

Operating instruction

ATEX

European Directive 2014/34/EU

**Spiral bevel gearboxes
in explosion proof version**



Product Code Spiral Bevel Gearboxes

Gearbox type	Gearbox size	Gear ratio	Bottom-facing side	Fittings side
K / MK;	100	1	A	E (F)
L / ML;	200		B	E (F)
H / MH;	230		C	E (F)
LV; LS	250	↓	D	E (F)
	300		E	D
	370		F	D
	400			
	500	6		

Gearbox type plate

Field	Content
1	Manufacturer, assembly plant, country, calendar week, year of manufacture, CE marking
2	ID number, job number, job position, bottom-facing side
3	Gearbox type, gearbox size, gear ratio, model
4	Max. input drive speed, max. output drive speed
5	Max. admissible rated torque, max. admissible power input
6	Lubricants, lubricant quantity, application factor
7	Ex protection specifications, ambient temperature
8	Reference to operating instructions

Type plate, example

VOGEL		Made in Germany	
ANTRIEBSTECHNIK		BJ29/2011	
ID.	292055	A.	461535 002 D
Typ:	L 100	i=	1,0 BA 30
max.n ₁	1500	n ₂	1500 min ⁻¹
max.M ₂	24 Nm	max.P	3,77 kW
Öl	CLP-HC 150		0,1 Liter c=1,5
Ex	II2GDc, kIIBT4/120°C		
Betriebsanleitung muß beachtet werden			

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1 Safety notices

- ▶ These operating instructions are valid only in connection with the general operating instructions!
- ▶ Observe the operating instructions for explosion-protected motors!
- ▶ In the event of contradictory details, these operating instructions have priority.
- ▶ EMC compatible installation must be ensured, particularly in frequency converter operation!

Failure to observe these operating instructions, especially the maintenance and inspection intervals, results in the expiry of the EC conformity statement.

1.1 Normal use

The gearboxes / geared motors have been designed for use in machinery and plant and must be used as specified in these operating instructions, in the details given on the type plate and in compliance with the text of the order confirmation. They comply with the applicable standards and regulations and with the requirements of Directive 2014/34/EU.

Explosive gas, mist or vapour mixtures or dust coming into contact with hot and/or sparking parts of the gearboxes and static discharges can cause severe personal injury and damage.

Assembling, connecting, starting and maintenance and repair work involving the gearboxes / geared motors and the electrical auxiliary equipment must be made only by qualified technical personnel!

- ▶ During installation, EN 60079-14 must be observed in gas explosion hazard zones and EN 50281-1-2 must be observed in dust explosion hazard zones!

The gearboxes may be used as follows:

- A In Zone 2 (Gas Ex, Category 3G) in explosion hazard groups IIA and IIB.
- B In Zone 22 (Dust Ex, Category 3D) with a minimum ignition power > 3mJ.
- C In Zone 1 (Gas Ex, Category 2G) in the explosion hazard groups IIA and IIB.
- D In Zone 21 (Dust Ex, Category 2D) with a minimum ignition power > 3mJ.

1.2 Definition of notices

To draw attention to hazards, risks and important information, the following signal words and symbols are used in these operating instructions:

Safety notices

Structure of the safety notices:



Hazard!
(identifies the nature and the severity of the hazard)

Notice text
(describes the hazard and ways to avoid it)

Pictogram and signal word



Danger!

Meaning

Risk of personal injury through general source of hazard

Notice of a general hazard which may cause death or severe injury unless special precautions are taken.



Stop!

Damage to property

Notice of potential hazards which may cause damage to property unless special precautions are taken.

User notices

Pictogram and signal word



Notice!

Meaning

Important notice for trouble-free function

2 Mechanical installation

2.1 Preparations

- ▶ Check to make sure that the details on the type plate of the gearbox and in the text of the order confirmation coincide with the admissible conditions of use in explosion hazard atmosphere existing on site:
 - Explosion group
 - Category
 - Zone
 - Temperature class
 - maximum surface temperature
- ▶ Mount the gearbox only in the installation position shown on the type plate!
The deviation of the inclination angle should have max. $\pm 2^\circ$.
- ▶ The maximum input speed and the maximum rated torque shown on the type plate must not be exceeded!
- ▶ Unless another temperature is shown on the type plate, the gearboxes must be used within an ambient temperature range of -20°C to $+40^\circ\text{C}$.

2.2 Ambient media

Precautions to be taken:

- ▶ During installation, no explosive atmosphere, oils, gases, vapours, flammable dust, etc. must exist.
- ▶ The lubricant must match the ambient temperature.

2.3 Mounting / installation site

 **Danger!**

The gearboxes must be mounted on / installed in the customer-provided machinery such that there are no gaps in which dust may settle which may eventually come into contact with moving parts (danger of heat build-up)

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

 **Danger!**

- ▶ The type of construction may be modified only after prior consultation with Vogel. The ATEX approval expires without such consultation!
- ▶ Parts of the gearboxes may be made of aluminium and must be protected from external impact to avoid impact sparking!
- ▶ The gearboxes / geared motors must **not** be used in plants with cathode-type anti-corrosion protection!
- ▶ The gearboxes / geared motors must be integrated into the equipotential bonding system of the plant.

2.4 Assembly of input / output elements

For use in the explosion hazard zone, use only suitable input and output elements!

