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KOELLMANN
GEAR

Operating Instruction for Extruder Gears



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1. Basic Instructions

This operating instruction (OI) is valid for all kinds of gear transmissions hereafter referred to as gearbox in the following, made by Thielenhaus Technologies GmbH, division KOELLMANN GEAR, and hereafter referred to as KOELLMANN GEAR. This OI is valid until replaced by a new operating instruction.

For information or descriptions of specific gearbox types see the respective technical data sheet, dimension sheet or spare part drawing.

Adhering to the OI is a prerequisite for the safety of operation of this gearbox. Therefore it is necessary that it will be read, understood and adhered to by all persons responsible for the transport, storage, set-up, installation and operation.

The safety instructions are introduced by signal words describing the effect of the danger.

The safety instructions must be adhered to and acted upon cautiously in order to avoid accidents and damages to persons and goods.

DANGER

This signal word describes an immediate threat resulting in serious injury or even death.

WARNING

This signal word describes a probable danger resulting in serious injury or even death.

CAUTION

This signal word describes a probable danger resulting in minor to heavy injuries.

NOTE

This signal word describes technical instructions that need to be adhered to in order to avoid damages and functional issues with the gearbox.

Information without a signal word describes operational tips or some very important information.

NOTE

During warranty the gearbox must only be opened by a service technician from KOELLMANN GEAR or by a qualified specialist only against our authorisation in writing. Otherwise we refrain from any obligation to meet the warranty claim. Furthermore, we will not assume any liability from damages resulting from the non-adherence to the OI.

The gearbox is designed for mounting into commercial installations. The use is strictly limited to the characteristics and qualities defined in the order.

With improper maintenance the warranty will expire. In case of complaints you need to provide respective proof of a professional maintenance as well as of proper operating conditions.

The gearbox is designed according to the data in the technical data sheet.

NOTE

In case you need to deviate from the data in the data sheet you need to discuss this with us as we will need another technical clarification.

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For any technical questions please contact us at the address below and give us the gearbox type and gearbox number found on the type plate:

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We reserve the right to any technical alterations of our gearboxes and our documentation. This operating instruction and servicing manual must be handed out to all necessary persons for information. All deliveries are subject to our sales and delivery conditions.

2. Safety information

Adhering to the OI and all safety instructions therein is a prerequisite for the safety of operation of this gearbox and the avoidance of damages to persons and goods.

The set-up, operation, maintenance and servicing of the gearbox must be carried out by persons instructed on this gearbox and respectively trained (qualified personnel).

Any works must be carried out with the gearbox switched off. You must make sure that an unintentional switching on by third parties is impossible. A sign placed at the switch of the drive motor must clearly state that there are works being carried out at the gearbox and the key must be kept safe by a responsible worker.

No welding works are allowed neither at the gearbox nor at parts connected to it. The gearbox must not be used as ground pin for welding works.

During start-up a potential equalisation must be carried out according to the applicable regulations and directives. Any electrical works at the gearbox must be carried out by qualified electrical personnel. No current must pass through the gearbox. Therefore the gearbox must be insulated and earthed professionally.

In case there are no threaded bores for a ground terminal at the gearbox you will have to choose other appropriate means.

During operation the gearbox may heat up on the surface to 80°C. Act with caution when touching the gearbox with bare limbs during and after operation depending on the temperature level and the respective time.

Any rotating parts like input shaft, coupling, pulley with V-belt and output shaft must be protected against accidental contact.

The type plate and any other plates must be legible at any time and must not be covered by anything.

In case there is uncharacteristic noise during normal operation from the gearbox or in case the gearbox temperature should rise unrepresentatively the machine must be stopped immediately in order to avoid further damage.

If not agreed otherwise in the written contract our gearboxes are delivered without oil. Therefore you need to carry out a first filling according to chapter 7.2, before first start-up of the gearbox as otherwise it will be damaged and the warranty will be forfeited.

With an oil change the inside of the gearbox must not be impinged with compressed air in order to fasten the outflow of the used oil.

