 100 °C	Gearboxes with synthetic oil (CLP HC) and FKM shaft sealing ring <ul style="list-style-type: none"> <li>• Provide for better cooling,</li> <li>• It may be necessary to contact Lenze</li> </ul>

Tab. 9 Housing temperature

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

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

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

# 7 Maintenance

## Important notes

---

### 7.1 Important notes



#### Note!

- Gearboxes below 200 Nm are lubricated for life.
- The mechanical power transmission system is maintenance-free.

- Before commissioning remove transport locking devices and keep them for later transports.
- Take safety measures prior to any operation:
  - Disconnect the machine from the mains, ensure standstill of the drive system and avoid any machine movement.
  - That the ambient temperature match the data on the nameplate.

### 7.2 Maintenance intervals



#### Stop!

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

Dust deposits prevent heat to be emitted and cause a high housing temperature. The gearboxes/geared motors must be purified of dirt and dust at regular intervals.

- In the case of gearboxes that are not lubricated for life, the lubricant must be replaced at regular intervals.
    - The type of lubricant is indicated on the nameplate. Replace the lubricant only with the same type of lubricant.
    - The lubricant change depends on the lubricant temperature, see Fig. 18.
1. Measure the lubricant temperature at the drain plug,
  2. Add 10 °C,
  3. Read the changing interval from the diagram.

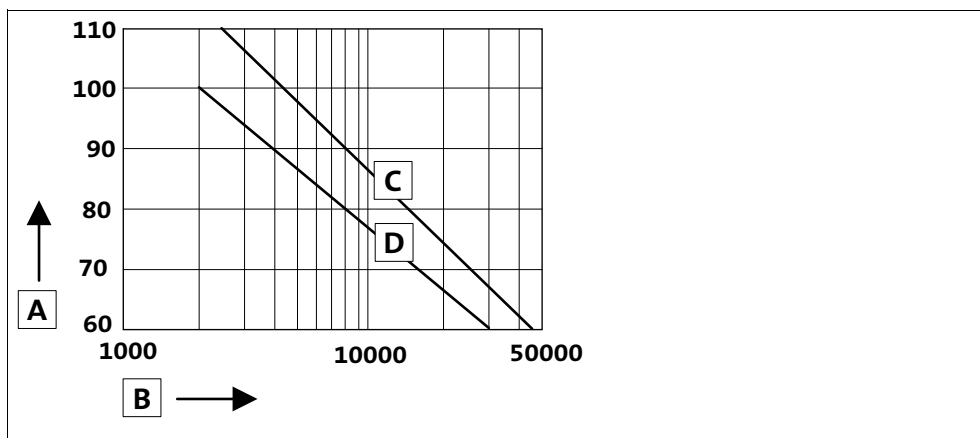


Fig. 18 Lubricant diagram

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

**STOP** **Stop!**  
Irrespective of the operating hours, an oil change must be carried out every three years at the latest!

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

Time interval	Measures	Description of the operations
On the first day, then every month	Visual inspection	Inspection regarding unusual operating noises, vibrations and impermissibly high temperatures
	Leakage test	If leakages are found, eliminate their cause, see "Troubleshooting" section
Every 6 months	Clean gearbox	Remove dirt and dust deposits. To be inspected more frequently in the case of heavy dirt accumulation
	Check rubber buffer	Check rubber buffer of the torque plate and replace it in the event of visible wear or damage
	Relubricate bell housings of the roller bearing	For bell housings with lubricating nipples: relubricate roller bearing in bell housing using a grease gun. Grease: Klüber Microlube GLY 92, quantity approx. 5 grams
	Check pipe of the oil expansion tank	Replace pipe when it shows signs of leakage or after 4 years
Annually	Check vent valve	Check whether air can pass through the breather element. If it shows blockages, replace it
After 3h, then every 2 years	Check fastening elements	Check mounting of the gearbox (foot, flange and shrink disk mounting).
According to diagram; at the latest as specified in the lubricant table	Oil change	Carry out oil change 68 for type and amount of lubricant see nameplate
	Replace roller bearing grease filling	When an oil change is carried out, the roller bearing grease filling should also be replaced 68