The suitability of the element can be demonstrated by:

- A** its own ATEX approval or
- B** an ignition hazard assessment in compliance with standard.

Mount transmission elements to the shaft end only by using the pusher tool and/or the centering thread fitted.

The forces from the transmission element must not exceed the admissible radial and axial forces.

 **Danger!**

- ▶ Avoid impact forces acting on the shaft! The rolling contact bearing, the housing and the shaft itself may be damaged.
- ▶ Tighten all screw connections to the prescribed torque and secure with standard screw-locking adhesive!
- ▶ Check the assembly of ATEX approved individual components for any new ignition hazards.

2.4.1 Assembly with belt pulleys

For belt pulleys, the correct belt tension specified by the manufacturer must be observed.



Danger!

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

2.5 Notes on gearboxes with shrink disk



Danger!

Secure all screw connections with commercial screw-locking adhesive!

The customer-side shaft must comply with the following requirements:

- ▶ Adequate strength of the material, tensile yield strength $R_e > 360 \text{ N/mm}^2$ (e. g. use C45 or 42 CrMo4).
- ▶ Median roughness depth $R_z < 15 \mu\text{m}$
- ▶ Shaft fit in quality grade h6



Danger!

Due to differences in friction values, connections in non-rusting steel grades must be checked by Vogel.

The shrink disk must be correctly mounted in strict compliance with the operating instructions. An incorrectly mounted shrink disk may slip and the heat generated by the slippage can be a potential spark source.

The maximum admissible torques of the shrink disk connections must not be exceeded (even for short periods)! Please note the following table.

Gearbox size [-]	Hollow shaft bores [mm]	Max. torque [Nm]
100	18	160
200	25	325
230	32	600
250	35	780
300	42	1160
370	55	2400
400	60	3200
500	80	9000

Table 1 Torques of the shrink disk connections



Danger!

The torques given in Table 1 apply only to torque stress. Consult Vogel if radial or axial forces are expected to act.

2.5.1 Shrink disk and hollow shaft covers (optional)



Danger!

If the cover is supplied with a seal, the seal must be fitted to prevent dust from penetrating the assembly.

Once the cover has been mounted, start a trial run to make sure that the shrink disk or the inserted machine shaft does not brush against the cover.

Protect the cover against impact effect and falling objects. Any protective devices attached must be electrically conductive and be integrated into the equipotential bonding system of the plant.

If the cover is damaged, replace the cover and the seal to prevent dust from penetrating the assembly. If dust penetration is suspected, remove and clean the shrink disk cover. Loose covers must be replaced.

2.6 Shaft seal rings

Shaft seal rings seal the gap between the housing and the rotating shafts.

Shaft seal rings are parts subject to wear and must be replaced once they reach their wear limit.

The service life of shaft seal rings depends on a number of factors and parameters, for instance:

- ▶ Circumferential speed at the sealing lip
- ▶ Temperature
- ▶ Internal pressure inside the gearbox
- ▶ Lubricant viscosity
- ▶ Chemical composition and additives of the lubricants
- ▶ Installation site (supply of the sealing lip with lubricant)
- ▶ Particles and/or metallic abraded matter in the lubricant
- ▶ Shaft sealing ring material

With this large number of different factors and parameters, it is virtually impossible to predict the service life with any degree of accuracy without specific tests and trials. As the service life of the shaft seal rings is subject to these fluctuations, regular checks are an absolute necessity to avoid undetected loss of lubricant in the gearbox (for the intervals, see chapter 5.1.1).

When renewing the shaft seal ring, also check the condition of the sealing lip contact surface on the shaft. If run-in score marks are found, the shaft must be repaired or replaced. Alternatively, the shaft may also be shifted slightly in axial direction to make sure that the sealing lip runs along a new and unmarked surface.

2.7 Lubricants

An adequate quantity of lubricant in the gearbox is absolutely necessary for its safe function. The lubricant guarantees that there will be no dry-running in the metal contacts and no inadmissibly high surface temperatures or mechanical sparking. Undetected loss of lubricant is one of the most substantial hazards. The gearboxes must therefore be regularly checked for any loss of lubricant (see chapter 5.1.1). Regular checks for any leakage and oil level controls must be made.



Danger!

The lubricant must be replaced at fixed intervals (see chapter 5.2).

2.8 Rolling contact bearings

The rolling contact bearings in the gearboxes have a finite useful service life even under normal operating conditions. This so-called fatigue life in rolling contact bearings is a purely statistical value, with the actual service life of a rolling contact bearing showing substantial variances from this statistical value. The rolling contact bearings must therefore be checked / monitored at regular intervals.

The Maintenance intervals chapter lists general periods and intervals for monitoring the rolling contact bearings. For operation in the ex zone of Category 2, the preventive exchange of rolling contact bearings is required after long running periods (see chapter 5.2.1). Vogel can carry out computations to determine the exact nominal service life of rolling contact bearings used in specific applications. This computation may arrive at different monitoring and exchange intervals for the rolling contact bearings.

Monitoring involves the following measurements, for instance:

- ▶ Running noise
- ▶ Temperature
- ▶ Vibration diagnosis
- ▶ Frequency analysis

A combination of several measurements is frequently used. The measurements usually involve controls of the changes in time, i.e., reference values are determined after a brief run-in period, and these reference values are eventually compared with the later measurements. Changes in the operational performance which may be indicative of a pending failure or necessary maintenance work can so be found.