The used oil must be transferred to an appropriate vessel and must be disposed of according to the actual environmental protection regulations.

For cleansing the outside of the gearbox you must not use any high-pressure cleaner as this may lead to damages of the sealing lip of the shaft seal and of other parts and lead to water entering the air filter.

3. Technical Data

As this OI is valid for all kinds of gear transmissions supplied by KOELLMANN GEAR the technical data is found on each respective data sheet. They contain the following information:

- Gearbox type
- Dimension sheet - No.
- Spare parts list
- Customer name
- Customer order - No. for first orders
- Order - No. for first orders
- Type – position – model

The gearbox must only be used in the stated positions. B Any changes can only be made after consultation with KOELLMANN GEAR.

- Nominal power (motor power)
- Input speed
- Output speed
- Transmission
- Permissible output torque *
- Permissible starting torque **
- Permissible radial force at center of input pivot
- Weight
- Oil type, oil viscosity and oil quantity to be used

The oil quantity in the operating instruction, in the data sheet and on the type plate is meant only for oil purchase purposes. The actual quantity to be filled into the gearbox depends on the oil level indicator at the gearbox in upright position (see also chapter 7,2 start-up)

- External cooling via cooling coil or external unit
- Maximum water temperature and water flow volume
- Particularities

* The permissible drive torque for a continuous operation of the extruder always includes an additional application factor. With no application factor stated in the data sheet it is 1,25 (according to DIN 3990, part 1).

NOTE

**** Severe damage with incorrect start-up!**

An incorrect start-up may cause severe damage to the extruder.

Therefore:

The extruder may only be started if the material within the worm has been completely melted.

4. Technical Description

4.1. General Description

The gearboxes described in this chapter are one step or multiple step spur gears for driving a single screw extruder gear. The special feature of the gears is the integrated axial thrust bearing, absorbing the axial forces resulting from the extrusion operation.

Depending on the gearbox type the gears feature different models and positioning. See the respective data sheets and dimension sheets (see chapter 3).

The test run carried out at our works guarantees a faultless function of all used assemblies.

4.2. Rotation Direction

NOTE

Destruction or operation failure due to wrong rotation direction!

In order to avoid destruction or operational failure of the gearbox the rotation direction of the drive shaft must correspond to the dimension sheet or the directional arrow.

4.3. Housing

The housing features a one-part or two-part design depending on the gearbox type. Due to the radial and axial forces within the gearbox they are designed to be particularly rigid. The spheroidal graphite cast iron design renders the whole system dynamically durable and vibration reduced.

4.4. Gearing

The optimised helical gearing is case hardened and ground. This guarantees a high power transfer at low operating noise.

4.5. Shaft Bedding

All shafts are bedded in anti-friction bearings. The kind of bedding depends on the gearbox type.

4.6. Sealings

Rotary shaft seals are used for sealing both input and output shafts. Rotary shaft seals are liable to factors like speed, temperature, greasing quality and cleanliness of the surrounding. A timely exchange will prevent run-in grooves on the shafts. A reference for a professional exchange can be found on the websites of well-known manufacturers like www.simrit.com.

4.7. Cooling

Depending on the running time, the load, the speed, and the surrounding temperature a gearbox cooling will be necessary in order to guarantee the usability of the machine parts. See also chapter 9.

4.7.1 Convection Cooling

With a mere convection cooling the heat produced during the operation is emitted to the surrounding through the housing. It must be insured that the necessary circulation of the air will not be hampered by customer assemblies, noise absorption hoods or other casings.

4.7.2 Cooling by Cooling Coil

In case the gearbox features a cooling coil it will have to be professionally connected to a water circuit. The necessary parameters like water inflow temperature and water flow volume can be found in the data sheet. In case the gearbox is to be operated at other performance data we need to be consulted beforehand in order to avoid an inadequate cooling.

The maximum operating pressure is 10 bar.

With this kind of cooling there needs to be a functioning convection in order to effect a heat removal through the housing and thus achieve an even better cooling.

