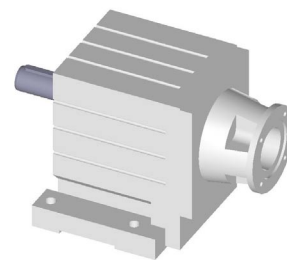


ATEX G..

Gearboxes / geared motors



GST, GFL, GKS, GKR, GSS

Operating Instructions

EN



13513694

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

These instructions apply to the following gearbox types:

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

Target group

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

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

1 About this documentation






Document history

1.1 Document history

Material number	Version			Description
473630	1.0	07/2003	TD09	1st edition for pilot series
474854	1.0	09/2003	TD09	Change: oil change diagram chap. 4.1.3 Supplemented by chapter 4.3.1
474854	2.0	01/2004	TD09	Change: Gearbox nameplate Change: Tab. 1 Torque for gearbox size 14
13025899	3.0	08/2004	TD09	Revision of the entire instructions Supplement to the chapters 7.1.1 Supplement to the chapters 7.4.1
13061856	4.0	08/2005	TD09	Supplement: Chapter 4.5.1 Chapter 7.1.1 Supplement and amendment of the chapters 7.4.1
13168445	5.0	10/2006	TD09	New nameplates
13294454	6.0	03/2009	TD09	Reprint due to reorganisation of company Change: Tab. 1 Torque for gearbox sizes 07 and 11 Change of lubricants filled in at the factory
13294454	6.1	10/2009	TD09	Conversion from G-motion to L-force geared motors ATEX classification key added Designation of the lubricants types in chapter 7.3 changed.
---	7.0	03/2015	TD09	Complete revision
13491281	7.1	08/2015	TD09	"Lubricant change" diagram: lubricant type changed "Maintenance intervals" table changed Surface temperature limit tables changed "During commissioning" table changed
13513694	8.0	05/2016	TD09	"ATEX" application area changed Declaration of Conformity renewed

1.2 Conventions used

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

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

1.3 Terminology used


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

1.4 Notes used




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

Safety instructions




Layout of the safety instructions:

 **Danger!**
(characterises the type and severity of danger)

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

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

Application notes

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

2 Safety instructions

Important notes

2.1 Important notes

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

If these Operating Instructions are disregarded, especially the inspection and maintenance intervals, the EC declaration of conformity will become void.

2.2 Application as directed

The gearboxes / geared motors are intended for use in machinery and systems and may only be used in accordance with these Operating Instructions, the nameplate and the text of the order confirmation. They correspond to existing standards and regulations and meet the requirements of EU directive 94/9/EG.

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

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

- For installation, the EN 60079-14 for locations with explosive gas atmosphere and the EN 50281-1-2 for locations with explosive dust atmosphere must be observed!

The machines can be used as follows:

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



Note!

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

2.3 Disposal

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

3.1 Identification

3.1.1 Gearbox code

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

ATEX classification

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

3 Product description

Nameplate

3.1.2 Nameplate

i Note!

Different nameplate layouts are provided for the Lenze ATEX gearboxes (geared motors).
 The Lenze ATEX gearboxes are delivered with one or two nameplates featuring different designs.

ATEX gearbox - nameplate with serial no. and bar code

Lenze			1	15
42			6	
5.1	7.2		28	
5.2	5.3/5.4		38 1)	
10.1	39.4		5.11	
⊕ 39.5	18		39.7	
⊕ 39.6	10.2/10.3			
40			11	

GT-ATEX-001.des

1) Data only for gearboxes with a motor

ATEX gearbox with a nameplate

Lenze			1	15
42			6	
5.1	7.2		28	
5.2	5.3/5.4		38 1)	
10.1	10.2		5.11	
⊕ 39.5	18		39.7	
⊕ 39.6			39.4	
20			40	

1) Data only for gearboxes with a motor

ATEX gearbox with two nameplates

Nameplate 1			Nameplate 2		
Lenze			1	15	
42			6		
39.1	5.2	5.3/5.4	18		
39.7		38 1)			
5.1	10.2	5.11			
39.5		39.4			
39.6			11		
			40		

GT-ATEX-001.des
GT-ATEX-001.des

1) Data only for gearboxes with a motor

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

4 Mechanical installation

Preparation

4.1 Preparation

- It must be checked that the data given on the nameplate of the gearbox/motor and in the order confirmation text comply with the permissible explosion-proof application conditions on site:
 - Explosion group
 - Category
 - Zone
 - Temperature class
 - Maximum surface temperature
- Mount the gearbox only in the mounting position indicated on the nameplate!
- The max. input speed and the max. rated torque given on the nameplate must not be exceeded!
- The application of the gearboxes is only permissible at an ambient temperature of -20°C to +40°C unless the nameplate bears another temperature.

