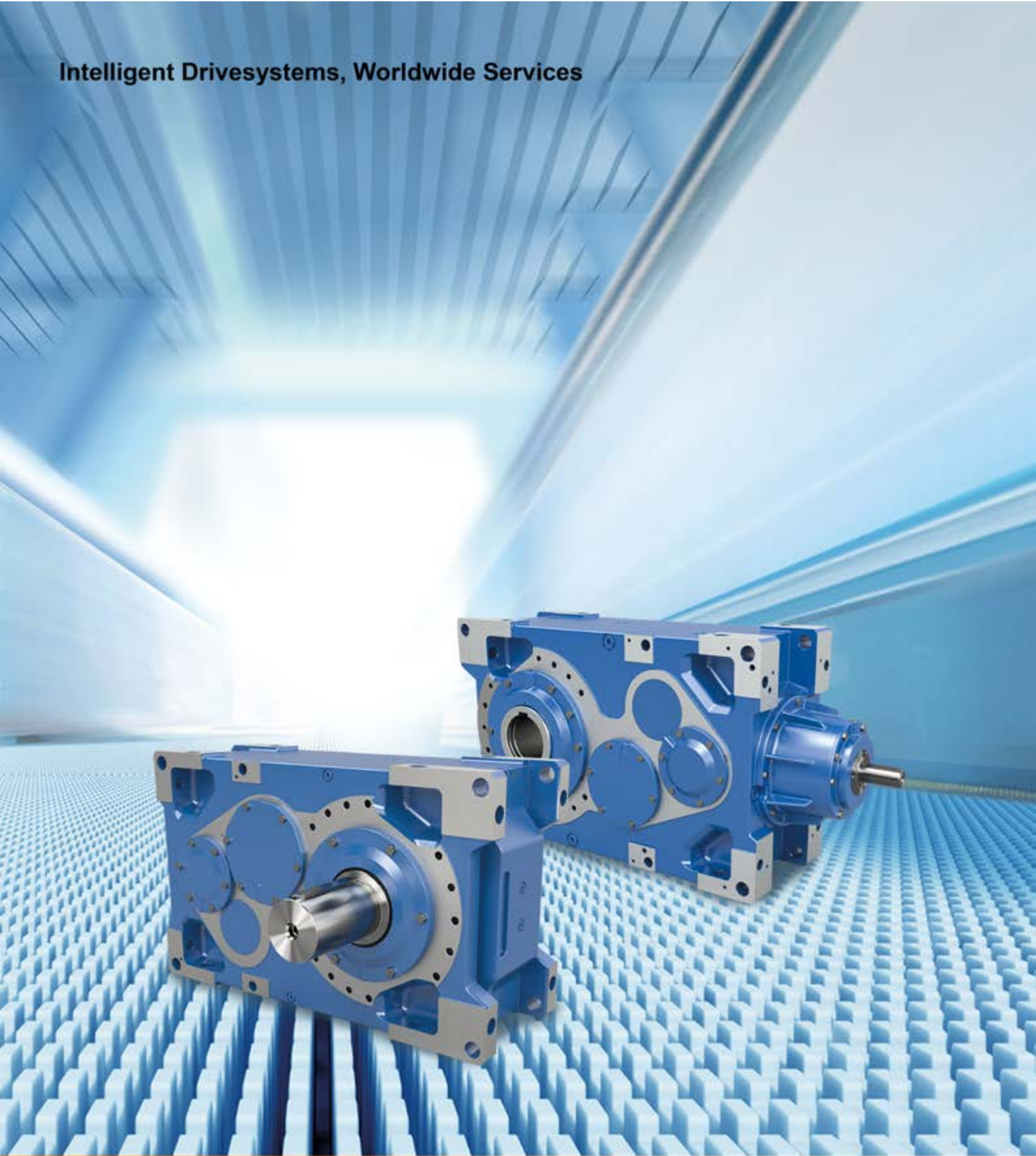


Intelligent Drivesystems, Worldwide Services



EN

B 1050

Industrial gear units

Operating and Assembly Instructions





General safety and operating instructions

1. General

Depending on its protection class, the device may have live, bare, moving or rotating parts or hot surfaces during operation.

Unauthorised removal of covers, improper use, incorrect installation or operation causes a risk of serious personal injury or material damage.

All transport, installation, commissioning and maintenance work must be carried out by qualified specialist personnel (national accident prevention regulations must be observed).

Within the meaning of this basic safety information, qualified specialist personnel are persons who are familiar with the installation, assembly, commissioning and operation of the product and who have the training and experience to recognise and avoid any hazards and risks.

2. Correct use

NORD products may only be used according to the information in the catalogue and the associated technical documentation.

Compliance with the operating and installation instructions is a **prerequisite for fault-free operation** and for the fulfilment of any warranty claims. **These operating and installation instructions must be read** before working with the device!

These operating and installation instructions contain important information about **servicing**. They must therefore be kept **close to the device**.

All details regarding technical data and permissible conditions at the installation site must be complied with.

3. Transport, storage

Information regarding transport, storage and correct handling must be complied with.

4. Installation

The device must be protected against impermissible loads. In particular, during transport and handling, components must not be deformed or changed. Touching of electronic components and contacts must be avoided.

5. Electrical Connection

When working on live three-phase motors, the applicable national accident prevention regulations must be complied with (e.g. BGV A3, formerly VBG 4).

The electrical installation must be implemented according to the applicable regulations (e.g. cable cross-section, fuses, earth lead connections).

Information regarding EMC-compliant installation – such as shielding, earthing and installation of cables – can be found in the three-phase motor documentation. Compliance with the limiting values specified in the EMC regulations is the responsibility of the manufacturer of the system or machine.

6. Operation

Appropriate safety measures must be taken for applications where failure of the device may result in injury.

Where necessary, systems in which NORD devices are installed must be equipped with additional monitoring and protective equipment according to the applicable safety requirements, e.g. legislation concerning technical equipment, accident prevention regulations, etc.

All covers and guards must be kept closed during operation.

7. Maintenance and repairs

After the device has been disconnected from the power supply, live equipment components and power connections should not be touched immediately, because of possible charged capacitors.

Further information can be found in this documentation.

These safety instructions must be kept in a safe place!

Documentation

Name: B 1050
Part No.: 6052902
Series: Industrial gear units
Type series: SK 7207 – SK 15507
Gear unit types: **Industrial gear units**

Version list

Title, Date	Order number	Comments
B 1050, January 2013	6052902 60529 02 / 0213	-
B 1050 September 2014	6052902 6052902 / 3814	General corrections
B 1050, April 2015	6052902 / 1915	General corrections

Table 1: Version list B 1050

Copyright notice

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Any editing or amendment or other utilisation of the document is prohibited.

Publisher

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1 Notes

1.1 General information

Read the Operating Manual carefully prior to performing any work on or putting the gear unit into operation. Strict compliance with the instructions in this Operating Manual is essential. This Operating Manual and all associated special documentation must be kept in the immediate vicinity of the gear unit.

Getriebebau NORD accepts no liability for damage to persons, materials or assets as a result of the non-observance of this Operating Manual, operating errors or incorrect use. General wearing parts, e.g. radial seals are excluded from the warranty.





If additional components are attached to or installed on or in the gear unit (e.g. motor, cooling system, pressure sensor etc.) or components (e.g. cooling system) are supplied with the order, the operating instructions for these components must be observed.

If geared motors are used, compliance with the Motor Operating Manual is also necessary.

If you do not understand the contents of this Operating Manual or additional operating instructions, please consult Getriebebau NORD!

1.2 Safety and information symbols

1.2.1 Explanation of labels used

 DANGER	Indicates an immediate danger, which may result in death or serious injury.
 WARNING	Indicates a possibly dangerous situation, which may result in death or serious injury.
 CAUTION	Indicates a possibly dangerous situation, which may result in slight or minor injuries.
NOTICE	Indicates a possibly harmful situation, which may cause damage to the product or the environment.
 Note	Indicates hints for use and useful information.

1.3 Correct use

These gear units generate a rotational movement and are intended for use in commercial systems. The gear unit must only be used according to the information in the technical documentation from Getriebebau NORD.

Commissioning (start of proper operation) is prohibited until it has been established that the machine complies with the local laws and directives. The EMC Directive 2004/108/EC and the Machinery Directive 2006/42/EC in their currently valid scope of application must be complied with in particular.

 **DANGER!**

Explosion hazard

Serious injury and material damage due to explosion are possible.

Use in explosion hazard areas is prohibited.

 **WARNING**

Injury to persons

Appropriate safety measures must be taken for applications where failure of a gear unit or geared motor may result in injury.

Safeguard a wide area around the hazard zone.

 **WARNING**

Material damage and personal injury

If the gear unit is not used as designed, this may cause damage to the gear unit or the premature failure of components. Personal injury as a result of this cannot be ruled out.

Strict compliance with the technical data on the type plate is essential. The documentation must be observed.

1.4 Safety information

Observe all safety information, including that provided in the individual sections of this Operating Manual. All national and other regulations on safety and accident prevention must also be observed.

DANGER!

Severe personal injury

Serious physical and property damage may result from inappropriate installation, non-designated use, incorrect operation, non-compliance with safety information, unauthorised removal of housing components or safety covers and structural modifications to the gear unit.

- All work, e.g. transportation, storage, installation, electrical connection, commissioning, servicing, maintenance and repair must only be performed by qualified specialist personnel.
- Observe the Operating Manual
- Observe the safety information
- Observe the safety and accident prevention regulations.
- Tighten the drive elements or secure the parallel key before switching on.
- Do not make any structural modifications.
- Do not remove any safety devices.
- If necessary, wear hearing protection when working in the immediate vicinity of the gear unit.
- All rotating components must be provided with guards. In standard cases, covers are fitted by NORD. The covers must always be used if contact protection is not provided by other methods.

DANGER!

Injury to persons

The surfaces of gear units or geared motors may become hot during or shortly after operation. Danger of burns!

- Installation and maintenance work must only be performed when gear unit is at a standstill and has cooled down. The drive must be isolated and secured to prevent accidental start-up.
- Wear protective gloves.
- Shield hot surfaces with contact guards.
- Do not store inflammable objects or substances in the immediate vicinity of the gear unit.

WARNING

Injury to persons

Serious injury and material damage due to improper transport are possible.

- No additional loads may be attached.
- Transportation aids and lifting gear must have an adequate load-bearing capacity.
- Pipes and hoses must be protected from damage.



CAUTION

Injury to persons

Danger of cuts from exterior edges of attachment adapters, flanges and covers.

Contact freezing with metallic components in case of low temperatures.

In addition to personal protective equipment, wear suitable protective gloves and suitable goggles during assembly, commissioning, inspection and maintenance, in order to prevent injuries.

It is recommended that repairs to NORD Products are carried out by the NORD Service department.

1.5 Other documents

Further information may be obtained from the following documents:

- Gear unit catalogues (G1000, G1012, G1014, G1035, G1050, G2000),
- Operating and maintenance instructions for the electric motor,
- if applicable, the Operating Manuals for attached or supplied options

1.6 Disposal

Observe the current local regulations. In particular, lubricants must be collected and disposed of correctly.