4.7.3 Cooling by Pump and Chiller

In case a cooling coil is not efficient a pump with a chiller can enhance the cooling capacity. The pump may be mechanical or electrical e.g. through a connection to the intermediate shaft or by using a pump with electric motor on a separate plate (external oil supply).

For further information regarding the cooling unit the necessary cooling water volume and permissible inflow temperature refer to the data sheet, the dimension sheet and the operating instruction of the cooling unit within the full documentation of the gearbox.

4.7.3 Water Quality

The content of free flowing solids should lie below 10 mg/l. The particle size must not exceed 0,5 mm (globular). Filamentary solids will quickly lead to an increase in pressure loss.

The following ions are not corrosive under normal conditions:
Iron, potassium, manganese, sodium, nitrate, nitrite, phosphate.

The following permissible limits must be kept:

pH-value	6,0-9,0	electrical conductivity	< 500 μ S/cm
Cl ⁻	< 50 ppm	SO ₄ ⁻²	< 50 ppm
CaCO ₃	< 50 ppm	Fe	< 0,3 ppm
NH ₃	< 2 ppm	NO ₃	< 100 ppm
S ⁻²	not suitable	SiO ₂	< 30 ppm
NH ₄ ⁺	< 0,1 ppm	free chlorine	< 0,1 ppm
CO ₃ ⁻²	< 0,4 ppm		

4.8. Lubrication

The lubrication of the gearbox is handled by immersion lubrication.

4.9. Monitoring Units

The oil level is monitored by an oil level indicator or an oil gauge at the gearbox. The general monitoring can be effected by further components from our accessories.

For further information regarding monitoring please refer to the respective operating instructions of the monitoring units. These operating instructions are part of the full documentation of the gearbox.

4.10. Other Attached Elements

Further information to other attached elements (e.g. couplings,...) can be found in the respective manuals of the components. These manuals are part of the complete documentation of the gearbox.

5. Transport and Storage

5.1. Transport

The gearbox is packed in such a way that a safe transport can be warranted for the respective form of transport.

⚠ WARNING

Danger to life through suspended loads!

Lifting operations may lead to a swing out of loads which may then fall down and thus may cause severe injury and even death.

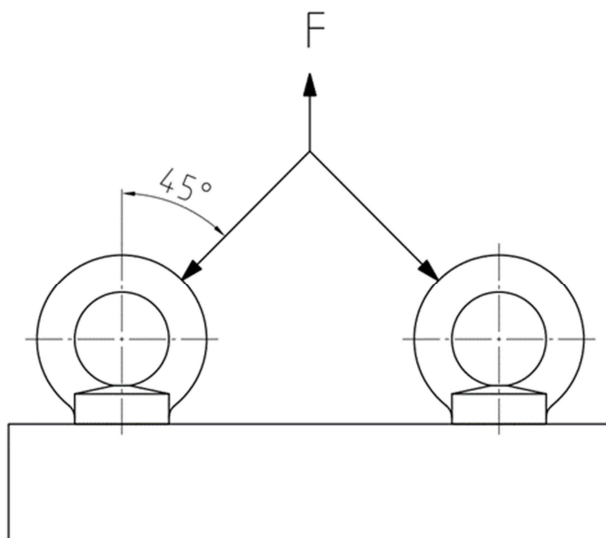
Therefore:

Never stand under suspended loads.

Only use authorised lifting gears and lifting tackles with correct carrying capacity.

Set down the load before leaving the workplace.

If the customer wishes The gearbox top features transport ring bolts. The size of the ring bolts is designed according to DIN 580. They must be fastened tight against the contact area. When fastening ropes or chains you must guarantee a maximum spread angle of 45° in order to not exceed the maximum load capacity of the ring bolts.



⚠ WARNING

Danger to life through incorrect fastening!

Incorrect fastening can lead to severe injury and even death.

Therefore only use the ring bolts for lifting the gearbox itself never for lifting the gearbox connected to other machine elements.