The rolling contact bearing industry offers the appropriate instruments and devices for monitoring the bearing performance (e.g. SKF or FAG). These companies also offer the option of having the bearings monitored by their own experts. Please contact the appropriate manufacturers for details on the most suitable measures for your requirements.

3 Electrical installation

3.1 Motor connection



Note!

Please note the operating instructions for explosion-protected motors!

4 Start-up



Stop!

The drive must not be put into operation until all the items listed have been checked and answered with “yes”!

4.1 Checklist for start-up

Before start-up

What must be checked?

Checked

Delivery:	
<ul style="list-style-type: none"> ▶ Are the items included in the delivery identical with those listed in the documents accompanying the delivery? <ul style="list-style-type: none"> - Immediately report any transport damage to the carrier. - Immediately report any identifiable defects/shortages to the appropriate Vogel agency. 	
Use in the explosion hazard zone:	
<ul style="list-style-type: none"> ▶ Do the following details on the type plate of the gearbox / geared motor correspond to the admissible EX conditions 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"> ▶ Will the ambient temperature range be maintained as specified in the lubricant schedule? <ul style="list-style-type: none"> - Unless another maximum temperature is stamped on the type plate of the gearbox, the maximum ambient temperature of 40°C must not be exceeded during the entire operating period. 	
Ventilation:	
<ul style="list-style-type: none"> ▶ Is the gearbox adequately ventilated? 	
Installation site:	
<ul style="list-style-type: none"> ▶ Does the installation site / position correspond to the installation site / position of the gearbox specified on the type plate? <ul style="list-style-type: none"> - Please note: The installation site / position may be changed only after prior consultation with Vogel. Failure to consult will result in the expiry of the ATEX approval! 	
Oil level in drives of Category 2:	
<ul style="list-style-type: none"> ▶ Has the oil level been checked in the correct installation site / position? ▶ Is the oil level correct? 	
Oil control and drainage plugs / venting elements:	
<ul style="list-style-type: none"> ▶ Are all oil control and drainage plugs and the venting plugs and valves freely accessible? <ul style="list-style-type: none"> - For ventilated gearboxes: remove the shipping braces of the ventilation element and/or mount the ventilation element. 	
Drive input and output elements:	
<ul style="list-style-type: none"> ▶ Are all drive input and output elements suitable for use in the explosion hazard zone? 	
Details on the type plate:	
<ul style="list-style-type: none"> ▶ Will the details given on the type plate of the gearbox not be exceeded? 	
Gearboxes with hollow shaft and shrink disk:	
<ul style="list-style-type: none"> ▶ Has the cowling cover been properly mounted? (see chapter 2.5.1) 	

What must be checked?

Checked

Mains-operated geared motors:	
▶ Do the data given on the type plate of the gearbox and the geared motor correspond to the ambient conditions existing at the site of operation?	
Converter-operated geared motors:	
▶ Is the geared motor approved for converter operation? - The parameterisation of the converter must prevent the overload of the gearbox (type plate on gearbox)	
Drives in installation site / position (motor on top):	
▶ Has the protective cover for the ventilator cowling been attached?	
Equipotential bonding:	
▶ Has the equipotential bonding been safeguarded in the installed position?	

During start-up

What must be checked?

Checked

Surrounding area:	
- Make sure that no explosive atmosphere, oil, acids, gases, vapours exist in the surrounding area!	
Temperature measurement:	
▶ A temperature measurement must be made after 3 hours of operation under maximum load in use! - The temperature must be measured in the area of the input drive at points not exposed to the ventilation air flow. To determine the maximum, it is advisable to take measurements at several measuring points (see chapter 4.3). - An absolute housing surface temperature of 90°C should not be exceeded in order to keep the thermal stress load acting on the shaft sealing rings and the lubricants as low as possible; this precautionary measure has a positive effect on their service life.	
Temperature class T4 in Zone 1 and 2:	
- The limit temperature for temperature class T4 in Zone 1 and 2 must not be exceeded (see chapter 4.4). If the drive runs hotter, it must be put out of operation.	
Absolute temperature:	
▶ Will the maximum admissible absolute temperature of 100°C be exceeded? - If yes, the drive must be put out of operation and Vogel must be consulted.	
Oil change period:	
- Oil changes are determined by the oil temperature (see chapter 5.2).	

4.2 Motor attachment

The connection / linkage between gearbox and motor is made by way of clamping elements. See the following table for the appropriate versions.

Type MK / ML / MH								
Size	100	200	230	250	300	370	400	500
Version	C	C	A	A	A	A	B	B



Caution! To ensure that the motor torque in Version A is transmitted safely also in the event of an emergency stop, a featherkey must be fitted in the motor shaft.

Version A

Degrease the motor shaft and the bore of the clamping sleeve before assembly. Push the clamping sleeve over the motor shaft up to the shaft shoulder. Then tighten the bolts of the profile sleeve in three alternating steps (20% / 50% / 100%), applying the specified torque. The required torque is shown (in Nm) on the clamping sleeve. During assembly, place the gearbox vertically with the motor flange pointing up. Now grease the toothed shaft profile and insert the motor vertically into the toothed shaft profile. Mount and tighten the motor flange bolts.

