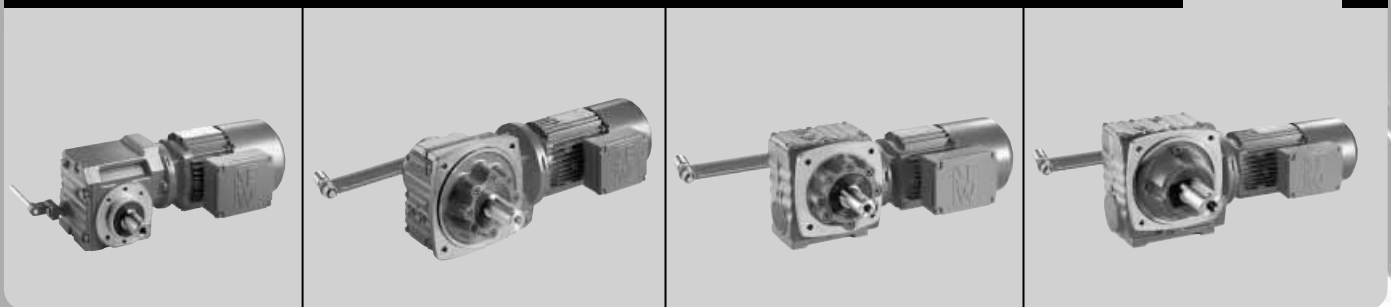
SEW EURODRIVE

Geared Motors HW30, HS40, HS41, HK40, HS50, HS60 for Trolley Drive Systems

Edition

07/2000



Operating Instructions

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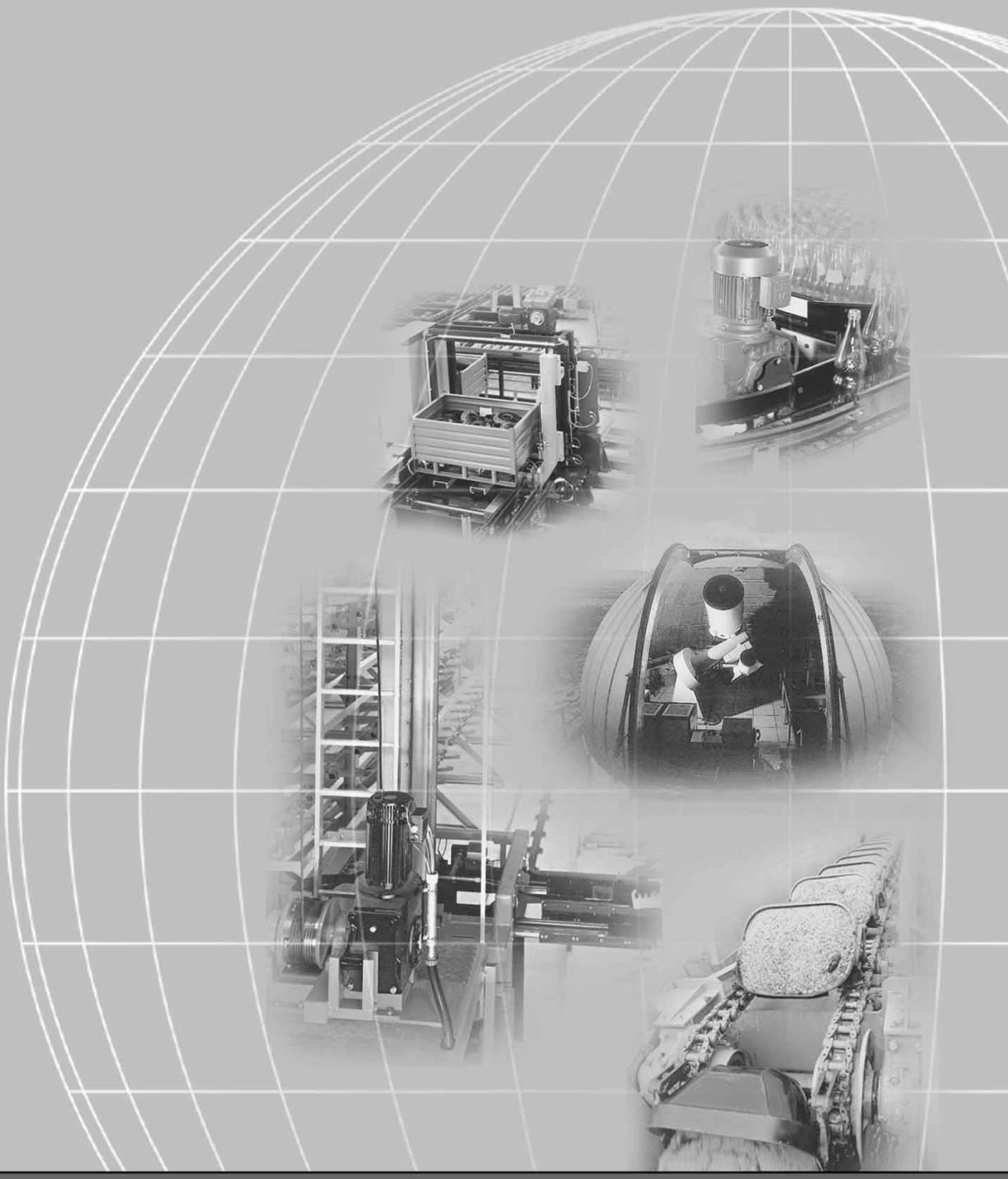


SEW-EURODRIVE

1 Important Notes

Warning and Safety Instructions

Always follow the warnings and safety instructions in this publication!

Electrical hazard
Possible effects: Serious or fatal injury.

Immediate danger
Possible effects: Serious or fatal injury.

Dangerous situation
Possible effects: Minor injury.

Harmful situation
Possible effects: Damage to equipment or surroundings.

Application hints and useful information.

Following these instructions is required for fault-free operation and fulfillment of any warranty claims. Read these instructions carefully before you start working with the unit!

These operating instructions contain vital servicing information and should be kept in the vicinity of the unit.

Disposal

(please observe all applicable regulations):

- Housing components, gears, shafts and rolling bearings of gear units should be disposed of as steel scrap. The same applies to components made of cast iron if no separate collection is available.
- Helical-worm wheels consist partially of non-ferrous metal and should be disposed of accordingly.
- Collect used oil and dispose of it according to applicable regulations.