Normally the ring bolts may be removed after transport and installation of the gearbox and can be discarded. With some gearbox types, however, the bores must be sealed after removal of the ring bolts. There is a respective note in the dimension sheet.

With gearboxes already filled with oil the air filter is exchanged against a locking bolt during transport. Replace the air filter before operation.

Take care not to damage attachments like temperature resistors (PT 100) or tubing during transport.

5.2. Storage

The gearbox must be stored in a vibration-free space as vibrations during standstill may lead to damages at the gearing and the anti-friction bearings. The gearbox should be protected against direct sunlight.

All adhesive tape must be removed completely from the outside metallic bright functional surfaces.

The inside of the gearbox is protected against surface and contact erosion by a preservative. If the gearbox is not used immediately it must be protected against environmental influences and stored in a dry room at a room temperature of approx. 20°C. It is imperative to keep the temperature at a constant level as temperature fluctuations may lead to condensation within the gearbox. The protection under such normal storage conditions will keep up to 6 months.

In case the gearbox is to be stored longer than 6 months it must be filled with oil. The oil level must be the same as under operating conditions. We recommend to use the oil viscosity according to the type plate in order to eliminate the danger of mix-ups.

The thread opening must be closed with a locking screw after filling.
Take care not to introduce any dirt into the gearbox.

Following this procedure the input shaft will have to be turned every 6 months until the output shaft has revolved 2 to 3 times.

NOTE

Before start-up the oil level must be lowered again and the air filter must be returned. See also chapter 7, start-up.

6. Assembly

6.1. General

The assembly of the gearbox must be carried out by trained and qualified personnel.

⚠ WARNING

Risk of injury through inadequate qualification!

Mishandling can lead to severe damage to persons and goods.

Therefore:

All works must be done by qualified personnel, see following table.

Activity	Persons	Trained Persons	Trained Persons with technical education	Skilled electrician*)	Specialists*) with additional qualification in pneumatics	Specialists*) with additional qualification in hydraulics
Set-up			●			
First start-up			●			
Installation			●	●		
Operation		●				
Electrical work				●		
Cleaning		●				
Packing/transport		●				
Disposal		●				

*) A specialist is a person who has received specific technical training and based on his knowledge and experience as well on his awareness of the appropriate regulations can therefore properly assess the work entrusted and possible dangers.

Before installation all notes in chapter 5 regarding transport and storage must be read and carried out respectively.

⚠ WARNING

Danger to life through incorrect fastening!

Incorrect fastening can lead to the gearbox falling down and thus to severe injury and even death.

Therefore:

Only use the ring bolts for lifting the gearbox. The ring bolts must be tightened against the contact surface.

When designing the machine you must provide enough free space around the gearbox for later servicing and maintenance works as well as for an exchange of the gearbox itself. Oil drainage and oil level indicators should be easily accessible for regular checking.

Before installing further attachments like couplings, pulleys, cylinders or other parts the temporary corrosion protection of the gearbox must be removed completely.

NOTE

Leakage caused by solvents!

Use of solvents for removing corrosion protection may spread onto shaft sealings and lead to leakage.

Therefore:

Do not use solvents.

The coupling or the pulley must be drawn onto the input shaft with the help of a thread alignment.

Only paired V-belts must be used. The balance quality of the V-belt disk must be between 6.3 and 2.5 according to VDI 2060.

When mounting the pulley and the following tensioning of the V-belts you must make sure that you do not exceed the maximum radial force according to the data sheet (acting on centre of input pin). Otherwise the input shaft will be deflected unacceptably high leading to an overload of the bearings and gearings.

The two pulleys must not be offset.

NOTE

Destruction by shock and impact!

Shocks or impact may lead to damage on inner parts like gearing, anti-friction bearings and safety rings.

Therefore:

Avoid shocks and impact.

In case you want to use a cooling coil it will need to be connected and its screw joints must be checked for leakage. When deciding on the pipe diameter you must take into consideration all the named parameters on the data sheet like maximum water temperature and water flow volume will be achieved.