Version B

Degrease the motor shaft and the bore of the profile sleeve before assembly. Push the profile sleeve over the motor shaft up to the shaft shoulder and mount using the enclosed shrink disk. Tighten the bolts of the shrink disk with the specified torque. The required torque is shown (in Nm) on each shrink disk. During assembly, place the gearbox vertically with the motor flange pointing up. Now grease the toothed shaft profile and insert the motor shaft vertically into the profile bore. Mount and tighten the motor flange bolts.

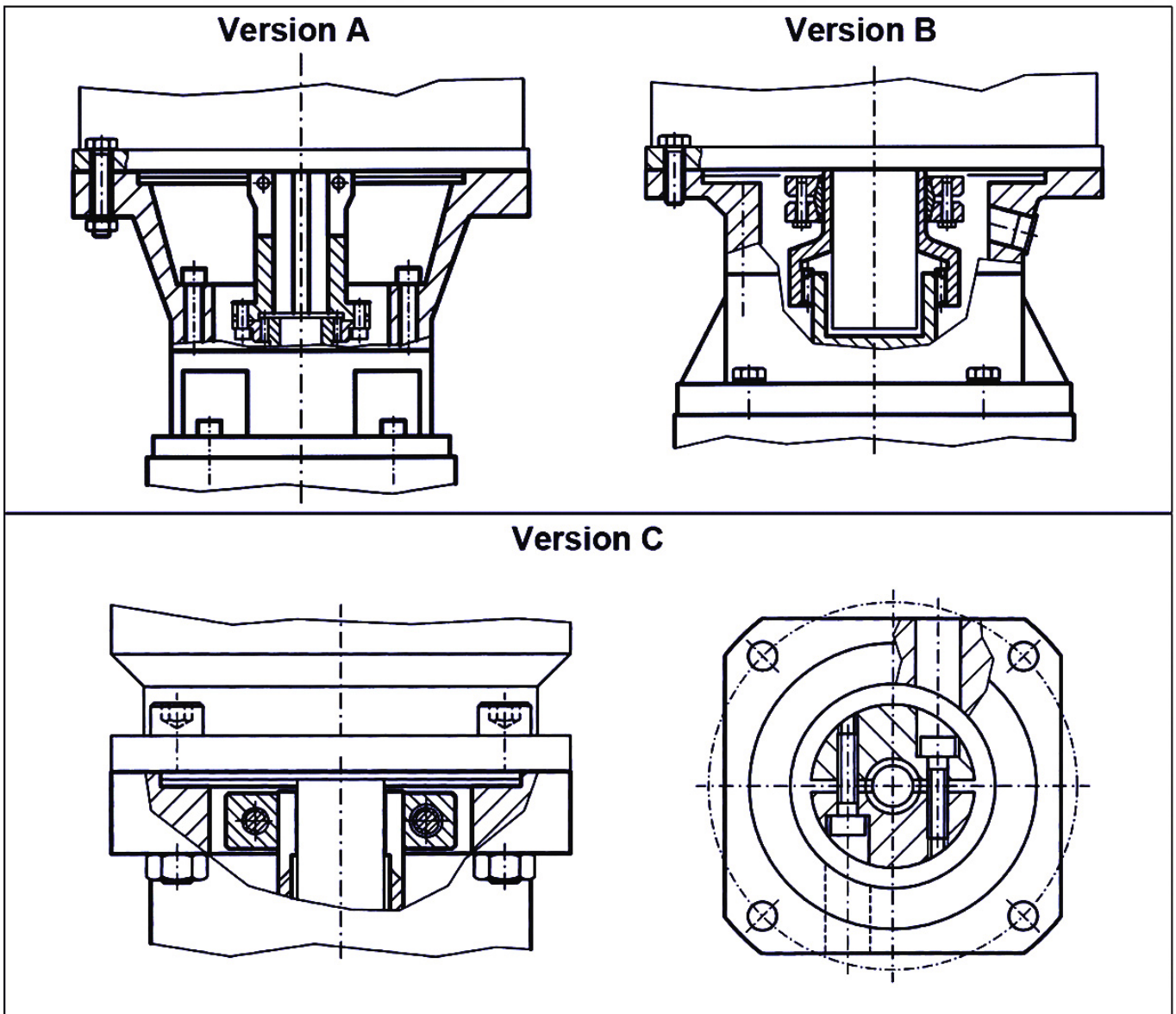
Version C

To assemble the motor, place the gearbox vertically with the motor flange pointing up. Before assembly, degrease the motor shaft and the blind hole bore in the gearbox. Remove the 2 plastic stoppers in the motor flange and push a long hexagon socket spanner through to the inside up to the tangential clamping bolts in the clamping element. Turn the clamping elements into the correct position.

Insert the motor together with the motor shaft vertically from the top into the blind hole bore, making sure that the motor shaft is fully inserted and that the motor flanges are properly placed on top of each other. Tighten the motor flange bolts. Then tighten the bolts of the clamping element in three alternating steps (20% / 50% / 100%), applying the specified torque. The required torque is shown (in Nm) on each clamping element. After assembly, put the 2 enclosed plastic stoppers back in the bores.