4.2 Ambient conditions

The following must be ensured:

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

4.3 Installation / mounting condition



Danger!

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

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



Danger!

- A change in mounting position may only be carried out after consultation with Lenze. The ATEX approval no longer applies when Lenze is not consulted!
- Parts of the gearbox can be made of aluminium and must be protected against external shocks in order to prevent shock sparks!
- The gearboxes/geared motors must **not** be used in systems with cathodic protection!
- The gearboxes and motors must be included in the equipotential bonding of the system.
- Placing an installation above hot parts on which, for instance, leaking oil may ignite is not permissible. If required, install an oil collecting trough.
- For the use in the area of explosion group IIC, the total thickness of all paint layers must not exceed 0.2 mm. For explosion group IIB the maximum is 2.0 mm.

Repair paint damages in order to avoid corrosion.

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

4 Mechanical installation

Mounting of input and output elements

4.4 Mounting of input and output elements

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

The applicability can be proven by:

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

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

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



Danger!

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

4.4.1 Mounting with belt pulleys

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

**Danger!**

Only electrostatically conductive belts must be used (leakage resistance $< 10^9 \Omega$).

In explosion group IIC no belts are permissible!

4.5 Information on gearboxes with shrink disc

**Danger!**

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

The customer shaft must meet the following requirements:

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

**Danger!**

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

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

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

4 Mechanical installation

Information on gearboxes with shrink disc
Shrink disc and hollow shaft cover

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

Tab. 1 Torques of the shrink disc connections



Danger!

The torque values in Tab. 1 apply to a true torque stress. If a radial or axial force is at work, it is necessary to consult Lenze.

4.5.1 Shrink disc and hollow shaft cover



Danger!

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

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

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

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

4.6 Shaft sealing rings



Note!

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

For this, please consult Lenze.

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

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

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

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

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

Due to this multitude of influencing parameters, without tests that are tailored to the application it is almost impossible to make an exact statement with regard to the service life. Since the service life of the shaft sealing rings is subject to the variations described above, regular inspections are absolutely required. This is the only way of avoiding an unnoticed loss of lubricant in the gearbox (see 24).

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

4 Mechanical installation

Lubricants

4.7 Lubricants

A sufficient amount of lubricant in the gearbox is essential to ensure its reliable function. The lubricant prevents dry running in the metallic contacts as well as resulting impermissible surface temperatures or mechanical sparks. The main risk in this respect is an unnoticed loss of lubricant. Therefore the gearboxes must be monitored at regular intervals with regard to the loss of lubricant (📖 24). For this purpose a leakage inspection and oil-level inspection must be carried out.



Danger!

- The lubricant must be changed at defined intervals (📖 24).
- The gearbox must be inspected for leakage at regular intervals!

4.8 Roller bearings

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

The following measurements are carried out for monitoring:

- Running noises
- Temperature
- Vibration diagnosis
- Frequency analysis

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

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



Note!

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

4.9 Mounting of motors on gearboxes with mounting flange




Stop!

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



Note!

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

- Mount coupling hub on the motor side,  documentation for the respective gearbox.
- Lock screws at the clutch hubs with adhesive for medium-strength screw locking.
- Tighten all screw connections with the torques given and lock them with standard screw locking adhesive!
- Clamping hubs must only be used together with a featherkey, otherwise the hubs may slip in the event of sudden torque changes!
- Check the clutch in the prescribed maintenance intervals.

5 Electrical installation

Motor connection

5.1 Motor connection



Note!

Please observe the Operating Instructions for the explosion-protected motor!



Danger!

Hazardous electrical voltage

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

6.1 Checklist for commissioning



Stop!