Air filter, oil level indicator and oil drain plug must be screwed into the respective threaded bores. The allocation depends on the location and will be found in the dimension sheet.

All intended monitoring devices must be connected and checked (see dimension sheet).

Carry out the potential equalisation according to the valid rules and regulations. These connections may only be carried out by qualified electricians. In case there are no threaded bores for ground connections you will have to use other appropriate means.

NOTE

Damage to anti-friction bearings and gearing through current flow!
You must make sure that no current may flow through the gearbox when used together with electrical machines (e.g. motors). Current flow may occur e.g. through flash overs, short circuits or conducting dust layers.

Therefore:

Use insulators and ground the gearbox professionally.

6.2. Alignment

The attachments at the input and output side must be aligned to the gearbox. When installing the attachments you must adhere to the installation manual of the respective manufacturers.

NOTE

Damage through incorrect alignment!

Incorrect alignment will lead to impermissible forces and torques.

Therefore:

Align gearbox and attachments correctly.

6.4. Finishing Works

Before start-up all screws between the gearbox mounting surface(s) and the machine frame must be checked for tightness. After fastening of all screws the alignment must be re-checked.

WARNING

Danger to life by accidental touching!

Accidental touching may lead to contact with rotating parts like gear shafts, couplings etc.. This may lead to heavy injuries or even death.

Therefore:

All rotating parts like gear shafts, couplings, pulleys with V-belts etc. must be guarded against accidental touching.

7. Start-up

7.1. Flushing of the Gearbox

If the gearbox was stored longer than 6 months you must flush it before start-up. The flushing must be carried out using an oil of respective operating viscosity. It must meet the requirements of chapter 9.2.3. The flushing length is 2 hours at no-load run.

7.2. Initial Filling with Oil

Before start-up the gearbox must be filled with oil. The oil to be used can be found on the data sheet or the type plate. The recommended oil types can be found in chapter 9, maintenance and servicing.

The level of purity of the oil must meet ISO 4406 = - / 17 / 14.

Make sure that the oil level indicator corresponds to the data in the dimension sheet. See also chapter 6.1.

The oil will be filled through the threaded bore of the removed air filter. With a gearbox featuring a level screw you will need to remove this screw. Take care during filling not to allow any dirt particles to enter the gearbox.

NOTE

The decisive factor for the oil volume is the oil level indicator. The volume mentioned in the data sheet is only a reference value for the purchasing department.

With the oil level screw use the bottom edge for measuring the oil volume. With an oil level indicator or a similar indicator the oil must reach the center of the indicator.

The checking of the correct oil level must be done with the gearbox standing still and at room temperature. Take into consideration that the oil volume increases with higher temperature. Do not forget to re-screw the oil level screw after filling.

7.3. Start-up

NOTE

Damage or operational failure with wrong rotation direction!

In order to avoid damage or operational failure of the gearbox the direction of rotation of the gearbox must be observed, see dimension sheet or directional arrow.

After the initial filling with oil the start-up can take place. We recommend to have the gearbox run without load for approx. 10 - 15 minutes. If you do not detect any irregularities within this period the load may be increased up to the nominal load.

If possible you should have a second person close to the gearbox so that the drive motor could be switched off promptly in case any irregularities should occur.

8. Operation

8.1. Operating Values

It must be ensured that the performance data and the parameters of the data sheet and the type plate are adhered to. This is the prerequisite for reliability and long life of the gearbox.

8.2. Behaviour in Case of Operating Disturbances

The gearbox must be monitored regularly and carefully. Only then it will be possible to observe irregularities like vibrations, high temperature, irregular running noise or leakages in time and thus avoid major secondary damages. If you find irregularities you will have to decide whether to stop the machine and inform the machine manufacturer or KOELLMANN GEAR directly. In doubt always stop the machine!

8.3. Longer Standstill

If the gearbox has not been operating for a longer period of time you will have to follow proceedings from chapter 5.2.

In order to eliminate corrosion within the cooling coil the cooling water should be drained.

8.3.1 Standstill up to 6 Months

The gearbox will remain filled with oil.