Details only for Version C Size 50 – 200

Blind hole Ø / Hollow input shaft-Ø	[mm]	9 x 23	11 x 26	14 x 35	19 x 45	24 x 55	28 x 65
Max. übertragbares Drehmoment des Spannelementes / Max. torque transmission of the shrink disk	[Nm]	30	40	55	75 (Grösse/Size 100) 125 (Grösse/Size 200)	160	180
Schraubenanzugsmoment / Bolt tightening torque	[Nm]	18	18	18	18 (Grösse/Size 100) 39 (Grösse/Size 200)	43	43
Schraubengrösse und Qualität / Bolt size and grade	-	M6/12.9	M6/12.9	M6/12.9	M6/12.9 (Grösse/Size 100) M8/12.9 (Grösse/Size 200)	M8/12.9	M8/12.9



4.3 Measuring the surface temperature

During the start-up of the gearbox, the surface temperature **MUST** be measured under maximum load in use. The maximum surface temperature is usually reached after about 3 hours.

The temperature must be measured in the area of the input drive at points not exposed to the ventilation air flow. To determine the maximum, it is advisable to take measurements at several measuring points.

The maximum admissible absolute temperature is 100°C. For temperature class T4 in Zone 1 or 2, the limit temperature under chapter 4.4 must be observed!



Danger!

If the temperature is higher than the specified value, the gearbox must immediately be put out of operation and Vogel must be consulted!

4.4 Surface limit temperature for temperature class T4 in Zone 1 and 2

As the geared motors are used and positioned in many different sites and applications, every precaution must be taken to ensure that the maximum temperature in the gearbox does not exceed 135°C even under the most unfavourable conditions. The maximum temperature measured on the outside of the housing (see chapter 4.3) must not exceed 90°C.

5 Maintenance



Danger!

If any unusual operating noise, vibrations or increased temperatures occur in the gearboxes during or in-between the prescribed checks, the gearbox must immediately be put out of operation and maintenance work must be carried out!

The specifications given in the pertinent guidelines, directives and standards (e.g. the regulations of the employer's liability insurance association [BGV A2], the operation regulations [EN 50110], the installation regulations EN 60079-14 and EN 50281-1-2) and the maintenance and repair regulations [EN 60079-17]) must be observed!

Plastic parts must be cleaned with a moist cloth to avoid static charges from building up.

5.1 Maintenance intervals

In analogy with EN 60079-17, the following terms are used in this chapter.

Visual check

A regular check in which visible, tangible or audible defects are found without the use of access equipment or tools.

Close check

A regular check in which – in addition to the aspects of the visual check – defects are identified with the help of tools and/or measuring instruments.

Detail check

A regular check in which – in addition to the close check – the gearbox or the geared motor is subject to closer scrutiny.

Inspection

Work involving the careful examination of an object with the aim of obtaining reliable data on the condition of the object, with such work carried out without dismantling or, if required with partial dismantling and using additional measures such as measurements.

Maintenance and repairs

A combination of all activities carried out to maintain or return an object (in this case the gearbox or the geared motor) in / into a condition which complies with the requirements of the appropriate specifications and safeguards the required function.



Danger!

For the safe operation in terms of explosion protection, the maintenance intervals **MUST** be observed!

Failure to observe the maintenance intervals will result in the expiry of the EC conformity statement!

5.1.1 Regular checks

The following time intervals may be doubled for use in Zone 2 and/or 22 and in installation site / positions A, B, C, E and F.

Type of check	Visual	Close	Detail
Checks at time intervals in terms of operating hours:		500 h	3000 h
At the latest after:	daily	3 months	6 months
Activity			
Visual check of the geared motor. Check oil level in oil-level sight glass. Remove dust, if required. Removal of dust deposits recommended at a dust layer thickness of 1 mm and greater.	X		
Check for oil leakage (see chapter 5.4) Check oil level with integrated motor attachment (see chapter 5.4.1). The oil level control at this point serves to check for leakages at the shaft sealing ring of the motor. Check for unusual operating noise, vibrations and impermissibly high temperatures.		X	
Check rubber buffers of the torque support, replace if worn or damaged. Check oil level (only drives in Category 2) For ventilated gearboxes: Check air passage of the ventilation element and clean (e.g. blowing through) or replace, if necessary. Check the gearbox mounting (base, flange and shrink disk mountings).			X
Checking the electric motors:	In compliance with the operating instructions for the motors		

5.2 Maintenance and repairs

Danger!

Work involving the repair of explosion-protected electric machines must be carried out only by the manufacturer or by suitably qualified personnel in specialist workshops equipped for such work. Original spare parts made by Vogel must be used. The work steps as given in the manufacturer's instructions must be followed.

Operational equipment modified or repaired in parts on which explosion protection depends must be returned to normal operation only after an expert has found and attested the compliance with the applicable technical regulations.

Type of check	Maintenance	Repair
Maintenance / repairs in time intervals measured in operating hours:	According to diagram ¹⁾	According to rolling contact maintenance schedule (see chapter 5.2.1) ²⁾
At the latest after:	5 years	---
Activities Change oil Renew shaft ring seals, check condition of sealing lip running surface, repair, if necessary. Renew rolling contact bearing grease. For ventilated gearboxes: renew ventilation element.	X	
Renewing the rolling contact bearings		X
Maintenance of the electric motors used	In compliance with the operating instructions for the motors	
¹⁾ Determining the time interval with the help of temperature measurement (see chapter 4.3) and the oil change diagram.		
²⁾ Longer change intervals may be possible. Consult Vogel for computations.		