- **In case of design changes, adjust the lubricant filling amounts accordingly.**
- **Please observe the information in Section 3.3!**

2 Safety Instructions

Preliminary remarks

The following safety instructions refer primarily to the operation of gear units.

When operating **geared motors**, please also observe safety instructions for motors in the corresponding operating instructions.

Please refer to the additional safety instructions in the individual sections of these operating instructions.

General

During and after operation, geared motors and gear units contain live and moving components and possibly hot surfaces.

All tasks related to transport, storage, installation/assembly, connection, startup, service and maintenance may only be performed by qualified technical personnel while strictly adhering to

- the pertinent detailed operating instruction(s) and circuit diagrams
- warning and safety labels on the gear unit/geared motor
- system-specific regulations and requirements
- national/regional regulations concerning safety and accident prevention

Serious personal injuries and material damage may occur through

- incorrect use
- wrong installation or operation
- inadmissible removal of required protective covers or of the housing

Intended usage

These geared motors/gear units are intended for industrial systems. They comply with existing standards and regulations. The technical data and information on approved conditions can be found on the nameplate and in the documentation.

All these details must be observed!

Transport / Storage

Inspect shipment for possible transport damages upon receipt. Immediately inform the shipping company of any damages. Startup may have to be cancelled.

Fasten installed lifting eyebolts. They were designed for the weight of the geared motor/ gear unit; no additional loads may be applied.

If necessary, use appropriate and sufficiently dimensioned means of transport. Remove existing shipping braces prior to startup.

Installation / Assembly

Observe information in sections 3 and 4!

Commissioning / Operation

Check the correct direction of rotation of the gear unit in its **disengaged** state (without built-on geared motor). Pay special attention to unusual sliding noises during barring. Secure the key for the trial run without output components. Do not deactivate monitoring and protection devices – not even for the trial run.

If in doubt, modifications to normal operation (e.g. increased temperature, noises, vibrations) may require that the geared motor be switched off. Determine the cause and confer with SEW, if necessary.

Inspection / Maintenance

Observe information in section 6!

3 Installation

3.1 Before you begin

The drive may only be installed if

- the entries on the nameplate of the geared motor match the supply voltage
- the drive is not damaged (no damage resulting from transport or storage)
- it is certain that the following requirements have been fulfilled:
  - with all gear units: ambient temperature between 0 °C and +40 °C, no oils, acids, gases, vapors, radiation, etc.
  - with special versions: drive configured according to ambient conditions
  - with Spiroplan® gear unit HW30 and helical-worm gear HS..:
    no large external mass moments of inertia are present that could exert a restoring load on the gear unit (with η' (restoring) = 2 – 1/η < 0.5 self-locking)

3.2 Preliminary work

Output shafts and flange surfaces must be thoroughly cleaned of anti-corrosion agents, contamination or similar impurities (use a commercially available solvent). Do not let the solvent get in contact with the sealing lips of the oil seals – danger of damage to the material!

Please note: The service life of the lubricant in the bearings is reduced if the unit is stored ≥ 1 year.

Gear unit designs of the "extended storage" type have

- an oil fill suitable for the mounting position so the unit is ready to run (mineral oil). Nevertheless, check the oil level prior to startup (see “Lubricant filling quantities" on page 19).
- a partially higher oil level if synthetic oil is used. Correct the oil level prior to startup (see “Lubricant filling quantities" on page 19).

3.3 Installing the gear unit

The gear unit or geared motor must be mounted/installed in the specified mounting position (Spiroplan® gear units are not dependent upon mounting position) on a level[1)], vibration-absorbing and torsionally rigid support structure. Do not tighten housing legs and mounting flanges against each other.

The oil check and drain screws and the breather valves must be freely accessible!

At this point of assembly, please check that the oil filling is as specified for the mounting position.

In case of design changes, adjust the lubricant filling amounts accordingly.

Where the mounting position of HS gear units is to be changed to mounting position M2, please consult the SEW service department.

1) Maximum permitted flatness error for flange mounting (approximate value with reference to DIN ISO 1101): with → flange 120 – 600 mm max. error 0.2 – 0.5 mm

Use plastic inserts (2–3 mm thick) if there is a risk of electrochemical corrosion between the gear unit and the driven machine (connection between different metals such as cast iron and high-grade steel)! Also fit the bolts with plastic washers! Ground the housing additionally – use the grounding bolts on the motor.

Installation in damp areas or on the outside

Gear units are supplied in corrosion-resistant versions for use in damp areas or in the open air. Any damage to the paintwork (e.g. on the breather valve) must be repaired.

Gear unit venting

All gear units are delivered by SEW ready for the mounting position with the breather valve and transport fixture fitted.

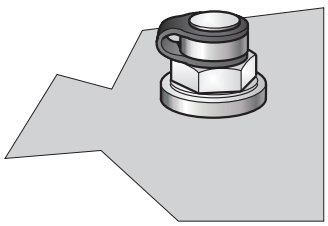
Exception:
Gear units for extended storage, pivoting and inclined mounting positions are delivered with a screw plug on the intended vent hole. Prior to startup, the customer must replace the highest screw plug by the supplied breather valve on each individual gear unit!

- **With geared motors** (for extended storage, pivoting or inclined mounting position), the supplied breather valve is located in the **terminal box on the motor**.
- **With mount-on units** that must breathe on the input side, a breather valve is supplied in a plastic bag.
- **With gear units in an enclosed design** no breather valve is supplied.

Activating the breather valve

Usually the breather valve is activated ex-works. **Should this not be the case, the transport fixture must be removed from the breather valve prior to the startup of the gear unit!**

1. Breather valve with transport fixture



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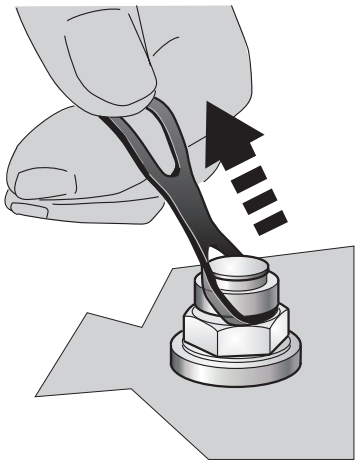
2. Remove the transport fixture



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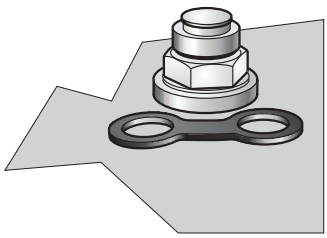
3. Breather valve activated



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Painting the gear unit

If the drive is to be overpainted or partially repainted, ensure that the breather valve and the oil seals are carefully covered with tape. Remove the tape strips after the paint work is finished.