8.3.2 Standstill longer than 6 Months

With a standstill of more than 6 months the gearbox must be filled with oil according to chapter 5 point 2, Every 6 months the input shaft must be turned until the output shaft has revolved 2 to 3 times.

8.4. Worm Pullout with Extruder Gears

Use an appropriate screw push-out device for pulling out the wormshaft in the designed pull-out direction. Make sure that the flow of forces remains within the drive shaft to avoid an impact of inadmissible forces on the anti-friction bearings.

NOTE

Destruction by shock and impact!

Shocks or impact may lead to damage on inner parts like gearing, anti-friction bearings and safety rings.

Therefore:

Avoid shocks and impact.

9. Maintenance and Servicing

9.1. Maintenance and Inspection

WARNING

Danger to life through unintentional switching on!

An unintentional switching on may lead to contact with rotating parts like gear shafts, couplings, pulleys with V-belt etc.. This may lead to heavy injuries and possible death.

Therefore:

Stop the machine and secure it against unintentional switching on..

The shutdown and disconnected unit must be sufficiently protected against accidental switch-on by third persons.

Maintenance and Inspection Table

Cnt. No.	Works to be done	Test Method Standard	Frequency	Comments
1	Checking clean oil type	DIN 51502 DIN 51517, part 3 DIN ISO 3448	Before each oil change or refilling	Oil viscosity class on type plate or in data sheet
2	Checking used oil	Visual for colour change and foreign substances	quarterly	If necessary oil check
3	Oil change	See chapter 9.2.1	1. Change: after 500 - 700 operating hours. All next changes: after 5000 operating hours (for mineral oil and synth. Gearbox oils for food industry). Then see chapter 9.2.1	See chapter 9.2.2
4	Oil check: - Kin.viscosity 40°C - water content -neutralisation number - solids content - Additive level	DIN 51562 DIN ISO 3733, DIN 51777 DIN 51558-2 Filtering method according to manufacturer	after approx. 500 operating hours, however, minimum once per year	See chapter 9.2.1 water content less than 0,02 % (200 ppm)
5	Housing temperature	max. temperature	weekly	
6	Leakages	visual	weekly	See chapter 4.6
7	Replacement of the sealing caps	ISO 2230	After 2 years and if required	
8	Replacement of the breather filter		After 2 years and if required	

9.2. Lubricant

9.2.1 Oil Change

The use duration of each oil depends on the parameters which cannot be predicted precisely. It depends on the load, the temperature and the degree of emerging contamination. Regular oil checks for usability will provide accurate information. You will need approx. 1 litre of a representative average sample. The oil must be sampled immediately after standstill still warm at the oil drain. Then the removed oil quantity will have to be refilled.

We recommend to carry out the oil changes with approved mineral oils and synthetic gear oils for food industry according to the following intervals:

First oil change: after 500 - 700 operating hours
 All further oil changes: after further 5000 operating hours,
 but after 1 year at the latest (see chapter 9.1)

The average oil sump temperature is 80 °C,
 the maximum oil sump temperature is 100 °C (short time only).

We recommend to carry out the oil changes with approved synthetic oils (PAO, PG) according to the following intervals:

First oil change: after 500-700 operating hours
 All further oil changes: after further 10 000 operating hours,
 but after 2 years at the latest (see chapter 9.1)

The average oil sump temperature is 90 °C,
 the maximum oil sump temperature is 110 °C (short time only)

NOTE

Damage of parts and ineffectiveness of the lubricant!

Only Polyglycol oils (PG) named in the table are approved after written authorisation by KOELLMANN GEAR!

NOTE

The actual oil change intervals may vary depending on the oil temperature. Generally speaking the rule is that with an increase in temperature by 10 K the usability of the oil will be reduced by 50 %, with a decrease in temperature by 10 K the usability of the oil will be increased by 50 %.

For an oil change drain the warm oil at the oil drain plug. When draining you should register the contamination of the oil in order to decide whether a flushing out of the gearbox will be necessary (see chapter 9.2.2).