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




Before you start

Check the following	Checked
Supply: <ul style="list-style-type: none"> • Does the scope of supply comply with the accompanying papers? <ul style="list-style-type: none"> – Claim visible transport damages immediately to the forwarder. – Claim visible deficiencies/incompleteness immediately to your Lenze representative. 	
Ex application: <ul style="list-style-type: none"> • Do the following data on the nameplate of the gearbox/motor comply with the permissible Ex application on site? <ul style="list-style-type: none"> – Explosion group – Category – Zone – Temperature class – Maximum surface temperature 	
Ambient temperature: <ul style="list-style-type: none"> • Is the ambient temperature range adhered to according to the data given in the lubricant table? <ul style="list-style-type: none"> – A maximum ambient temperature of 40 °C must not be exceeded during the entire operating time, unless the gearbox nameplate contains a different maximum temperature. 	
Ventilation: <ul style="list-style-type: none"> • Is a sufficient ventilation of the gearbox guaranteed? 	
Mounting position: <ul style="list-style-type: none"> • Does the mounting position comply with the mounting position given on the nameplate of the gearbox? <ul style="list-style-type: none"> – Please observe: Changing the mounting position may only be performed after consultation with Lenze. Without consultation, the ATEX approval no longer applies! 	
Oil level for drives of category 2: <ul style="list-style-type: none"> • Was the oil-level control carried out in the correct mounting position? • Is the oil level correct? 	
Oil control and oil drain plugs /breather elements: <ul style="list-style-type: none"> • Are all oil control screws and drain screws as well as breather screws and valves freely accessible? <ul style="list-style-type: none"> – For gearboxes with ventilation remove the transport locking device of the ventilation or mount the breather element. 	
Input and output elements: <ul style="list-style-type: none"> • Are all input and output elements to be installed suitable for this explosion-protected application? 	
Nameplate data: <ul style="list-style-type: none"> • Are the data given on the nameplate of the gearboxes not exceeded? 	
Gearbox with hollow shaft and shrink disk: <ul style="list-style-type: none"> • Has the cover been mounted correctly? (☞ 16) 	
Mains-operated geared motors: <ul style="list-style-type: none"> • Do the data given on the nameplate of the gearbox and motor comply with the ambient conditions on site? 	
Inverter-operated geared motors: <ul style="list-style-type: none"> • Is the geared motor permitted for inverter operation? <ul style="list-style-type: none"> – The parameter setting of the inverter must prevent an overload of the gearbox (gearbox nameplate). 	
Drives in mounting position C (motor at the top): <ul style="list-style-type: none"> • Is the protection for the fan cover mounted? 	
Equipotential bonding: <ul style="list-style-type: none"> • Is equipotential bonding of the motor and gearbox guaranteed in the mounted state? 	
State: <ul style="list-style-type: none"> • Is the gearbox closed and undamaged? 	

6 Commissioning

Measurement of surface temperature


During commissioning

Check the following	Checked
Ambient area: – It must be ensured that there are no explosive atmospheres, oils, acids, gases, vapours, or combustible dusts!	
Temperature measurement: • The temperature must be measured after 3 hours of operation at the maximum load of the corresponding application! – The temperature must be measured at points that are protected against the cooling air flow, in the area of the drive. It is useful to carry out measurements at several points in order to determine the maximum,  22. – An absolute housing surface temperature of 90 °C should not be exceeded to keep the thermal stress of shaft sealing rings and lubricant low; this contributes positively to the service life.	
Temperature class T4 in zones 1 and 2: – The temperature limit for temperature class T4 in zones 1 and 2 must not be exceeded,  22. When the drive gets warmer it has to be decommissioned.	
Absolute temperature: • Is the maximum permissible absolute temperature of 90 °C exceeded? – If this is the case, the drive must be put out of operation and Lenze must be contacted.	
Oil change: – The oil change depends on the oil temperature,  24	

6.2 Measurement of surface temperature

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

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

The maximum permissible absolute temperature is 90 °C at the hottest point. For temperature class T4 in zone 1 or 2, the temperature limit ( 22) must be observed!



Danger!

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

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

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

Input speeds up to 1500 rpm

Mounting positions A, B, D, E and F		Mounting position C	
Drive size [-]	Temperature limit [°C]	Drive size [-]	Temperature limit [°C]
<input type="checkbox"/> A	90	<input type="checkbox"/> A	90
<input type="checkbox"/> B		<input type="checkbox"/> B	
<input type="checkbox"/> C		<input type="checkbox"/> C	
<input type="checkbox"/> D		<input type="checkbox"/> D	
<input type="checkbox"/> E		<input type="checkbox"/> E	
<input type="checkbox"/> F		<input type="checkbox"/> F	
<input type="checkbox"/> G		<input type="checkbox"/> G	
<input type="checkbox"/> H		80	<input type="checkbox"/> H
<input type="checkbox"/> K	<input type="checkbox"/> K		