4 Assembly / Disassembly

4.1 Required tools

- Wrench set
- Mounting device
- Shims and distance rings, if necessary
- Fixing devices for input and output elements
- Lubricant (e.g. NOCO® fluid)

Installation tolerances

Shaft end	Flanges
Diametric tolerances in accordance with DIN 748 • ISO k6 for solid shafts with d, $d_1 \leq 50$ mm • ISO k6 for solid shafts with d, $d_1 > 50$ mm • Center hole in accordance with DIN 332, shape DR..	Centering shoulder tolerances in accordance with DIN 42948 • ISO j6 with $b_1 \leq 230$ mm • ISO h6 with $b_1 > 230$ mm

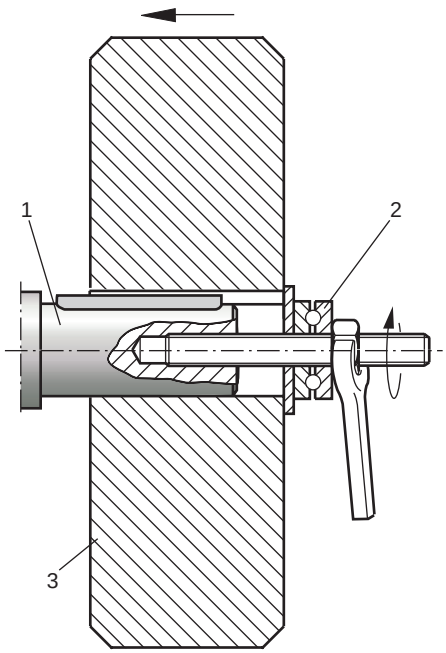
4.2 Installing the drive rod

Install the supplied drive rod (with Spiroplan® gear unit HW30 and helical-worm gear unit HS40/41) into the operating lever and secure it with a lock nut.

4.3 Gear units with solid shafts

Mounting of carrying wheels

Figure 1 shows an example of a mounting device for the installation of a carrying wheel onto the gear unit or motor shaft ends. It may be possible to dispense with the thrust bearing on the mounting device.



1 Shaft end of gear unit
2 Thrust bearing
3 Carrying wheel

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Figure 1: Example of a mounting device for installation of carrying wheels

Figure 2 shows the correct mounting arrangement ② of a carrying wheel in order to avoid impermissible overhung loads.

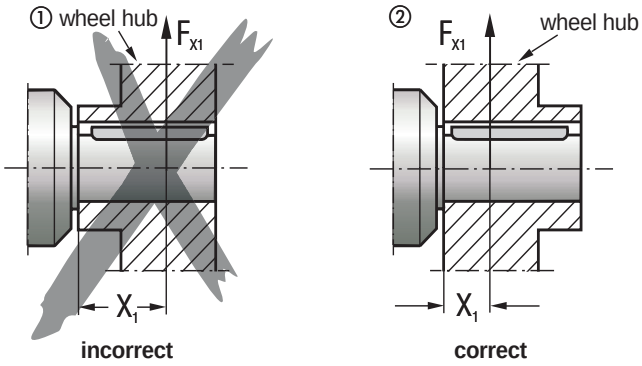

Figure 2: Correct mounting arrangement of a carrying wheel

- Only use a mounting device (see Figure 1) for installing input and output elements. Use the center bore and the thread on the shaft end for positioning purposes.
- **Never drive carrying wheels, etc. onto the shaft end by hitting them with a hammer (damage to bearings, housing and the shaft)!**
- Power transmission elements should be balanced after fitting and must not give rise to any impermissible radial or axial forces (see Figure 2 / permitted values see the "Trolley drive systems" catalog).

Note:

- Assembly is easier if you first apply lubricant to the output element or heat it up briefly (80 to 100 °C).

Input and output elements such as carrying wheels must have protection against contact!

Mechanical clutch

The output can be mechanically separated from a continuously running motor by activating the clutch.

Pole-switchable motors or motors controlled by frequency inverters should be engaged at low output speeds.

5 Startup

5.1 Startup of gear units HW30 and helical-worm gear units HS..

The direction of rotation of the output shaft on the HS40/41 helical-worm gear units was changed from CW to CCW in comparison to the predecssor SHB4. Swap two motor feeder cables to change the direction of rotation.

Running-in period

The Spiroplan® gear unit HW30 and the helical-worm gear unit HS.. require a running-in period of at least 24 hours before reaching their maximm efficiency. A separate running-in period for each direction of rotation is required if the gear unit is operated in both directions of rotation. Table 1 shows the average power reduction during the running-in period.

	Power reduction for helical-worm gear unit HS..	i range	Power reduction Spiroplan® gear unit HW30	i range
1 speed	approx. 12 %	approx. 50...280	approx. 15 %	approx. 40…75
2 speeds	approx. 6 %	approx. 20…75	approx. 10 %	approx. 20…30
3 speeds	-	-	approx. 8 %	approx. 15
4 speeds	-	-	approx. 8 %	approx. 10
5 speeds	approx. 3 %	approx. 6…25	approx. 5 %	approx. 8

Table 1: Power reduction for helical-worm gear units HS.. and Spiroplan® gear units HW30

6 Inspection / Maintenance

6.1 Inspection and maintenance intervals

Interval	What to do?	→ Section
Every **3000** machine hours At least **every six months**	Check the oil	see Section 6.3
Depending on **operating conditions** (→ Figure 3) at least **every 3 years**	Change mineral oil	
	Renew the anti-friction bearing	
Depending on **operating conditions** (→ Figure 3) at least **every 5 years**	Change synthetic oil	
	Renew the anti-friction bearing	
Spiroplan® gear units HW30 are lubricated for life and, therefore, are maintenance-free.		