If the oil plug screw contains a magnet, it will have to be cleaned before plugging it back in. After re-plugging the oil drain plug or after the oil drain tap has been closed the gearbox must be filled with fresh oil. The degree of purity of the oil must conform to ISO 4406 = - / 17 / 14.

The threaded bore of the air filter is used for filling. During the filling process you must take care not to introduce any contamination into the gearbox. Immediately after filling you need to screw back the air filter.

If the gearbox has an external cooling unit the pump will have to run again for a short time so that the fresh oil will be pumped into the cooling unit and the tubes. Finally, you must check the oil level and if necessary adjust the filling.

9.2.2 Flushing of the Gearbox

D The gearbox must be flushed out with an oil corresponding to the respective operating viscosity. It must meet the requirements in chapter 9.2.3. The duration is 2 hours at a load-free run.

9.2.3 Lubricant Selection

Our required gear oil can be taken from the type plate It is valid for all named performance data within the data sheet. Should these data change you will have to come back to us.

The mineral based gear oil types approved by us according to DIN 51502 with the respective oil viscosity classes ISO VG according to DIN 51519, must meet DIN 51517, part 3 in their minimum requirements. They may be used with operating temperatures of -10°C to +90°C, and in a short period up to +100°C.

The type plate reads:

Example 1

„this gearbox is filled with approx. ...l Öl CLP ISO VG 320.“

This means: You can use all mineral oils and Polyalphaolefin oils of the viscosity class 320.

Example

„Oil type Mobil SHC Gear 320“

You may only use the gear oil Mobil SHC Gear 320. The approval of other gear oils must be given by KOELLMANN GEAR in writing.

The following lubricant table by KOELLMANN GEAR states recommended mineral oils of different manufacturers.

Mineral-Oils

DIN 51517-3	ADDINOL	BP	Castrol	Fuchs Lubritech	Klüber	Mobil	Shell
CLP 150	ECO GEAR 150 M	Energol GR-XP 150	Alpha SP 150 Optigear BM 150	GEARMASTER CLP 150	Klüberoil GEM 1-150 N	Mobilgear 600 XP 150	Omala S2 GX 150
CLP 220	ECO GEAR 220 M	Energol GR-XP 220	Alpha SP 220 Optigear BM 220	GEARMASTER CLP 220	Klüberoil GEM 1-220 N	Mobilgear 600 XP 220	Omala S2 GX 220
CLP 320	ECO GEAR 320 M	Energol GR-XP 320	Alpha SP 320 Optigear BM 320	GEARMASTER CLP 320	Klüberoil GEM 1-320 N	Mobilgear 600 XP 320	Omala S2 GX 320
CLP 460	ECO GEAR 460 M	Energol GR-XP 460	Alpha SP 460 Optigear BM 460	GEARMASTER CLP 460	Klüberoil GEM 1-460 N	Mobilgear 600 XP 460	Omala S2 GX 460
CLP 680	ECO GEAR 680 M	Energol GR-XP 680	Alpha SP 680 Optigear BM 680	GEARMASTER CLP 680	Klüberoil GEM 1-680 N	Mobilgear 600 XP 680	Omala S2 GX 680

Synthetic oils have a different viscosity index from mineral oils. Thus there is a larger operating temperature range. Additionally, there are further advantages.

The following lubricant tables contain different manufacturers recommended by KOELLMANN GEAR.

Polyalphaolefin-Oils

DIN 51517-3	ADDINOL	Fuchs Lubritech	Klüber	Mobil	Shell
CLP HC 150				Mobil SHC Gear 150	Omala S4 GXV 150
CLP HC 220	ECO GEAR 220 S		Klübersynth GEM 4-220 N	Mobil SHC Gear 220	Omala S4 GXV 220
CLP HC 320	ECO GEAR 320 S	GEARMASTER SYN 320	Klübersynth GEM 4-320 N	Mobil SHC Gear 320	Omala S4 GXV 320
CLP HC 460	ECO GEAR 460 S	GEARMASTER SYN 460	Klübersynth GEM 4-460 N	Mobil SHC Gear 460	Omala S4 GXV 460
CLP HC 680	ECO GEAR 680 S	GEARMASTER SYN 680	Klübersynth GEM 4-680 N	Mobil SHC Gear 680	Omala S4 GXV 680