Gear unit components	Material
Gear wheels, shafts, rolling bearings, parallel keys, locking rings, ...	Steel
Gear unit housing, housing components, ...	Grey cast iron
Light alloy gear unit housing, light alloy gear unit housing components, ...	Aluminium
Worm gears, bushes, ...	Bronze
Radial seals, sealing caps, rubber components,...	Elastomers with steel
Coupling components	Plastic with steel
Flat seals	Asbestos-free sealing material
Gear oil	Additive mineral oil
Synthetic gear oil (type plate code: CLP PG)	Polyglycol-based lubricants
Cooling spiral, embedding material of the cooling spiral, screw fittings	Copper, epoxy, yellow brass

Table 2: Disposal of materials

2 Description of gear unit

2.1 Type designations and gear unit types

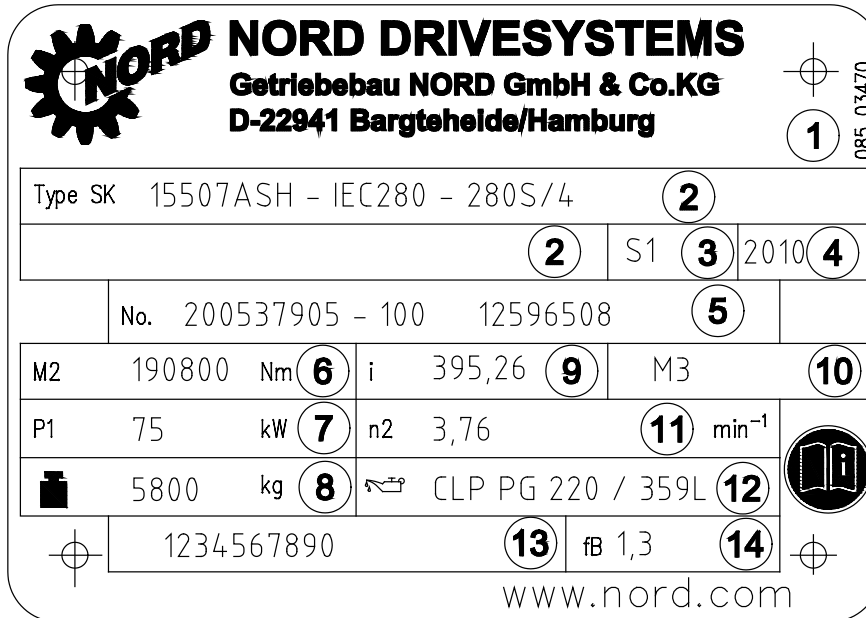
Gear unit types / Type designations					
Helical gear units					
SK 7207, SK 8207, SK 9207, SK 10207, SK 11207, SK 12207, SK 13207, SK 15207 (2-stage) SK 7307, SK 8307, SK 9307, SK 10307, SK 11307, SK 12307, SK 13307, SK 15307(3-stage)					
Bevel helical gear unit					
SK 7407, SK 8407, SK 9407, SK 10407, SK 11407, SK 12407, SK 13407, SK 15407 (3-stage) SK 7507, SK 8507, SK 9507, SK 10507, SK 11507, SK 12507, SK 13507, SK 15507 (4-stage)					
Versions / Options					
-	Foot mounting with solid shaft	IEC	Standard IEC motor mounting	R	Back stop
A	Hollow shaft version	L	Solid shaft both sides	S	Shrink disc
B	Fixing element	LC	Lubricant circulation	V	Solid shaft
CC	Integrated cooling coil	MC	Motor bracket	VL	Reinforced bearings
CS1	Cooling system oil/water	MF..	Motor base frame	VL2	Agitator version
CS2	Cooling system oil/air	...B	with brake	VL3	Drywell agitator version
D	Torque support	...K	with elastic coupling	W	Free input shaft
EA	Hollow shaft with internal spline	...T	with hydrodynamic coupling	W2	Two drive shaft journals
ED	Elastic torque support	MS..	Motor swing base	W3	Three drive shaft journals
EV	Solid shaft with internal spline	...B	with brake	WX	Auxiliary drive unit
EW	Drive shaft with internal spline	...K	with elastic coupling	F	Output flange B5
F	Block flange	...T	with hydrodynamic coupling	G	Rubber buffer
FAN	Fans	MT	Motor mount	6	Viton radial seals
FK	Collar flange	NEMA	Standard NEMA motor attachment	SO1	Synthetic oil ISO VG 220
F1	Drive flange	OA	Oil expansion vessel	DR	Pressure venting
H	Covering cap as contact guard	OH	Oil heater		
		OT	Oil storage tank		

Table 3: Type designations and gear unit types

Double gear units consist of two single gear units. They are to be treated as per the instructions in this Manual, i.e. as two individual gear units.

Type designation for double gear units: e.g. SK 13307 /7282 (consisting of single gear units SK 13307 and SK 7282).

2.2 Type plate



Explanation

- 1 Matrix or bar code
- 2 NORD gear unit type
- 3 Operating mode
- 4 Year of manufacture
- 5 Serial number
- 6 Rated torque of gear unit output shaft
- 7 Drive power
- 8 Weight according to ordered version
- 9 Overall gear unit ratio
- 10 Installation orientation
- 11 Rated speed of gear unit output shaft
- 12 Lubricant type, viscosity and quantity
- 13 Customer's part number
- 14 Operating factor

Fig. 1: Type plate (example) with explanation of the type plate fields

3 Assembly instructions, storage, preparation, installation

Please observe all general safety instructions (please see chapter 1.4 "Safety information"), the safety information in the individual sections and the proper use (please see chapter 1.3 "Correct use").

3.1 Transporting the gear unit



WARNING

Hazard due to heavy loads

Severe injuries and material damage due to falling, swinging or tipping heavy loads are possible.

- To prevent injury, the danger area must be generously cordoned off.
- Standing under the gear unit during transport is **extremely dangerous**.
- Use adequately dimensioned and **suitable means of transportation**. Lifting tackle must be designed for the weight of the gear unit. The weight of the gear unit can be obtained from the dispatch documents.
- If geared motors have an additional eyebolt attached to the motor, this must **not** be used.
- Only the **four ring bolts** provided may be used for transporting the gear unit.



CAUTION

Slipping hazard

Transport damage to the gear unit or gear unit components may result from the leakage of lubricants. There is a slipping hazard due to leaked lubricants.

The drive unit must be inspected and may only be installed if no transportation damage or leaks are visible. In particular the radial seals and the sealing caps must be inspected for damage.

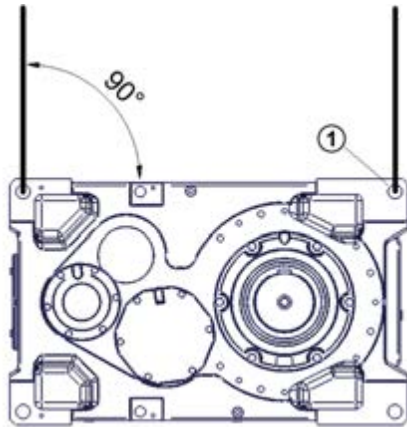
NOTICE

Gear unit damage

Damage to the gear unit due to improper use is possible.

- Prevent damage to the gear unit. Impacts to the free ends of the shafts may cause internal damage to the gear unit.
- The ends of the shafts must not be used for transportation, as this may seriously damage the gear unit.

For additional drive units and components, an additional lifting point may be necessary.

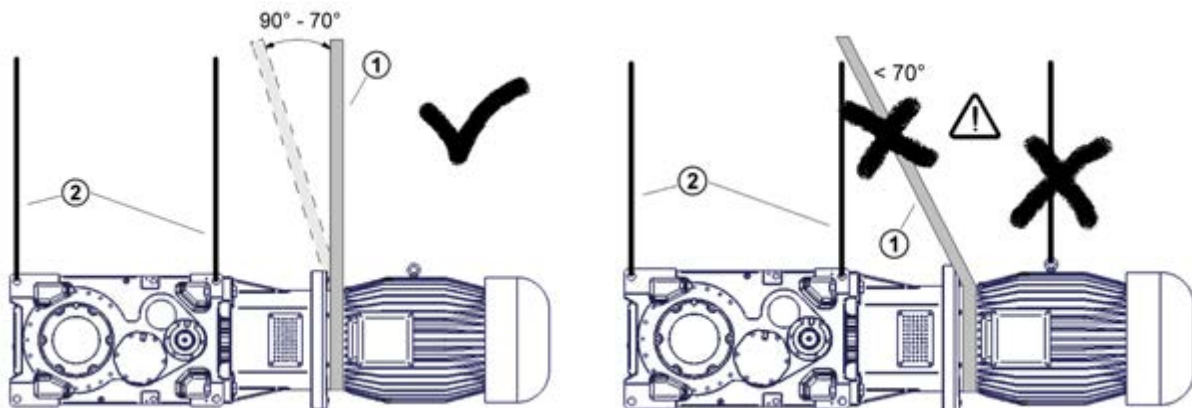


1 Transport eyebolts

Fig. 2: Gear unit lifting points

Gear units with motor adapter

Gear units with a motor adapter may only be transported with lifting ropes and chains or lifting straps at an angle of **90° to 70°** to the horizontal. The ring bolts on the motor must **not** be used for transportation.



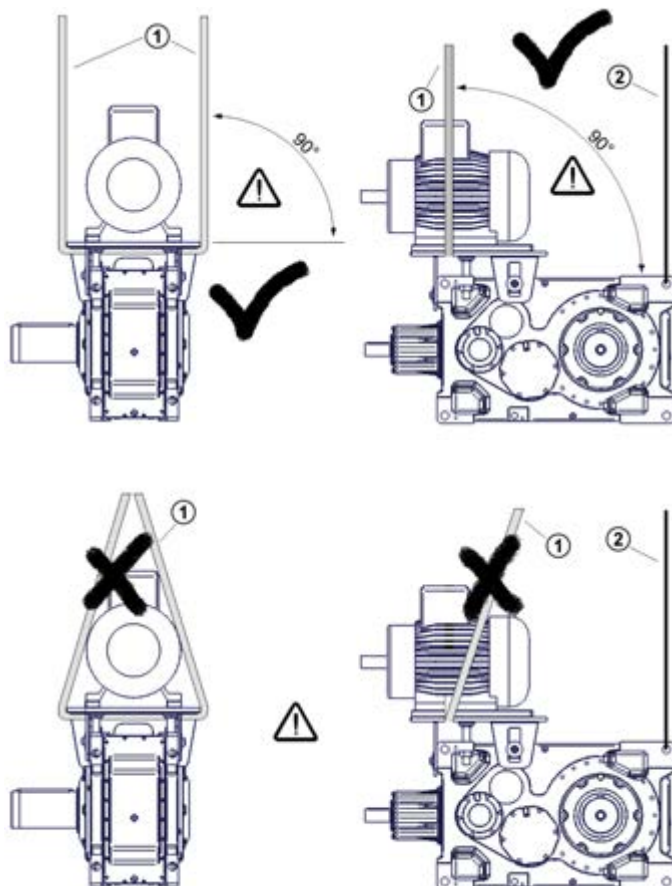
Explanation

1 Lifting strap 2 Lifting rope

Fig. 3: Transport of gear unit with motor

Gear units with V-belt drive

Gear units with V-belt drive must only be transported with lifting straps and lifting ropes at an angle of **90 ° (vertical)**. The ring bolts on the motor must **not** be used for transportation.