Table 2: Inspection and maintenance intervals

6.2 Lubricant change intervals

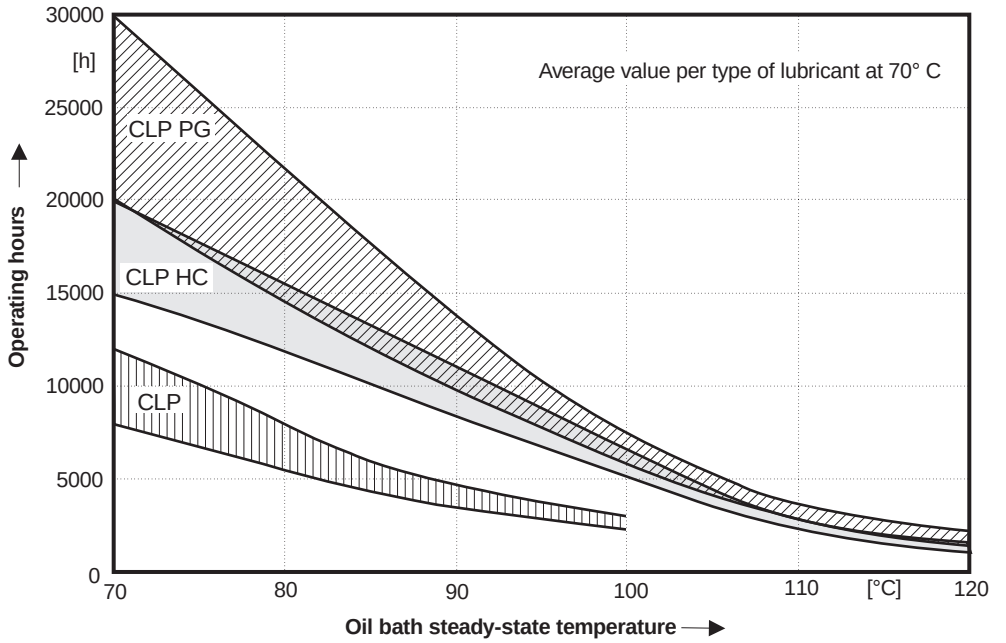

Figure 3: Change intervals for standard gear units under normal environmental conditions. Change the oil more frequently when using special versions subject to more severe/ aggressive environmental conditions!

6.3 Inspection and maintenance

Do not mix synthetic lubricants with each other and do not mix synthetic and mineral lubricants!

Oil is the standard lubricant.

The location of the oil level plug, the oil drain plug and the breather plug for the different mounting positions can be found in the corresponding figures (see section 8.1).

Checking the oil level

1. **Disconnect the drive and secure against unintentional switch-on!**
   Wait until the gear unit has cooled down – Danger of burns!
2. For modified mounting positions refer to Section 3.3!
3. For gear units with oil level plug:
   Remove oil level plug, check oil level and adjust if necessary, replace oil level plug.

Checking the oil

1. **Disconnect the drive and secure against unintentional switch-on!**
   Wait until the gear unit has cooled down – Danger of burns!
2. Remove some oil from the oil drain plug.
3. Check the oil consistency:
   – viscosity
   – if the oil is visibly strongly contaminated, it is recommended to change it sooner than specified in the maintenance intervals in section 6.1
4. For gear units with oil level plug:
   Remove oil level plug, check oil level and adjust if necessary, replace oil level plug.

Changing the oil

Change the oil only when the gear unit is at operating temperature.

1. **Disconnect the drive and secure it against unintentional switch-on!**
   Wait until the gear unit has cooled down – Danger of burns!
   Note: However, the gear unit must still be warm, otherwise the high viscosity of excessively cold oil will make it harder to drain the oil correctly.
2. Place a container underneath the oil drain plug.
3. Remove the oil level screw, breather plug/breather valve and oil drain plug.
4. Drain all the oil.
5. Screw in the oil drain plug.
6. Fill new oil of the same type through the breather hole. In other cases please consult the SEW service department.
   – Fill to oil volume in accordance with the mounting positions (see Section 8.1) or the details given on the name plate.
   – Check at the oil level screw.
7. Screw the oil level plug back in.
8. Install breather plug/breather valve.

7 Operation and Service

Please provide the following information if you require assistance from our customer service department:

- Nameplate data (complete)
- State type and extent of the fault
- Time and circumstances of the fault
- Presumed cause

7.1 Gear unit malfunction

Malfunction	Possible cause	Solution
Unusual, regular running noise	a) Meshing/grinding noise: Bearing damage b) Knocking noise: Irregularity in the gearing	1. Check the oil (→ Section 6.3) 2. Contact customer service
Unusual, irregular running noise	Foreign bodies in the oil	1. Check the oil (→ Section 6.3) 2. Stop the drive, contact customer service
Oil leaking [1)] • from the motor flange • from the motor oil seal • from the gear unit flange • from the output end oil seal	a) Seal defective b) Gear unit not vented	for a) Call customer service for b) Vent the gear unit (→ Section 8)
Oil leaking • from the breather valve	a) Too much oil b) Breather valve not fitted properly c) Frequent cold starts (oil foams) and/ or high oil level	for a) Correct the oil level (→ Section 6.3) for b) Fit the breather valve correctly (→ Section 8.1)
Output shaft is not rotating although the motor is running or the input shaft is rotating	Clutch interrupted	1. Check clutch function On / Off 2. Send in the gear unit/geared motor for repair

1) It is normal for small amounts of oil/grease to leak out of the oil seal during the **running-in phase (24 hour running time)**.

8 Mounting positions

8.1 General information on mounting positions

Mounting position designation

SEW distinguishes the four mounting positions M1 – M4 with right-angle geared motors for trolley drive systems. The following figure shows the spatial position of the gear unit with mounting positions M1 – M4.