# 7 Maintenance

## Maintenance operations

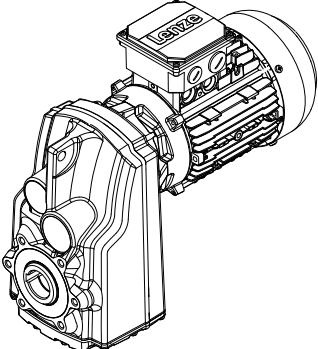
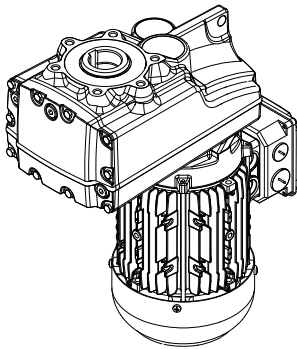
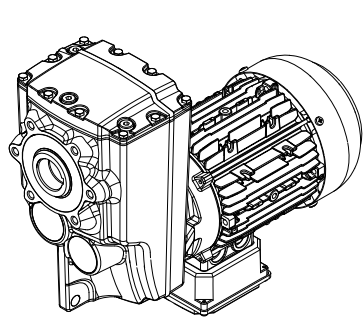
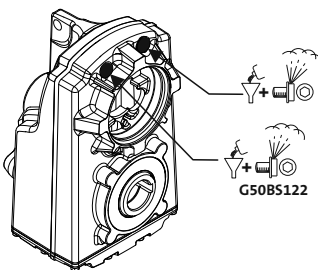
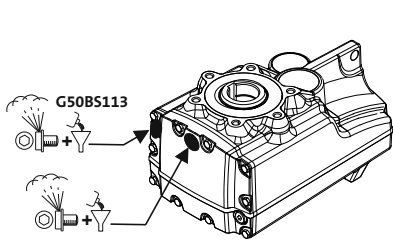
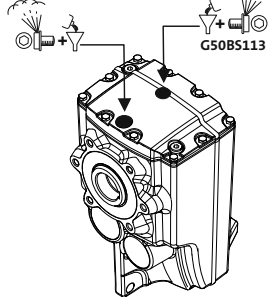
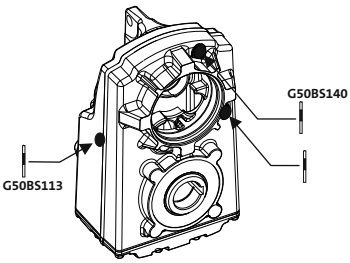
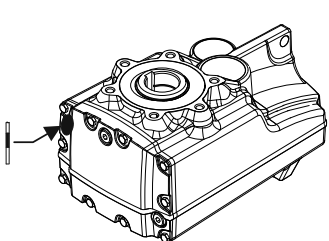
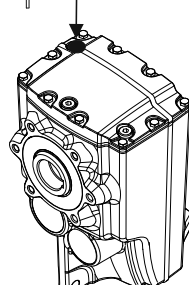
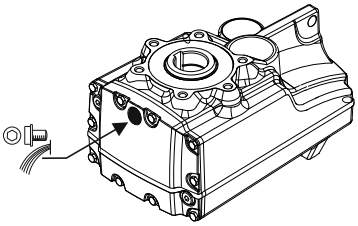
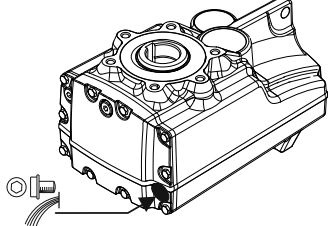
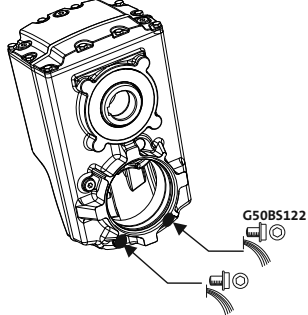




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### 7.3 Maintenance operations

Gearboxes and geared motors are ready to use on delivery and filled by Lenze with the lubricant type and lubricant quantity indicated on the nameplate. The first filling corresponds to the mounting position and design indicated on the nameplate.