Input speeds 1501 to 3000 rpm

Mounting positions A, B, D, E and F		Mounting position C		
Drive size [-]	Temperature limit [°C]	Drive size [-]	Temperature limit [°C]	
<input type="checkbox"/> A	90	<input type="checkbox"/> A	90	
<input type="checkbox"/> B		<input type="checkbox"/> B		
<input type="checkbox"/> C		<input type="checkbox"/> C		
<input type="checkbox"/> D		<input type="checkbox"/> D		
<input type="checkbox"/> E		<input type="checkbox"/> E		
<input type="checkbox"/> F		<input type="checkbox"/> F		
<input type="checkbox"/> G	80	<input type="checkbox"/> G	80	
<input type="checkbox"/> H		<input type="checkbox"/> H	70	
<input type="checkbox"/> K		80	<input type="checkbox"/> K	65



Note!

Mounting position D does not permit input speeds higher than 1500 rpm due to the high stress of the shaft seal!

6.4 Measurement of oil temperature

The oil temperature is measured in the lower area of the gearbox (on the level of the oil sump). In the case of gearboxes with an oil drain plug, the temperature must be measured on the oil drain plug. 10 K are added to the temperature measured and, on the basis of the diagram (📖 27), the lubricant change (📖 24) is determined.

7 Maintenance

Maintenance intervals



Danger!

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

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

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

7.1 Maintenance intervals

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

Visual inspection

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

Close inspection

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

Detailed inspection

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

Inspection

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

Maintenance and repair

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



Danger!

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

Non-adherence to the maintenance intervals will annul the EC Declaration of Conformity!

7.1.1 Periodic inspections

In zone 2 or 22 and with mounting positions A, B, C, E and F the following time intervals output for close inspection and detailed inspection can be doubled.

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



Stop!

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

	Type of inspection		
	Visual	Close	Detailed
Inspection to be carried out within the time interval of operating hours:	100 h	500 h	3000 h
But at the latest:	Once a week	3 months	6 months
Actions			
Visual inspection of the geared motor.			
Inspection regarding unusual operating noises, vibrations and inadmissibly high temperatures.	•		
Dust deposits must be cleaned according to the amount of dust. We recommend removing the dust cover when the thickness exceeds 1.0 mm.			
When the entry of dust is suspected, covers are to be removed and cleaned, 16.			
Examination with regard to oil leakage, 29.		•	
Check of the oil level with integrated motor mounting, 30. The check of the oil level in this case serves the purpose of leakage monitoring at the shaft sealing ring of the motor.			
Visual inspection and backlash check of the elastic ring gear, 32.			
Check rubber buffer of the torque arm and replace it in the event of visible wear or damage.			
Check oil level (only drives for category 2)			
For gearboxes with ventilation: Check the air passage of the breather element and clean it, if necessary (e.g. blow through) or replace it.			•
Check whether earthing / equipotential bonding is still ensured.			
Check mounting of the gearbox (foot, flange and shrink disk mounting).			
Inspections of the electric motors	As specified in the operating instructions for the motor		

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

	Type of inspection
Inspection to be carried out once after:	Visual
Not later than after:	2000 h
Not later than after:	3 months
Actions	
Visual inspection and backlash check of the elastic ring gear, 32.	•

7 Maintenance

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

7.2 Maintenance and repair



Danger!

Maintenance or repair operations under ex conditions are not permissible!

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

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

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

- 1) Determination of the period by means of temperature measurement, 23 and using the oil change diagram.
- 2) For better assessment of the roller bearing changing interval, a calculation taking the real operating conditions into consideration should be carried out at Lenze, 18



Note!

Since it is not possible to reliably calculate the service life of an individual roller bearing (18), it is absolutely essential that the roller bearings are checked at regular intervals. A difference in the noise or vibration response or rising temperatures indicate the immediate necessity for replacing the bearings.