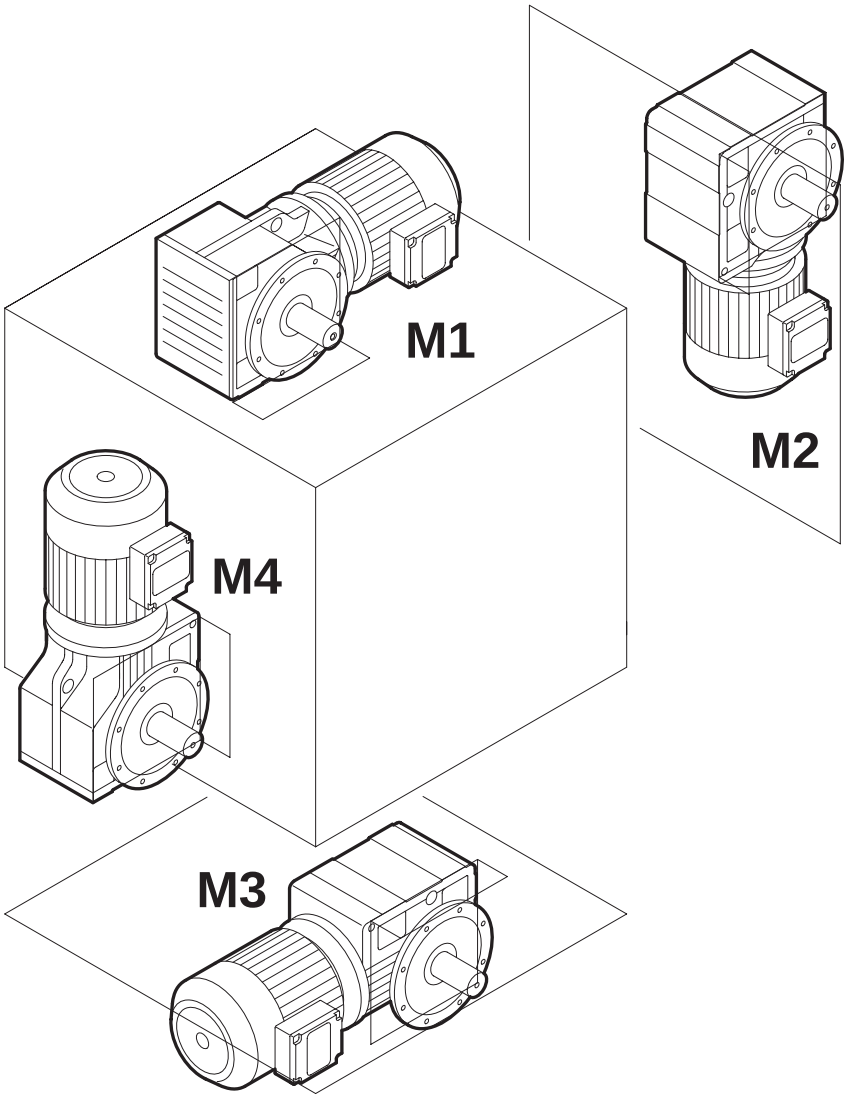

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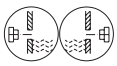
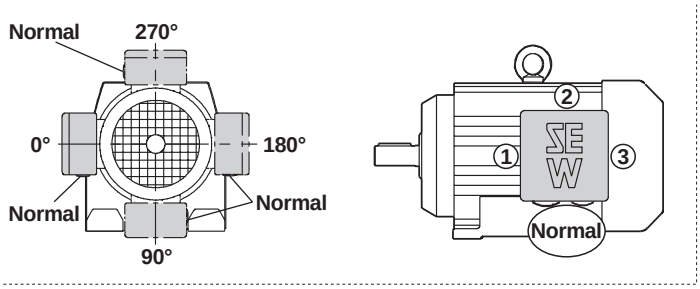
Figure 9: Representation of mounting positions M1 – M4 for right-angle geared motors.

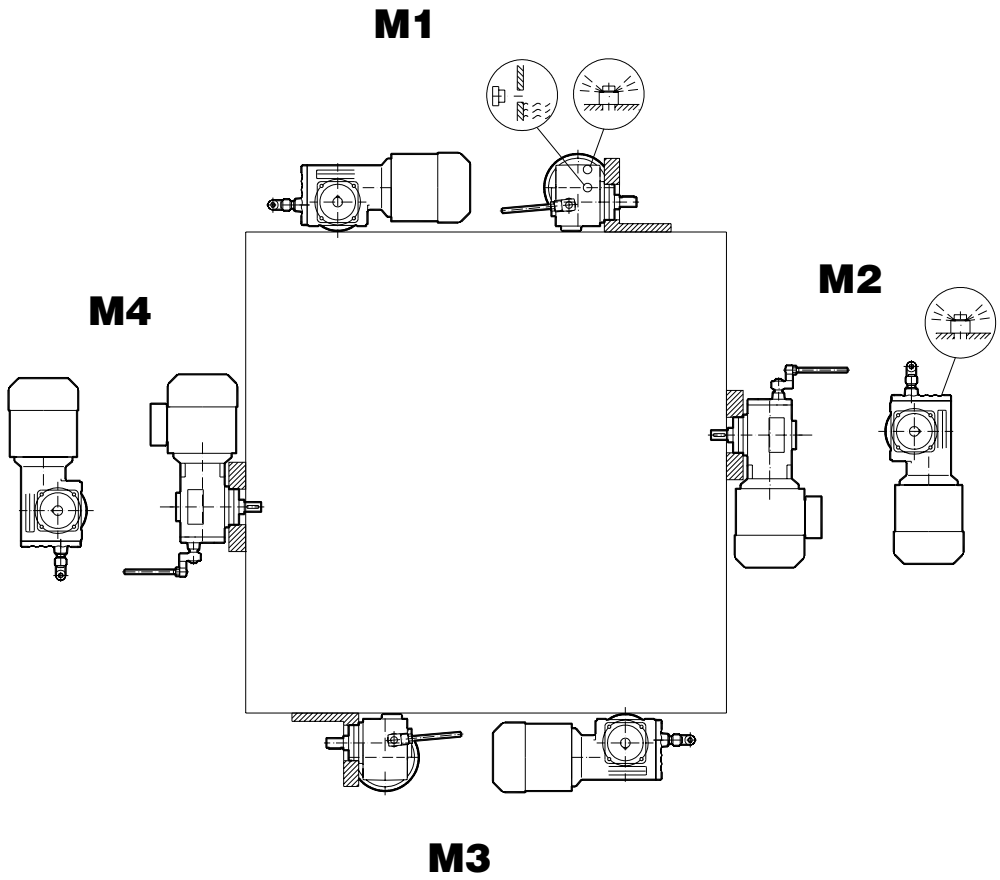
List of symbols

The following table shows the symbols used in the mounting position sheets and their meanings:

Symbol	Meaning
	Breather valve
	Oil level inspection plug
	Oil drain plug

8.2 HW30 D..



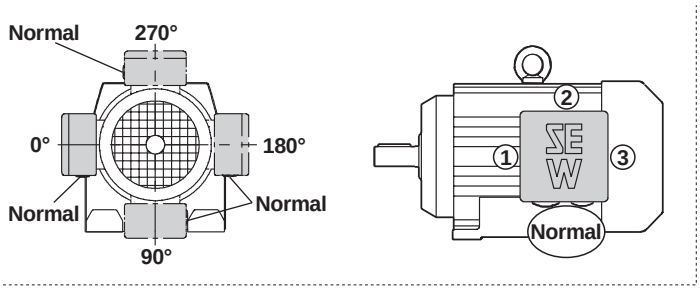


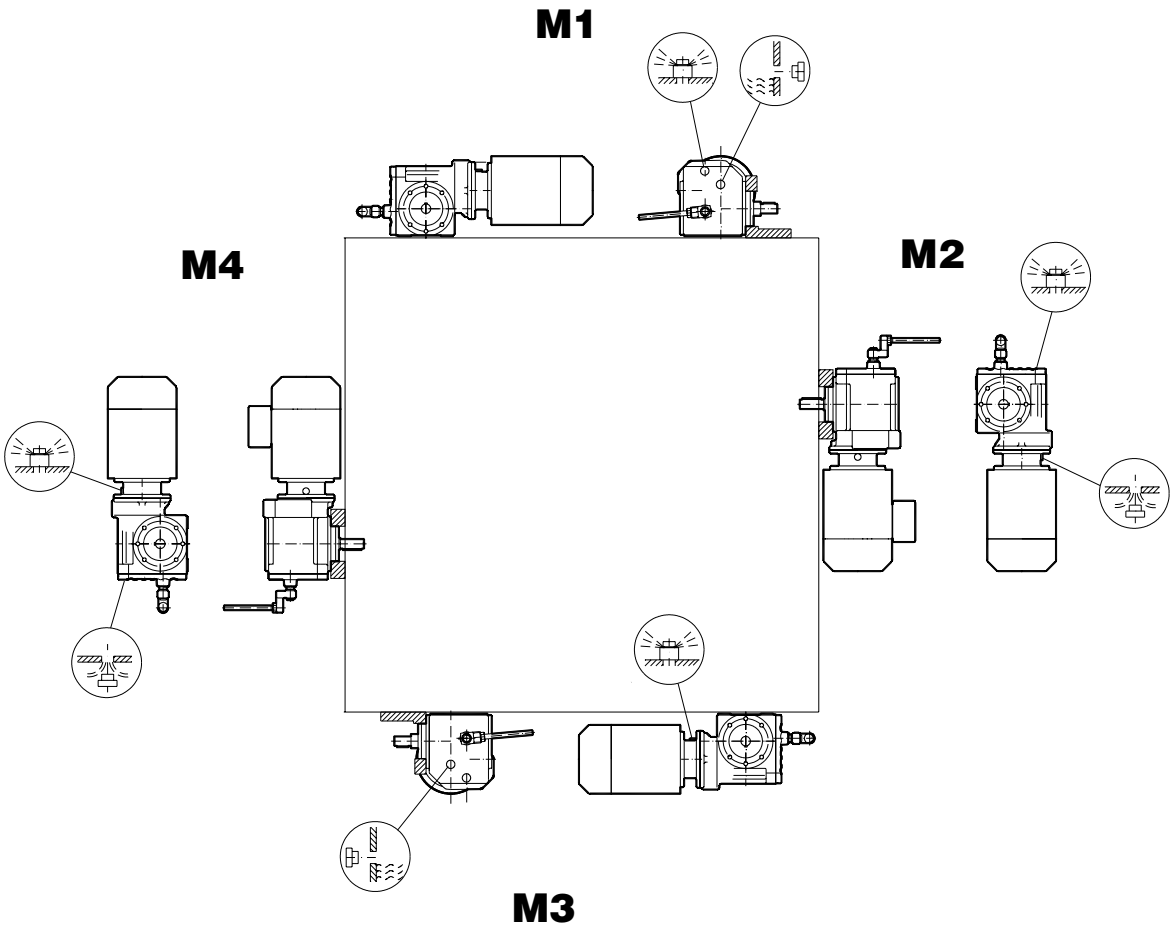
M3, M4

M2, M3, M4

M1, M2, M3, M4

8.3 HS40 D.., HS41 D..

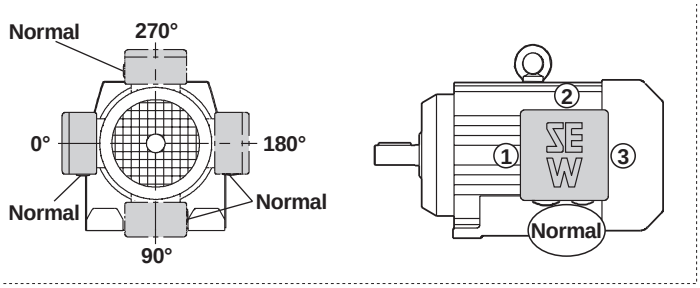


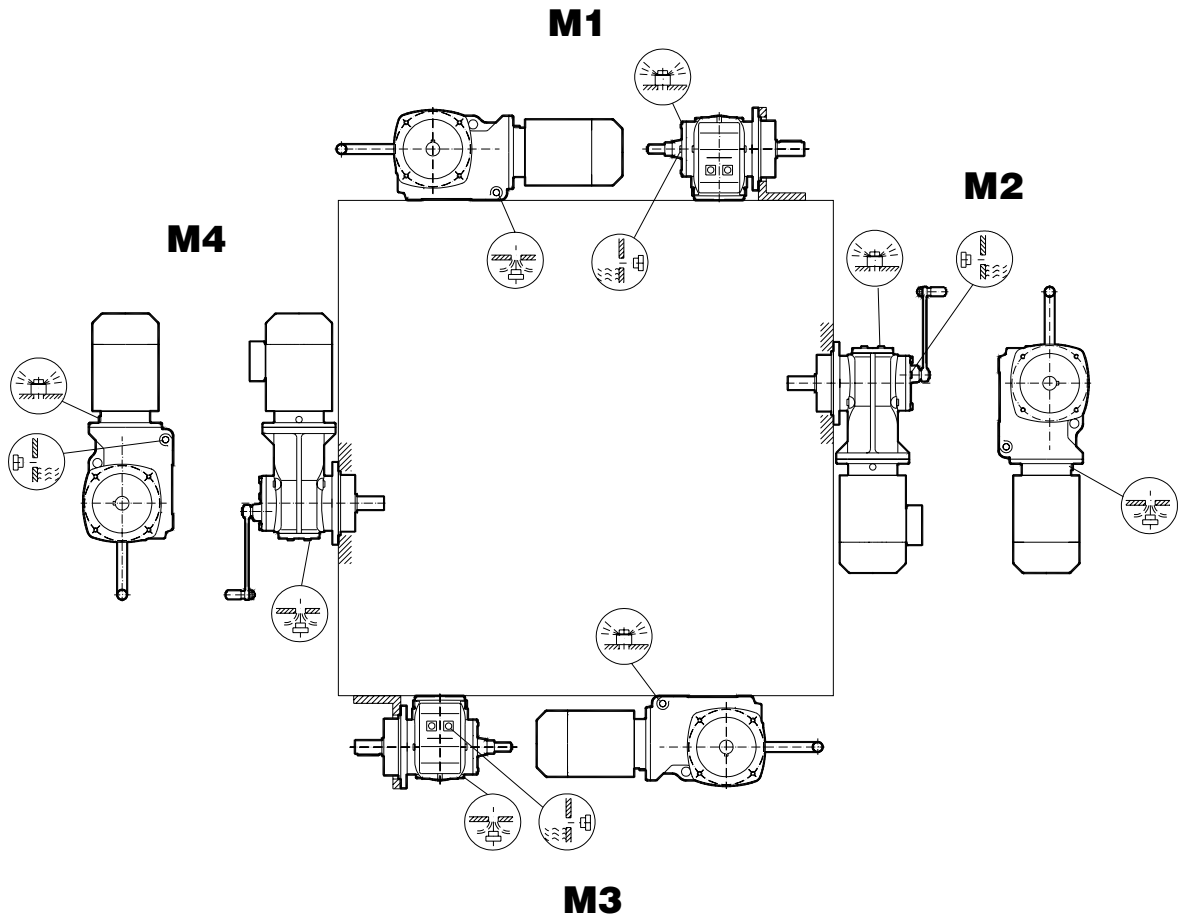


M2, M4

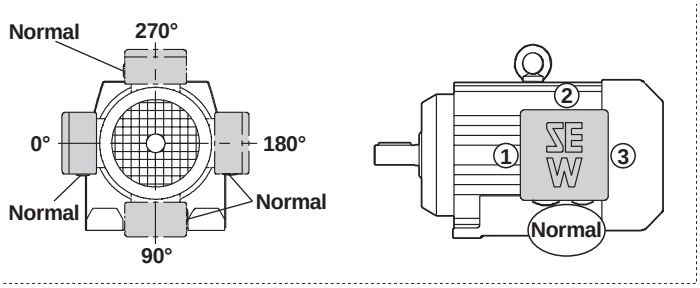