### 7.3.1 Position of the lubricant monitoring elements

g500-S130 ... g500-S660  
G50BS113 ... G50BS166

Mounting position M1 [A]	Mounting position M2 [D]	Mounting position M3 [B]	
			
			
			
			
	Filling		Drain
	Breathing		Control

# 7 Maintenance

Maintenance operations  
Position of the lubricant monitoring elements

Mounting position M4 [C]	Mounting position M5 [F]	Mounting position M6 [E]	
	<p>Filling</p>		<p>Drain</p>
	<p>Breathing</p>		<p>Control</p>







**g500-S950 ... g500-S4500**  
**G50BS195 ... G50BS245**







Mounting position M1 [A]	Mounting position M2 [D]	Mounting position M3 [B]	
	Filling		Drain
	Breathing		Control

# 7 Maintenance

Maintenance operations  
Position of the lubricant monitoring elements

Mounting position M4 [C]	Mounting position M5 [F]	Mounting position M6 [E]
 Filling  Breathing	 Drain  Control	

**g500-S8000 ... g500-S19000**  
**G50BS280 ... G50BS319**

Mounting position M1 [A]	Mounting position M2 [D]	Mounting position M3 [B]
 Filling	 Drain	 2-stage
 Breathing	 Control	 3-stage

# 7 Maintenance

## Maintenance operations

### Position of the lubricant monitoring elements

Mounting position M4 [C]	Mounting position M5 [F]	Mounting position M6 [E]	
	Filling		Drain
	Breathing		Control

### 7.3.2 Table of lubricants

Lenze recommends the use of the following lubricants. If you carry out an oil change, use the same type of oil as specified on the nameplate. The oil changing intervals are reference values for normal ambient conditions and a maximum oil temperature of 70 °C. Difficult operating conditions (e.g. high temperatures, aggressive ambient media) require shorter intervals.

Lubricant	Ambient temperature	Specification	Changing intervals at 70°C		Lubricant manufacturer		
			For the first time after	Not later than after	Fuchs	Klüber	Shell
CLP 220	0 °C ... + 40 °C	Mineral oil with EP additives	16000 h	3 years	Renolin CLP220 / CLP Plus 220	Klüber oil GEM 1-220 N	Omala S2 G220 Omala S2 GXV 220
CLP 460	0 °C ... + 40 °C	Mineral oil with EP additives	16000 h	3 years	Renolin CLP460 / CLP Plus 460	Klüberoil GEM 1-460 N	Omala S2 G460 Omala S2 GXV 460
CLP HC 220	-30 °C ... + 40 °C	Synthetic oil with a poly-alpha-olefin basis	25000 h	4 years	Renolin Unisyn CLP220 / XT 220	Klübersynth GEM 4-220 N	Omala S4 GXV 220
CLP HC 320	-20 °C ... + 50 °C	Synthetic oil with a poly-alpha-olefin basis	25000 h	4 years	Renolin Unisyn CLP320 / XT 320	Klübersynth GEM 4-320 N	Omala S4 GXV 320
CLP HC 220 USDA H1	-20 °C ... + 40 °C	Synthetic oil with a poly-alpha-olefin basis H1 approval	16000 h	3 years	Cassida Fluid GL 220	Klüberoil 4 UH1-220 N	-----
CLP PG 460 USDA H1	-20 °C ... + 40 °C	Synthetic oil with a polyglycol basis H1 approval	16000 h	3 years	Cassida Fluid WG 460	Klüberoil UH1 6-460	-----

Tab. 10 Overview of lubricant types  
Lubricants with a USDA H1 approval are approved for the use in the food industry.



#### Note!

In case of ambient temperatures < -20°C or > +40°C, please contact Lenze!

Observe increased starting torques at low temperatures!

The type of lubricant indicated on the nameplate by the following manufacturers is approved.

Shell	Klüber	Fuchs
		

# 7 Maintenance

## Maintenance operations

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Version	Lubricants		
	CLP 460	CLP HC 320	CLP HC 220 USDA H1
Ambient temperature [°C]	0 °C ... + 40	-25 °C ... + 50	-20 °C ... + 40
Specification	Mineral oil with additive compounds	Synthetic oil (synthetic hydrocarbon/poly-alpha-olefin oil)	
Fuchs	Fuchs Renolin CLP 460	Fuchs Renolin Unisyn CLP 320	
Klüber	Klüberoil GEM1-460 N	Klübersynthl GEM4-320 N	Klüberoil 4 UH1-220 N
Shell	Shell Omala S2 G 460	Shell Omala S4 GX HD 320	
bremer & leguil			Cassida Fluid GL 220