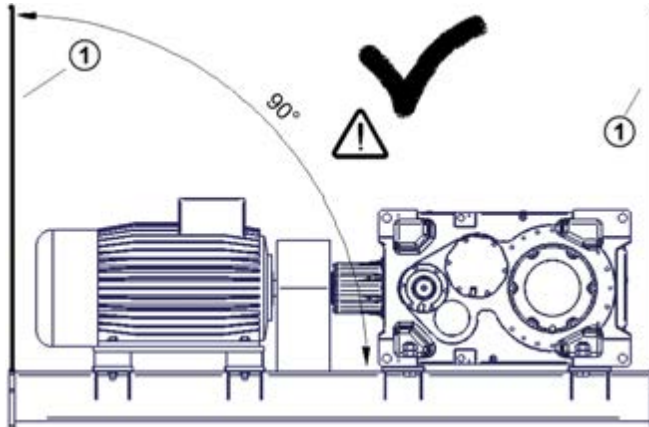
Explanation

- 1 Lifting strap
- 2 Lifting rope

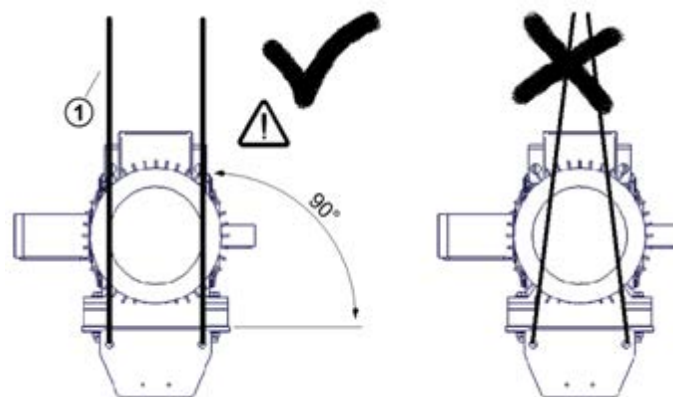
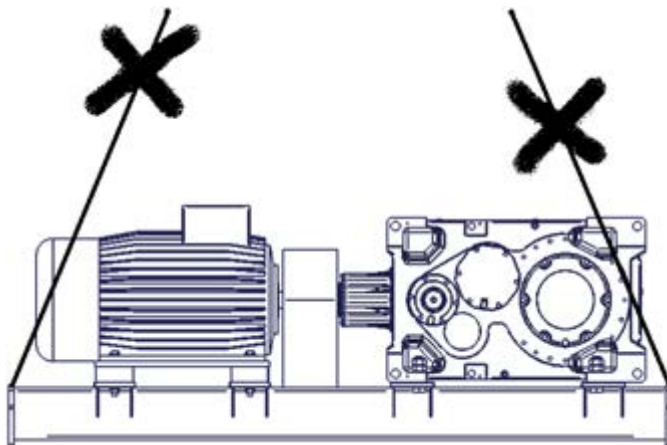
Fig. 4: Transport of gear unit with V-belt drive

Gear units on motor swing base or base frame

Gear units on a motor swing base or base frame must only be transported with **vertically** tensioned lifting ropes or chains. Only use the attachment points on the motor swing base or base frame.



1 Lifting strap



1 Lifting strap

Fig. 5: Transport of gear unit with motor swing base or base frame

3.2 Storage

For short-term storage before commissioning, please observe the following:

Store in the installation position (please see chapter 6.1 "Configurations and maintenance") and secure the gear unit against falling,

- Lightly oil bare metal housing surfaces and shafts
- Store in a dry place.
- Temperature in the range from – 5 °C to + 50 °C without large fluctuations,
- Relative humidity less than 60 %,
- No direct exposure to sunlight or UV light,
- No aggressive, corrosive substances (contaminated air, ozone, gases, solvents, acids, alkalis, salts, radioactivity etc.) in the immediate vicinity,
- No vibration or oscillation

3.3 Long-term storage



CAUTION

Injury to persons

Incorrect, or excessively long storage may result in malfunctions of the gear unit.

Perform an inspection of the gear unit prior to commissioning if the permissible storage time has been exceeded.



Information

Long-term storage

For storage or standstill periods in excess of 9 months, Getriebebau NORD recommends the long-term storage option.

With the long-term storage option and the use of the measures listed below, storage for up to 2 years is possible. As the actual influences on the unit greatly depend on the local conditions, these times should only be regarded as guide values.

Conditions of the gear unit and storage area for long-term storage prior to commissioning:

- Store in the installation position (please see chapter 6.1 "Configurations and maintenance") and secure the gear unit against falling.
- Transportation damage to the external paint must be repaired. Check that a suitable rust inhibitor is applied to the flange bearing surfaces. If necessary apply a suitable rust inhibitor to the surfaces.
- Gear units with the long-term storage option are completely filled with lubricant or have VCI corrosion protection agent mixed with the gear oil (see adhesive label on the gear unit, or are not filled with oil, but rather with small quantities of VCI concentrate.
- The sealing band in the vent plug must not be removed during storage. The gear unit must remain sealed tight.
- Store in a dry place.
- In tropical regions, the gear unit must be protected against damage by insects
- Temperature in the range from – 5 °C to + 40 °C without large fluctuations,
- Relative humidity less than 60 %,
- No direct exposure to sunlight or UV light,
- No aggressive, corrosive substances (contaminated air, ozone, gases, solvents, acids, alkalis, salts, radioactivity etc.) in the immediate vicinity,
- No vibration or oscillation

Measures during storage or standstill periods

- If the relative humidity is <50 % the gear unit can be stored for up to 3 years.

Measures before commissioning

- If the storage or standstill period exceeds 2 years or the temperature during short-term storage has greatly deviated from the standard range, the lubricant in the gear unit must be replaced before commissioning.
- If the gear unit is completely filled, the oil level must be reduced before commissioning.
- For gear units without oil filling, the oil level for the version must be filled before commissioning. The VCI concentrate may remain in the gear unit. Lubricant quantities and types must be filled according to the details on the type plate.

3.4 Preparing for installation



CAUTION

Injury to persons

Transport damage may cause malfunctions of the gear unit, which may cause material damage or personal injury.

Please inspect the delivery for transport and packaging damage immediately on receipt. Report any damage to the carrier immediately. Gear units with transport damage must not be commissioned.

The drive unit must be inspected and may only be installed if no damage is apparent. In particular the radial seals and the sealing caps must be inspected for damage.

Pay attention to leaked lubricants, they may cause slips.

All bare metal surfaces and shafts of the gear unit are protected against corrosion with oil, grease or corrosion protection agents before shipping.

Thoroughly remove all oil, grease or corrosion protection agents and any dirt from the shafts and flange surfaces before assembly.

In applications where an incorrect rotational direction may result in damage or potential risk, the correct rotational direction of the drive shaft is to be established by test running the drive when uncoupled and guaranteeing such for subsequent operation.

Gears with integrated return stops are marked with arrows on the driven/driving sides. The arrows point in the rotation direction of the gear unit. When connecting the motor and during motor control, it must be ensured that the gear unit can only operate in the direction of rotation. (For further explanations see catalogue G1050 and WN 0-000 40)

NOTICE

Gear unit damage

With gear units with an integrated back stop, switching the drive motor to the blocked direction of rotation, i.e. incorrect direction of rotation, may result in damage to the gear unit.

Take care that the direction of rotation is correct.

NOTICE

Gear unit damage

Damage to the gear unit due to aggressive or corrosive environments.

Ensure that no aggressive or corrosive substances are present in the area surrounding the installation site or are subsequently expected during operation, which attack metal, lubricants or elastomers. In case of doubt, please contact Getriebebau NORD and take the recommended action.

Oil expansion tanks (Option OA) must be fitted in accordance with works standard WN 0-530 04. For gear units with an M10x1 vent plug, works standard WN 0-52135 must be also be observed during installation.

Oil storage tanks (Option OT) must be fitted in accordance with the enclosed works standard WN 0-521 30.

3.5 Installing the gear unit



WARNING

Danger of burns

The surfaces of gear units or geared motors may become hot during or shortly after operation. Hot surfaces which can be touched directly must be protected with a contact guard.



WARNING

Injury to persons

If the foundation or the fastening of the gear unit is not adequately dimensioned, the gear unit may detach, fall down or rotate in an uncontrolled manner.

The foundation and the gear unit fastening must be appropriately designed for the weight and the torque. All bolts must be used to fasten the gear unit.

NOTICE

Gear unit damage

The gear unit may be damaged by overheating.

When installing, check that the cooling air from the motor fan can circulate around the geared motor and the gear unit without obstruction.

NOTICE

Gear unit damage

Forces which are introduced due to incorrect installation or deformation may cause premature damage.

The gear unit and the base must be precisely aligned with the drive shaft of the machine in order to prevent additional forces from being imposed on the gear unit due to distortion.

The base and/or flange to which the gear unit is fitted should be vibration-free, torsionally strong and flat. The smoothness of the mating surface on the base or flange must be according to tolerance class K according to DIN ISO 2768-2. All contamination to the bolting surfaces of gear unit and base and/or flange must be thoroughly removed.

The base must be designed according to the weight and torque, taking into account the forces acting on the gear unit. Bases which are insufficiently rigid may lead to radial and axial displacement during operation, which is **not** measurable when the unit is stopped.

When attaching the gear unit to a concrete base using masonry bolts or base blocks, appropriate recesses must be provided in the base. Tensioning bars must be cast into the concrete base in their aligned state.

i Information

Orientation

The service life of shafts, bearings and couplings depends on the precision of alignment of the shaft. Therefore, **zero deviation** should always be aimed for in alignment. For this, e.g. the requirements for the coupling should be obtained from the special Operating Manuals.

The tolerances of the shaft ends and the flange connections should be obtained from the dimension sheet.

NOTICE

Gear unit damage

Bearing damage and damage to the gear teeth due to the passage of electric current.

Welding of the gear unit is prohibited. The gear unit must not be used as the earth connection for welding work.

The gear housing must always be earthed. With geared motors, earthing via the motor connection must be ensured.

The gear unit must be installed in the correct configuration (please see chapter 6.1 "Configurations and maintenance"). All gear unit feet and/or all flange bolts on each side must be used. Bolts must have a minimum quality of 8.8. The bolts must be tightened with the correct torques (please see chapter 6.4 "Torque values"). Tension-free bolting must be ensured, particularly for gear units with a foot and flange.

The oil inspection screws, oil drain screws and the vent valves must be accessible.

3.6 Fitting hubs on the gear shafts

NOTICE

Gear unit damage

The gear unit may be damaged by axial forces.

Do not subject the gear unit to harmful axial forces when fitting the hubs. In particular, do not hit the hubs with a hammer.

Drive and driven elements, e.g. coupling and chain-wheel hubs must be mounted onto the drive and driven shaft of the gear unit using suitable pullers that will not apply damaging axial forces onto the gear unit.

i Information

Assembly

Use the end thread of the shafts for pulling. Fitting can be aided by coating the hub with lubricant or heating it up to approx. 100°C beforehand.