M1, M3

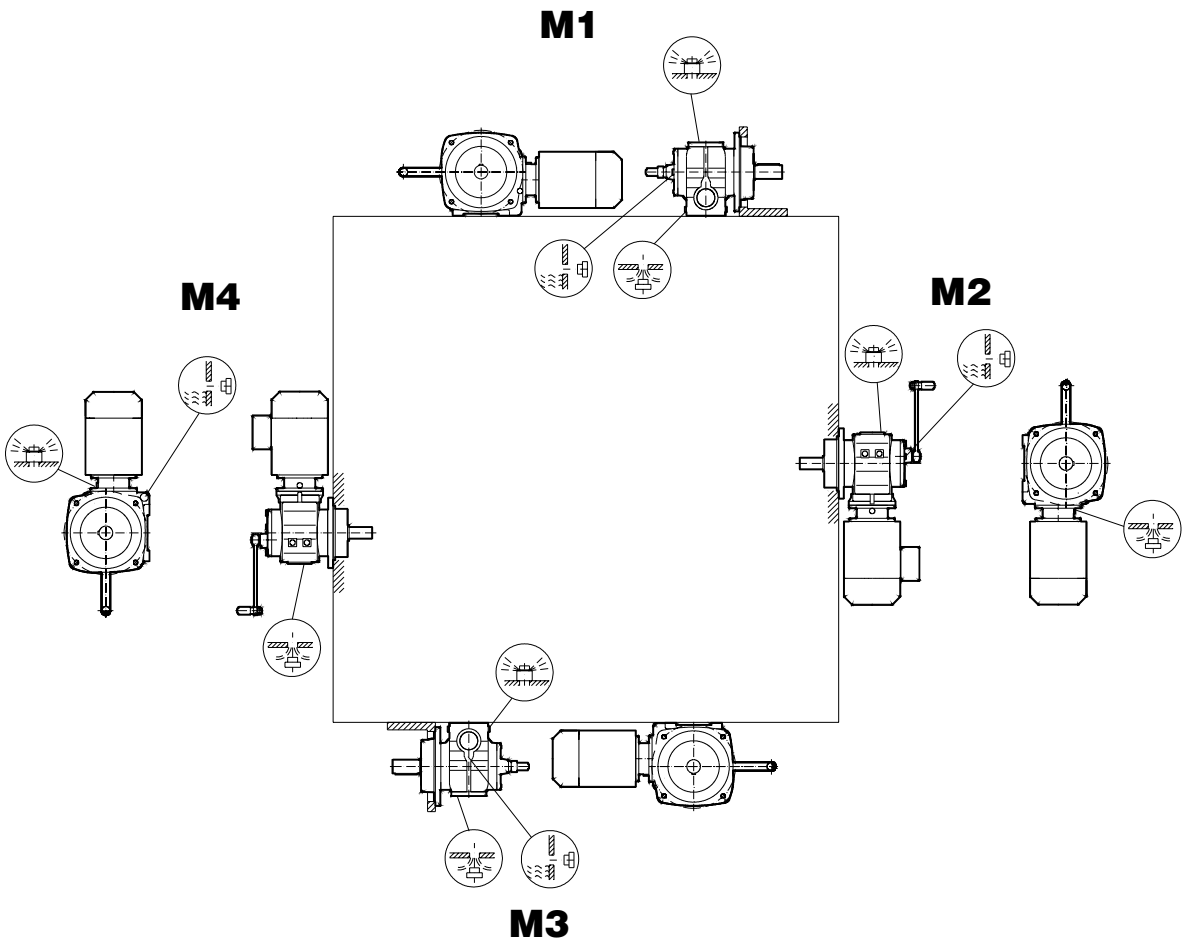
8.4 HK40D...





8.5 HS50 D.., HS60 D..





9 Technical Data

9.1 Lubricant filling quantities

The following table shows the lubricant filling quantities with respect to the mounting positions M1 – M4. It is essential to use the **oil level screw as an indicator of the correct lubricant quantity** during filling.