### 7.3.3 Checking the oil level



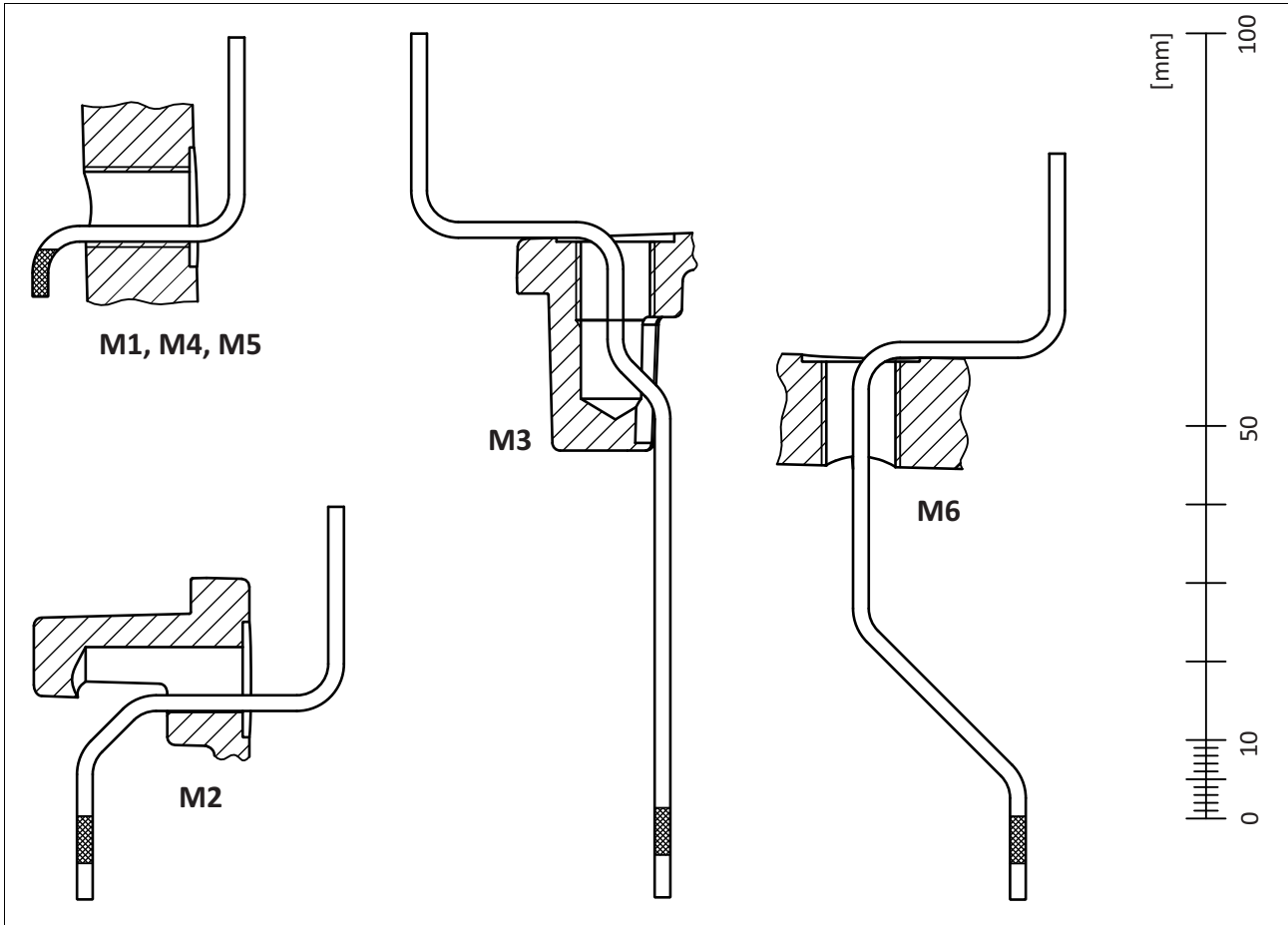
#### Note!

Check the oil level in cold condition!

### Geared motor g500-S130/G50BS113 ... g500-S660/G50BS166

Check the oil level by means of the displayed dipsticks. Manufacture them according to the mounting position.