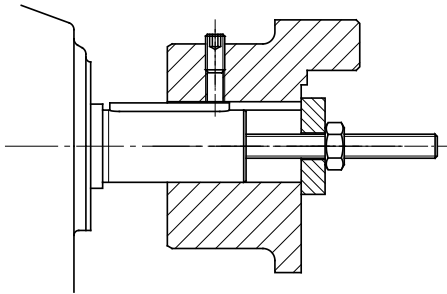


Fig. 6: Example of a simple pulling device

! DANGER!

Severe personal injury

There is a danger of injury due to rapidly rotating drive and driven elements.

Drive and driven elements, such as belt drives, chain drives, shrink disks, fans and couplings must be fitted with contact protection.

Drive and driven elements may only subject the drive unit to the maximum radial forces F_R and axial forces F_A which are specified in the catalogue. Observe the correct tension, particularly on belts and chains.

Additional loads due to unbalanced hubs are not permitted.

The radial force must be applied to the gear unit as closely as possible.

3.7 Fitting push-on gear units

NOTICE

Gear unit damage

The bearings, gear wheels, shafts and housing may be damaged by incorrect fitting.

- Observe the assembly instructions.
- The push-on gear unit must be fitted onto the shaft using a suitable puller, which will not exert damaging axial forces on the gear unit. In particular, do not hit the gear unit with a hammer.

Assembly and subsequent dismantling is aided by applying an anti-corrosive lubricant to the shaft before fitting (e.g. Nord Anti-Corrosion Part No. 089 00099). Excess grease or anti-corrosion agent may escape after assembly and may drip off. Clean these points on the driven shaft after a running-in time of approx. 24 hours. This escape of grease is not due to a leak in the gear unit.

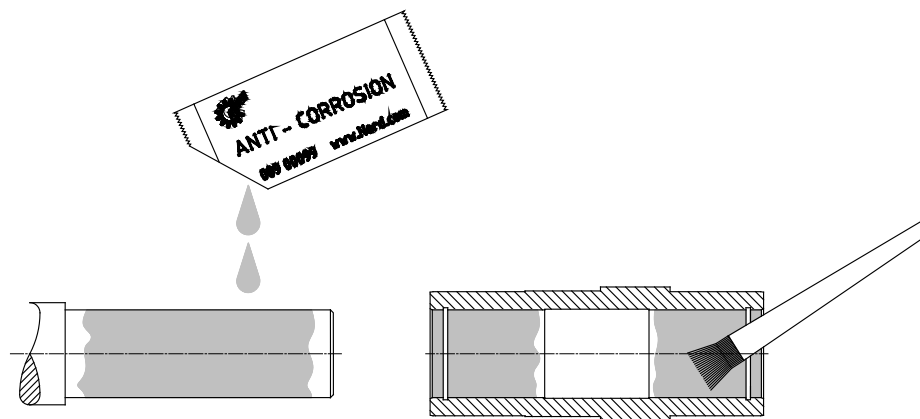


Fig. 7: Applying lubricant to the shaft and the hub

i Information

Fixing element

The gear unit can be fitted to shafts with and without a shoulder using the fastening element (Option B). Tighten the bolt of the fastening element to the correct torque (please see chapter 6.4 "Torque values").

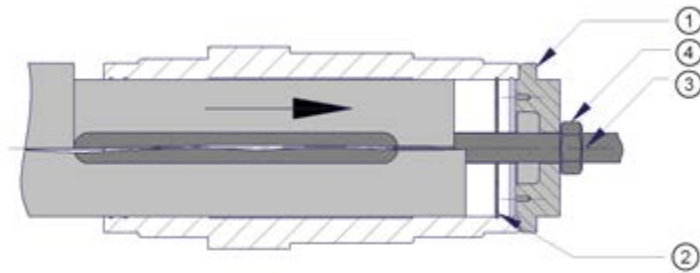
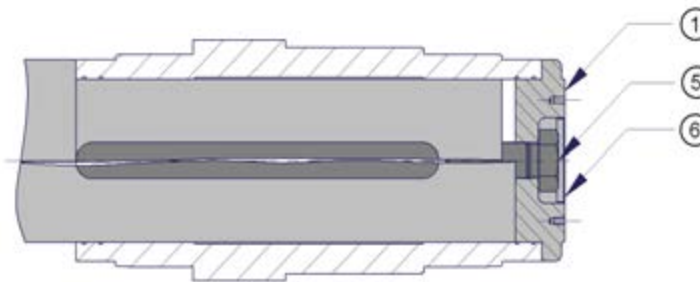


Fig. 8: Assembly



Explanation

- | | |
|---|-----------------------------|
| 1 | Fixing element |
| 2 | Circlip |
| 3 | Assembly – threaded rod |
| 4 | Assembly – threaded nut |
| 5 | Securing screw |
| 6 | Protective cover |
| 7 | Disassembly of threaded rod |
| 8 | Disassembly element |
| 9 | Disassembly – threaded nut |

Fig. 9: Securing

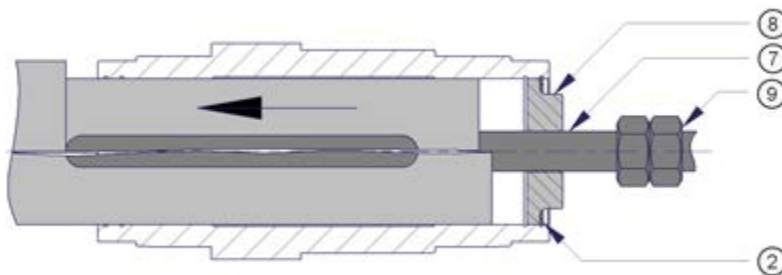


Fig. 10: Dismantling

When assembling push-on gears with torque supports, the support must not be distorted. Distortion-free assembly is made easier if an elastic element (Option DG) is used.

3.8 Torque support

Assembly should be carried out from the side of the machine, in order to reduce the bending moment on the machine shaft. Tension and pressure and installation upwards or downwards are not permissible.

Distortion of the torque support during assembly or operation must be avoided, as otherwise the service life of the output shaft bearings may be reduced. Torque supports are not suitable for the transmission of radial forces, therefore they may only be used in combination with motor adapters or couplings which cannot transmit radial forces.

For helical gear units with motor adapters, the torque support is located opposite to the motor adapter.

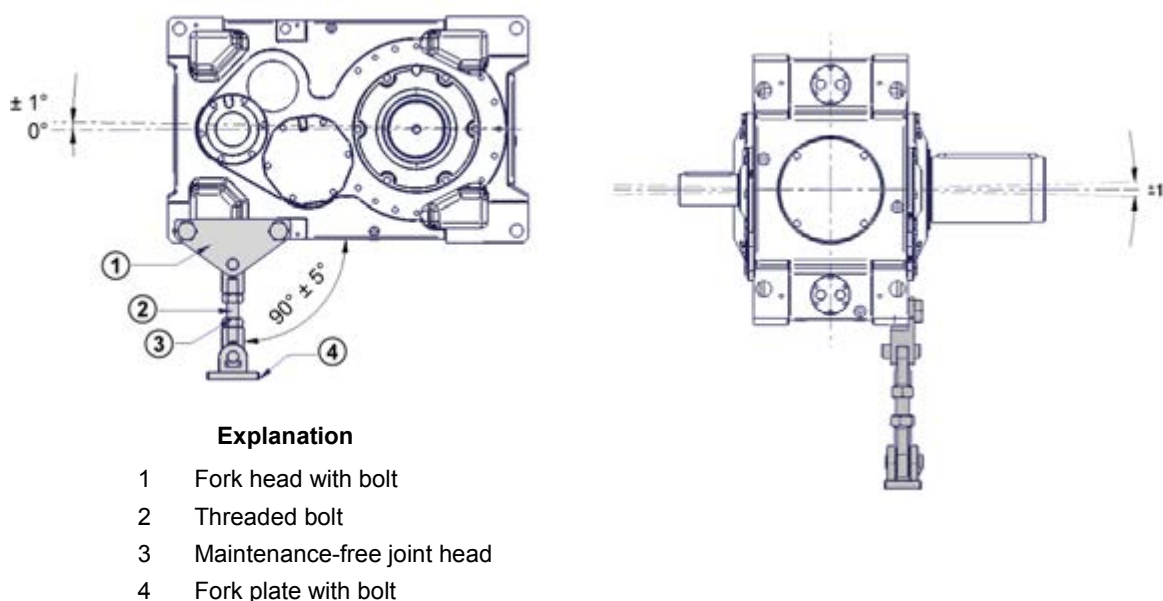


Fig. 11: Permissible deviating installation of the torque support (Option D and ED)

The length of the torque support (Option D) can be adjusted within a certain range.

The gear unit is aligned horizontally by means of the threaded bolt and the nuts of the torque support and secured with lock-nuts.

Tighten the fastenings of the torque support with the correct tightening torques (please see chapter 6.4 "Torque values") and secure against loosening (e.g. Loctite 242, Loxeal 54-03).

The Option ED torque support has an integrated elastic element and cannot be adjusted in length.

3.9 Fitting shrink discs



CAUTION

Danger of crushing

There is a danger of crushing when assembling and disassembling the shrink disk.

The operating instructions for the shrink disc must be observed.

3.10 Installing brakes



WARNING

Injury to persons

The brake is not adjusted at the factory and proper function is not ensured. This may result in severe material damage and personal injury.

Adjust the brake as described in the operating instructions before commissioning. The brake is supplied in the closed condition.

3.11 Fitting the covers



WARNING

Risk of injury

There is a danger of injury due to shrink discs and freely rotating shaft journals.

- Use a cover (Option H) as a guard.
 - If this does not achieve sufficient protection against contact according to the required protection type, the machinery and plant constructor must ensure this by means of special attached components.
-

All fixing screws must be used and tightened to the correct torque (please see chapter 6.4 "Torque values").

3.12 Fitting a standard motor

The maximum permitted motor weights indicated in the table below must not be exceeded when attaching the motor to an IEC- / NEMA adapter:

Maximum permitted motor weights [kg]							
IEC motor size	63	71	80	90	100	112	132
NEMA motor size		56C	143T	145T	182T	184T	210T
Max. motor weight	25	30	40	50	60	80	100
IEC motor size	160	180	200	225	250	280	315
NEMA motor size	250T	280T	324T	326T	365T		
Max. motor weight	200	250	350	500	700	1000	1500
Transnorm	315	355	400	450			
Max. motor weight	1500	2200	3200	4400			

Table 4: Motor weights



WARNING

Risk of injury

Severe injuries may be caused by rapidly rotating parts when installing and servicing couplings.

- Secure the drive unit against accidental switch-on.
- The operating and assembly instructions for the coupling must be observed.

Gear units with IEC adapters must be operated with self-cooling motors compliant with IC411 (TEFC) or externally cooled IC416 (TEBC) motors compliant with EN60034-6 which generate a continuous flow of air in the direction of the gear unit. Please consult NORD if IC410 (TENV) motors without fans are to be used.