Polyglykol-Oils*

DIN 51517-3	ADDINOL	Klüber	SETRAL
CLP PG 150	Poly Gear PG 150	Klübersynth GH 6-150	SYN-setral-GEAR/PGB 150 FD
CLP PG 220	Poly Gear PG 220	Klübersynth GH 6-220	SYN-setral-GEAR/PGB 220 FD
CLP PG 320	Poly Gear PG 320	Klübersynth GH 6-320	SYN-setral-GEAR/PGB 320 FD
CLP PG 460	Poly Gear PG 460	Klübersynth GH 6-460	SYN-setral-GEAR/PGB 460 FD
CLP PG 680	Poly Gear PG 680	Klübersynth GH 6-680	SYN-setral-GEAR/PGB 680 FD

NOTE

Damage of parts and ineffectiveness of the lubricant!

Only Polyglycol oils (PG) named in the table are approved after written authorisation by KOELLMANN GEAR!

Synthetic oils for the food industry (NSF H1-authorisation)

DIN 51517-3	Bechem	Bremer & Leguil	Fuchs	Klüber	SETRAL
CLP (NSF H1) 150	Ber synth 150 H1	CASSIDA GL 150 Rivolta F. L. 170	CASSIDA GL 150	Klüberoil 4 UH 1-150 N	SYN-setral-GEAR/PGB 150 FD *
CLP (NSF H1) 220	Ber synth 220 H1	CASSIDA GL 220 Rivolta F. L. 250	CASSIDA GL 220	Klüberoil 4 UH 1-220 N	SYN-setral-GEAR/PGB 220 FD *
CLP (NSF H1) 320		CASSIDA GL 320 Rivolta F. L. 400	CASSIDA GL 320	Klüberoil 4 UH 1-320 N	SYN-setral-GEAR/PGB 320 FD *
CLP (NSF H1) 460	Ber synth 460 H1	CASSIDA GL 460 Rivolta F. L. 500	CASSIDA GL 460	Klüberoil 4 UH 1-460 N	SYN-setral-GEAR/PGB 460 FD *
CLP (NSF H1) 680		CASSIDA GL 680	CASSIDA GL 680	Klüberoil 4 UH 1-680 N	SYN-setral-GEAR/PGB 680 FD *

* Filling of old gear units with SYN-setral-GEAR/PGB xxx FD only with written approval by KOELLMANN GEAR.

NOTE

**Damage of parts and ineffectiveness of the lubricant!
In order to avoid damages to the gearbox and thus disruptions you must never mix oils of different manufacturers.**

The oils mentioned in the tables are oils recommended by KOELLMANN GEAR, however, we cannot take responsibility regarding the quality of the oil you use.

9.2.4 Greasing

Bearings and shaft seals do not need any special greasing. They are integrated in the lubrication circuit. With some gearboxes, however, the bearing covers feature two grease nipples each for re-lubrication of the shaft seals. After 1000 to 2500 operating hours you should re-lubricate by removing one nipple and applying grease through the other nipple until fresh grease will emerge from the threaded bore. Then the grease nipple must be screwed back on.

10. Spare Parts Order

Spare parts orders must contain the gearbox type and gearbox number and the part numbers from the respective spare parts lists and spare parts drawings.

All spare parts supplied by us have been quality checked and quality released. If spare parts – both purchase parts as well as production parts- are not ordered from us we will not accept any liability for damages caused by these parts.

WARNING

Danger of injury by using incorrect spare parts!

Usage of incorrect or faulty spare parts may cause danger to personnel and may lead to damage of goods, functional failures or even total failure of the whole system.

Therefore

Use only original spare parts from KOELLMANN GEAR.

For clarification please contact the manufacturer.