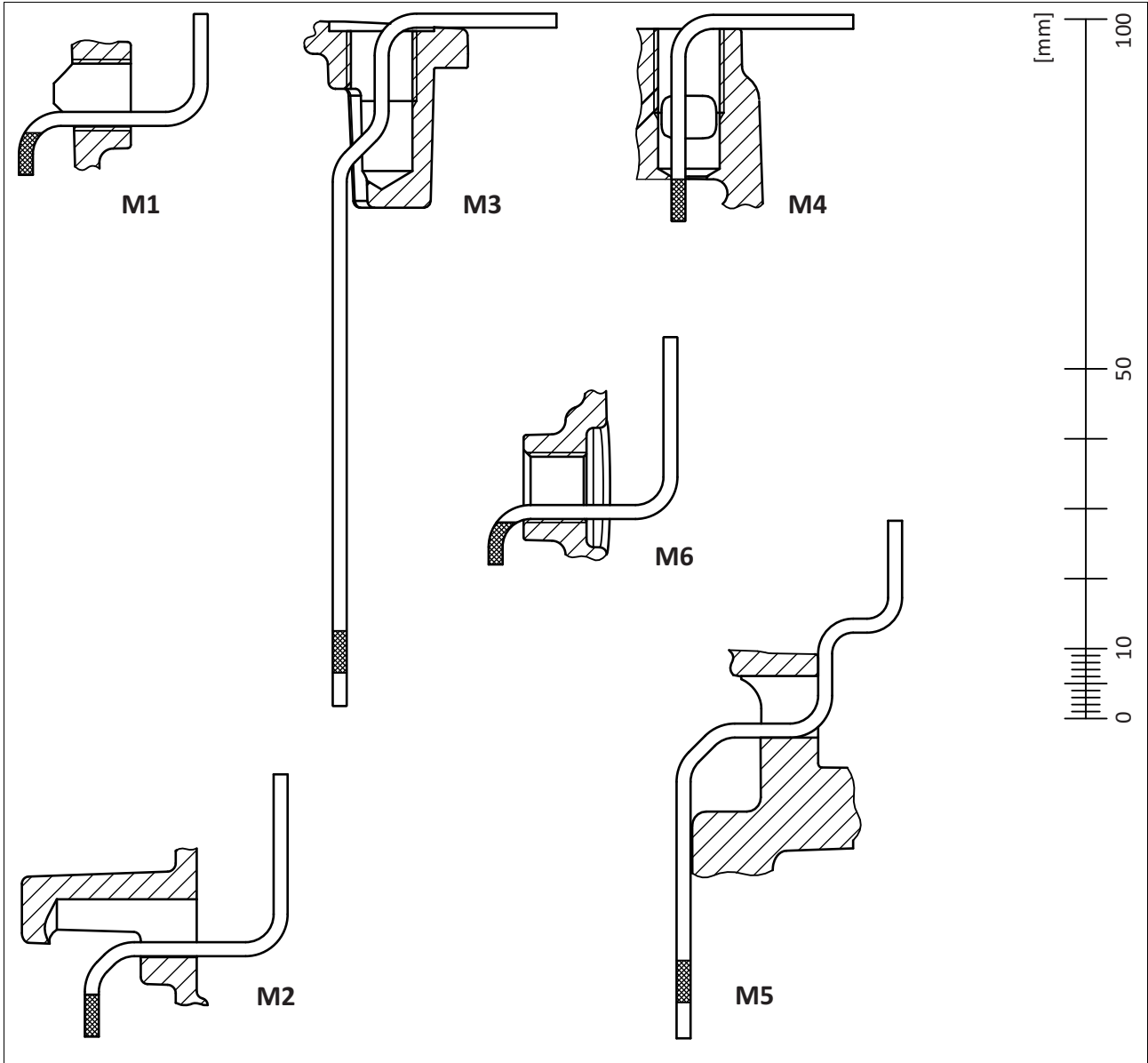
#### Form template: dipsticks for g500-S130/G50BS113