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

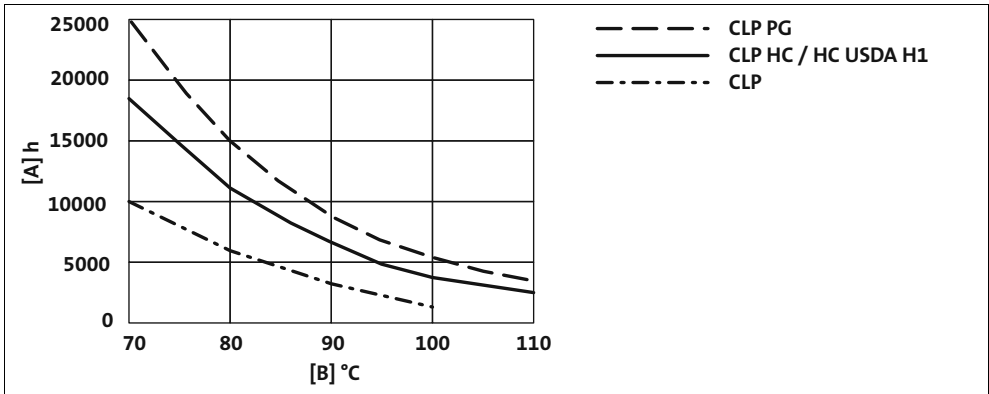


Fig. 1 "Lubricant change" diagram




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

7 Maintenance

Lubricant table for ATEX geared motors
Lubricate roller bearings

7.3 Lubricant table for ATEX geared motors

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

	Ambient temperature [°C]			DIN 51517-3: CLP ISO 12925-1: CKC/CKD		Gearbox type GST, GFL, GKS, GKR	Gearbox type GSS
	-50	0	+50				
	-25		+50 ³⁾	CLP HC	VG 320	Omala S4 GX 320	
	-20		+40	CLP PG	VG 220		Omala S4 WE 220 ²⁾
	-25		+50 ³⁾	CLP HC	VG 320	Klübersynth GEM 4-320 N	
	-20		+40	CLP PG	VG 220		Klübersynth GH 6-220 ²⁾
	-20		+40	CLP HC	VG 220	Klüberoil 4 UH1-220 N	
	-30		0 ⁴⁾	CLP PG	VG 32		Klübersynth GH 6-32 ^{1) 2)}
	-40		0 ⁴⁾	CLP HC	VG 46	Klüber Summit HySyn FG-46	
	-25		+50 ³⁾	CLP HC	VG 320	Renolin Unisyn CLP HC 320	
	-20		+40	CLP PG	VG 220		Renolin PG 220 ²⁾

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

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

7.3.1 Lubricate roller bearings

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

The following lubricant quantities are required:

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

7.4 How to check for oil leakages

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

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

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

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

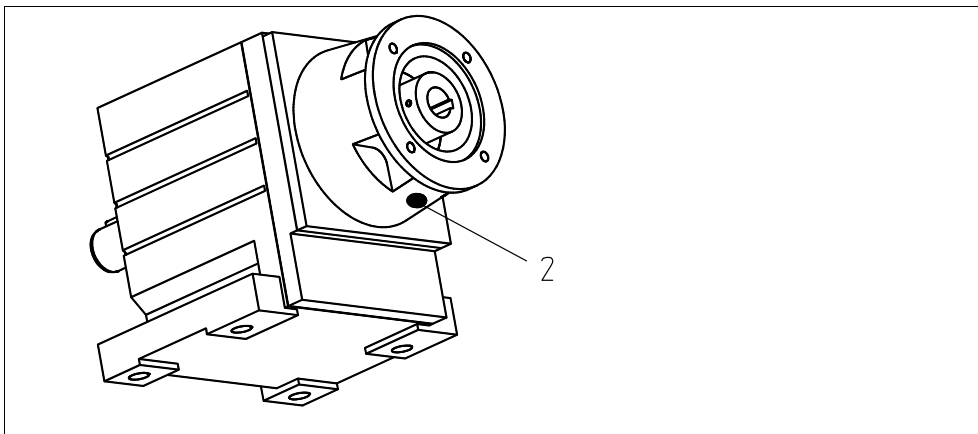


Fig. 2 Standard motor flange; position of the check bore hole for leakages

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

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

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

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

7 Maintenance

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

7.4.1 Oil level check for gearboxes (geared motors)

For gearboxes (geared motors) that are used in zone 1 or 21, a check of the oil level is required in addition to a check for oil leakage. The check must be performed before the initial commissioning and subsequently at regular intervals (☞ 25).

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

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

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

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

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

Tab. 2

3. Correct the oil level if required.



Stop!