Assembly procedure to attach a standard motor to the IEC adapter (Option IEC)/NEMA adapter

1. Clean motor shaft and flange surfaces of motor and adapter and check for damage. The mounting dimensions and tolerances of the motor must conform to DIN EN 50347/NEMA MG1 Part 4.
2. Push the coupling sleeve onto the motor shaft so that the motor parallel key engages into the groove in the sleeve on tightening.
3. Pull the coupling sleeve onto the motor shaft according to the instructions of the motor manufacturer. The shaft end of the motor must be adjusted so that it is parallel with the face of the coupling (see Fig. 12).
4. Secure the coupling half with the threaded pin. Prior to use the threaded pin must be coated with a securing adhesive e.g. Loctite 242, Loxeal 54-03 and tightened to the correct torque (please see chapter 6.4 "Torque values").
5. Sealing of the flange surfaces of the motor and the adapter is recommended if the motor is installed outdoors or in a humid environment. Before the motor is installed, the flange surfaces must be completely coated with surface sealant Loctite 574 or Loxeal 58-14 so that the flange seals after mounting.
6. Mount the motor to the adapter. Do not forget to fit the gear rim or the sleeve.
7. Tighten the bolts of the adapter with the correct torque (please see chapter 6.4 "Torque values").

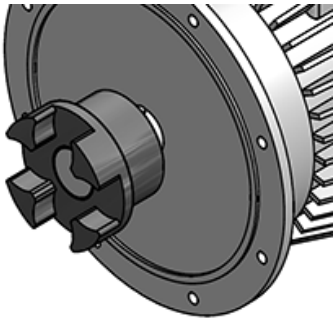


Fig. 12: Fitting the coupling to the motor shaft

3.13 Fitting the cooling coil to the cooling system



WARNING

Risk of injury

Possibility of injury due to pressure discharge.

The pressure released from the cooling circuit before carrying out any work on the gear unit.

For the inlet and outlet of cooling fluid, connections with G ½ pipe thread are located in the casing cover for the fitting of pipes or hoses.

Remove the drain plug from the screw neck prior to assembly to avoid any contamination of the cooling system. The screw necks should be connected with the coolant circuit, which must be provided by the operator. The flow direction of the coolant is irrelevant.

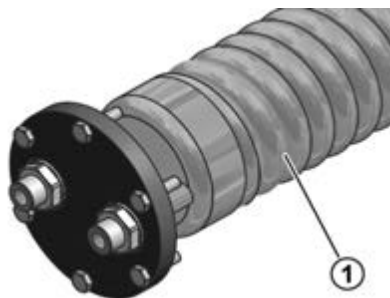
NOTICE

Damage to the device

Make sure not to twist the screw necks during or after assembly as the cooling coil may be damaged.

You must ensure that no external forces act on the cooling coil.

If a volume regulator is fitted upstream of the cooling coil, the connection is extended accordingly. The cooling water must be inlet via the volume regulator. Observe the operating instructions of the volume regulator.



1 Cooling coil

Fig. 13: Cooling cover with cooling coil fitted

3.14 Fitting the external oil / air cooler (cooling unit)

NOTICE

External cooling system

- The separate manufacturer's documentation must be observed for assembly.
- With circulation lubrication (LC) use the connection diagram included by NORD.

Connect the cooling system as shown in the illustration. Other connection plans can be agreed upon during consultation with NORD.

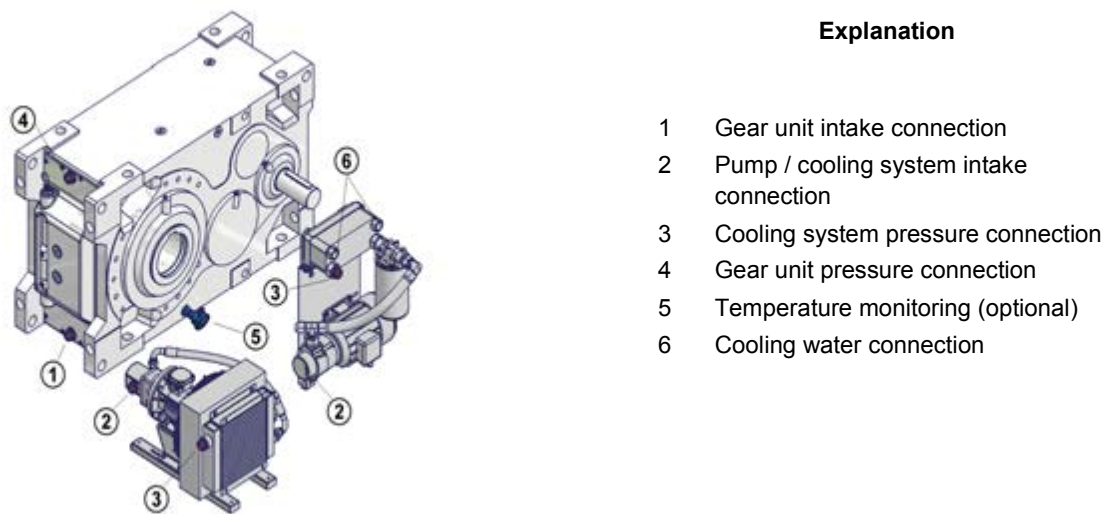


Fig. 14: Industrial gear unit with CS1 and CS2 cooling systems

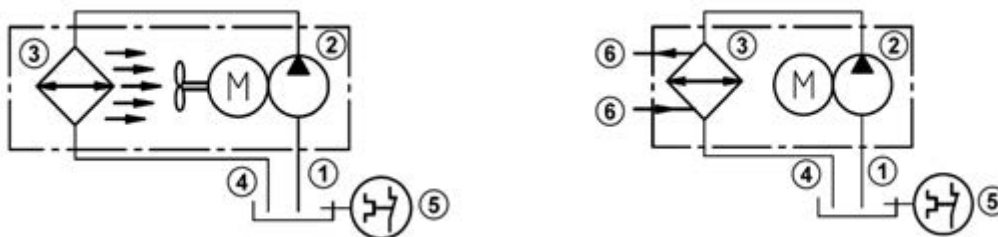


Fig. 15: Hydraulic diagram of the industrial gear unit with CS1 and CS2 cooling systems

3.15 Subsequent paintwork

NOTICE

Damage to the device

For retrospective painting of the gear unit, the radial seals, rubber elements, pressure venting valves, hoses, type plates, adhesive labels and motor coupling components must not come into contact with paints, lacquers or solvents, as otherwise components may be damaged or made illegible.

For subsequent painting, note that for use in Category II2G Group IIC the paint thickness must not exceed 0.2 mm.

4 Commissioning

4.1 Check the oil level

NOTICE

Gear unit damage

The oil level must be checked prior to commissioning (please see chapter 5.2 "Service and Maintenance Work")

4.2 Lubricant cooling with internal water cooler

NOTICE

Gear unit damage

The gear unit may be damaged by overheating.

The drive may only be commissioned after the cooling spiral has been connected to the cooling circuit, and the cooling circuit has been put into operation.

The coolant must have a similar thermal capacity as water (specific thermal capacity at 20 °C $c=4.18 \text{ kJ/kgK}$). Industrial water without any air bubbles or sediments is recommended as a coolant. The hardness of the water must be between 1 dH and 15 dH; the pH value must be between pH 7.4 and pH 9.5. No aggressive liquids may be added to the coolant!

The **coolant pressure** must not exceed **8 bar**. The required **quantity of coolant** is **10 litres/minute**, and the **coolant inlet temperature** must not exceed 40°C; we recommend **10 °C**.

We also recommend fitting a pressure reducer or similar at the coolant inlet to avoid damage due to excessive pressure.

If there is a danger of frost the operator should add a suitable anti-freeze solution to the cooling water.

The **temperature of the cooling water** and the **cooling water flow rate** must be supervised and ensured by the operator.

Information

Thermostat

With a thermostat in the cooling water inlet, the volume of cooling water can be adjusted to the actual requirements.

4.3 Lubricant cooling with external oil / water cooler (cooling unit)

NOTICE

Operating Manual

The operating instructions for the cooling system must be observed.

The unit consists of at least a motor pump, a filter and a heat exchanger. In addition, a pressure switch is usual in order to monitor the pump and therefore the lubrication.

NOTICE

Gear unit damage

The gear unit may be damaged by overheating.

The drive may only be commissioned after the cooling spiral has been connected to the cooling circuit, and the cooling circuit has been put into operation.

i Information

Thermostat

With a thermostat in the cooling water inlet, the volume of cooling water can be adjusted to the actual requirements.

Temperature regulation is provided by means of a thermostat, which is installed in the oil sump of the gear unit.

4.4 Lubricant cooling with external oil / water cooler (cooling unit)

NOTICE

Operating Manual

The operating instructions for the cooling system must be observed.

The unit consists of at least a motor pump, a filter and a heat exchanger. In addition, a pressure switch is usual in order to monitor the pump and therefore the lubrication.

NOTICE

Gear unit damage

The gear unit may be damaged by overheating.

The drive may only be commissioned after the cooling spiral has been connected to the cooling circuit, and the cooling circuit has been put into operation.

An adequate air intake must be ensured. The air inlet grille and the fan blades must be kept clean.

Temperature regulation is provided by means of a thermostat, which is installed in the oil sump of the gear unit.

4.5 Gear unit cooling with a fan

! DANGER!

Severe personal injury

Danger of injury due to rotating fan blades.

- Use a cover as a guard.
- If this does not achieve sufficient protection against contact according to the required protection type, the machinery and plant constructor must ensure this by means of special attached components.
- Wear suitable goggles to prevent eye injuries due to thrown-up particles of dirt.

NOTICE

Overheating

The gear unit may be damaged by overheating.

An adequate air intake must be ensured. The air inlet grille and the fan blades must be kept clean.

NOTICE

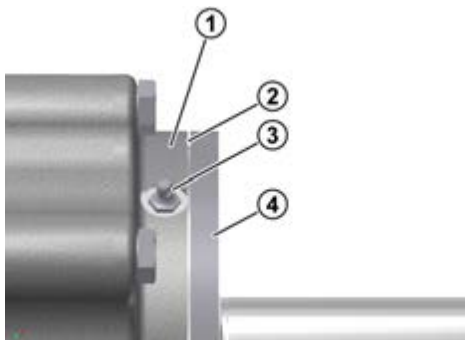
Contact protection

Contact with the fan guard may cause damage to the fan.

Check the contact guard for damage (e.g. due to incorrect transportation or installation). Repair any damage prior to commissioning.

4.6 Checking the Taconite seals

If Taconite seals are installed, check whether there is a gap between the bearing cover plates and that this is filled with grease. Re-greasing is carried out via the M10 x 1 – DIN 71412 conical grease nipple.



Explanation

- | | |
|---|-----------------------|
| 1 | Bearing cover 1 |
| 2 | Grease-filled gap |
| 3 | Conical grease nipple |
| 4 | Bearing cover 2 |

Fig. 16: Testing a Taconite seal

4.7 Pressure safeguard

The pressure monitor is an electric switch, which monitors the lubrication pressure of gear units with circulation lubrication or targeted lubrication. If the pre-set pressure is undershot, the applied electric signal is interrupted by the pressure monitor. Evaluate the signal accordingly.

NOTICE

Gear unit damage

Insufficient lubrication pressure may cause damage to the gear unit

- Connect the pressure monitor so as to be fully functional before starting operation for the first time.
- The pressure monitor can only be used in combination with a monitoring system.

Information

Commissioning

Evaluate the pressure monitor after initially operating the pump, as pressure must be built up.