# 7 Maintenance

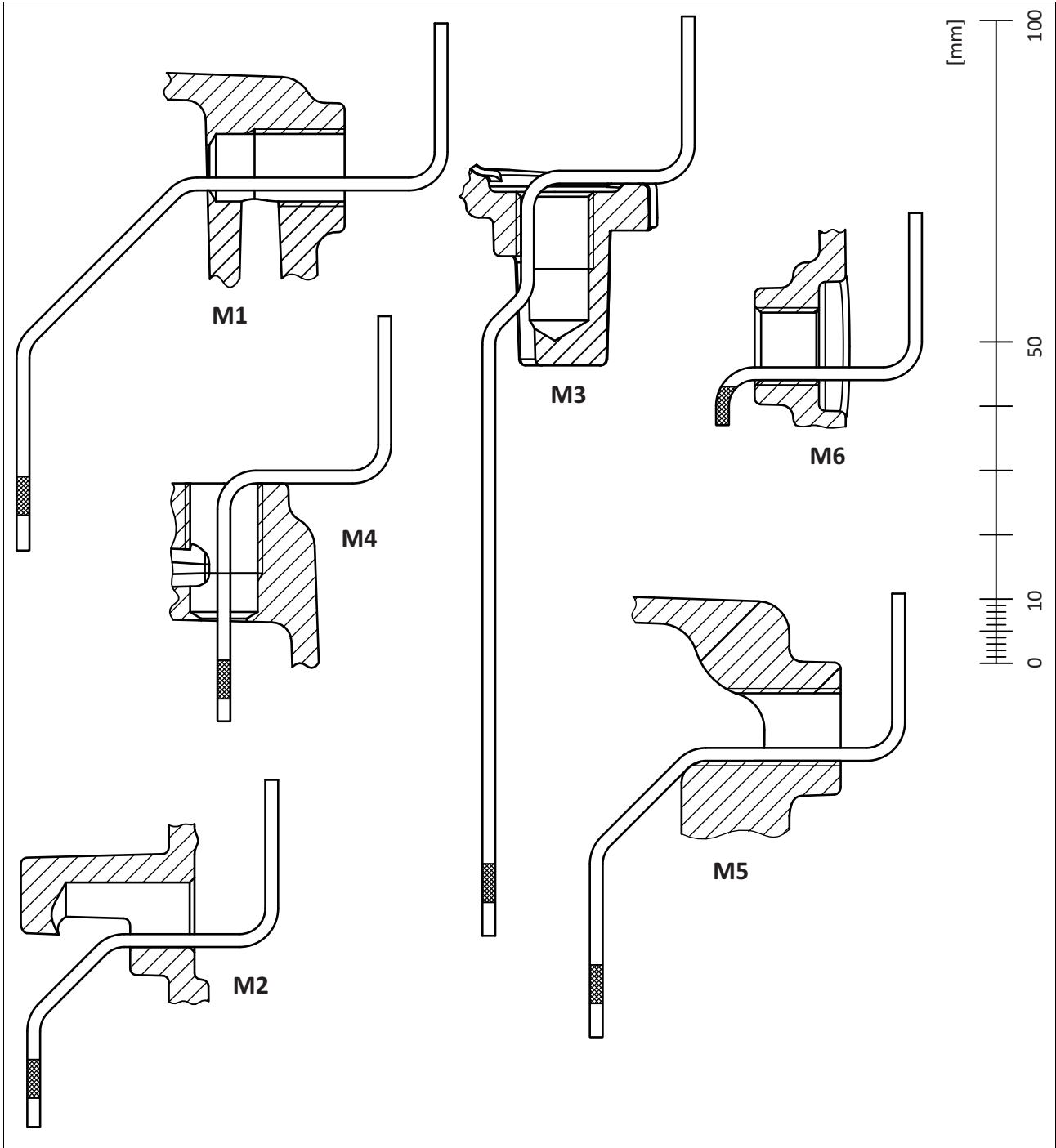
Maintenance operations  
Checking the oil level