Gear unit type	Filling quantity in liter			
	M1	M2	M3	M4
HW30	0.65	0.65	0.65	0.75
HS40	1.2	1.45	0.95	1.9
HS41	1.2	1.45	0.95	1.9
HK40	2.0	2.0	2.3	2.8
HS50	1.4	1.4	1.5	2.2
HS60	2.8	2.7	2.8	4.1

Table 3: Lubricant filling quantities

9.2 Recommended lubricants for SEW drives

Lubrication table for SEW drives

Gear unit type	Ambient temperature range	Lubricant type DIN (ISO)	ISO viscosity resp. NLGI class	Mobil	Shell	Klüber Lubrication	Aral	BP	Tribol	Texaco	Optimol	Fuchs
Helical gear units, helical-bevel gear units, parallel gear units	-10 0°C +50 +100 Standard +40	CLP (CC)	VG 220	Mobilgear 630	Shell Omala 220	Klüberoil GEM 1-220	Aral Degol BG 220	BP Energol GR-XP 220	Tribol 1100/220	Meropa 220	Optigear BM 220	Renolin CLP 220
	-25 +80	CLP PG	VG 220	Mobil Glygoyle 30	Shell Tivela WB	Klübersynth GH 6-220	Aral Degol GS 220	BP Enersyn SG-XP 220	Tribol 800/220	Synlube CLP 220	Optiflex A 220	
	* -40 +80	CLP HC	VG 220	Mobil SHC 630	Shell Omala 220 HD	Klübersynth GEM 4-220	Aral Degol PAS 220		Tribol 1510/220	Pinnacle EP 220	Optigear Synthetic A 220	Renolin Unisyn CLP 220
	* -40 +40	CLP HC	VG 150	Mobil SHC 629		Klübersynth GEM 4-150						
	-20 +25	CLP (CC)	VG 150	Mobilgear 629	Shell Omala 100	Klüberoil GEM 1-150	Aral Degol BG 100	BP Energol GR-XP 100	Tribol 1100/100	Meropa 150	Optigear BM 100	Renolin CLP 150
	-30 +10	CLP (CC)	VG 68-46	Mobil D.T.E. 15M	Shell Tellus T 32	Klüberoil GEM 1-68	Aral Degol BG 46		Tribol 1100/68	Anubia EP 46	Optigear 32	Renolin B 46 HVI
	* -40 +10	CLP HC	VG 32	Mobil SHC 624		Klübersynth GEM 4-32				Cetus PAO 46		
	* -40 -20	HLP (HM)	VG 22 VG 15	Mobil D.T.E. 11M	Shell Tellus T 15	MT 30 ROT		BP Energol HLP-HM 10		Aircraft Hydr. Oil 15		
	0 Standard +40	CLP (CC)	VG 680	Mobilgear 636	Shell Omala 680	Klüberoil GEM 1-680	Aral Degol BG 680	BP Energol GR-XP 680	Tribol 1100/680	Meropa 680	Optigear BM 680	Renolin CLP 680
Helical-worm gear units	-20 +60	CLP PG	VG 680 1)	Mobil Glygoyle HE 680		Klübersynth GH 6-680		BP Enersyn SG-XP 680	Tribol 800/680	Synlube CLP 680		
	* -30 +80	CLP HC	VG 460	Mobil SHC 634	Shell Omala 460 HD	Klübersynth GEM 4-460						
	* -40 +10	CLP HC	VG 150	Mobil SHC 629		Klübersynth GEM 4-150						
	-20 +10	CLP (CC)	VG 150 VG 100	Mobil D.T.E. 18M	Shell Omala 100	Klüberoil GEM 1-150	Aral Degol BG 100	BP Energol GR-XP 100	Tribol 1100/100	Meropa 100	Optigear BM 100	Renolin CLP 150
	-25 +20	CLP PG	VG 220 1)	Mobil Glygoyle 30		Klübersynth GH 6-220			Tribol 800/220	Synlube CLP 220	Optiflex A 220	
	* -40 0	CLP HC	VG 32	Mobil SHC 624		Klübersynth GEM 4-32				Cetus PAO 46		
W gear units	-20 Standard +40	SEW PG	VG 460 3)			Klüber SEW HT-460-5						
	* -40 +10	API GL5	SAE 75W90 (~VG 100)	Mobilube SHC 75 W90-LS								
R, K, F, S gear units	* -30 +40	HCE	VG 460		Shell Cassida Fluid GL 460	Klüberöl 4UH1-460 Klüberbio CA2-460	Aral Eural Gear 460					
	-20 +40	E	VG 460		Shell Tivela Compound A	Klübersynth GE 46-1200	Aralub MFL 00	BP Energrease LS-EP 00		Multifak 6833 EP 00	Multifak EP 000	Longtime PD 00	Renolit SF 7- 041
R 32 R 302	-25 -15 Standard +40 +60	DIN 51181	00 000 - 0 2)	Glygoyle Grease 00	Shell Alvania GL 00							
Grease	Bio oil Food ind. oil		2)	Mobilux EP 004								

◀ = lubricants supplied at the assembly plants SEW USOCOME (F)

▬ = lubricants supplied at the assembly plants SEW EURODRIVE (BRD)

▭ = synthetic lubricants

▭ = mineral lubricants

1) Helical-worm gear units with PG oil. Consult SEW-Eurodrive

2) Consult SEW-Eurodrive for other gear units

3) Special lubricant for Spiroplan gear units only

★ Please note: critical startup behaviour at low temperatures.

CLP PG = polyglycol

CLP HC = synth. hydrocarbon

E = diester oil (water contamination class WGK 1)

HCE = synth. hydrocarbons + diester oil (USDA - H1 approval)

CLP = mineral oil

HLP = hydraulic oil

01 805 492e

KBTS/GaVI

Anti-friction bearing grease

It is recommended to change the grease for anti-friction bearings with grease filling at the same time that the oil is changed.

	Ambient temperature	Basis	current filling	Manu-facturer
Gear unit anti-friction bearing	-30 °C to +60 °C -40 °C to +80 °C	mineral synthetic	Mobilux EP 2 Mobiltemp SHC 100	Mobil
Motor anti-friction bearing	-25 °C to +80 °C -25 °C to +60 °C +80 °C to +100 °C -45 °C to -25 °C	mineral mineral synthetic synthetic	Unirex N3 Alvania R3 Barrierta L55/2 Aero Shell Grease 16	Esso Shell Klüber Shell

Table 4: Anti-friction bearing grease

The applied grease filling quantity must amount to

- one-third of the cavities between the rolling elements for fast running bearings (motor and gear unit input shaft end)
- two-thirds of the cavities between the rolling elements for slow running bearings (motor and gear unit input shaft end)

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	Lyon	SEW-USOCOME SAS Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Phone: 04 72 15 37 00 Fax: 04 72 15 37 15
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