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

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

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

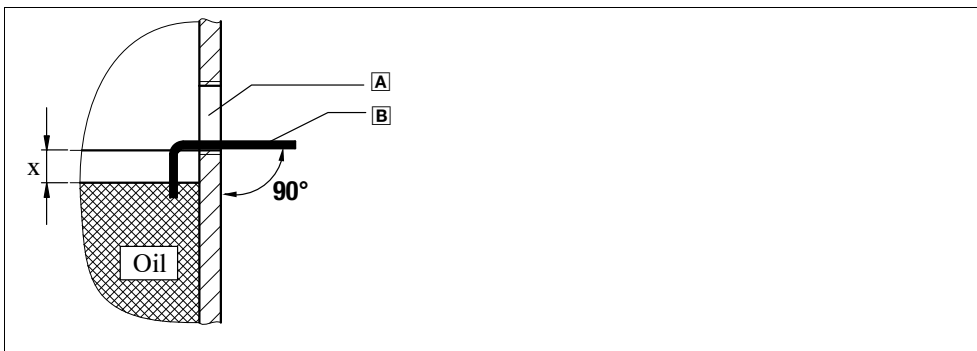


Fig. 3 Oil-level check with auxiliary tool

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

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

Tab. 3

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

Tab. 4 Tightening torques of the oil-level plugs

7 Maintenance

Check intervals for clutches in potentially explosive atmospheres

7.5 Check intervals for clutches in potentially explosive atmospheres

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



Stop!

When the wear limit of max. abrasion is reached (📖 32) the ring gear must be replaced immediately!

7.5.1 Wear and backlash check

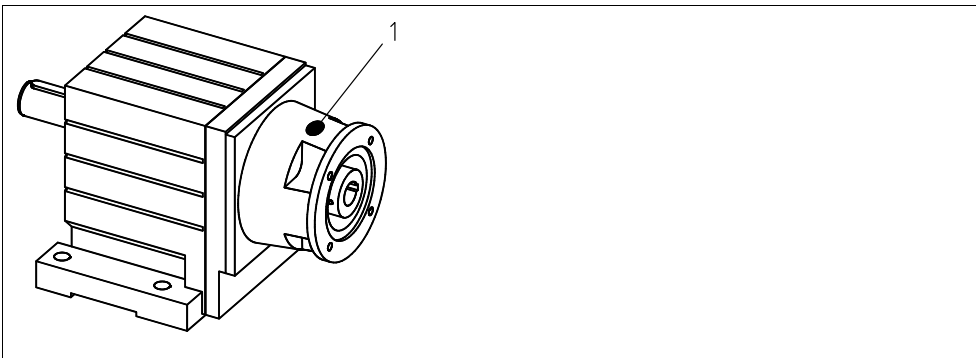


Fig. 4 Standard motor with flange; position of the screw plug (1)

1. Remove the screw plug (item 1) for the wear and backlash check.
2. Check the clearance between clutch hub and elastic ring gear with a feeler gauge (Fig. 5).
3. If the wear limit " $X_{max.}$ " (Tab. 5) is exceeded, the ring gear must be replaced. If the hub shows damages, the complete clutch must be replaced.
4. After performing the test, the opening (item 1) must be closed again with the screw plug.

Check intervals for clutches in potentially explosive atmospheres Wear and backlash check

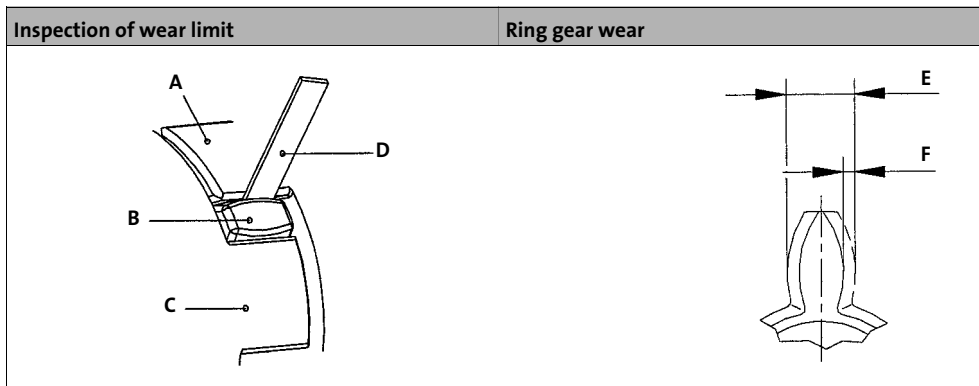


Fig. 5 Inspection: wear

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

Drive size	Wear limits (output side) $X_{max.}$ [mm]
1A	1.25
1B / 2B	0.9
1C / 2C / 3C / 4C	0.9
1D / 2D	0.9
1E / 2E / 3E	1.0
1F / 2F	1.0
1G / 2G / 3G	1.4
1H / 2H / 3H	2.0
1K / 2K	2.25

Tab. 5 Wear limits



Notes





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