Form template: dipsticks for g500-S220/G50BS122





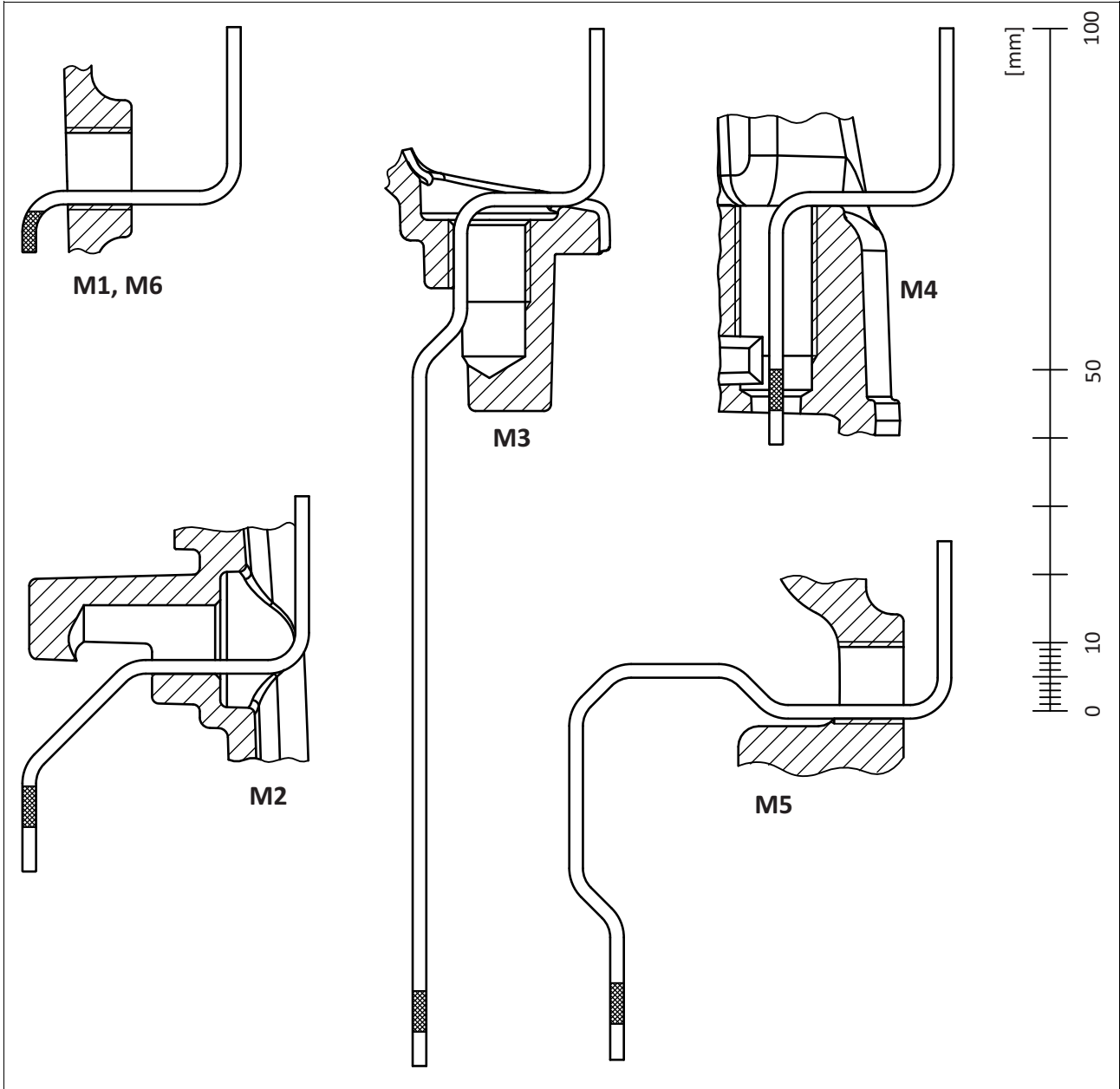
Form template: dipsticks for g500-S400/G50BS140



# 7 Maintenance

Maintenance operations  
Checking the oil level

Form template: dipsticks for g500-S660/G50BS166



### Geared motor G50BS195 ... G50BS319

1. Switch the drive to a deenergised state.
2. Remove oil control plug. (☞ 7.3.1)
3. Check oil level using a tool. If necessary, refill oil.  
At the maximum, the oil level must be below the threaded hole by the dimension x.
4. Check gasket and replace it, if necessary.
5. Tighten oil control plug.

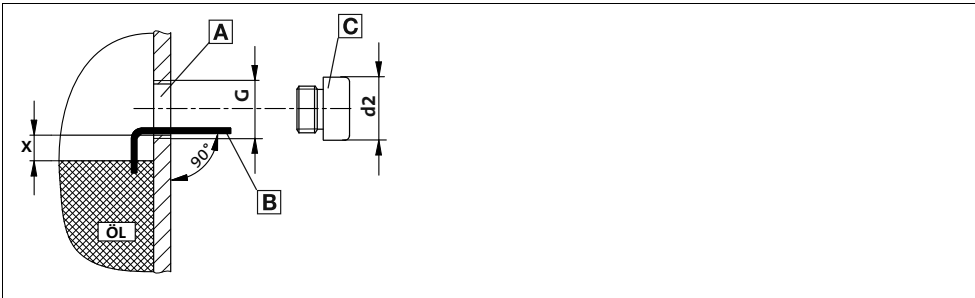


Fig. 19 Oil level in the gearbox housing

- A** Oil check bore hole
- B** Auxiliary tool, e. g. angled wire (not included in the scope of supply)
- C** Bleeder screw/oil filler plug

Oil-level bore	d2 [mm]	Filling height x [mm]	Tightening torque [Nm]
M10 x 1	14	2	10
M12 x 1.5	17	3	20
M16 x 1.5	21	4	34
M20 x 1.5	25	5	50
G 1/8"	14	2.5	10
G 1/4"	18	3	10
G 3/8"	22	4	25
G 3/4"	32	7	50

# 7 Maintenance

Maintenance operations  
Changing the oil

## 7.3.4 Changing the oil



### Stop!

- Secure the drive system and machinery against unintended movement or mains power-up.
- The gearbox should be lukewarm in order that the oil flows well but there is no risk of scalding.
- Only use lubricant types that match the nameplate or are listed in Tab. 10.