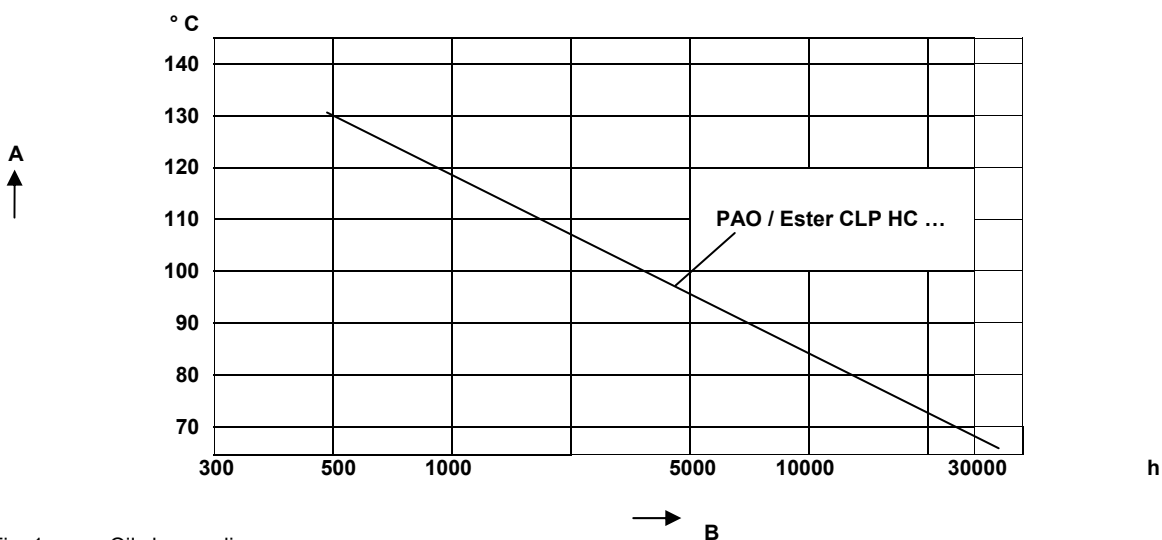


Fig. 1 Oil change diagram

A Oil temperature
B Operating hours

5.2.1 Determining the rolling contact bearing maintenance intervals for gearboxes without motors

The maintenance intervals for the rolling contact bearings must be determined depending on the capacity utilisation of the gearbox. Depending on load, the variable k is calculated and the maintenance interval is determined from the rolling contact bearing maintenance schedule.

The variable k must always be smaller than ≥ 1 !

Under constant load

$$k = \frac{T_{\text{adm. gearbox}}}{T_{\text{required machine}}} \quad \text{with } k \geq 1$$

Under variable load

with:

$$T_{\text{equivalent}} = \sqrt[3]{T_1^3 \cdot \frac{n_1}{n_m} \cdot \frac{q_1}{100} + T_2^3 \cdot \frac{n_2}{n_m} \cdot \frac{q_2}{100} + \dots}$$

and the average rotary speed n_m determined from:

$$n_m = n_1 \cdot \frac{q_1}{100} + n_2 \cdot \frac{q_2}{100} + \dots$$

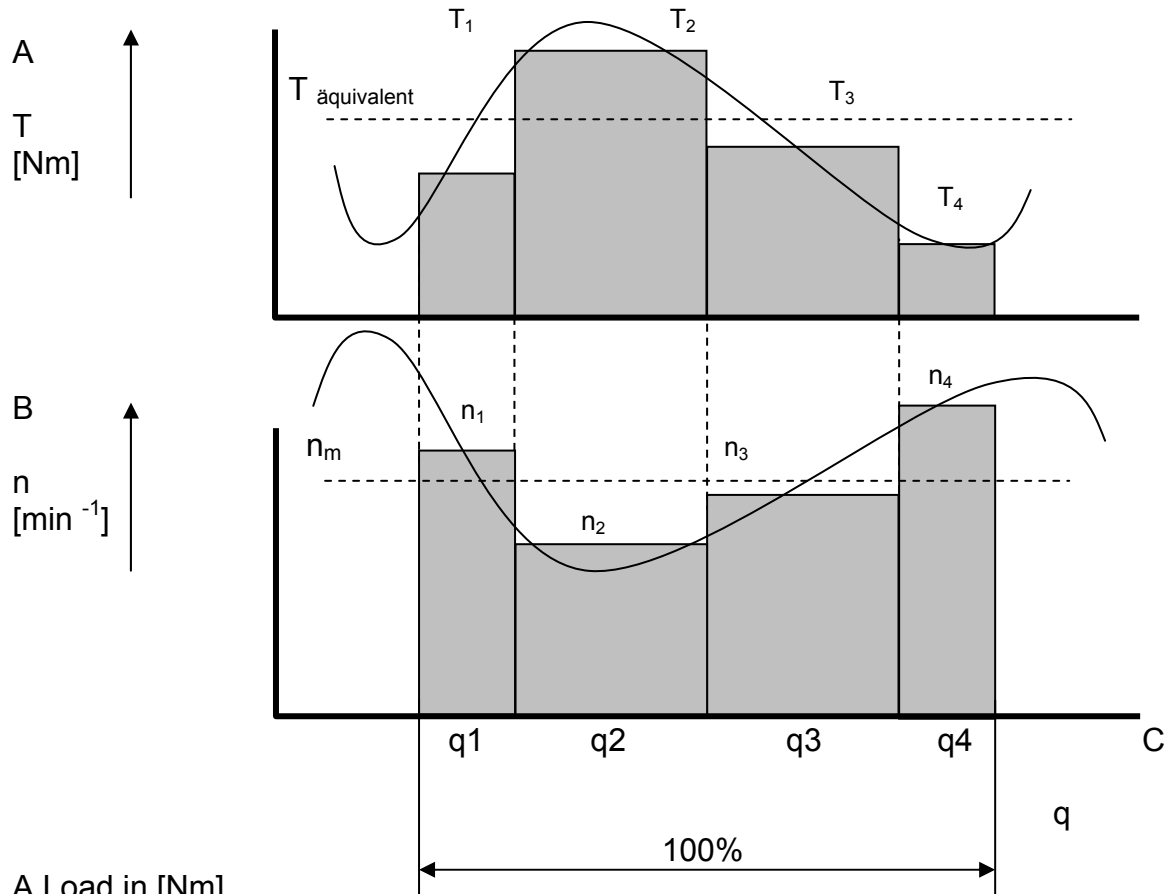
resulting in:

$$k = \frac{T_{\text{adm. gearbox}}}{T_{\text{equivalent}}} \quad \text{with } k \geq 1$$

Explanations:

$n_{1, 2, \dots}$	Averaged rotary speed in [min-1] in the time intervals 1, 2...
$q_{1, 2, \dots}$	Time fraction in [%] in the time intervals 1, 2, ...
$T_{1, 2, \dots}$	Averaged load in [Nm] in the time intervals 1, 2, ...

Stoppage times must not be included in the above calculation!



A Load in [Nm]
 B Rotary speed in [min-1]
 C Time fraction in [%]

Rolling contact bearings – maintenance schedule

K	Maintenance interval [h]
1.0	6000
1.2	10000
1.4	16000
1.6	24000
1.8	35000
> 2.0	48000

5.3 Lubricant schedule ATEX gearboxes

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

Ambient temperature [°C]			DIN 51517-3:CLP ISO 12925-1: CKC / CKD			
-50	0	+50				
Shell	-20		+50 ¹⁾	CLP HC	VG 320	Omala S4 GX 320
	-25		+40	CLP HC	VG 150	Omala S4 GX 150
	-40	0 ²⁾		CLP HC	VG 46	Cassida HF 46 / USDA H1
Klüber Lubrication	-20		+50 ¹⁾	CLP HC	VG 320	KLübersynth EG 4-320
	-25		+40	CLP HC	VG 150	KLübersynth EG 4-150
	-30	0 ²⁾				
	-40	0 ²⁾		CLP HC	VG 46	Klüber Summit HySyn FG 46
Fuchs	-20		+50 ¹⁾	CLP HC	VG 320	Renolin Unisyn CLP HC 320
	-25		+40	CLP HC	VG 150	Renolin Unisyn CLP HC 150
Mobil	-20		+50 ¹⁾	CLP HC	VG 320	Mobil SHC 632
	-25		+40	CLP HC	VG 150	Mobil SHC 629 ³⁾
	-40	0 ²⁾		CLP HC	VG 68	Mobil SHC 626

When selecting the lubricants, please note the following legend to the lubricant table!

CLP HC → Synthetic hydrocarbons or polyalphaolefine oil

- 1) → For ambient temperatures above 40°C, please call us for details on the conditions of use!
- 2) → Observe the critical run-up performance at low temperatures! Special measures for the motor bearing and the NBR shaft sealing rings are required for temperatures below -25°C!
- 3) → Factory-filled lubricant

5.3.1 Rolling contact bearing greases

To regrease the rolling contact bearings and to grease the shaft sealing ring lip in the Vogel ATEX gearboxes in the ambient temperature range from -30 °C to +50 °C use the grease Klüber Petamo 133N.

The following grease quantities are required:

- ▶ For fast-running bearings (motor and gearbox input side), pack approx. one third of the cavities between the rolling contact bearing shells with grease.
- ▶ For slower-running bearings (in gearboxes and gearbox output side), pack approx. two thirds of the cavities between the rolling contact bearing shells with grease.

5.4 Checks for oil leakages

Check the gearboxes / geared motors for leakages in the periods specified in chapter 5.1.1 Maintenance intervals.

Carry out a visual check of the entire gearbox / geared motor. Lubricant leakages can be identified by streaks or drops on the gearbox / geared motor or lubricant collecting underneath the gearbox / geared motor.

Leakages should usually be expected on the shaft sealing rings. Other potential leakage points are the joints between the housing sections, flanges, lids, covers, etc.

If a leak is detected, immediately check the filling level of the lubricant and refill up to the required level, if necessary.

- ▶ If the leak involved only a small quantity of lubricant, operations can normally continue on condition that the level is checked more frequently to rule out any undetected increase in the leakage volume. The leak must be repaired at the earliest possible time after detection.
- ▶ Larger leakages must be repaired immediately.

When renewing the shaft seal ring, also check the condition of the sealing lip contact surface on the shaft. If run-in score marks are found, the shaft must be repaired or replaced. Alternatively, the shaft may also be shifted slightly in axial direction to make sure that the sealing lip runs along a new and unmarked surface.