4.8 Checklist

Checklist		
Subject of check	Date checked:	Information see Section
Is the vent screw screwed in?		3.1
Does the required configuration conform with the actual installation?		6.1
Are the external gear shaft forces within permitted limits (chain tension)?		3.5
Is the torque support correctly fitted?		3.8
Are contact guards fitted to rotating components?		3.11
Is the cooling system connected?		3.13 4.2 4.4
Is a grease-filled gap visible with Taconite seals?		4.6
Has the pressure monitor been functionally connected?		4.7

5 Service and maintenance



WARNING

Danger of burns

The surfaces of gear units or geared motors may become hot during or shortly after operation.

- Installation and maintenance work must only be performed when gear unit is at a standstill and has cooled down. The drive must be isolated and secured to prevent accidental start-up.
- Wear protective gloves.
- Shield hot surfaces with contact guards.

5.1 Service and Maintenance Intervals

Service and Maintenance Intervals	Service and Maintenance Work	Information see Section
At least every six months	<ul style="list-style-type: none"> • Visual inspection • Check for running noises • Check the oil level • Re-grease / remove excess grease • Checking the oil filter • Checking fans for dirt • Re-lubricating the Taconite seals • Clean or replace the (pressure) vent plug or the vent filter 	5.2
For operating temperatures up to 80 °C. every 10000 operating hours, at least every 2 years	<ul style="list-style-type: none"> • Change the oil (The interval is doubled if filled with synthetic products) • Replacing the oil filter • Replace shaft sealing rings if worn 	5.2
Every 20000 operating hours, at least every 4 years	<ul style="list-style-type: none"> • Re-lubrication of the bearings in the gear unit 	5.2
At least every 10 years	<ul style="list-style-type: none"> • General overhaul 	5.2

 Information

Oil change intervals

The oil change intervals apply for normal operating conditions and operating temperatures up to 80°C. The oil change intervals are reduced in the case of extreme conditions (operating temperatures higher than 80°C, high humidity, aggressive environment and frequent fluctuations in the operating temperature).

5.2 Service and Maintenance Work



WARNING

Serious personal injury and material damage

Severe injury and material damage may be caused by incorrect servicing and maintenance work.

Servicing and maintenance work must only be performed by qualified specialist personnel. Wear the necessary protective clothing for servicing and maintenance work (e.g. industrial footwear, protective gloves, goggles, etc.)



WARNING

Severe personal injury

Risk of injury due to rapidly rotating and hot machine components.

Installation and maintenance work must only be performed when gear units are at a standstill and have cooled down. The drive must be isolated and secured to prevent accidental start-up.



WARNING

Severe personal injury

Particles or liquids thrown up during servicing and maintenance can cause injuries.

- Observe the safety information
 - Pressure washers and compressed air must not be used for cleaning.
-



WARNING

Danger of burns

Danger of burns due to hot oil.

- Allow the gear unit to cool down before carrying out maintenance or repair work.
 - Wear protective gloves.
-

Visual inspection

The gear unit must be checked for leaks. In addition, the gear unit must be inspected for external damage and cracks in the hoses, hose connections and rubber buffers. Have the gear unit repaired in case of leaks, e.g. dripping gear oil or cooling water, damage or cracks. Please contact the NORD service department.

Information

Shaft sealing rings

Shaft sealing rings are rubbing seals and have sealing lips made from an elastomer material. These sealing lips are lubricated with a special grease at the factory. This reduces the wear due to their function and ensures a long service life. An oil film in the region of the rubbing sealing lip is therefore normal and is not due to leakage. The section 6.6 "Leaks and seals" provides detailed information about leakage and sealing.

Check for running noises

If the gear unit produces unusual running noises and/or vibrations, this could indicate damage to the gear unit. In this case the gear should be shut down and a general overhaul carried out.

Check the oil level

Section 6.1 "Configurations and maintenance" describes the configurations and the corresponding oil level screws. With double gear units, the oil level must be checked on both units. The vent must be in the position indicated in Section 6.1 "Configurations and maintenance".

The oil level does not need to be checked on gear units without oil level screw (please see chapter 6.1 "Configurations and maintenance").

Gear unit types that are not supplied full of oil must be filled before the oil level is checked.

Check the oil level with an oil temperature of between 20°C to 40°C.

1. Gear units with oil level screw: Unscrew the oil level screw for the particular configuration (please see chapter 6.1 "Configurations and maintenance"). The oil level in the gear unit must be checked and corrected with the correct type of oil if necessary.
2. Gear units with oil inspection glass or oil level glass: The oil level in the gear unit can be seen directly in the viewing window. Correct with the correct type of oil if necessary. The correct oil level is the middle of the inspection glass

3. Gear units with dipstick: The oil level in the gear unit must be between the upper and lower marking when the dipstick is fully screwed in (see Fig. 17). Top up the oil level with the relevant type of oil as necessary.
4. Gear units with an oil reservoir: The oil level must be checked **in the oil reservoir** with the aid of the dipstick plug (thread G1 1/4). The oil level must be between the upper and lower marking when the dipstick is fully screwed in (see Fig. 17). Top up the oil level with the relevant type of oil as necessary. These gear units may only be operated in the configuration stated in Section 6.1 "Configurations and maintenance".
5. The oil level screw or the cap screw with dipstick and all other loosened screws must be correctly re-tightened (please see chapter 6.4 "Torque values").

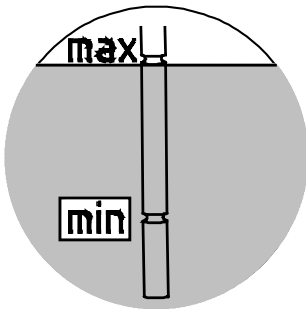


Fig. 17: Checking the oil level with a dipstick

Re-greasing

Some gear unit designs (agitator designs VL2 and VL3) are equipped with a re-greasing device. The outer roller bearing should be re-greased with approx. 20-25 g of grease via the grease nipple provided. Excess grease must be removed from the adapter. Recommended grease: Petamo GHY 133N (please see chapter 6.2 "Lubricants") (Klüber Lubrication).

Checking the oil filter

The oil filters are equipped with a visual or electro-mechanical contamination indicator. If contamination is indicated, the oil filter must be replaced according to the operating instructions for the particular cooling system.

Re-lubricating the Taconite seals

The grease nipples of the Taconite seals must be filled with grease until clean grease emerges from the grease gap. Remove and dispose of escaping grease. Recommended grease: Petamo GHY 133N (please see chapter 6.2 "Lubricants") (Klüber Lubrication).

Information

Optimal re-lubrication is achieved by rotating the gear unit shaft in 45 ° steps when lubricating and pressing in grease until clean grease emerges from the shaft.

Checking fans for dirt

The inlet and outlet openings on the fan cover and the fan wheel must be kept clean.

Before re-commissioning, observe the information in Section 4.4 "Lubricant cooling with external oil / water cooler (cooling unit)".

Clean or replace the (pressure) vent plug or the vent filter

In case of heavy soiling, unscrew the vent plug or vent filter and clean it thoroughly and carry out a function test. If necessary fit a new vent plug or vent filter with a new sealing ring.

Change the oil

The illustrations in Section 6.1 "Configurations and maintenance" show the oil drain screw, the oil level screw and the pressure vent screw (if fitted) for various designs.

Procedure:

1. Place a catchment vessel under the oil drain screw or the oil drain cock.
2. Completely remove oil level screw, screwed sealing plug with dipstick if an oil level tank is being used and oil drain screw.
3. Drain all the oil from the gear unit.
4. If the sealing ring of the oil drain screw or oil level screw is damaged, a new oil level screw must be used or the thread cleaned and coated with securing adhesive, e.g. Loctite 242, Loxeal 54-03 prior to insertion.
5. Support the seal ring, insert the oil drain screw into the hole and tighten to the correct torque (please see chapter 6.4 "Torque values").
6. Using a suitable filling device, refill with oil of the same type through the oil level hole until oil emerges from the oil level hole. (The oil can also be filled through the pressure vent screw or a sealing plug located higher than the oil level). If an oil level vessel is used, fill the oil through the upper inlet (thread G1¼) until the oil level is set as described in Section **Check the oil level**
7. Wait at least 15 minutes, or at least 30 minutes if an oil level tank is used, and then check the oil level. Proceed as described in Section **Check the oil level**.

Replacing the oil filter

The oil filter must be changed according to the operating instructions from the supplier.

Replacing the shaft sealing ring

Once the shaft sealing ring has reached the end of its service life, the oil film in the region of the sealing lip increases and a measurable leakage with dripping oil occurs. **The shaft sealing ring must then be replaced.** The space between the sealing lip and the protective lip must be filled approximately 50 % with grease on fitting (recommended grease: PETAMO GHY 133N). Take care that after fitting, the new shaft sealing ring does not run in the old wear track.

Re-lubricating bearings

For bearings which are not oil-lubricated and whose holes are completely above the oil level, replace the roller bearing grease (recommended grease: PETAMO GHY 133N). Please contact the NORD service department.

General overhaul

For this, the gear unit must be completely dismantled. The following work must be carried out:





- Clean all gear unit components
- Examine all gear unit components for damage
- All damaged components must be replaced
- All roller bearings must be replaced
- Replace back stops if fitted
- Replace all seals, radial seals and Nilos rings
- Replace plastic and elastomer components of the motor coupling

The general overhaul must be carried out by qualified personnel in a specialist workshop with appropriate equipment in observance of national regulations and laws. We recommend that the general overhaul is carried out by the NORD Service department.

6 Appendix

6.1 Configurations and maintenance

Explanation of symbols for the following version illustrations:

	E	Venting	¹⁾	Special oil level
	S	Oil level	²⁾	According to cover assembly
	A	Oil drain	³⁾	Installation position M1 to M6  Page 45, 45

Information

Oil details

The configuration and the position of the oil drain, vent and oil level should be primarily obtained from the dimension sheet. If this does not contain any details, the following details can be used.