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.



### Note!

Change from the CLP or CLP HC standard gearbox oil to the food-compatible CLP xx xxx USDA H1 gearbox oil.

The oil drainage holes do not allow for complete draining of the gearbox in all cases. Then a residual amount of oil remains in the gearbox. If a change-over to a food-compatible gearbox oil is to be effected, the gearbox must be rinsed thoroughly with the food-compatible gearbox oil.

## 7.3.5 Lubricate roller bearings

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

	Ambient temperature	Manufacturer	Type
<b>Gearbox roller bearing</b>	-30 °C ... +50 °C -30 °C ... +80 °C -40 °C ... +60 °C	Fuchs Klüber Klüber	Renolit H 443 Petamo 133 N Microlube GLY 92
<b>Motor roller bearing</b>	-30 °C ... +70 °C -40 °C ... +80 °C	Lubcon Klüber	Thermoplex 2TML Asonic GHY 72
<b>Special grease for gearbox roller bearings</b>			
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 0120S



### Note!

Clean roller bearings before applying new grease!

**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.

**7.3.6 Drain condensation**

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.

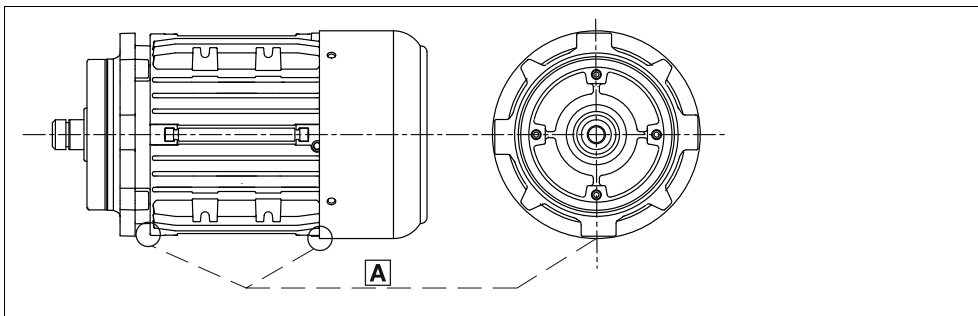




Fig. 20 Motor with condensation drain holes  
A Condensation drain holes

**7.4 Repair**

- We recommend having all repairs carried out by the Lenze Service department.


## 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 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
Vibrations, noise	Loose fixing elements	Tighten fixing elements
Shrink disc connection is spinning	<ul style="list-style-type: none"> <li>• Correct screw tightening torque has not been reached               <ul style="list-style-type: none"> <li>– Insufficient number of passes, not all screws are tightened correctly.</li> </ul> </li> <li>• Machine shaft and hollow shaft bore not sufficiently degreased</li> <li>• Wrong component part dimensions               <ul style="list-style-type: none"> <li>– Fits, roughnesses</li> </ul> </li> <li>• Yield point of machine shaft material is too low               <ul style="list-style-type: none"> <li>– <math>R_e &gt; 300 \text{ N/mm}^2</math> required</li> </ul> </li> <li>• Friction factors are too low               <ul style="list-style-type: none"> <li>– Coefficients of friction <math>\mu \geq 0.15</math> required</li> </ul> </li> <li>• 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.</li> </ul>	Specifications for assembly, dimensions and material not observed
Oil is leaking	Wrong oil level for the applied mounting position	Check mounting position (see nameplate) and oil level
	Initial insignificant leakage at the shaft sealing ring	Optimum sealing conditions only develop after the run-in period
	Overpressure due to lacking ventilation	Install ventilation according to the mounting position
	Overpressure due to polluted ventilation	Clean ventilation
	Worn-out shaft sealing rings	Change shaft sealing rings
	Cover / flange screws are loose	Check that the fixing screws are tightly fastened. Continue to monitor the gearbox
	Oil discharge at the gearbox ventilation unit	Mounting position (see nameplate) Check oil level  62 Check position of ventilation unit  55 Use oil compensation reservoir



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