5.4.1 Controlling the oil level in gearboxes

Gearboxes (geared motors) of Category 2 require not only checks for leakages, but also regular checks of the oil level. The checks must be carried out before the first start-up and after that at regular intervals (see chapter 5.1.1).

The gearboxes are fitted with one or several oil level plugs or oil-level sight glasses. Depending on the oil level control equipment fitted, carry out the oil level checks as follows.

Geared motors with direct motor attachment (without standard dome) are also fitted with oil-level sight glass or oil level plug in Category 3. This allows controls for oil loss in the gearbox in the event of undetected oil seepage into the motor through leaks in the shaft seal ring of the motor.

5.4.1.1 Oil level checks for gearboxes with oil-level sight glass

1. Switch off the geared motor.
2. Wait for a few minutes to allow the oil to collect in the sump.
3. The oil level must be roughly in the middle of the sight glass. The following levels above or below the middle of the sight glass are permitted:

Gearbox size	100...200	230...300	370...500
Tolerance oil level [mm]	2	3	5

Table 2

4. If necessary, refill oil up to the required level.



Stop!

When refilling, use the same oil grade as the one that has already been used in the gearbox.

5.4.1.2 Oil level checks for gearboxes with oil level plugs

1. Take the geared motor off circuit and secure the motor against inadvertent activation.
2. Wait for a few minutes to allow the oil to collect in the sump.
3. Determine the position of the oil level plug. The oil level plugs are marked in red, or a drawing is attached which shows the position of the plug.
4. Remove the oil level plug.
5. Checking the oil level.
 - max. oil level: bottom edge of the oil level bore
 - min. oil level: X mm below the bottom edge of the oil level bore (see Fig. 3).
6. Refill up to the required level, if necessary. Use the same oil grade as the one already used in the gearbox.
7. Close the oil level plug.

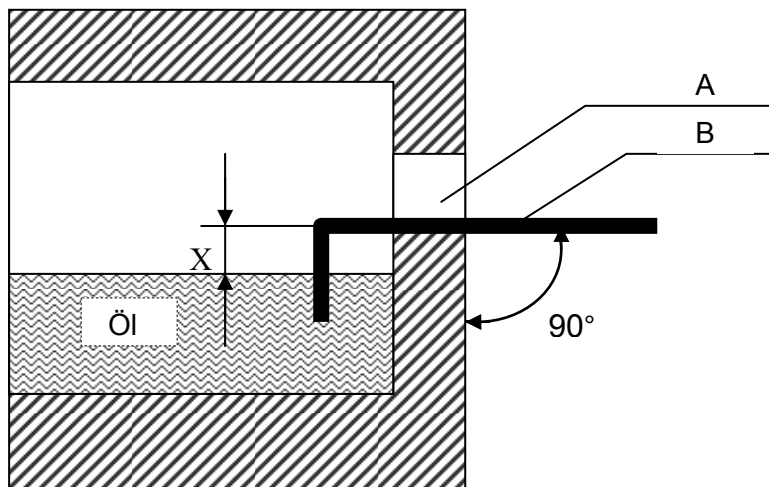


Fig. 3 Oil level control with auxiliary tool

- A Oil control bore
- B Auxiliary tool, e.g. angled wire (not supplied)

Gearbox size	100...200	230...300	370...500
Dimension X [mm]	2	3	5

Table 3

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EC Conformity Statement

Within the meaning of EC Directive Explosion Protection 2014/34/EU

Product	Type description	Specification according to type plate
Spiral Bevel Gearboxes	K, L, H, LV, LS, MK, ML, MH	II 2GD

This is to confirm that the above gearbox with mechanically constant gear ratio made by Wilhelm Vogel GmbH complies with the requirements laid down in the Directives by the Council for the Harmonisation of the Regulations in the Member States for Appliances and Protection Systems for Proper Use in Explosion Hazard Zones (2014/34/EU) as amended. The statement applies to all specimen items manufactured in accordance with the production documentation deposited with the manufacturer and which are deemed to be an integral part of this statement.

The gearboxes are components of drive engineering and may be installed only by specialist and qualified personnel in

**Zone 1 and 21 (Category II 2GD)
and
Zone 2 and 22 (Category II 3GD)**

The pertinent safety regulations must be observed!

Norms and standards applied:

EN 1127-1: 2011	EN 1127-1	Potentially explosive atmospheres, explosion protection, Part 1: Principles and Methodology.
EN 13463-1: 2009	EN 13463-1	Non-electric appliances for use in explosion hazard zones, Part 1: Principles and Requirements.
EN 13463-5: 2011	EN 13463-5	Non-electric appliances for use in potentially explosive atmospheres, Part 5: Protection through constructive design safety.
EN 13463-8: 2003	EN 13463-8	Non-electric appliances for use in potentially explosive atmospheres, Part 8: Protection through liquid encapsulation.

Oberboihingen, dated 26 October 2016


Managing Director
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Product	Type description	Specification according to type plate
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The gearboxes are components of drive engineering and may be installed only by specialist and qualified personnel in

Zone 2 and 22 (Category II 3GD)

The pertinent safety regulations must be observed!

Norms and standards applied:

EN 1127-1: 2011	EN 1127-1	Potentially explosive atmospheres, explosion protection, Part 1: Principles and Methodology.
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