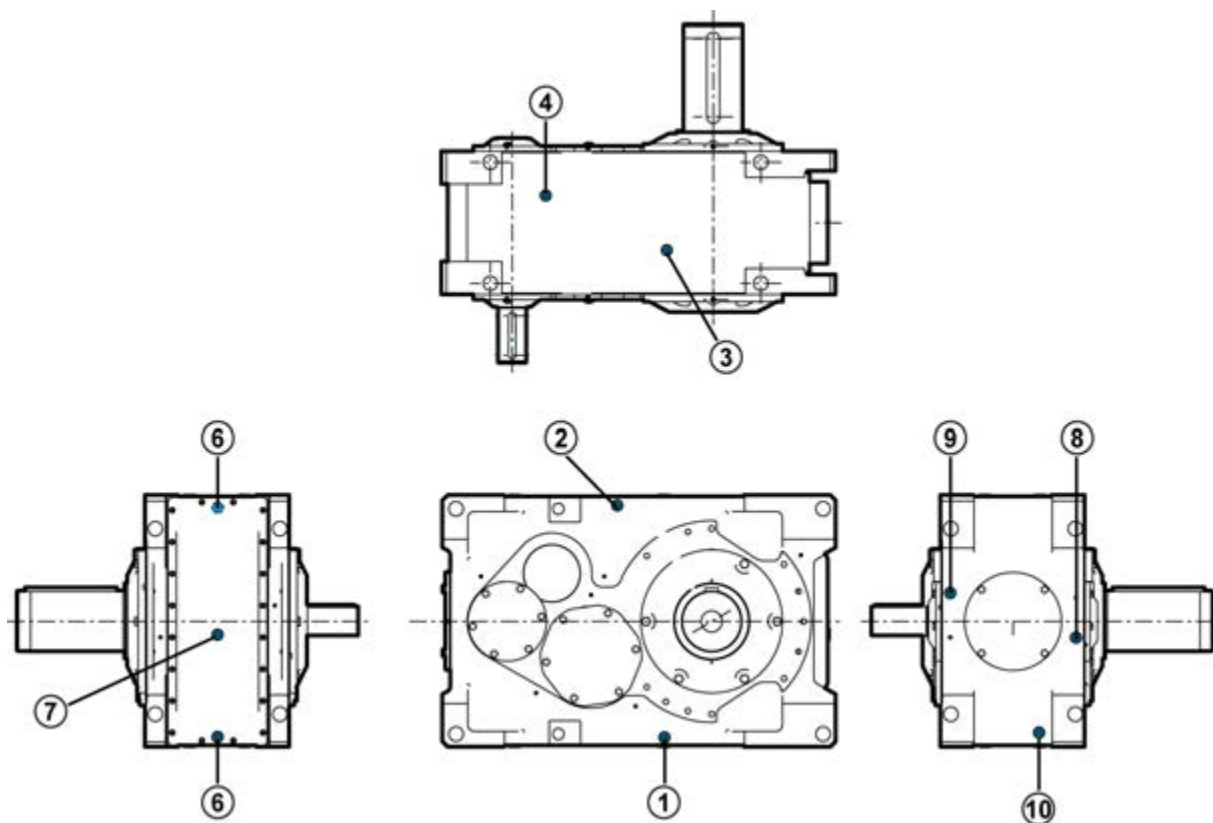


Fig. 18: Position of the oil screws in the gear unit

No.	Explanation	Thread	Installation position ³⁾					
			M1	M2	M3	M4	M5	M6
1	Both sides	G1	A	S ¹⁾	E	S ¹⁾	A / E	A / E
2	Both sides	G1	E	S ¹⁾	A	S ¹⁾	A / E	A / E
3	Both sides	G1	E	S	E	S ¹⁾	S	S ¹⁾
4	Both sides	G1	E	---	E	S	S ¹⁾	S
6	Up or down according to installation – the cover can be rotated	G1	A / E ²⁾		A / E ²⁾	A	S ¹⁾	S ¹⁾
7		G1	S ¹⁾	E	S ¹⁾	A	S ¹⁾	S ¹⁾
8		G1	S	A	S	E	A	E
9		G1	S ¹⁾	A	S ¹⁾	E	E	A
10		G1	A	E	E	A	S ¹⁾	S ¹⁾

Installation orientations for helical gear units

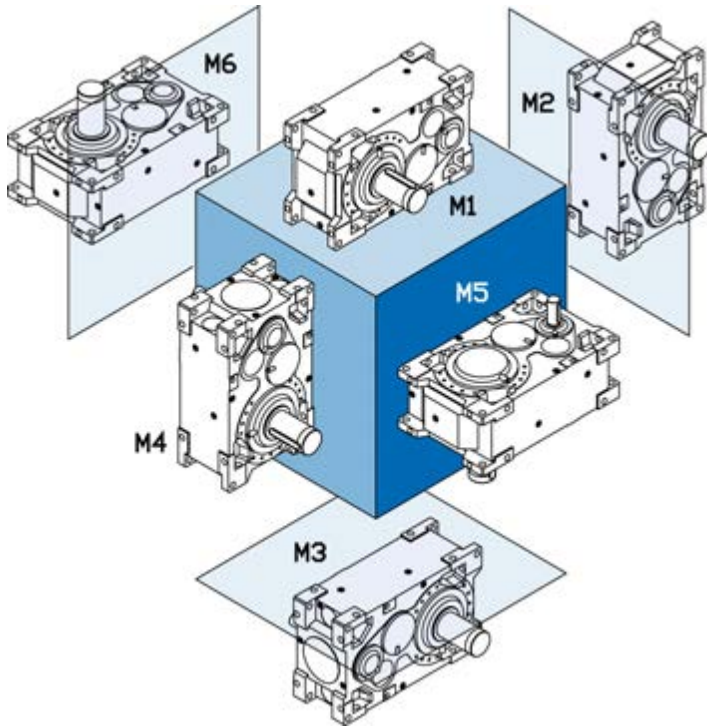


Fig. 19: Installation orientations for helical gear units

Installation orientations for bevel helical gear units

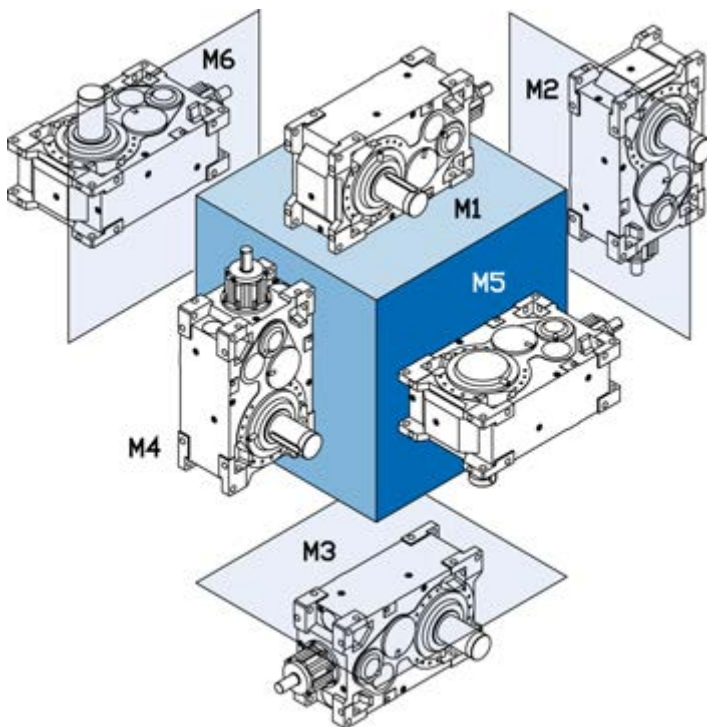


Fig. 20: Installation orientations for bevel helical gear units

6.2 Lubricants

Roller bearing greases

This table shows comparable roller bearing greases from various manufacturers. The manufacturer can be changed for a given grease type. Getriebebau NORD must be contacted in case of change of grease type or ambient temperature range, as otherwise no warranty for the functionality of our gear units can be accepted.







Lubricant type	Ambient temperature						
Mineral oil-based grease	-30 ... 60 °C	Energrease LS 2 Energrease LS-EP 2	Longtime PD 2	RENOLIT GP 2 RENOLIT LZR 2 H	-	Mobilux EP 2	Gadus S2 V100 2
	-50 ... 40 °C	-	Optitemp LG 2	RENOLIT JP 1619	-	-	-
Synthetic grease	-25 ... 80 °C	Energrease SY 2202	Tribol 4747	RENOLIT HLT 2 RENOLIT LST 2	PETAMO GHY 133 N Klüberplex BEM 41-132	Mobiltemp SHC 32	Cassida EPS2
Biodegradable grease	-25 ... 40 °C	Biogrease EP 2	-	PLANTOGEL 2 S	Klüberbio M 72-82	Mobil SHC Grease 102 EAL	Naturelle Grease EP2
Foodstuff compatible grease	-25 ... 40 °C	-	Obeen UF 2	RENOLIT G 7 FG 1	Klübersynth UH1 14-151	Mobilgrease FM 222	Cassida RLS2

Table 5: Roller bearing greases

Lubricant table

This table shows comparable lubricants from various manufacturers. The manufacturer can be changed within a particular viscosity or lubricant type. Getriebbau NORD must be contacted in case of change of viscosity or lubricant type, as otherwise no warranty for the functionality of our gearboxes can be accepted.







Lubricant type	Details on type plate	DIN (ISO) / Ambient temperature						
Mineral oil	CLP 220	ISO VG 220 -10...40°C	Energol GR-XP 220	Alpha SP 220 Alpha MAX 220 Optigear BM 220 Tribol 1100 / 220	Renolin CLP 220 Renolin CLP 220 Plus Gearmaster CLP 220	Klüberoil GEM 1 - 220 N	Mobilgear 600 XP 220 Mobilgear XMP 220	Shell Omala F 220
	CLP 320	ISO VG 320 -10...40°C	Energol GR-XP 320	Alpha SP 320 Alpha MAX 320 Optigear BM 320 Tribol 1100 / 320	Renolin CLP 320 Renolin CLP 320 Plus Gearmaster CLP 320	Klüberoil GEM 1 - 320 N	Mobilgear 600 XP 320 Mobilgear XMP 320	Shell Omala F 320
	CLP 680	ISO VG 680 0...40°C	Energol GR-XP 680	Alpha SP 680 Optigear BM 680 Tribol 1100 / 680	Renolin CLP 680 Renolin CLP 680 Plus Gearmaster CLP 680	Klüberoil GEM 1 - 680 N	Mobilgear 600 XP 680 Mobilgear XMP 680	-
Synthetic oil (Polyglycol)	CLP PG 220	ISO VG 220 -25...40°C	Energyn SG-XP 220	Tribol 1300 / 220	Renolin PG 220 Gearmaster PGP 220	Klübersynth GH 6 - 220	-	Shell Omala S4 WE 220
	CLP PG 320	ISO VG 320 -25...40°C	Energyn SG-XP 320	Tribol 1300 / 320	Renolin PG 320 Gearmaster PGP 320	Klübersynth GH 6 - 320	-	Shell Omala S4 WE 320
	CLP PG 680	ISO VG 680 -20...40°C	Energyn SG-XP 680	Tribol 1300 / 680	Renolin PG 680 Gearmaster PGP 680	Klübersynth GH 6 - 680	-	Shell Omala S4 WE 680
Synthetic oil (hydrocarbons)	CLP HC 220	ISO VG 220 -40...40°C	Energyn EP-XF 220	Optigear Synth X 220 Tribol 1710 / 220	Renolin Unisyn CLP 220 Gearmaster SYN 220	Klübersynth GEM 4 - 220N	Mobil SHC 630	Shell Omala S4 GX 220
	CLP HC 320	ISO VG 320 -25...40°C	Energyn EP-XF 320	Optigear Synth X 320 Tribol 1710 / 320	Renolin Unisyn CLP 320 Gearmaster SYN 320	Klübersynth GEM 4 - 320N	Mobil SHC 632	Shell Omala S4 GX 320
	CLP HC 680	ISO VG 680 -10...40°C	-	Optigear Synth X 680	Renolin Unisyn CLP 680 Gearmaster SYN 680	Klübersynth GEM 4 - 680N	-	Shell Omala S4 GX 680
Bio-degradable oil	CLP E 220	ISO VG 220 -5...40°C	-	Tribol BioTop 1418 / 220	Plantogear 220 S Gearmaster ECO 220	Klübersynth GEM 2 - 220	-	Shell Naturelle Gear Fluid EP 220
	CLP E 320	ISO VG 320 -5...40°C	-	Tribol BioTop 1418 / 320	Plantogear 320 S Gearmaster ECO 320	Klübersynth GEM 2 - 320	-	Shell Naturelle Gear Fluid EP 320
	CLP E 680	ISO VG 680 -5...40°C	-	-	Plantogear 680 S Gearmaster ECO 680	-	-	-
Foodstuff- compatible oil	CLP PG H1 220	ISO VG 220 -25...40°C	-	Optileb GT 220	Cassida Fluid WG 220	Klübersynth UH1 6 - 220	-	-
	CLP PG H1 320	ISO VG 320 -20...40°C	-	Optileb GT 320	Cassida Fluid WG 320	Klübersynth UH1 6 - 320	-	-
	CLP PG H1 680	ISO VG 680 -5...40°C	-	Optileb GT 680	Cassida Fluid WG 680	Klübersynth UH1 6 - 680	-	-

Table 6: Lubricant table

6.3 Lubricant quantities

i Information

Lubricants

After changing the lubricant, and in particular after the initial filling, the oil level may change during the first few hours of operation, as the oil galleries and the hollow spaces only fill gradually during operation. The oil level is still within the permissible tolerance.

If an oil inspection glass is installed at an additional charge, we recommend that the customer corrects the oil level after an operating period of approx. 2 hours, so that when the gear unit is at a standstill and has cooled down, the oil level is visible in the inspection glass. Only then, is it possible to check the oil level by means of the inspection glass.

i Information

Oil fill volumes

The stated filling quantities are for guidance only. The precise quantities vary depending on the exact gear ratio. When filling, the precise quantity must be observed on the oil level indicator.

i Information

Lubricant circulation

The values in brackets apply for circulation lubrication.

Helical gear units



							
	[L]	M1	M2	M3	M4	M5 2)	M6 2)
SK 7207	36	45	36	48	46	46	62
SK 7307	36	45	36	48	46	46	62
SK 8207	44	55	44	59	57	57	76
SK 8307	44	55	44	59	57	57	76
SK 9207	57	71	57	76	74	74	98
SK 9307	57	71	57	76	74	74	98
SK 10207	72	89	72	96	92	92	123
SK 10307	72	89	72	96	92	92	123
SK 11207	105	130 (50)	105	140 (40)	135 (45)	135 (45)	180
SK 11307	105	130 (50)	105	140 (40)	135 (45)	135 (45)	180
SK 12207	116	185 (83)	116	203 (65)	199 (69)	199 (69)	268
SK 12307	116	185 (83)	116	203 (65)	199 (69)	199 (69)	268
SK 13207	154	256 (107)	154	290 (73)	268 (95)	268 (95)	363
SK 13307	154	256 (107)	154	290 (73)	268 (95)	268 (95)	363
SK 15207	358	415 (160)	335	450 (125)	405 (170)	412 (163)	575
SK 15307	358	415 (160)	335	450 (125)	405 (170)	412 (163)	575

Table 7: Lubricant quantities for helical gear units

Bevel helical gear units


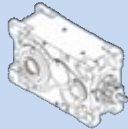
							
	[L]	M1	M2	M3	M4 1)	M5 2)	M6 2)
SK 7407	38	47	38	50	49	50	64
SK 7507	38	47	38	50	49	50	64
SK 8407	47	58	47	62	60	62	79
SK 8507	47	58	47	62	60	62	79
SK 9407	61	75	61	80	78	80	102
SK 9507	61	75	61	80	78	80	102
SK 10407	77	94	77	101	97	101	128
SK 10507	77	94	77	101	97	101	128
SK 11407	112	137 (57)	112	147 (47)	142 (52)	147 (47)	187
SK 11507	112	137 (57)	112	147 (47)	142 (52)	147 (47)	187
SK 12407	126	195 (93)	126	213 (75)	209 (79)	209 (79)	278
SK 12507	126	195 (93)	126	213 (75)	209 (79)	209 (79)	278
SK 13407	168	270 (121)	168	304 (87)	282 (109)	282 (109)	377
SK 13507	168	270 (121)	168	304 (87)	282 (109)	282 (109)	377
SK 15407	382	439 (184)	359	474 (149)	429 (194)	436 (187)	599
SK 15507	382	439 (184)	359	474 (149)	429 (194)	436 (187)	599

Table 8: Lubricant quantities for bevel helical gear units
Explanation of the oil fill quantity tables

The details stated in the table are in litres.

- 1) Circulation lubrication necessary for bevel gear stages
- 2) Oil filling quantity for circulation lubrication
- 3) Poor efficiency, observe heat balance

6.4 Torque values

Dimensions	Bolt Torques [Nm]					
	Screw connections in the strength classes			Cover screws	Threaded pin on coupling	Screw connections on protective covers
	8.8	10.9	12.9			
M4	3.2	5	6	-	-	-
M5	6.4	9	11	-	2	-
M6	11	16	19	-	-	6.4
M8	27	39	46	11	10	11
M10	53	78	91	11	17	27
M12	92	135	155	27	40	53
M16	230	335	390	35	-	92
M20	460	660	770	-	-	230
M24	790	1150	1300	80	-	460
M30	1600	2250	2650	170	-	-
M36	2780	3910	4710	-	-	1600
M42	4470	6290	7540	-	-	-
M48	6140	8640	16610	-	-	-
M56	9840	13850	24130	-	-	-
G½	-	-	-	75	-	-
G¾	-	-	-	110	-	-
G1	-	-	-	190	-	-
G1¼	-	-	-	240	-	-
G1½				300		-

Table 9: Torque values

Assembling the hose fittings

Oil the thread of the union nut, the cutting ring and the screw neck. Tighten the union nut with the wrench until the point where the union nut can only be turned with considerably more force. Turn the union nut of the screw fitting approx. 30° to 60° further but not more than 90°. For this the screw neck must be held with a wrench. Remove excess oil from the screw fitting

6.5 Troubleshooting

WARNING

Injury to persons

There is a slipping hazard in case of leaks.

Clean the soiled floor and machine components before starting troubleshooting.

WARNING

Injury to persons

Risk of injury due to rapidly rotating and hot machine components.

Troubleshooting must only be performed when gear units are at a standstill and have cooled down. The drive must be isolated and secured to prevent accidental start-up.

NOTICE

Gear unit damage

Damage to the gear unit is possible in case of faults.

Shut down the drive unit immediately in case of any faults in the gear unit.

Gear unit malfunctions		
Fault	Possible cause	Remedy
Unusual running noises, vibrations	Oil too low or bearing damage or gear wheel damage	Consult NORD Service
Oil escaping from the gear unit or motor	Defective seal	Consult NORD Service
Oil escaping from pressure vent	Incorrect oil level or incorrect, contaminated oil or unfavourable operating conditions	Oil change: Use oil expansion tank (Option OA)
Gear unit becomes too hot	Unfavourable installation conditions or gear unit damage	Consult NORD Service
Shock when switching on, vibrations	Defective motor coupling or loose gear unit mounting or defective rubber element	Replace elastomer gear rim, tighten motor and gear unit fastening bolts, replace rubber element
Drive shaft does not rotate although motor is running	Fracture in gear unit or defective motor coupling or shrink disc slippage	Consult NORD Service
Pressure at the pressure safeguard is too low	Pump is not delivering any oil or leakage in the piping	Check the pump and the pipes

Table 10: Overview of malfunctions

6.6 Leaks and seals

Gear units are filled with oil or grease to lubricate the moving parts. Seals prevent the escape of lubricants. A complete seal is not technically possible, as a certain film of moisture, for example on the radial shaft sealing rings is normal and advantageous for a long-term seal. In the region of vents, moisture due to oil may be visible due to the escape of oil mist because of the function. In the case of grease-lubricated labyrinth seals, e.g. Taconite sealing systems, used grease emerges from the sealing gap due to the principle of operation. This apparent leak is not a fault.

According to the test conditions as per DIN 3761, the leak is determined by the medium which is to be sealed, which in test bench tests exceeds the function-related moisture in a defined test period and which results in dripping of the medium which is to be sealed. The measured quantity which is then collected is designated as leakage.

Definition of leakage according to DIN 3761 and its appropriate use					
Term	Explanation	Shaft sealing ring	Location of leak		
			in IEC adapter	Housing joint	Venting
Sealed	No moisture apparent	No reason for complaint	No reason for complaint	No reason for complaint	No reason for complaint
Damp	Moisture film locally restricted (not an area)	No reason for complaint	No reason for complaint	No reason for complaint	No reason for complaint
Wet	Moisture film beyond the extent of the component	No reason for complaint	No reason for complaint	Repair if necessary	No reason for complaint
Measurable leakage	Recognisable stream, dripping	Repair recommended	Repair recommended	Repair recommended	Repair recommended
Temporary leakage	Temporary malfunction of the sealing system or oil leak due to transport *)	No reason for complaint	No reason for complaint	Repair if necessary	No reason for complaint
Apparent leakage	Apparent leakage, e.g. due to soiling, sealing systems which can be re-lubricated	No reason for complaint	No reason for complaint	No reason for complaint	No reason for complaint

Table 11: Definition of leaks according to DIN 3761

*) Previous experience has shown that moist or wet radial shaft sealing rings stop leaking later. Therefore, under no circumstances can replacement be recommended at this stage. The reason for momentary moisture may be e.g. small particles under the sealing lip.

6.7 Repair information

For enquiries to our technical and mechanical service departments, please have the precise gear unit type (type plate) and if necessary the order number (type plate) to hand.

6.7.1 Repairs

The device must be sent to the following address if it needs repairing:

Getriebebau NORD GmbH & Co. KG

Service Department

Getriebebau-Nord-Straße 1

22941 Bargteheide

No guarantee can be given for any attachments, such as encoders or external fans, if a gear unit or geared motor is sent for repair.

Please remove all non-original parts from the gear unit or geared motor.

i Information	Reason for return
<p>If possible, the reason for returning the component or device should be stated. If necessary, at least one contact should be stated in case of queries.</p> <p>This is important in order to keep repair times as short and efficient as possible.</p>	

6.7.2 Internet information


In addition, the country-specific operating and installation instructions in the available languages can be found on our Internet site: www.nord.com

6.8 Abbreviations

2D	Dust explosion protected gear units zone 21	FA	Axial force
2G	Explosion protected gear units with ignition protection class "c"	IE1	Motors with standard efficiency
3D	Dust explosion protected gear units zone 22	IE2	Motors with high efficiency
ATEX	AT mospheres EX plosibles	IEC	International Electrotechnical Commission
B5	Flange fastening with through holes	NEMA	National Electrical Manufacturers Association
B14	Flange fastening with threaded holes	IP55	International Protection
CW	Clockwise, right-hand direction of rotation	ISO	International Standardisation Organisation
CCW	Counter-clockwise, left-hand direction of rotation	pH	pH value
°dH	Water hardness in German hardness degrees: 1°dH = 0.1783 mmol/l	PPE	Personal Protective Equipment
DIN	German standards institute	RL	Directive
EC	European Community	VCI	Volatile Corrosion Inhibitor
EN	European standard	WN	Getriebebau NORD factory standard
FR	Radial transverse force		

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